

## Glen Canyon Dam Technical Work Group Meeting

April 8-9, 2008

**Conducting:** Kurt Dongoske, Chairperson

**April 8, 2008**

**Convened:** 9:30 a.m.

### Committee Members Present:

Jan Balsom, NPS/GCNP  
Mary Barger, WAPA  
Cliff Barrett, UAMPS  
Charley Bullets, Southern Paiute Consortium  
Jonathan Damp, Pueblo of Zuni  
William Davis, CREDA  
Jay Groseclose, NM Interstate Stream Comm.  
Norm Henderson, NPS/GCNRA  
Amy Heuslein, BIA  
Rick Johnson, Grand Canyon Trust  
Glen Knowles, USFWS

Dennis Kubly, USBR  
Anthony Miller, Colo. River Comm./NV  
John O'Brien, GCRG  
Don Ostler, UCRC  
D. Randolph Seaholm, CWCB  
Mark Steffen, Federation of Fly Fishers  
Larry Stevens, Grand Canyon Wildlands Council  
Bill Werner, ADWR  
Michael Yeatts, The Hopi Tribe

### Committee Members Absent:

Steven Begay, Navajo Nation  
Kerry Christensen, Hualapai Tribe  
Christopher Harris, Colo. River Board of Calif.

Robert King, UDWR  
Bill Persons, AGFD  
John Shields, WY State Engineers Office

### Alternates Present:

Don Ostler

### For:

John Shields, State Engineers Ofc./WY

### Interested Persons:

Andrea Alpine, GCMRC/USGS  
Matthew Andersen, GCRM/USGS  
Glenn Bennett, GCMRC/USGS  
John Bleisner, Mussetter Engineering  
Helen Fairley, GCRM/USGS  
David Garrett, M<sup>3</sup>Research/Science Advisors  
John Hamill, GCRM/USGS  
Leslie James, CREDA  
Ted Melis, GCMRC/USGS

Tom Ryan, USBR  
Jack Schmidt, Utah State University  
Phil Smith, GCMRC/USGS  
Pam Sponholtz, USFWS  
Barbara Steffen, Federation of Fly Fishers  
David Topping, GCMRC/USGS  
John Weisheit, Living Rivers  
Scott Wright, USGS

**Meeting Recorder:** Linda Whetton, USBR

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**Welcome and Administrative.** The Chairman welcomed the TWG members, alternates, and interested persons. Attendance sheets were distributed.

**Approval of Draft Minutes from December 4-5, 2007, Meeting.** Kurt said the minutes were distributed late and so they will be put on the agenda for the next TWG meeting. He also asked if there were any comments on the format. Linda also asked the members to clarify areas in which there were blank spots.

- Page 8, Mark Steffen said the word "tribes" needs to be changed to "tributaries."
- Page 9, Rick Johnson thought he said "brook trout" but he will look it up and get back to Linda.

**Review of Action Items. (Attachment 1)**

Action Item: 2007:06.25-26(4). John O'Brien said he had a very draft report on the Sediment Transport Modeling Report and has nothing to provide on the monitoring report. He gave a short PPT presentation (**Attachment 2**) which included seven recommendations:

1. Formulate an integrated research plan.
2. Further calibrate and test the Wiele, Wilcock, Grams (WWG) model. (Reach-averaged sediment routing model)
3. Gradually revise and refine the starting equations used by WWG.
4. GCMRC is encouraged to continue using innovative technology, like the NZ pilot tube work.
5. Use data and (existing) multi-dimensional tools (2D and 3D) to understand eddy and bar systems
6. Revisit the existing data, and determine need for additional data (for 2D and 3D models).
7. Analyze the uncertainty of the model predictions.

He concluded with the following motion: The TWG accepts the Draft Report and tells GCMRC to continue working on it but forward to the AMWG as indicated.

Kurt said that because the recommendation John was making hadn't been vetted through the Sediment AHG and because it also dovetails with the long-term core monitoring that GCMRC is working on, he wondered if it covers what the PEP was working on. He wasn't sure the group has to make a recommendation to the AMWG.

John Hamill added that Scott Wright will be making a presentation which will include more recommendations and discussion on whether it's appropriate to use FY09 funds.

**ACTION:** The Sediment AHG will meet and bring another recommendation to the TWG.

### **New Business:**

Hydropower Economics Presentation. Rick Johnson provided a list of questions (**Attachment 3**) that he wants addressed in a hydropower economics presentation to be given by WAPA or CREDA. While he had a lot of questions, he suggested the TWG might want to shorten the list. Leslie thought it would be helpful for members to send in any additional questions so she could focus on specific issues. Dave Garrett said the SPG asked for an economic analysis related to hydropower and related to flow regimes. WAPA developed that and the SPG asked the SAs to do that review. He thought Clayton had made a presentation that may have dealt with some of Rick's questions. Dave said he could provide a list of those questions to the TWG for their further consideration. Leslie said she felt WAPA should take the lead on making a presentation.

**ACTION ITEM:** TWG members will provide additional questions to Mary Barger and Leslie James by Friday, April 11, 2008, with a presentation to be scheduled for the next TWG Meeting.

**ACTION ITEM:** Dave Garrett will provide a copy of the SA report completed with regard to the economic analysis done related to hydropower and related flow regimes to Linda for distribution to the TWG.

Rick questioned the status of the Argonne Report (August 2006 minutes). Leslie said the Argonne Report is not being done for this program and thinks it's probably information that WAPA would be willing to share. It was something that WAPA was asked to do. She suggested it not be an action item or a task because it has nothing to do with the AMP and isn't being funded by the AMP. Norm followed up with a question about a study in Section 1809 of the GCPA regarding replacement power. Leslie said that was probably the replacement methods report and she's sure it's out of date. However, she suggested WAPA might be able to make a presentation on that.

Extirpated Species Concern. Larry Stevens would like to know more about the species that are MIA in the river corridor and how they can be reintroduced. He would like to work with NPS on preparing a presentation for the next TWG meeting.

**ACTION ITEM:** Larry Stevens (GCRG) and Jan Balsom (NPS) will work together on preparing a report on reintroducing missing species into the river corridor.

Update on Rate Setting Process. Leslie James said there is currently an ongoing consultation process between CREDA and WAPA. The initial proposed rate increase was about 14%. They will hear on Thursday at a formal information/comment forum but she doesn't know what the latest is going to be. The comment period closes May 5 and everything has been noticed in the Federal Register. The proposal is to take effect October 1, 2008. The increase is a result of increases in O&M costs primarily at WAPA and a slight increase from USBR along with purchase power, etc.

