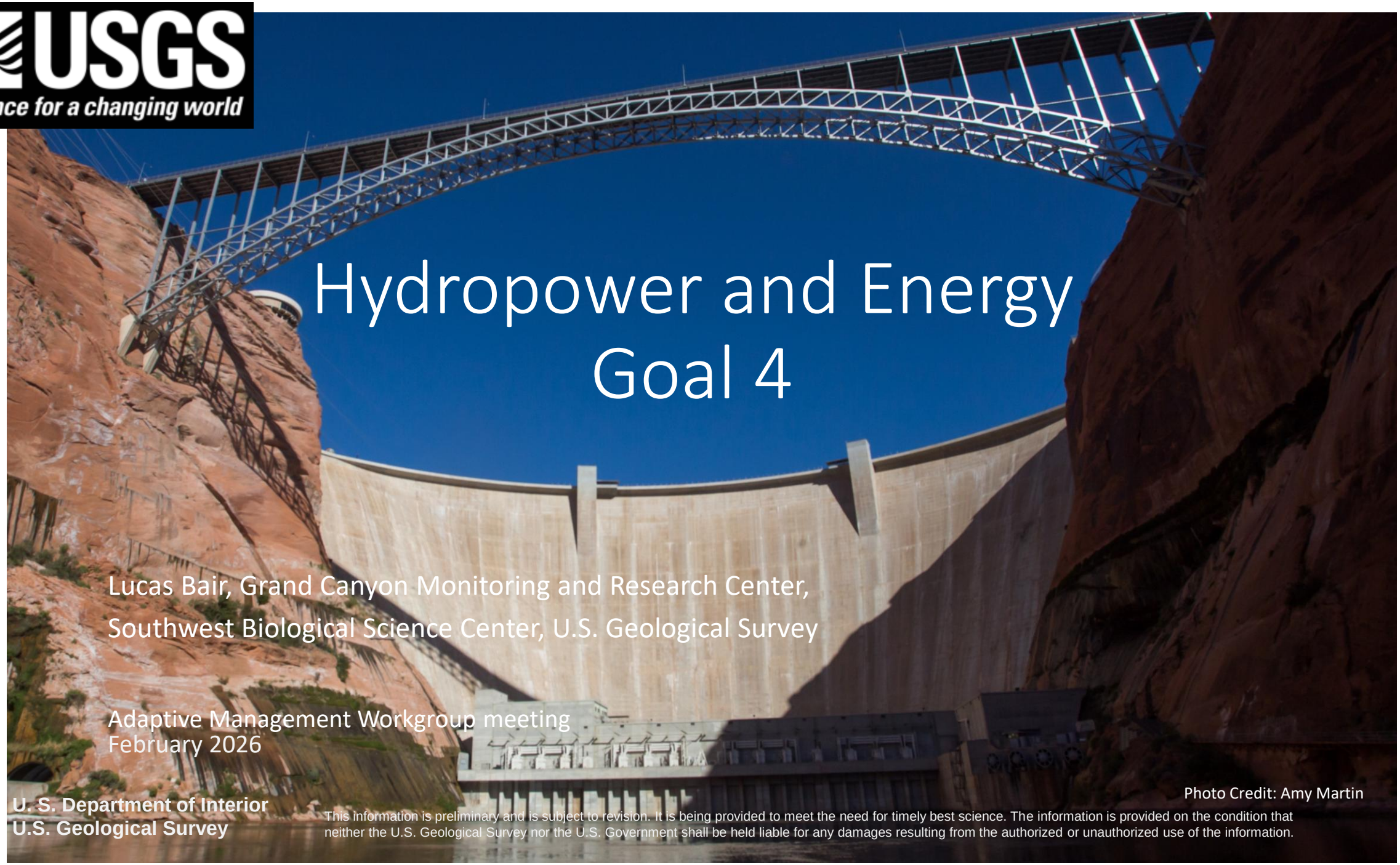


Hydropower and Energy Goal 4

Lucas Bair, Grand Canyon Monitoring and Research Center,
Southwest Biological Science Center, U.S. Geological Survey

