

Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
May 18, 2011

Agenda Item

Report on Two Environmental Assessments (EAs): Protocol for High-Flow Experimental Releases EA and Non-Native Fish Control EA

Action Requested

- ✓ This is an information item.

Presenters

Glen Knowles, Chief, Adaptive Management Group, Upper Colorado Region, Bureau of Reclamation

Dennis Kubly, Environmental Resources Division, Upper Colorado Region, Bureau of Reclamation

Ted Melis, Acting Chief, Grand Canyon Monitoring and Research Center

Previous Action Taken

- ✓ By AMWG: AMWG provided comments and recommendations on the High-Flow Experimental Releases Protocol EA as part of National Environmental Policy Act scoping at its February 3, 2010 meeting in Phoenix, Arizona.

- ✓ By AMWG: At its August 2010 meeting, AMWG approved the FY 11-12 Biennial Workplan, and with it, an earlier version of the HFE science plan. The approved work plan included the following language: “Some changes to this work plan may be needed once the Protocol is finalized pursuant to the EA process. Additional revisions may be required to address additional experimental activities that may be identified in the Long Term Experimental and Management Plan EIS (http://www.usbr.gov/uc/rm/amp/amwg/mtgs/10aug24/Attach_08b.pdf, page 204).”

Relevant Science

- ✓ The following describes the relevant research or monitoring on this subject:
 - Coggins, L.G. Jr., M.D. Yard, and W.E. Pine III. 2011. Nonnative fish control in the Colorado River in Grand Canyon, Arizona: an effective program or serendipitous timing? Transactions of the American Fisheries Society 140:456–470.
 - Korman, J., M. Kaplinski, and T.S. Melis, 2011, Effects of fluctuating flows and a controlled flood on incubation success and early survival rates and growth of age-0 rainbow trout in a large regulated river. Transactions of the American Fisheries Society 140:487-505.
 - Melis, T.S., ed., 2011, Effects of three high-flow experiments on the Colorado River ecosystem downstream from Glen Canyon Dam, Arizona: U.S. Geological Survey Circular 1366, 147 p.
 - Melis, T.S., Korman, J. and Kennedy, T.A., 2011, Abiotic & Biotic Responses of the Colorado River to Controlled Floods at Glen Canyon Dam, Arizona, USA, River Research and Applications, (wileyonlinelibrary.com) DOI: 10.1002/rra.1503

- Runge, M.C., Bean, Ellen, Smith, D.R., and Kokos, Sonja, 2011, Non-native fish control below Glen Canyon Dam—Report from a structured decision-making project: U.S. Geological Survey Open-File Report 2011-1012, 74 p., at <http://pubs.usgs.gov/of/2011/1012/>.
- U.S. Bureau of Reclamation, 2009, Notice of Development of Experimental High-Flow Releases from Glen Canyon Dam under the Authority of the Secretary of the Interior (Secretary), Development of an Environmental Assessment, and Notice of Public Meeting: Federal Register 74 (250): 69361-69362.
- Wright, S.A., and Grams, P.E., 2010, Evaluation of Water Year 2011 Glen Canyon Dam flow release scenarios on downstream sand storage along the Colorado River in Arizona: U.S. Geological Survey Open-File Report 2010-1133, 19 p.
- Wright, S.A., J.C. Schmidt, D.J. Topping, 2008, Is there enough sand? Evaluating the fate of Grand Canyon sandbars: *GSA Today* 18(8):4-10.
- Yard, M.D., L.G. Coggins, C.V. Baxter, G.E. Bennett, and J. Korman, 2011, Trout piscivory in the Colorado River, Grand Canyon: effects of turbidity, temperature, and fish prey availability. *Transactions of the American Fisheries Society* 140:471-486.

Background Information

Report on Protocol for High-Flow Experimental Releases EA (including possibility of a fall 2011 HFE) – Dennis Kubly

The High Flow Experiment (HFE) Protocol is being developed to establish a set of guidelines that will enable the Glen Canyon Dam Adaptive Management Program to conduct experimental dam releases on a multi-year, multi-experiment basis, while reducing the time and expense of compliance activities. The intent of the experiments is to improve learning that will lead to improved fine sediment conservation and benefit resources that depend on sediment – sandbars, camping beaches, and nearshore habitat for native fish. The EA will also analyze the effect of conducting high flow experiments on other natural resources, hydropower production, and recreation.

