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July 14, 2009

MEMORANDUM

To: Adaptive Management Work Group

From: John Hamill, Chief, Grand Canyon Monitoring and Research Center

Subject: Proposed Biennial Work Plan to support the Glen Canyon Dam Adaptive Management Program, Fiscal Year 2010-11

Attached is the GCMRC's Fiscal Year 2010–11 biennial work plan (BWP) for your consideration. Attachment 2 provides specific GCMRC responses to AMWG and TWG recommendations related to our proposed BWP.

Developing a balanced budget for this work plan was particularly challenging. It is often the case that the demand for science projects exceeds the funding available to GCMRC. This year was especially challenging due to the expansion of the nonnative fish removal project, the use of a 0% indexing for inflation for FY 2010, and normal increases in operating expenses. As a result, several science projects were deferred (see Appendix B) or substantially reduced in scope. To address this situation, we propose using the Experimental Fund to continue mainstem nonnative fish removal, publish a synthesis of 1996, 2004, and 2008 high flow experimental results, and produce a second SCORE report in 2011.

Demands on the science budget are expected to increase as monitoring and research needs continue to grow. In addition, the need to implement compliance measures and new management actions will place additional demands on the budget. Solely using power revenues to fund management and compliance actions is likely to have adverse consequences on long term monitoring and research programs. We encourage the AMWG to consider developing a broader and expanded funding strategy that allows for implementation of management and compliance activities in a manner that will not jeopardize GCDAMP science support.

Thanks for your consideration. I look forward to discussing GCMRC's proposed BWP at the August 12-13, 2009, AMWG meeting.

Attachments (2)
cc Secretary's Designee

Attachment 2
GCMRC Response to AMWG and TWG Recommendations
related to
GCMRC's proposed FY 2010-11 Biennial Work Plan

Attachment 2A summarizes GCMRC's responses to the detailed motion that was passed by the AMWG at its meeting on April 29-30, 2009. A draft Biennial Work Plan (BWP) was provided to the BAHG and TWG in mid-June; the BWP and GCMRC's responses to the AMWG motion were reviewed with the TWG at their June 22-23, 2009, meeting. Based on that review, the TWG recommended four changes to the draft BWP:

1. Include an additional \$70K in the budget for National Park Service participation in the cultural program. The role of this funding is to address coordination aspects of compliance activities beyond those specific to the actual data recovery, including monitoring and data management integration.
2. GCMRC should develop a High Flow Experiment (HFE) Science Plan in FY 2011 based on GCMRC's option 2, as presented to TWG.
3. GCMRC should include, as a work element, the investigation of the hypothesis that the primary source of trout in Grand Canyon is the Lees Ferry reach in FY 2010-11.
4. GCMRC should disclose the total "burden" rate for each line item in the budget.

The attached BWP addresses recommendations 2 and 3 above. Clarification was also added in that GCMRC will prepare a HFE Science Plan in FY 2011 following completion of the synthesis of results of the 1996, 2004, and 2008 high flow experiments. In addition, GCMRC included a specific work plan that describes activities that will be carried out to address the natal origin of rainbow trout that occupy the reach of the Colorado River below its confluence with the Little Colorado River.

We did not address the TWG recommendation to provide \$70K to the National Park Service to support their involvement in the cultural program because it is unclear how NPS funds would be used to support implementation of the Cultural Resource Monitoring Research and Development Project. We also did not specifically provide project-by-project accounting details related to how USGS appropriated funds (about \$1M) are being used to reduce the burden rate assessed by USGS on GCDAMP projects. The role of the USGS \$1M appropriation in the AMP budget is described in the BWP and the total burden rate for each project is provided.

The scope of the mainstem nonnative fish removal project in FY 2010 has been expanded to include the evaluation of potential alternatives to the current mainstem removal project for controlling rainbow trout near the confluence of the Little Colorado River. This evaluation would address the feasibility of, cost of, and possible approaches for a variety of flow and nonflow alternatives for controlling rainbow trout populations downstream of Lees Ferry. We believe this evaluation is warranted given the concerns expressed by the Tribes about killing fish near the mouth of in the Little Colorado River and the high cost and logistical difficulties of the

current of nonnative fish control project. Also, alternative control efforts are likely to be controversial and a thorough evaluation is needed to allow for public and stakeholder input. I am hopeful that there will be sufficient FY 2009 carry over funds to implement the evaluation in FY 2010. Please note the work plan and budget for the evaluation are still a work in progress. Also, this proposal is not meant to alleviate the need for formal Tribal consultation on this issue.