Adaptive Management Workgroup meeting
February 2026

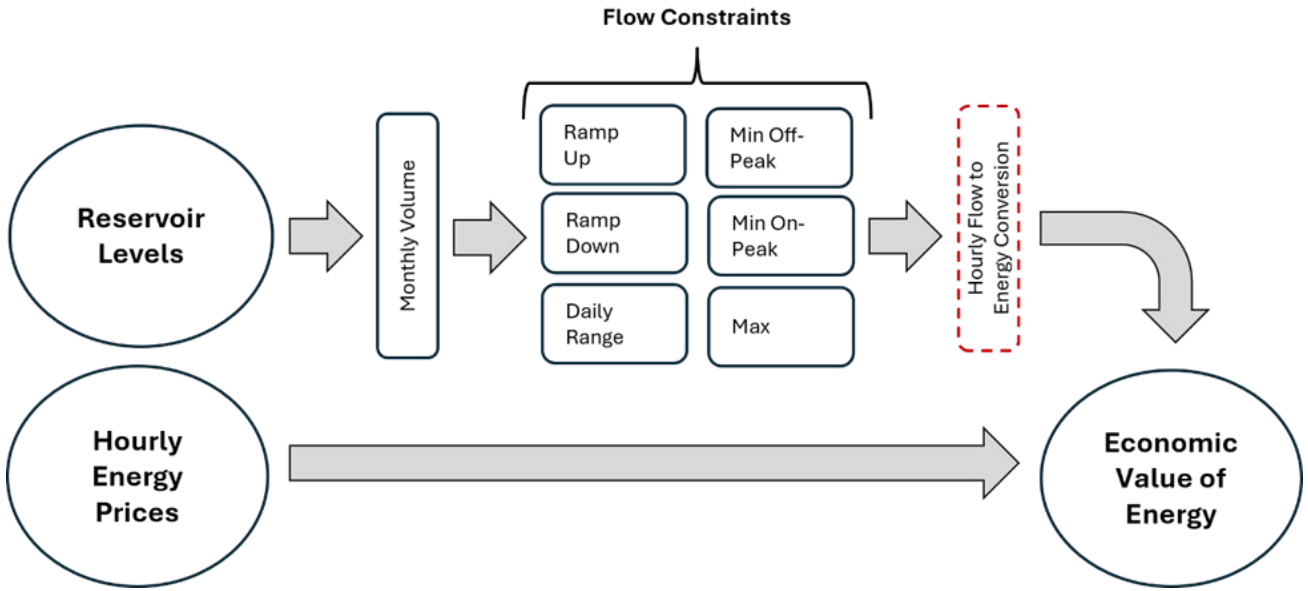
Photo Credit: Amy Martin

U. S. Department of Interior
U.S. Geological Survey

Hydropower and Energy Goal

- Maintain or increase Glen Canyon Dam electric energy generation, load following capability, and ramp rate capability, and minimize emissions and costs to the greatest extent practicable, consistent with improvement and long-term sustainability of downstream resources.

- Hydropower and Energy Metrics
  - Electrical Energy Generation
  - Economic Value of Energy
  - Firm Capacity



Overview of the Status of Hydropower and Energy Goal

- 2026 forecast: 2nd lowest Glen Canyon **generation** in 50 years
  - With potential coolmix bypass: 2026 generation likely lowest on record
  - Recent trend: 4 of last 5 years among lowest generation years

- Coolmix replacement **energy** (2024–2025): ~$25.5M total
  - $18.9M in 2024 and $6.5M in 2025
  - Cost reductions due to implementation coordination:
    - $3.4M (2024) – no bypass during peak demand hours
    - $1.1M (2025) – no bypass during peak demand hours
      – early end date and fewer river miles cooled

