

Glen Canyon Dam Technical Work Group Meeting

November 15-16, 2010

Conducting: Shane Capron, Chairperson

Convened: 9:30 a.m.

Committee Members/Alternates Present:

Jan Balsom, NPS/GRCA
Mary Barger, WAPA
Cliff Barrett, UAMPS
Charley Bullets, So. Paiute Consortium
Kerry Christensen, Hualapai Tribe
Jerry Lee Cox, Grand Canyon River Guides
Kurt Dongoske, Pueblo of Zuni
Paul Harms, NM Interstate Stream Commission
Norm Henderson, NPS/GCNRA
Amy Heuslein, BIA
Tony H. Joe, Jr., Navajo Nation
Leslie James, CREDA (alternate)
Rick Johnson, Grand Canyon Trust

John Jordan, Federation of Fly Fishers
Robert King, UDWR
Glen Knowles, U.S. Bureau of Reclamation
Andy Makinster, AGFD
Tricia McCraw, ADWR
Don Ostler, UCRC (alternate for WY)
S. Clayton Palmer, WAPA
D. Randolph Seaholm, CWCB (alternate)
Pam Sponholtz, FWS
Larry Stevens, Grand Canyon Wildlands Council
Bill Stewart, AGFD
Jason Thiriot, Colo. River Commission/NV
Michael Yeatts, Hopi Tribe

Committee Members Absent:

Bill Davis, CREDA
Christopher Harris, Colorado River Board/CA

John Shields, Wyoming State Engineer's Office

Interested Persons:

Matthew Andersen, USGS/GCMRC
Marianne Crawford, USBR
Helen Fairley, USGS/GCMRC
Paul Grams, USGS/GCMRC
John Hamill, USGS/GCMRC
Sam Jansen, Grand Canyon River Guides

Barbara McKenzie, USGS/GCMRC
Ted Melis, USGS/GCMRC
Colby Pellegrino, So. Nevada Water Authority
Bill Persons, USGS/GCMRC
Barbara Ralston, USGS/GCMRC

Meeting Recorder: Linda Whetton

Administrative. Shane made some minor adjustments to the agenda.

Approval of the June 29-30, Meeting Minutes. Without objection, the minutes were approved along with other TWG related meetings: 1) June 14, 2010, BAHG/TWG combined conference call, 2) June 21, 2010, TWG webinar/conference call, and 3) June 27, 2010 conference call.

Review of Action Items. The action items (**Attachment 1a**) were reviewed. The following action items were discussed in more detail. Since there were a number of related action items, Shane suggested talking about the tribal issues in general.

Action Item 2010:03-15-16(1). John Hamill asked if there were any responses received from the letters (**Attachment 1b**) sent to the tribes regarding the nearshore ecology study research project. Glen said no written responses were received from any of the tribes. He said Kurt had expressed concerns at the last TWG meeting about the otolith study, the nearshore ecology study, and the taking of HBC for their otoliths. He said Reclamation has not followed up on that specific issue. In terms of consultation regarding the two EAs and the otolith study, Kurt said the Structured Decision Making (SDM) Workshop should not be considered consultation. He said consultation should be when the federal agency goes to the tribe and talks directly with the governor and/or the tribal council. He said any work he does with Reclamation is in preparation for that consultation occurring. It has to be Government-to-Government and has to take place between the elected officials at Zuni and the federal agency. He said there was a letter drafted for the governor regarding the otolith study, but he didn't know the status of it but is trying to track it down. Glen said it was his understanding FWS had permitted GCMRC to take some fish for otoliths. Pam said the FWS did permit the University of Florida for the otolith samples in the spring of 2010, but they made the

permit contingent on tribal consultation between the tribes and GCMRC. Shane asked if the otolith permit was available for the TWG to read. Pam said it was and she would send it to Linda for distribution to the TWG. (Refer to **Attachment 1c**)

Action Item 2010:03-15-16(4). Kurt stated the Tribal Consultation Plan has been in existence since 2000, gone through 14 iterations, and is currently in the Department for further action. As such, he wanted to know what the AMP plans to do with it because a lot of people put a lot of effort into it. Glen said it was going through an internal review within the Department and he would follow up on the status and report back to the TWG.

Action Item 2010:06-29-30(6). As follow up to the second part of the action item, Kurt said Reclamation was supposed to meet with the PA signatories shortly after the AMWG meeting to discuss how they would remain in compliance for FY11-12 and so far they haven't provided any information on compliance and how they plan to stay in compliance. Glen said a PA conference call was conducted on Aug. 31, 2010, and the focus of that call was on NHPA compliance on the two environmental assessments. A follow-up meeting was scheduled for Oct. 12th, but shortly thereafter AS-WS Anne Castle made a decision to begin a process dealing with Structured Decision Making (SDM) as part of Reclamation's effort to develop alternatives for the non-native fish control EA. As a result, that sidelined Reclamation's efforts in a number of areas and the Oct. 12th was canceled. They recognize the need to come back to the PA and the CRAHG and talk about next steps with regard to the Canyon Treatment Plan and the Programmatic Agreement. He said a meeting is being planned for January 2011 and within the next week a request for availability will be sent out via e-mail.

