Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
May 10, 2012 Webinar

Agenda Item

FY13-14 Budget Development and Process

Action Requested

✓ Feedback is requested from AMWG members.

Presenters

Shane Capron, Technical Work Group Chair, Western Area Power Administration
Glen Knowles, Chief, Adaptive Management Group, Upper Colorado Region, Bureau of Reclamation
Jack Schmidt, Chief, Grand Canyon Monitoring and Research Center

Previous Action Taken

✓ By TWG: At its April 16-17 meeting, TWG heard budget reports from GCMRC and Reclamation, and generated a list of technical and policy concerns.

Relevant Science

N/A

Background Information

TWG Chair Budget Report – Shane Capron

During review of the budget and work plan, the TWG and Budget Ad Hoc Group (BAHG) have continued to implement the budget process as requested by Anne Castle (Secretary's Designee: March 31, 2011; May 4, 2011) which modified parts of the AMWG approved budget protocol (May 6, 2010). Both of these documents are posted at http://www.usbr.gov/uc/rm/amp/amwg/mtgs/12may10/index.html.

The goal of this process is to identify and resolve technical issues of detail at the TWG/DOI level and refer only policy-level issues to AMWG for consideration.

As part of this process, a fully described budget and work plan is provided to TWG and the BAHG for review before the June TWG meeting. At its June meeting, TWG makes a budget recommendation to AMWG, and any remaining technical issues could be forwarded to DOI for consideration. The AMWG considers a budget recommendation to the Secretary at its August meeting.

TWG received the draft budget overview April 6, held a BAHG webinar on April 12, and held a TWG meeting on April 16-17. Based on this brief review, TWG identified several technical issues for DOI to consider, as well as six policy issues for AMWG to consider. AMWG will hear a

presentation about the six policy items, and will have the opportunity to offer feedback to TWG and DOI, either in the form of informal discussion or a motion.

The full report from TWG is the first attachment to this document. The TWG followed a consensus-building process that led to consensus on all of the issues in the attachment. Following are the policy issues identified by the TWG for the consideration of the AMWG. The bold language is what was approved by consensus at the TWG meeting. The regular font that follows is explanatory.

1. **Tribes should be included in the process as equal partners in the program. Specifically, Tribes, as sovereign governments, should participate at the earliest moments of development of programs, projects, and budgets.**

   Tribes believe they should be included earlier in all aspects of the AMP program. Tribes will have the opportunity to discuss how they would like to participate during the AMWG webinar. AMWG can discuss and offer feedback as desired.

2. **Clarify funding for Lees Ferry Creel surveys. If annual Creel surveys are important, funding needs to come from this program. AGFD can do only every 3 years. Supplement with AMP; coordinate.**

   Arizona Game and Fish Department (AGFD) creel surveys provide information on the angler catch per unit effort (CPUE) in the Lees Ferry area. These surveys cost approximately $25,000 per year and have been funded by AGFD since 1977. These annual surveys provide a long-term data set of relative abundance. However, due to lack of funds and other priority rivers, AGFD will be reducing the survey to once every three to five years. The data from these surveys has been used in modeling and in developing comparisons with other fishery studies. If a "blue ribbon trout fishery" were a goal of the program, these surveys would give valuable information regarding movement towards that goal. Because the trout population changes quickly, a survey every three years may be of limited use. However, annual Lees Ferry trout electrofishing assessments would continue under the current proposed budget. If the AMWG would like to consider funding this project, TWG could undertake a more detailed assessment of the utility of this study and make a recommendation to AMWG at its June meeting. Direction to TWG is requested.

3. **Identify funding sources and funding amounts for GCMRC and Science Advisors support for LTEMP EIS development and implementation.**

   If support for the Science Advisors (SAs) to participate in the LTEMP process will be forthcoming from sources outside the GCDAMP, TWG is requesting that those funds be shown in the budget tables so a true picture of funding for the SAs can be understood. AMWG can discuss and offer feedback as desired.

4. **The budget for FY 2013-14 must have a clear plan for implementing the SEAHG recommendations and set priorities.**

   The budget that GCMRC presented to the TWG did not include funding for an economist or a socioeconomic research program. TWG felt that both of these should be included. AMWG can discuss and offer feedback as desired.

5. **Examine the possibility of using NNFC contingency funds to fund GCMRC for overage.**

   Because GCMRC does not have sufficient funding from the program for its proposed workplan, TWG is suggesting that the carryover / contingency funding for non-native fish control (NNFC) could be used for some of the high-priority workplan items in the short term, particularly if there is not a projected need for NNFC in FY13. AMWG can discuss and offer feedback as desired.

6. **POAHG should re-evaluate the true budget needs and reduce accordingly.**

   The Public Outreach Ad Hoc Group (POAHG) has a standing amount of funding in the budget that increases each year by the CPI. TWG is suggesting that this AMWG subcommittee develop a budget for high-priority items during the FY13-14 period and reduce the amount of its line item, if possible. AMWG could direct the POAHG to develop a budget and provide this to TWG before its June meeting.

2013-14 Workplan – GCMRC
Please see the second attachment for the budget report from GCMRC.

2013-14 Workplan – Reclamation
Please see the third attachment for the budget report from GCMRC.

To: Deputy Assistant Secretary
Assistant Secretary - Water and Science

From: Chair
Glen Canyon Dam Technical Work Group

Date: April 19, 2012 (sent electronically)

Subject: The Glen Canyon Dam Technical Work Group (TWG) Report on Budget Issues for Review by the Department of Interior on the FY 2013-14 Glen Canyon Dam Adaptive Management Program Budget and Work Plan

The TWG has reviewed the initial FY 2013-14 budget recommendations provided by Jack Schmidt (GCMRC) and Glen Knowles (Reclamation) dated April 6, 2012 and April 9, 2012. The Budget Ad Hoc Group (BAHG), met via conference call on April 12 to review and consider the budgets. The Cultural Resources Ad Hoc Group (CRAHG) provided a report to TWG on budget issues and John Halliday (DOI) provided a report on tribal concerns. The Science Advisors also considered the budget and provided an initial review (L.D. Garrett, April 11, 2012).

During review of the budget and work plan, the TWG and BAHG, have continued to implement the budget process as requested by Anne Castle (Secretary's Designee: March 31, 2011; May 4, 2011). The goal of this process is to identify and resolve technical issues of detail at the TWG/DOI level and pass only policy-level issues up to AMWG.

The TWG requests consideration and feedback from DOI on the unresolved technical issues described below before its June 20-21 meeting. We are also transmitting the draft policy issues to DOI that the TWG will present to the AMWG at its May 10 webinar. It is possible that further technical issues may surface at the June TWG meeting. If so, the TWG Chair will forward those to you for consideration by DOI in the development of the draft budget that AMWG will consider in August.

Many of the issues described below stem from a need for further information. Dr. Schmidt has made substantial changes to the way GCMRC operates and its budget and workplan and the summaries of projects are not adequate for full consideration at this time. Based on our discussion, I believe the TWG generally supports the direction Dr. Schmidt is taking GCMRC, but has a keen interest in the details which are expected to come soon after the May 10 AMWG webinar (full budget and work plan). However, the area of most concern continues to revolve around the cultural monitoring program and the lack of a specified monitoring plan. We understand the National Park Service (NPS) and GCMRC are working to resolve differences and to develop a coordinated plan. When this project is described later this spring, the TWG would like GCMRC and the NPS to provide the rationale for how the new plan meets the needs described in the previous monitoring program approved by AMWG. We also hope that DOI endeavors to include the tribes in the development of the plan, to the extent possible, in order to fully include tribal considerations.