The Bureau of Reclamation (Reclamation) began the process to develop an Environmental Assessment (EA) for the HFE Protocol with a Federal Register notice in December of 2009, and held a public scoping meeting at the February 3-4, 2010, AMP Adaptive Management Work Group meeting. Since that time, 10 cooperating agencies--Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, Western Area Power Administration, Arizona Game and Fish Department, Upper Colorado River Commission, Hopi Tribe, Hualapai Tribe and Pueblo of Zuni--have joined with Reclamation to develop the HFE Protocol and the EA.

In development of the EA, Reclamation conducted a cooperating agencies HFE Protocol Workshop (June 17-18, 2010) and held a series of cooperating agencies conference calls to discuss purpose and need, as well as elements of potential alternatives for the EA. Reclamation also met with each of the AMP Tribes to conduct government-to-government consultation on the proposed action. Reclamation continues to work with the cooperating agencies and tribes to develop this EA. The EA was provided to the public for a 30-day review on January 14, 2011. A second public review will occur for two weeks in May 2011.

The proposed HFE Protocol contains three major components: (1) planning and budgeting; (2) modeling and; (3) decision and implementation. The planning and budgeting component sets the stage for HFE consideration by evaluating the status of resources and assigning funding for conducting HFEs. The modeling component projects the sand mass balance during potential HFE

release windows using known tributary sand inputs and forecasted hydrology. The decision and implementation process 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.

Report on Non-Native Fish Control EA – Glen Knowles

The Bureau of Reclamation (Reclamation) began the process to develop an Environmental Assessment (EA) for nonnative fish control in March 2010, when it was determined that, due to tribal concerns over the taking of life in a sacred place, mechanical removal of nonnative fishes in FY 2010 would be cancelled. Reclamation began development of the Nonnative Fish Control EA and reinitiated consultation with the U.S. Fish and Wildlife Service on cancelling mechanical removal. Since that time, Reclamation has invited the AMP federal agencies (Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, and U.S. Geological Survey), the Arizona Game and Fish Department (AGFD), and the AMP Tribes (Hopi Tribe, Hualapai Tribe, Navajo Nation, Southern Paiute Consortium, and the Pueblo of Zuni) to be cooperating agencies. All of the Federal agencies, AGFD, the Zuni Tribe, and the Hualapai Tribe are cooperating agencies and completed memorandums of understanding with Reclamation.

In development of the EA, Reclamation has conducted a Nonnative Fish Control Workshop (March 29-30, 2010), as well as numerous Cooperating Agencies conference calls to discuss purpose and need as well as elements of potential alternatives. Reclamation also served on a panel entitled “Non-native Fish Removal in the Grand Canyon: Cultural Considerations and Fish Management” at the July 29, 2010, Native American Fish and Wildlife Society Southwest Region 2010 Conference in Scottsdale, Arizona, to discuss the issues surrounding the use of mechanical removal to control nonnative fish species and the cultural concerns of AMP Tribes over this practice.

Reclamation partnered with the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center to conduct a structured decision making (SDM) project on non-native fish management below Glen Canyon Dam (SDM Project) as part of the NEPA EA. The purpose of the SDM Project was to use a structured approach to develop and provide substantive input from the cooperating agencies and tribes to Reclamation in the NEPA process concerning management of non-native fish below Glen Canyon Dam. This project provided a forum for the diverse cooperating agencies and Tribes to discuss, expand, and articulate their respective values, to develop and evaluate a broad set of potential management alternatives, and to indicate how they would individually prefer to manage the inherent trade-offs in this management problem.

Two workshops were held at Saguaro Lake Ranch near Phoenix, Arizona, on October 18-20 and on November 8-10, 2010. At these workshops, a diverse set of objectives for the project were defined, a set of alternatives (“hybrid portfolios”) was developed, and participants assessed alternatives against the array of objectives. Multi-criteria decision analysis methods were then employed to examine the trade-offs inherent in the problem, and allowed the participating agencies and Tribes to express their individual judgments about how those trade-offs should best be managed in selecting a preferred alternative. The project served to enlist the cooperating agencies in alternative development and analysis. The final report has been published as a USGS open file report (see *Relevant Science* above) and will be provided as an appendix or companion document to the EA.

Report on Two EAs, continued

Reclamation and the Department of the Interior continue to meet with each of the AMP Tribes to conduct tribal consultation on the EA. The EA was distributed to the public on January 28, 2011 for a public comment period that closed on March 18, 2011. Reclamation continues to work with the cooperating agencies to develop the EA and expects to provide the EA for a second two-week public review in May 2011.

