

RECLAMATION

Managing Water in the West

Non-native Fish Control Environmental Assessment

Bureau of Reclamation
Glen Canyon Dam
Adaptive Management Program
Technical Work Group
March 8, 2011



U.S. Department of the Interior
Bureau of Reclamation

History

- Some tribes first expressed concern during the 2003-2006 removal experiment, resulting in a removal and mitigation program using fish emulsion as fertilizer in the Hualapai tribal gardens.
- Later, non-native fish control was added as an important conservation measure of several U.S. Fish and Wildlife biological opinions on operations of Glen Canyon Dam.
- As part of the Annual Work Plan of the Glen Canyon Dam Adaptive Management Program for Fiscal Year 2010-2011, up to two river trips to mechanically remove non-native fish were included and tentatively scheduled for May-June 2010 and 2011.
- The Pueblo of Zuni sent Reclamation a letter on June 30, 2009 in which Zuni Governor Norman Cooney expressed the Zuni Tribe's concerns with the "taking of life" associated with mechanical removal, and the failure of Reclamation and FWS to consult with the Zuni Tribe concerning this management action.
- In response DOI representatives attended a meeting with Zuni tribal leaders to hear their concerns on September 15, 2009. In response, DOI cancelled the two planned removal trips in March 2010, reinitiated consultation with the U.S. Fish and Wildlife Service on cancelling removal, and later in 2010 began work on the EA.



Cooperating agencies

Federal:

National Park Service, Intermountain Region

Bureau of Indian Affairs

U.S. Fish and Wildlife Service

U.S. Geological Survey, Pacific Southwest Area

Western Area Power Administration

State:

Arizona Game and Fish Department

American Indian Tribes:

Hualapai Tribe

Pueblo of Zuni

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Purpose and Need Tribal Consultation

- **Government-to-government tribal consultation meetings were held with the Zuni Tribe at the Pueblo of Zuni at Zuni, New Mexico, on September 15, 2009, and on March 24 and June 4, 2010; with the Hopi Tribe (March 4 and April 22 2010, January 27, 2011), Navajo Nation (June 9, 2010, and January 26, 2011), Hualapai (March 6, 2010, and January 8, 2011), Havasupai (March 15, 2010), Kaibab Paiute Tribe (March 18, 2010, and January 20, 2011), and the Paiute Indian Tribe of Utah (December 13, 2010);**
- **Reclamation served on a discussion panel about this issue at the 2010 Native American Fish and Wildlife Society Southwest Conference;**
- **Assistant Secretary Anne Castle and DOI representatives met with the Zuni Governor and Tribal Council, Zuni Cultural Resource Advisory Team, and the Zuni public at Zuni, New Mexico, on August 5, 2010.**
- **The Pueblo of Zuni sent Reclamation the Zuni Tribal Council Resolution No. M70-2010-C086 regarding their concerns with mechanical removal and the request that Grand Canyon be included as a TCP eligible for listing on the National Register. This resolution was given to Assistant Secretary Castle at the August 5, 2010 meeting.**
- **A CA and tribal meeting was held in Flagstaff on August 20, 2010; and,**
- **CA conference calls were conducted on September 2, 9, 16, 23, 30, and November 4 and 21, 2010, and on January 5, 2011. These often included the tribes that participated as cooperating agencies, the Pueblo of Zuni and Hualapai Tribe.**
- **Tribes participated in SDM Workshops, October 18-20, and November 8-10.**
- **A tribal consultation meeting with the Pueblo of Zuni was held on January 25, 2011, during which the tribe indicated that they would prefer, if fish are to be killed, to be used for human consumption as a beneficial use.**



Purpose and Need - ESA

September 1, 2010 FWS revised incidental take statement:

“If a decline below 6,000 is documented, such effects exceed the authorized level of take and represent effects not previously considered in this Opinion and reinitiation of consultation should be requested by Reclamation.”

November 9, 2010 Biological Opinion on cancelling 2010 non-native removal trips, included terms and conditions:

“Resume nonnative control at the mouth of the LCR in 2011. Attempt to implement the program in a manner compatible with the interests of Tribes and other interested stakeholders.