Action Item 2010:06-29-30(3). Norm said the action item deals with the Bright Angel weir and the NPS proposal to start working on a native fish management plan for the Grand Canyon but also related to the non-native control issue. He said workshops were held and it was his understanding that they're in the process of developing the plan. He wasn't sure of the schedule and asked Jan if she had more information. Jan said she wasn't sure of the timeline since she didn't attend the last workshop. Jan said what they're working on goes beyond the AMWG and TWG and deals with how the Park Service manages their resources. They are hoping that AMP stakeholders will participate in the process in providing information. Norm said the plan is comprehensive and is intended to incorporate fish management in the Grand Canyon and in Glen Canyon which would include the Lees Ferry trout fishery. It overlaps with Reclamation activities and the GCDAMP. Shane suggested they talk more offline but wanted to make sure that each others' efforts are supported and coordinated. Shane asked Jan to send the timeline of dates to Linda in an effort to coordinate review schedules.

Shane asked Jan to talk about the Bright Angel work. Jan said in 2006 the Park Service did an environmental assessment and then a FONSI (**Attachment 2a**) for the operation of the weir at Bright Angel to try and restore the native components of that system. They didn't get the EA done earlier enough in the season to really be effective and have been working towards to not only have a fisheries biologist staff but also starting to manage this program better which is why they're developing a native fish program. They installed a weir at the end of October and it's now in operation removing non-natives from the system. There has been a lot of visitor interest and information has been posted down at Phantom Ranch.

Jan said the "Environmental Assessment/Assessment of Effect 2006: Bright Angel Creek Trout Reduction Project" was completed. (See **Attachment 2b**)

ACTION ITEM: Jan Balsom will send the dates on the NPS proposal to Linda to keep the TWG informed of upcoming activities. (URL = <http://www.nps.gov/archive/grca/compliance/>)

OLD BUSINESS.

Status of HFE Protocol EA. Glen said they continue to work on this EA. In an e-mail sent from Ms. Castle last week, it was noted there is enough sediment to conduct a HFE. Through internal Department discussions, it made more sense to finalize the HFE protocol and then discuss a potential HFE. He said the NN EA and the HFE are somewhat linked by their recruitment. They plan to have a draft EA to the cooperators by next week and a public EA by mid-December. Ms. Castle has set up a conference call with the AMWG on Monday, Nov. 22 to discuss the status of the HFE Protocol EA.

Status of Nonnative Fish Removal. Glen said in a 2009 TWG meeting Kurt raised concerns by the Pueblo of Zuni on non-native fish removal. Reclamation also heard from other tribes on the issue. As such, no mechanical removal was scheduled in 2010. In an effort to help the cooperators and AMP stakeholders in their decision-making process, an SDM Workshop was held. Last week the second of two workshops was held and Glen said they made a lot of progress on understanding the issues and resources of concern. He said they will continue to work through the SDM process with the tribes and the cooperating agencies and plan to have a 1) draft SDM report late this month, 2) a final report by December 10, 2010, 3) a draft EA to the tribes and cooperating agencies by Dec. 17th, and 4) a public draft of the EA by January 17, 2011.

Shane said he attended the second SDM workshop and said it worked very well and he felt it could really help the TWG. He has talked with John Hamill about using a similar process with Dave Garrett's for the core monitoring process and utilizing some of the tools from the SDM workshop.

Update from Budget AMWG Motion for FY11. Shane said he wanted to address the economics portion of the FY11-12 budget that was passed by the AMWG at the August 2010 meeting. Glen said the AMWG passed a motion and forwarded the budget recommendation to the Secretary. They received a memo from the Secretary indicating that he had accepted the AMWG's recommendation. However, Shane said some reconciliation had to occur.

Norm said he thought it had to deal with putting the money back in for the treatment plan. Glen said more work needs to be done with the PA group and the CRAHG. The funding that had been moved was restored (\$500K). Barbara McKenzie has been working on the budget updates and will be sending to Reclamation shortly for their input. Pending updates to Reclamation's portion of the budget, Glen said it would the budget plan would be provided to the TWG at a later date.

Kurt said it was his recollection that the change in funding didn't have anything to do with GCMRC because it was asking Reclamation to take the \$300K that had been taken from the treatment plan and put into the non-native fish management plan, to restore that back to the treatment plan. He doesn't feel any changes are contingent on GCMRC's budget and that it's up to Reclamation to state how they plan to maintain compliance in FY11. With almost two months into the new fiscal year, Kurt said a meeting won't be held until January and he wasn't sure how Reclamation would be in compliance and it could be assumed they are putting more value into compliance with ESA than they are with the NHPA even though they are both Acts of Congress requesting federal agencies to do certain things in relation to their undertakings. Shane said the TWG will review the final budget and discuss further.