Report on Science Plan – Ted Melis

Protocol for High-Flow Experimental Releases: Please refer to February 2011 meeting materials on this topic (http://www.usbr.gov/uc/rm/amp/amwg/mtgs/11feb09/Attach_06a.pdf and http://www.usbr.gov/uc/rm/amp/amwg/mtgs/11feb09/Attach_06b.pdf) for previously reported background information.

Following the February 2011 AMWG meeting, GCMRC prepared a draft of a HFE science plan for inclusion in the draft Protocol for High-Flow Experimental Releases environmental assessment (EA) published by Reclamation and released for public comment. The draft science plan focused mostly on the sediment monitoring elements that were previously identified in the GCDAMP's FY 2011-12 biennial workplan/budget, and was intended mostly as a placeholder until a more complete plan could be completed following review by the Science Advisors and completion of the EA.

Non-Native Fish Control: In addition to the HFE science planning described above, a rough “outline” style draft science plan for anticipated nonnative fish control experimental treatment(s) was also prepared by GCMRC staff and science cooperators during winter 2010-11. This draft plan identified three possible options for studying elements of nonnative fish control, with emphasis on non-native fish removal treatments in both upper and lower Marble Canyon relative to rainbow trout production in the Lees Ferry tailwater (as well as other possible source areas for nonnative fish).

Both Science Plans: In February, the Science Advisors reviewed both draft science plans. The GCMRC is currently preparing to revise and complete both science plans in response to review comments as the proposed actions for both EAs are finalized. Following completion of the revisions, the science plans will undergo further peer review before implementation in support of long-term experimentation of both treatments. To the degree possible, these science plans will be integrated to meet the information needs of resource managers and investigate ecosystem-level interactions between HFEs and non-native and native fish responses relative to non-native fish control treatments.

RECLAMATION

Managing Water in the West

High-Flow Experiment Protocol Environmental Assessment Update

Dennis Kubly
Bureau of Reclamation
Salt Lake City, UT

Adaptive Management Work Group Meeting
May 18, 2011



U.S. Department of the Interior
Bureau of Reclamation

HFE Protocol EA Chronology

- **Announcement by Secretary: Dec 9, 2009**
- **Federal Register Notice: Dec 22, 2009**
- **Initiate Public Scoping, AMWG: Feb 3-4, 2010**
- **HFE Workshop: June 17-18, 2010**
- **Conference Calls w/10 Coop Agencies: Jul-Dec 2010**
- **Coop Agency Review Draft: Nov 23-Dec 6, 2010**
- **Public Review Draft: Jan 14-Mar 18, 2011**

The Protocol

- A formal set of rules and procedures to be followed during a particular research experiment.
- Experimental in nature and to facilitate better learning of how to incorporate high dam releases into future operations in a manner that effectively conserves more sediment by depositing on beaches and sandbars above the stage of MLFF dam operations.
- Sandbar building potential is greatest by generating the greatest possible sand concentrations and largest possible areas of inundation, both of which are maximized by increasing flow magnitude.
- Sandbar building occurs as long as elevated sand concentrations are maintained and there is still space available to deposit sand; thus high flows should be of as long a duration as can be maintained with available sand.