AND/OR

Work with interested Tribes and other parties, expeditiously, to develop options that would move nonnative removal outside of LCR confluence tribal sacred areas in 2011, with the goal that nonnative removal of trout in sacred areas will be reserved for use only to ensure the upper incidental take level is not exceeded.”

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Purpose and Need

Purpose of the action is to reduce the negative impacts of competition and predation by rainbow trout and brown trout on the endangered humpback chub (*Gila cypha*) and its critical habitat in Grand Canyon.

The need for this action is to fulfill the conservation measures and terms and conditions of several U.S. Fish and Wildlife Service (USFWS) biological opinions, to contribute to the recovery of humpback chub by helping to maintain high juvenile survival and recruitment rates resulting in an increasing adult population, and to address concerns expressed by American Indian Tribes over the killing of trout in the Grand Canyon, a location of cultural, religious, and historical importance to the tribes.

Structured Decision Making Project

<http://pubs.usgs.gov/of/2011/1012/>

<http://www.usbr.gov/uc/envdocs/ea/gc/nnfc/Appdx-A-SDMreport.pdf>



Non-Native Fish Control below Glen Canyon Dam— Report from a Structured Decision-Making Project

Open-File Report 2011–1012

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

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SDM Results

Hybrid portfolio	AZGF	BoR	FWS	Hopi	Navajo	NPS	WAPA	Zuni	Average
A	0.598	0.527	0.497	0.563	0.498	0.647	0.432	0.462	0.501
C ₂	0.505	0.418	0.418	0.450	0.428	0.474	0.308	0.314	0.402
C ₃	0.427	0.380	0.373	0.419	0.397	0.443	0.280	0.267	0.361
C ₄	0.478	0.440	0.428	0.545	0.458	0.512	0.353	0.370	0.437
C ₅	0.444	0.404	0.397	0.527	0.433	0.483	0.326	0.366	0.411
D ₁	0.672	0.589	0.649	0.571	0.648	0.629	0.557	0.504	0.606
D ₂	0.584	0.538	0.596	0.525	0.610	0.598	0.519	0.457	0.554
D ₃	0.610	0.578	0.623	0.618	0.645	0.651	0.565	0.558	0.603
J ₁	0.522	0.496	0.567	0.586	0.553	0.503	0.501	0.519	0.539
J ₁ '	0.610	0.525	0.583	0.528	0.537	0.508	0.523	0.481	0.545
J ₂	0.439	0.452	0.519	0.559	0.522	0.474	0.472	0.471	0.497
J ₂ '	0.524	0.479	0.532	0.497	0.503	0.473	0.491	0.433	0.500
K	0.365	0.387	0.426	0.459	0.436	0.472	0.293	0.346	0.390
Rank									
1	D ₁	D ₁	D ₁	D ₃	D ₁	D ₃	D ₃	D ₃	D ₁
2	J ₁ '	D ₃	D ₃	J ₁	D ₃	A	D ₁	J ₁	D ₃
3	D ₃	D ₂	D ₂	D ₁	D ₂	D ₁	J ₁ '	D ₁	D ₂
4	A	A	J ₁ '	A	J ₁	D ₂	D ₂	J ₁ '	J ₁ '
5	D ₂	J ₁ '	J ₁	J ₂	J ₁ '	C ₄	J ₁	J ₂	J ₁

D1 – Removal curtain – includes PBR Removal to test limiting emigration of trout from Lees Ferry to reduce trout numbers at LCR, and LCR removal as a means to directly address the threat of predation and competition if needed. Mitigation of freezing fish removed for beneficial use to address tribal concerns.



Science Advisor Review of SDM

- The SAs feel that use of DSMs in GCDAMP decision processes are both appropriate and needed and recommend their continued application. This exercise, given concerns expressed, clarifies many issues in the non-native fish decision process and is helpful to managers and scientists.
- SDM in the GCDAMP must recognize Adaptive Management environment in which decisions are made. Learning is utilized in the process to inform the selection of alternatives in the face of the continued uncertainty. Hopefully this AM concept can be incorporated in future SDM approaches.
- Because of these limitations the focus of SDM should be to learn and stimulate development of alternative or improved policy experiments, management actions, hypothesis and questions for science and management, rather than determinate outcomes. Perhaps for the exercise completed, the SDM process could have sought to clarify the most critical additional information needs, required tradeoffs, consultation, and multi-party agreements necessary to assist the managers in a final decision process.
- This SDM process chose to focus on primarily a single goal of the GCDAMP, albeit a critical goal. This approach significantly restricts the decision frame in which the GCDAMP manager must perform. This seems to support the reasoned argument for avoiding determinate outcomes as a primary direction of a SDM process.