ACTION ITEM: Reclamation/GCMRC will provide the revised FY11-12 BWP to the TWG.

Status of the LTEMP EIS. Glen said either later this calendar year or the first part of the fiscal year, Interior plans for Reclamation to develop a LTEMP EIS. Rick asked if the LTEMP would focus on changes to dam operations or doing more research. Glen said there are a number of actions to be considered and scoping will ferret those out.

FY 2011 Hydrology Update. Glen said it's still looking like a 9 MAF equalization water year. He said the forecast is still consistent with the information provided by Rick Clayton at the last AMWG meeting.

Nomination of TWG Chair. With the end of the FY09, Glen said that Shane's tenure is up as the TWG Chair. He asked Shane to leave the room and then asked the members if there were any nominations for a TWG Chair for FY11. Jason Thiriot nominated Shane again and Cliff Barrett seconded the nomination. Without objection, Shane was reappointed as the TWG chair for FY11. Shane said he was really excited about the program and what could be accomplished this year.

Review of Ad Hoc Groups (Attachment 3)

CRAHG. Kurt said that since he's been chair, there hasn't been an issue requiring them to meet. He feels there is a distinct difference between the CRAHG, which is a sub ad hoc group of the TWG, and that group would take direction from the TWG when they want something evaluated and come back with a recommendation. He doesn't feel it's the CRAHG's purview to independently select things to review. When asked if he wanted to remain the chair, Kurt said he would. Shane said he felt the CRAHG should at least weigh in on the budget and that it was expectation to integrate the CRAHG with the BAHG. Shane said the TWG should think about the cultural issues and how the CRAHG can handle. Jan reminded the group that the CRAHG was originally set up to deal with cultural issues and non-native fish issues are not the same types of things. She said there are also a lot of things relative to Govt-to-Govt tribal issues and it would be awkward to ask an ad hoc group of the TWG to weigh in on those issues. Shane said it might be helpful for John Halliday to participate or facilitate the process. Helen said the CRAHG would like to re-engage with the TWG and GCMRC on some issues.

HBC AHG. Shane said he thought this group was on hold pending an update from the AMWG's HBC Comprehensive Plan Implementation AHG. Glen said he thought the HBC AHG completed its charge when it finished the comprehensive plan and handed it off to the AMWG ad hoc group. It will be kept open pending further technical assistance from the TWG.

HBCPIAHG. Randy Seaholm said the ad hoc group at the AMWG level, after the comprehensive plan was received, was to go through and decide which elements should be in and out of the program. That's where they will presumably focus their efforts. It was chaired by Randy, Sam Spiller, and Nikolai Lash. He said he wasn't sure where Sam and Nikolai are with respect to chairing that ad hoc group and they need another state representative appointed to that group to finish that charge. Larry said that since there has been so much turnover on all the committees associated with humpback chub issues, he feels the AMWG needs to re-focus its request. Shane said he thought that was on their agenda for the February meeting.

Species of Concern. Larry said there was a white paper developed on the missing species (**Attachment 4**). He said there were two meetings held on the topic with various people. He asked if anyone else was interested in participating in the group to let him know. He said there are more than 50 species missing from the ecosystem. Others to be involved in the group: Bill Stewart, Glen Knowles, John Jordan, Pam Sponholtz, and Marianne Crawford.

Core Monitoring AHG. This will be discussed shortly.

Socioeconomic AHG. This will be dealt with later today.

Fall Steady Flows AHG. This update will be provided later today.

Agenda Change. Due to Dr. Martell's flight arrival, it was decided to move the Fish PEP agenda item until this afternoon.

General Core Monitoring. Shane said the next three items would focus on the General Core Monitoring Plan, TWG Appendix B to that plan, and the individual core monitoring plan to be seen next year as well as the Fish PEP implementation and fish core monitoring plan. He said the issues are quite complex and asked Helen to join him in leading the discussions. He said the GCMP has been working on trying to work with GCMRC and revise the plan and in that process they agreed to develop an appendix to the GCMP that basically would be TWG's review process or describing the review criteria and how they would go about approving the individual core monitoring plans. Currently, there is a revised GCMP with comments on that were provided by Shane and based in input from the ad hoc group. He said those primarily occur in Section 1.1 of the GCMP (**Attachment 5a**), TWG's Appendix B, and the SA's input of Appendix B.