Technical Issues for Consideration by DOI (via Caramanian)

General Information Needs

1. There were a number of projects in the GCMRC FY 13-14 budget that are new starts in FY 13-14 and the TWG felt that there was not enough information to evaluate these projects. The GCMRC proposal is over-budget and lacks a cultural resources monitoring component. The TWG would like more information in the form of written project proposals for each project to fully evaluate these to make recommendations on prioritization and project selection. Several projects were also specifically identified as needing more information:
    a. Project series I. Integrated riparian vegetation studies
    b. The new starts for humpback chub, project series D. Mainstem humpback chub aggregation studies and E. Humpback chub early life history near LCR
    c. Project series A. Sandbars and sediment storage dynamics and B. Stream flow, water quality, and sediment transport
    d. Project A. 4. Geochemical signatures of mined pre-dam sediment
    e. Project series G. Interactions between native fish and nonnative trout
    f. Bureau of Reclamation project "Admin Support NPS Permitting"

Cultural/Tribal Issues

2. DOI should consider funding for Tribal contracts based on requests from the tribes, including the possibility of CPI increases or increasing the base amount.
3. Funding for cultural resources, whether it be NHPA or GCPA needs to be fully developed and vetted through agencies and Tribes for the program as a whole. Add a cultural resource advisor to the Science Advisors.
4. Tribes will work with GCMRC staff to develop and implement a research project utilizing TEK for the FY 13-14 budget. (riverine ecology - aquatic ecology and riparian).

Fish/Aquatic Resources Issues

5. Do additional research proposals significantly increase handling, stress, and mortality on HBC when program has already been criticized for handling through monitoring? What is absolutely necessary to answer key questions? Make sure there is no duplication of efforts.
6. Due to ESA status, do not cut back on humpback chub monitoring except as it applies to handling issues described above. High priority is more frequent ASMR runs (e.g., every 2 years).
7. Important to maintain this work because it provides a wide view of fish population dynamics in the river. More emphasis on Diamond Down for mainstem spawning. Also focus on tributaries until temperature issue in mainstem is resolved.
8. Consolidate, combine trips to reduce costs. Collaborate with NSE project, warm water native/non-native fish surveys at Lees Ferry. Include foodbase as well, coordination with MSCP.
9. The ovaprim study should be conducted as a pilot in a lab setting first. Do otoliths research instead.
10. Speed up information for Martell to develop length-frequency method for aging to resolve errors. ASMR should be run more frequently so different management efforts can be evaluated.

Management Issues

11. Resolve conflicts regarding the treatment plans and implement the treatment plans by the end of FY12.
12. Ensure the Science Advisors' contract is fully funded, as defined in the contract.
13. Clearly identify the cultural resources budget. [Budget is currently $0.5 M over without cultural resources funding needs being identified]
14. Examine the possibility of further reducing logistical costs through consolidation of resources.
15. Reevaluate the scope of work of the facilitator position with the goal of reducing as appropriate.
16. Identify funds for biological opinion (ESA) and Section 106 compliance, and for HFE and non-native EA's.
17. Indentify all sources and amounts of funds in the AMP program. [to include outside funds, appropriations, etc]
18. Indentify the possibility of a stakeholder field trip down the CRE or other activity near the CRE.

Accountability Issues

19. Please provide a brief description of delivered reports, accomplishments and a tracking of funds spent on the development of the cultural resources monitoring program. Please describe how the AMWG approved monitoring program is being proposed to be modified by DOI in May.
20. Please provide funding for the preparation of summaries of the knowledge assessment workshops in time to be considered for the LTEMP EIS.
21. The biological opinion requires periodic monitoring for Kanab Ambersnail, however this is not provided for in the draft budget. Provide funding for taxonomic report in 2013.
22. Please provide clarification on the agencies involved and principal investigators for all projects. Also, please consult in FY13-14 with collaborative agencies involved.
23. Please provide funding for periodic reports on Lake Powell water quality and the implications for downstream ecology.
24. Please provide funding for a science plan for the Rapid Response HFE.

Policy Issues for Consideration by AMWG

1. Tribes should be included in the process as equal partners in the program. Specifically, Tribes, as sovereign governments, should participate at the earliest moments of development of programs, projects, and budgets.
2. Clarify funding for Lees Ferry Creel surveys. If annual Creel surveys are important, funding needs to come from this program [GCDAMP]. AGFD can do only every 3 years. Supplement with AMP; coordinate.
3. Identify funding sources and funding amounts for GCMRC and Science Advisors support for LTEMP EIS development and implementation.
4. The budget for FY 2013-14 must have a clear plan for implementing the SEAHG recommendations and set priorities. [socioeconomic implementation plan]
5. Examine the possibility of using NNFC contingency funds to fund GCMRC for overage.
6. POAHG should re-evaluate the true budget needs and reduce accordingly.

United States Department of the Interior
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April 6, 2012

Memorandum

To: Technical Work Group (TWG)

From: John (Jack) C. Schmidt, Chief

Subject: Preliminary Draft Budget and Summary of Work Plan for Fiscal Years 2013 and 2014

Attached are the preliminary budgets for FY 2013 and 2014 for your consideration. Attachment 1 is a spreadsheet listing the project titles, primary investigators and primary collaborators, total budget amount, as well as the estimated costs for some of the primary budget categories. For each project, we state the status of the project (either on-going or new), whether the project has been significantly expanded in scope, and the purpose of the project. The primary scientific projects also have been assigned a letter, and this letter refers to Attachment 2, where summaries of each major scientific project are provided. Attachment 3 is a simple chart depicting the relative amounts assigned to each project. The budget and the project summaries do not include activities in cultural resource monitoring, nor do they include staffing of an economist.

This budget and the project summaries have been reviewed in a preliminary sense by our sister agencies of the Department of the Interior. Based on this preliminary review, we are confident that the proposed work in the natural sciences (projects A–I) is consistent with the missions and management responsibilities of the various DoI agencies, including Grand Canyon National Park. In the case of cultural resources monitoring, the GCMRC and Grand Canyon National Park have agreed to review each other's proposed monitoring and research activities for FY13/14, to revise those programs so as to develop a complementary program that meets the needs of the Park Service and of the Glen Canyon Dam Adaptive Management Program (GCDAMP), and to subsequently propose an integrated, joint program. It is anticipated that development of this integrated program revision in cultural resources will be completed soon after the April TWG meeting and will be available for review prior to the May Adaptive Management Work Group (AMWG) meeting.

Excluding the program in cultural resources monitoring and excluding the funding of a staff economist, the preliminary budget for FY13 is $9.4 million. At this point, GCMRC expects that our available funds in FY13 will be approximately $8.5 million from GCDAMP funds and approximately $0.4 million from Reclamation funds that directly fund the Lake Powell

monitoring program and support GCMRC work in monitoring the efficacy of brown trout removal in Upper Granite Gorge. Thus, the preliminary budget of GCMRC is approximately $0.5 million greater than is needed to support the entire proposed work plan, and this shortfall does not include any funding for the pending program in cultural resources monitoring, nor support for a staff economist.

