

Glen Canyon Dam Technical Work Group Meeting  
January 25, 2006

**Conducting:** Kurt Dongoske, Chairperson

**Convened:** 10:10 a.m.

**Committee Members Present:**

Mary Barger, WAPA  
Steven Begay, Navajo Nation  
Kerry Christensen, Hualapai Tribe  
Jonathan Damp, Pueblo of Zuni  
William Davis, CREDA  
Brenda Drye, So. Paiute Consortium  
Lloyd Greiner, UAMPS  
Norm Henderson, NPS  
Rick Johnson, Grand Canyon Trust  
Robert King, UDWR

Dennis Kubly, USBR  
Glen Knowles, USFWS  
Phillip S. Lehr, Colo. River Comm./NV  
Ken McMullen, NPS/GCNP  
John O'Brien, Grand Canyon River Guides  
Don Ostler, UCRC  
Bill Persons, AGFD  
Mark Steffen, Federation of Fly Fishers  
Larry Stevens, Grand Canyon Wildlands Council  
Michael Yeatts, The Hopi Tribe

**Committee Members Absent:**

Christopher Harris, CR/CA  
Amy Heuslein, BIA  
D. Randolph Seaholm, CWCB

John Shields, WY State Engr. Office  
Bill Werner, ADWR

**Alternates Present:**

Garry Cantley

**For:**

Amy Heuslein, BIA

**Interested Persons:**

Matthew Andersen, USGS/GCMRC  
Christine Beard, USGS/GCMRC  
Mike Berry, USBR  
Gary Burton, WAPA  
Helen Fairley, USGS/GCMRC  
Dave & Pam Garrett, M<sup>3</sup>Research

John Hamill, USGS/GCMRC  
Lisa Leap, NPS/GRCA  
Ted Melis, USGS/GCMRC  
Clayton Palmer, WAPA  
Pam Sponholtz, USFWS  
Kimberly Spurr, Navajo Nation Arch. Dept.

**Recorder:** Linda Whetton, USBR

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**Welcome and Administrative Items:** The chairman welcomed the members, alternates, and interested persons. A quorum was established and attendance sheets distributed.

**Approval of the June 21-22 Meeting Minutes.** Pending some minor edits, the minutes were approved.

**Approval of the November 29-30, 2005 meeting minutes.** Pending some minor edits, the minutes were approved.

**Review of the Agenda.** Bill Davis requested the item scheduled for 11:15 tomorrow be moved up to 8:15 so Leslie James could be present for that discussion. The change was made.

**Review of Action Items:** Kurt asked if there were any comments and/or suggestions on the new format. Linda said the format is the same one being used by the AMWG. She will post the previous completed action items list on the web site.

Discussion of TWG Operating Procedures Kurt suggested waiting until the SPG has presented their documents and the TWG is ready to deal with implementation of the plans before discussing changes to the TWG Operating Procedures. The Budget AHG 's role isn't defined in the Operating Procedures but Kurt sees it as possibly combining with the SPG. This will be addressed at a future TWG meeting.

Bill Persons asked about the status of the Roles AHG Report. Norm said the report was finalized and given to Mike Gabaldon and the AMWG for comments. Once comments are received, the report will be revised and sent back to Mike. Mike is also waiting to hear from the Department relative to changes in his role as the Secretary's Designee. Kurt said he would contact Mike as to what the status of the report is.

**Action Item:** Kurt will contact Mike Gabaldon regarding the status of the Roles AHG Report and report back to the TWG at the next meeting.

Humpback Chub Genetics Management Plan. This item was reassigned to Glen Knowles. Glen will report on some new developments during his presentation scheduled for later in the day.

HBC Genetics Plan. The report should be delivered at the end of this month. Once it is received, Matt Andersen will distribute it to the TWG.

Strategic Plan Elements. Dennis said a table was provided to the Core Monitoring Plan Group quite some time ago in the development of that document. Given the FY06 budget was passed, this action item is completed.

**HBC Hatchery Evaluation/TWG Conference call.** Bill Persons said the "Humpback Chub Hatchery Evaluation: Prospective Refuge Facilities" report was distributed to the TWG in June 2005. He received feedback on one issue but no technical assessment of the report. At that time Dennis expressed concern regarding technical and policy issues and advocated the policy issues go to the AMWG Humpback Chub Comprehensive Plan (HBCCP AHG) and technical issues go to Glen Knowles as the TWG chair of the Humpback Chub Ad Hoc Group (HBC AHG). Rick Johnson also proposed the TWG hold a conference call to determine what action should be taken and develop a recommendation to the AMWG for their August 2005 meeting. No conference call was held, however, Bill did give a presentation to the AMWG in August 2005. Glen said the HBC AHG recognizes the document as being useful and part of the overall comprehensive effort but the review is a separate action. Bill is comfortable with the HBCCP AHG doing the review if the TWG is agreeable but doesn't feel the report requires a scientific peer review. Bill said members can still provide comments to him. Glen said the HBC AHG hasn't had time to perform the separate review but intend to do so. The HBC AHG will provide recommendations to the TWG and Glen will provide regular updates to the TWG.

**Action Item:** The HBCAHG will perform a separate review of the "Humpback Chub Hatchery Evaluation: Prospective Refuge Facilities" report and Glen will provide regular updates to the TWG on the status of the HBC AHG's efforts.

**OLD BUSINESS.** None.

**HBC Recommendations.** Glen distributed copies of the handout, "GCD AMP Humpback Chub Comprehensive Plan AHG Progress Report (**Attachment 1a**) and gave a PPT presentation (**Attachment 1b**). He went through a list of the projects and how they will be accomplished.

Mary suggested Dave Otis make a presentation to the AMWG because it would speed up the process and because the AMWG made a motion to do the concurrent estimates. Dennis said the Department of the Interior directed that the population estimate modeling would be done first and asked Ted what the peer review process would entail. Ted said preliminary results would be presented to the TWG but that once GCMRC accepts the finalized peer-reviewed and revised report, it would be distributed to everybody and a

final presentation would be made to the AWMG. Mary said that if it is going to take too long to get a peer review, she would still like to see a preliminary report and encouraged GCMRC to get the TWG review.

Bill Persons expressed concern about big budget implications if concurrent estimates need to be made and questioned whether Region 6 would accept the results of the study. Matt suggested Bob Muth and Tom Czapla attend the meeting when Dr. Otis makes his presentation to help address Bill's concerns.

Glen said the Genetics Management Plan was identified in the first version of the HBC Comprehensive Plan and is still considered a top priority. Region 6 provided a draft plan last year and the HBC AHG reviewed and submitted comments on it but since that time some interesting things have occurred. Dexter National Fish Hatchery has acquired three new geneticist positions, one of them being Connie Keeler-Foster who is one of the main investigators to look at the genetics of the Willow Beach humpback chub. She has completed that work so they're in a good position to do some work for the AMP. Glen said Tom Czapla is comfortable with having them complete the genetics management plan. The HBC AHG recommended the AMP take any surplus funds available in 2006 to complete the genetics management plan. Glen said the HBC AHG is asking the TWG to make a recommendation to AMWG that any surplus 2006 dollars be directed to Dexter National Fish Hatchery to complete the HBC Genetics Management Plan. He thinks the work could be done for \$50,000 and a draft completed within 1-1 1/2 years. The HBC AHG will be working closely to develop a scope of work with Dexter so they will get exactly the plan that is needed for the AMP.

Glen feels strongly this is something that needs to get done and that's why they're recommending AMP dollars be put towards an RFP to develop a genetics management plan. Dennis added that when AMWG made that motion, they didn't seem to consider the requirement in the Biological Opinion for the establishment of a second population and clearly a genetics management plan is needed before undertaking that endeavor. One could argue that it is a Region 6 responsibility, it's a recovery objective, but there is also a biological opinion requirement that could drive the development of that plan and could make it a program responsibility.