Proposed Action

- **Remove non-native fish, mostly trout, to reduce non-native fish abundance at the confluence of the Colorado and Little Colorado rivers, from river mile (RM) 56 to 66, area of greatest humpback chub abundance in the mainstem Colorado River and so predation losses are greatest.**
- **In order to achieve this reduction, the proposed action, in coordination with related actions, includes reducing emigration of rainbow trout and brown trout from source populations in Glen and Grand canyons.**
- **Up to 10 boat-mounted electrofishing trips per year would occur in the Paria River to Badger Creek reach (PBR reach, RM 1 to RM 8) and up to 6 removal trips in the LCR reach (RM 56 to 66). Fish that are removed will be frozen for later beneficial use. The proposed action will take place from 2011-2020.**
- **Adaptive Management component: The EA proposes that determining the location (LCR or PBR) and extent of removal actions will be based upon both numbers of rainbow trout in the LCR Confluence area and adult humpback chub abundance and other humpback chub population parameters, and that flow actions be tested.**



Role of Adaptive Management in Non-Native Fish Control, GCMRC Science Plan

GCMRC Science Plan Science Questions:

- Can a decrease in non-native fishes be linked to higher recruitment rate in humpback chub?
- Can PBR removal lower densities of trout in the LCR Reach?
- Can non-native fish control offset any increases in trout from HFEs?

Removal will be conducted in conjunction with a science plan being developed by GCMRC. GCMRC has proposed 3 options:

1. Postponing LCR Removal until hbc adult or juvenile abundance declines.
2. Postpone LCR Removal for one year.
3. Implement LCR Removal for six years.



Science Advisor Review of NNFC Science Plan

- **Seemingly a conflict between management and science, implementing the action, or utilizing alternatives that better evaluate science questions (Options 1 and 2).**
- **GCMRC needs to provide arguments based on existing science as to why main stem is or is not important to survival and recruitment of juvenile humpback chub.**
- **Clarify EA question 2 - the source and related amounts of immigration.**
- **Assessments in the science plan require 4-6 years, or inferences from HBC juvenile assessments of growth and survival that require shorter periods. More clarification is needed for how learning could be enhanced and accelerated.**
- **Although there are science questions relative to the effect of HFEs on this action, there is little integration of the two science plan, and this needs resolution.**
- **No clear benefit from waiting 1 or 2 years to initiate removal at the LCR.**
- **A risk assessment and cost benefit analysis should be conducted.**



Refined Proposed Action

1. 10-year period of proposed action, 2011-2020
2. Little Colorado River (LCR) reach removal, up to 6 removal trips per year
3. Paria River to Badger Creek (PBR) reach removal, up to 10 trips per year
4. All fish removed are frozen and used for animal feed or human consumption
5. For 2011-2013:
 - a. One Lees Ferry rainbow trout marking trip in October.
 - b. Two PBR removal Trips in November-January.
 - c. LCR removal if adult humpback chub abundance drops below 7,000 adult fish, and there are more than 1,200 rainbow trout in the LCR reach.
 - d. Research to develop triggers for juvenile humpback chub abundance and survivorship to consider in implementing LCR reach removal.
 - e. Begin 1-2 year process with stakeholder involvement to develop and test feasibility of flow releases from Glen Canyon Dam to reduce recruitment of rainbow trout in Lees Ferry.
 - f. In 2014 Reclamation will undertake science review with a workshop with scientists to assess first two years of non-native fish control.



Next Steps

The EA is available on the Reclamation website at:

<http://www.usbr.gov/uc/envdocs/ea/gc/nafc/index.html>

Reclamation intends to provide the public with another draft of the EA for a two-week review in April.

Conclude process by early Summer 2011 with a decision notice.

