

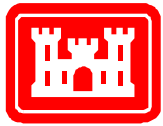
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Albuquerque District

Rio Grande Reservoir Symposium

Federal Perspective - Upper Rio Grande Operations Model and URWOPS Update

April Sanders - Project Manager



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Why are we doing this?

URGWOM

*Upper Rio Grandè Basin
Water Operations Model*

URGWOPS

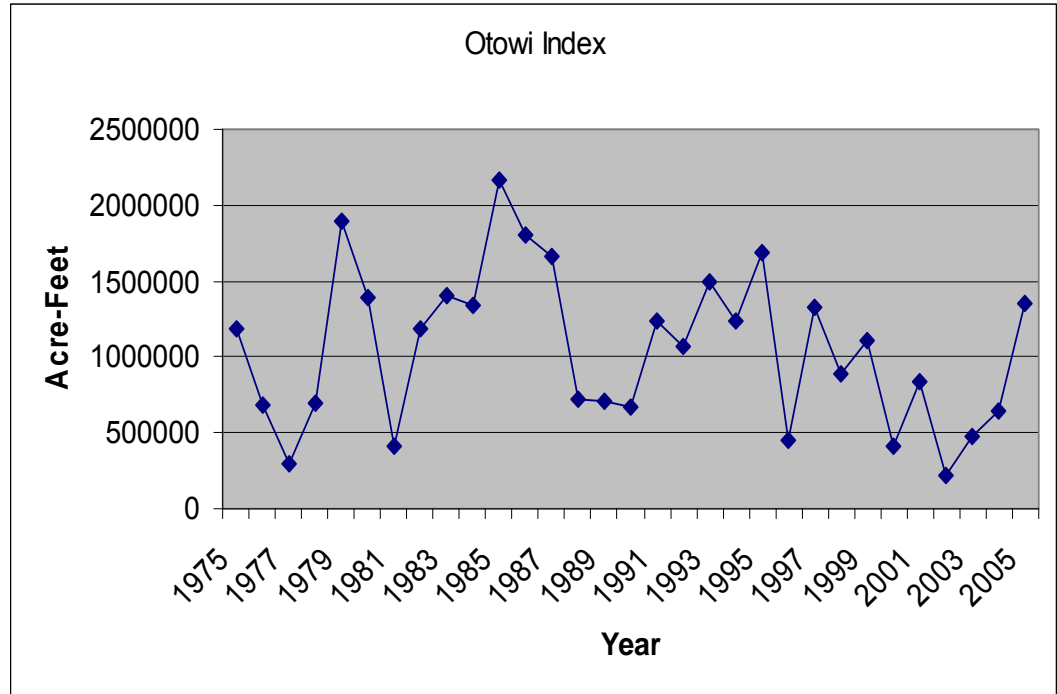
*Upper Rio Grandè Basin Water
Operations Review & EIS*