Due to unresolved permit issues with Grand Canyon National Park, the cultural resources monitoring research and development project may need to be terminated or revised significantly for FY 2010 and/or FY 2011. Discussions are ongoing between USGS and NPS management to try to resolve NPS issues and possibly chart a new direction for the GCDAMP's cultural project; however, NPS believes that the Park's current monitoring approach is adequate to satisfy National Historic Preservation Act Section 106 compliance monitoring needs for dam operations. If the current project is terminated or significantly modified, we propose that any cost saving be redirected to address other priority needs or deposited into the Experimental Fund.

Finally, several minor changes were made to the TWG review draft including:

- The entire BWP was edited for clarity, format, grammar, etc.,
- The scope and methods associated with the SCORE Report and Knowledge Assessment were clarified, and
- A statement was added to the Coordinated Image Analysis project description that deliverables may be delayed due to unanticipated data analysis complications.

Attachment 2A

GCMRC Response to Budget Motions from the AMWG Meeting, April 29-30, 2009

MOTION: AMWG gives the following direction to the TWG as it continues to work with Bureau of Reclamation (Reclamation) and GCMRC to develop a proposed budget, work plan, and hydrograph for FY 2010–11 for consideration by AMWG at its next meeting:

1. **Continue to develop a budget based on an annual operations hydrograph for FY 2010 and 2011 water years of MLFF with fall steady flows in September and October.**

BAHG Chair Note: *GCMRC, BAHG, and TWG are proceeding to develop FY 2010 and FY 2011 budgets with this assumption. Any change in plan for FY 2011 can be accommodated in the FY 2011 review that will take place in FY 2010 under the biennial budget process.*

2. **Move funding for “Mainstem Nonnative Mechanical Removal” back to line 71 under the June revised GCMRC budget and add funding for an additional removal trip, if TWG deems it necessary.**

GCMRC response: GCMRC continues to believe that a portion of this activity is a “management action” and should be implemented and funded outside the science program budget. \$300K is included in the FY 2010 and FY 2011 budget to implement nonnative fish control (coldwater species) as an ongoing experimental project. Experimental aspects of the project will assess more cost effective techniques for mainstem cold water nonnative fish control, as well as the influence of nonnative control on early life history success of native fish. Management agencies should secure an alternative funding source for this activity in FY 2012 and beyond.

3. **Develop scope and objectives for a geomorphological model that would evaluate dam effects on cultural sites, with no budgetary implications at this time for FY 2010–11.**

BAHG Chair Note: *A geomorphical model ad hoc will be established at the June 22-23 TWG meeting.*

GCMRC Response: The AMP has received several recommendations to develop a geomorphic model from previous independent review panels, the most recent recommendation coming from the panel that reviewed the NPS legacy monitoring data. The proposal to develop a geomorphic model is also identified in the Monitoring and Research Plan. GCMRC is encouraged that the CRAHG and the AMWG are now advocating that a work group be established to define the specific purpose, scope, and objectives of a geomorphic model; we look forward to working with the group. We believe that within existing funding constraints, the primary focus in the FY 2010 and 2011 work plan should continue to be on piloting testing the archaeological site monitoring protocols, completing a PEP review, and developing a core monitoring proposal for TWG review.

4. **Work with the CRAHG, GCMRC, and Reclamation to do the following:**
 - a. **Provide an explanation of current funding line items (more explicit description of accounting) and how they relate to the treatment plan and necessary compliance, including lines: 23, 31, 114, and relevant portions of lines 39-43.**

GCMRC Response: In the previous budget reviewed by TWG and AMWG, Line 114

referred to the Cultural Monitoring R&D project. The cultural monitoring R&D project is developing objective monitoring protocols to 1) evaluate status and trends in the condition of archaeological sites and other historic properties, 2) assess the role and impacts of dam operations in affecting resource condition, and 3) assess the effectiveness of check dams and other forms of treatment that are intended to control erosion or mitigate adverse effects from dam operations. These objectives are compatible with the intent of Section 106 compliance monitoring, in that Section 106 directs federal agencies to consider the effects of their undertakings (in this case, dam operations) on historic properties. The intent of this R&D project is to develop a monitoring program that will complement existing NPS compliance programs through the collection of quantitative monitoring data which can be used by NPS and the AMP to objectively assess the effects of dam operations and the effectiveness of erosion control activities or the effectiveness of other management actions that may be undertaken by the program in the future, such as high flow experiments.