### **Science Advisors' Review of GCMRC's Science Plan for the High Flow Test (HFT).**

Dr. Dave Garrett distributed copies of his report, "Review of the Science Plan for Potential 2008 Experimental High Flow at Glen Canyon Dam," (**Attachment 4a**) and then gave a PPT presentation, "SA Review of HFT and Improving SA Information Transfer to the TWG" (**Attachment 4b**)

John Hamill said the reason GCMRC asked the SAs to review the 2008 Science Plan was primarily because there was a large study that was added at the end of the process. The whole study of backwater habitats increased the cost of the high flow science plan by about 40% from about \$2 million to \$3+million. The study had not gone through any kind of peer review and they felt it was incumbent to ask the SAs to look at the new plan in light of that. At the time of the review GCMRC was also directed to aggressively prepare for a possible high flow event so their ability to interact with the SAs, take their comments, and in many cases make adjustments to the plan was limited because they were in an implementation mode at the time. Knowing that, they still felt it was important to ask the SAs to provide feedback/advice on how to proceed and identify if there were any fatal flaws and looked for their endorsement. He passed out copies of GCMRC's responses to the SAs comments on the Science Plan (**Attachment 4c**).

Mary asked if the Science Plan had been rewritten as a result of the comments received. Dr. Garrett said there needed to be some revisions and GCMRC made those revisions. John said the plan was finalized at the end of December before the SAs had reviewed it one more time. Their comments were considered but GCMRC didn't have time to make all the changes. Dr. Garrett went through the process of how the SAs would deal with the issues raised and how GCMRC would address the concerns raised by the TWG. He thought that perhaps he needs to work with AMWG in changing the protocols.

Kurt stated that in looking at the role the SAs have with the TWG, the missing element was a face-to-face dialogue with the SAs on common ground issues that are at odd and how to resolve technical issues. There should be an exchange of ideas and results, and he wanted to facilitate more of a dialogue between the TWG and the SAs. Andrea Alpine commented that there never seems to be an endpoint and, as such, it's important to find ways to find closure. It's critical for GCMRC to get their work done and she questioned whether the TWG is going to ever work on multi-year budget proposals.

Kurt asked if the members were supportive of adopting the recommendations and for greater interaction with the SAs. He asked for a show of hands in support of that and except for three individuals who abstained, the TWG were fairly supportive.

**ACTION ITEM:** Dave Garrett will take the lead in developing a method for improving TWG/SA interaction.

### **GCMRC Updates**

Sediment Update. Dr. Ted Melis said that in 2002 the AMWG passed a motion requiring GCMRC to provide 6-month updates on any experimental results and their long-term monitoring of sediment flux from the tributaries through the mainstem as well as core monitoring. At the AMWG meeting last August he made a presentation on Dave Topping's behalf. That information was going to be provided to the AMWG at their

next meeting but because they held a conference call in January, this meeting is the first opportunity to see the presentation. With that said, Dave Topping gave a PPT, "April 2008 Grand Canyon Sediment Update" (**Attachment 5a**).

Ted said CREDA provided some comments and questions on the HFE Experimental Science Plan (**Attachment 5b**). John requested comments on the HFE at the December meeting but CREDA was the only entity that provided comments. Ted said they were answered to the best of their knowledge at this point in time.

HFT Preliminary Observations. Ted Melis distributed a copy of the Science Plan (**Attachment 5c**) along with the PPT, "Update on 2008 Experimental High Flow Test and Observations" (**Attachment 5d**). He commented on some brief updates to the plan. He said the plan is to synthesize all the high flow experimental results related to any resource area that they've acquired or accumulated since 1995-96. He said the budget to complete the synthesis work has not been fully determined. There is a team comprised of Principle Investigators (PIs) and co-PIs that will work on offering that but the funding will have to be resolved in the context of the 2010 budget. The proposal right now is being proposed at \$250K which will come from the Experimental Flow Fund in 2009. He directed the members to look at Figure 4 (page 16) and said the time scale required to truly evaluate the policy of high flow management of sand and related sources plays out much longer than one month or even a year because normal operations over the 6-18 months is what they're going to fully evaluate.

Part II – Early results from 2008 HFE. Dave Topping continued with this portion of the Updates.

Part IV – Initial Photographic Data. Ted provided these updates. Ted started on Part IV – Initial Photographic Data.

*Q: Based on what was said earlier that 20% of the sediment is above the river and 80% is under the river, does that mean the sediment that was retained after the high flow experiment, 80% is below the river? Is there any way to figure out how much was retained as beaches and not just in sandbars? (Barger)*

*A: That figure comes from analyses that have been done by Joe Hazel and Jack Schmidt and they're for more typical conditions and not the conditions immediately after a HFE like this. (Topping)*

*Q: So when the analysis is done, will we have a good feel for that? (Barger)*

*A: Yes. We did collect all the data to address issues like that. (Topping)*

Ted said the emphasis has been on the upper third of the system, the sediment transport data down to Mile 88. He said they didn't have anymore to show below there but know that certain people on the river made observations. The best information they could provide for this meeting was digital images and acoustic data in the upper third of the system.

Is there enough sand? Scott Wright passed out copies of his PPT, "Is there enough Sand?" (**Attachment 5e**) and provided the following conclusions:

- The "best case scenario" for hydrology and dam operation has some viability for rebuilding and maintaining sandbar deposits.
- The maximum rate at which sandbars could potentially be rebuilt is comparable to their erosion rate over the ~40 years since dam construction.
- Deviations from optimal conditions (e.g., wetter hydrology, fluctuating flows) will decrease the rate of accumulation or result in net erosion.
- The largest uncertainty is in estimating  $F_b$ . Can high flow hydrographs be optimized to promote sandbar building while minimizing export.

*Q: At 200,000 tons that you say would be available, is that accumulative? In other words, if you don't do a high flow event, would that 200,000 accumulate every time? (Henderson)*

*A: Yes, I think it should but as more and more accumulates, the numbers should go down because as the system becomes more enriched, there will be more export. For the near future it would but eventually the system would build up to the point that it's so enriched that it's just exporting what's coming in. (Wright)*

Modeling Updates and next steps FY09 Work Plan” Scott presented the next PPT, “Modeling Updates and next steps FY09 Work Plan” **Attachment 5f**. He also distributed the report, “Development and Application of a Water Temperature Model for the Colorado River Below Glen Canyon Dam, Arizona (**Attachment 5g**).

*Q: On the ramping study, do you know what kind of variables you're going to be looking at? (Davis)*

*A: The main things would be the level of fluctuation in the flow and the makeup of the bar in terms of the current size. (Wright)*

*C: The work that was done years ago for the original EIS was done on one site as I recall and one of the questions we had was whether or not that was applicable all the way down the river and the different grain size in the different parts of the river would seem to be very important to know that. I would hope that is included in there. (Davis)*

*A: It is included in there and I think Mark would be a good one to talk about it. (Wright)*

Update on Analysis of 2005 Imagery. Ted introduced Mike Breedlove and Jack Schmidt and said they would be giving an update on what's going on in the current era of remote sensing imagery analysis specifically the work that's been done on shoreline mapping and change detection in 2007 and 2008, which is still underway and will be completed later in the calendar year. He said their presentation would focus on the results that occurred in response to the 2004 high flow experiment, using 2002-2005 imagery. Jack Schmidt distributed copies of his “Update on Analysis of 2006 Imagery” PowerPoint presentation. (**Attachment 5h**). Mike said the preliminary analysis of report could be completed by the end of FY08.