**Warm Water Nonnative Fish Workshop Proposal.** Matt Andersen distributed copies of the draft plan (**Attachment 2a**) and gave a PPT presentation (**Attachment 2b**)

Questions, Answers, and Comments:

*Q: Rather than replacing trout/no trout as an experimental treatment on the system, would you be replacing trout removal with warm water removal? (Stevens)*

*A: I'm suggesting that the cold water removal has been pretty effective and that the trout population downstream of Glen Canyon Dam has been reduced pretty dramatically. I would expect that because of the warmer water temperatures, we would be now favoring non-native fish species, Asian tapeworm, and potentially other parasites there as well and potentially grayfish so our efforts should be shifted in a management response mode to start looking at those species. (Andersen)*

*Q: In the trout work you've got one recent study as a learning reach. Is that in your vision here or are those issues that you don't understand entirely? (Stevens)*

*A: Certainly those details need to be fleshed out more so I can't be really complete in answering you. I do think those acoustic technologies that I suggested are important to start pursuing to help get a handle on what you're talking about. (Andersen)*

*Q: Is there going to be some piloting of those technologies before they're actually put into broad scale use? (Stevens)*

*A: I propose for 2006 we start to understand where we can be most effective with those and how they can help us evaluate our efforts. (Andersen)*

*Q: Is your thinking, in terms of winding down the trout suppression work in the mainstem that because we've knocked them back over the last several years and because we've got warmer flows, you just don't expect them to come back up to former levels or at least up to levels that could? (Johnson)*

*A: It seems to me that the warmer water is a suppression, environmental effect so that we could expect that with the reduced numbers and reduced condition we're seeing in those fishes than with warmer water. We're not necessarily favoring them anyway and perhaps even disfavoring those species because we have limited resources and we should be shifting our focus. (Andersen)*

**Q:** *Since most of this is directed at non-natives and relieving some of the predation and competition pressure on non-natives, I'm a little concerned about maintaining this dichotomy between warm water and cold water non-natives because obviously from a point of view of HBC, they don't care what's eating them, right? It could be either one. I would like to see this proposal more from the perspective of we no longer think trout are going to be the issue and warm waters are, certainly that's the way we go but that we don't just replace one predator/competitor or assemblage for another one. It's just that we aren't making this artificial distinction between warm and cold water. We ought to be concerned with what species are impacting HBC and other native fish. (Johnson)*

**A:** *I think we are disfavoring the rainbows and so the risk of predation has decreased to some level. Is it one-tenth of what it was or one-half? We would certainly need to debate that. If warm water species are at risk, we're going to have to go after those with different gears. We're not going to be as effective with electroshocking on channel cats and carp who are especially found near the bottoms of streams are really good at hiding as we have been with rainbow trout. (Andersen)*

**C:** *One thing we need to look at is where is the SPG going in terms of an experimental design for 2007 and out of that part of the design is rogue predator/competitor levels. We have to be careful about what we're doing here so that that is feeding into the design coming up in 2007. (Johnson)*

**C:** *Looking at Tom Ryan's work on the hydrology in the Colorado River, this is going to be an above average discharge or runoff year. Predictions are that the lake is going to come up another 25 feet. This warm water condition we have is a function of lake level. It looks as though we may be returning more to a cooler water situation so it is a little premature to jump off that cliff and just give up on trout issues and jump into the warm water condition. This is not a warm water/cold water issue. Let's make sure we don't give up one for the other. (Davis)*

**R:** *So some of this is a function of the delay that is inherent with committee activities in that a problem was identified by AMWG and TWG and this is the response to that and now as you're saying this year may be different than the past years. (Andersen)*

**C:** *It looks like we may be starting to get down from this warm water situation and starting to get cooler water in this next runoff year. (Davis)*

**C:** *I participated in the warm water workshop and there was a lot of discussion on convention, both by the people that presented the information as well as by the workshop participants. I think a greater emphasis needs to be put in this workplan on prevention. While it is inherent in many of the risk assessments, it has to go beyond review. I know it's very uncomfortable for the program to discuss that because a lot of these things are watershed levels. As I said then and I'll say it now, dollar for dollar this program will spend less if they focus somewhat on prevention as opposed to addressing the issue once it happens. (Sponholtz)*

**FY06 Funding Surplus.** John Hamill distributed copies of a handout (**Attachment 3a**) and then went through a PPT presentation (**Attachment 3b**). The Roles AHG report anticipated there might be shortfalls or windfalls of funds and it provided some recommendations for how those allocations should be dealt with. It lays out a process to consult with the Budget AHG, get their advice, and then meet with the TWG Chair and determine whether or not he would support or whether something would have to be brought to the TWG. Even though the Roles AHG Report hasn't been accepted, GCMRC wanted to follow the process that had been laid out. As a result of the CPI rate change, there is an additional \$188,000 available for programming in FY06. He reviewed the list of proposals:

1. Continued operation of the Lower LCR stream gage (\$30K)
2. Continued operation of the HWY 89 Paria River gage (\$41K)
3. Sediment augmentation Feasibility Study (\$25K)
4. Experimental Trout Suppression Research (\$13K)
5. Improvement in STARS Stage Modeling (\$29K)
6. Effects of Natural Warming and Warm Water Non Native Fish start up (\$50K)

Questions, Answers, and Comments:

**Q:** *What does it mean if we discontinue funding of the gages? (Johnson)*

**A:** *In terms of the LCR gage, there was a decision made to put the gage in initially because there was a need for monitoring flows and water quality. If we shut it down now, we're going to lose that continuous record and not have any good tracking of either water quality or flow that comes out of that system. The problem is there wasn't been a specific need identified for that data so there isn't a group of users wanting the information at this point. It seems pretty fundamental we would want to have some basic flow and water quality information on that river system and that was*

*committed to in 2003 and I don't know why we would change our mind right now simply because we haven't identified a specific use of that data. (Hamill)*

*Q: Has there been any firming up of possible uses of this data since it was originally cut from the budget? (Ostler)*

*Q: We think it's very valuable information and some people have commented on it. Carl Walters has commented a couple of times on what has really gone on with the LCR over recent history and how has that affected the population. In short, we don't know because we haven't had a focused effort to look at what data is available and what can be gleaned from it. It's important we keep collecting data so if there are changes in the LCR, we'll know if that's what is affecting HBC. (Knowles)*

*C: There is a process for monitoring, a process for long-term experimentation, and we're in the middle of that right now. It just seems to me that we're pre-empting the process by saying we need this. (Henderson)*

*C: That process is focused on 7-11 and certainly you could decide to bank the money in the experimental fund and defer all decisions. We thought these were fairly minor adjustments to a budget that is less than 2% or around 2% of the total budget. We didn't want to make it a big deal because having a big debate on how we're going to spend \$188,000 is counter to the overall planning effort that we're trying to go through.*

*(Hamill)*

*Q: My comment was more from the perspective that if you shut it down, are there start-up costs? (Johnson)*

*A: The hard part was getting the permits from the Park Service, getting the technology together, and showing that we could do this with acoustic sensors rather than in situ traditional techniques which didn't work very well in the LCR because of the carbonate issues and floods tend to wash this stuff away. In 2003, we decided to venture out there and try to support the fisheries program and get underway with a water quality protocol for the LCR and the first toehold in that process was could we measure changes in base flow and capture events that come down there. It worked out really well. It reports in real time online. The intention wasn't to operate the station for the sediment mass balance part of the water quality program but to specifically try to help with the fisheries biology. When we were deliberating on how to develop this contingency fund for the FY07 and beyond experiment, this was one of the things that got pared away as well as the Diamond Creek gage. The surface water record at that site was picked up by Southern Nevada and this site was kind of out there. We were discussing it with the biologists and whether they could support this in FY06 until the long-term core monitoring was resolved and they said they really liked having the record there but their fisheries program was pretty constrained so we'll pass. So we didn't pull the plug initially in October because I wanted to see what Matthew thought when he came on board in November and John arrived at about the same time. One of the things we promoted was continuation of this record because talking to people like Pam and Glen, they said it should be continued. They put in there as something that probably is part of the long-term monitoring program but discontinuing the record while we still have people doing monitoring in the spring and through the summer in the LCR didn't make sense unless we had concurrence from everyone that the gage wasn't needed. We can stop the record and start it again later but the question is do you want to promote this continuities in records. (Melis)*

*Q: These projects seem quite reasonable and they support your program and we all trust you to be doing the best job. It would be nice to see a little bit of cultural attention paid here too. These tend to be USGS topics. We have extra money. Can we learn something from this process that will help guide our protocols as an advisory body here? We should also collaborate with the SPG to make sure it is in line with their protocols. (Stevens)*

Ted said the experimental Paria gage was set up in 2003 on the highway bridge at Highway 89 in Utah and is operated by the USGS. The cost is higher (\$20K-30K) compared to other gages because it doesn't get any "DOI cost share" relief so the District has to charge the full overhead rate. It is a sediment reporting station and provides real-time information. They have been using that gage along with the gage up near Cannonville which the BLM is paying for and the Lees Ferry record to develop a travel time model for the slugs of sediment that come down the Paria so they have some idea of how much time is required to do a rapid response. It is an experimental station and it was never intended to be there forever. They are taking a year off on the sediment experiment and there is no plan for a BHBF but the inputs for a future BHBF test in 2007 actually start as early as July 2006. Having this station operating through 2006 seems to make some sense because they're starting to use it along with the Paria, Lees Ferry to track inputs starting next summer towards something that might actually turn out to be a BHBF test sometime in 2007. They hope to continue collecting events which are few and far between and develop the travel time and sediment transport model for the Paria. Ted said funding for this gage could come from the experimental contingency fund.