- b. Describe why the treatment plan cannot be fully implemented using the current line items described above, specifically the \$500,000 allocated in line 31 and ~ \$147,000 in line 23.**

GCMRC Response: GCMRC has had limited involvement with the current treatment effort. We recommend completion of the Science Advisor's independent review of the treatment plan before additional funds are committed to the project. We also have concerns about expanded funding for this management and compliance activity with AMP funds—expansion of this project will impact the funding available for the future monitoring and research programs.

- c. Discuss the necessity of the \$70,000 for the NPS (line 114).**

GCMRC Response: Once the current issues surrounding the permitting of this project have been resolved and agreement has been reached with NPS about the scope and objectives of this project, GCMRC will evaluate the funding needed to support NPS involvement in the implementation of this project. GCMRC does not support providing funding from this project or from the science budget in general for NPS compliance activities.

CRAHG Response from 6/11/09 meeting: The CRAHG is still recommending the 70K be added back into the budget for NPS participation. The role of this funding is to address coordination aspects of compliance activities beyond those specific to the actual data recovery, including monitoring (NPS/CRMP, Tribal, and GCMRC) and data management integration. The CRAHG recommended that the funding come from one of the following:

- a) carryover*
- b) reduce number of cold-water non-native removal trips*
- c) sediment program*
- d) quality of water program*

- 5. Develop a discussion paper on the pros and cons of the two budget approaches described in Issue of Concern #9, for submittal to AMWG at its August meeting.**

BAHG Chair Note: Discussion paper in development; to be presented to TWG at June 22-23 meeting

GCMRC Response: GCMRC supports this recommendation. Before approving the FY 2010–11

budget, a clear agreement should be developed on how the biennial budget process will work. GCMRC believes that the primary purposes of the biennial budget should be to streamline the AMP budget process, free up time for agencies and AMP to address other priority needs, and allow for better integration of AMP funding needs into agency budget process.

6. Continue to address the following issues of concern:

- a. General comment on core monitoring: The budget assumes that we will have moved forward on core monitoring for a number of Goals under the AMP. Although this is reasonable to consider TWG believes it is premature. TWG will begin to consider the General Core Monitoring Plan this summer and from there will have a better idea what may constitute core monitoring. TWG should, within the core monitoring discussion, evaluate cost-effectiveness of current monitoring programs (precision, accuracy, cost trade-offs). GCMRC is planning a core monitoring workshop before the next TWG meeting to discuss the draft plan.**

GCMRC response: The designation of projects as “core monitoring” is based on the anticipation that several projects will be approved for Core Monitoring status in FY 2010–11 following TWG review and DOI approval; this approach is consistent with the schedule and 4-step core monitoring process identified in the Monitoring and Research Plan. As noted above a TWG discussion of the General Core Monitoring Plan will occur this summer.

- b. General comment on the work plan. TWG is looking for additional clarity in the work plan on staff funding including a current GCMRC organizational chart. TWG requests the following: (a) that staff time for individual projects be allocated under those projects, (b) time be allocated in the work plan such that a substantial amount of time, about 20%, is allocated to writing reports and publications, and (c) any new staff additions or deletions be clearly outlined in the budget introduction and appropriate projects.**

GCMRC Response: We provided an updated organization chart to the TWG and AMWG and will identify any new permanent positions that will be established in FY 2010-11. The level of detail provided in the preliminary and final budget/work plan was discussed and agreed to by the TWG and GCMRC several years ago. The BWP provides a summary of funding by project by major funding category (GCMRC staff, logistics, equipment, contracts etc.). Providing information on how GCMRC staff time is allocated among projects is beyond the scope of what we intend to provide; this is unnecessary detail that will lead to inappropriate micro management by the TWG. With respect to suggestion b, timely data analysis and reporting is a major focus of the FY 2010-11 budget and work plan. Following is a list of reports/analysis that will be included in the FY 2010-11 BWP:

- *2008 HFE projects 1 – 5 reporting*
- *HFE synthesis of results 1996, 2004, and 2008 tests*
- *Camp site monitoring data analysis and reporting*
- *Channel mapping data analysis and reporting (Goal #8 sediment monitoring and change detection to compliment sand mass balance monitoring)*
- *Aquatic Food Web research findings*
- *Coordinated Image analysis of terrestrial resources (2005 versus 2009 overflight imagery)*
- *Ecosystem modeling and data gaps science and stakeholder workshops*
- *Integrated sediment, flow, and temp modeling*
- *Riparian vegetation synthesis*

- *2000 Low Summer Steady Flow synthesis*
- *Knowledge assessment workshops and SCORE II reporting on experimental treatments*

- c. **General comment on Goal 10. There is a lack of economic analysis capacity in the program to evaluate trade-offs or other economic concerns. Additional capacity should be considered. Unknown funding needs at this time.**

BAHG Chair Note: GCMRC, the SA, WAPA and NPS will collaborate on development of a workshop in FY 10 that will evaluate program needs, including funding, to address the lack of economic analysis capacity. This subject likely will be brought back for consideration in the FY 2012-13 budget cycle.