Update on Cultural Monitoring R&D Project. Helen Fairley distributed copies of her PowerPoint presentation (**Attachment 5i**) along with copies of the “Legacy Monitoring Data Review Panel Report to GCMRC” dated Nov. 29, 2007 (**Attachment 5j**). She said the final report on the Legacy meeting was provided in December 2007. Brian Collins from Menlo Park was invited to speak and distributed copies of his PowerPoint presentation, “Evaluation of Terrestrial Lidar as a Tool for Monitoring Geomorphic Change at Archaeological Sites in Grand Canyon National Park” (**Attachment 5k**).

*Q: What's the comparison of costs between the two systems? (Davis)*

*A: There is the cost of the processing, the labor, and the instruments. The instruments are about \$100K and I don't know what a total station goes for. (Collins)*

*Q: So you haven't gone through a chart to come up with a comparison of the difference in costs to do this job using terrestrial LiDAR versus total station? (Davis)*

*A: The reason we haven't presented a number value on that is because it's difficult to get a metric. If you decide that the goal is to collect a gully thalweg, then the terrestrial LiDAR is going to be much more expensive because of the post-processing time and the equipment. If your goal is to monitor the entire site, then terrestrial LiDAR is far more inexpensive because it would take you so much time to monitor that site with the conventional total station. We presented some conclusions in the report to that effect that states you really have to decide first on what you want to monitor and then make the decision on what is more economical for the job. (Collins)*

*Q: We understood at the last CRAHG meeting that you were going to hire an archaeologist at the Center, but we didn't hear what they were going to be working on and what the status is on that hiring? (Barger)*

*A: The position has been underway as far as being classified for some time. Because we're looking for someone that could cover a broad range of needs within the program, including maintaining these weather stations, doing the technical upkeep on them, dealing with the data that was coming out of this program both from a geomorphic standpoint as well as an archeological standpoint, we created a position description that our HR Dept. had never seen before. It's taken them awhile to get that out. We are expecting that position to be advertised by the end of next week. I'll share with people once it comes out. (Fairley)*

*Q: Brian, did I understand you correctly on this LiDAR that it is subject to some atmospheric conditions and if it is, how do you adjust for that? (Seaholm)*

*A: The primary atmospheric condition would be on whether it's foggy or not. You generally can't get the range that you're looking for if there is high moisture or even dust in the air. Most of the atmospheric abnormalities are taken into account by the laser and it actually does a calibration check when it boots up and measures its own range and returns so those condition-specific measurements are taken into account. It's pretty automatic. (Collins)*

*Q: So it's pretty much self-correcting, if you will? (Seaholm)*

*A: In general. If you are working in very abnormal conditions, you can do additional post processing. (Collins)*

Update from Mike Berry on Programmatic Agreement and Excavation of Archeological Sites. Kurt said that before Jonathan Damp would give his presentation, he said he talked with Mike Berry and Mike wanted the TWG to know that the Programmatic Agreement will be the master document for treating sites under 106 Compliance and that it will be rewritten to reflect what we now see as the long-term monitoring requirement, probably at a reduced rate via probability sampling and a series of annual Memorandums of Agreement will be executed to deal with specific sites. Only four sites will be excavated in FY08 and that needs to be increased to six or seven to complete data recovery of 54 sites in 10 years or less.

Preliminary Report on the Archaeological Excavations at the 9-mile site in Glen Canyon. Jonathan Damp provided information on what they did last year and what will be done this year as it relates to the Nine-Mile Wash Site before the high flow event. This was done through the ZCRE with Joel Pedersen, Gary O'Brien, and Erin Tainer. Jonathan distributed copies of his PowerPoint presentation "Geoarchaeology in Grand Canyon Update for 2007 and 2008" (**Attachment 6**).

*Q: How do you infer agricultural fields? Some of these settings seem like very unlikely places to be. (Stevens)*

*A: I don't think it's a very unlikely setting. I think it could be something given the way that agriculture is practiced. It does have water, something that if you get up over out of the canyon and you're getting into a place that doesn't have water and in those areas where you have plentiful rainfall, you might have good places for crops but this is a good way of hedging your bets, putting your fields everywhere and maybe getting some corn to grow there. How do we know if we don't know yet? That's one of the hypotheses we're testing. (Damp)*

*Q: You mentioned the four sites that are going to be excavated in 2008. Do you know which ones they are? (Heuslein)*

*A: Yes. There are two at Tanner, one at 39 in Eastern Canyon, and the one we just did at 9-Mile Wash. (Damp)*

*Q: You made a statement there were 2008 dates taken from the left side of the site and dates from the right side of the site that you attributed to the more recent dates from cat fill, right? Do you think those dates are in situ or are they coming from higher up? (Dongoske)*

*A: No, those dates are in situ. In this part of the site over here, you have cut and fill coming down from this hillside and we haven't dated those yet and I don't think there's a need to date it because we had a hearth and some charcoal stains and Tsegi orangeware that dates to about 1100 A.D. so we're pretty confident of that. We need to date these but the earlier dates out of here and Kurt Anderson's dates so I really think they are in situ. They haven't been disturbed but you do have cut and fill events happening on the downstream side, that's the far side. (Damp)*

LTEP Update. Dennis Kubly read from a fax (**Attachment 7**) he received earlier today: "The Long-Term Experimental Plan EIS was to begin in 2006. The AMWG made recommendations to the Secretary on the options that had been assessed by GCMRC and then the identification of 16 cooperating agencies that joined Reclamation as the lead for developing the alternatives. Scoping occurred in early 2007 for that effort. There were both flow and non-flow actions considered in the alternatives. Multiple factors including unique sediment circumstances, new information on the endangered humpback chub, and litigation led to temporary suspension of the work on the LTEP and instead the primary focus was placed on ESA NEPA compliance for a 5-year plan of experimental flows including a 2008 high flow test that was undertaken earlier this year. During the ESA NEPA compliance efforts and a Federal Register Notice published on Feb. 12, 2008, the Department of the Interior committed to reassess the need for an approach to the LTEP following the completion of compliance on the short-term (the 5-year experimental flow program). That reassessment has not been completed and has barely begun and there is a need for both internal discussions within the Department of the Interior and external coordination with AMWG members on the question of where to go with the LTEP." He said he didn't have all the answers today. He said flow actions for the next five years have been addressed and decided by DOI in the EA, BO, and FONSI so that's for the 5-year period but no one knows what comes after that. Ongoing studies will provide guidance for subsequent science and further adaptive management decisions and/or modifications. He said it's important to note that the FONSI directly addressed flow issues over the next few years in the context of adaptive management and he quoted from the FONSI (pg. 3) "During the public review process for this proposed action, a number of entities have advocated additional steady flows or high flows in the future or management actions. This proposed experiment neither mandates nor precludes future experimentation rather this proposed experiment was developed consistent with the principles of adaptive management to

require full scientific and public analysis of the effects of the experiment and integration of such results in future decision making.” The Biological Opinion also contemplates continuation and expansion of non-flow experimental and management actions. With respect to the non-flow actions, the lead for these efforts will likely vary depending on the action following the line authority of the various agencies. Discussions within DOI have just begun on these efforts and are far from complete. Reassessment of the LTEP will include consideration of what is the best approach to complete these ongoing and new non-flow actions in a timely manner. Finally, the reassessment of the LTEP will also consider whether it is preferable to bundle up a number of actions in a single EIS versus addressing the issues in a series of parallel but complementary NEPA actions. Perhaps the path used in the past, incremental, sequential EAs, is a better approach in an adaptive management setting that needs to be able to respond to new and updated information.

