

Glen Canyon Dam Technical Work Group
Meeting Minutes
November 12, 2003

Conducting: Norm Henderson, Chairperson

FINAL

Committee Members Present:

Mary Barger, WAPA
Kerry Christensen, Hualapai Tribe
Wayne Cook, UCRC
Jonathan Damp, Pueblo of Zuni
William Davis, CREDA
Brenda Drye, So. Paiute Consortium
Amy Heulsein, BIA
Lisa Force, Grand Canyon Trust
Lloyd Greiner, UAMPS
Matt Kaplinski, Grand Canyon River Guides

Robert King, UDWR
Glen Knowles, USFWS
Dennis Kubly, USBR
Phillip Lehr, Colo. River Commission/NV
Bill Persons, AGFD
Lisa Force, Grand Canyon Trust
John Ritenour, NPS/GRCA NRA
D. Randolph Seaholm, CWCB
Mark Steffen, Federation of Fly Fishers
Mike Yeatts, The Hopi Tribe

Committee Members Absent:

Robert Begay, Navajo Nation
Perri Benemelis, ADWR
Cole Crocker-Bedford, NPS/GRCA
Christopher Harris, CRB/CA
Larry Stevens, Grand Canyon Wildlands Council

Alternates Present:

Jan Balsom
Wayne Cook
Wayne Cook
Pamela Hyde

For:

Cole Crocker-Bedford, NPS/GRCA
John Shields, WY State Engineer's Office
John Whipple, NM Interstate Stream Comm.
Larry Stevens, Grand Canyon Wildlands Council

Interested Persons:

Emma Benenati, NPS/GRCA
Mike Breedlove, USGS/GCMRC
Gary Burton, WAPA
Lew Coggins, USGS/GCMRC
Nancy Coulam, USBR
Kurt Dongoske, CREDA
Helen Fairly, USGS/GCMRC
Andrea Gonzales, Attorney Robert Lynch

Lisa Leap, NPS/GRA
Jeff Lovich, USGS/GCMRC
Ted Melis, USGS/GCMRC
Mike Liszewski, USGS/GCMRC
Clayton Palmer, WAPA
Randall Peterson, USBR
Barbara Ralston, USGS/GCMRC
Mike Yard, USGS/GCMRC

Recorder: Linda Whetton, USBR

Meeting Opening and Administrative Items

Convened: 9:30 a.m.

Welcome and Administrative Items: Norm Henderson welcomed the members, alternates, and general public. A quorum was established, introductions made, and attendance sheets (**Attachment 1**) were distributed.

BIA Reorganization - Amy Heuslein said the BIA is going through a reorganization and making a variety of changes. As such, her office is no longer under a "centralized" billing aspect so there is the possibility of charging for the use of conference rooms which may affect the location of future AMWG/TWG meetings. There may also be some charges for making copies. Amy said she mentioned this to Linda and the possibility of putting some type of agreement in place between USBR and BIA to handle such costs. The reorganization should be completed by March 2004.

Sheep Creek Erosion-Control Structures and Seeding Project - Randy Seaholm said that at the recent Salinity Control Forum Meeting, the Bureau of Land Management announced plans for some type of watershed treatment project in the Paria River Basin to reduce sediment. Randy suggested someone from GCMRC follow-up with the BLM. Norm said he was contacted by Sue Goheen, Soil Scientist with BLM, who provided a proposal (**Attachment 2**) on the project for the TWG to look at. Norm said she would be willing to make a presentation to the TWG at a future meeting.

Review of Action Items. All items were completed.

Approval of October 1-2, 2003, Meeting Minutes. Pending a few minor edits and without objection, the minutes were approved.

Cultural Program and PA Update – In response to questions raised at the last TWG meeting regarding FY 2005 budget items, Helen Fairley gave a PowerPoint presentation (**Attachment 3**) to explain those in more detail.

Helen asked Jan to comment on the NPS' plan to nominate the whole Grand Canyon as a traditional cultural property (TCP). Jan said a lot of the questions had to do with how the NPS deals with its national register properties and nominations. If they were going to look at the entire canyon as a national register eligible traditional cultural property, it would be the responsibility of NPS and not the AMP's. The area of responsibility involves park areas outside of consideration here, Navajo Nation lands on the east border, and Havasupai and Hualapai tribal lands on the southwest border so there are other groups that need to be considered in this and that is where it is stalled right now.

Update from Nancy Coulam:

The NPS has agreed to take the lead on completing documentation and determinations of eligibility for the tribal traditional cultural properties located south of Glen Canyon Dam. However, it is Reclamation's responsibility to ensure that this is completed in time for its Section 106 compliance needs. This means that once NPS completes documentation, Reclamation, either independently or in conjunction with the NPS, needs to seek the concurrence of the Arizona State Historic Preservation Officer, and possibly the Keeper of the National Register, on its determination of eligibility.

Helen encouraged the members to read the Protocol Evaluation Panel (PEP) recommendations on GCMRC's web site (http://www.gcmrc.gov/pep%5CCult_PEP.htm).

Experimental Flow Proposal – Clayton Palmer (WAPA) said he wanted to do three things: (1) propose a modification to the non-native fish suppression element of the experimental flows, (2) inform the TWG that WAPA is considering addressing the transportation of sediment that occurs in months of high releases, and (3) to express WAPA's interest in participating in the development of a long-term plan for experimental flows. He distributed a handout, "ROD Flow vs. Fish Flow Comparison" (**Attachment 4**) to illustrate the difference between ROD flows and non-native fish suppression flows which occurred last year between January 1 through the end of March. The issue that came up last year was Glen Canyon Dam was at 5,000 cfs and didn't started ramping up until about 8 a.m. and wasn't fully ramped up to peak until around 11 a.m. so between the hours of 7-11 a.m., WAPA, on behalf of its contract obligations, had to make purchases from the market. Normally they purchase either a block of 24 hours or a block of 16 hours, because they conform to an on-peak period of electrical power loads. They were out on the market purchasing a block of power for just 4 hours. People who had power available for WAPA to buy were only interested in selling electrical power at fairly high prices.

WAPA spent quite a bit of money in those months as a result of the effect. They tried to figure out if there was something they could do about it and subsequently talked with Reclamation, Jeff English, Bill Persons, and others about modifications. WAPA would like to have an operation that in the long-term is both compatible with the goals of improving the status of humpback chub and meeting their contractual obligations for electrical power. WAPA is proposing to add 2 hours to the on-peak time period. Last year after ramp-up, the 20,000 cfs was sustained for 9 hours and then they started to ramp down. They propose to do the same ramping but to have the on-peak 20,000 cfs occur for 11 hours over the course of the day so it would begin 2 hours earlier basically. Since they have a 4 hour problem but are only proposing a modification of 2 hours, they are going to take very little water that's available at the Aspinall units on the Gunnison River and use all the day's allocation of water from the Aspinall units in the first 2 hours. They will meet their scheduled obligations from about 7-9 a.m. and then from 9 a.m. through the rest of the peak time, using Glen Canyon Dam.

