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2022



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27TH CONGRESS
90TH ANNUAL
MEETING



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ANNUELLE



Committee G Environment –

Case studies involving planning, construction and operation of dams demonstrating environmental and social benefits

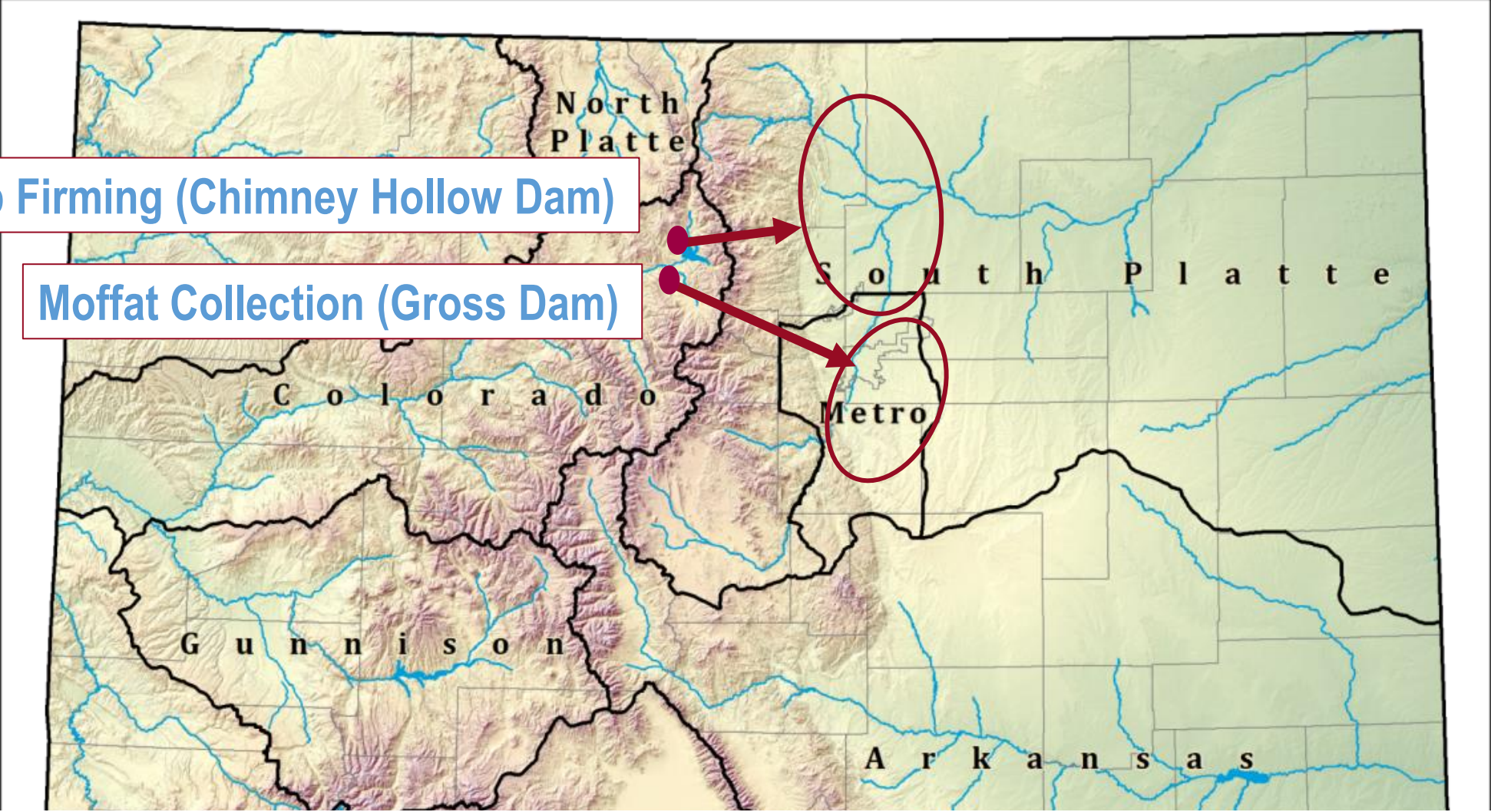
Gross Dam and Reservoir Project

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Blaine Dwyer – HDR Engineering



Windy Gap Firming (Chimney Hollow Dam)