He said that leaves the TWG with an open question about whether or not it will be considered preferable and these are all discussions that have to occur to engage in an LTEP or continue as has been since 2002 when the first EA was done on a series of shorter and simpler actions.

**Adjourned:** 4:50 p.m.

**Glen Canyon Dam Technical Work Group Meeting**  
April 8-9, 2008

**Conducting:** Kurt Dongoske, Chairperson

**April 9, 2008**

**Convened:** 8 a.m.

**Committee Members Present:**

Jan Balsom, NPS  
Mary Barger, WAPA  
Cliff Barrett, UAMPS  
Charley Bullets, Kaibab Band of Paiute Indians  
Jonathan Damp, Pueblo of Zuni  
William Davis, CREDA  
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Robert King, UDWR  
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**Alternates Present:**

Don Ostler

**For:**

John Shields, State Engineers Ofc./WY

**Interested Persons:**

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Jack Schmidt, Utah State University  
Phil Smith, GCMRC/USGS  
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David Topping, GCMRC/USGS  
John Weisheit, Living Rivers  
Scott Wright/GCMRC/USGS

**Meeting Recorder:** Linda Whetton, USBR

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**Welcome and Administrative.** The Chairman welcomed the TWG members, alternates, and interested persons. Attendance sheets were distributed.

Clarification from Andrea Alpine on Scott Wright's presentation. Andrea Alpine said there were some questions regarding the yesterday's presentation on "Is there enough Sand?" It is not a recommendation but came about because the TWG had asked if there was a flow only option for creating beaches and backwater habitats. She said the presentation was step one in analyzing that question. From a scientist's standpoint, you analyze an extreme case and you say in that extreme case, and when they say "optimal," they mean optimal for sandbar creation. She said if there was one word she could put altogether so that

they always stuck those words together, that is what she would try to create so it doesn't look like someone saying this is the "optimal regime." She stated you have to use the term "optimal" when analyzing various flow regimes. The next steps are to analyze the more realistic options. If the program wants to start to analyze options for MLFF, peak flows, etc., more understanding is needed and that's why the sand study was done. The second thing is people making statements that we should do this every year, every fall, etc.. She said people need to be careful or things could be made worse. They still don't know enough when to do the tests.

**LSSF Synthesis Work Plan.** Matthew Andersen gave a PPT on the "Low Steady Summer Flows 2000 Synthesis Project" (**Attachment 8a**) along with copies of the Experimental Flows of 2000 Brief Summary of Associated Scientific Studies (**Attachment 8b**), and Goal 12 (**Attachment 8c**). Matthew asked the members to look at the projects and if there are any things missing to let him know.

*C: The Center did a step process and Barbara Ralston is going to go into a workshop setting and perform more analysis and synthesis. Phase III and IV may change significantly. (Garrett)*

*C: We're right on the cusp of doing a low steady flow in the fall so why are we doing this? We were going to get information from 2000 but it won't be available. We've asked for the synthesis for a long, long time. We're already down the road of what we want to do (Davis)*

*C: We're only dealing with flows of the dam and whether low steady flows are going to be good for nonnative fish. We've been asking for this for a long time and a key question if LSSF are going to do things for our fish. There are huge questions associated with this. I think having a mini workshop might be a possibility. (Stevens)*

*R: There is a relatively new report that summarizes transport work done in 2000. There is also a data series on nearshore measurements done in that year so that data will be acceptable and will be part of that synthesis. (Melis)*

*Q: The managers think it is important for a large synthesis while scientists have been reviewing reports and are able to respond to RFPs in moving forward. Is there a knowledge assessment that precedes the next SCORE Report? (Kubly)*

*A: I don't know but highlight that for your attention. (Andersen)*

*Q: Out of these studies listed here, I don't see anything that relates to SSQs for dam operations at TCP and archaeological sites. Are these going to be accomplished? The other question under economics will also include impacts to tribal entities and also effects on tribal entities. (Heuslein)*

*Q: Would you consider in Phase II? (Dongoske)*

*A: If there is a direction to do more, it will be more synthetic, taking existing data and looking at that. (Andersen)*

**HFT Work Plan / Impacts on 2008 Work.** John Hamill passed out copies of the "Impacts of the High Flow Experiment on GCMRC's Approved FY08 Work Plan" (**Attachment 9**). He said GCMRC tried to articulate in the table the magnitude that went into the high flow experiment. He said the table identifies the project name as listed in the FY08 workplan. He went through the various projects and due dates. He didn't feel there would be any financial impacts but some things may be delayed but GCMRC will try to catch up.

*Q: I don't see the AMP Effectiveness Workshop. (Barger)*

*A: That's out of my control. We proposed it for FY07 and it was canceled. (Hamill)*

*Q: You don't show any impacts on staff time and things moving into FY09. Those impacts are not reflected. (Barger)*

*A: We're assuming those folks will still be around and this assignment will just have to be done. (Hamill)*

**Chute Falls HBC Translocation/Augmentation.** Glen Knowles said he didn't have a handout but Pam Sponholtz has a PPT presentation, "Translocation of humpback chub above Chute Falls (**Attachment 10**). He said that by now most people are familiar with the Fish and Wildlife Service's February 27, 2008 Biological Opinion and Reclamation's proposed action for that was for a high flow test in 2008 which was just completed as well as five years of MLFF with steady flows in September and October. In addition to that, Reclamation proposed a number of conservation measures as part of the proposed action to minimize the adverse effects associated with conducting high flow tests and other aspects of the proposed action. One of those conservation measures is translocation of humpback chub. He said FWS is planning to translocate HBC at Havasu Creek, Shinumo Creek, and Bright Angel Creek. They also want to continue doing translocations in the Little Colorado River, taking them from near the mouth of the LCR and moving them upstream above Chute Falls. They would like to do that in 2008 and have procured funding as part of

the 2008 budget process. He said today's presentation will focus on what they've done in the past three years. This was a conservation measure in the 2002 and 2003 biological opinions to offset take from mechanical removal of non-native fish and conducting a high flow test in 2004. Pam proceeded with her presentation. She concluded with the benefits of the Chute Falls Project:

1. Increased abundance of HBC
2. 2-year old fish >200mm
3. Reduced mortality of YOY chubs
4. Increased historical range by 4km
5. Better understanding of life history

*Q: Have you encountered disease issues, parasite issues up there? (Stevens)*

*A: None whatsoever. (Sponholtz)*

*Q: The KAS is an interesting analog to this but some of the concerns that we've had is because the dam has allowed this habitat to expand, and the snails have moved down to the habitat. As such, we're concerned that the snails were getting away with an easier life and therefore diluting the overall genetic integrity of the snail population. This is also a possibility if conditions are really good for HBC above Chute Falls. The selection factor going on might drift downstream and soften that population a little bit. Can you talk a little bit about the loss of genetic integrity? (Stevens)*