Comments are due by **March 18, 2011**:

Bureau of Reclamation,
Environmental Resources Division
125 South State Street, room 7218
Salt Lake City, Utah 84138

e-mail to: fishcontrol@usbr.gov

For more info call **Glen Knowles** at **(801) 524-3781**

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Development and Implementation of a Protocol for High-Flow Experimental Releases from Glen Canyon Dam

Glen Knowles
Bureau of Reclamation
Glen Canyon Dam
Adaptive Management Program
Technical Work Group Meeting
March 8, 2011



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Public Involvement

- First presented to the public, agencies, and tribes beginning with an announcement from the Secretary of the Interior, Ken Salazar, on December 10, 2009.
- This announcement was followed by a Federal Register Notice on December 31, 2009 (74 FR 69361) to develop an experimental protocol under which future high flow experiments below Glen Canyon Dam would be conducted to improve sand conservation below Glen Canyon Dam. Hold a public meeting of the AMWG in Phoenix, Arizona, on February 3-4, 2010 in order to provide scoping information for the EA process.
- A workshop was held in Salt Lake City on June 15-16, 2010. The information from of this workshop, as well as ongoing communications with GCMRC and the researchers involved in the synthesis, has also been used in this EA.
- Reclamation also had a meeting with the local businesses in Glen Canyon on August 20, 2010, where comments on the proposed action were received.
- Reclamation also used available information from a synthesis of information by the U.S. Geological Survey on the three HFEs in Grand Canyon.



Cooperating agencies

Federal:

National Park Service, Intermountain Region

Bureau of Indian Affairs

U.S. Fish and Wildlife Service

U.S. Geological Survey, Pacific Southwest Area

Western Area Power Administration

State:

Arizona Game and Fish Commission

Upper Colorado River Commission

American Indian Tribes:

Hualapai Tribe

Pueblo of Zuni

Hopi Tribe

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Purpose and Need

The Bureau of Reclamation is proposing a protocol for high-flow experimental releases (HFEs) from Glen Canyon Dam for a 10-year period, 2011–2020 as a multi-year, multi-experimental approach using short-duration, high-volume releases from Glen Canyon Dam during sediment -enriched conditions.

Purpose: 1) to develop and implement a protocol that determines when and under what conditions to conduct experimental high volume releases, and 2) to evaluate the parameters of high-flow releases in conserving sediment to benefit downstream resources in Glen, Marble, and Grand Canyons.

Need: to take advantage of future sediment-enriched conditions and improve understanding of HFEs and sediment conservation.