Nevertheless, I am optimistic of the potential to find funds to support the work described here. Reclamation has indicated that supplemental funds might be made available to support the new research efforts described in Project E as well as the laboratory studies proposed in Project G.

Approximately 31%, 42%, and 5% of the preliminary FY13 budget addresses monitoring and research needs in the physical sciences (Projects A, B, and C), aquatic and fisheries sciences (Projects D, E, F, G, and H), and riparian ecology (Project I), respectively. These proportions are approximately the same as in the FY11/12 budget period. Approximately 19% of the preliminary budget concerns administration of the GCMRC. The budget for independent reviews, including the budget for the Science Advisors, has been decreased to $170,000 (2% of the total budget).

Most of the projects are collaborative efforts of GCMRC staff and staff in sister agencies of federal and state government, universities, and private consulting firms. We also identify collaborations with other units of the U.S. Geological Survey. In terms of major budget categories, 39% of the total budget is allocated to salaries of GCMRC staff, 19% is allocated to the work of non-USGS cooperators, and 8% allocated to the work of other USGS offices. The budget for the logistical effort of supporting river trips is approximately $1 million (11% of the preliminary budget). In contrast to past years, there is no distinct budget for remote sensing and GIS activities. Instead, these costs are absorbed into the work of each scientific project; we estimate that the total work in remote sensing and GIS services is approximately $487,000 (5% of the budget).

The budget and program of work described here were developed based on guidance provided in the Strategic Science Plan published in March 2007 and amended in April 2009, the Monitoring and Research Plan published in August 2007 and amended in 2009, the draft General Core Monitoring Plan of February 2011, and the various Knowledge Assessment Workshops conducted in 2011 and 2012. This program of work was also developed in response to the Desired Future Conditions Ad Hoc Group report that was presented to the AMWG in February 2012. Lastly, this program of work is responsive to the science plans for the Environmental Assessment for the Development and Implementation of a Protocol for High-Flow Experimental Releases, the Environmental Assessment for Non-native Fish Control, the U.S. Fish and Wildlife Service's December 2011 Biological Opinions related to those EAs, and the recent Memoranda of Agreement developed by Reclamation and the Tribes.

My charge to the GCMRC staff was to develop integrative projects that are responsive to the major issues in natural and socio-economic science that are confronted by the GCDAMP. As such, this preliminary program of study is organized into 10 major projects (including the pending program in cultural resources monitoring). Additionally, there are three other programs: independent review, USGS and GCMRC administration, and an annual allocation to fund the quadrennial acquisition of aerial photos and other remotely sensed data. The 10 major projects are focused on the primary areas of concern to the GCDAMP:

- geomorphology of fine-grained sediment (Project A);
- measurement of stream flow quantity and quality and sediment transport (Project B);
- measurement of Lake Powell water quality (Project C)
- monitoring and research concerning mainstem and tributary humpback chub (Projects D, E, F);
- monitoring and research concerning tailwater recreational rainbow trout (Project H);
- monitoring and research concerning the interactions between trout and humpback chub (Project H);
- monitoring and research concerning riparian vegetation and its interactions with geomorphic processes; and,
- cultural resources monitoring.

Approximately 50% of the preliminary budget is related to fulfilling data collection and data analysis needs associated with environmental compliance issues of the two EAs and the Biological Opinion. Approximately 13% of the preliminary FY13 budget is associated with research activities needed to resolve critical management uncertainties, especially in the biological sciences. Approximately 18% of the preliminary budget constitutes new projects not previously undertaken.

The GCMRC staff especially appreciated the thoughts and perspectives of the Budget Ad Hoc Group (BAHG) and the compiled comments received in February 2012. GCMRC chose not to initiate some of the research projects suggested by the BAHG, largely due to budget considerations. Thus, we did not initiate a new study to evaluate opportunities to reintroduce humpback chub near the Paria River, nor do we propose to study the potential to reintroduce extirpated species. Our effort to expand the riparian vegetation studies in this budget is explicitly responsive to BAHG suggestions. At this time, we are not proposing to initiate a new ecosystem modeling study, although we recognize the potential utility of such an effort. We are uncertain how to fund the GCMRC staff economist at this time, and we are exploring various options.

We look forward to the April 12th discussion with the BAHG in which the relation of this budget to other BAHG suggestions can be discussed.

Attachment 2

Summaries of GCMRC's FY 13-14 Proposals

A. Project Title: Sandbars and sediment storage dynamics: Long-term monitoring and research at the site, reach, and ecosystem scales

Collaborators: Paul Grams and Keith Kohl (Grand Canyon Monitoring and Research Center); David Rubin (U.S. Geological Survey); Joseph E. Hazel, Jr. and Matt Kaplinski (Northern Arizona University); Rod Parnell (Northern Arizona University)

This ongoing project includes a set of integrated studies conducted at multiple spatial and temporal scales that are designed to track the results of individual high flow experiments (HFEs), monitor the cumulative effect of multiple high flows and intervening operations, and advance our understanding of sediment and eddy sandbar dynamics to improve capacity for predicting the effects of future dam operations. The key uncertainty about management of sandbars below glen canyon dam articulated in the recently completed Environmental Assessment for Development and Implementation of a Protocol for High-Flow Experimental Releases from Glen Canyon Dam, 2011 through 2020 is the question, "Can sandbar building during HFEs exceed sandbar erosion during periods between HFEs, such that sandbar size can be increased and maintained over several years?" This question will only be answered through continued monitoring of sand resources over a multi-year timeframe of repeated controlled flood experimentation.

Monitoring will include daily and annual observations of long-term sandbar monitoring sites by remote camera and conventional topographic survey, respectively. These observations contribute to the existing long-term dataset and will be available following each high flow as a preliminary partial assessment of resource condition that could be used to adjust the high-flow implementation strategy, if necessary. Because these monitoring sites represent only a small proportion of the total number of sandbars in Grand Canyon, the project also includes the use of systemwide airborne remote sensing to monitor a much larger set of sandbars every four years to assess sandbar size and abundance. While the sandbar monitoring studies provide needed information on resource condition, they do not provide any measure of how much sand is in storage, and the continued success of high flows to rebuild sandbars depends on maintaining an adequate supply of sand storage. If there is a decline in sand storage, future high flows are likely to be less effective at building sandbars. To provide this information and evaluate whether dam operations, including high flows, are likely to result in sandbar maintenance or eventual decline, sediment storage will be monitored by repeat channel-wide surveys of selected river segments approximately every three to ten years. Additional components of this project are designed to integrate findings across the spatial

and temporal scales, investigate how specific changes in sandbar morphology affects campsite quality, link sandbar deposition dynamics with the distribution of riparian vegetation along shorelines, provide habitat and riverbed substrate information to biological studies, and improve our understanding of the variability of sandbar response to dam operations thereby contributing to improved capacity to predict the effects of future high flows in the context of intervening daily operations.