Norm said in the original proposal for FY06 other projects were cut because GCMRC was trying to put some money into the experimental fund. He didn't see them in John's list and wanted to know the rationale

for why the above projects are important now when theoretically they were important back then as well. Norm said that unless it's absolutely critical the money should be put back into the experimental fund until the TWG can sort some things out through the appropriate venues.

John said some dollars have already been committed on the gages. John said their original proposal was to take \$50K for the warm water initiative that Matt presented.

Kurt reminded the TWG there are four different proposals to consider: (1) Proposals from John, (2) \$210,000 for a warm water non-native species research plan, (3) \$50,000 for a HBC genetics management (includes a captive breeding plan, a translocation plan, a refugia plan for maintaining a refuge population, and working up additional samples) proposed by Glen, and (4) putting the \$188,000 in the experimental fund. Dennis said he intends to vote on the warm water non-native startup but wants to vote for development of a strategic plan that will accompany the environmental compliance document for the TCD that will allow them to argue for a mitigated FONSI on that action because otherwise they may be going to an EIS.

Kurt asked the members if they were prepared to vote on the projects. It was decided to postpone voting on the projects until tomorrow. Christine Beard informed the TWG that \$25,000 was held back by Reclamation for the Randle/Lyons feasibility study on sediment augmentation so the TWG will be working with only \$143,000 in their deliberations tomorrow.

**Sedimentation Augmentation Feasibility Report.** Tim Randle said he was asked by Ted Melis to do a study to look at the engineering feasibility of a sediment augmentation program. He distributed copies of his PPT presentation (**Attachment 4**).

Questions/Answers:

**Q:** Did you speak about the option of dropping it right below the dam vs. taking it to the mouth of the Paria and dropping it? (Cook)

**A:** Yes and the other option is a combination that we want to look at as well and that's taking the silt clay all the way to Lees Ferry by taking the sand to right below the dam. (Randle)

**Q:** Will you develop cost estimates for the two separate delivery systems? In other words, dredging for only silt and clay and only delivery of silt and clay separate and apart from your sand deliveries? (Davis)

**A:** That should be easily done. (Randle)

**C:** The objective of having these combined and I'm not sure that the AMWG would necessarily support both of them. They may only decide to do sediment augmentation for turbidity and not for beach building. If you have them separated out, at least you have a basis for making a decision. (Davis)

**C:** There is a little bit of economy of scale, you only have to dig one trench so if you're ultimately going to do both, it's cheaper to do them at the same time. Your point is well taken because the stakeholders may say they're interested in one but not the other. (Randle)

**Q:** Did you look at the potential impacts in Navajo Canyon? Is the effect just going to be right at the mouth where you're doing the dredging or is this going to have impacts upstream? (Johnson)

**A:** The only impacts really would be the noise from the pumping plants or the dredging operation. It depends on your perspective. You could look at the sediment entering and depositing in Navajo Canyon as an impact so to that extent it would be mitigating for part of that impact but it's only going to affect the sediment you're depositing in the canyon. It's not going to affect anything upstream. (Randle)

**C:** There was a question asked about the terrestrial source using the Paria. One of the issues is the timing for those materials to be available. Say you're trying to create a turbid condition downstream and you want to do it when you want to do it and not when nature wants to do it. There would be some advantage to having some constructive device to deliver it. To discount it out of hand doesn't seem the right thing to do. The Paria is a source of large amounts of silt and clay and it may very well be able to be used on a periodic basis maybe for one to three months out of the year. But to not consider it at all seems to me that you might want to consider that as a source because it does come in at a strategic spot below the Lees Ferry Fishery. It comes into an area that we're very interested in creating turbid conditions downstream. (Davis)

**A:** I guess the other reason we didn't go there because I understand it's a wilderness area and you'd be trying to propose a strip mining operation. (Randle)

**C:** *There are a lot of social and environmental issues associated. You have not considered at all even looking at Navajo. You should look at it from an engineering standpoint and then we can discount it later on the basis of environmental issues. (Davis)*

**C:** *For this study, there just isn't the budget to do it anymore. If somebody wanted to pursue that down the road, that's certainly a good possibility but keep in mind that any sediment you mine from the Paria is sediment that may have otherwise come to the Colorado. So, at the most, you might be changing the timing of when it comes. (Randle)*

**C:** *You could mine the Paria and add an additional million metric tons of sediment to what it is already being delivered and that would accomplish the goals you stated at the first of your presentation. You could sustain it more than 300 years maybe but I'm with Bill that that is something you dismissed too quickly. (Palmer)*

**Q:** *Did you have a ballpark operating figure? (O'Brien)*

**A:** *It's going to cost about \$12 million for the dredging operation to put the sediment in the pipeline. If we look at storing sand in Lees Ferry, that's around \$4 million. This is very preliminary and we haven't added contingencies or listed items to these things. (Randle)*

**Q:** *What's driving the delivery separately of silt and clay and sand? Is it the inability to move them through the same pipe or is it the concentrations that you established that you could only achieve if you move them individually? The answer is if you're willing to accept the concentrations as they're dredged. Could you combine those pipelines and reduce the costs considerably? (Kubly)*

**A:** *The reason we came up with separate systems was mainly for the timing aspects. For the increase in turbidity, that needs to be a fairly continuous thing. We had the season from May-December. We could look at a different season but that's the season we settled on for this purpose whereas with the sand we don't necessarily want to do that. We would like to inject the sand before the beach building flow so our strategy was to either store it in Glen Canyon and then have a pre-spike before the beach building flow, perhaps run the powerplant up to full capacity for a week, maybe a month or so prior to when you want to run a beach building flow to get that sand on its way or have the bulldozers push it in say a month or so prior to a beach building flow. So you want that concentrated pulse whereas the turbidity you want continuous throughout a season. (Randle)*

**Q:** *Is anybody doing this anywhere? (Knowles)*

**A:** *There are coal stories going on. There are a lot of dredging operations but they're pumping on the order of thousands of feet and not tens of miles. I suspect this could be the world's largest sediment slurry pipeline operation if it were built especially the one to Lees Ferry. (Randle)*

Tim said he expects the cost estimators will complete the report in February and it could be ready for peer review in March.

**Review/Report on the Science Planning Process.** Dave Garrett mentioned that of the 15 TWG members currently seated around the table, 11 are actively participating in the SPG. He gave a PPT presentation (**Attachment 5**). On the schedule that's approved, the SPG is not planning to update the TWG again until June. At that time they will propose the final strategic science plan, the monitoring and research plan, and the annual work plan and budget.

Ted said the Knowledge Assessment report being prepared by Josh Korman will be distributed to the TWG on February 3. The Science Advisors have also scheduled a review of that document and Dave will report back to the SPG at the February 21 meeting.

**Action Item:** Dave Garrett will provide the results of the Science Advisors' review of the Knowledge Assessment Report to the SPG at the February 21 SPG meeting.

Dave concluded there has to be a strategy that is an operating procedure at some point. There has to be a developed format and list of programs and budgets for the research program and the monitoring program. And in the annual work plan, there has to be a look at the outyears because they have now said they will put in operation budget together for two years but then there is a planning period of five years. There are things that will happen in which projects will come off the table and money can be pulled back into the process. As a result, there has to be some strategic budget planning.

**Q:** *Two of the issues that always confront us are building our house from the second floor up which is we don't have an ecosystem structure on which to frame our logical process and question asking, and that's gets us up to the attic where we do our budget work such as the example that we had with John here. There is a perfectly legitimate set of*

*projects and we have no idea where the priorities are that support where those projects fall out. This is the process whereby we get to explore how to do that. I would like to support your efforts here because it's just brutal to re-think our construction designs for this whole process. (Stevens)*

*A: I've told the SPG that what we'll have when we get through this year is a first approximation to a lot of things: desired future conditions, experimental design, ecosystem design, and to just the planning process itself which will have to change. There has to be decided work by some group to make sure that the basement gets filled. If you keep the house sitting there on that shifting sand, eventually you're going to suffer but if you can put a solid foundation under it, you won't. (Garrett)*

*Q: Can you comment on what we've been struggling with as part of the knowledge assessment which is trying to follow our task orders from the AMWG in identifying potential management actions vs. experimental actions as an outcome of the knowledge assessment? (Melis)*