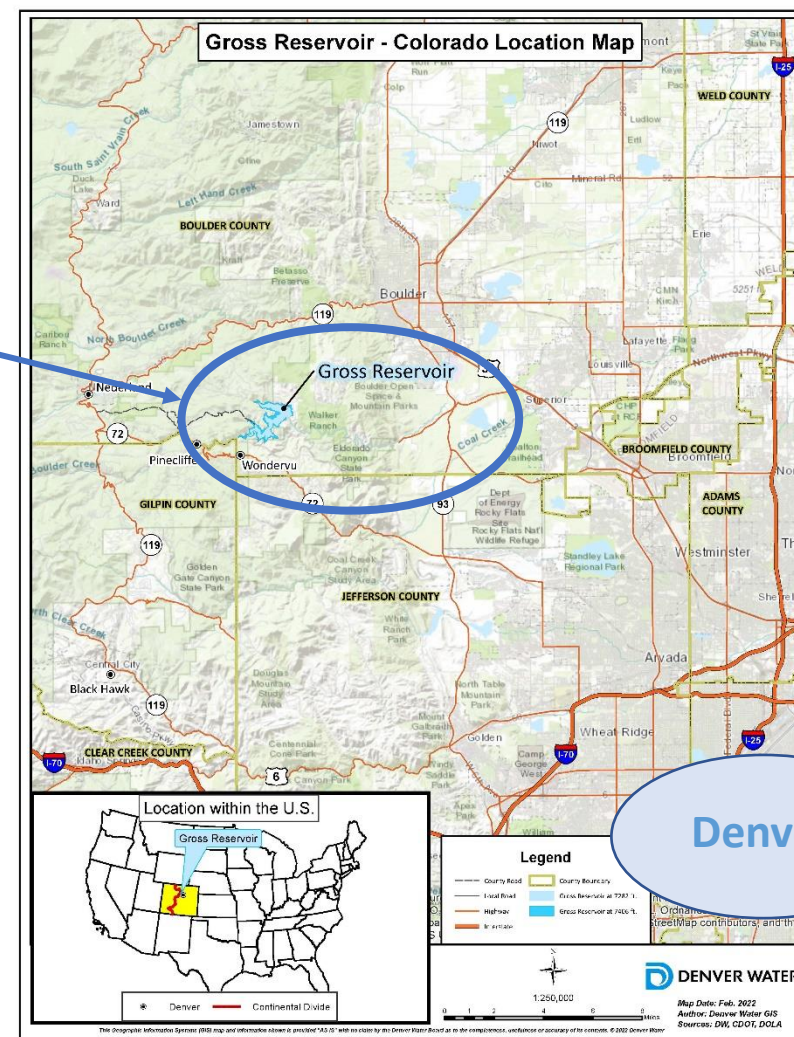
Moffat Collection (Gross Dam)



The Problem

- Gross Dam constructed in the early 1950s.
- Captures water from both sides of the Continental Divide
- Critical part of Denver Water's infrastructure - is on north side – 90% of Denver's storage is on the south side

Water from the
Colorado River
basin



Addresses Vulnerability and Provides Resiliency

- 2002 drought, fire (Colorado's largest to that time), sediment and debris showed vulnerability
- 80% of Denver's supply is brought into the system at Strontia Springs Reservoir
- ***Need more storage – and it needs to be on the North side!***



Figure 3: Strontia Springs



Existing Dam

- On South Boulder Creek
- 340 feet (104 meters) high
- Impounds 42,000 acre-feet (52 MCM)

Dam and Reservoir Enlargement

- Raise the dam 131 feet (40 meters) to 471 feet (144 meters)
- Nearly triple the reservoir capacity – to 119,000 acre-feet (147 MCM)