B. Project Title: Streamflow, water quality, and sediment transport in the Colorado River Ecosystem

Collaborators: David Topping (Grand Canyon Monitoring and Research Center); Arizona Water Science Center; Utah Water Science Center; Scott Wright (U.S. Geological Survey); and the Center for Integrated Data Analytics.

This project funds the ongoing measurement of stage, discharge, water quality (water temperature, specific conductance, turbidity, dissolved oxygen), and suspended sediment at gaging stations. The data collected by this project provide the fundamental stream flow, sediment transport, temperature, and water quality data that are used by other physical, ecological, and socio-cultural resource studies. Thus, this project directly links dam operations to the physical, biological, and sociocultural resources of the Colorado River ecosystem (CRe). This project also funds interpretation of these basic data, specifically examining how stream flow and its related attributes affect resources of the CRe.

Much of the proposed work in this project consists of high-resolution (typically 15-minute) measurements of the following parameters: stage, discharge, water temperature, specific conductance, turbidity, dissolved oxygen, suspended-sediment concentration, and suspended-sediment grain-size distribution. In addition, episodic measurements of bed sediment are made. One of the major products of this project has been the mass-balance sand budgets used to trigger artificial floods and to evaluate the effects of all dam operations on the CRe. To make all of the data collected by this project, and especially these sediment budgets, more available to both GCDAMP stakeholders and the general public, a major emphasis is being placed on the development of user-interactive web tools for downloading and visualizing these data (through collaboration with the USGS Center for Integrated Data Analytics). The tools developed in collaboration with CIDA will allow anyone to plot the data, construct mass-balance sediment budgets, and plot changes in reach-averaged bed-sediment grain size for any time period in any reach of the CRE on demand. In addition, these tools will allow different user-chosen methods for error propagation through these sediment budgets. Because sandbar response during artificial floods depends on both the amount and grain-size distribution of the sand stored in each reach these tools should be extremely useful in the planning of artificial floods under the HFE protocol EA in the upcoming LTEMP EIS. Much of the proposed

increase in the budget for this project above previous funding levels is for this effort to make the data collected by this project more available, more usable, and therefore more relevant to the decision makers in the GCDAMP.

C. Project Title: Water-quality monitoring of Lake Powell and Glen Canyon Dam releases

Collaborators: William Vernieu (Grand Canyon Monitoring and Research Center); Reclamation; National Park Service; LP Cooperators Group; and Dale Robertson (U.S. Geological Survey)

This project conducts water-quality monitoring on Lake Powell and the Glen Canyon Dam tailwaters. The water-quality monitoring program consists of monthly surveys of the reservoir forebay and tailwater, as well as quarterly surveys of the entire reservoir, including the Colorado, San Juan, and Escalante arms of the reservoir to the inflow areas. It also includes continuous monitoring of dam releases. The data collected by this project describe the current quality of Glen Canyon Dam releases to the downstream ecosystem, as well as describe the current water-quality conditions and hydrologic processes in Lake Powell, which can be used to predict the quality of future releases from the dam. The current long-term monitoring program will continue at the current level, with possible minor revisions to the number of sites monitored or parameters collected. In an effort to improve the predictive capabilities of the CE-QUAL-W2 simulation model, it is proposed that one or more inflow monitoring stations be reestablished to provide input data on inflow temperature and salinity. It is also proposed to establish one or more weather stations at remote pumpout stations in the upper part of the reservoir to improve inputs to the model. In addition to the ongoing monitoring program, efforts are currently being made to analyze sonar chart paper data to develop longitudinal profiles of the sediment deltas of the three major tributaries to evaluate rates and patterns of deposition under varying hydrologic regimes and reservoir levels. These profiles have been collected in conjunction with most quarterly reservoir surveys since 2001.

D. Project Title: Mainstem Humpback Chub Aggregation Studies and Metapopulation Dynamics

Collaborators: William Persons, Theodore Kennedy, and David Ward (Grand Canyon Monitoring and Research Center); D.R. Van Haverbeke **(**U.S. Fish and Wildlife Service); Brian Healy and Emily Omana (National Park Service); Karen Limburg and Todd Hayden (State University of New York); Scott Bonar (University of Arizona); and Scott Wright (U.S. Geological Survey)

Standardized monitoring of mainstem humpback chub aggregations has been conducted during the fall in 2002 through 2004, 2006, 2010, and 2011. Fish were sampled by hoop and trammel nets at aggregations first described by Valdez and Ryel (1995). These monitoring efforts provide catch per unit effort indices, but not abundance estimates, so inferences that can be drawn from these data regarding chub response to ongoing management actions are extremely limited; continued monitoring of aggregations is required as part of the non-native control Environmental Assessment and associated Biological Opinion. This project, conducted in collaboration with the U.S. Fish and Wildlife Service, Grand Canyon National Park , and the University of Arizona, will increase aggregation sampling during FY13-14, including the addition of a second aggregation sampling trip in late spring/early summer, to improve monitoring techniques and provide estimates of humpback chub abundance at all mainstem aggregations. This additional sampling will also improve our understanding of the role ongoing juvenile humpback chub translocations play in the metapopulation dynamics of this species.

Although recent catch rate information indicates aggregations might be growing, absolute numbers of humpback chub at aggregations remains low. Therefore, we propose a suite of research activities to better understand the factors limiting the abundance of aggregations. We propose research on otolith microchemistry of juvenile humpback chub at aggregations to assess whether these aggregations are supported by emigration of juvenile fish from the Little Colorado River or local spawning and recruitment. Recent foodbase research efforts indicate fish production throughout Glen, Marble, and Grand Canyon is limited by the availability of high quality prey, particularly midges and black flies; although food availability was quantified across 5 sites in Grand Canyon including at least one aggregation (Middle Granite Gorge, river mile ~127), the feeding habits and energy intake by humpback chub were only quantified at the Little Colorado River confluence area. We therefore propose estimating the growth potential of humpback chub at aggregations by quantifying food resource availability (i.e., invertebrate drift), , measurement of chub feeding habits, and integration of these data using models of net energy intake potential that account for prey detection and the energetic costs of swimming by fish, among other things. These data will be compared with similar data collected near the Little Colorado River, which are described in a different project. Reproductive potential of humpback chub will be determined using condition indices (i.e., lipids) and manipulative experiments. Collectively, the proposed research will yield a more rigorous aggregation monitoring program and will increase our understanding of the ecology of aggregations, including whether downstream reaches in Grand Canyon are capable of supporting self-sustaining populations of humpback chub.