The second issue is adding 2 hours means adding additional water to the months of January, February, and March since they are in a condition of minimum flows, 8.23 maf release year. He suggested taking water from Sunday. If 2 hours are added to the peak every day, there are 6 on-peak days in the week, they would be using 12 hours of additional water. If they eliminate the peak on Sunday, then 9 of the 12 hours would be gained back. It's almost a wash in terms of water release. There would not be a lot of water needed to be scheduled in the month of January in order to accomplish 11 hours of on-peak time instead of 9 hours of on-peak time.

Clayton said it was WAPA's intent to listen to comments from the TWG and based on the comments they receive, WAPA will meet with Reclamation as well as consult with other entities before seeking AMWG approval. Clayton said that Ted Melis suggested the possibility of studying the effect of ramp rates. There is some question about the sediment effects of different ramp rates. The sediment transport that occurred last year (Jan-Feb-Mar) as compared to the ROD is both a function of the increase of maximum daily flows and the change in ramp rates. Ted mentioned that he would prefer to see one element changed then the other in order to discern and separate what the effects are. He made the suggestion to run the 5,000-20,000 cfs at ROD ramp rates for 2 weeks and then switch to 5,000-20,000 cfs at the ramp rates used last year through the months of January and February. Then based on what is learned, modify the ramp rates again in March by making them higher.

Concerns/Comments:

- *Leaving it steady at 5,000 cfs from 7 p.m. to 7 a.m. and then increasing it to 8,000 cfs for the other 12 hours of the day would be more agreeable but it would depend on the condition of the foodbase. (Steffen)*
- *There was an EA done on these flows, why didn't this issue come up during the original EA? If there is a change in the experimental flows, then NEPA documentation needs to be modified. Also need to consider impacts to other resources in the canyon. (Hyde)*

- *As you look at a proposal and you look at where you might get water, anything you can do to keep the launch ramps covered with water through Labor Day would be good. (Ritenour)*
- *Lees Ferry fishing guides weren't keen on the idea of having the water brought up 2 hours earlier because that would mean running up river in the dark. (Persons)*
- *What compliance (ESA and NEPA) needs to be done and is there time to complete by January? (Davis)*
- *The proposal should be vetted through GCMRC to determine the potential effects of the earlier 2 hours on the rest of the ecosystem. (Kaplinski)*

ACTION ITEM: Clayton will work with GCMRC on proposed modifications and send a written proposal to the TWG (via Linda on e-mail) on what flow changes WAPA intends to propose to AMWG.

ACTION ITEM: TWG members will send comments to Clayton (cspalmer@wapa.gov) with a cc: to Linda by Wednesday, November 19.

FY 2004 Project Planning and Implementation – Jeff Lovich (GCMRC) said the program managers would be presenting information on their individual programs.

Sediment Program – Ted Melis (GCMRC) said the Paria trigger hasn't been close to being met. Unless something extraordinary happens, December would be scheduled as a normal ROD December release. There is still a chance for enrichment to occur anytime after January 1, which moves into Scenario 2 but the odds of that happening are relatively small. He said the January-March component was conceived originally as a biological treatment for trying to mitigate the problems that were perceived between native and non-native fisheries but that operation provides great opportunities to learn about sediment and suspended sediment transport. They tried to piggyback on top of that. Originally the idea was to focus on a treatment that would make early stage life for salmonids in places like Marble Canyon as difficult as possible to try and enhance the mortality of those individual fish. It basically ended up being all elements of the diurnal ROD constraints being modified, the daily range in both the upramp and the downramp rate. They had an excellent opportunity last January-March to collect suspended sediment transport data through conventional methods at the Grand Canyon cableway and at the cableway that was formally above the LCR Confluence twice a day for the first 10 days of January and then as frequently as they could at the LCR for the remainder of the treatment period.

Ted said he understands the predicament that WAPA is in with having to buy replacement power at premium values and said the concern they have on the sediment transport front is they have the makings of a beautiful sediment experiment within the context of the fish treatment. They would like to make it as robust a year two experiment as they can for comparability. He proposed keeping the range the same but that they start off with ROD upramp and downramp rates for the first 2 weeks in January and then start alternating after that first two week period with experimental ramping rates. The duration problem which they know from data and modeling an extra several hours a day of 20,000 cfs will exacerbate that export value. Changing the duration also changes the volume of water and it's going to change the overall transport per day for any sediment condition. What they would really like to do in year two is constrain the changes to one at least for the first two weeks and that one would be the daily range under the ROD vs. the daily range under the experiment. They can't control the sediment supply conditions so by alternating experimental vs. ROD type operations, they can start picking apart what's important and what's not, assuming they can detect the changes. If no change can be detected in the overall sediment transport volume, they would conclude as scientists that either they can't detect it or it's not within the realm of science currently and they would have to conclude there was no difference.

FIST – Ted stated the sand storage change detection monitoring is scheduled to occur this spring with primary emphasis on getting a really robust topographic dataset within Reaches 1 and 8. The proposal is to ask for some limited time period of 8,000 cfs flows for the duration of the overflight. At this point, it looks like it will be in the range of 4-5 days during the middle of May. There will be some emphasis on grain size of what's stored in the bed for sand as well as some limited topography within those reaches to

keep the change detection program going, only above Phantom Ranch. The three reaches below Phantom Ranch cannot be handled under the current 2004 budget reductions.

Biological Component of Experiment – Lew Coggins (GCMRC) said they provided a lot of information at the Science Symposium relative to the efficacy of trout removal. Over the six trips they found they have been quite effective at removing rainbow trout and brown trout and a few other non-natives out of the removal reaches. For any given trip, they are looking at efficiencies of removal of greater than 50%. From the beginning of the trip to the end of the trip when they are doing a five pass completion, they are taking greater than 50% of the fish that are in there. They also found fairly high immigration rates in between the trips and particularly between the long hiatus they had in between the March trip and the July trip, rates approaching 800 fish per month. The bottom line is that they need to be a concerted effort to remove the fish.

