

**Glen Canyon Dam Technical Work Group**  
**Agenda Item Information**  
**October 28-29, 2014**

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Agenda Item

Long-Term Experimental and Management Plan (LTEMP) EIS

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Action Requested

Information item only

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Presenter

Glen Knowles, Bureau of Reclamation (Reclamation)

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Previous Action Taken

**December 2009:** Secretary of the Interior Ken Salazar announced that the development of a Long-Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam was needed. The Secretary emphasized the inclusion of stakeholders, particularly those in the Glen Canyon Dam Adaptive Management Program (GDAMP), in the development of the LTEMP.

**November 2011:** Public scoping meetings were held in Phoenix, Flagstaff, Page, Salt Lake City, Las Vegas, and Denver. A webcast was also held to capture participation from those that could not attend in person.

**April 4-5, 2012:** A public workshop was held in Flagstaff, AZ to receive feedback on the preliminary alternative concepts.

**April 30, 2012:** The Secretary of the Interior responded to a recommendation from the AMWG by stating, "With respect to the report of the Socioeconomic Ad Hoc Group, I appreciate the comprehensive nature of the program and plan proposed, and the support of the AMWG for the implementation of these socioeconomic impact assessment studies. I am directing the interagency team for the Department of the Interior to communicate to the AMWG the specific studies and activities that should be prioritized for utilization as part of the ongoing National Environmental Policy Act process to develop a Long Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam. The Technical Work Group can then identify information needs and research priorities not addressed through the LTEMP process so that the [Grand] Canyon Monitoring and Research Center can refine and develop a work plan."

**August 30, 2012:** Motion (moved by Larry Stevens and seconded by Ted Rampton): AMWG requests that the February 2013 AMWG meeting agenda include a detailed description of the LTEMP alternatives; time for discussion and identification of issues, questions, and concerns; and possible development of a recommendation from non-DOI AMWG members.

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Relevant Science

Science and research completed since the GCDMP was established will be used in the development of the EIS and assessment of impacts.

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Background Information

The Department of the Interior (Department), through Reclamation and NPS, is preparing a draft EIS for adoption of the LTEMP for the operation of Glen Canyon Dam. The purpose of the proposed LTEMP is to utilize current, and develop additional, scientific information to better inform Departmental decisions and to operate the dam in such a manner as to improve and protect important downstream resources while maintaining compliance with the Grand Canyon Protection Act (GCPA), the Law of the River, and the Endangered Species Act, among others, and to fully evaluate dam operations and identify management actions and experimental options that will provide a framework for adaptively managing Glen Canyon Dam over the next 15 to 20 years, consistent with the GCPA and other provisions of applicable Federal law.

The LTEMP EIS Team conducted stakeholder workshops August 5-7, 2013 and March 30-April 1, 2014 where results of the analysis of alternatives using resource-specific performance metrics were presented and stakeholders had an opportunity to participate in the LTEMP structured-decision analysis process. The LTEMP Team has now completed modeling of the 6 alternatives with the exception of the power systems analysis which will be completed in November. The LTEMP Team is now in the process of completing a draft document that includes a hybrid alternative with the intention of developing the hybrid alternative into a consensus preferred alternative. The LTEMP Team is also working to incorporate tribal input, and completing the power systems analysis. A DEIS will be sent to cooperating agencies in calendar year 2014, with a public DEIS released in 2015. The LTEMP EIS Team will review progress to date, upcoming planned meetings, and the current schedule for completion of the EIS.

A wide-angle photograph of the Glen Canyon Dam, a massive concrete structure spanning a deep, narrow canyon. The river flows through the canyon below the dam. The surrounding landscape is arid and rocky, with some sparse vegetation. The sky is filled with large, white clouds. The text is overlaid on the right side of the image.