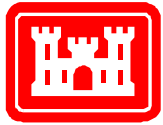


Heron Reservoir
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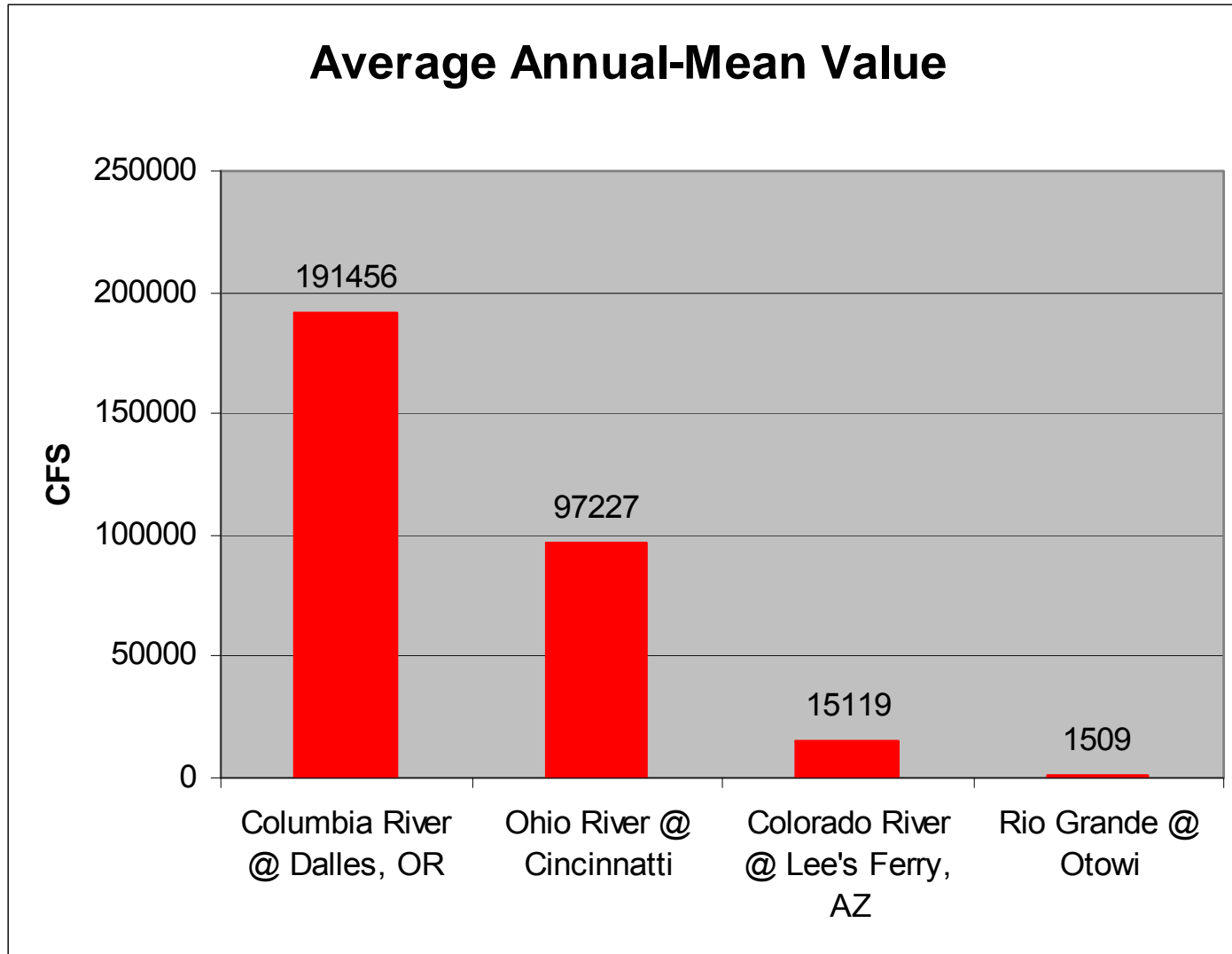
Colorado
New Mexico

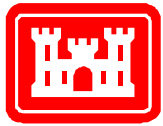
25+ Hydrology Years...





PERSPECTIVE

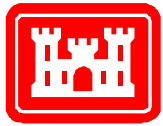




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PHYSICAL SETTING

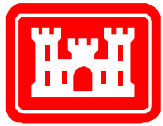
- ✓ It is ~125 desert miles (5-7 days) from Cochiti Dam to San Marcial – lined with thirsty riparians
- ✓ At least 50 cfs must reach San Marcial
- ✓ Open water evaporation, and crop and riparian transpiration (consumption) vary constantly, BUT $\approx 67\%$ of FLOW
- ✓ Over-released water evaporates at a higher rate in lower reservoirs and is unavailable for late season flow support and contract deliveries



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LEGAL/POLITICAL SETTING

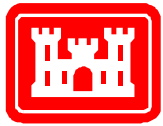
- ✓ **New Mexico water law is based on the Prior Appropriation doctrine – first in time = first right to beneficial use.**
- ✓ **The Rio Grande and its tributaries are over-appropriated and unadjudicated (NO WATER RIGHTS EXIST).**
- ✓ **New Mexico is a member of the Rio Grande Compact with Colorado and Texas – each receive a portion of the Rio Grande flow on an annual basis.**
- ✓ **All waters are the property of the State of New Mexico under the jurisdiction of the State Engineer’s Office.**
- ✓ **Indian Prior and Paramount, contracted water and the BiOp water must be delivered and accounted for.**