Lew said that Josh Korman also provided a summary of his work on fluctuating flows at Lees Ferry. When they proposed the fluctuating flows, they were essentially relying on correlational data between magnitude of fluctuating flows, pre-ROD, and correlating those with recruitment of rainbow trout. However, they don't have a clear understanding of the mechanism that is dampening recruitment. There are two most likely mechanisms, the first one is related to mortality of a year class of trout while they're still in the redds and the second one is related to displacing the young fish after they have emerged and essentially causing them greater mortality risk in the form of energetics as well as increased predation risk as they're having to adjust their position in the river much more under fluctuating flows than under ROD flows. Josh and others went about looking at mapping of redds and looking at the fraction of redds that end up being dewatered and over time and direct mortality. The bottom line is that there was a significant portion of the observed mortality or the predicted mortality in the redds that was temperature dependent. At around the 12,000 cfs range a large fraction of the redds were essentially reaching lethal temperatures. If the water was to come up sooner, the elevated temperatures wouldn't be reached and there would be less mortality.

Stranding of Fish – Lew said this was work done by Ecoplan Associates and essentially they saw very limited stranding and mortality associated with the stranding in the Lees Ferry Reach under the experimental flows.

Humpback Chub Actions – Ted said the HBC actions were approved by the AMWG and are currently being implemented. He would like to have further discussion with the TWG on how to proceed with the work.

ACTION ITEM: Lew Coggins will schedule this (HBC) discussion for an upcoming TWG meeting.

Concerns/Comments:

- *Thought we had already determined which projects were not to be funded by the AMP. (Davis)*
- *WAPA was able to secure funding through the Upper Basin Recovery Program. Region 6 of the FWS will be writing a supplement to their Genetics Management Plan which will address the Grand Canyon HBC genetics work to be done in FY 2004. The lead is Tom Czaplá. (Palmer)*
- *Competitive science is required so work should be done via RFPs. (Hyde)*
- *How does GCMRC intend to get from this state of confusion today to having a set of work plans in which decisions will be made for whether the work will be done through RFPs, competitively done in-house, etc.? (Kubly)*

Cultural Program – Helen said that in the budget process last year all but one cultural program project was cut from the budget so what was left from the original proposal was to organize a workshop and bring in some outside expertise to help them develop a plan for integrating Native American perspectives with some of the science programs. In addition, funding was provided for two PEPS, the Socio-

Economic and Recreation, which will probably be organized in late spring of the next calendar year. Some funding was also provided at the last minute to do an APE study. She needs direction in terms of what is expected to come out of the study and how to proceed.

Mike Yeatts asked what was happening with implementation of the **public outreach** component of the FY 2004 budget. Helen said there was a public outreach/education element in the cultural program but it got transformed into an adaptive management outreach effort headed up by John Shields.

ACTION ITEM: Dennis sent an inquiry to Helen on 11/17/03 for documentation of John Shields role in the public outreach effort and to see if anything has been started.

Amy asked what the status was on the **Tribal Consultation Plan**. Nancy Coulam said representatives from the federal agencies met after the last TWG Meeting (Oct. 1-2, 2003), to discuss it. Since the Tribal Consultation Plan is intrinsically tied to the funding issue, the representatives made a recommendation that Norm Henderson and Nancy write a position paper to send to the Department to help resolve the funding issue and answer questions about the Tribal Consultation Plan itself. The paper was sent and is working its way through the Department. Because Washington is often slow in responding, Norm and Nancy are also going to talk with some DOI solicitors who are specialists in Indian law. They will report back to the tribes when they have more information.

ACTION ITEM: Nancy will provide a copy of the tribal funding letter that was sent to the Department to Linda for e-mailing to the TWG members.

GCMRC Reorganization – Jeff Lovich said the reorganization took place on October 9, 2003, and gave a PowerPoint presentation (**Attachment 5**) explaining the changes. He believes strongly in interdisciplinary collaboration and was looking at ways to increase those opportunities. There were also a variety of support functions within GCMRC, many of which were housed under the Information Technology Program, and he was interested in looking at ways to move the support functions in closer proximity to the science they support. He also wanted to change from a program-oriented focus to a center-oriented focus with the goal of increasing opportunities for interdisciplinary science and interaction among different programs. He said there were a couple of things that needed additional discussion: (1) A Special Assistant position to work directly with him, and (2) Mike Liszewski is no longer the chief of the Information Technology Program. Mike's focus will change from internal activities to external activities with particular emphasis on re-designing the GCMRC web site. Jeff wants the GCMRC to be a real-time information source for the Adaptive Management Program.

Jeff has asked each of the new program managers to prepare operational plans for how they will structure their individual programs. He has created an ad hoc organizational assessment committee with GCMRC staff and given them a charge to develop an instrument to help him and the program managers make improvements.

Concerns/Comments:

- *The Cultural Program has three components: cultural, socio-economic, and recreation. (Barger)*
- *GCMRC is supposed to be an advisory body of science. Was there some analysis or measured thought that went into having GCMRC become a more deeper in-house body than an administrative body? (Force)*
- *Part of the problem with the AMP has been the inability to effectively integrate cultural resources into the entire AMP. In integrating biological and physical, it reinforces the bias towards the natural sciences and away from the social sciences. My fear is the gap will continue to widen. (Dongoske)*

FY 2005 Budget and Work Plans

Matt said he wanted to have some discussion about **conflict of interest** issues before the TWG starts reviewing the budget and work plans as he is personally involved in a couple of the projects. It's unclear to him what he can discuss or whether he should recuse himself from particular topics.

Linda said the AMWG Charter includes a paragraph on conflict of interest and that members who are interested in bidding on future work should probably not be involved in discussing that particular project. Norm said he thought it would be okay for members to discuss but should probably abstain from voting on projects in which they have a vested interest.

UPDATE: The AMWG Charter language reads: "To avoid conflict of interest issues arising from entities, including Federal agencies, having representatives on the AMWG and also submitting responses to request for proposals to perform work, the Federal procurement process shall be strictly adhered to. While members of the AMWG may give advice to the Secretarial Designee, all decisions in the procurement process shall be made by Federal procurement officials free of influence from AMWG members.

The Charter is in the process of being revised by the Department to include the following paragraph:

ETHICS RESPONSIBILITIES OF MEMBERS

A member may not participate in matters that will directly affect, or appear to affect, the financial interests of the members or the member's spouse or minor children, unless authorized by the DFO. Compensation from employment does not constitute a financial interest of the member so long as the matter before the committee will not have a special or distinct effect on the member or the member's employer, other than as part of a class. The provisions of this paragraph do not affect any other statutory or regulatory ethical obligations to which a member may be subject.

Because there have been questions regarding conflict of interest issues, it is anticipated the AMWG will further discuss at its next meeting. Reclamation is also trying to have a solicitor from the Washington Office present during that discussion.