Shane said the ad hoc felt that one of the main things they needed to have in the document was a description of a process for setting up when you develop the individual plans a way to do a risk assessment and a tradeoff analysis. That was integrated into Section 1.1. He said it's the concept of having three scenarios brought forward in each plan that represents a high, a medium, and a low scenario. A high would be the full implementation and in some cases GCMRC might want to more in the high scenario than what is in the general plan to describe the different projects. The medium would be a modest reduction in spending on the 10-30% range, and the low would be a much more drastic change of about 40-50% reduction to implement only the highest priority core monitoring information needs. He said the focus should be on Appendix B (**Attachment 5b**) and asked John to talk about the document in general.

John Hamill said that Shane made a number of proposed changes to the plan and he provided copies of the "TWG Comments/GCMRC Response Table" (**Attachment 5c**). He said GCMRC is generally in agreement with the changes. They would like to see the plan finalized in January. He said it would be difficult to move forward with the detailed discussions on the individual plans until there is agreement on the general approach. The fish plan is a major component and is probably 20-25% of the whole core monitoring program and the vegetation program. In order to move forward with those, there should be agreement on what the general approach is going to be and the sooner it can get finalized the better. They are cognizant of the budget issues and said that for each of the core monitoring plans that they've developed to date represents a compromise based on budget constraints and that there are additional things that could be done in any of the CMPs to make it a more robust program. John said he was comfortable with a high-medium-low assessment of what a program would be. Coming up with a process that works for the TWG will be a major challenge and they may want to use structured decision making in that process. He reminded the group that they've been working on a core monitoring plan since 1994 and still don't have agreement on a plan. He feels the group needs to get past where they're at today and take it through the process.

Shane there has been a lot of discussion with John, Helen, and the ad hoc group. He realizes there are some people who have issues and they've worked hard to resolve the differences. He said there is only so much GCMRC is willing to accept in the document. He said Appendix B is the TWG's opportunity to describe the documents, the process, and the type of program they want to have. There is a need for a management program for how to assess these documents. John Hamill said he thinks the question is where to go from here, is it under scoped, over scoped, is more being done than is needed, or less than is needed, and that should be the focus of the discussion. He feels the starting point is deciding where the program wants to go from here. Helen said when some of the discussions occurred, GCMRC didn't feel it wasn't in their purview to decide on which risks to take.

Shane distributed copies of the Science Advisors' "Review of TWG-developed Appendix and Related Changes to the GCMRC Draft Core Monitoring Plan" (**Attachment 5d**). He said there were a lot of comments related to the details and feels it would be beneficial to the process. He said when they got to the sediment plan a lot of them felt they didn't know where they could make changes. He said the best place for those manipulations is the scientists that are deeply involved in the program because they understand how things fit together. He said the scenarios are the most important elements in doing a risk assessment framework. Larry said the first step is to try and understand whether or not you can get to a predictive scenario of a resource in relation to dam operations. He said there are many examples but one that they're not looking at yet is long-term nutrient depletion effects on the ecosystem. While they know a lot about sediment transport, flows, and dynamics, they don't know what the long-term nutrient dynamics stored in the system might be.

Shane said he talked to Mike Runge about the importance of core monitoring and monitoring for decision making. In looking at the costs and what decisions need to be made, he said there is a scale for collecting information of a data that might be interesting long-term for various reasons versus just

collecting certain streams of data to, on a minimalist approach to be able to make decisions you're your highest risk. He feels there is a continuum along the way of how much money is spent and how big the programs are for how much information we have funneling into decisions and the risks we're willing to take or do we want to spend a lot more money and have a quite bit more data and have a lot less risk and have a lot more information.

Norm said the group needs to look at the core monitoring priorities and the broad programmatic set of priorities. Shane said the best science to date came out of the SPG. He said the TWG could walk through each individual plan and, based on their values, see where that takes them or as Norm proposed, look at it more programmatically and have that drive the process and priorities. Randy said he felt Shane's approach was very good and would like to see the GCMP go forward as long as information can be added or deleted.

John Hamill said there needs to be a structured process of what the overall scope of the program should be. Instead of debating all the details, he suggested taking a program and working through it to clarify the objectives and different alternatives.

Shane said there are two individual plans before the TWG today. He feels that if they could approve a plan in January, then they possibly have a March and June review schedule for the fish and vegetation plan. He would like to have a first review, comment and response, a final review, and then a decision making process.

Norm said there is a contrast between what Shane says and what John said in the CMP. Norm asked what the concept would be as they develop each of the individual plans through his process or working under a strategy that the overall CMP would be 40-60% of the science budget or not. Shane said that's why there is a scenario which is about a 50% reduction and so the TWG could evaluate that scenario and make a good choice based on science and what is the implication for cutting this program back 50%. Norm said that didn't give the difference between the different programs and that for one program the highest level would be wanted and that they couldn't get to that decision without a budget concept than they already have. Shane said it wouldn't be a perfect process because they haven't walked through the science to understand what the choices might mean. Norm said since he and Shane have differing opinions, he felt the TWG should weigh in on what they want. Norm stressed this was an important document for the AMP and he feels the TWG should deliberate and decide very clearly on how they want to proceed. Shane asked for comments from the TWG.