*A: The knowledge assessment was something that the AMWG wanted to drive the process so we could find where the holes are, so we could then work with management or scientists to fill those holes with new knowledge. It was done very quickly and it was done by Ecometrics and so the science advisors are going to review that as not a status of knowledge but as a first run at what we know about this using what we call kind of a Delphi process. Out of that we were supposed to come up with some concrete decisions on what is a management action and what is really a treatment and that affects what GCMRC and the SPG is struggling with right now on laying out the experimental options for the next five years. The reality of it is that the science community has a lot of struggle. You can move quickly from the seat of your pants but as scientists you go into a cold sweat. If he/she doesn't throw up when they're asked to make that quick movement, the thing they will do is qualify everything. Different managers are different risk takers. Managers generally will be willing to go on a management decision at about level 4 or 5 on information. The scientist wants to be at 9 or 10 so when you ask the scientist what do they know about this when the knowledge assessment came back, the scientists basically don't know for sure. (Garrett)*

*C: At some point the TWG might want to make a recommendation to the AMWG that what has been evaluated is experimental treatment x, y, or z is now ready for prime time because it is believed it has a management role in the future. We're working in our planning group to try and sort some of this stuff out but I always feel like I'm second guessing the TWG. Will the TWG concur and actually make it as a recommendation to the AMWG? The process at some point has to come up to through the TWG as a recommendation to AMWG for consideration as a long-term management activity. So what we resolved at the last SPG meeting was to make final revisions to the Knowledge Assessment Report and distribute it to all the TWG members. I just want to make sure that when it shows up in your e-mail, you know it's coming to you basically not for another round of comments but consideration in terms of this concept of what is known/unknown would still be desired as a management action even if we don't have a dark green color imposed on that cell in that treatment in that resource response. The scientists haven't been comfortable trying to define based on our knowledge of certainty of what you consider to be useful as a future management action so it's coming to the TWG with a request that the TWG have some deliberations on this in some format. (Melis)*

Dave said he will be working with GCRMC staff on Feb. 6-7 on the Strategic Science Plan and the Monitoring and Research Plan. They will revise the plans and have the SPG review them again.

**Update on Experimental Flow Options.** John Hamill said one of the things that became evident upon his arrival at GCMRC was the whole discussion of experimental flows and the experimental approach that was going to be taken. He thought it would be important to look at a full range of options from GCMRC staff and stakeholders to facilitate a side-by-side comparison of those different options.

He said there seems to be broad agreement on doing something with a temperature control device and broad agreement to move forward and implement some or all portions of the HBC Comprehensive Plan, as well as moving forward at looking at non-native fish that may increase with implementation of warm water conditions. When looking at flows, the major disagreement is really over the degree to which steady flows are going to be implemented. There is fairly strong agreement about almost everything else except that particular factor. He distributed a handout (**Attachment 6a**) describing the four options:

- **Option 1** – Continue baseline monitoring of Modified Low-Fluctuating Flow Operation Under the 1996 Record of Decision with Testing of Beach Habitat Building Flows and winter ramping studies

- Option 2 – Baseline monitoring of Modified Low-Fluctuating Flow Operations Under the 1996 Record of Decision w/BHBF Testing + Winter ramping rate studies + Stable Flow Operations in September and October
- Option 3 – WAPA/AFGD/FFF “Experimental Modification of the Record of Decision Modified Low-Fluctuation Flow
- Option 4 – Grand Canyon Trust Experimental Modification of the Record of Decision Modified Low-Fluctuation Flow

**WAPA/FFF/AGFD on WY06 Proposal.** Clayton Palmer said WAPA, AGFD, and FFF decided it was more practical to use the SPG process and timeline vs. developing a separate proposal. They took pieces of their proposal to develop a proposed set of actions and experiments for the 2007-2012 time frame with an implementation date beginning in FY07. He distributed copies of the handout, “Proposed Long-term Experimental Program of Flows and Management Actions in the Colorado River Below Glen Canyon Dam” (**Attachment 6b**). WAPA has hired SWCA to help them evaluate some of the foodbase issues and they will be working with Mark Steffen, Bill Persons, and two ecologists at Argonne National Laboratory. He wanted to be clear in the draft presentation that this is intended to benefit resources, specifically humpback chub, sediment conservation in the critical reach in the long-term, the aquatic foodbase, power flexibility and generation, and the Lee Ferry trout fishery but stated the primary focus is on humpback chub. They developed a matrix which can be compared to the matrices prepared by GCMRC. They want AMWG to provide a clear recommendation to the Interior that the TCD is necessary and warranted and that there should be a TCD on as many units as needed in order to achieve temperature benefits downstream. They feel the document is instructive for what they’re proposing in Option 3 and they’re of the opinion that the best approach in terms of managing the resources is a simultaneous implementation of several elements in order to achieve the goals. They believe that BHBFs outside of the ROD parameters are not currently lawful but they’re willing to take the lead in terms of finding ways in which the BHBFs can be used as a management action in the long term to identify the issue of sediment conservation as envisioned in the EIS in the critical reaches doesn’t work and that another sediment conservation mechanism needs to be considered. They would like to use management actions that would benefit sediment conservation.

Rick Johnson said that information from the recent SCORE Report, the Knowledge Assessment Workshop, and also as a means to satisfy element 1a of the RPA, he took a very different tact than WAPA did. He feels the responsibility and expertise for fleshing out proposals lies with GCMRC. He said the write-up represents the flow side and he would like to see the effects of three different treatments and that is the flows based on what Rich Valdez did in his 2000 report using the RPA as a foundation for the flows. He would like to see an evaluation of the effects of a combination of those three treatments in two different scenarios. The ultimate reason for doing that would be to come up with a potential alternative to the current ROD. He also picked sediment and native fish because those are two things which are obviously hurting right now. He also tried to think of other resources that might be negatively affected and there are probably others like cultural resources that might well benefit under that type of management regime. Although that was his focus, he recognizes the review and the consideration should be for all the resources, all the Park values.

John Hamill said he didn’t have Clayton’s information last week when he was preparing his presentation but said the new ideas and concepts will be integrated into the analysis. GCMRC is committed to looking at both proposals in the context of the Knowledge Assessment to see the pros/cons of the options as they relate to the AMWG goals. They will provide that information to the SPG for their upcoming deliberations.

Dave said the Science Advisors agreed to do a risk assessment of experimental plan options at TWG’s direction and that WAPA would try to provide one recommendation. The SAs would present that recommendation to the AMWG at their August 2006 meeting.

Clayton said WAPA, AGFD, and FFF would bring their proposal with flow and non-flow components to the SPG process. The SPG process is on a timeline that isn’t completed until it brings a proposal to the AMWG in August. As such, Clayton said that disposition of the TWG vote last November is a moot point to WAPA.

Dennis said that Mike Gabaldon is comfortable with WAPA's view of the transition and how it will be approached by the SPG process.

**Lees Ferry Trout Evaluation.** Bill Persons said he was asked to give an update on the oxygen problems at that the fishery could be in trouble. He distributed copies of an e-mail message from Jeff English (**Attachment 7a**) and then proceeded with a PowerPoint presentation (**Attachment 7b**).

*C: I thought that work by the Bureau of Reclamation deserved a report to the TWG in more detail. The Bureau took a problem (dissolved oxygen below Glen Canyon Dam) that was identified by Arizona Game and Fish and they found a solution that was within the law, within the parameters of operation of the dam, and would cause minimal impact to power generation. I think it's a success story related to adaptive management and it's not one that anyone knows about. (Palmer)*

*Q: Is there a process set in place so that you don't drop below the line? (Davis)*

*A: Not a formal process. When we saw this happening, we got a heads up from GCMRC that we could hit this range. That was in August and there was some concern about crying wolf until we knew there was a problem. I think after this year we can see it happening and get on the phone with GCMRC and Reclamation and talk about trying to implement the changes again. It did cost WAPA a fair amount of power revenue but they seemed willing to accept that. Thanks to WAPA. (Persons)*

*C: It was not a fair amount, it was a small amount. And it seemed to me that the Bureau worked really hard to find a way to accomplish increased DO levels below the dam with little impact to power revenues and I want to hold that up as a standard for us all. (Palmer)*

*Q: I think you hit on it but I was interested that the small fish seem to do well but do you think that is a question of the habitat they're occupying from? (O'Brien)*

*A: That's a common observation. It's not an uncommon problem in fish hatcheries and fish culture situations to face episodes of low oxygen. Typically you think of a small bodied fish as being more vulnerable to environmental perturbations than a large fish but the small fish has a lower metabolic demand compared to the large fish so the large fish just needs to get more oxygen and more food to stay alive. The small fish can get by with less. (Persons)*