E. Project Title: Humpback chub (*Gila cypha*) early life history in and around the Little Colorado River

Collaborators: Charles Yackulic, Theodore Kennedy, and David Ward (Grand Canyon Monitoring and Research Center); Colden Baxter (Idaho State University); Bill Pine (University of Florida); D.R. Van Haverbeke (U.S. Fish and Wildlife Service); and Scott Wright (U.S. Geological Survey)

The Nearshore Ecology Project (NSE) validated Visual Implant Elastomer (VIE) tags and otolith microchemistry as useful tools for understanding juvenile humpback chub movements, growth, and survival. Prior to NSE, our ability to quantify variation in cohort strength was limited to back-calculations from two-year old fish (Coggins and Walters 2009). These tools provide information that is critical for evaluating ongoing adaptive management experimentation because population dynamics of many fish species are driven by changes in survival at early life stages (i.e., <1 year; Walters and Martell 2004). A better understanding of juvenile humpback chub early life history was identified as a critical information need at recent Knowledge Assessment Workshops (GCMRC and Cooperator presentations, 2011-2012). Recent foodbase research efforts indicate fish production throughout Glen, Marble, and Grand Canyon is limited by the availability of high quality prey, particularly midges and black flies; however, food web structure and the potential for food limitation of humpback chub in the Little Colorado River itself have not been studied. Because foodbase and NSE sampling was/is limited to the mainstem and current LCR monitoring is limited to the spring and fall, these projects do not allow us to understand the relative importance of LCR hydrology, food availability and food web structure in the LCR itself, and inter- and intraspecific interactions in determining young-of-year survival and outmigration. A better understanding of the drivers of among year variation in juvenile humpback chub survival and outmigration from the LCR, combined with ongoing NSE survival estimates from the mainstem, would allow us to evaluate the relative importance of the LCR versus the mainstem in humpback chub population dynamics.

Our proposal calls for: a) estimating growth, survival and dispersal of juvenile humpback chub in the Little Colorado River by marking young-of-year humpback chub in the Little Colorado River in July of each year, b) determining food availability and food web structure in the Little Colorado River confluence including describing the feeding habits of juvenile chub in both the LCR and mainstem, c) systematic collection of otoliths from young-of-year in both the LCR and mainstem across seasons to better resolve movement and dispersal, d) laboratory studies on chemical imprinting to determine whether the timing of juvenile outmigration ultimately affects spawning site fidelity for chub, and e) data analysis and modeling to determine both the relative roles of hydrology and

intraspecific interactions in LCR juvenile dynamics and the relative importance of the LCR versus the mainstem in humpback chub population dynamics.

F. Project Title: Long-term monitoring of native and nonnative fishes in the mainstem Colorado River and the Little Colorado River

Collaborators: William Persons, Luke Avery, Charles Yackulic, and Mike Yard (Grand Canyon Monitoring and Research Center); Aaron Bunch and Brian Clark (Arizona Game and Fish Department); D.R. Van Haverbeke, Dennis Stone, and Mike Pillow (U.S. Fish and Wildlife Service); Brian Healy and Emily Omana (Grand Canyon National Park); Josh Korman (Ecometric Research); and Dana Winkelman and Kristen Pearson (Colorado State University)

Native and nonnative fish populations in Grand Canyon are key resources of concern influencing decisions on both the operation of Glen Canyon Dam and non-flow actions. To inform these decisions, it is imperative that accurate and timely information on the status of fish populations, particularly the endangered humpback chub, be available to managers. A suite of adaptive experimental management actions are being contemplated to better understand the mechanisms controlling the population dynamics of native and nonnative fishes and to identify policies that are consistent with the attainment of management goals. The assessments generated from this project provide a baseline from which to assess the effects of implemented experimental actions. This information is therefore crucial to (1) inform the program as to attainment of identified goals, (2) provide baseline status and trend information to be used as a backdrop to further understand mechanisms controlling native and nonnative fish population dynamics, and (3) evaluate the efficacy of particular management policies in attaining program goals. The results of this project are potentially useful in assessing changes to the Federal Endangered Species Act listing status of humpback chub in Grand Canyon.

G. Project Title: Interactions between native fish and nonnative trout

Collaborators: David Ward (Grand Canyon Monitoring and Research Center); Aaron Bunch and Mike Anderson (Arizona Game and Fish Department); D.R. Van Haverbeke (U.S. Fish and Wildlife Service); Brian Healy and Emily Omana (Grand Canyon National Park)

We propose to evaluate impacts of rainbow and brown trout on humpback chub in both laboratory and field settings. Laboratory studies will be used to isolate confounding variables and quantify relative competition and predation impacts of rainbow and brown trout on humpback chub under varying environmental conditions. Results of laboratory

tests will then be used in conjunction with data from long-term monitoring to model population level impacts of trout on humpback chub. A field study conducted in collaboration with Grand Canyon National Park will remove brown trout using electrofishing in and around Bright Angel Creek and subsequently evaluate impacts of brown trout removal on native fish populations. Combining laboratory studies, field studies, monitoring efforts, and modeling will allow researchers to understand and quantify how predation and competition by trout are impacting humpback chub at a population level, and will allow managers to better plan and implement management actions designed to conserve Colorado River native fishes.

H. Project Title: Identifying the main driver(s) of rainbow trout growth, population size, demographics and distribution in Glen and Marble Canyon

Collaborators: Mike Yard, David Ward, Theodore Kennedy, and Charles Yackulic (Grand Canyon Monitoring and Research Center); Aaron Bunch and Mike Anderson (Arizona Game and Fish Department); Robert Hall (University of Wyoming); Scott Wright (U.S. Geological Survey); and Josh Korman (Ecometric Research)

Over the last few decades the rainbow trout (Oncorhynchus mykiss; hereafter RBT) fishery in Lees Ferry has been characterized by three undesirable properties: 1) an absence of the large RBT that are highly valued by the angling community (Schmidt and others 1998), 2) increasing potential for negative interactions between RBT and native fishes as RBT populations expanded downstream (Yard and others 2011), and 3) decadal scale cycles in RBT population abundance (Makinster and others 2011). The causes of the long term population cycles (3) are fairly well understood (Korman et al., in press), and the Natal Origins project was specifically designed to address uncertainties surrounding the downstream migration of RBT (2). Here, we propose a suite of activities, many of which build on the Natal Origins platform, to better understand the factors limiting the growth of large RBT (1). Research efforts have repeatedly identified the limited prey base in Glen Canyon as a likely cause of some of these undesirable properties (Stevens and others 1997, McKinney and Speas 2001, Cross and others 2011) so our proposal emphasizes continued research on fish-food linkages.

Our proposal calls for: a) a simple laboratory experiment to determine if the strain of rainbow trout in Lees Ferry is actually capable of growing to large size, b) measurement of algae primary production, invertebrate drift, and rainbow trout diets to quantify prey abundance, and c) modeling that combines hydrodynamics, invertebrate drift, and fish bioenergetics to estimate net energy intake and growth potential for rainbow trout, and d) a synthesis of data from tailwaters throughout the nation to better understand the link between salmonid population dynamics and flow and temperature regimes, which will

help identify alternative flow regimes that could be considered for implementation on Glen Canyon Dam. In addition, we present a contingency plan for a potential fall High Flow Experiment (HFE). Although we have a good understanding of food web response to the spring HFEs conducted in 1996 and 2008, our understanding of food web response to the fall HFE in 2004 is more limited. Thus, we are also poised to take advantage of the learning opportunity presented by any HFEs that occur during FY13-14.