ACTION ITEM: Reclamation (Dennis) will pursue advice from the Solicitor's Office on this conflict of interest question.

Comments/Concerns on budget documents:

- *Current budget documents are inadequate for making informed decisions on the budget. The TWG should look at the actual expenses from previous years before proposing a new budget. The budget should be vetted through the Budget Ad Hoc Group prior to coming to the TWG. (Hyde)*
- *Would like to see what work will be accomplished through appropriations vs. program dollars. Would also like to see past expenditures. (Seaholm)*
- *We need to focus our primary dollars in the right places and where the money needs to be spent. (Cook)*
- *Would like to go with Jeff's process of a biennial review. (Force)*
- *I'm confused with the TWG's function. Don't hear anything about quality science. We need more emphasis on science in the work plans. (Kubly)*
- *Need to have adequate time to review the budget materials with my AMWG member and other personnel in my agency. (Persons)*

MOTION: The Budget Ad Hoc Group to review process and timeline developed for budget deliberations and approval including the materials necessary for these deliberations, and bring a recommendation to the TWG at the next TWG meeting.

Motion seconded.

AMENDED MOTION: The Budget Ad Hoc Group to review process and timeline developed for budget and work plan deliberations and approval including the materials necessary for these deliberations, and bring a recommendation to the TWG at the next TWG meeting.

Amended motion seconded.

Voting results: Yes = 19 No = 1 Abstaining = 0

Motion passed.

Randy Peterson suggested the TWG make a list of what should be included in the budget materials. The following items were captured on a flip chart:

- Need funding source and history
- Information Needs should be addressed
- List priority work
- Provide actual expenses from previous years
- Include knowledge assessment (SCORE Report) and completed projects/reports
- Provide cost savings (conference rooms at BIA vs. hotels)
- Identify core monitoring and show separation of experimental flows vs. rest of budget
- Provide salary and personnel breakdown
- Provide more information on contractors being used
- Establish and review timeline for budget reviews/iterations
(review Cliff Barrett document → **Attachment 6**)
- Need to have regular ad hoc group reports. The Budget AHG should report on the budget schedule.

Budget Ad Hoc Group: Dennis Kubly (Chairperson), Mary Barger, Cole Crocker-Bedford/Jan Balsom, Robert Begay, Wayne Cook, Kurt Dongoske, Brenda Drye, Helen Fairley, Steve Gloss, Lloyd Greiner, Norm Henderson, Amy Heuslein, Mike Liszewski, Ted Melis, Bill Persons, and Larry Stevens.

GCMRC FY2005-06 Budget & Work Plan - Jeff presented an overview of the FY 2005-06 budget via a PowerPoint presentation (**Attachment 7a**). He's not sure what the FY04 budget appropriation will be because the Federal Government is still in a continuing resolution. There may be a decline of over \$1 million in available funding through the AMP in FY05 and that's a significant impact to the program and one which created a special challenge to GCMRC in their ability to try and provide the science that the AMP needs to accomplish.

Jeff presented the Draft Interim Work Plan (**Attachment 7b**). He said the total GCMRC FY 2005 budget is \$7,632,000 which is about \$1 million less than the GCMRC budget in FY04 due in large part to the uncertainty of the appropriations amount for FY 2005. He said they are recommending a rather radical reduction under the experimental flows program. They also have fairly significant reductions in the terrestrial program and under the integrated programs. In some cases, the programs have large amounts of funding and in an effort to present a balanced budget, they had to make some very painful decisions about how to cut the program and still maintain some degree of responsiveness with respect to the priorities in the program.

BOR Administrative Costs – Dennis referred to the Response to Comments Table (**Attachment 8a**) and the Project Summary Sheets (**Attachment 8b**). He said the FY 2004 budget was approved for \$387,000 and for FY 2005 it is \$396,650. The increase was indexed by the Consumer Price Index but with reductions in some of the categories. The following comments were recorded:

Comments:

- *AMWG & TWG travel costs and savings. Rental cars vs. shuttles? Savings by not having to rent a hotel for AMWG & TWG meetings – are they substantial? (Heuslein)*
- *Facilitation contract for the AMWG. Is that an actual cost?*
- *TWG Chairperson costs?*
- *AMWG Other expenses. (Davis)*
- *Need actual expenses for administrative costs*
- *Compliance Documents – more of a breakdown. What NEPA documents are we looking at?*
- *Could we re-program dollars in the middle of the year? (i.e., experimental flows)*
- *Need for personnel and salary breakdown*

PA Cultural Resources Budget – Nancy Coulam said she would present on the projects put forward by individual Programmatic Signatories and explain Reclamation's priorities for Section 106 compliance in FY 2004. She commented on the specific line items.

1. Reclamation Administration. The program has been kept flat for the last three years and ran a CPI in FY05 because there were requests for additional funding. In terms of actual costs, they are averaging about \$12,000 in terms of administering the cooperative agreements, requisitions, or other purchases of services or goods through the program. The rest is salary, travel, and indirect costs of the regional archeologist working on projects directly related to Glen Canyon and CRSP.

2. Database and GIS. This was a proposal out of the PEP. It is not being funded in the foreseeable future.

3-4. NPS-GRCA & GLCA Monitoring Costs. These are at the request of NPS. It's their monitoring dollars with the CPI added.

5. Navajo Nation & GLCA Treatment Plan and Implementation. Reclamation feels the most critical project in FY05 is the Navajo Nation treatment plan. They are projecting costs at \$100K and are in the process of working on a Scope of Work and a detailed budget. The work will be done through the Navajo Nation's Archaeology Department as a sole source because they have right of first refusal for all archaeological work on reservation lands.

6. Whole Canyon Treatment Plan and Implementation. The Zuni Tribe has been installing checkdams as a means of stabilizing sediment around archaeological sites for a number of years. In the past the work was funded out of the Park Service's Monitoring and Remedial Action Plan (MRAP) and program with \$200K going to the Park, which also included expenses for Zuni's crew to go down on the river. This was put forward as a separate line item thinking that the treatment plans might call for additional work from the Zuni Conservation Corps. However, based on comments they have received subsequent to their PA meeting, it may be premature to put this in as a line item until the treatment plans have been completed. This was not a Reclamation priority but was put forth by one of the signatories. Nancy said the plan was discussed by the PA signatories. They will need to get there by talking about how they are going to mitigate adverse effects of dam operations in Grand Canyon and on Hualapai lands. However, they have also received comments that it would be worth deferring this from FY05.