*Q: At minimum, you have six hypotheses that you're considering as possible cause and effect. I can think back on a dozen cases in this system over the last 30 years in which big surprises happened that caught even well informed managers by surprise. Part of the reason we have this is because we don't have a bottom up foundational approach to this system. We don't know the foodbase. We don't know those interactions and we're left with guess work because we don't have enough information to be able to address the question. There are a couple of elements that might be interesting here which are that you could step back and say okay did other fish species that you might have been sampling for show the same response. Did you electroshock the flannelmouth suckers? Did they show any change in population comparable to trout? They're better at handling low DO than trout are so if they're doing okay and the trout are not, then that might be an indication. Do you think you have evidence of a catastrophic loss or is this a graded decline because that can also show tell you some critical threshold was reached by flow conditions. It's probably not food based, it could very well be a catastrophic change in water chemistry. I'm just posing that as a way to get at some of these questions but you're going to end up with six hypotheses not resolved, like the 1991, which had seven hypotheses which were not resolved. Apparently you don't have a disease infestation that goes up at the same time as the class. These are topics that ecosystem managers really have to get a hold on. How do you deal with these situations? Leaving a gap in foodbase monitoring for almost 3-4 years now in order to build and develop enough information on it will take another couple of years to get it up and running. Not a good idea. (Stevens)*

*A: I wish we had more control over the releases we got from the dam but we don't right now. We're also at Mother Nature's mercy, hence we tend to react. I wish we could spend more time trying to develop a good research program to answer these questions. (Persons)*

*C: I agree with Larry about that. We keep getting hit with these surprises and studying those hypotheses would be great. I would like to be clear because I think you said earlier that you also didn't find any big trout at 30-mile and Nankoweap and to me that's really scary because what does that say about perhaps the adult HBC down on the LCR? (Steffen)*

*R: The report I got back from the river was there were few trout. They didn't tell me about the size distribution. (Persons)*

*C: Some people had suggested we stock cutthroat or something we could really keep an eye on easily, perhaps even a Colorado river cutthroat. (Steffen)*

*C: Some people don't know what it takes to get to that point, can you quickly tell them who gets involved? (Kubly)*

*R: At this point the researchers, and that's when I put on my research hat. Scott Rogers, who has been studying the fish pretty extensively, will go to his program manager for the region who is Scott Reger out of Flagstaff and our fishery chief in Phoenix, Larry Riley, will tell them there is a problem. We have in-house discussions on what can be done. We*

*like to go up and talk to the fishing community at Lees Ferry and Marble Canyon and get input from them. I'm not sure what kind of consultation we'd have to do with FWS. My understanding is that we're pretty well covered but that's a question that gets answered outside of my arena. (Persons)*

Adjourned: 5 p.m.

Glen Canyon Dam Technical Work Group Meeting  
January 26, 2006

**Conducting:** Kurt Dongoske, Chairperson

**Convened:** 8:05 a.m.

**Committee Members Present:**

Mary Barger, WAPA  
Steven Begay, Navajo Nation  
Kerry Christensen, Hualapai Tribe  
Jonathan Damp, Pueblo of Zuni  
William Davis, CREDA  
Brenda Drye, So. Paiute Consortium  
Lloyd Greiner, UAMPS  
Norm Henderson, NPS  
Rick Johnson, Grand Canyon Trust  
Robert King, UDWR  
Dennis Kubly, USBR

Glen Knowles, USFWS  
Phillip S. Lehr, Colo. River Comm./NV  
Ken McMullen, NPS/GCNP  
John O'Brien, Grand Canyon River Guides  
Don Ostler, UCRC  
Bill Persons, AGFD  
Mark Steffen, Federation of Fly Fishers  
Larry Stevens, Grand Canyon Wildlands Council  
Bill Werner, ADWR  
Michael Yeatts, The Hopi Tribe

**Committee Members Absent:**

Christopher Harris, CR/CA  
Amy Heuslein, BIA

D. Randolph Seaholm, CWCB  
John Shields, WY State Engr. Office

**Alternates Present:**

Garry Cantley

**For:**

Amy Heuslein, BIA

**Interested Persons:**

Matthew Andersen, USGS/GCMRC  
Christine Beard, USGS/GCMRC  
Mike Berry, USBR  
Gary Burton, WAPA  
Helen Fairley, USGS/GCMRC  
Dave & Pam Garrett, M<sup>3</sup>Research

John Hamill, USGS/GCMRC  
Leslie James, CREDA  
Lisa Leap, NPS/GRCA  
Ted Melis, USGS/GCMRC  
David Siebert, University of Arizona  
Pam Sponholtz, USFWS

**Recorder:** Linda Whetton, USBR

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**Welcome and Administrative Items:** The chairman welcomed the members, alternates, and interested persons. A quorum was established and attendance sheets distributed.

**Status of PA Signatory.** Mike Berry said that CREDA, WAPA, and BIA requested signatory status for the Programmatic Agreement for cultural resources. Reclamation has been on record as advocating their additions. They all have well known and well trained archeologists on staff and would significantly contribute to the process. Unfortunately the process is now stalled. Reclamation's Solicitor felt it was okay to add the new signatories so they could provide input to the process. However, the Advisory Council disagreed and the Park Service followed suit as did the Arizona State Historical Preservation Office (SHPO) so at present it's not going to be signed until there are substantive modifications to the PA. Margie Nowick revised the document prior to leaving the Advisory Council but it was a rather lengthy PA. As soon as substantive changes can be made, Reclamation will recommend that CREDA, WAPA,

and BIA be signatories to the new PA. Mike said a meeting was held two days ago which had implications for how that PA will be rewritten but the details haven't been worked out yet.

Leslie James said that about three years ago CREDA was advised they had the right to become a signatory and provided constructive comments on the various documents. She was given a signature page this past summer which her Board ratified and CREDA has executed. Her reading of the Advisory Council's correspondence was their preference for a new PA and were not so concerned who the signatories were. She asked if Reclamation's solicitor's opinion is operating under the same one that governs the Park Service in this matter. Mike said it was a regional solicitor out of the UC Region. Leslie clarified that the Advisory Council's issue is more with the substance of the PA than an objection to CREDA becoming a signatory. She asked if that was the same situation for the Park Service or if there was still an objection that CREDA become a signatory. Mike said they had many lines of argument and not all of them are as clear as the Advisory Council's. Leslie said that CREDA has tried to be constructive throughout the process. She said that early on there was a concern that CREDA was trying to become a signatory so they could terminate the PA. She said CREDA has done everything to assure the participants that is not the case and the program is important to them.

**Continuation of Ranking Discussion.** The TWG continued to discuss funding some of the projects with the remaining \$143,000. They developed a ranking table and voted on the projects:

Ranking	Items	Spent	Need	Voting Results
1	HBC Genetics Plan (combined projects) - Refugia plan - additional sampling		50,000	Yes = 16 No = 1
2	LCR Gage	\$8,000	22,000	Yes = 15 No = 5
3	Experimental Trout Suppression Research		13,000	Yes = 14 No = 3
4	Effects of Natural Warming and Warm Water Nonnative Fish Startup (biologist)		42,000	Yes = 12 No = 6
	Sediment Augmentation Study	25,000		
6	Paria River gage	12,000	29,000	Yes = 6 No = 12
	Improvement in STARS Stage Modeling		29,000	Yes = 0 No = 20
<b>Other Warm Water Monitoring and control actions (4 distinct projects = \$210,000)</b>				
5	LCR Monitoring		30,000	Yes = 7 No = 8
7	Diamond Down Monitoring		80,000	Yes = 5 No = 13
8	Acoustic tags		50,000	Yes = 3 No = 14
9	Didson Camera		50,000	Yes = 1 No = 11
	<b>subtotal</b>	<b>45,000</b>	<b>127,000</b>	
	Experimental flow fund/remaining money		16,000	Yes = Consensus
	<b>Total</b>		<b>188,000</b>	

**Motion: Accept the top four on the ranking table and put the remaining funds into the Experimental Flow Fund.**

**Motion seconded.**

**Yes = 15**

**No = 4**

**Abstaining = 1**

**Motion passes.**

**Selective Withdrawal on Glen Canyon Dam.** Dennis Kubly said that from now on the term "selective withdrawal" will be used rather than temperature control device (TCD) which is the term that was used in 1994-95 when discussions first began and carries the recognition that this device has utility for managing other water quality features than just temperature. He gave a PowerPoint presentation (**Attachment 8**).