GCMRC Response: The AMWG or DOI needs to determine whether additional economic analysis capacity is an AMP priority. It has been clearly identified as a priority by the Science Advisors and by previous NAS/NRC reviews of the program. However, it is currently not reflected in the AMWG priority questions or called for in the Monitoring and Research Plan.

- d. **Line 74: Priorities and funding under Goal 2. GCMRC should provide an explanation of where funding used in FY 2009 for Mainstem Nonnative Mechanical Removal has been reallocated within the program.**

GCMRC response: There are three primary budget items that received the money previously allocated for the mainstem removal project:

1. *The salaries at USFWS, AZGFD, and USGS are only going up each year. GCMRC always receives requests for more funding for salaries from the cooperators each year and USGS salaries also increase.*
 2. *Funding was provided for the remote PIT tag project in FY 2010 to provide for more equipment and the expertise to install it. This project has, to date, received broad support from the fish cooperators (primarily FWS, AZGFD, GCMRC, and Reclamation) because of its potential to reduce personnel costs in the future to get the same, or even more, data on the tagged fish (primarily HBC) that use the LCR.*
 3. *Funding was provided for monitoring rainbow trout redds and larvae in the Lee Ferry reach. In FY 2008 this work was funded under the HFE, so additional funds needed to be provided for this activity from the annual budget in FY 2010 -11. These costs may be adjusted depending on the outcome of the May 2009 PEP review.*
- e. **General comment on accounting. Currently, Reclamation does not have adequate staff resources to track reports due by GCMRC from the work plan. Thus, there is inadequate tracking of deliverables by the AMP for projects funded by Reclamation funds. Reclamation should investigate options to provide staff resources in tracking reports.**

Reclamation Response: Reclamation has hired a staff member (in a pre-existing position) whose job responsibilities will include acting as a Contracting Officer's Technical Representative on fund transfers to USGS-GCMRC. That individual also will work with GCMRC to identify and track deliverables for funds transferred.

GCMRC response: Since many of the deliverables are being developed by GCMRC, additional tracking and reporting on these deliverables will have staff implications for

GCMRC as well as for Reclamation. GCMRC will work with Reclamation to address this need.

f. Goal 8: GCMRC should develop an on-the-shelf HFE science plan for a potential next HFE.

***GCMRC Response:** GCMRC will present 2008 HFE results at the TWG meeting in January 2010. The reports will be made as part of the annual reporting meeting being organized by the TWG chair. A synthesis of the results of the 1996, 2004, and 2008 experiments? will be completed by the end of fiscal year 2010. While it is important to fully evaluate all of the learning that has come from the past three high flow experiments, it is clear that additional sand-enriched higher flows and continued long-term monitoring will be needed to answer the primary strategic science question – “Is there a flow only (using only the existing downstream sand supply) operating strategy for rebuilding and maintaining sandbars along the Colorado River below Glen Canyon Dam?” GCMRC is concerned that developing a HFE Science plan? in FY 2010 will delay the reporting schedule for various projects in FY 2010 (see 6 (b) above), including the HFE synthesis and possibly the knowledge assessment workshops and SCORE II report set for FY 2011. FY 2011 is the most appropriate timeline for developing a long term plan for future HFEs. Options for how to proceed with additional HFEs in a manner that will not impacting reporting schedules and requirements will be discussed at the TWG meeting on June 22, 2009.*

To support effective HFE planning and implementation, the GCMRC recommends the following actions by the AMWG/DOI:

- *Revise the 1998 hydrologic triggers for Beach/Habitat-Building Flows in light of the new information that has become available to managers about sand conservation options since the 1995 EIS was completed.*
- *Develop criteria for sandbar conditions below the dam that are needed/desired for achieving the goals of their 2003 Strategic Plan; making sure, on the basis of best available science information, that their recommended desired future conditions are both attainable and measurable.*
- *Develop and agree to a structured approach and timeline for evaluating the results of past HFEs and determining how to proceed from a science, compliance, and management standpoint. The crisis planning and compliance that have accompanied AMP/DOI deliberations of past HFEs have been very disruptive and needs to be avoided in the future.*

g. TWG understands that GCMRC will attempt to provide historical expenditures by project (going back 3 years) in the work plan.