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Situation Summary

- ✓ Rio Grande is an ephemeral stream
- ✓ Very little surface water supply relative to the other 17 western states
- ✓ Indian water management and accounting
- ✓ Compact restrictions on storage
- ✓ ESA requirements for surface flow
- ✓ Complex surface water - groundwater
- ✓ Highly variable significant ET depletions



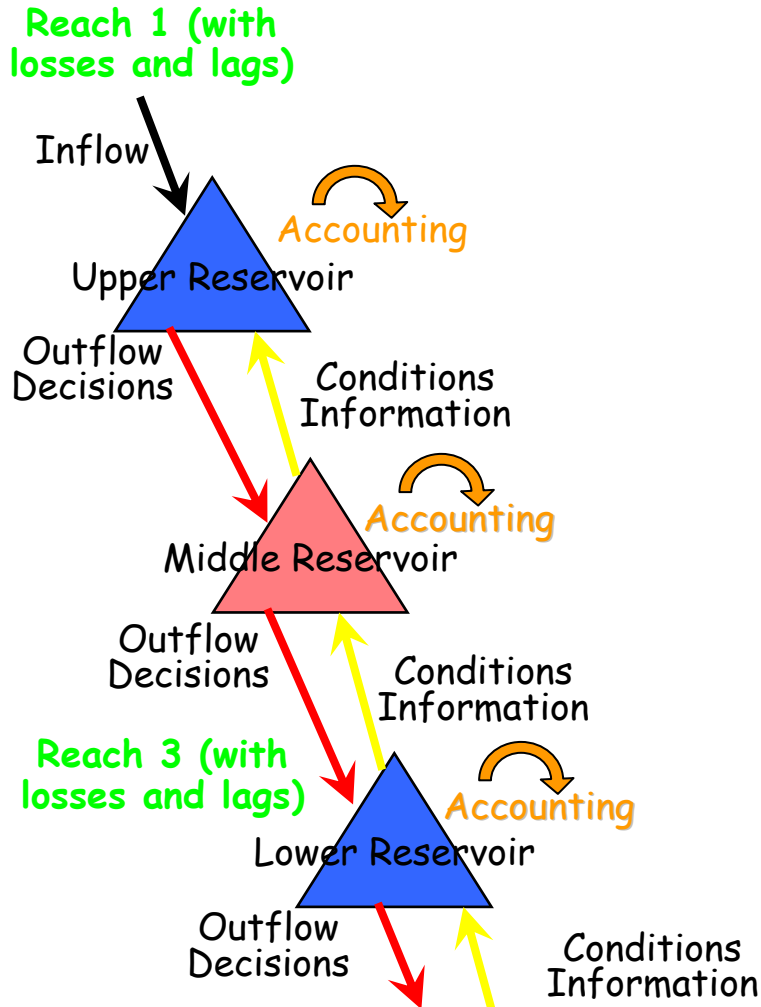
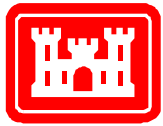
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URGAWOM

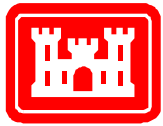
An integrative approach to system-wide modeling...

- Rio Grande modeled with RiverWare™ Software
- Four Daily Time-Step Models: Accounting, Forecasting, Water Operations, & Planning
- Physical modeling, reservoirs, reaches, diversions, etc.
- 16 Accounts of trans-basin water (San Juan-Chama)
- NRCS/NWS coordinated spring-runoff forecasts
- Rio Grande Compact “Lite” helps see Article VII status
- Operational Rules on how to operate reservoirs (releases)

...so more than one model 9



- ✓ Information is shared between reservoirs - they work together
- ✓ All water sources and demands are brought together
- ✓ Predict downstream flows
- ✓ Release decisions are made just as if by water managers
- ✓ Complex accounting included
- ✓ Regulations, policies, preferences, are automatically enacted
- ✓ New ideas can be tried in the model without risking actually doing it
- ✓ Reports are automatic, detailed, and can be customized
- ✓ Tool for Biological Opinion compliance