*A: There are some differences between the fish that have been collected at Willow Beach back in the 1990's and the fish that are moved above Chute Falls which is interesting because they're both collected from the same place. We have done no genetic analysis on the three F1s that have been captured so essentially the fish above Chute Falls are not an issue now but is something this group should be aware of for future action. (Sponholtz)*

*Q: Is the food resources abundant upstream? What is going on in the downstream resources? (Weisheit)*

*A: There aren't a lot in the lower basin. (Sponholtz)*

*Q: Have you done a diet study? (Kubly)*

*Q: We have not done one but there is a study done by Rich Valdez. (Sponholtz)*

**HFT Biological Opinion and Future Direction - Proposed Action on Conservation Measures.** Dennis Kubly distributed copies of his PPT presentation, "Conservation Measures 2007 and 2008 Biological Opinions Glen Canyon Dam Operations" (**Attachment 11a**). He started off by identifying what conservation measures are under the ESA, Section 7. They're voluntary actions proposed by the action agency and in a biological opinion the Service evaluates the effects of the proposed action by the action agency on the listed species. So the conservation measures are intended to voluntarily offset any negative effects that might occur pursuant to undertaking the proposed action.

John Hamill passed out copies of his PPT, "GCMRC Monitoring and Research Plan to Support the GCD AMP" (**Attachment 11b**) and said the MRP will be the basis for the annual work plan budget. He feels it needs to be updated and suggested that when we have the next AMWG meeting, the document needs to reflect this.

*C: There are two issues the Science group brings to you: science development, and science planning. We said there should be some process of maintaining this documentation. The SA's that should go hand-in-hand. (Garrett)*

*R: I don't feel there is a lot of time to go through and update the knowledge assessment. (Hamill)*

*C: Is AMP the vehicle for doing work? I would like to go to the AMWG and suggest doing a 2-year budget, specifically for 2010-2011. (Kubly)*

*C: I agree we need a plan and also the EA and BO for the next year. (Garrett)*

**Budget Ad Hoc Group Report on Preliminary FY09 Budget and Work Plan,** Dennis Kubly passed out copies of the "Budget Ad Hoc Group Report to the TWG" (**Attachment 12a**) and said that USBR's portion was about \$2M and asked the TWG if the BAHG was headed in the right direction.

**Overview of the budget process** John passed out copies of a revised Memorandum dated April 17, 2008, Subject: Preliminary Fiscal Year 2009 Glen Canyon Dam Adaptive Management Program Budget (**Attachment 12b**).

**GCMRC Portion of Budget.** Rick said he would like to see a BHBF in FY09. It would affect the rest of the motion which was prepared with Hopi, GCWC, and GCT. Dennis asked if he saw where the funding was identified. He advised having the budget discussion first, discuss the hydrograph, and then have the TWG consider Rick's motion. Dennis said it relates to the analysis of the 08 test and that was getting into areas he was unfamiliar with. He said NPS comments would also need to be included.

**Q:** *How is our budget fit with our Strategic Plan? (Heuslein)*

**R:** *The budget was built around the CMINS, RINS, etc., and it specifically address those. (Hamill)*

**C:** *I suggest adding a column for each of the budget items. (Heuslein)*

**R:** *I think it would be better to have a pre-discussion with the AMWG rather than put a lot of footnotes into the spreadsheet. (Hamill)*

#### Discussion on Reclamation's portion of the FY09 budget:

Dennis said Reclamation's prepares its budget based on a 3% CPI rate. He said the main changes to the FY09 budget was a reduction from LTEP compliance \$229,000 from FY09, leaving \$50K in the compliance work. He went through the remainder of the line items and said \$250,000 was planned for the NHPA treatment plan.

**C:** *The \$1.5 million was put in line 198. It would be nice to know what that money will be spent on. I want it kept as a placeholder. (Barger)*

**C:** *None of the budget line items reflect looking at extirpated species. It doesn't need to be included but it needs to be kept in mind on future budgets. John H said it was put in the MRP so it remains a concern as we review the MRP. (Stevens)*

Rick presented the following motion developed by Grand Canyon Trust, Grand Canyon River Guides, and the Hopi Tribe.

Motion seconded by Mike Yeatts.

**MOTION:** The strategic science questions for sediment include:

1. Is there a flow-only (non-sediment augmentation) operation that will restore mainstem sandbar habitats over decadal time scales?
2. Is there an optimal strategy for BHBF implementation to manage tributary inputs on an annual to inter-annual time scale? A science plan specific to a spring BHBF will be provided for TWG review by mid-January 2008.
3. What are the short-term responses for sandbars to BHBFs?

Following the 2008 BHBF we now have, or soon will have, significant information regarding questions 2 and 3. It is necessary to now consider question 1 --testing the implementation of multiple BHBFs under enriched sediment conditions in order to restore and maintain sandbar habitats over time.

The TWG recommends to the AMWG that if the sediment trigger is reached, then a BHBF takes place in WY 2009 as follows:

1. The hydrograph should resemble the March 2008 hydrograph.
2. The BHBF will be implemented in late March or early April. .

#### Discussion

**Q:** *Question for GCMRC: Whether the information from the 08 test can be fully analyzed, presented to the AMWG or presented to the public and implemented into an appropriate, analytical framework based on predictive models and analytical tools before we do an 09 test. Can you do that? (Ostler)*

**A:** *No. (Hamill)*

**R:** *Well, I think that the FONSI says that's what you have to do in order to have another experimental test. It's very clear. Those are the specific words referenced in the FONSI and the BO. How do you do this? (Ostler)*

**R:** *It's the second paragraph. I would argue that we know that doing aHFT will park sediment. I would say that we've met that requirement BHBF. We've run flows under low sediment conditions, moderate sediment conditions, and now high sediment conditions. Each one we know we're parting sediment with that. Everything else that we do from now on*

*is going to be an experiment but it's a matter of details. The antecedent conditions are always going to be different. The hydrograph is always going to be a little bit different and so everything is going to be an experiment to some extent but whether or not that BHBFAre important are parking sediment concerns, I'd say that we can put a stamp of approval on that that one. It's done. (Johnson)*

**R:** *That's not what the FONSI says. (Ostler)*

**C:** *It will take 6-8 years of what this flow did. There is no way to get short-term answers. There is too long a time frame waiting for sediment management. We're trying to set the stage and come back and talk through the issues, there is enough sediment in the system, and limit impacts. (Stevens)*

**C:** *I think the EA made the frequency of the tests. It was specifically considered. The tests cost a lot of money. I think the decision was made to get the information before we test every single hypothesis. We've done enough tests and need to save some of those funds. (Ostler)*

Kurt asked if it was productive to continue the discussion and a member called for the question. The motion was put for a roll call vote:

Motion presented by Rick Johnson.  
 Motion seconded by Mike Yeatts.