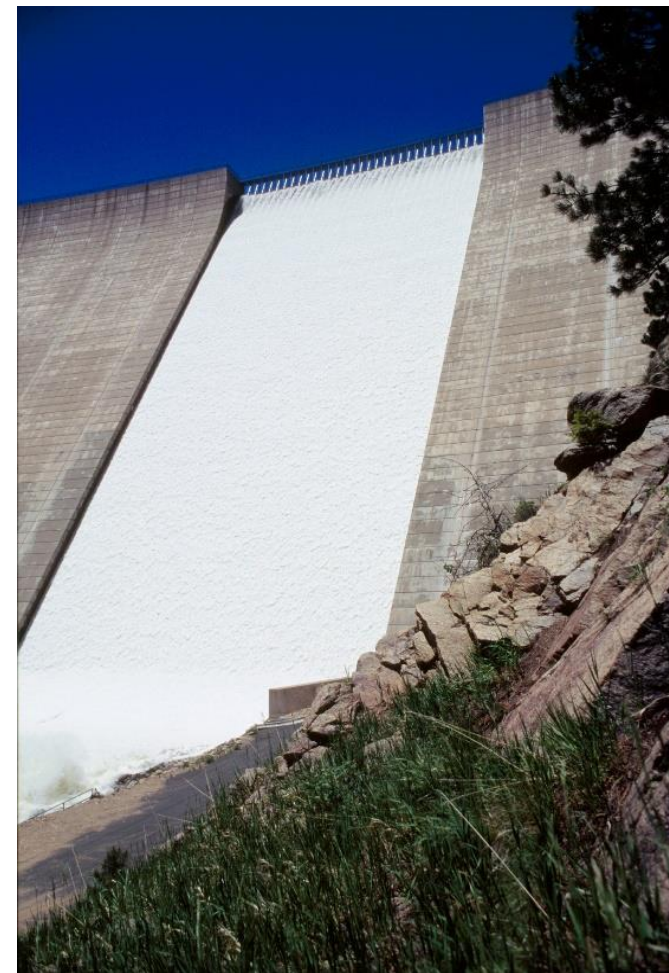
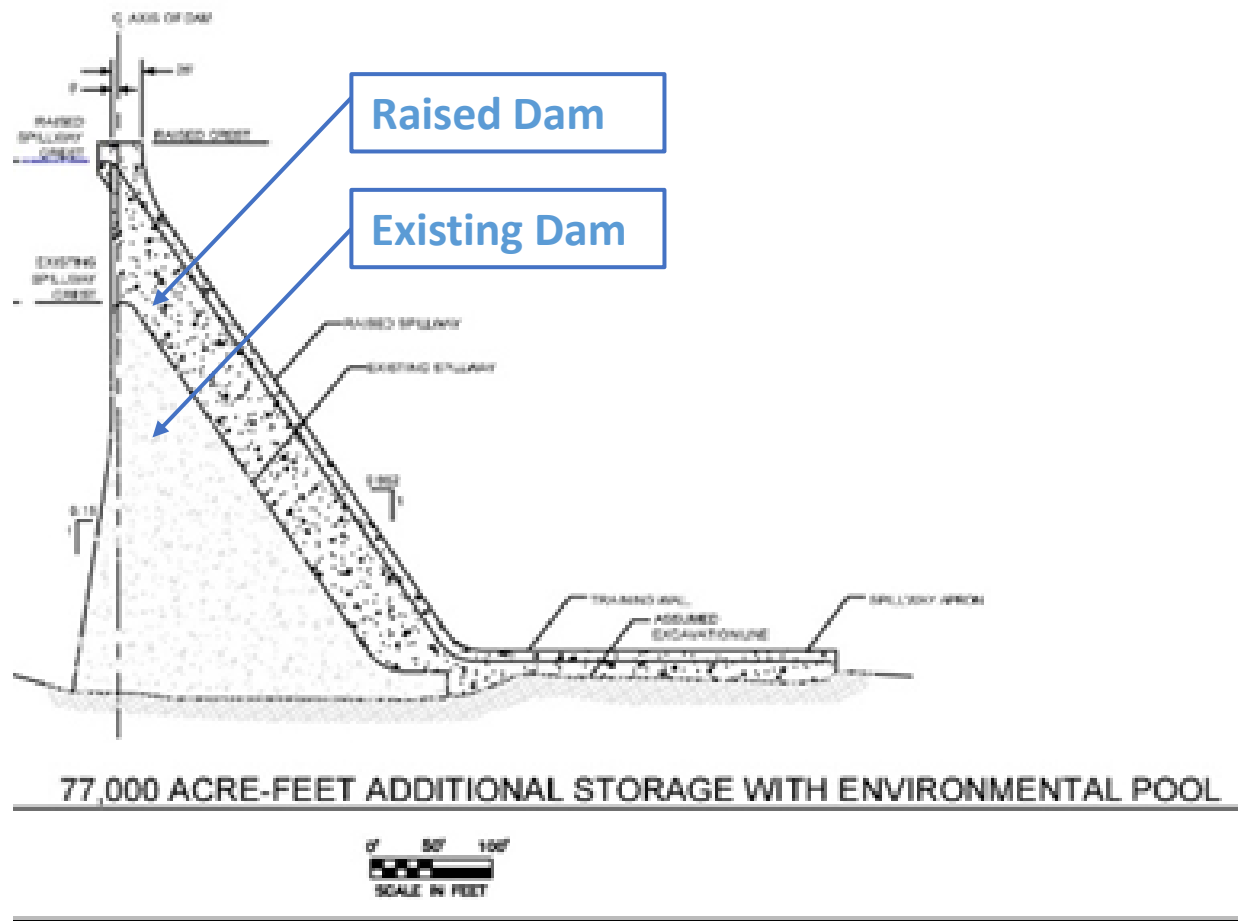