# Glen Canyon Dam LTEMP EIS

## TWG Meeting

## Oct. 29, 2014





# Glen Canyon Dam

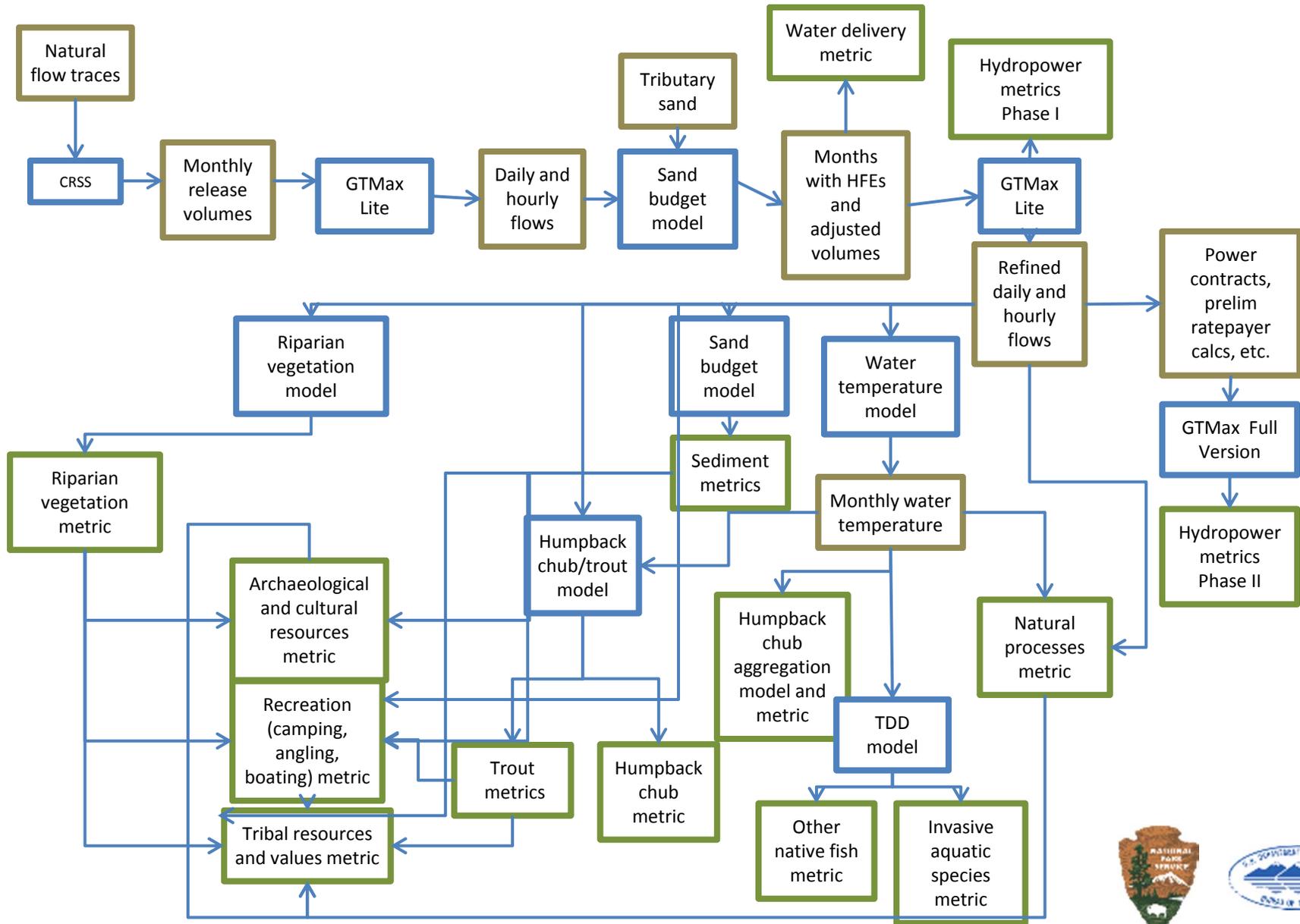
Long-Term Experimental and Management Plan EIS



## Alternatives Carried Forward for Analysis in EIS

1. No-Action Alternative
2. Balanced Resource Alternative
3. Condition-Dependent Adaptive Strategy
4. Resource Targeted Condition-Dependent Alternative
5. Seasonally Adjusted Steady Flows
6. Year-Round Steady Flows
7. Hybrid Alternative

# LTEMP Modeling





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## Characteristics of the Hybrid Alternative

Component	Hybrid Alternative	Other Alternatives
Monthly volumes	Lower volume Aug-Oct, relatively even rest of year following CROD	Very close to RTCD. More even monthly distribution of flows than all but YRSF.
Daily fluctuations	10 x kaf in June-Aug 9 x kaf in other months Maximum daily range 8,000 cfs	Fluctuation comparable to No-Action. Less than Balanced Resource and RTCD. More daily fluctuation than others alts.
Proactive spring HFEs	Yes, not in first 2 years, but then possible in the rest of the 20 years	Comparable to CDAS and YRSF. Not in others.
Spring HFEs	Yes, not in first 2 years, but then possible in the rest of the 20 years	Comparable to CDAS, SASF, and YRSF. More Spring HFEs than No-Action, Balanced Resource, and RTCD.
Fall HFEs	Yes, possible in all 20 years	Same as CDAS, RTCD, SASF, and YRSF. More Fall HFEs than No-Action and Balanced Resource.
Extended duration fall HFE	Yes, up to 250 hr but implemented in phases and limited to 4 per 20 years	Comparable to CDAS and YRSF. Not in others.
Load-following curtailment	Test before and after fall HFEs, limited from Sept-Nov	Comparable to CDAS (spring and fall) and RTCD (before fall only). Not in others.
Trout management flows	Test untriggered in first 2-5 years and implement with triggers if successful	Test and implement if successful in most. Test only in No-Action. Not in SASF.
Low summer flows	Test possible in years 11-20	Same as RTCD. Test possible in all 20 years in CDAS. No test in others.
Mechanical removal of trout	Yes, based on triggers	Yes in all but SASF.