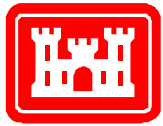
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URGWOPS Scoping Process of Initial Alternatives

- **Proposed operations are within existing authorities**
- **Alternatives are physically possible**
- **Flexibilities identified as follows:**
 - **Heron Reservoir – waivers**
 - **Abiquiu Reservoir – native water storage**
 - **Channel capacities below Abiquiu and Cochiti**
 - **Diversions to the Low Flow Conveyance Channel**
 - **Flood control operations: Elephant Butte & Caballo**
- **Public scoping helped refine alternatives**

Alternatives Screened Against Threshold Criteria

- **Provides safe dam and flood control operations**
- **Meets downstream delivery requirements mandated by the Rio Grande Compact and international treaty with Mexico**
- **Meets contracted water delivery requirements**



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Detailed Analysis of Alternatives: EIS Decision Hierarchy

6 out of 21
alternatives
met threshold
criteria
and were
forwarded
for detailed
analysis

Select Alternative

Meets Ecosystem Needs

Provides Operating Flexibility

Preserves Water Quality

Provides Sediment Management

Preserves Indian Trust Assets

Preserves Cultural Resources

Preserves Desired Land Uses

Preserves Recreational Uses

Alternative is Fair & Equitable

Alternative B-3

Heron Waivers - September 30
Abiquiu Storage - 180,000 AF
Abiquiu Channel Capacity - 1,500 cfs
Cochiti Channel Capacity - 8,500 cfs

Alternative D-3

Heron Waivers - August 31
Abiquiu Storage - 180,000 AF
Abiquiu Channel Capacity - 2,000 cfs

Alternative E-3

Heron Waivers - September 30
Abiquiu Storage - 180,000 AF
Cochiti Channel Capacity - 10,000 cfs

Alternative I-1

Abiquiu Storage - 20,000 AF
LFCC Diversion - 0 to 500 cfs

Alternative I-2

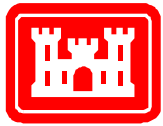
Abiquiu Storage - 75,000 AF
LFCC Diversion - 0 to 1,000 cfs

Alternative I-3

Abiquiu Storage - 180,000 AF

**No
Action**

Heron Waivers - April 30
Abiquiu Storage - 0 AF
Abiquiu Channel Capacity - 1,800 cfs
Cochiti Channel Capacity - 7,000 cfs
LFCC Diversions - 0 - 2,000 cfs
Elephant Butte/Caballo - Improved Coordination
Improved Communications



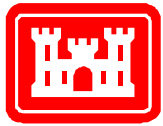
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Native Storage at Abiquiu Reservoir

The water operations team looked at the feasibility of storing native water in various amounts ranging from 20,000 af to 200,000 af.

The proposed action is for storage of native flow during the spring runoff period. Storage would be limited by the amount of storage available that is not being used for San Juan-Chama water. The water would be stored when native flow exceed downstream demands and when New Mexico is in compliance with the Rio Grande Compact.