John said the PA Group discussed the NN GLCA Treatment Plan for a cost of \$100,000 for FY04 and question whether the effort is really underway. Regarding the Whole Canyon Treatment Plan, they are having trouble getting ahead of the loss of the cultural resources. They are faced with this continuing cycle of not having a plan and therefore don't take care of the resources which are being lost on a daily basis. In reference to the Traditional Cultural Property effort, there is a lot of information the different tribes and the Park Service have and if that information could be combined, a determination of eligibility could be made that would allow them to get ahead of the TCP problems.

Nancy said the treatment plan is a Reclamation priority in FY 2004 and continuing into FY05 because it will bring them pretty close to the completion of the HPP which is the final stipulation in the Programmatic Agreement. Moving ahead with treatment is critical to Reclamation's 106 compliance effort and that's why it is a top priority. They are starting in the GLCA reach because they think it most likely that adverse effects of dam operations occur closest to the dam. The treatment plan is the key component in the HPP. Nancy said there is also a data management plan that has not formally been undertaken and the hope was that GCMRC could integrate it into its database and IT efforts. They also hope to use GIS as a mechanism to integrate cultural resources with other GCMRC programs so the data management plan is also part of the HPP.

Nancy said there are two NPS monitoring projects along with the Zuni checkdam project that they think are being done under the prior MRAP. With completion of the treatment plan in FY04, they don't see a need for monitoring under Section 106 compliance to continue. They do see the need to continue monitoring and research under GCPA and believe GCMRC is going to be bringing forward a project to develop a monitoring program at least starting in FY05 but don't see the need to monitor under Section 106 in FY05 in the Glen Canyon Reach as there should be a treatment plan in place.

Nancy said a decision needs to be made by the tribes about what level of documentation they are interested in going through to complete identification and then determination of national register eligibility within the accounting. Some of the tribes are pretty far along in that effort. For instance, Hopi is going through a full documentation and evaluation process that should not require additional funding although in all honesty if they elected to go with a GIS data project, they're probably further ahead than any of the other tribes. Zuni is probably next in line in terms of the GIS documentation and we really don't know what level of documentation Hualapai, Navajo, or Paiute want to go through. Glen Canyon at the meeting volunteered because of the Park Service's management interests to take the lead in working with the tribes to complete that evaluation and documentation effort but the tribes do need to make a decision themselves on about what kind of documentation they want to do. That's not been decided yet.

Nancy said that after the PEP there were lots of meetings about how to implement each one of these little plans that the PEP had called for that would be components within the broader historic preservation plan. She met with the IT staff at GCMRC about how to get the plan implemented. Instead of having a specific cultural resource plan, GCMRC felt they could cover the need by just integrating it in the larger GCMRC database plan and GIS plan. It became clear that the process was going a little slower than anticipated which is why last fiscal year Nancy suggested creating the GIS data layer by mapping the archeological site locations within the canyon. Whether a formal plan is needed depends on what GCMRC does with its larger Oracle database planning.

Comments:

- *We basically piloted an Oracle database plan and now it's a matter of populating it with data. The one issue that continues to confound this particular program is concern over site confidentiality. (Balsom)*
- *Jonathan's work with the GIS database will do a lot with the confidentiality issue as far as what goes into the larger database, etc. The treatment plans were called for in the HPP and the PEP. Take the issue of which agency will oversee monitoring program in the Grand Canyon to the AMWG. (Ritenour)*
- *The SHPO and the Advisory Council on Historic Preservation need to be involved in these types of discussions. (Balsom)*
- *If work is shifted to GCMRC, do they have the personnel to work with the tribes on consultation at each site? Who is going to pay for the monitoring and tribal input? (Drye)*

Nancy said that because the consultation process for eligibility and effect, including eligibility of the TCPs and effects of dam operations on those hasn't been completed, it's premature to put up a 2005 project for the whole canyon treatment plan. There would have to be some upfront consultation about eligibility

because of Reclamation's Section 106 responsibility and that it's premature to propose a treatment plan until those other things are resolved. The work may have to get shifted to another fiscal year.

Cultural Resources Program – Helen Fairley said she would talk about the cultural projects but cautioned that because of GCMRC's recent organization, the budget is still in transition.

B1, Evaluation and Plan for Cultural – Core Monitoring. This is a new project aimed at getting a handle on the core monitoring for cultural resources under GCPA by developing a monitoring system that will measure and quantify the extent of dam operations on cultural resources. Helen said she wasn't sure if anything more than a conceptual framework could be provided because they would still like to have a PEP review of monitoring to look at how they could actually revise or refine what's being done or perhaps replace entirely the current program so they could actually tracking and quantify effects from dam operations and be able to do trend analysis, etc. The 05 budget represents an effort to bring together a group of experts in geomorphology, monitoring statistic, and so forth and develop a really tight plan for implementation in 2006.

B2, 1st Year Geomorphology Model, Process Study. This project came out of a recommendation from work done by Joel Pedersen which was to evaluate the effectiveness of the checkdams and also to evaluate the use of remote sensing as a monitoring measure. Joel's study said the checkdams were working as an interim measure. Helen said she thinks what Joel was basically saying is that the checkdams can work to slow erosion as long as they're constantly maintained and the right techniques are used.

B3 Implementation of Recreation PEP Recommendations and B4, Implementation of Socioeconomic PEP recommendation - are placeholder projects which could be implemented as a result of PEP recommendations.

B5, Impacts to Concessionaires, Anglers – Helen said this project is listed under the Experimental Flows section of the budget. If the experimental flows do occur, she felt a study to assess the impacts on the concessionaires and anglers would be worth doing. This study has been deferred twice but she felt it should happen in the future.

B6, Comprehensive Inventory of Campsites. This was in the interim work plan. Helen said she would like to see this done sooner than FY06 but that was the first opportunity to get it into the budget where the money was already accounted for. This would be a project to take the legacy data from previous inventory efforts done in 1975 and 1983, and early 1990's and combine them into a GIS and get them mapped in relation to each other. They would also take the work Mike Breedlove has been doing with remote sensing of campable areas based on the remote analysis of aerial photography.

Comments:

- *I'm disturbed by the geomorphology model process study. Looking at the flyer here (Attachment 9) on frequency of debris flows into the canyon, they make the observation that debris flows increase the bed level elevations. In the study that we're doing here, we're making the assumption that the clean water is causing a lowering of the effect of base level of the river. It's got to be one or the other. (Seaholm)*
- *How are we going to be able to do terrestrial monitoring, integration, and create a larger role for the tribes when there isn't a mechanism by which a tribe can solicit funds from the Center? (Yeatts)*
- *When I read the summary of the project description, there doesn't seem to be any mention of tribal involvement in that project description rather it seeks to bring in national experts in geomorphologies, physical sampling, and cultural resource integrity evaluation. If you don't get tribal involvement from the beginning in developing the core monitoring program, it will end up costing more money to try and integrate it later.*

ADJOURNED: 5 p.m.