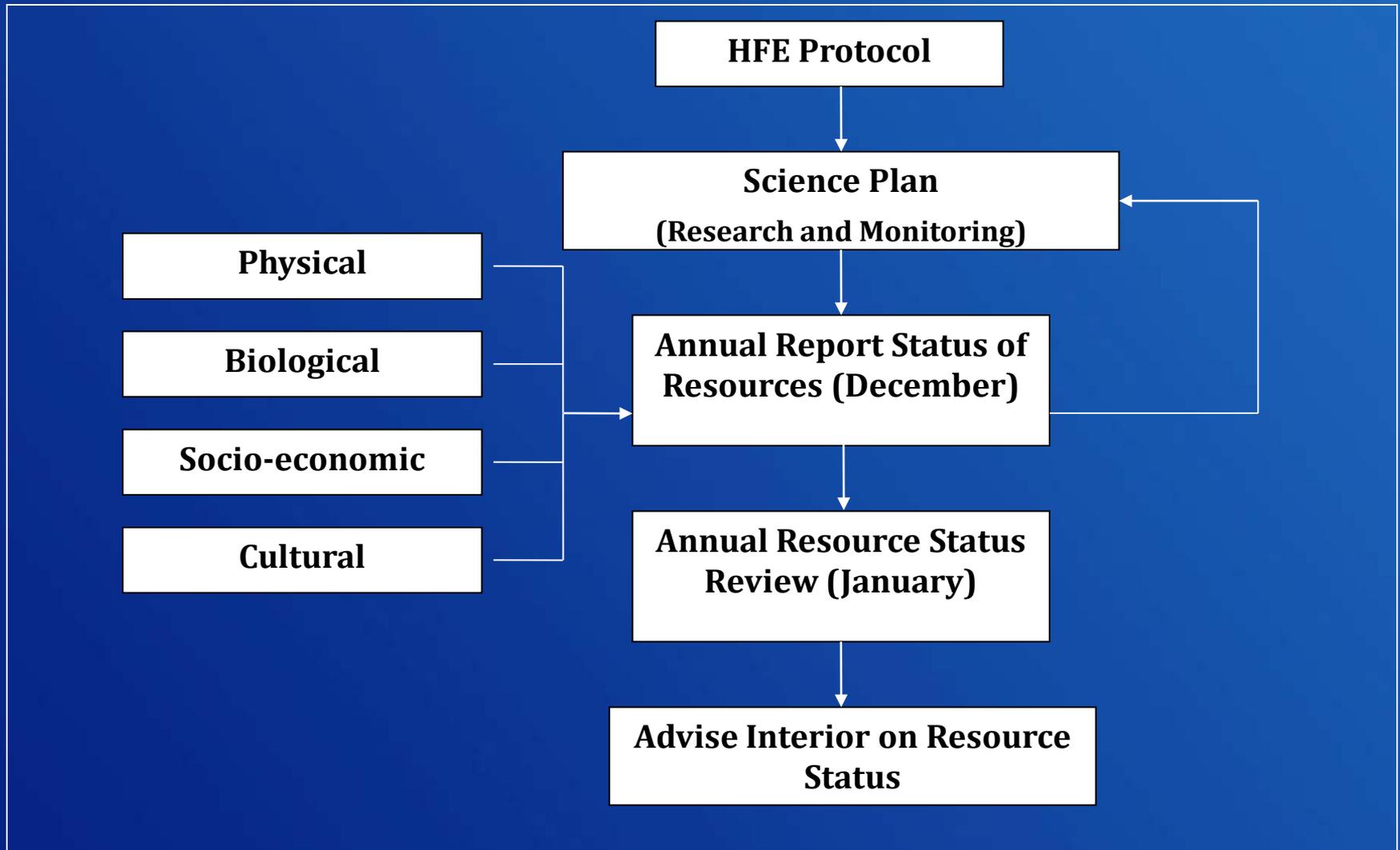
Purpose and Need

- **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:** This action is needed to take advantage of future sediment-enriched conditions in the Colorado River with experimental high flow tests that will improve the understanding of the relationships between high dam releases of up to 45,000 cfs and sediment conservation.