I. Project Title: Integrated riparian vegetation studies

Collaborators: Barbara Ralston, Phil Davis, and Paul Grams (Grand Canyon Monitoring and Research Center); Dustin Perkins (Northern Plateau I&M Program); Grand Canyon National Park; Northern Arizona University

Riparian vegetation affects physical process as well as ecological and cultural interactions along the river corridor. Reduced local precipitation, altered basin hydrology, and the introduction of the tamarisk leaf-beetle into the river corridor in 2008 are conditions that collectively may significantly alter the composition of the riparian community and indirectly affect efforts to manage and conserve sediment along the corridor. The presence and expansion of vegetation promotes bank stability which is the antithesis of the historic Colorado River sediment dynamics. The effect of riparian vegetation's presence and the uncertain direction that compositional changes may take has garnered the attention of stakeholders within the Adaptive Management Program for Glen Canyon Dam (GCDAMP), and resource managers along other stretch of the Colorado Rivers. The stakeholders for the GCDAMP requested a greater emphasis be put on quantifying and understanding riparian vegetation dynamics. Better understanding of the response of riparian vegetation to Glen Canyon Dam and the effect of riparian vegetation on other resources can be gained by improving the monitoring efforts within the river corridor downstream of Glen Canyon Dam, and by expanding opportunities to compare and integrate riparian monitoring data and research across the Colorado River Basin. This proposal includes three study elements that are intended to initiate a monitoring approach that is collaborative with the National Park Service's Northern Colorado Plateau's Inventory and Monitoring Program and Grand Canyon National Park, and research efforts intended to be integrative with the physical sciences and trophic interactions.

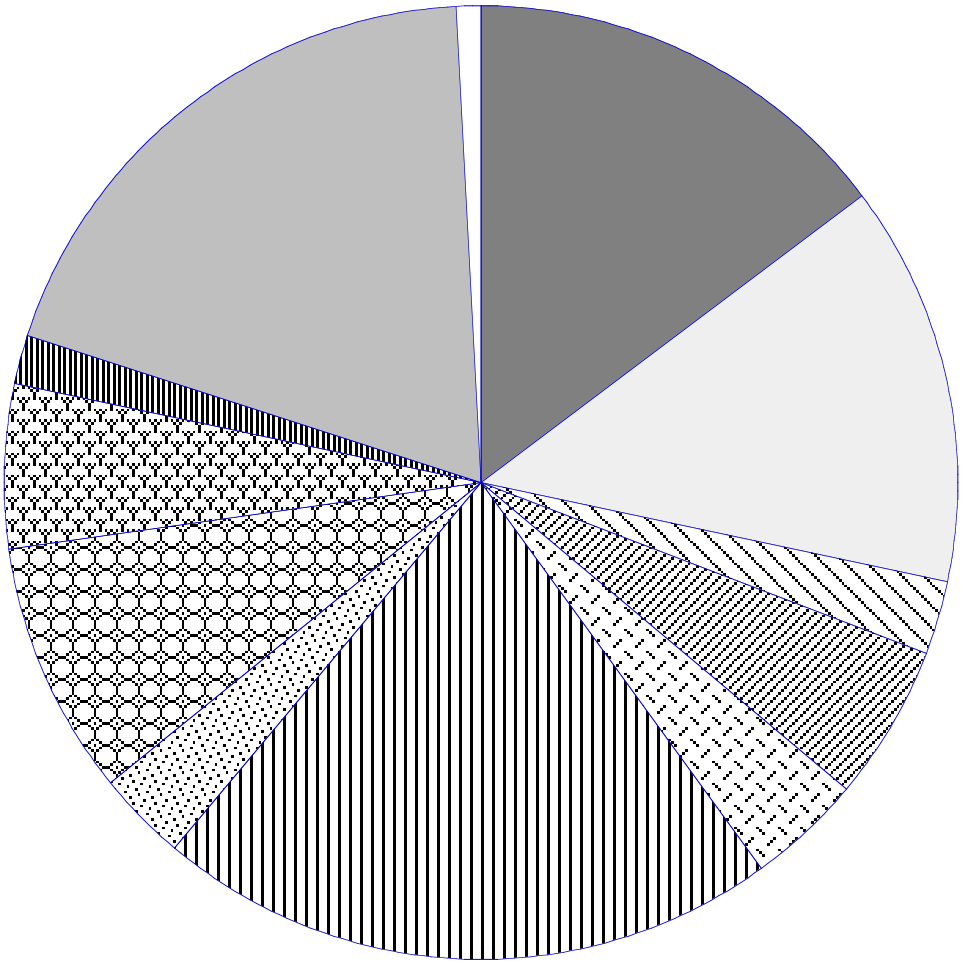
This proposed work includes three complimentary elements: 1) Remote and ground-based riparian vegetation monitoring; 2) Investigating Eddy Sandbar Variability: Interactions among Flow, Vegetation, and Geomorphology; 3) Riparian vegetation dynamics and trophic level linkages. Vegetation monitoring data should inform resource managers about the status of vegetation as it relates to biotic, physical and cultural resources within a geomorphic framework that allows comparison of vegetation response

across the river corridor (Element 1 goal). Monitoring the response of vegetation may provide feedback information to geomorphology research concerned about responsive or unresponsive bars either within or between river reaches (Element 2 goal). Data collected for vegetation monitoring can also compliment research focused on understanding trophic linkages between aquatic and terrestrial systems and how dam operations and other agents of change (e.g., tamarisk beetle) may affect these linkages (Element 3 goal). The Adaptive Management Program has identified specific monitoring information needs associated with Goal 6 that identify species composition distribution and area cover as basic data the program needs to understand plant response to dam operations. Consistent data collection of species presence and cover that is nested within a geomorphic framework can assist resource managers in answering the following questions which are drawn from the stated information needs:

1. Which species (native and nonnative species) and what is the percent cover of species that occupy and form habitat within the depositional environments of debris-fan eddy complexes and the channel margins associated with the hydrologic features of pools, eddys, and runs? (Element 1 goal)
2. How do patterns of species composition and cover vary by stage and by river reach?
3. Do species common to all reaches of river within Grand Canyon respond similarly to changes in operations of Glen Canyon Dam? (Element 1 goal).
4. How does woody riparian vegetation expansion below power plant capacity limit sediment conservation associated with experimental high flows? (Element 2 goal).
5. How does woody riparian vegetation expansion below power plant capacity affect shoreline complexity for juvenile fish? (Element 2 goal).
6. How will the decline in tamarisk cover affect riparian breeding bird habitat, reptile abundance along the river corridor and (or) available terrestrial food resources (e.g., ground-dwelling arthropods)? (Element 3 goal).

Answering these questions requires data collection and analysis at multiple spatial scales using ground-based sampling, periodic collection of remotely sensed imagery and modeling that is integrated with physical resources. By answering these questions through monitoring and research, opportunities to experiment with release volumes and patterns of release from Glen Canyon Dam may allow resource managers to move toward reaching their resource goal of supporting native vegetation in some portions of the river if not the majority of the Colorado River downstream from Glen Canyon Dam.