Slide courtesy of Jerry Wilhite, Western Area Power Administration

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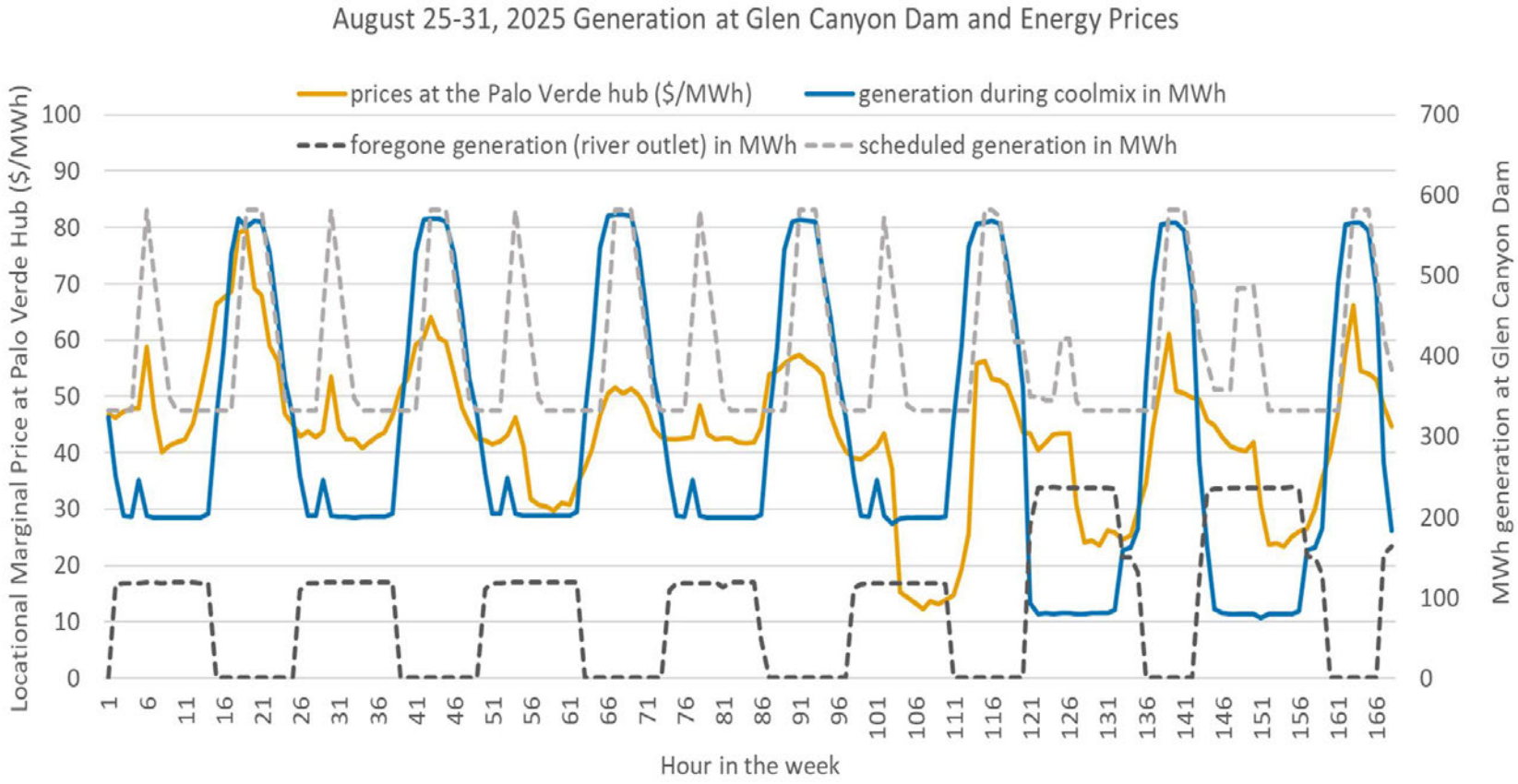
Hydrologic and Energy Price Uncertainty Drive Estimated Cost of Experimental Flows (e.g., Coolmix)

- A screening tool will be applied in 2026 to estimate the hydropower cost of coolmix operations.
- Cost estimates incorporate uncertainty in hydrology and energy prices.
- Uncertainty in Upper Basin operations further complicates estimation of coolmix-related costs in 2026.



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BUREAU OF RECLAMATION

Argonne NATIONAL LABORATORY

Western Area Power Administration

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Overview of the Status of Hydropower and Energy Goal

- Poor hydrology: WAPA reduced firm energy (Dec 2021)
  - WAPA savings of ~$338M in avoided purchase power
  - Cost shift to utility customers
- Reduced generation + non-reimbursable costs: impacting the CRSP Basin Fund
  - 2026 outlook (no coolmix bypass): $17M Basin Fund reduction in balance
  - With bypass experiments: further Basin Fund losses