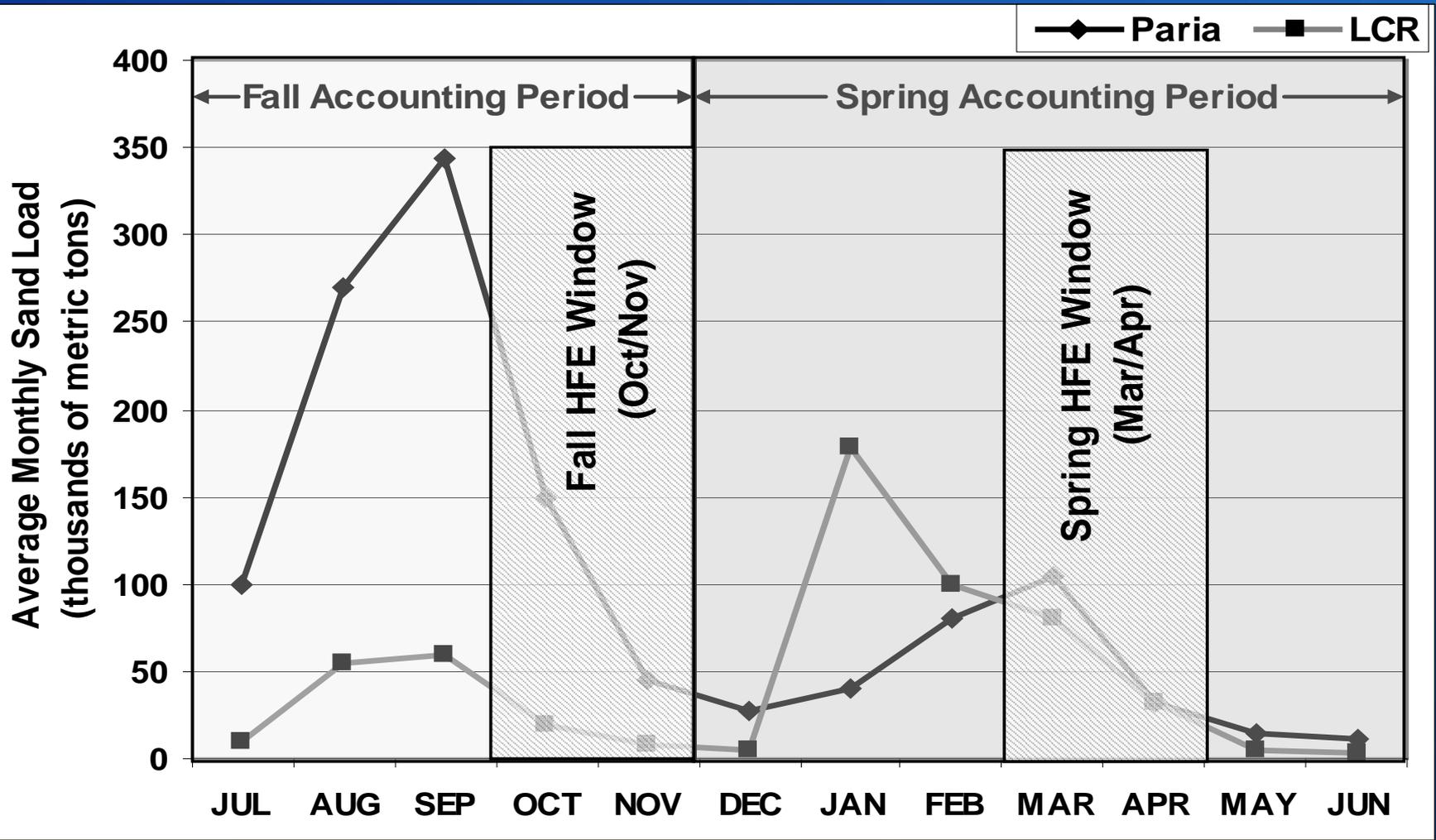
HFE Protocol Paradigms

- **Store and Release**
 - developed by USGS and was first introduced as the basis for the HFE protocol in a June 2010 modeling workshop
 - relies on accumulation of sand during periods of above-average sediment input from tributaries to achieve sediment enriched conditions called for in the development of the HFE protocol (74 FR 69361); decisions occur over months
- **Rapid Response**
 - proposed in September 2010 by Western Area Power Administration
 - requires real-time coupling of tributary sediment inputs and dam releases; decisions must occur in hours