Glen Canyon Dam Technical Work Group
Meeting Minutes
November 13, 2003

Conducting: Norm Henderson, Chairperson

FINAL

Committee Members Present:

Mary Barger, WAPA
Kerry Christensen, Hualapai Tribe
Wayne Cook, UCRC
Jonathan Damp, Pueblo of Zuni
Amy Heulsein, BIA
Lisa Force, Grand Canyon Trust
Lloyd Greiner, UAMPS
Matt Kaplinski, Grand Canyon River Guides
Robert King, UDWR
Glen Knowles, USFWS

Dennis Kubly, USBR
Phillip Lehr, Colo. River Commission/NV
Bill Persons, AGFD
Lisa Force, Grand Canyon Trust
John Ritenour, NPS/GRCA NRA
D. Randolph Seaholm, CWCB
Mark Steffen, Federation of Fly Fishers
Larry Stevens, Grand Canyon Wildlands Council
Mike Yeatts, The Hopi Tribe

Committee Members Absent:

Robert Begay, Navajo Nation
Perri Benemelis, ADWR
Cole Crocker-Bedford, NPS/GRCA
William Davis, CREDA
Brenda Drye, So. Paiute Consortium
Christopher Harris, CRB/CA

Alternates Present:

Jan Balsom
Wayne Cook
Wayne Cook
Kurt Dongoske

For:

Cole Crocker-Bedford, NPS/GRCA
John Shields, WY State Engineer's Office
John Whipple, NM Interstate Stream Comm.
William Davis, CREDA

Interested Persons:

Emma Benenati, NPS/GRCA
Mike Breedlove, USGS/GCMRC
Kelly Burke, GCWC
Gary Burton, WAPA
Lew Coggins, USGS/GCMRC
Nancy Coulam, USBR
Helen Fairley, USGS/GCMRC
Pamela Hyde, Grand Canyon Wildlands Council
Lisa Leap, NPS/GRA

Jeff Lovich, USGS/GCMRC
Ted Melis, USGS/GCMRC
Paul Li, Attorney Robert Lynch
Mike Liszewski, USGS/GCMRC
John O'Brien, GCRG
Randall Peterson, USBR
Barbara Ralston, USGS/GCMRC
Christopher Updike, NAU
Mike Yard, USGS/GCMRC

Recorder: Linda Whetton, USBR

Meeting Opening and Administrative Items

Convened: 8:13 a.m.

Welcome and Administrative Items: Norm Henderson welcomed the members, alternates, and public. Introductions were made and attendance sheets (**Attachment 1**) distributed.

Norm suggested the Budget Ad Hoc Group get together at the end of the day and schedule a meeting.

Pam said she would like to avoid what was done with the 2004 budget with regard to voting projects in and out. She proposed getting through the presentations, holding questions, and then spending the remainder of the time discussing specific line items. Once that has been done, she suggested the information be sent to the Budget AHG and GCMRC. The TWG would then meet before the January 7th AMWG meeting to finalize a document to give to the AMWG.

FY 2005 Budget Discussion (cont).

Refer to GCMRC FY05-06 Budget (rev. 11-11-03), **Attachment 10**; List of Projects, **Attachment 11**; and Draft Interim Monitoring and Research Plan (dated 11-10-03), **Attachment 12**.

A.1.a. Integrated Water Quality – Lake Powell. Ted Melis said the basic structure of the work plan now in terms of how the projects are organized is different from past presentations. The general consensus is to start with the goal of the monitoring - what's coming out of Lake Powell and what's happening in Lake Powell. The funds to do the work come directly from Reclamation. There are no major changes in this program.

A.1.b. IWQP – DS. Ted reported there are no huge fundamental changes in this program although they are starting to develop more of an integrated approach to doing this and are trying to add the sediment mass balance to this as one of the parameters of the downstream integrated quality of water program.

A.1.c. Steamflow & SS Transport. This has an abrupt downward move from \$505K in FY04 to \$300K in FY05, which reflects the budget constraints in the 05 budget and not really a part of the strategy of integrating this into the water quality project. The proposal is to keep the experimental component, the sediment experiment, going as it was proposed in 03 and 04 with the assumption that it might continue into 05 and 06. The level of funding needs to come back up pretty abruptly in 06 to keep those mass balance components going in a way that fully fulfills the core monitoring but the experimental component of the flood. The mass balance has to be tracked very carefully month by month to know whether or not we're on or not on for the experimental high flow. The problem now in 05 is that project is in jeopardy but what the scientists have recommended to him is that under this skeletal level of funding for mass balance of sand, we probably can't do all the things that were proposed in the science plan around the sediment experiment, meaning up to high flow and through the high flow and beyond. That's an area of concern but the proposal is to try to regain back through whatever means possible into 06 and beyond at least as long as the experiment is implemented a level that will actually meet all the needs as proposed in the science plan.

A.1.d. Ted said this was put in as a placeholder because it is their intention as part of the integrated plan to develop the same kind of mass flux core monitoring for nutrients to support the foodbase work in the future in the same way it is done for sand. With the reductions in 04, there will be no FIST reach integrated work below Phantom Ranch so the emphasis is basically on the first 8 reaches down to Phantom Ranch and the three reaches below won't be measured again unless there is additional funding. With a biennial program, you've got an expensive on-year and a less expensive off year, there is no field component in the off year so the way you split out the costs in the off year is \$250,000 to core

monitoring and \$750,000 to experiment and then the on-year you split the difference and say you're going to get \$450,000 or \$500,000 for core monitoring and another \$500,000 for an experimental component. Even if there isn't an experiment, the FIST is still in the field collecting data in 06 which is the on-year.

Terrestrial Monitoring – Barbara Ralston presented on this portion of the budget. In terms of a biology or terrestrial program, in 05 it's proposed that the total project costs be \$250,000 and that would basically cut this program in half. She is recommending that the portion of the program that be retained for 05 is the vegetation transects that are measured in the fall. However, the consequences are they won't be monitoring for riparian breeding birds, surveying for invertebrates, herps, or small mammals at the integrated terrestrial sites. Included in 05 is retaining a portion of tribal participation component although it is reduced to some extent and the allocation is described in that portion of the A.4b section in terms of tribal participation. For FY06, it is proposed that this program be funded back up at a value of \$425,000 which would then bring back bird surveys as well as including a portion of the terrestrial integrated sites such as insect surveys and maybe to a limited extent small mammals for herp surveys.