***GCMRC Response:** GCMRC will provide a summary at the TWG meeting for funding that was budgeted /approved for projects dating back to FY 2007.*

h. Goal 2 (line 67): AMWG should be aware that the implementation of the warmwater nonnative control plan efforts in 2011 may have budget implications (moving from the testing phase to nonnative control implementation).

***GCMRC Response:** Funding is included in the budget for implementation of high priority research and monitoring elements of the warmwater nonnative control plan (early detection, species risk assessment, source assessment). No funding is included for funding warmwater nonnative fish control. This is a potentially expensive undertaking that could*

seriously impact the AMP science program in future years. AMWG should consider how this and other management/compliance programs will be funded and implemented in the future.

- i. Goal 2: GCMRC should investigate research into determining the natal origins of trout in the LCR reach of the mainstem. This investigation should consider the feasibility of whether to specifically target juvenile fish that are not currently being tagged.**

***GCMRC Response:** GCMRC made a presentation on this topic to the TWG at their October 2008 meeting. The conclusion of this presentation is that all available data suggest that the majority, but not all, of the rainbow trout found downstream of Lees Ferry are spawned between Glen Canyon Dam and Lees Ferry. Some TWG members recommended additional research to increase the certainty of this conclusion. GCMRC agreed to initiate a literature review to bring together available information on this topic and review this topic with the protocol evaluation panel in May 2009. PEP recommendations on this issue will be presented at the June 23 TWG meeting.*

- j. Budget general. GCMRC should disclose the total “burden” for each budget line item, the amount of carry-over for each budget line item, and that a crosswalk be provided from the 2009 budget to the 2010 and 2011 budget so that changes in the budget/work plan for each item can be understood.**

***GCMRC Response:** USGS appropriated funding (about \$1M) is being used to reduce the burden rate assessed by USGS on AMP projects. Providing detailed project by project accounting on how USGS cost share funds are allocated among projects is beyond the scope of what we intend to provide; this unnecessary detail will not improve the TWG’s technical review of the budget or work plan.*

Grand Canyon Monitoring and Research Center (GCMRC) Biennial Work Plan for Fiscal Years 2010-11

John Hamill, Chief, GCMRC

Adaptive Management Work Group Meeting
August 12-13, 2009



Overview

- Funding sources and budget guidance
- General focus areas, major activities, and Technical Work Group (TWG) recommendations
- Program highlights
- High-flow experiment (HFE) findings and options
- Deferred projects
- Other significant issues

Anticipated Funding & Sources

| | FY10 | FY11 |
|--------------------------------------|---------------------|---------------------|
| Hydropower Capped Revenues | \$7,967,420 | \$8,206,442 |
| Experimental Funds | \$ 258,674 | \$ 484,251 |
| Nonnative Contingency Funds | \$ 96,966 | \$ 0 |
| FY09 Carryover Funds | \$1,244,064 | \$ 0 |
| Ancillary Project Revenues | | |
| Reclamation (BOR)–Lake Powell | \$ 275,502 | \$ 286,342 |
| USGS Appropriations | | |
| Reduced Overhead | \$1,000,000 | \$1,000,000 |
| Appropriations to Tribes | \$ 95,000 | \$ 95,000 |
| BOR Appropriations–Nearshore Ecology | \$ 16,185 | \$ 556,912 |
| TOTAL Anticipated Funds | \$10,953,811 | \$10,628,947 |

Assumes 0% consumer price index (CPI) in FY10 and 3% CPI in FY11



Budget Guidance

- Strategic Science Plan (SSP) and Monitoring and Research Plan (MRP), as amended and approved
- Budget Ad Hoc Group conference calls and TWG meetings
- AMWG budget motion (April 2009)

General Focus Areas

- Science support for 2008 Environmental Assessment (EA) and ESA conservation measures
- Increased emphasis on data analysis and reporting
- Transition of several projects from research and development phase to core monitoring

Major Analysis and Reports

- 2008 HFE project reporting
- Synthesis of results for 1996, 2004, and 2008 HFEs
- Campsite monitoring data analysis and reporting
- Channel mapping data analysis and reporting
- Aquatic food web research findings
- Coordinated image analysis of terrestrial resources
- Ecosystem modeling and stakeholder workshop
- Integrated sediment, flow, and temperature modeling
- Riparian vegetation synthesis
- 2000 low summer steady flow (LSSF) experiment synthesis
- Knowledge assessment workshop and SCORE II Report