C: I agree with where you're going. As we develop these different programs and incorporate the monitoring, we would have a big difference of opinion on socioeconomics. If we step back, we're not advancing the program. I could certainly support Shane in his efforts. (Seaholm)

C: We are going to have to go through and make priorities fit within the budget. My desire is that if we work through the process, we can resolve the conflicts at the end. Let's get some better understanding of the components proposed because we'll have to finish up in the end. It would be better to have the specific discussions first. (King)

C: There is no beginning or end. It has to be an adaptive management process all the way through. (Stevens)

C: Shane, I want to read through what you've put together, take a look at what the direction is from the Secretary's office, and then come back to looking at the CMP and actually give you some reasoned comments based upon on the discussion I'm hearing today and also what you've provided in text. (Balsom)

Shane said until AMWG approves a CMP, there isn't one. He liked the SDM process and pulling in the values of the program and using those in decision-making efforts. He went through the six steps outlined in the SDM process and said he is excited about the tools available to the TWG and working with Mike Runge and Dave Garrett in using the process. Shane said he wanted to make sure the group develops a list that incorporates the values.

Vegetation Core Monitoring. Barbara Ralston gave a PPT presentation, "Riparian vegetation monitoring for the Colorado River Ecosystem" (**Attachment 6**). Barbara asked the TWG to think of

questions they might have on the high, medium, and low level intensities and what is being proposed through the process for riparian vegetation monitoring.

Q: *Wasn't there a remote sensing component of the vegetation monitoring? (Christensen)*

A: *We do overflights every four years and we have been attempting to do community mapping of riparian vegetation using four-band imagery, so color infrared, red, green, and blue. The first map was from 2002 and had great success at identifying marsh vegetation and not so great success in identifying or separating out mesquite from tamarisk. There is still difficulty in pulling out those individual species. (Ralston)*

Q: *Prior to the dam being installed when you had very high spring flows, what was the effect of those flows on the vegetation below the high water line? (Jordan)*

A: *There was some vegetation in the floodplain areas like around Lee's Ferry and down in western Grand Canyon. There might be plants down along the sandbars or along the channel but they were certainly were ephemeral species. (Ralston)*

Q: *How much coordination has there been with the Park's vegetation program since we have vegetation mapping, vegetation plots? (Balsom)*

A: *There hasn't been any. I asked them to come to the PEP panel and they presented something. I talked with Laurie a little bit about sharing data and that's as far as we've gotten. I send things but I often don't get responses. (Ralston)*

C: *We need to make sure the modeling and monitoring take into account the effects of the terrestrial ecosystem back into the aquatic system too. (Yeatts)*

Mary asked that an action item be captured as to the coordination efforts by NPS and GCMRC on vegetation monitoring.

ACTION ITEM: Jan Balsom will inform Shane on the coordination efforts between NPS and GCMRC on what vegetation monitoring is being done.

Shane suggested that perhaps GCMRC could provide a strawman of both the fish and the vegetation program of high, medium, and low and that might give the TWG some starting point for conversation and more input from the tribes also.

Fish PEP Implementation Core Monitoring. Matthew Andersen talked about the Fish PEP and what data was available to refute their recommendations. He said Steve Martell was invited to help explain some of the information. He passed out copies of the report, "Evaluating the relationship between capture probability and uncertainty in estimates of humpback chub abundance using ASMR" (**Attachment 7a**) and gave a PPT presentation (**Attachment 7b**). Overall, aging errors and the age-length keys used to compile the data are critical in establishing estimates of uncertainty as well as estimates of age-specific capture probabilities. Subsets of the historical data indicate non-random sampling is occurring. One of the major findings in this analysis and previous work by Coggins (2008) is that estimates of uncertainty are extremely sensitive to aging errors. Aging errors are also likely contributing to poor estimates of age-2 recruitment, where lags are introduced because of the asymmetric rounding down of small fish due to the minimum size limit of 150 mm. Aging errors are also largely the source of retrospective bias reported by Coggins (2008). The current version of ASMR is also an observation error only model and the major assumption in this model is that the catch-at-age is known without error. The observation error only model will also tend to underestimate the total uncertainty in the population estimates.