**Q:** *It seems like your cheaper designs will work better when the lake is fuller. When the lake is lower, you get natural warming anyway. Did you take that into consideration? (Steffen)*

**A:** *You have to look very carefully at the graphs. There is no way you can know at the quick look you got but if you go back to the graph that shows the different reservoir elevations, it shows when the reservoir drops below 3600 feet, you are still delivering cold water. And with an upper limit of 3670, if you have a full reservoir, you can deliver still in the range of 10 degrees, not 8 degrees. So you're sacrificing at both ends, at the full reservoir and as you drop below 3600 feet. (Kubly)*

**Q:** *You're setting out two as the endpoint. There are 8 intakes. Is part of the thought you start with two and using the information that comes from that to decide if you want to put on 3, 4, or more? (Johnson)*

**A:** *Sure, and the whole adaptive management concept was we don't know if two will do the job or not. So now be a manager. I can spend more and get more assuredness that my test will actually be meaningful or I can spend less and take the risk that I'm going to get years where I'm sitting at the right reservoir elevation. Which should I do? (Kubly)*

**Q:** *One part of this equation that we haven't considered at all is what our needs are. We have not assessed or put the weight to this equation relative to what the fishes needs are which we're trying to come up with. I don't know whether we need warm water every year, 2 years, 5-10 years. We haven't assessed that and it seems to me that is necessary to put against this equation to determine how often you actually need to operate this system. So in other words, if the cheaper system could be operated on a probably of once every 10 years and the fishes needs are equal to that, then we could get away with once every 10 years. (Davis)*

**A:** *So what I come back to is if I want insurance, there is only one way I can get it. In other words if I want control, there is only way I can get it. If somebody will tell me as a manager that they know you only need it once every 10 years, I might be a lot more likely to save some money. (Kubly)*

**Q:** *At what elevation does the use of the spillways come in? Could you use a spillway to pull warm water off the top? (McMullen)*

**A:** *It's close to full. (Kubly)*

**Q:** *There are issues of warmer water might be beneficial for native fish but it might be much more beneficial for non-native fish. We have issues of literally swamping that system with plankton that will come off the surface of the lake and increasing the food supply with unknown consequences. How in your addressing of this whole issue have you dealt with those scientific concerns? (Stevens)*

**A:** *The simple answer is there is no way to know but to test. We can't conceive of a series of laboratory experiments that would really reduce the anxiety of managers in making this decision. And so the compromise was two units and then the second compromise perhaps was two units with even less utility than the external frame. As far as finding a way to manipulate temperature in the system to have any control over it to conduct experiments and doing that on a smaller scale, the conclusion was it's never going to give you the information you need. So you're going to spend a certain amount of money to modify the system and test it through adaptive management. (Kubly)*

**C:** *But for a couple million bucks you could do some small scale experiments that might be highly informative. (Stevens)*

**R:** *And if people are willing to buy off on that and make future decisions based on those kinds of experiments, I'm sure that Reclamation would love to hear that when it comes time for the AMWG to give them feedback.*

*Reclamation hasn't heard back from the stakeholders that this is a really good idea. Clayton stood up in front of everybody yesterday and publicly said that WAPA supports the TCD. (Kubly)*

**Q:** *Regarding the NEPA document for cumulative effects, are you addressing additional units? (Barger)*

**A:** *No because there is no determination that additional units would be built. It's a potential in the future but it's predicated on the iterative process of adaptive management. Part of your answer is probably going to come out of how this notice of intent plays out. If Interior takes the position that we have used adaptive management to iteratively build our knowledge and we've done consultations on those actions in the process, this becomes a new modus operandi. You don't do the grand experiment, you don't spend all the money upfront, you did it iteratively and you building your conclusions on the knowledge that you gained through this adaptive management process. (Kubly)*

**Q:** *The sediment shows up and strategically it looks like the condition we had last year is a pretty close fit for what we could create if we had spent the \$59 million and got a thing going there. So for a lot less money, can you think of things we could be doing in terms of long-term monitoring to put ourselves in a place to gain information without going out and building a TCD? I know Reclamation has direction to look at the possibility of building one, but do you see the overlap there? (O'Brien)*

**R:** *You make me think of when we had the discussion with GCMRC about the CPI dollars or the TCD dollars, we've never had that kind of assessment. We've never looked very seriously of what we're monitoring and say to ourselves how should that change or would we advocate it change if the lake fell and the temperatures warmed. I think we're way behind in doing that evaluation and it's very possible there is monitoring we're not doing that could*

give us a better idea of what the responses of these key resources would be to increased temperatures. The hard part is that you can't sustain those temperatures when nature is driving the system. We asked our people to do some modeling for this next year and what they do when they run CE-QUAL is take the predicted hydrology from the 24-month study that Reclamation does but they look for previous years that are close to that hydrology and then they have to couple that with meteorology. It's all run by reservoir elevation, inflow, and outflow. You can only monitor the conditions provided by nature. You can't construct a design and force the temperatures to be what you want. (Kubly)

**C:** In classical science the first thing you do when you start an experiment is to wash your glassware but we're not in that kind of controlled condition where we even know what our glassware is and we're not about to set it back to zero. We're kind of doing these experiments in this huge ecosystem and somehow I think we may have to give up some of that level of certainty and say over the next 10 years be able to monitor two warm years and eight cold years. What can we learn from that? I just wonder if that is something we should be thinking about as scientists where this program is going? We have a hard time sticking to a 4-year block anyway so we might just want to accept the fact that politics are going to change, funding is going to change, the people around this table are going to change, and what can we do to position ourselves to keep getting good information. (O'Brien)

**Q:** What's the schedule? (McMullen)

**A:** Darryl Beckmann is on the agenda for the AMWG meeting in March. He hopes to be able to tell them whether there are any intermediates that are feasible between these funding levels, talk about the probability of use, and then get into the very discussion that John is looking at here, which is whether the AMWG in favor of expending some level of funding. Darryl would be looking for some feedback on whether that's the cheaper design or the more expensive one in order to have the control over temperature we're talking about. They already said to go ahead with compliance and yesterday Clayton said that WAPA supports a TCD. Do they support one at \$80 million or \$25 million? (Kubly)

**Q:** What difference does it make to us whether we support one at \$40 million or \$80 million? It's Reclamation's dollars? (Knowles)

**A:** It all depends on whether those are all appropriated dollars or cost-shared somehow. (Kubly)

**Q:** What is the new outdate? (Garrett)

**A:** If Reclamation has to fully fund with no cost-share and the \$80 million design were selected, the final unit would be likely finished in 2013, the second of the two units. (Kubly)

**Q:** If you go back to 2002, the science advisors expressed some concerns and said there was a positive benefit because we know enough to speculate or hypothesize that the HBC habitat could be enhanced by this, that you would be in a controlled environment as managers. We also know that other things are going to happen. Hypothetically, if there are some recruitment responses coming from this warm water. We also know there are parasite issues, predation concerns, trout, and dissolved oxygen implications from these warm waters. One of the things we're not talking about and the SAs brought up is there are some benefits that could've been derived by having this for the trout. We could've helped by bringing cold water to that setting. It's a control mechanism and this is a management issue. I'm pleased that WAPA made that recommendation. This issue has been discussed since 1993 and for managers it's a way to try to get at some of the issues. You could have some real issues with resources before you could even start experimenting with this thing. (Garrett)

**Q:** When would you start construction? (Werner)

**A:** Late 2007 or early 2008. And that's not the full amount of time necessary to build it. That's the amount of time necessary to secure the funds to build it. In this instance, it is limited by availability of funds not by the amount of time necessary to create steel and bolt it to the backside of the dam. (Kubly)

**Q:** So are you implying that it could be as far out as 2020? (Garrett)

**A:** I'm not sure about that without solid support that it's going to happen. (Kubly)

**C:** The science advisors are concerned about a manager's inability to look at this as an opportunity and if there is more information needed on laying costs vs. advantages for you as managers. With all this work and all this time, there is only one group that has stepped forward to move forward. (Garrett)

**C:** I don't think that's true. I know we've thrown our public support out there as well for a TCD. (McMullen)

**R:** I would have your AMWG member voice that at the next meeting. (Kubly)

**Q:** Wasn't the support implicit with AMWG told Reclamation to go forth and do the analysis? (Johnson)

**A:** Yes, to do the compliance but there wasn't solid support for using two units and there certainly wasn't support for one design vs. the other for the amount of money that had to be spent. I think this is a feedback loop in proceeding through the compliance. Now you're at the stage of looking at different alternatives, that's always something you have to go through. (Kubly)

**C:** When WAPA or the customer says we support the TCD, yeah, we support that concept but then we talk about the issues of parasites, predation, etc., and other issues that are unknowns and so we don't want to get caught into

*the situation where you guys supported TCD so that means that you supported predation, parasites, etc. You have to be very careful. We need to have a good analysis of whether this thing is really going to work. (Greiner)*

**Q:** *So when we came in and said what we want to do is construct two units and test for adaptive management, did that make it easier to take that next step? (Kubly)*

**A:** *I think it did for us. Sure. (Greiner)*

**Q:** *Are the scientists failing the managers? (Garrett)*

**C:** *I just heard an analysis here which had a range of \$30 million. The scientists haven't told us the frequency of need. The amount of money varies in terms of the design. I don't know if we need the expensive or cheap design because it's contingent upon the need of the fish in my mind and that's a scientific question. (Davis)*