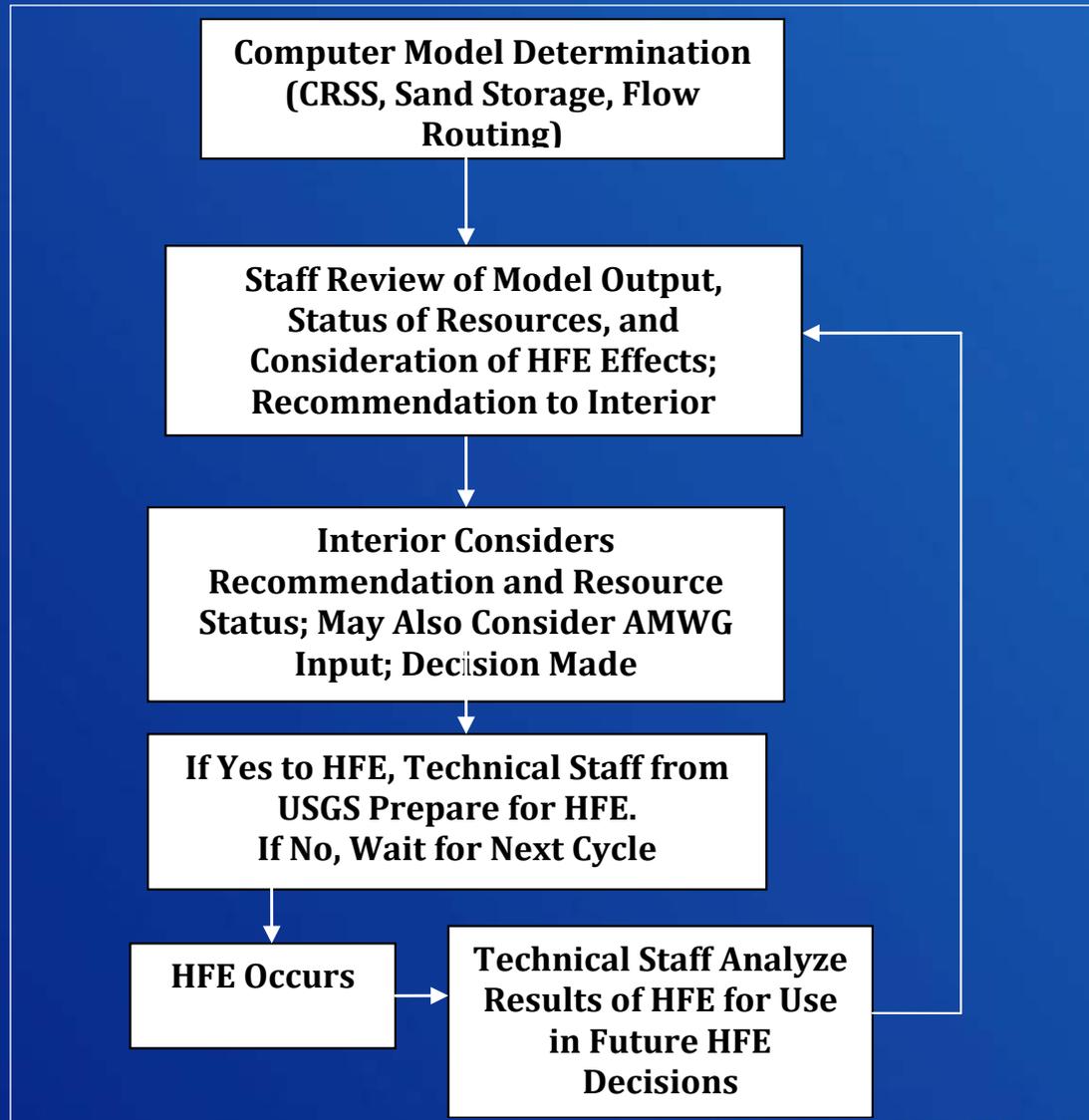
Planning and Budgeting Component



Modeling Component



Decision and Implementation Component



RECLAMATION

Assessment of Effects

PHYSICAL RESOURCES	CULTURAL RESOURCES
Water Resources	Historic Properties
Water Quality	Sacred Sites
Air Quality	SOCIO-ECONOMIC RESOURCES
Sediment	Hydropower
BIOLOGICAL RESOURCES	Recreation (including Public Safety)
Vegetation	
Terrestrial Invertebrates and Herptofauna (Kanab ambersnail)	
Aquatic Foodbase	
Fish	
• Humpback Chub	
• Razorback Sucker	
• Non-Listed Native Fishes	
• Trout	
• Other Non-native Fishes	
• Fish Habitat	
Birds (Southwest willow flycatcher)	
Mammals	

RECLAMATION

Effects Analysis

- **Four principal attributes of an HFE are identified—timing, magnitude, duration, and frequency.**
 - **Timing refers to time of year (Mar-Apr and Oct-Nov)**
 - **Magnitude is the peak flow (31,500-45,000 cfs)**
 - **Duration is the length of time for the high dam release from the start of up-ramp to the end of down-ramp (<1 hr-96 hrs)**
 - **Frequency is how often HFEs are conducted and considers the interval of time between HFEs (up to 2/yr)**
 - **The first three attributes (timing, magnitude, and duration) are analyzed for a single HFE, and the fourth (frequency) is also included in the analysis of multiple HFEs.**

Some of the Comment Received

- **77 responses (19 GCDAMP members; 5 Tribes; 9 State; 4 Recreation; 7 Environmental; 3 Water and Power; 42 No identified affiliation)**
- **Main Recurring Issues**
 - **Scope, T&E impacts, and EA interactions require EIS**
 - **Must coordinate and integrate two EAs**
 - **Underestimate negative impacts of trout and overestimate positive effects on native fish**
 - **Protocol decision process is unclear; needs more detail**
 - **Insufficient for GCPA; missing targets for measures of success**
 - **Insufficient consideration of navigation risks; other safety, property and financial impacts from low and high flows**