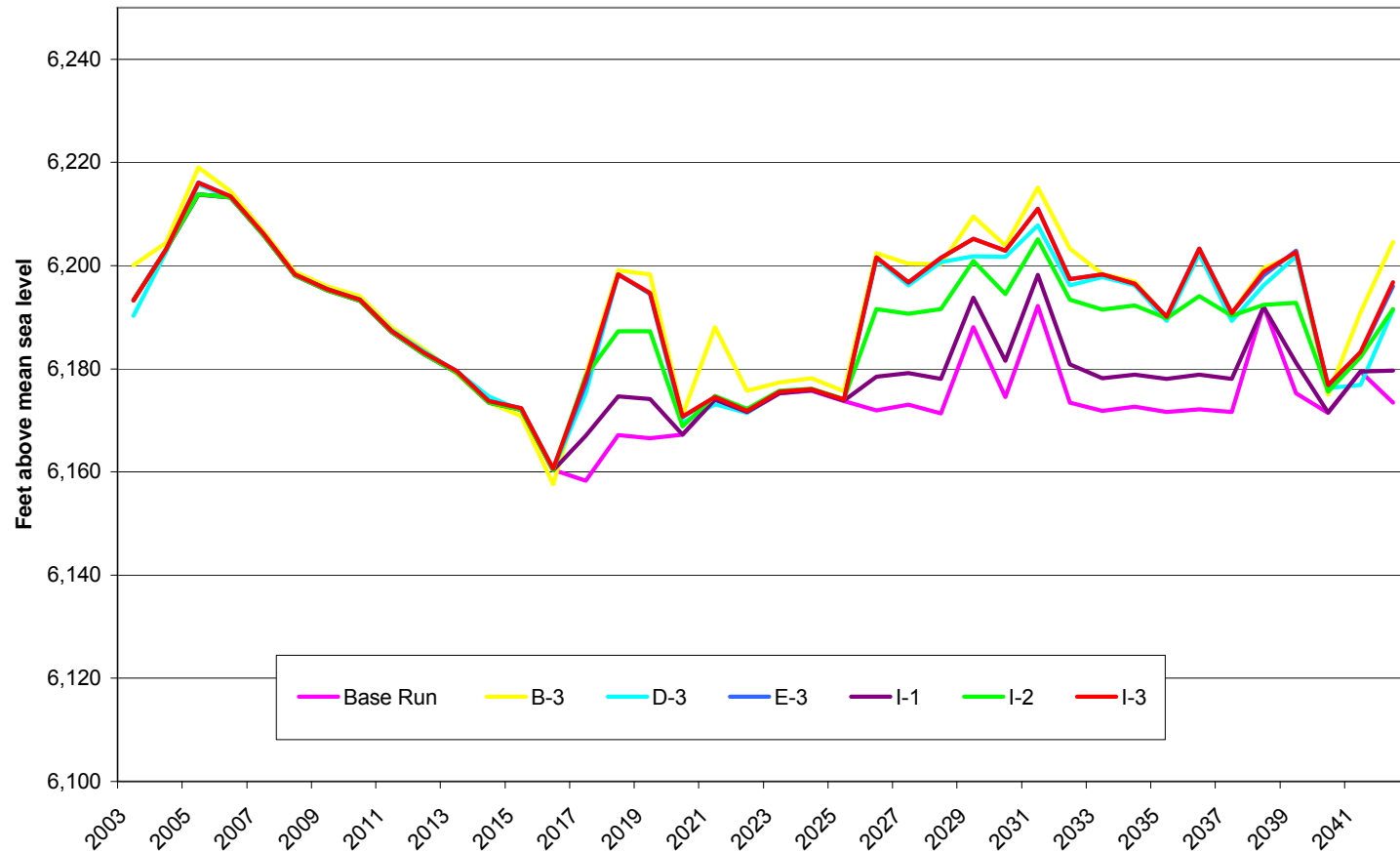
Combined SJ-C and native water cannot exceed elevation 6220 feet.

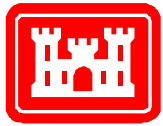


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Native Storage at Abiquiu Reservoir

Abiquiu Average Annual Pool Elevation (Model Year 1-40)





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Abiquiu Storage Evaluation

Activities evaluated for fatal flaws:

Meet irrigation demands

SJ-C deliveries met

Minimize flood damages

Pool elevations don't impact rafting take-out

May reduce peak discharge below Abiquiu

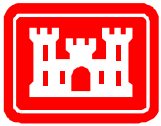
Reduction in channel capacity

Sediment transport

Spawning flows

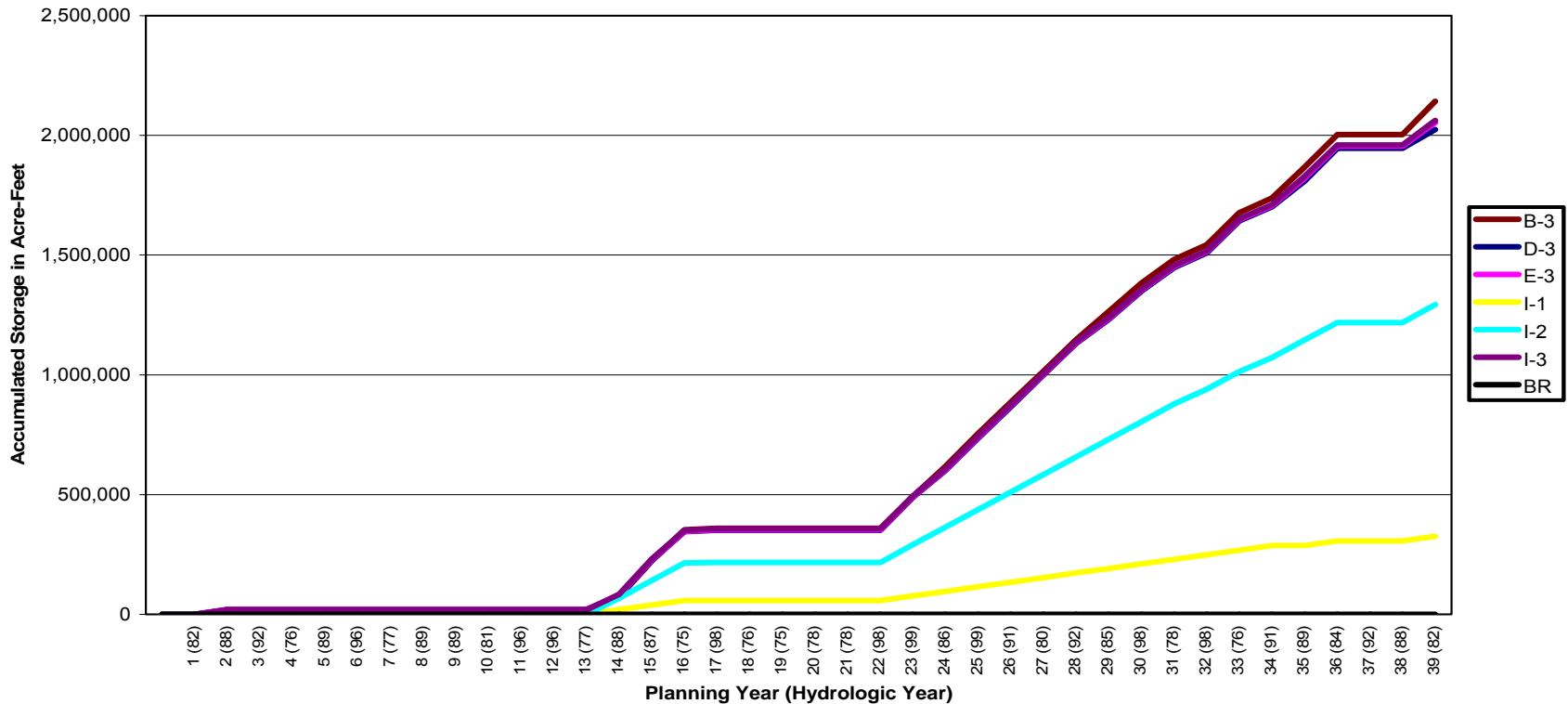
Bank erosion

Carry-over storage at Cochiti

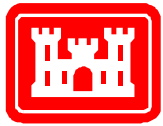


Abiquiu Storage Evaluation

Alternatives: Cumulative Annual Abiquiu Conservation Storage
Cumulative Storage based on Annual July 1 Conservation Storage



Accumulated conservation storage over the 40-year model runs. Alternative B-3 has the most and I-1 with the least. The difference between alternatives B-3, D-3, E-3 and I-3 is relative small over the 40-years.