Figure 2: Gross Dam Reservoir



Dam Raise

- Downstream buttress raise with Roller Compacted Concrete (RCC)
- Five-year construction program (RCC placement in three years)



Outline

- A. Planning and permitting processes
- B. Environmental mitigation and enhancements
- C. Lessons Learned





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Planning and Permitting Processes



Denver's key strategy – Work very closely with all the competing interests

- Denver has rightful claim under Colorado's water law system to move additional water from the Colorado River basin to the city in the South Platte River basin
- But they knew community opposition could potentially slow or stop the project
- Closely listened to affected communities and stakeholders and collaboratively fashioning solutions
- Many year process with dozens of entities to plan how the enlarged reservoir could create benefits for communities and the environment on both sides of the Continental Divide
- In 2013 ***Colorado River Cooperative Agreement*** (CRCA) was completed
 - Landmark accord between East-West water interests.
 - “New Era of Cooperation”
 - Signed by 40 West Slope entities.
 - Protected watersheds in the Colorado River Basin while allowing the Gross Reservoir expansion



Colorado River Cooperative Agreement

- City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water)
- Board of County Commissioners, County of Eagle
- Board of County Commissioners, County of Grand
- Board of County Commissioners, County of Summit
- Colorado River Water Conservation District
- Middle Park Water Conservancy District
- Clinton Ditch and Reservoir Company
- Eagle Park Reservoir Company
- Eagle River Water and Sanitation District
- Upper Eagle Regional Water Authority
- Grand Valley Water Users Association
- Orchard Mesa Irrigation District
- Ute Water Conservancy District
- Palisade Irrigation District
- Mesa County Irrigation District
- Grand Valley Irrigation Company
- City of Glenwood Springs
- City of Rifle





Entities Receiving Water or Money

- Grand County
- Granby Sanitation District
- Grand County Mutual Ditch and Reservoir Company
- Grand County Water and Sanitation District No. 1
- Tabernash Meadows Water and Sanitation District
- Town of Fraser
- Town of Granby
- Winter Park Ranch Water and Sanitation District
- Winter Park Recreational Association
- Winter Park Water and Sanitation District
- Summit County
- Arapahoe Basin Ski Area
- Copper Mountain Metro District
- Mesa Cortina Water and Sanitation District
- Copper Mountain Resort
- Dillon Valley Metro District
- Frisco Sanitation District
- Snake River Water District
- Town of Breckenridge
- Town of Dillon
- Town of Frisco
- Town of Silverthorne
- Vail Resorts (Breckenridge)
- Vail Resorts (Keystone)
- Buffalo Mountain Metropolitan District
- East Dillon Water District
- Hamilton Creek Metropolitan District





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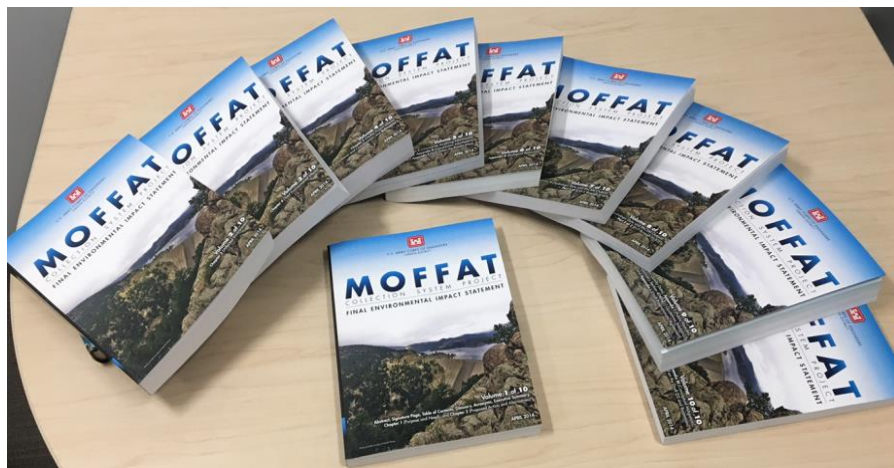
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Environmental Mitigation and Enhancements