***Preliminary Results—Do Not Cite or Distribute***



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## Benefits of Hybrid Alternative Relative to Original Alternatives Considered

- Blends two alternatives (CDAS and RTCD) that were weighted highly by a wide variety of stakeholders in structured decision analysis process
- Uses a monthly volume pattern very close to RTCD that more closely matches power demand, maintains hydropower performance, improves sediment conservation and maintains annual water delivery
- Represents an improvement over CDAS and RTCD in terms of sediment transport and conservation
- Proposes Trout Management Flows (TMFs) to manage for a healthy trout population and manage risks related to humpback chub
- Tests a variety of condition-dependent elements to improve sediment and humpback chub conservation

*Preliminary Results—Do Not Cite or Distribute*



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## Sediment Restoration

Hybrid performs well for sediment restoration:

- Frequent High Flow Events to redistribute sediment
- Conservative interim flows (10/9/8) that maintains safety and recreation concerns as well as sediment conservation
- Good, middle of the road sand mass balance
- Tests GCMRC's ideas for proactive HFES and extended HFES
- Retains variability in HFE magnitudes to mimic natural variability

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## Vegetation Restoration Project

- Workshop with scientists and Tribes in 2014
- Pilot project, and then on-the-ground, adaptive vegetation restoration in phases for up to 20 yrs
- Objectives:
  - Clearing encroaching vegetation from camping areas
  - Invasive species (target around camping areas)
  - Targeted removal in wind-driven sand source areas to protect cultural resources
  - Native restoration of Gooding's willow, cottonwood, and other native species.

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## Vegetation Restoration Project

- Partnership between:
  - NPS, BOR, GCMRC and tribes
- Geographic Scope:
  - River corridor from the dam down to Pearce Ferry
- Funding
  - Upper Basin Fund, phases, apportioned between GRCA, GLCA, Hualapai and GCMRC

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## Vegetation Restoration – Granite Camp example



Pre-tamarisk removal; View from upstream end of camp.



Post-tamarisk removal; View from upstream end of camp.

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## Vegetation Restoration

- NPS Granite Creek project – Good example of project objectives
- Hualapai project in 2014
- Zuni projects/interests – Future collaboration
- GCMRC Workshop in planning stages, will involve tribes

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## Cultural

- Draft Programmatic Agreement
- Comments from tribes and other parties received and being considered
- The PA will help define impact analysis in the EIS
  - Will be developed to account for dam operations, flow and non-flow actions
  - Will incorporate existing Section 106 agreements into a single agreement document

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## Fish Management

- What we are trying to accomplish with fish management:
  - Keep trout population healthy – larger fish
  - Keep trout migration from Lees Ferry to LCR low in order to restore native fisheries
  - Would like to restore and get native system back in more balance - allow humpback chub and other native fish to thrive

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## Fish Management

Hybrid alternative elements and tools that affect trout:

- Spring HFEs and equalization years increase trout
- Trout Management flows should decrease trout in Lees Ferry and decrease migration but promote a healthier population structure
- Mechanical removal decreases trout in LCR area
- Temperature has effects, but low summer flows have not shown the desired effects for humpback chub in modeling thus far
- Turbidity could potentially be a tool, but many questions about how that might work
- Tribal concerns about any element that kills any fish