Q: *You list one of the assumptions as that mortality is known. Isn't another assumption is that mortality is constant over those years? (Johnson)*

A: *Correct. (Martell)*

Q: *What kind of bias is that introducing into this? (Johnson)*

A: *We have in this analysis and I think in the analysis that Lew did in 2006, we did look at time varying changes in natural mortality rates and in doing that I don't recall looking at estimates of bias but if in fact there are time varying natural mortality rates, from what we know from age-composition data, there usually is information in there that*

estimate changes in sed, meaning natural mortality rates in this case, and it should be relatively unbiased. As you add more parameters, you're trading off precision in the estimates. (Martell)

Q: In your model if we remove the fall sampling, are those fish then available, fish you would see in the fall, you don't see because you don't go sampling? But that fish then comes back and spawns in the spring and would be available to be selected by the spring survey, tagged, and then become part of the population that we've tagged. Does your model incorporate chance of seeing that fish in the spring and tagging it? (Capron)

A: The short answer is yes, it does see it in the sense that that fish is there that year. The way the data get broken down going into ASMR is you can recapture the same individual four or five times in one given year. All of that gets thrown out. All we want to know is what is captured. (Martell)

C: It almost seems like we're losing fish from the population so maybe it's a modeling artifact or it's a physical system. (Capron)

A: When we pull these data out, the assumption we made there is that the capture possibilities for all ages wouldn't change. If you don't sample in the fall, you get reduced estimates of the age specific capture probabilities. So if you don't sample in the fall, you're less likely to catch older fish. (Martell)

Q: It sounds like the bigger issue is the non-random sampling aspect. Based on your recommendations developing better models in which to analyze the data and the age of year, is that correct? Before we start taking things out of this program, we need to address those two issues first and then maybe we do this analysis. (Sponholtz)

A: You're right. (Martell)

Q: My question has to do with handling of the fish and whether or not from your analysis you can detect evidence of handling issues with fish? (Stevens)

A: That's one of the big assumptions in a lot of the mark-recapture programs and it doesn't matter whether you're tagging HBC or catching possums with peanut butter, one of the major assumptions is that you have the same probability of catching a tag versus an untagged fish. The model assumes they have an equal recapture probability. There isn't data on tagging mortality. (Martell)

Shane said the next step is for GCMRC to consider this in the biology program. Matthew said there is a statistician position in their program and could dedicate some of the time to do this work.

Socioeconomics Plan FY 2011. Shane said that historically the TWG presented a draft motion to the AMWG that was partially put together with an implementation plan for economics based on the panel report and then AMWG asked the TWG to develop an implementation plan. He said Helen is going to make a presentation that crosses a whole number of issues the TWG has to deal with. Helen distributed copies of the "Final Report of the GCMRC Socioeconomic Research Review Panel (**Attachment 8a**) and gave a PPT presentation, "Socioeconomics Plan FY2011" (**Attachment 8b**). She asked if anyone wanted to participate in a Socioeconomics 101 Course (**Attachment 8c**). She passed out copies of the "Table 1. Socioeconomic Projects identified in the February 2010 Expert Panel Report" (**Attachment 8d**) and "Comments on Socio Econ Workshop Report" (**Attachment 8e**). Helen said they're looking for the TWG to weigh on the recommendations to reaffirm, dispute, etc. She said she didn't copy the highlighted questions. She directed the TWG to the end of the table for the questions that came out of the workshop.

ACTION ITEM: Comments required on the SocioeconomicsTable 1 are due to Helen by Nov. 26, 2010.

Leslie said that the report didn't state that the questions were consensus and when there was a question for Phase I or Phase II, there wasn't any way to indicate a third option of "not at all." She said it was how the voting machines were set up and wanted to make sure the TWG understood what happened at the meeting. Helen said there was an opportunity to vote on the top ranked items. Helen said the items in the table were ranked by importance. She said she tried to replicate what was in the workshop.

Helen said there WAPA will put a strawman together and wanted to make sure that everyone understands what a base case analysis is. She also said the TWG should develop a process of change case analysis.

Leslie said that consideration should not be given to pre-ROD. Helen said that the panel said that since MLFF was being done that probably a base case on MLFF might be the place to start and then look retroactively and forward. They realized it could be contentious.

Shane said the Implementation Plan based on the AMWG motion should be done in time for the AMWG to consider in February 2011.

Economics 101 Course Recommendations. Shane said the ad hoc group put together for the Economics 101 course and wanted to provide some input for GCMRC to consider. He said Dave Garrett and the SAs worked with them in their recommendations for possible presenters.

Clayton said the suggestion to have a course was a good idea but was limited to non-use economics. He advocated on the ad hoc that they compartmentalize practitioners in the field on power economics, a subject on recreational economics, one of them on income measures or non-market studies, and on non-use economics.

Shane said he would like some type of agreement on an Economics 101 course. John Hamill said he would like people to raise their hands if they're interested in a face-to-face class or a WebEx. Shane said they would start in the afternoon of one day and then continue the following day. He asked the TWG if they were interested or having a detailed workshop following the monitoring workshop.

Since some people were not in agreement as to when to hold a workshop and what should be included, Shane suggested the ad hoc group work with GCMRC on developing the content and when to hold it. John said early discussions focused on providing a basic economics class, but now it appears to be growing into something more. Because of the time commitment required to complete two EAs, he nor his staff have the time to engage and interface with the SEAHG. He said that if the TWG wants to move forward with the workshop, they can do so without GCMRC. As such, Shane said further discussion on a basic economics workshop would be dealt with by the SEAHG.