The strategic science questions for sediment include:

1. Is there a flow-only (non-sediment augmentation) operation that will restore and mainstem sandbar habitats over decadal time scales?
2. Is there an optimal strategy for BHBF implementation to manage tributary inputs on an annual to inter-annul time scale? A science plan specific to a spring BHBF will be provided for TWG review by mid-January 2008
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The TWG recommends to the AMWG that if the sediment trigger is reached, then a BHBF takes place in WY 2009 as follows:

1. The hydrograph should resemble the March 2008 hydrograph.
2. The BHBF will be implemented in late March or early April.

Representative	Stakeholder Entity	Vote	Representative	Stakeholder Entity	Vote
Bill Persons Scott Rogers	Arizona Game & Fish Dept.	absent	Rick Johnson	Grand Canyon Trust	Y
Amy Heuslein	Bureau of Indian Affairs	Y	Larry Stevens	Gr. Canyons Wildlands Council	Y
Dennis Kubly	Bureau of Reclamation	N	Mark Steffen	Federation of Fly Fishers	N
Mike Yeatts	Hopi Tribe	Y	John O'Brien	Grand Canyon River Guides	Y
Kerry Christensen	Hualapai Tribe	absent	Bill Werner	State of Arizona	N
Jan Balsom	NPS-GRCA	Y	Christopher Harris	State of California	absent
Norm Henderson	NPS-GLNRA	Y	Randy Seaholm	State of Colorado	N
Steven Begay	Navajo Nation	absent	Anthony Miller	State of Nevada	N
Jonathan Damp	Pueblo of Zuni	A	Jay Groseclose	State of New Mexico	N
VACANT	San Juan Southern Paiute	absent	Robert King	State of Utah	absent
Charley Bullets	Southern Paiute Consortium	Y	Don Ostler	State of Wyoming	N
Glen Knowles	U.S. Fish & Wildlife Service	Y	Bill Davis	CREDA	N
Mary Barger	Western Area Power Admin.	N	Cliff Barrett	UAMPS	N
			<b>Total Yes 9</b>		
			<b>Total No 10</b>		
			<b>Total Abstain 1</b>		
			<b>Total Voting 20</b>		
			<b>Motion Fails</b>		

General Discussion on budget:

Kurt presented the list of budget concerns and asked the TWG how they wanted to handle them. It was decided they would go through the list and add/delete as needed.

### Whiteboard Comments

1. Extirpated species (Goal 3- some concern that it's outside the program) – okay i
2. HFE in 09
3. LSSF Synthesis funding 09 (placeholder funding)
4. TWG Chair/Facilitator
5. Mainstem coldwater non-native control (line 74)
6. Nearshore ecology/FSF/(needs some plan) → USBR will provide \$
- 7 Delay Vegetation work
8. Tribal Liaison Position
9. Overflight Photo during Sept.Oct
10. AMP Effectiveness Workshop
11. Sediment Transport Study – Have all data necessary
12. Conservation and other Measures

NPS Budget. Norm Henderson passed out the Park Service's concerns (**Attachment 13**) and said their budget incorporates the conservation measures and funding sources. By starting these, they don't have to say that they're all under the AMP. Their intent is to have a balanced budget under the DOI cap in order to fully implement the GCPA.

Kurt asked him if he was saying what DOI's intent was and also how he wanted the TWG deal with the NPS budget. Norm said it was the Park Service's plan to present it to the AMWG as an additional item to the budget and that it would be an assumption under the umbrella of the AMP and under the cap.

TWG comments on the NPS proposed budget:

1. Items 2,3, & 4 tributary work – outside the AMP
2. Mainstem coldwater fish control – management actions
3. Monitoring and research need to stay within the existing program
4. Have DOI make formal presentation to TWG/AMWG

Andrea said that other DOI agencies haven't been involved in the preparation of the NPS budget and it hasn't been blessed by DOI.

Don Ostler asked if there was sufficient time to go through the level of detail required to understand what the NPS is proposing and whether it would be possible to schedule it for the next TWG Meeting. Norm said it could be done.

Motion Discussion. Kurt said there were three motions up for consideration in terms of the FY09 budget: a HFE for 09, and two motions that Larry Stevens wants to present.

Mary said that WAPA had some concerns on timing and could split the TWG on this. Norm told Mary that they had been told this initiative was coming. He doesn't see it as anything different from what they've received from GCMRC. It's always been tucked into ancillary projects.

Randy expressed concern that the monitoring and research needs to stay under the program as it is until a management action is actually declared to move it into a particular agency. Furthermore the conservation measures USBR has agreed to and he would also like to see a lot of guidance on how core monitoring is going to be implemented.

Norm said they've relied on GCMRC to develop and review the protocols but the implementation is done by the NPS. This fits in with the overall paradigm throughout the whole US.

Leslie said it would be more beneficial to have one presentation from the DOI agencies rather than having separate ones. That's where a management action is determined. The DOI agencies need to be in sync. Leslie said there is the issue of keeping this under Reclamation.

In the interest of time, Kurt asked for comments and the following were provided:

*C: The SAs brought up a key issue that you'll be here in 2 days and transfer management actions and make some moves. If you had seen it then, it would've been easier to handle today. You haven't made decisions on management actions. The TWG needs to step up and line out these kinds of issues. (Garrett)*

*R: You're exactly right. I don't think we can face these issues especially at the 11<sup>th</sup> hour. It does not seem to have any authority on the DOI Secretary. On behalf of our state, this kind of venue where we're supposed to be working cooperatively, is counterproductive and could set us back. If we want to undertake, let's put on the list. We can't do in the short time and I'm not ready to accept this imposition. (Groseclose)*

Kurt advised the group to recognize that the NPS budget is out there but that they need to address concerns about the FY09 budget and asked if anyone couldn't accept the FY09 budget pending the issues discussed when GCMRC goes back and revises their workplan with more specificity. Bill Werner said it would be helpful if Rick could explain what the money would be used for

Norm said that at some point the TWG is going to have to deal with the conservation measures and suggested merging the NPS proposal with the FY09 budget into some acceptable document.

Kurt said he sensed that the TWG acknowledges the NPS proposal but there isn't sufficient time to really review it in detail and make a recommendation or take any action.

Dennis said that members are asking very good questions about a concept and he thinks that's a level at which that needs to be presented. If indeed it is a DOI proposal, then it should be a DOI concept and not an NPS so he would advocate that the concept which includes transition from experimentation to management actions and the lack of any framework under which to do that is what should be put forth to the AMWG and ask for their direction on whether the TWG should consider. He added that a key component will be getting appropriated dollars to bear the financial part of the conservation measures commitments which also needs to be identified to the AMWG. That it is not just being dumped on the program but there is other funding and that leads into the question of whether or not in the future some of that could transition into the Park Service to bring appropriated dollars to alleviate the impact on the program. I think we need to march one step at a time.