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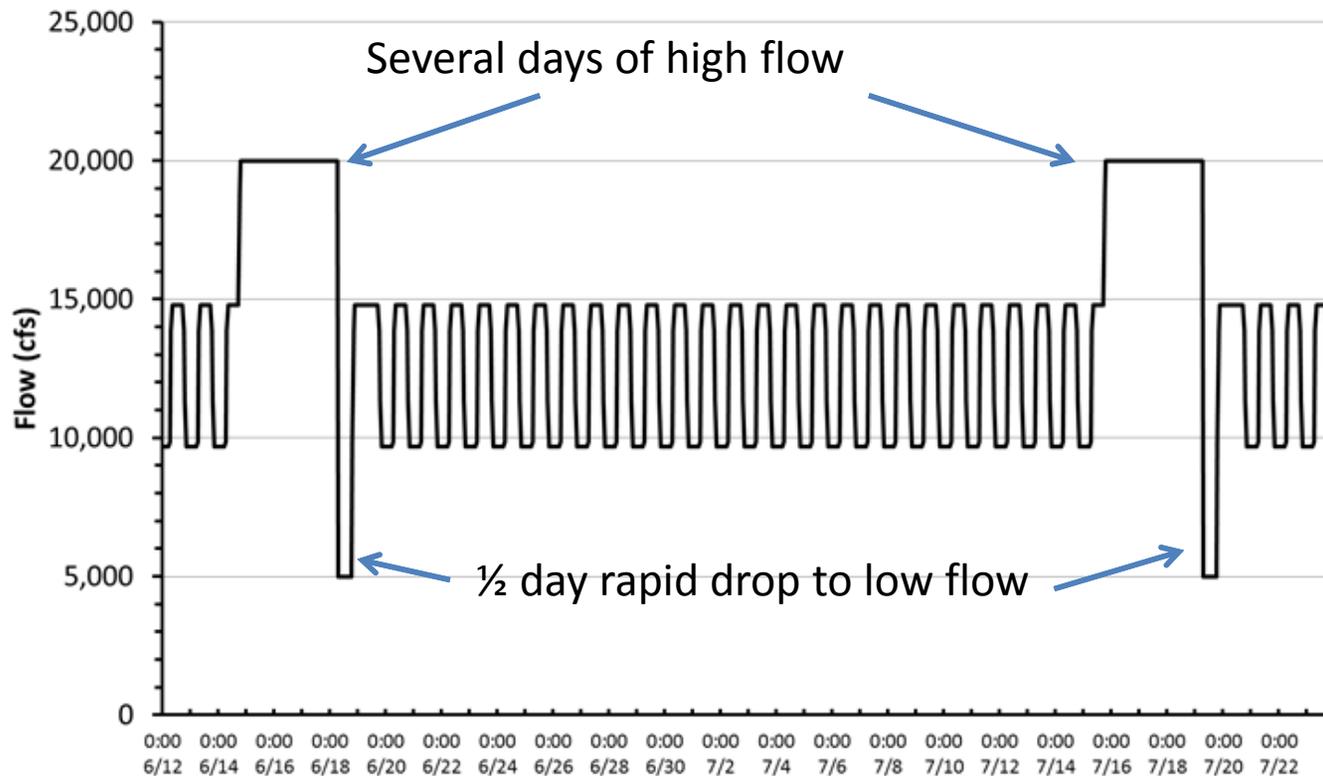
## Trout Management Flows

- Modeling indicates TMFs may be potentially powerful to manage annual trout production in Glen Canyon reach and emigration from Glen Canyon
- More healthy trout population and protection for humpback chub at the LCR
- TMFs proposed to be tested in the hybrid alternative in the first 2 years and potentially in the first 5 years without a trigger to determine effectiveness
- If effective and not harmful to other resources, TMFs would be tested as an adaptive experimental treatment triggered by trout recruitment
- Tribes have concerns

*Preliminary Results—Do Not Cite or Distribute*

## Trout Management Flows

An example 2-cycle TMF implemented from June 15 through July 20 with a return to normal fluctuations afterwards. As many as 3-cycles/month for the 4-month



***Preliminary Results—Do Not Cite or Distribute***



# Glen Canyon Dam

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## How to address tribal concerns on fish management?

- Consultation
- PA changes
- Bright Angel practices for beneficial use
- Upcoming trips on mainstem or at Bright Angel (Dec-Feb)
- Possibilities for further discussion/involvement in BA/BO
- Ideas

*Preliminary Results—Do Not Cite or Distribute*

## Current Schedule

Task	Date
Internal Administrative Draft EIS	January 2015
Complete Hydropower Analysis	December 2014
CA Draft Distributed	January/February 2015
Public Draft	February/March 2015
Draft Biological Assessment Review	Spring 2015
Draft Biological Opinion Review	Spring-Summer 2015
Final Draft	Winter 2015/2016



# Glen Canyon Dam

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## LTEMP Website

For more information, visit the project website:

**<http://ltempeis.anl.gov>**

Anyone may sign up for the mailing list