ACTION ITEM: Comments on the Socioeconomics Table 1 are due to Helen Fairley by Nov. 26, 2010.

Fall Steady Flow Plan. The "Study Plan—Biological Resource Responses to Fall Steady Experimental Flows Released from Glen Canyon Dam, 2009-12" (**Attachment 9a**) was distributed along with copies of the Fall Steady Flows Comment Table (**Attachment 9b**) and the "Science Plan for Fall Steady Flows" PowerPoint presentation (**Attachment 9c**). Shane said they were about to entertain a motion in March. He said he wasn't sure what happened. John Hamill said the \$50,000 is not available to do the synthesis work in FY12. Rick Johnson objected to the motion which was offered:

Motion (Proposed by Kerry Christensen, seconded by Kurt Dongoske): The TWG has reviewed the following document: "Study Plan – Biological Resource Response to Fall Steady Experimental Flows Related from Glen Canyon Dam, 2009-2012" dated February 2010. TWG understands that GMRC will prepare a synthesis of results from the various studies identified in the plan and present to the TWG in January 2011. This synthesis should include the following:

- a. The scientific linkages between the study results and the SSQs and other INs identified in the study plan,
- b. Analysis of the effects and causal factors including the ability to answer the SSQs as well as a description of the uncertainty of the results including confounding factors (e.g, storm events)
- c. A synthesis of all the results evaluating the biological success of the Fall Steady Flow experiment and the overall objectives described in the plan and the 2009 biological Opinion.

Representative	Stakeholder Entity	Vote
Bill Stewart / Andy Makinster	Arizona Game and Fish Department	Y
Amy Heuslein / Garry Cantley	Bureau of Indian Affairs	Y
Glen Knowles / Marianne Crawford	Bureau of Reclamation	Y
Mike Yeatts	Hopi Tribe	Y
Kerry Christensen	Hualapai Tribe	Y

Jan Balsom	National Park Service - Grand Canyon	Abstain
Norm Henderson / Chris Kincaid	National Park Service - GLNRA	Abstain
Tony Joe, Jr.	Navajo Nation	Y
Kurt Dongoske	Pueblo of Zuni	Y
VACANT	San Juan Southern Paiute Tribe	
Charley Bullets/LeAnn Skrzynski	Southern Paiute Consortium	Absent
Pam Sponholtz / Sam Spiller	U.S. Fish and Wildlife Service	Y
Mary Barger / Clayton Palmer	Western Area Power Administration (DOE)	Y
Rick Johnson / Nikolai Lash	Grand Canyon Trust	N
Larry Stevens / Emily Omana	Grand Canyon Wildlands Council	Y
John Jordan	Federation of Fly Fishers	Y
Jerry Lee Cox / Sam Jansen	Grand Canyon River Guides	Y
Tricia McCraw / Perri Benemelis	Arizona	Y
Christopher Harris	California	Absent
Ted Kowalski / Randy Seaholm	Colorado	Abstain
McClain Peterson/ Jason Thiriot	Nevada	Y
Paul Harms / Don Ostler	New Mexico	Y
Robert King	Utah	Y
John Shields / Don Ostler	Wyoming	Absent
Bill Davis / Leslie James	Colorado River Energy Distributors Association	Y
Cliff Barrett	Utah Associated Municipal Power Systems	Y
	Total Yes	18
	Total No	1
	Total Abstain	3
	Total Voting	19
	Motion Passes	
Abstentions count toward the quorum, but not the vote. For example, if 20 TWG members are present then a quorum is present (quorum=16). If the vote is 3-0-17 (that is 3 yeas, 0 nays, and 17 abstentions), the motion passes because abstentions are non-votes for all purposes other than to establish a quorum. To explain further, the simple majority or two-thirds majority is based on all votes minus the abstentions.		

Public Comments: None.

Glen Canyon Dam Technical Work Group Meeting
November 15-16, 2010

Conducting: Shane Capron, Chairperson

Convened: 8:20 a.m.

Committee Members/Alternates Present:

Jan Balsom, NPS/GRCA
Mary Barger, WAPA
Cliff Barrett, UAMPS
Charley Bullets, So. Paiute Consortium
Kerry Christensen, Hualapai Tribe
Jerry Lee Cox, Grand Canyon River Guides
Kurt Dongoske, Pueblo of Zuni
Paul Harms, NM Interstate Stream Commission
Norm Henderson, NPS/GCNRA
Amy Heuslein, BIA
Tony H. Joe, Jr., Navajo Nation
Leslie James, CREDA (alternate)
Rick Johnson, Grand Canyon Trust