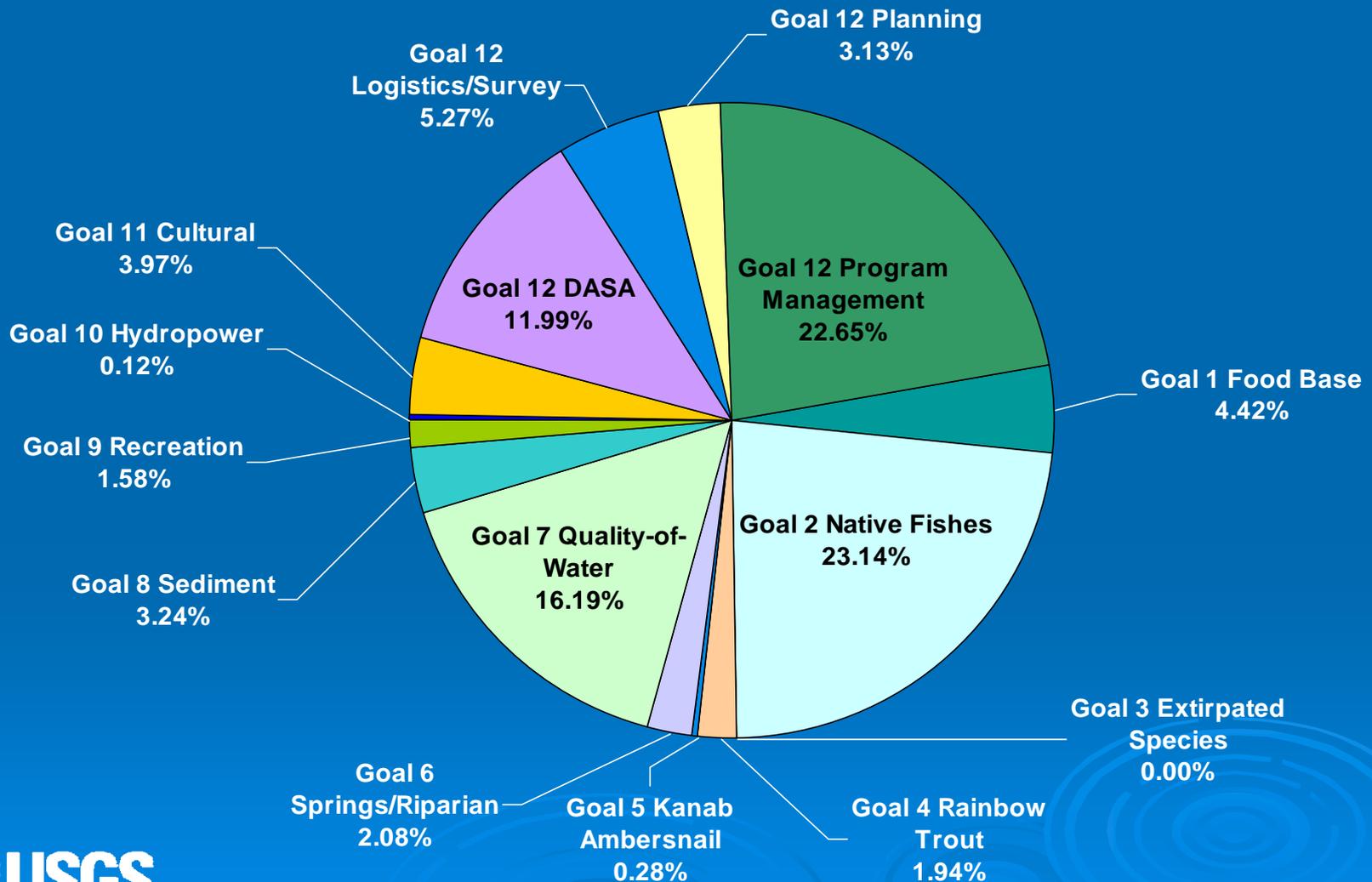
Protocol Evaluation Panel (PEP) Reviews and Core Monitoring Plans (CMP)