**C:** *We just went through a year of warm flows and achieved the temperature levels that this thing would provide. One of the hypotheses responsible for contributing to the loss of trout in the Lees Ferry Reach is temperature.*

*There might be something else going on there that we don't know about. We don't have an ecosystem model robust enough to follow those leads through and make predictions based on different thermal regimes. (Stevens)*

**C:** *I think the adaptive management program has shown broad support for the TCD. A couple of years ago the AMWG passed a motion to proceed with compliance and I think that implies construction. Why would you do compliance if you're not going to move into constructing two units for a test? There is still is broad support from the AMWG. Have you presented this information on two different designs before? Do you want the TWG to make a recommendation to the AMWG today about one or two of these units? (Knowles)*

**R:** *That's up to you, of course. I'm not here to ask for a recommendation. It is going to be on the agenda for the March AMWG meeting. (Kubly)*

**Q:** *Do we have some sort of schedule on moving forward on the compliance document? (Barger)*

**A:** *The decision to proceed for compliance depends on which of those bands you're going to evaluate, that depends on a decision on a design, which depends on a decision on the amount of funding you're going to put into a TCD. (Kubly)*

**Q:** *Why couldn't you use two or three designs that go through the NEPA process as alternatives? (McMullen)*

**A:** *You could depending upon what level of compliance you want to engage in and whether you want to carry this out even further than 2013. I think that's what you would get into and we may anyway. Nevada has expressed concerns about delivery of warm water on a more consistent basis downstream. There could be objections that force this to a higher level. That's why I keep saying that the only way you can get to a mitigated FONSI is likely with a warm water non-native fish plan so that you can convince people you have a process in place to address that threat if it actually occurs. (Kubly)*

**C:** *I've been working with these things for a long time. This group and the AMWG needs to have clear and active, vocal support if you expect to get \$80 million. I remember being in the upper basin in the mid-1980s and you guys were talking about a TCD then. You need to have things in writing. It needs to be done at the political level to make sure there is clear, unambiguous support for moving forward with an option. However you need to get there, you need to get there otherwise you'll be here another ten years still talking about it. (John Hamill)*

**Q:** *Why can't we analyze more than one option so we can get on with compliance? (Henderson)*

**A:** *I think that is an option. It just creates a broader band. I'm not sure what level of compliance you end up in that stage. Usually when you're talking about multiple alternatives, you're talking about an EIS. (Kubly)*

**Q:** *Can we craft some kind of motion? (Henderson)*

**A:** *Sure. You heard information on the designs that are under consideration. You understand that this is for the compliance process. You urge Reclamation to move forward as quickly as possible to finish that. (Kubly)*

**C:** *This is not an action item on the agenda. This is an update. I'm not prepared to vote on it at all day. I would like to talk with my AMWG representative as far as this item goes. (Davis)*

**C:** *The language that I advocated is that Reclamation continue with the process that AMWG has already agreed to. (Kubly)*

**C:** *I would feel better if we could come up with some description of what we've done to understand the warming we've already had. Could GCMRC put together a list of activities that have been done in the last couple of years to understand what's already happened? (Steffen)*

**R:** *That will be in the compliance document. (Kubly)*

**C:** *We've had warm water for a couple of years and have we done enough? And if we did, then does it gives us the confidence that you'll be able to deal with it when you install this device? (Steffen)*

**C:** *This is exactly what happens every time. People say there is strong support but then you have this discussion about all the things that are necessary. That's what John is saying. There is no unified, solid support coming out of this group or AMWG that says at the level Dave Garrett is advocating that this is really important. That's the impression I have. (Kubly)*

**Q:** *Do we need a stronger statement rather than just supporting compliance at this point? (Persons)*

Kurt advised the TWG that there was a time limit for continuing the TCD discussion. He recognized the item was not listed for action on the agenda and asked the TWG what they wanted to do recognizing that some members weren't prepared to vote on a motion. However, the TWG passed the following motion:

**MOTION: The TWG recommends Reclamation complete compliance on the TCD as soon as possible**

**Motion seconded.**

**Voting Results: Yes = 17 No = 0 Abstaining = 2**

**Call for the question.**

**Motion passes.**

Abstaining (Bill Davis): I don't think we need to do this. Direction to USBR has already been given.

Abstaining (Lloyd Greiner): I haven't heard anyone telling Reclamation to not do it. There is general support for Reclamation to go forward.

Robert King said the scientists need to recommend what designs they support, frequency for occurrence, and range of testing. It also needs to go beyond management making a recommendation to the Secretary. He said those members who are not restricted from lobbying the Federal Government need to step forward and write the Secretary, Reclamation, and Congress stating that a TCD is needed on Glen Canyon Dam.

**Status of FY07-08 Budget & Workplan.** Dennis Kubly said he wanted to talk about the SPG. It is the porthole for evaluating the monitoring and research proposals that get included in the budget and workplan. For example, the HBC AHG has sent in a list for projects and they want \$1.4 million. The SPG, through a process, will serve as a filter to recommend on to the Budget AHG that will in turn recommend to the TWG. When they looked at the membership of the SPG, there were only two individuals who were not members of the BAHG so the thought was to actually combine them in functions thereby reducing meetings and increasing efficiency. When the proposals get through the SPG, GCMRC would have a clear path to develop their work plan. He presented a PPT presentation (**Attachment 9**).

Bill Persons said he thought they designed a good process for ranking the goals - go through a couple of iterations of voting, see how things fell out, discuss them, get feedback, vote again, and come up again with a final ranking - but they basically voted once and they were done. He had some problems with that. There was either a lot of uncertainty about the criteria or clear biases because he thought some of the criteria were pretty clear cut. He's concerned how far they go with the goal ranking. Dennis said the goal ranking wasn't an attempt to establish research priorities but was to address the budget in a sequence. They had to start with one of the goals. It was more a matter of convenience and effectiveness rather than trying to establish one particular goal that had a higher priority than another.

John Hamill said it's still a little unclear to him how things are incorporated into the budget (CMINs, etc.) However, he does see how much of the work revolves around GCMRC and the budget. He wanted to share his philosophy about how the work is approached recognizing that this is a work in progress. The SPG is continually evolving and he is still learning and welcomes any feedback or ideas that might have merit.

Larry said that even though the foodbase study has a conceptual element to it, he doubts it will answer the foodbase questions in a time frame that is consistent with the changing conditions. He encouraged strong support for a really good, rigorous examination of the foodbase in the coming year. Whether that's some version of replication or past foodbase monitoring efforts, he feels quality information must be obtained.

Dennis reminded the TWG that the SPG is serving as a filter for proposals by other ad hoc groups and is working with GCMRC on other projects.

**The Paria River Mouth as an Experimental Humpback Chub Rearing Site.** Larry Stevens provided an abstract of his presentation (**Attachment 10a**) and said he would like to discuss reintroduction of HBC at the Paria River confluence and describe the rationale they're approaching the issue with and the process by which they can make some progress. He proceeded with a PowerPoint presentation (**Attachment 10b**). He concluded by saying that unlike all other sites proposed for second HBC populations, the Paria River site is a practical site for studies as it is easy to access by road. He intends to talk with the FWS on how to integrate this into the HBC Plan, conduct a feasibility study, and then perhaps develop an experimental pond as an example. He is seeking funding for the work.

**Q:** *Have you approached members of the Upper Basin recovery program with the same proposal? (Melis)*

**A:** *I haven't yet but that would be one of the steps to go through (Stevens)*

**Q:** *The initial concept reminds a lot of Minckley's basic idea and his bioscience article on strategy for razorback in the lower river. Another point, Reclamation out of Boulder City has been looking at managing similar kinds of features for fish in the lower system and recently convened a group looking at criteria to incorporate into ponds on the lower river so there are people who have been working on similar things. (Werner)*

**Q:** *What would be the estimated cost? (Barger)*

**A:** *When I started this, we had just proposed a very inexpensive two days with a bulldozer and not very much cost to it, maintaining someone there during the growing season, being able to drain the ponds in the summer. We're still working on that but my aim would be to keep this very inexpensive because these are expendable ponds. We don't expect these to survive unaffected by high flows. (Stevens)*

**C:** *And just the design considerations are going to have to be taken into account because the backwater that is just upstream of Lees Ferry propagates legions of carp and that if you have a gate open to the Colorado River, that is going to continue to propagate them as well. (Sponholtz)*

**R:** *The Colorado River is gated and I would probably propose six gates on that, including two triple gates because we want to keep non-natives out of this. Having replicated a structure though means that if something goes awry, we end up with non-natives in a pond, we can clean it up and start over again and easily move the fish to another pond. (Stevens)*

**Q:** *What's the aspect of compliance as the level of public controversy? Have you talked to the angling community? (Kubly)*