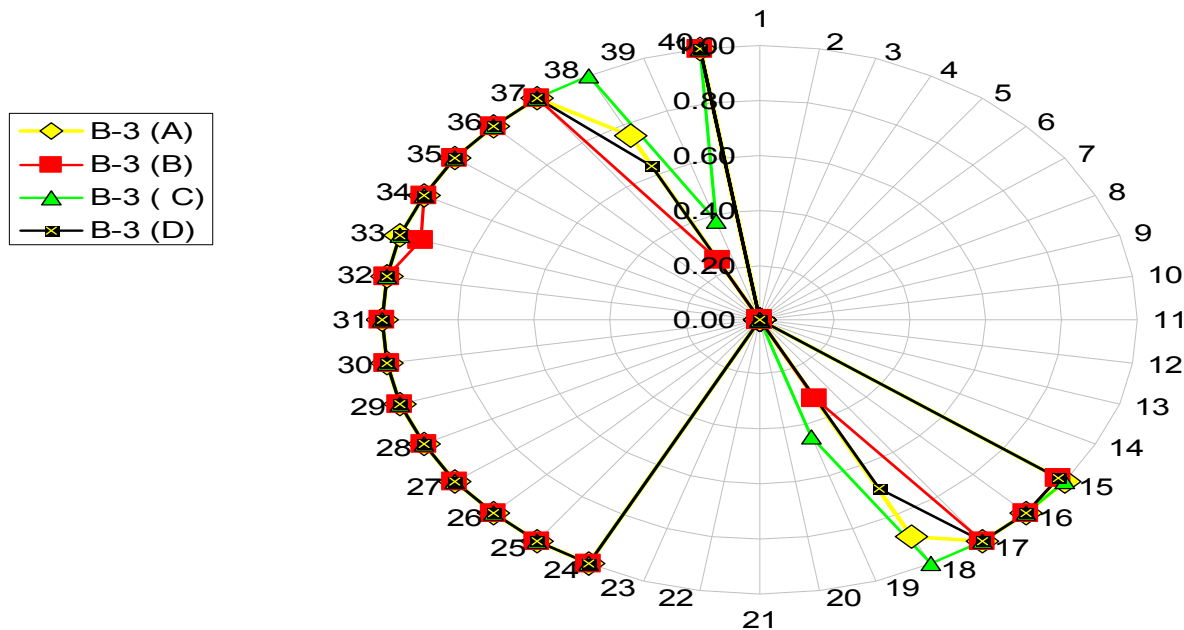
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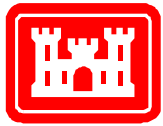
Conservation Storage and carryover provisions

Alternative B3 provided gains in fish habitat area using native conservation storage water to meet flow targets. Additional flexibility under B3 was analyzed by allowing certain carryover amounts from the previous years, assisting in meeting flow targets under dryer conditions.

Conservation Storage - Alternative B-3

A = 40KAF/25%CO B=75KAF/25%CO
C=40KAF/50%CO D=75KAF/50%CO





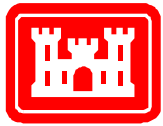
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Conservation Storage Results

A frequency analysis of conservation storage in Abiquiu Reservoir conducted over the 40-year planning period for all action alternatives indicates that the **opportunity to store conservation water would occur 21 of 40 years and opportunities to store more than 100,000 AF would occur about 35 percent of the time.**

Native conservation storage was identified as water that could possibly be stored and used for the benefit of endangered species, ecosystem management, Compact deliveries, etc.

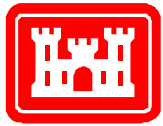
Specifics regarding the release, year-to-year carryover, and other use of this water remain to be defined by specific agreement for storage in Abiquiu. The Corps anticipates , based on the Record of Decision for this EIS, taking the federal lead in pursuing a process for native storage in Abiquiu.



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Actions identified outside of the EIS Scope

- ✓ Greater utilization of Abiquiu Reservoir (wet water bank)
- ✓ Coordinate water supply operations at Elephant Butte and Caballo Reservoirs with the Middle Rio Grande
- ✓ Storage of native water at Heron Reservoir
- ✓ Use of Cochiti Lake for other than Authorized purposes
- ✓ Use of Jemez Canyon Dam for other than Authorized purposes



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Questions?