Preliminary FY13 GCMRC budget
(does not include cultural resources)



- Sandbars and sediment storage dynamics
- Stream flow, water quality, and sediment transport
- Lake Powell water quality monitoring
- Mainstem humpback chub aggregation studies
- Humpback chub early life history near LCR
- Long-term monitoring native and nonnative mainstem
- Native fish and nonnative trout interactions
- Identifying main drivers rainbow trout growth, etc
- Integrated riparian vegetation studies
- Independent Review
- USGS Administration
- Other Allocations

Attachment 1

						FY 13						FY14	
					investigators	GCMRC salaries	logistics	GIS / RS / electronics support (includes burden)	cooperators (non-USGS)	USGS cooperators	total	total	collaborators / cooperators
				Total (does not include Cultural Resources monitoring)		$3,669,000	$1,047,000	$487,000	$1,808,000	$757,000	$9,370,000	$9,739,000	
			A	***Sandbars and sediment storage dynamics ($1,391,000)***									
on-going		GCDAMP monitoring, including environmental compliance		1. Sandbar and camping beach monitoring …	Grams et al	$106,000	$27,000	77,000	$98,000		$344,000	$354,000	Northern Arizona U
on-going		GCDAMP monitoring, including environmental compliance / research		2. Sediment storage monitoring and research	Grams et al	$259,000	$74,000	$81,000	$164,000	$14,000	$691,000	$712,000	Northern Arizona U, USGS/Coastal Marine Geology
new		research		3. Bed sediment influences on suspended sediment	Rubin et al	$43,000	$37,000	$22,000	$65,000	$83,000	$267,000	$275,000	USGS/Coastal Marine Geology
new		research		4. Geochemical signatures of mined pre-dam sediment	Takesue et al	$6,000				$46,000	$53,000	$55,000	USGS/Coastal Marine Geology
on-going				5. General survey support	Kohl et al	$22,000	$6,000				$36,000	$37,000	
on-going		GCDAMP monitoring, including environmental compliance	B	***Stream flow, water quality, and sediment transport ($1,258,000)***	Topping	$524,000	$60,000	$55,000		$480,000	$1,258,000	$1,336,000	USGS/AZ Water Science Center, USGS/UT Water Science Center, USGS/Center Integrated Data Analytics
on-going		GCDAMP monitoring	C	***Lake Powell water quality monitoring ($236,000)***	Vernieu	$166,000	$22,000				$236,000	$243,000	Reclamation, National Park Service
			D	***Mainstem humpback chub aggregation studies (504,000)***									
on-going	expanded	GCDAMP monitoring, including environmental compliance		1. Aggregation sampling	Ward et al	$22,000	$100,000	$15,000	$80,000		$250,000	$257,000	US Fish Wildlife Service
on-going	expanded	GCDAMP monitoring, including environmental compliance		2. Aggregation ecology	Kennedy et al.	$51,000	$15,000	$15,000	$27,000		$124,000	$127,000	US Fish Wildlife Service
new		research		3a. Adult condition and reproductive potential (ovaprim studies)	Ward et al.	$7,000			$15,000		$27,000	$28,000	USGS/AZ Co-op Unit, US Fish Wildlife Service
new		research		3b. Adult condition and reproductive potential (ultrasonic imaging)	Ward et al.	$7,000			$15,000		$36,000	$28,000	USGS/AZ Co-op Unit, US Fish Wildlife Service
new		research		3c. Adult condition and reproductive potential (diet nutritional studies)	Ward et al.	$7,000			$15,000		$29,000	$31,000	USGS/AZ Co-op Unit, US Fish Wildlife Service
new		research		4. Humpback chub natal origins	Persons et al.	$10,000			$20,000		$38,000	$38,000	US Fish Wildlife Service, SUNY
			E	***Humpback chub early life history near LCR ($358,000)***									
new		research		1. July LCR marking	Yackulic et al.	$65,000	$10,000				$93,000	$97,000	
new		research		2. Describing trophic ecology humpback chub in LCR	Kennedy et al	$69,000			$20,000		$119,000	$110,000	Univ Wyoming
new		research		3. Otolith sampling NSE reach in fall		$11,000					$32,000	$32,000	SUNY
new		research		4. Laboaratory study imprinting of humpback chub (FY 14 project)	Ward et al.							$39,000	
new		research		5. Linkages / modeling	Yackulic et al.	$84,000			$10,000		$114,000	$118,000	Univ Florida
			F	***Long-term monitoring native nonnative fishes mainstem Colorado River and LCR ($1,988,000)***									
on-going		GCDAMP monitoring, including environmental compliance		1. Mainstem spring native/nonnative fish monitoring	Persons et al.	$23,000	$55,000		$103,000		$206,000	$212,000	AZ Game Fish Dept
on-going		GCDAMP monitoring, including environmental compliance		1c.1. Rainbow trout monitoring	Persons et al.	$23,000	$42,000		$132,000		$216,000	$222,000	AZ Game Fish Dept
on-going		GCDAMP monitoring, including environmental compliance		1c.2. Rainbow trout early life studies	Avery et al.	$46,000	$42,000				$109,000	$113,000	
on-going		GCDAMP monitoring, including environmental compliance		1d. Mainstem monitoring native/nonnative fish near LCR confluences	Yard et al.	$13,000	$206,000		$177,000		$432,000	$445,000	Ecometric Inc.
on-going		GCDAMP monitoring, including environmental compliance		2a. Annual spring/fall HBC abundance estimates lower 13.6km ofLCR	Persons et al.	$18,000	$86,000		$364,000		$511,000	$526,000	US Fish Wildlife Service
on-going		GCDAMP monitoring, including environmental compliance		2b. Monitoring native/nonative in lower 1,200m LCR	Persons et al.	$17,000	$12,000		$50,000		$88,000	$90,000	AZ Game Fish Dept

						FY 13						FY14	
					investigators	GCMRC salaries	logistics	GIS / RS / electronics support (includes burden)	cooperators (non-USGS)	USGS cooperators	total	total	collaborators / cooperators
on-going		GCDAMP monitoring, including environmental compliance		2c. Translocation and monitoring above Chute Falls	Persons et al.	$17,000	$37,000		$67,000		$132,000	$135,000	US Fish Wildlife Service
on-going		GCDAMP monitoring / research		2d. PIT tag antenna monitoring	Persons et al.	$23,000	$6,000		$40,000		$80,000	$41,000	Colorado State U
on-going		GCDAMP monitoring, including environmental compliance		3. Stock assessment and structured mark recapture model humpback chub abundance estimates	Yackulic et al.	$19,000					$22,000	$23,000	
on-going		GCDAMP monitoring, including environmental compliance		4. Detection of rainbow trout movement from upper Colorado River below GCD	Korman	$35,000	$28,000		$67,000		$192,000	$198,000	Ecometric Inc.
			G	***Interactions between native fish and nonnative trout ($277,000)***									
new		research		1. Laboratory studies…	Ward	$52,000					$83,000	$84,000	AZ Game Fish Dept, US Fish Wildlife Service, US Forest Service
new		GCDAMP monitoring / research		2. Efficacy ecological impacts brown trout	Ward et al.	$71,000	$89,000				$194,000	$196,000	AZ Game Fish Dept, National Park Service
			H	***Identifying main drivers rainbow trout growth, population size, demographics, distribution ($814,000)***									
on-going	expanded	GCDAMP monitoring / research		1. Establishing current conditions	Yard et al	$59,000					$113,000	$116,000	Ecometrics, Inc.
new		research		2. Laboratory feeding studies	Ward	$15,000					$36,000	$5,000	
on-going	expanded	GCDAMP monitoring / research		3. Monitoring modeling food base	Kennedy et al.	$254,000			$20,000		$327,000	$337,000	Idaho State U
new		GCDAMP monitoring / research		4. Integration modeling factors limiting large rainbow trout growth	Yackulic et al.	$98,000					$111,000	$114,000	
new		research		5. Tailwater synthesis	Yackulic et al.	$93,000					$118,000	$128,000	
new		GCDAMP monitoring, including environmental compliance / research		6. Rainbow trout population management	Yard et al	$45,000	$23,000				$109,000	$113,000	
			I	***Integrated riparian vegetation studies ($509,000)***									
on-going	expanded	GCDAMP monitoring		1. Integrated vegetation monitoring	Ralston	$69,000	$30,000	$137,000	$25,000		$276,000	$281,000	National Park Service
new		research		2. Vegetation-sediment modeling	Ralston	$113,000	$35,000				$189,000	$193,000	
new		research		3. Riparian vegetation dynamics - trophic linkages	Ralston	$26,000	$5,000				$44,000	$45,000	
				Cultural Resources monitoring									
on-going	expanded	GCDAMP monitoring, including environmental compliance		Glen Canyon NRA and Grand Canyon NP Cultural Resource Pilot Monitoring Project; Grand Canyon NP remote sensing analysis ***(GCMRC and NPS project proposals are under review)***	Fairley et al.								USGS/Geology, Minerals, Energy, and Geophysics Science Center
				Independent Review ($170,000)									
on-going	reduced			Independent Reviewers					$21,000		$24,000	$25,000	
on-going	reduced			Science Advisors					$142,000		$146,000	$150,000	
				USGS Administration ($1,780,000)									
				Budget analyst, communications support, library, discretionary awards		$253,000			$71,000		$426,000	$439,000	
				vehicles							$134,000	$138,000	
				leadership personnel		$584,000					$699,960	$717,000	
				AMWG/TWG travel							$32,000	$33,000	
				SBSC IT overhead						$134,000	$153,000	$158,000	
				Logistics base costs		$244,000					$335,000	$345,000	
				Other Allocations ($85,000)									
				Annual contribution of Overflight Fund				$85,000			$85,000	$200,000	