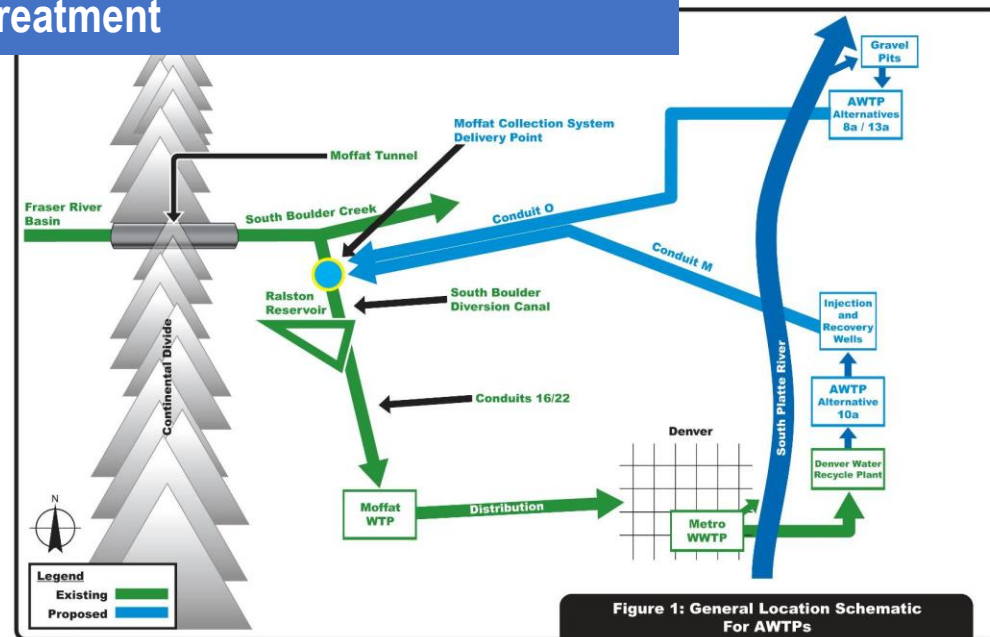


Environmental Permits and Approvals

- Complex alternatives – many locations and types of water sources
- 13 years, 10 months for environmental permitting
- 10 volume EIS!



Alternatives including blending high-quality mountain water with degraded agricultural runoff and require advanced water treatment



Federal Laws



Endangered Species Act



Clean Water Act



Safe Drinking Water Act



Key Mitigations and Enhancements

Learning By Doing: emphasizes cooperation over conflict in addressing river health and impaired streams.

Stream and habitat restoration: **{add photo}**

Installation of aquatic organism passages: Many aquatic species benefit if the stream habitat through bridges and culverts is more like a natural stream with a rocky bottom, resting areas and flowing water - especially helpful to two sensitive species: boreal toads and Colorado River cutthroat trout **{add photo}**

Land donation: Denver Water will convey 539 acres of undeveloped forest and wetlands



Key Mitigations and Enhancements

New technology: improved flow and telemetry equipment to upgrade streamflow measurements.

Road sand capture: removal of more than 3,000 tons (2.7 million kilograms) - dramatic improvements in water quality and aquatic habitat.

Additional projects for Boulder County: \$13 million of projects, including open space, trails and creek restoration

Addressing neighbors' concerns: using on-site construction materials, relocate a quarry to address visual concerns, improvements to roads and intersections, a traffic reduction program leading to the site, adjusting delivery schedules to reduce impacts, and funding to be set aside to address specific concerns raised by residents during construction.





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Lessons Learned



Lessons Learned

- Constructing a water storage project in the United States is increasingly difficult and time-consuming
- intensification of political opposition
- Increasing concerns that climate change will render such projects obsolete
- objections of residents in the vicinity of construction activities
- Invest the time in working through these issues
- As important as working through the laborious government and environmental review process
- One cannot proceed without the other
- A comprehensive legal strategy is also a necessity
- Denver Water's message throughout was to do this project right, in a way that improved environmental conditions in impacted streams and that incorporated the concerns and proposals from stakeholders and jurisdictions touched by the project.
- Build partnerships that will have long term social, political and environmental benefits



The Result

An example of the success of such efforts can be captured by a comment from Colorado's public health agency. When issuing a key permit for the project, the agency noted that the reservoir expansion would create a ***“net environmental benefit”*** for the state's water quality.





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Questions and Comments?