- **Aquatic Food Base and Lake Powell and Downstream Water-Quality Monitoring**
 - PEP and CMP in FY11
- **Native and Nonnative Fish Monitoring**
 - Lees Ferry Trout CMP in FY10
 - Little Colorado River and mainstem Colorado River CMP in FY11
- **Vegetation Monitoring**
 - CMP in FY10
- **Camping Beaches Monitoring**
 - PEP and CMP in FY11

Technical Work Group Recommendations

- Provide additional \$70,000 for National Park Service participation in the cultural program (not addressed)
- Develop HFE science plan in FY11 (based on Option 2, as presented to TWG) (addressed)
- Investigate in FY10-11 hypothesis that the primary source of trout in Grand Canyon is the Lees Ferry reach (addressed)
- Disclose the total burden rate for each line item in the budget (partially addressed)

Funding Allocation by Goal (FY10-11 Average)



Biology Program Highlights

- Goal 1: Aquatic Food Base (\$409,384, FY10-11 average)
 - Complete research project in FY10 (analysis and reporting)
 - Transition from research and development to core monitoring in FY11
 - Limited data collection in FY10-11



Biology Program Highlights (Cont.)

- Goal 2: Native Fish (\$2,144,913, FY10-11 average)
 - Fish monitoring
 - Incorporate PEP recommendations in FY11
 - Humpback chub stock assessment (annual reporting; ASMR in FY11)
 - Expand mainstem monitoring
 - Implement mainstem nonnative (NN) removal
 - Use experimental and NN contingency funds
 - Evaluate alternatives to current project
 - Evaluate natal origins of rainbow trout
 - Provide science support for implementation of NN control plan
 - Implement nearshore ecology/fall steady flow science plan
 - Continue Chute Falls translocation and monitoring

Biology Program Highlights (Cont.)

- Goal 3: Extirpated Species (\$0)
 - Participate in TWG Extirpated Species Ad Hoc Group
 - Participate in Lake Mead razorback sucker assessment work group

- Goal 4: Rainbow Trout (\$179,278, FY10-11 average)
 - Continue with adult monitoring (scaled back)
 - Continue with larval and redd survey as part of fall steady flow science plan

Biology Program Highlights (Cont.)

- Goal 5: Kanab Ambersnail (\$25,232, FY10-11 average)
 - Continue annual monitoring (AZ Game and Fish Department); reassess after U.S Fish and Wildlife Service status review
- Goal 6: Riparian Areas and Springs (\$191,741, FY10-11 average)
 - Vegetation monitoring (transects) in FY11
 - Vegetation mapping and change detections

Physical Program Highlights

- Goal 7: Quality of Water (\$1,500,433, FY10-11 average)
 - Lake Powell and downstream water-quality monitoring
 - Integrated flow, temperature, sediment modeling
 - Phase 1 ends in FY10
 - Staff support for model maintenance and updating beginning in FY11

- Goal 8: Sediment (\$300,829, FY10-11 average)
 - Channel mapping data analysis and reporting in FY10; resume fieldwork in FY11
 - Sandbar mapping data analysis and reporting in FY10; resume fieldwork on biannual basis beginning in FY11

Sociocultural Program Highlights

- Goal 9: Recreation (\$145,860, FY10-11 average)
 - Campsite mapping
 - Data analysis and reporting in FY10; resume fieldwork on biannual basis beginning in FY11
 - Maintain/update campsite atlas
 - Final recreation safety study report in FY11

- Goal 10: Hydropower (\$10,825, FY10-11 average)
 - Serve via Web site hydropower data from Western Area Power Administration
 - Produce annual report

Sociocultural Program Highlights (Cont.)

- Goal 11: Cultural Resources (\$367,783, FY10-11 average)
 - Reduce funding for cooperator involvement
 - Focus on completing research and development (LIDAR evaluation) and integration with NPS monitoring
 - Develop and pilot test monitoring protocols in FY10-11
 - Progress dependent on resolution of NPS concerns

Data Acquisition, Storage and Analysis (DASA) Program Highlights

- Goal 12: DASA (\$1,111,289, FY10-11 average)
 - \$200,000 annual contribution to overflight fund in FY10; defer FY11 contribution
 - Establish integrated image analysis and change-detection project
 - Focus on analysis and processing of 2009 imagery (vegetation, sandbars, camping beaches, etc.)
 - Biometrics and analysis support
 - Library operations
 - GIS support
 - Database management

Other Work Plan Highlights

Other Projects: (\$2,879,270, FY10-11 average)

- Continue ecosystem initiative started in FY08
 - Develop or refine ecosystem models
 - Conduct stakeholder workshop (April 2010)
- Science Advisor contract, independent reviews, and PEPs
- SCORE II report and knowledge assessment in FY11
- Survey support and control network
- Logistics base support
- Program planning and management
- Implement and maintain new GCMRC Web site

AMWG/TWG Motion Issues (Cont.)