The members continued to deliberate over the items identified and made the following changes:

#### Whiteboard Comments & Changes

1. ~~Extirpated species (Goal 3—some concern that it's outside the program)—okay i~~
2. ~~HFE in 09~~
3. LSSF Synthesis funding 09 (placeholder funding)
4. ~~TWG Chair/Facilitator~~ (removed due to budget issues per request from Amy Heuslein)
5. Mainstem coldwater non-native control (line 74)
6. Nearshore ecology/FSF/(needs some plan) → USBR will provide \$
7. ~~Delay Vegetation work~~
8. Tribal Liaison Position
9. Overflight Photo during Sept.-Oct
10. AMP Effectiveness Workshop
11. Sediment Transport Study – Have all data necessary
12. DOI Proposed Conservation and other Measures

Cliff Barrett said one of the issues they've raised a number of times and have never gotten an answer to is the cost of \$4 million in power revenues to do a test and whether that cost should come out of the ceiling of use of power revenues for the AMP program. They've never received a satisfactory answer to that issue but he wanted to make sure the TWG realizes it is an unresolved issue and he would like to see it have a thorough discussion at some point in the near future.

Given the discussion and the lack of time, Kurt suggested that rather than having to generate a motion to the AMWG, he wondered if the TWG would agree that GCMRC needs to revise the budget based on issues raised today and that the TWG needs more time to understand the NPS proposal as well as any other DOI proposals that come in. Rather than try and craft a motion at today's meeting, Kurt suggested they dedicate the next TWG meeting to dealing with just the FY09 budget and workplan. He asked for a show of hands and the TWG indicated they were in agreement.

Terrestrial PEP Results. Dr. Matthew Andersen said a Terrestrial PEP panel was conducted in the summer of 2007. Dr. David Cooper was the panel chairman which led to the preparation of the panel's report, "Review of Terrestrial Monitoring Protocols for the Grand Canyon (**Attachment 14a**). Dr. Cooper proceeded with his PPT and distributed copies of it as well (**Attachment 14b**). He concluded with the specific recommendations from the report:

1. The Management Objectives (MOs) and Core Monitoring Information Needs (CMINs) developed to direct GCMRC actions need re-evaluation as some are unrelated to dam operations, others seem unrealistic, and others need clarification.
2. We recommend that CMINs 6.6.6 (seeps and springs) and 6.6.7 (SW willow flycatcher) be discontinued by the GCMRC, and that the GCMRC arrange to receive data being collected by other agencies on these topics.
3. Vegetation maps need to be finalized.
4. A schedule and strategy for repeat mapping and change detection analysis should be developed.
5. Sample plots should be located randomly within the randomly selected sample sites, and plot design should be modified as discussed in the vegetation summary.
6. The suite of biotic variables chosen from monitoring can be truncated to include only organisms conducive to rigorous sampling and methods conducive to rigorous analyses. Data on native and non-native plant species should be collected simultaneously, but separate analyses should be conducted for each.
7. Monitoring large wood abundance and location should be considered.
8. The absence of monitoring sites outside of Glen Canyon reduces the strength of inferences about the effects of dam operations. Reference sites not subject to the flow regime imposed by Glen Canyon Dam are necessary, but their location may vary depending on the suite of monitoring variables under consideration.
9. Publication of results in peer reviewed journals should be a priority as there is a large audience interested in how flow regulation affects Grand Canyon habitats, and the journal review process is a valuable mechanism for quality control.
10. Sampling frequency should be determined both by expected rates of change and expected drivers of change (e.g., natural droughts, management high-flow events).

**Q:** *This entire program suffers from the entire issue of what the future condition of the Colorado River corridor should be. We go through lots and lots of discussions about that. After 15 years of data collection in this program it would be nice to see a model that tells us what's possible and then when somebody throws out that we want the pristine condition here, how close can we get to that, what's the reality of that for vegetation? Is it your view that this program is headed in that direction towards a model that can actually demonstrate to us or predict future conditions here given different management scenarios? (Stevens)*

**A:** *I think this program is set up to detect change. There is no reference. There aren't goals because you haven't worked outside of the Grand Canyon. So without a reference standard, without the historical photograph analysis to see how the vegetation has changed to date, it's hard to know what the goals, the pristine, or pre-dam condition would be. Without knowing the pre-dam condition, it's hard to know what condition you are really aiming for. (Cooper)*

**Q:** *This program doesn't seem to be directed towards a model. Your panel sounds like they're a little bit divided in terms of – pristine condition is what we should be aimed at with your first set of conditions. You're saying that some things are good, some things are kind of bad, tamarisk is bad. There are elements in your discussion that show your panel is divided as to their perspective of where the system should go and the options are, of course, pristine condition, some modified post-dam condition, or something in the future that we could drive it to. Is this program capable of delivering us to a model that will help answer that question. It's a core problem for this program. (Stevens)*

**A:** I would say our panel wasn't divided. We all agreed on the need for removing exotic plants, etc. We all agreed there is a reference standard that needs to be established and if there was a reference standard along with the monitoring and some of the other suggestions that we had, it seems like this program could take you in the right direction, but what are the goals? What are your goals? This is a monitoring program. Our understanding is that this program wasn't set up to restore the Grand Canyon or set the goals. (Cooper)

**C:** Yes, but without the model in mind is vacuous. (Stevens)

**Q:** Is it your understanding that GCMRC, this program, was supposed to set the goal or do the monitoring? What we reviewed was the monitoring objectives, the monitoring approaches and the past work that's been done. It wasn't to look at the overall goals of the program. That wasn't part of any of the documents that we saw and we weren't asked to do that at all. (Cooper)

**C:** Just comparing this to the sediment program where pretty much any question we could throw at them, they can generate an answer, some kind of prediction of what the effects will be of a flow regime. (Stevens)

**R:** But the sediment program has had lots and lots of science done. (Cooper)

**C:** I'm just saying from your report, it would be nice to have that as an emphasis and something that we should be aiming at as a model of how the riparian system works rather than simply tagging along and waiting for decades or centuries before we have enough information. (Stevens)

**R:** We didn't review anything that was an analysis of such a model. To do this right, you need to have an understanding of what was there before the dam and how it's changed and why. That will give you a functional understanding of how these terrestrial systems respond to different flow scenarios and it just doesn't exist. (Cooper)

**Q:** I'd actually like to challenge you on that because I shared many of the things that Larry has brought up and that is it seems to me the riparian work in particular has been involved in primary change rather than change toward or change relative to some natural condition. And given that we're in a national park, it should be relative to the natural condition set by the Park. This is one of the issues that undoubtedly troubles us because we're told by law and policy who is close to those conditions and what are they. It's been very difficult to establish those but on the other hand there is a lot of good photography. When I see the stuff that comes out of the riparian, I ask myself "well, what relevance is this? How do we use this information in a way to say dam operations are fine or dam operations should be changed because it's not relative to some natural condition?" (Johnson)

**R:** I agree. All the recommendations I had at the end, we need to develop that model so we understand what was there and how it's changed so that you can understand how dam operations affect the terrestrial communities. (Cooper)

**Q:** Can you give us some of your thoughts on tamarisk removal and how could be done in the canyon itself? (Heuslein)

**R:** We're doing quite a number of large tamarisk removal projects in other remote areas – Dinosaur National Monument which again is accessed by rafts. There are lots of examples. The technology is that you cut the stem off and you paint the stem with herbicide. That's really all there is to it. (Cooper)

**Proposed MRP Motion.** Kurt said that due to not having a quorum (16 members) present, he asked the members to provide their availability to Linda to participate in a conference call to discuss the MRP motion that was prepared by Larry Stevens and sent via e-mail to the TWG prior to the meeting. A conference call was held on April 22, 2008 and the following motion was passed by consensus with the roll call votes noted below:

Motion presented by Larry Stevens.  
Motion seconded by Bill Werner.