**A:** *I've only discussed this with Mark Steffen. There is more to talk about. I'm sure Mark has comments. (Stevens)*

**C:** *I don't want to take a lot of time here. Larry's is at the very beginning of this and I have some concerns but I also like the idea a whole lot for various reasons. I have always contended that trout and chubs can get along just fine together and the base problem the chubs have is the water temperature. If the water was a little bit warmer, I think the trout and chubs would get along fine. I think it would be very interesting and I think the other anglers would probably support. However, it is in an area that does get quite a bit of traffic. I think you might be wrong that it would be inconspicuous. (Steffen)*

**R:** *If this design held, there would be some kind of channel from the Colorado River to bring water across and people would have to step over. (Stevens)*

**C:** *The Upper Basin Recovery Program isn't trying right now to develop a lot of fish rearing methods and techniques and so they need to be consulted. I think they can help you out a lot. The Lower Basin MSCP is also doing the very same thing where they're trying to come up with methods for rearing and they're looking at things like porous gravel infiltration as ways to get water in so you don't have to worry about non-native fish because that's exactly what they're trying to do to keep them out. So you need to consult with Reclamation in Boulder City about that. (Davis)*

**Glen Canyon Treatment Plan.** Mike Berry said that because of the perceived inertia and perhaps lack of communication among the three primary organizations responsible for the cultural resources management, management and cultural staff of GCMRC, NPS, and Reclamation met on Monday and Tuesday (Jan. 23-24) for the purpose of defining a structure and process for moving forward in FY06 and beyond and accomplishing the requirements of the National Historic Preservation Act (NHPA) and the Grand Canyon Protection Act (GCPA) for cultural resources. They are working out the details and putting an agreement in place. NPS, Reclamation, and GCMRC agreed to move forward with an integrated approach to assessing Section 106 treatment and long-term monitoring needs for archaeological sites. Treatment planning will address the 161 sites agreed upon as the target population for treatment by the Programmatic Agreement group. Monitoring planning will encompass all sites originally considered in the EIS. For FY06, they are moving on the Grand Canyon Treatment Plan development, Zuni Cultural Resource enterprise and Utah State University along with the Museum of Northern Arizona. MNA got a

separate fund of money from NPS to do mitigation at ten of the larger sites in the canyon leaving 151 sites for ZCRE and USU to focus on, however, they're going to work from a common ground with the same set of research questions and there will be a lot of collaboration in the field work (**Attachment 11a**).

Mike Yeatts said he was a little concerned that the first time he sees tribal involvement is in FY07 and certainly coming at it as a tribe that needs to be consulted, that's probably appropriate. But as a PA signatory in developing the process for dealing with a couple of resources down there, he was concerned that in FY06, the groups are identified in developing the various things and didn't have a role in developing the treatment plan. Mike B. assured him they will have a role but that the initial design is to look at it strictly from an archeological perspective because they didn't know what was going to happen. They are not trying to shut the tribes out of the process but perhaps all of 2007 will be devoted to tribal consultation especially with regard to TCP development, TCP identification, etc. Mike Y. said the Hopi Tribe considers a lot of sites to be TCPs and would like to have a role in guiding the research questions that are appropriate. He would like to see all the PA signatories involved.

Mary said significant comments were provided to the original agreement by WAPA and CREDA. She asked if any of those were going to be incorporated into the agreement. Mike said they would be, however, since staff were not involved with the agreement, they are trying to figure out how management wants things to work. He reiterated that WAPA's and CREDA's comments would be taken seriously.

Wearing his CREDA hat, Kurt said it would be important to see the draft agreement between NPS and USBR again because the first one had a lot of contradictions and inconsistencies in it. He feels it is worthwhile to distribute it among the other stakeholders so they can understand what the relationship is between the two agencies in carrying out compliance and dealing with cultural resources that are under the purview of that compliance.

Kurt referenced one of slides which stated that the monitoring planning will encompass all sites originally considered in the EIS. He said that differs from the original agreement which identified a 97,000 cfs level as being the cutoff point for the area of potential affect or the area which Reclamation would consider of dam effects. He asked if that was going to change as well. Mike said that the 97K was never implemented because they could never get agreement on that and currently there is a wide difference of opinion between staff members on what monitoring all those sites means. He would like to see as much remote sensing as possible and using probability sampling. The whole point to be less intrusive on the monitoring than in the past because monitoring did a great deal of damage in the past. He feels that is a good topic of the PA group to give guidance to GCMRC but that is something that can be worked out later. Mike said he can't say how public the document will be and that decision will be left up to Randy Peterson, Jeff Cross, John Hamill, or whoever.

Norm said they are trying to do an integrated program so that the GCPA or AMP monitoring would be incorporated into the total monitoring program so what you see as an expanded portion is the GCPA portion of that. The GCPA is going to look at all the sites that were in the EIS.

Condition Assessment and Significance Evaluation for Cultural Resources between the Glen Canyon and Paria Riffle, GCNRA. Kimberly Spurr works with the Navajo Nation Archaeology Department. Their department contracted with the Bureau of Reclamation to work in the Glen Canyon Reach between Glen Canyon Dam and the Paria Riffle to reassess previously recorded archeological sites in that area. They weren't working at this stage on TCP or other types of sites. They were really focusing on the 53 sites she will talk about today as phase one of the plan. She proceeded with a PPT presentation (**Attachment 11b**).

**Q:** Did you encounter the post there at the lower crossing? (Stevens)

**A:** The lower crossing is below the Paria Riffle so we know where it is but that site was not in our area. (Spurr)

**Q:** *Almost every one of your photos show a massive coverage of non-native plants. Have you considered fire hazard as an element of risk in these sites? (Stevens)*

**A:** *We haven't. That's a good point because one of the things we've discussed regarding these charcoal lenses that we see in the terraces is whether they are natural or cultural fires. We were out there last summer and it was stunning with the amount of vegetation. It was waves of green. Once the cheat grass turned brown, if you had had a lightning bolt or anything down in there, you would've had a spectacular fire that would've laid down a pretty impressive charcoal layer on that surface. (Spurr)*

**Q:** *What do you guess is the percent of success on the gulley protection effort? (Stevens)*

**A:** *We can only speak to Glen Canyon Reach because we didn't go further down. I'd say it's probably 30% success. It's about 1-2 that worked vs. that didn't work. Partly because by the time they did the work, the gulleys were already so deep and so far cut back in that I'm not anything could've helped it. (Spurr)*

**Q:** *Spencer Trail has never been designated as an historic trail and wondered whether your information will encourage or discourage the Park from that designation. (Stevens)*

**A:** *We didn't do Spencer Trail because it's not part of the historic district but it was well out of sight of the area so we didn't look at it. (Spurr)*

**Q:** *Did Kurt do anything on dam effects of looking at besides the base level issue? (Barger)*

**A:** *Yes. He got hold of Mark Minoni's repeat photography at 9 mile and looked at Site 32 and the collapse of the wall there. He looked at some of the literature on bank face failure. Kurt's report is at the technical editor right now so I've not seen the final version. His synopsis is that Glen Canyon Reach is a really different animal than further down. It is so tight. The dynamics of the side drainages are very different and the land forms are very different. You end up with these high, flat terraces that are sort of tucked back. You don't have the real big broad bands and so the dynamics of it are really different but he is looking at that. Two cases where I can specifically say are the arroyo site whether he thinks that is dam related or not but certainly the ones on the alluvial fan across from the boat launch we found really good evidence and we mapped in some of these locations where the historic road crosses it with retaining mounds. (Spurr)*

**Q:** *What is the schedule to receive the report? Mike, do we review them or are you the only one that is reviewing them? (Barger)*

**A:** *We just finished reviewing version 2 and I will be distributing that to the PA group. (Berry)*

**C:** *We submitted our first draft of this report to Mike, received his comments and revised, and gave him a second draft in December. We're waiting to do anything with treatment plans until we get comments. We did as a condition and eligibility assessment report and then we're waiting on treatment plans until we get comments back. (Spurr)*

**C:** *We're waiting for Chris' review and as soon as she is done, I'll distribute it. (Berry)*

**Chronology of TWG Chairs.** Per a request from Amy Heuslein to provide a record of members who have served as TWG Chairs, Kurt passed out copies of a list prepared by Reclamation (**Attachment 12**).

**Adjourned:** 12:15 p.m.

Respectfully submitted,

/s/ Linda Whetton

U.S. Bureau of Reclamation  
Upper Colorado Region  
Salt Lake City, Utah

### 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 – U.S. Bureau of Reclamation  
RBT – Rainbow Trout  
RFP - Request For Proposals  
RPA - Reasonable and Prudent Alternative  
SAB - Science Advisory Board  
Secretary(=s) - Secretary of the Interior  
SPG - Science Planning Group  
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)