Some of the Revisions Made

- Clarify that the HFE Protocol will be conducted during the period 2011-2020 as an experimental action
- Clarify that the HFE Protocol is a component of Interior's compliance with the Grand Canyon Protection Act, in its entirety
- Clarify that the HFE Protocol would be carried out under the 1996 ROD, the 1997 operating criteria, and the 2007 interim guidelines wherein annual release volumes are amounts of water released in a water year, Oct 1 – Sep 30
- Updated the literature cited to include recently released publications and corrected previous errors identified by cooperating agencies and the public
- Provided additional information on the relationships and interactions between the HFE Protocol EA and the Non-native Fish Control EA
- Added text to better identify how uncertainty will be addressed using CEQ guidelines for the inclusion of adaptive management into the NEPA process

Ongoing Compliance

- **Draft High Flow Experimental Protocol EA public review was opened January 14, 2011, and the comment period closed on March 18, 2011.**
- **Reclamation requested formal ESA Section 7 consultation with the US Fish and Wildlife Service (FWS) on January 14, 2011, for effects to endangered humpback chub, razorback sucker, southwestern willow flycatcher, and Kanab ambersnail.**
- **Reclamation needs to complete consultation with FWS, complete tribal consultation and NHPA compliance, and complete NEPA compliance to implement the HFE Protocol.**
- **Additional cooperating agency and public review are being scheduled.**

RECLAMATION

Managing Water in the West

Non-native Fish Control Environmental Assessment

Bureau of Reclamation
Glen Canyon Dam
Adaptive Management Program
Adaptive Management Work Group
May 18, 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

RECLAMATION

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.”

RECLAMATION

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. The Pueblo of Zuni now indicates that only live removal of fish would mitigate their concerns.**

Purpose and Need

Purpose of the action is to reduce the negative impacts of competition and predation by non-native fish 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 fish 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/nafc/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

RECLAMATION

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.

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.

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.

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 the GCMRC science plan:

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 GCMRC 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.**

Comments received during Public Comment Period January 28 – March 18 2011

- 35 comments total
- 11 AMWG member comments, including 3 tribes
- 13 public comments

Major themes of comments:

- Public comments tended to be short, all opposed the action of killing trout in general
- Several expressed concern that HFEs and trout control would hurt Marble Canyon business owners
- General opposition to taking of life on cultural grounds, support of Tribal concerns and need to find resolution to this issue
- Non-native fish control is essential to recovery of humpback chub and necessary to maintain ongoing dam operations under the 2007 Interim Guidelines
- Need for better integration between the two EAs
- HFEs should not be done due to the risk to hbc due to trout response and predation

Comments received during Public Comment Period January 28 – March 18 2011 cont.

Major themes of comments:

- Should be more focus on the science and answering questions of trout movement, emigration, ultimate effect of trout predation on hbc, and role of mainstem versus the LCR for HBC recovery
- Flow actions (non-native fish suppression flows) were not adequately considered
- Alternative uses for trout removed should be considered – live removal, smoked for tribal human consumption, used for food to feed wildlife or for fertilizer by tribal agricultural industry
- Need trout and HBC triggers to determine if LCR removal should take place
- Postpone LCR removal to better test the effects of trout predation on HBC

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 moved alive to other waters for use as sport fish or euthanized for other beneficial use.
5. Research:
 - a. Is Lees Ferry the source? Lees Ferry rainbow trout marking with PIT tags (fall) and increased Marble Canyon trout monitoring (summer).
 - b. Can PBR removal work? Two PBR removal Trips in (winter).
 - c. Is predation limiting HBC recruitment? Is mainstem important habitat?
 - LCR removal only if adult humpback chub abundance drops below 7,000 adult fish.
 - Increased marking and monitoring of young hbc.
 - e. Are other NNFC methods better? Begin 1-2 year process with stakeholder involvement to develop and test feasibility of GCD flow releases and other non-flow options to reduce rainbow trout.
 - f. Safety Valve: In 2014 Reclamation will undertake science review 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 Cooperating Agencies with a another review period and then conduct a second two-week public comment period.

Conclude process in Summer 2011 with a decision notice.

Comments can be sent to:

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**

RECLAMATION