"The TWG requests that the AMWG authorize the TWG to work with GCMRC to update the MRP to reflect the new priorities and provisions of the 2007 Biological Opinion concerning the shortage guidelines and coordinated operations of lakes Powell and Mead, the 2008 Biological Opinion on the Operation Glen Canyon Dam, and the associated Environmental Assessment. The TWG will report recommended MRP changes to the AMWG for review and approval by the Fall/Winter 2008 meeting."

Representative	Stakeholder Entity	Vote	Representative	Stakeholder Entity	Vote
Scott Rogers	Arizona Game & Fish Dept.	Y	Rick Johnson	Grand Canyon Trust	Y
Amy Heuslein	Bureau of Indian Affairs	absent	Larry Stevens	Gr. Canyons Wildlands Council	Y
Dennis Kubly	Bureau of Reclamation	Y	Mark Steffen	Federation of Fly Fishers	Y
Mike Yeatts	Hopi Tribe	absent	John O'Brien	Grand Canyon River Guides	Y
Kerry Christensen	Hualapai Tribe	absent	Bill Werner	State of Arizona	Y
Jan Balsom	NPS-GRCA	absent	Christopher Harris	State of California	absent
Norm Henderson	NPS-GLNRA	Y	Randy Seaholm	State of Colorado	Y

Steven Begay	Navajo Nation	Y	Anthony Miller	State of Nevada	absent
Jonathan Damp	Pueblo of Zuni	absent	Jay Groseclose	State of New Mexico	Y
VACANT	San Juan Southern Paiute	absent	Robert King	State of Utah	absent
Charley Bullets	Southern Paiute Consortium	absent	<b>Don Ostler</b>	State of Wyoming	Y
Glen Knowles	U.S. Fish & Wildlife Service	Y	Bill Davis	CREDA	Y
Mary Barger	Western Area Power Admin.	Y	Cliff Barrett	UAMPS	Y
					<b>Total Yes</b>
					<b>16</b>
					<b>Total No</b>
					<b>0</b>
					<b>Total Abstain</b>
					<b>0</b>
					<b>Total Voting</b>
					<b>16</b>
					<b>Motion Passes</b>

Adjourned: 3 p.m.

Respectfully submitted,

Linda Whetton  
 U.S. Bureau of Reclamation

### General Key to Adaptive Management Program Acronyms

ADWR – Arizona Dept. of Water Resources	KA – Knowledge Assessment (workshop)
AF – Acre Feet	KAS – Kanab ambersnail (endangered native snail)
AGFD – Arizona Game and Fish Department	LCR – Little Colorado River
AGU – American Geophysical Union	LRMCP – Lower Colorado River Multi-Species Conservation Program
AIF – Agenda Information Form	LTEP – Long Term Experimental Plan
AMP – Adaptive Management Program	MAF – Million Acre Feet
AMWG – Adaptive Management Work Group	MA – Management Action
AOP – Annual Operating Plan	MLFF – Modified Low Fluctuating Flow
BA – Biological Assessment	MO – Management Objective
BAHG – Budget Ad Hoc Group	MRP – Monitoring and Research Plan
BCOM – Biological Conservation Measure	NAAO – Native American Affairs Office
BE – Biological Evaluation	NAU – Northern Arizona University (Flagstaff, AZ)
BHBF – Beach/Habitat-Building Flow	NEPA – National Environmental Policy Act
BHMF – Beach/Habitat Maintenance Flow	NGS – National Geodetic Survey
BHTF – Beach/Habitat Test Flow	NHPA – National Historic Preservation Act
BIA – Bureau of Indian Affairs	NPS – National Park Service
BO – Biological Opinion	NRC – National Research Council
BOR – Bureau of Reclamation	NWS – National Weather Service
CAPA – Central Arizona Project Association	O&M – Operations & Maintenance (USBR funding)
GCT – Grand Canyon Trust	PA – Programmatic Agreement
CESU – Cooperative Ecosystems Studies Unit	PEP – Protocol Evaluation Panel
cfs – cubic feet per second	POAHG – Public Outreach Ad Hoc Group
CMINs – Core Monitoring Information Needs	Powerplant Capacity = 31,000 cfs
CRBC – Colorado River Board of California	PPT – PowerPoint (presentation)
CRAHG – Cultural Resources Ad Hoc Group	R&D – Research and Development
CRCN – Colorado River Commission of Nevada	Reclamation – United States Bureau of Reclamation
CRE – Colorado River Ecosystem	RBT – Rainbow Trout
CREDA – Colorado River Energy Distributors Assn.	RFP – Request For Proposals
CRSP – Colorado River Storage Project	RINs – Research Information Needs
CWCB – Colorado Water Conservation Board	ROD Flows – Record of Decision Flows
DBMS – Data Base Management System	RPA – Reasonable and Prudent Alternative
DFCAHG – Desired Future Conditions Ad Hoc Group	SA – Science Advisors
DOE – Department of Energy	Secretary – Secretary of the Interior
DOI – Department of the Interior	SCORE – State of the Colorado River Ecosystem
EA – Environmental Assessment	SHPO – State Historic Preservation Office(r)
EIS – Environmental Impact Statement	SOW – Scope of Work
ESA – Endangered Species Act	SPAHG – Strategic Plan Ad Hoc Group
FACA – Federal Advisory Committee Act	SPG – Science Planning Group
FEIS – Final Environmental Impact Statement	SSQs – Strategic Science Questions
FRN – Federal Register Notice	SWCA – Steven W. Carothers Associates
FWS – United States Fish & Wildlife Service	TCD – Temperature Control Device
FY – Fiscal Year (October 1 – September 30)	TCP – Traditional Cultural Property
GCD – Glen Canyon Dam	TES – Threatened and Endangered Species
GCT – Grand Canyon Trust	TWG – Technical Work Group
GCMRC – Grand Canyon Monitoring & Research Ctr.	UCRC – Upper Colorado River Commission
GCNP – Grand Canyon National Park	UDWR – Utah Division of Water Resources
GCNRA – Glen Canyon National Recreation Area	USBR – United States Bureau of Reclamation
GCPA – Grand Canyon Protection Act	USFWS – United States Fish & Wildlife Service
GLCA – Glen Canyon National Recreation Area	USGS – United States Geological Survey
GRCA – Grand Canyon National Park	WAPA – Western Area Power Administration
GCRG – Grand Canyon River Guides	WY – Water Year (a calendar year)
GCWC – Grand Canyon Wildlands Council	
GUI – Graphical User Interface	
HBC – Humpback Chub (endangered native fish)	
HMF – Habitat Maintenance Flow	
HPP – Historic Preservation Plan	
IEDA – Irrigation & Electrical Districts Assoc. of Arizona	
INs – Information Needs	
IT – Information Technology	

**Q/A/C/R** = Question/Answer/Comment/Response