Slide courtesy of Jerry Wilhite, Western Area Power Administration

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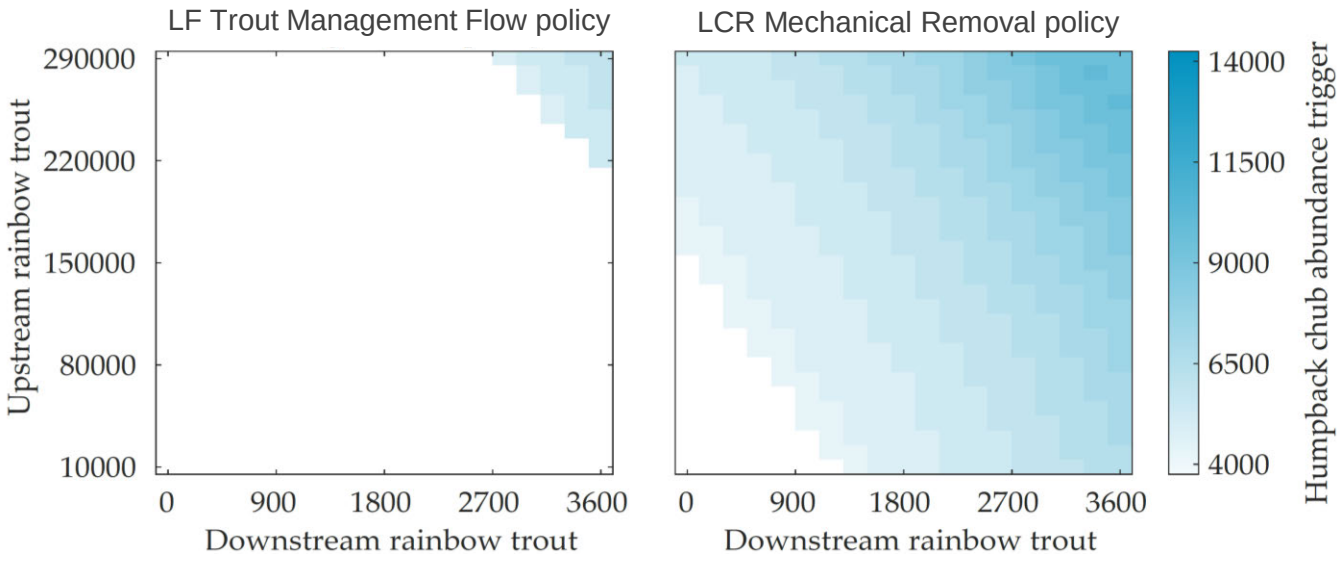
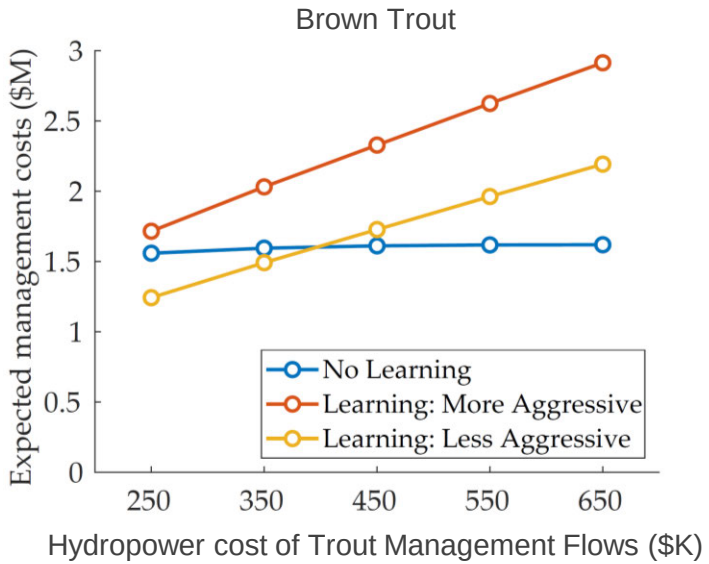
Hydropower Value and Tradeoffs in Adaptive Management





- Multi-objective models are essential for evaluating tradeoffs among competing resource objectives.
- Hydropower cost of experimental flows is important in determining when management action triggers are met.
- Monitoring does not always produce decision-relevant information.
- Hydropower value helps determine whether additional learning is cost-effective.