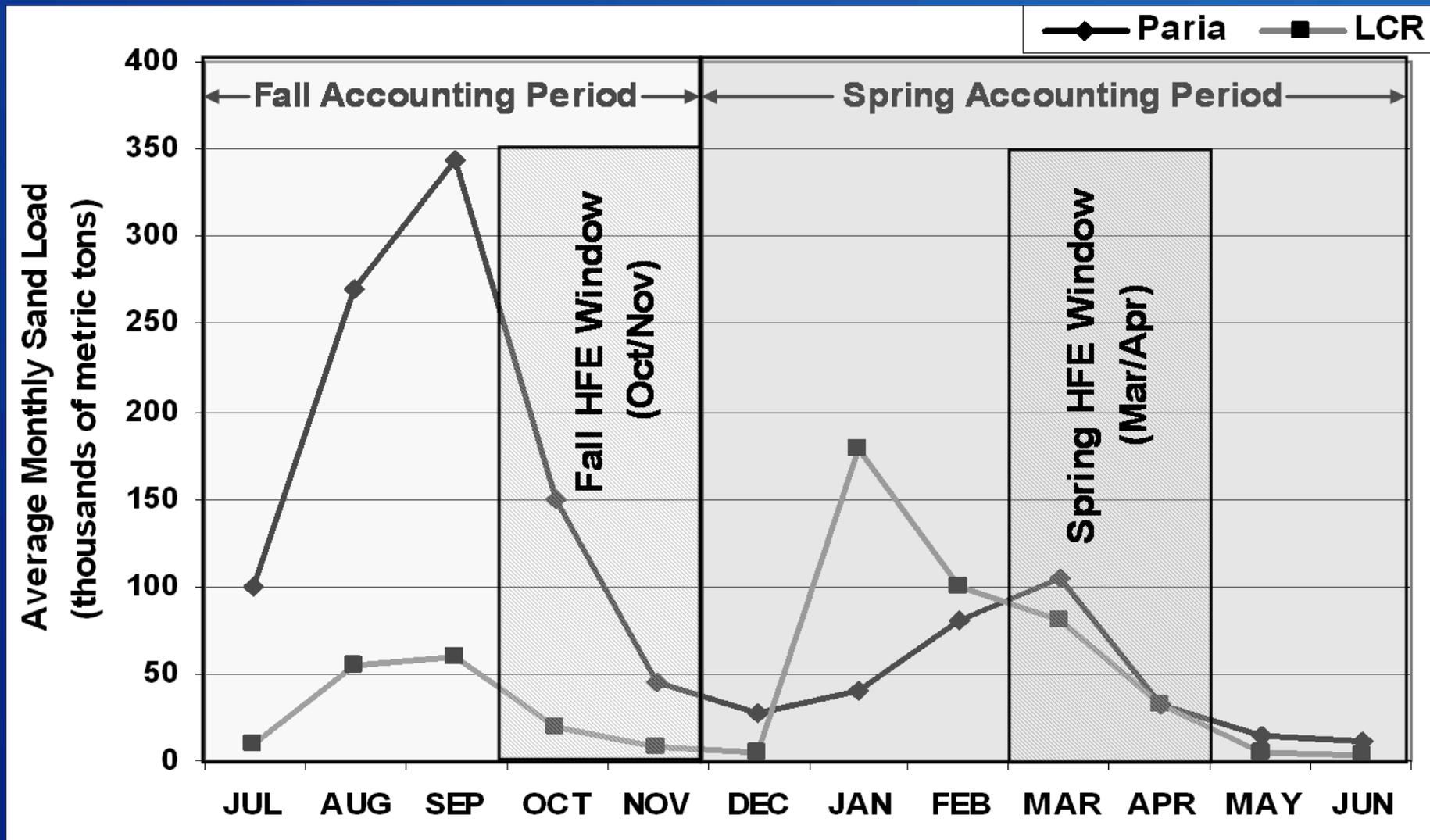
HFE Protocol

The proposed HFE Protocol contains three major components:

- (1) Planning and budgeting:** sets the stage for HFE consideration by evaluating the status of resources and assigning funding for conducting HFEs.
- (2) Modeling:** projects the sand mass balance during potential HFE release windows using known tributary sand inputs and forecasted hydrology, provides 1 of 13 HFE types.
- (3) Decision and implementation:** incorporates the results of the first two components in a process of technical deliberation balanced with policy considerations.

If the decision is made to conduct an HFE, GCMRC and cooperating scientists would conduct the scientific investigations following a previously agreed upon science plan.

HFE Protocol – Store and Release



Latest Changes to the EA

- Public draft was distributed on January 18, 2010.
- Numerous comments, meetings with agencies and stakeholders, January 20, 2011 TWG Meeting, and February 8-9, 2011 AMWG Meeting resulted in changes to the EA:
 - Clarification about annual operations defined as the “water year.”
 - Clarified description and references to the Interim Guidelines and its guiding role in operations and that the Protocol will not result in changes to annual releases for a water year.
 - Clarified sections of the EA to better correlate with the Non-native Fish Control EA, and vice versa.
 - Additional explanation on the need for a 10-year proposed action.
 - Reclamation will re-evaluate, and suspend if necessary, the protocol, if it anticipates that significant impacts that cannot be mitigated.

Latest Changes to the EA cont.

- Added additional language on the HFE Protocol Annual Report on the Status of Resources, and the Annual Review of the Status of Resources.
- If monitoring shows that there are unacceptable impacts, such as a significant decline in humpback chub numbers, Reclamation will suspend implementation of the protocol and re-evaluate the protocol.
- A trigger for humpback chub utilized in the Non-native Fish Control EA will also be utilized in the HFE Protocol EA. If adult humpback chub decline below 7,000 adult humpback chub, Reclamation could suspend implementation of the protocol given the relationship between HFEs, trout, and humpback chub.

Latest Changes to the EA cont.