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Regional Office
125 South State Street, Room 6107
Salt Lake City, Utah 84138-1102

IN REPLY REFER TO:

Memorandum

Date: April 9, 2012

To: Glen Canyon Dam Adaptive Management Program (GCDAMP) Technical Work Group (TWG)

From: Glen Knowles, Chief, Adaptive Management Group, Bureau of Reclamation (Reclamation)

Subject: Draft Reclamation GCDAMP Budget Table for Fiscal Years (FY) 2013 and 2014

Attached is a spreadsheet table of the Reclamation GCDAMP budget for fiscal years FY 2013-14. Much of this budget should look familiar to you. The GCDAMP budget has been adjusted for the consumer price index (CPI); CPI for FY 2012 is 3.9 percent, and is forecasted to be 3.0 percent in 2013 and 2014. We are in the process of creating new project summaries for Reclamation's budget; we will provide these to you in a joint-agency draft budget and work plan document with the Grand Canyon Monitoring and Research Center (GCMRC) for your review. We anticipate the draft budget and work plan will be available for your review prior to your June 20-21, 2012 TWG meeting.

We have included indication of $91,000 of appropriated funds provided to the National Park Service in FY 2012 for cultural resources monitoring, and we continue to identify $500,000 annually for cultural resources monitoring and research needs though the Grand Canyon Treatment Plan line item. As Jack Schmidt informed you in his memo to you on April 6, 2012, GCMRC and Grand Canyon National Park have agreed to review each other's proposed monitoring and research activities for FY 2013-14 and develop a complementary program that meets the needs of the National Park Service and the GCDAMP through an integrated, joint cultural resources program. It is anticipated that development of this integrated program will be completed soon after the April TWG meeting and be available for your review prior to the May 10, 2012 Adaptive Management Work Group (AMWG) webinar. We look forward to working with both agencies, the GCDAMP Tribes, and the TWG to create a cultural resources program that meets the needs of the GCDAMP, as well as our responsibilities for National Historic Preservation Act and Grand Canyon Protection Act compliance.

We have also made changes to the use of the Experimental Carryover Fund and the Non-native Fish Control Contingency Fund. Because the cost of high flow experiments are now covered through existing GCMRC monitoring and research efforts, the use of the Experimental Carryover Fund will now be used primarily to fund non-native fish control needs, if the HFE Protocol and Non-native Fish Control EA proposed actions are implemented.

Glen Canyon Dam Adaptive Management Program

FY 2013-14 Preliminary Draft Budget for the Bureau of Reclamation **Updated: 4/8/12**

	Description				FY12 w/3.9% CPI	FY13 w/3.0% CPI	FY14 w/3.0% CPI
AMWG							
	Personnel Costs - Labor & Burden				184,846	190,391	196,103
	AMWG Member Travel Reimb				14,756	15,199	15,655
	AMWG Reclamation Travel Reimb.				15,140	15,595	16,062
	Facilitation Contract				40,531	41,747	43,000
	POAHG Expenses - Labor, Burden, & Travel				59,305	61,084	62,917
	Other				8,509	8,765	9,028
	Subtotal				**$323,087**	**$332,781**	**$342,765**
TWG							
	Personnel Costs - Labor				92,045	94,806	97,651
	TWG Member Travel Reimb.				21,681	22,331	23,001
	Reclamation Travel				14,958	15,407	15,869
	TWG Chair / Facilitation				30,145	31,049	31,980
	Other				2,431	2,504	2,579
	Subtotal				**$161,260**	**$166,097**	**$171,080**
OTHER							
	Compliance Documents				259,750	0	0
	Admin Support NPS Permitting				121,882	126,242	130,029
	Contract Administration - Labor, Burden, Travel				42,665	43,945	45,264
	Experimental Carryover Funds				507,679	515,000	515,000
	Integrated Tribal Resource Monitoring				152,583	157,160	161,875
	Non-Native Fish Control Contingency Fund				0	782,660	1,321,139
	Subtotal				**$1,084,559**	**$1,625,007**	**$2,173,308**
PROGRAMMATIC AGREEMENT ADMINISTRATION							
	Reclamation Administration and Travel				64,226	66,153	68,137
	Grand Canyon Treatment Plan and Implementation				519,500	515,000	515,000
	Subtotal				**$583,726**	**$581,153**	**$583,137**
	Reclamation Power Revenue Costs Total				**$2,152,632**	**$2,705,038**	**$3,270,290**

Glen Canyon Dam Adaptive Management Program

FY 2013-14 Preliminary Draft Budget for the Bureau of Reclamation **Updated: 4/8/12**

	Description				FY12 w/3.9% CPI	FY13 w/3.0% CPI	FY14 w/3.0% CPI
OTHER APPROPRIATED FUNDS							
	NPS Cultural Resources Monitoring FY12		91,000				
TRIBAL CONTRACTS (Appropriated Funds)							
	Hopi Tribe			95,000			
	Hualapai Tribe			95,000			
	Navajo Nation ($190K deobligated 7/19/10)			95,000			
	Pueblo of Zuni			95,000			
	Kaibab Band of Paiute Indians			95,000			
	DOI Agency Appropriated Funds Total		**$91,000**	**$475,000**			
	Total		**$91,000**	**$475,000**	**$2,152,632**	**$2,705,038**	**$3,270,290**