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Recreational Experience Goal 6

Lucas Bair, Grand Canyon Monitoring and Research Center,
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Adaptive Management Workgroup meeting
February 2026

Photo Credit: Lucas Bair

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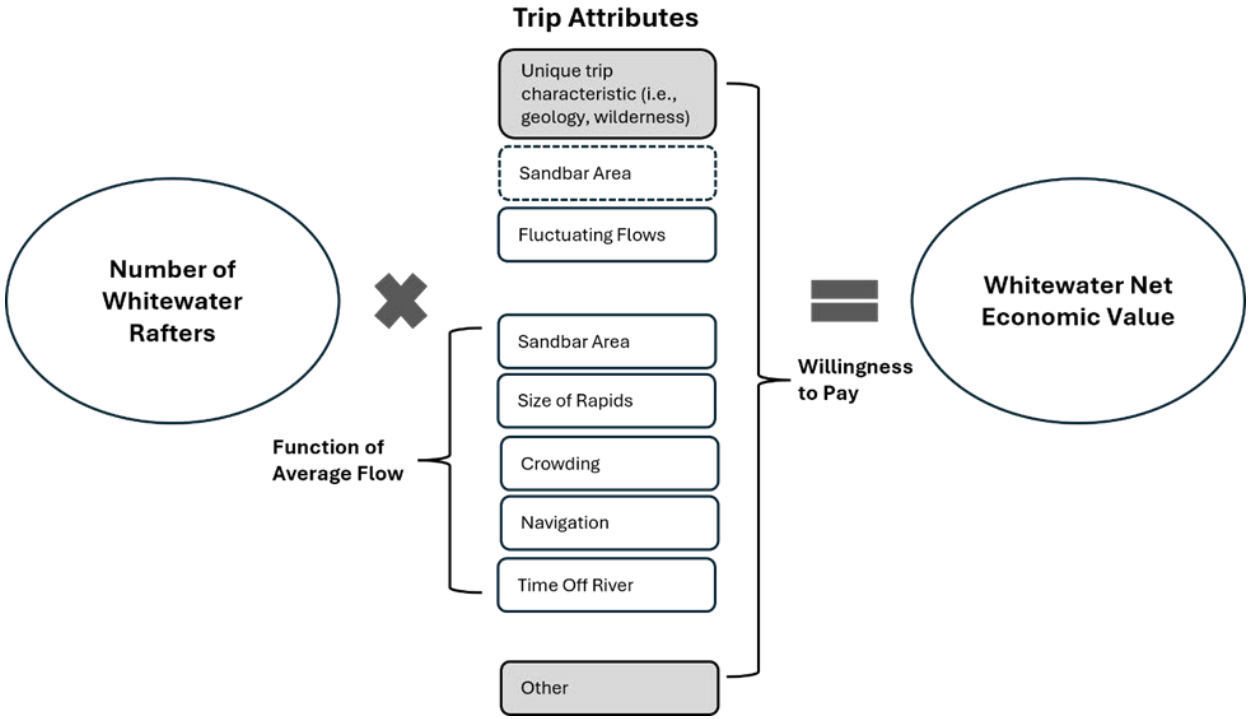
Recreational Experience Goal

- Maintain and improve the quality of recreational experiences for the users of the Colorado River Ecosystem. Recreation includes, but is not limited to, flatwater and whitewater boating, river corridor camping, and angling in Glen Canyon.

- Metric: Economic value of recreational experience
  - Whitewater rafting in Grand Canyon
  - Angling in Glen Canyon



Overview of the Whitewater Recreational Experience

- **Extent of critical beach loss in the Grand Canyon.** Beach conditions are currently degraded, with several high-priority sites experiencing complete erosion.

- **Opportunities for HFEs.** Flooding that triggers HFEs is often associated with erosion of beach sand in the Grand Canyon. Conducting HFEs when triggered represents an opportunity to offset or mitigate these sediment losses.

- **Potential effectiveness of lower-capacity HFEs.** HFEs conducted at power plant capacity may still contribute to rebuilding sandbars and marginal beaches.

- **River flow and motorized boating safety.** During the motorized boating season (April through September 15), flows below approximately 8,000 cfs are associated with reduced safety for commercial motorized navigation; flows at or above this level are generally linked to improved navigability.

Slide courtesy of Ben Reeder, Grand Canyon River Guides

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Overview of the Angling Recreational Experience

- The incentivized brown trout harvest provided a valuable learning opportunity.
- Publications on observed angler behavior and survey research in preparation.
- The rainbow trout fishery is currently not meeting management objectives.
- Recreational activities at Lees Ferry are shifting significantly.