- Reclamation intends to carefully track the status of resources on an annual basis as defined in the science plan:
 - In-channel sediment storage
 - High-elevation sandbar
 - Sandbar campable area
 - High-elevation sand deposits
 - Archaeological site condition and stability
 - Sediment flux
 - Aquatic food base
 - Lees Ferry fish monitoring
 - Lees Ferry recreation experience quality
 - Fish abundance including humpback chub
 - Riparian vegetation
 - Kanab ambersnail
 - Lake Powell and Lees Ferry water quality
 - Hydropower production and marketable capacity



Science Advisor Review of HFE Protocol Science Plan

- This plan does not present an appropriate science design to test the proposed HFE protocol in the EA. It is recommended that the plan be revised to incorporate up front in several pages a definitive science design for the ten year activity.
- Identify why you are undertaking this HFE science program, i.e. address fundamental learning needs that go beyond the requirements of the EA and other legal and policy requirements.
- State what you intend to accomplish, i.e. what hypothesis are necessary to address the overarching science questions to gain resolves and reduce uncertainty in management and science, for example, how will you specifically determine whether or not flow only methods will resolve long term sediment, habitat and recreation beach issues for stakeholders.
- Better methods are needed to examine interactions.
- The science design to accomplish the necessary management and science integration needs significantly more specification than is presented.



Next Steps

Reclamation released the draft EA to the public on January 18, 2011.

Reclamation intends to provide the public with another draft of the EA for a two-week review in April.

Conclude process by early Summer 2011 with a decision notice.

The EA is available on the Reclamation website at:

<http://www.usbr.gov/uc/envdocs/ea/gc/HFEProtocol/index.html>

Comments are due by **March 18, 2011**:

Bureau of Reclamation,
Environmental Resources Division
125 South State Street, room 7218
Salt Lake City, Utah 84138

e-mail to: protocol@usbr.gov

For more info Dennis Kubly at (801) 524-3715

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Glen Canyon Dam Long-Term Experimental and Management Plan Environmental Impact Statement



Bureau of Reclamation
Glen Canyon Dam
Adaptive Management Program
Upper Colorado Leadership Team
March 8, 2011





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Managing Water in the West

National Park Service

National Park Service
U.S. Department of the Interior



Long-Term Experimental and Management Plan EIS

- First announced by Asst. Secretary Anne Castle at the August AMWG Meeting that Secretary of the Interior Ken Salazar had directed development of a of the Long Term Experimental and Management Plan.
- Will be led by the Bureau of Reclamation and the National Park Service as co-lead agencies.
- Will include multiple cooperating agencies, including Federal, Tribal, State or Local agencies or governments.
- 2011 will be primarily determining and designating cooperating agencies and scoping.
- Effort will be on an expedited schedule to draft EIS.

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Managing Water in the West

National Park Service

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Purpose and Need, Proposed Action

- ❑ Purpose and Need will be focused on continuing adaptive management through the GCDAMP to meet requirements of Grand Canyon Protection Act, the Law of the River, and other laws, to continue the adaptive management experiments that have been successfully completed under the GCDAMP.
- ❑ Will build on prior experiments, such as the 1996, 2004, and 2008 HFEs, and learning gained through implementation of the High Flow Experimental Protocol, non-native fish control experimentation, and other experiments. Reclamation will utilize information developed during prior NEPA process, the ongoing EAs and LTEP EIS Process.
- ❑ Alternatives to be considered include dam operations and other actions under the authority of the Secretary of the Interior in keeping with the GCPA, Law of the River, other laws.

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Managing Water in the West

National Park Service

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- We are now 15 years removed from 1996 ROD and have GCDAMP in place and much new information acquired over the years.
- Two EAs currently out for public comment: if these actions are implemented, additional knowledge will be acquired concurrent with EIS development.
- With our increased knowledge, we have the opportunity to incorporate informed management actions and techniques into the operating criteria and to direct the next generation of experimental actions.

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Managing Water in the West

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Goals for 2011

- **Identify and formalize Cooperating Agencies.**
- **Define roles and responsibilities.**
- **Complete scoping and scoping comment analysis in 2011.**
- **Begin to develop alternatives with cooperating agencies by the end of 2011.**

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Next Steps

- **Kickoff meeting with potential cooperating agencies was held on February 11, 2011. We have received initial input from potential cooperating agencies.**
- **Now working with NPS on NOI for publication in the Federal Register.**
- **Scoping meetings in Phoenix, Salt Lake City, likely additional sites.**
- **More to come...**