- Issue: GCMRC should disclose the total burden rate for each item in the budget
 - Total burden for each project *is* shown (appendix E)
 - Role of USGS appropriated funds (about \$1M) in reducing the burden rate assessed on projects is described in biennial work plan
 - Detailed accounting of how USGS appropriated funds (\$1M) is allocated to specific projects is *not* provided

AMWGW/TWGW Motion Issues (Cont.)

- Issue: GCMRC should develop an off-the-shelf HFE science plan for a potential next experiment
 - Three options evaluated and discussed with TWGW

HFE Published Findings

- The only way to rebuild sandbars using dam operations is to release short-duration high flows after tributary floods deposit large amounts of sand into the main channel of the Colorado River. Topping and others, 2006
- Because the amount of sand typically supplied by tributaries in any one year is limited, a series of sand-enriched high flows will be needed to determine if there is a flow only operating strategy for rebuilding and maintaining sandbars. Topping and others, 2006
- Under “optimal” dam operations (low steady flows with frequent sand enriched high flows) it **may** be possible to rebuild sand bars in the Grand Canyon over the long run. However, there is considerable uncertainty whether this will be possible under the current basin hydrology and dam operating rules (MLFF) (Wright and others, 2008)

HFE Option 1

Develop an off-the-shelf science plan in FY10 for a single HFE that would be implemented when next sediment “trigger” is met.

➤ PROS

- + Allows managers to pursue the only identified dam operation strategy for rebuilding sandbars
- + Allows for evaluation of potential cumulative building of sandbars occurring under repeated sand-enriched HFEs
- + Allows opportunity to test an alternative duration peak flow

➤ CONS

- Impacts HFE synthesis and other efforts (for example, SCORE II)
- Minimal learning, simply repeats what has already been tested
- Does not incorporate findings of HFE synthesis or integrated modeling project research results

HFE Option 2

Develop a multiyear HFE science plan after HFE synthesis is completed (Sept 2010) that addresses (1) triggers and other HFE parameters and (2) experimental daily operations (**TWG Recommended Option**)

➤ PROS

- + Consistent with commitments in 2008 EA/FONSI
- + Allows more time for comprehensive HFE planning
- + Provides more time to accumulate experimental funds
- + Minimizes impact to existing project schedules and reporting commitments

➤ CONS

- If sediment input occurs in FY10, foregoes the opportunity to rebuild sandbars

HFE Option 3

Replicate 2004/2008 HFE when next sediment trigger is met. Rely primarily on existing resource monitoring projects to assess the effects of the high flow. Pursue multiyear plan (Option 2) once HFE synthesis is complete in fall 2010.

➤ PROS

- + Allows managers to pursue the only identified dam operation strategy for rebuilding sandbars
- + Minimal impact on experimental fund
- + Minimal impact to ongoing projects and schedules
- + Allows for evaluation of cumulative sandbar building and maintenance under repeated, sand-enriched HFEs

➤ CONS

- Does not incorporate findings of HFE synthesis or integrated modeling project research results
- Counter to commitments in 2008 EA/FONSI



HFE Conclusions

➤ GCMRC supports Option 2

- Allows GCMRC to meet reporting and synthesis commitment in FY10
- A fully informed HFE science planning process could be completed in FY11

➤ GCMRC supports Option 3

- Such an adaptive management response will allow reporting and long-term HFE planning to continue on schedule

➤ GCMRC does not support Option 1

- Would disrupt ongoing projects and reporting commitments

➤ HFE planning involves more than science

- DOI/AMWG should actively pursue discussions related to desired future conditions for sediment, legal/policy basis for HFE's, and a structured long-term HFE planning and compliance approach

Deferred/Scaled Back Projects

- Expanded economic analysis
- Decision-support tools/trade-off analyses
- Cooperator involvement in archaeological site monitoring
- 1984 sandbar analysis
- Arthropod monitoring
- Hyperspectral image acquisition and analysis
- Terrestrial ecosystem modeling
- FY11 contribution to the overflight fund
- Recreation study
- Temperature control device planning and design

Other Significant Issues

- Impact to the experimental fund and future experimentation (see handout)
- Impact to nonnative fish control contingency fund
- Competition for funding among science, management actions, *and* compliance actions