Barbara suggested moving towards a biennial survey for riparian birds and vegetative structure, volumes, and have them coincide with sediment/core monitoring programs so a complete monitoring effort for the entire terrestrial resources could be done at the same time every other year.

Comments/Questions:

- *One of the advantage that we've seen from your part of the program is a statistical approach that identifies to us what the cost is of losing sampling intervals and I guess I have a general question for GCMRC. Is that a context in which in the future you can portray the effects to us? What we're trying to do here is for the most part is identify status and trends and key resources and there is a lot of emotional attachment to certain resources and some legal attachments to something like SWWF but I don't know how to put it in a common metric if you can't tell me what the impact is on detecting the trends and status of the resources? (Kubly)*
- *So if you don't get funding in 06, is the result that you decapitate a program in its fifth year? Then four years of data is invaluable? (Force)*
- *Do you understand the legal ramifications for not monitoring for SWWF? This program is designed to insure that those kinds of species are definitely monitored. It's the same equivalent for not monitoring for humpback chub. How can you develop a budget for \$250,000 that doesn't include the key resource that you are legally required to do? (Stevens)*
- *This is a 5-year program that is supposed to establish methodologies but if you get rid of the 5th year, I don't understand the consequences. Is the 5th year the year that they actually determine the methodologies? (Ritenour)*

Foodbase – Mike Yard said one of the guiding documents or approaches that they do with changes associated with given programs are these PEP reviews. They had a PEP review that was completed in 2001 related to the aquatic program which included both the native fish and non-native fish as well as the foodbase. In their review, they stated a long-term monitoring program for the foodbase does not presently exist. There was insufficient research to establish strong linkages to what is implicitly assumed is a resource foodbase. They are taking a new approach and implementing what they are calling a new initiative to look at the flow of energy and the source of that energy. Additionally, with some of the other programs that have been ear-tagged, they suggest utilizing some of the monies associated with programs that are influx as well as the high fluctuating flows and being able to utilize those towards this initiative. They would also like to address a lot of the limitations and linkages with the experimental flow and trout removal program down at the LCR.

Downstream Status and Trends – Lew Coggins said this project is remaining at funding at flat levels in 05 and 06. There are three components to this project: (1) downstream non-native fish monitoring, (2) monitoring focused at the LCR HBC population, and (3) downstream native fish monitoring. Of those three and since 2000 with their cooperators, they're essentially structuring what will be their long-term

monitoring program. Particularly with non-native fishes, they think they have a good program in place and will be looking to put that program out for RFPs developed in 2004. Related to the other elements, the native fish downstream monitoring, they're looking at most likely another year before they're comfortable issuing that as an RFP for long-term monitoring implementation.

Core monitoring of Trout at Lees Ferry – The principle investigators are AGFD and the 2005 budget reflects a reduction that will be manifested in the work that was being subcontracted by AGFD for Ecometric to do snorkeling surveys.

ACTION ITEM: More discussion is needed by AMWG & TWG, GCMRC, and AGFD about the disconnect between population estimates and management objectives for fish in Lees Ferry. (Per Bill Persons)

A.13 Kanab Ambersnail Population – Lew said there was another item in the experimental plan meant to look at effects of habitat loss on kanab ambersnail associated with an experimental high flow. This project is one that they're proposing to essentially utilize for the foodbase initiative.

A.15 Experimental Treatments. This project was started in 03 associated with the experiment and Josh Korman was the principle investigator on this program. He was basically looking at mechanisms of trout mortality in the Lees Ferry Reach associated with fluctuating flows. Josh has focused primarily on the Lees Ferry Reach and some of the work will continue to be done in the Lees Ferry Reach and then it will also go downstream to look at redds.

Ted added that this project was originally proposed and funded as part of the experiment as two separate projects, redds mapping and another as a research effort on identifying the mechanism for mortality. Most of their emphasis was on the lower Marble Canyon reach because of the concerns with HBC and trout interactions. They have decided to combine both of those into one so that they are truly integrated. The budgets have also been combined. Most of the emphasis was on the Lees Ferry Reach in the first year because they knew there would be a lot of risk in trying to do redds mapping in Marble Canyon where the turbidity issues were unknown. The proposal this winter is to implement Phase 2 as an exploratory component of the study to start identifying redds in the mainstem below Lees Ferry.

A.16 Experimental Treatments – Lew said that data was collected on the phyto-benthic community before the initiation of fluctuating flows during and following this year and because their new foodbase initiative will utilize the same type of collections in the Lees Ferry Reach, this project will remain basically unchanged for FY04 and then in 05 and beyond, the fluctuations were not proposed in the experimental design.

Ted added that that is a key element to remember because they're still operating even though the AMWG only adopted the first two years of our experimental flows plan. They are still looking at it as a holistic approach to the experiment. Their strategy is to have two consecutive years with experimental fluctuations and then two years with just ROD operations and then compare the two.

A.19 Humpback Chub Actions - The plan was to have this treatment occur for 4 years and they already through year one. Their plan is to issue an RFP and have the work implemented in 2005.

Mary asked who would be responsible for doing the NEPA Compliance in 2005. Denis responded that the NEPA documents are a little complicated. Because they can't predict when the triggers will occur for the sediment part, Reclamation wrote an "indeterminate period of time" but there was only coverage for the remainder for 2 years so in 2005, they will have to do NEPA compliance on whatever isn't covered.

A.18 Non-Native Diet and Predation Analysis. Lew said that GCMRC thinks this is important to do and an RFP needs to be developed and competed for this project. There are a number of items in the HBC document that look at pollution, monitoring plan, LCR management plan, and invasive species management plan and they suggested those be combined. It's unclear to them who the lead agency should be on this project.

A.18 HBC Stock Assessment and Combined Population Estimate. Lew said they convened a panel last week to look at stock assessment methods for HBC. The panel was given a deadline to prepare a report by Dec. 5 for submission to the AMWG. He said it was his understanding that the AMWG will then make recommendations as to whether or not a concurrent assessment is conducted.

A.32 ISP Support – Mike Liszewski said the new program consists of four primary activities – systems administration, library, peer review activities, and web page development. The library and systems administration budgets have remained flat over the last couple of years and are projected to remain flat into 2005. Both those budgets took a 15% reduction in 2003 with the USGS assessment. The only thing different is a \$80K charge in the outsourced labor for development for web page development. It is the intent of the Information Office to be more proactive in web page development.

Concern/Comments:

- *A23 – If there is additional money coming in from MSCP, it should be included in comments section. The projected cost for this work in 2004 was 50K. MSCP has indicated they will provide \$10K for HBC work in the AMP. In 2005, if there are threats of fish coming from Lake Mead, then the MSCP should share the costs (50/50). (Kubly)*
- *There are several elements which were summarized in a letter from the science advisors to the GCMRC following the Science Symposium. They recommended having a well defined strategic plan based on this socio-ecosystem and have the structure reflected in the strategic plan from the GCMRC and have that be based on the administrative structure of this program and bring those two structures together proposing a 2005 budget. GCMRC has time constraints in terms of their contracting framework but with elements of this program, not monitoring endangered species that need to be monitored, that literally have to be monitored, the program has become very susceptible to lawsuits. Recommend GCMRC put together at least the outline of a strategic plan, have a couple more meetings with the TWG, have this process go through the Budget AHG to the TWG, and then to AMWG. (Stevens)*
- *The funds that were needed to cover HBC needs were derived from the core monitoring program. I disagree with that strategy and would be more comfortable with a budget that covers the core monitoring programs at the expense of these additional elements for the HBC work that were added by the AMWG motion to the program in August. (Kaplinski)*
- *Concerned that there are cuts being made in programs that are critical to this program. The administrative and management costs seem to be pretty steady regardless of whether the overall budget is \$9M, \$7M or \$11 and wondering if you have considered a structure which aligns your administrative costs more with your project work and if you have looked for some efficiencies in project work that might support continuation of core monitoring. (Force)*
- *Would like to see an actual science plan developed for the HBC. (Stevens)*
- *Deferring money from one year to the next (parasite work) and am concerned the 06 funding will be lost and the work won't be done. Can that be shown in the budget table to 2006? (Persons)*

The TWG discussed the best way to complete the budget and when it would be ready to send to the AMWG.

Dennis said he felt the group was in better shape than they think they are. He referred to the yesterday's discussion of the Whole Canyon Treatment Plan and told the members that Reclamation and the Park Service have been discussing differences in coming to agreements over where the geographic boundaries are for Section 106 compliance. They are well along the road for the agreement that would allow the whole canyon treatment plan to be put into effect and for the monitoring to continue. The approach would be to identify the 97,000 cfs stage as the initial line of demarcation but also agree that

future science might show, particularly for individual sites, that they are also impacted by dam operations. It's an agreement to move forward. Even though preparing and approving the budget will continue to be a difficult process, it can get better. In terms of getting things done, he would schedule a Budget AHG meeting.

The TWG discussed moving the AMWG Meeting. Dennis reviewed some of the items currently on the agenda for the next AMWG meeting: Discuss FY05 budget, environmental compliance required on the temperature control device, current and potential future temperatures of Glen Canyon Dam releases, humpback chub comprehensive plan and peer review, long-term monitoring plan development, update on GCMRC reorganization, review of AMWG Charter and Operating Procedures, etc.

It was decided the Budget AHG would meet on Monday, Dec. 1 prior to the start of the MATA Workshop on Dec. 2.

ACTION ITEM: The TWG will send comments on the budget and work plan to GCRM by Nov. 21.

Larry suggested the budget spreadsheet be sent to the TWG members so they could make the comments directly on the form. Ted said he would need to check the numbers again but would forward to Linda for distribution to the TWG.

ADJOURNED: 12:10 p.m.

General Key to Adaptive Management Program Acronyms

ADWR – Arizona Dept. of Water Resources
AF – Acre Feet
AGFD – Arizona Game and Fish Department
AGU – American Geophysical Union
AMP – Adaptive Management Program
AMWG – Adaptive Management Work Group
AOP – Annual Operating Plan
BA – Biological Assessment
BE – Biological Evaluation
BHBF – Beach/Habitat-Building Flow
BHMF – Beach/Habitat Maintenance Flow
BHTF – Beach/Habitat Test Flow
BIA – Bureau of Indian Affairs
BO – Biological Opinion
BOR – Bureau of Reclamation
CAPA – Central Arizona Project Assn.
cfs – cubic feet per second
CRBC – Colorado River Board of California
CRCN – Colorado River Commission of Nevada
CREDA – Colorado River Energy Distributors Assn.
CRSP – Colorado River Storage Project
CWCB – Colorado Water Conservation Board
DBMS – Data Base Management System
DOI – Department of the Interior
EA – Environmental Assessment
EIS – Environmental Impact Statement
ESA – Endangered Species Act
FACA – Federal Advisory Committee Act
FEIS – Final Environmental Impact Statement
FRN – Federal Register Notice
FWS – United States Fish & Wildlife Service
GCD – Glen Canyon Dam
GCMRC – Grand Canyon Monitoring and Research Center
GCNP – Grand Canyon National Park
GCNRA – Glen Canyon National Recreation Area
GCPA – Grand Canyon Protection Act
GUI – Graphical User Interface
HBC – Humpback Chub (endangered native fish)
HMF – Habitat Maintenance Flow
HPP – Historic Preservation Plan
IEDA- Irrigation and Electrical Districts Association of Arizona
IN – Information Need
IT – Information Technology (GCMRC program)
KAS – Kanab ambersnail (endangered native snail)
LCR – Little Colorado River
LRRMCP – Lower Colorado River Multi-Species Conservation Program
MAF – Million Acre Feet
MA – Management Action
MO – Management Objective
MRAP – Monitoring and Remedial Action Plan
NAAO – Native American Affairs Office
NAU – Northern Arizona University (Flagstaff, AZ)
NEPA – National Environmental Policy Act
NGS – National Geodetic Survey
NHPA – National Historic Preservation Act
NPS - National Park Service
NRC - National Research Council
NWS - National Weather Service
O&M - Operations & Maintenance (USBR funding)
PA - Programmatic Agreement
PEP - Protocol Evaluation Panel
Powerplant Capacity - 31,000 cfs
Reclamation - United States Bureau of Reclamation
RBT – Rainbow Trout
RFP - Request For Proposals
RPA - Reasonable and Prudent Alternative
SAB - Science Advisory Board
Secretary - Secretary of the Interior
SWCA - Steven W. Carothers Associates
TCD - Temperature Control Device (for Glen Canyon Dam water releases)
TCP - Traditional Cultural Property
TES - Threatened and Endangered Species
TWG - Glen Canyon Technical Work Group (a subcommittee of the AMWG)
UCR - Upper Colorado Region (of the USBR)
UCRC - Upper Colorado River Commission
UDWR - Utah Division of Water Resources
USBR - United States Bureau of Reclamation
USFWS - United States Fish & Wildlife Service
USGS - United States Geological Survey
WAPA - Western Area Power Administration
WY – Water Year (a calendar year)