John Jordan, Federation of Fly Fishers
Robert King, UDWR
Glen Knowles, U.S. Bureau of Reclamation
Tricia McCraw, ADWR
Don Ostler, UCRC (alternate for WY)
S. Clayton Palmer, WAPA
D. Randolph Seaholm, CWCB (alternate)
Pam Sponholtz, FWS
Larry Stevens, Grand Canyon Wildlands Council
Bill Stewart, AGFD
Jason Thiriot, Colo. River Comm./NV
Michael Yeatts, the Hopi Tribe

Committee Members Absent:

Bill Davis, CREDA
Kurt Dongoske, Pueblo of Zuni
Christopher Harris, Colorado River Board/CA

John Shields, Wyoming State Engineer's Office

Interested Persons:

Anwar Al-Mallah, USGS/GCMRC
Matthew Andersen, USGS/GCMRC
Mary Barger, WAPA
Marianne Crawford, USBR
Helen Fairley, USGS/GCMRC
Paul Grams, USGS/GCMRC
John Hamill, USGS/GCMRC

Sam Jansen, Grand Canyon River Guides
Andy Makinster, AGFD
Barbara McKenzie, USGS/GCMRC
Ted Melis, USGS/GCMRC
Bill Persons, USGS/GCMRC
Barbara Ralston, USGS/GCMRC
Sam Spiller, USFWS

Meeting Recorder: Linda Whetton

Administrative. Shane welcomed the members and new attendees to the meeting. He reviewed topics from yesterday's meeting:

- **General Core Monitoring Process.** Shane said a workshop process is needed to determine the criteria and the values they're going to use to evaluate the individual plans. He said that if people wanted to stay later this afternoon to work on those, he would be happy to stay around and work on those.
- **Vegetation Core Monitoring Plan.** Shane said they're looking at a workshop similar to what was done with the Fish Plan. He said they need to work through the plans in order to keep them current. He suggested a possible January timeframe for a workshop.
- **HBC Assessment.** Shane said that Martell's analysis was very interesting and raises a lot of questions about the model that he used and what sampling changes might need to be included or tested in the next few years to test that random sampling issue. Given the information, he said the TWG needs to determine what changes need to be made to develop their scenarios and review a core monitoring plan to collaboratively develop those scenarios with the scientists.
- **SEAHG.** Shane said that when he went back and looked at the Fish PEP work, they are really talking about developing the MOs and the CMINs. He said that as a program, they need to do

some hard thinking about how these things relate, if they're collecting the right data, and what process are they going to use. If the SEAHG thinks in terms of the MOs utilizing the questions that came out of the workshop, they might be able to make some progress in that limited scope.

- Economics 101. He said that if the SEAHG works with GCMRC, they can come up with a good compromise on an economics course.

Hydrograph & Budget Discussion. Shane said the TWG will need to develop a hydrograph recommendation for AMWG to consider at their August 2011 meeting and he would like to have an open process where people's recommendations can be evaluated and coordinated. If there are analyses, they want to request GCMRC do it all at once in a time frame that fits into their work schedule. He said last year DOI/Western came in with their proposal late in the fiscal year which added to the confusion. He has talked with Anne Castle and Deanna Archuleta about this and they're in agreement that if there is a DOI/Western proposal, it will come through the TWG and be analyzed and all brought together for a consolidated recommendation to AMWG. He sees the process starting in January, a review in March, and then a recommendation formulated at the June TWG meeting. He would like the BAHG to develop budget items as well as a hydrograph as a format where people can have a series of 5-7 questions about whatever proposal they're making. In the budget biennial work plan there are a number of criteria set out for making changes to documents and Shane said he would like a sheet so that whoever is making a proposal will have the same information so that the TWG can then have a number of proposals to use for comparison and have a common understanding of what's required. He will work with Glen and the BAHG on the proposed hydrographs.

Rick wants the hydrograph discussions to start earlier in the process. He didn't feel there was sufficient discussion on the 2011 hydrograph. Shane agreed and said by starting earlier there would be information available to make a good decision based on resources. Shane also said that Ms. Castle is concerned with the level of detail that AMWG is brought into so it will be important for the TWG to make sure their decisions are well documented. He is supportive of making more decisions within the TWG. He said if the TWG can't agree on certain parts of the workplan, the TWG would inform AMWG on the decisions and then have the Secretary make the decision.

Leslie asked whether GCMRC could identify which parts of the budget rely on the hydrograph. John Hamill said there are two major hydrograph issues: 1) HFE protocol, and 2) the whole nonnative thing and the control strategies. John said GCMRC is waiting to hear the results of the EAs in order to support those.

Knowledge Assessment and SCORE II Discussion. Ted Melis distributed copies of his PPT presentation, "Seeking TWG Input, Knowledge Assessment II Steps and Timeline" (**Attachment 10a**). He said the first KA workshop was held in May 2005 and then brought to the TWG in Nov. 2005. They were working with Josh Korman and the best way to document the outcome of the workshops. If anyone hasn't seen the report, it will be added to the TWG meeting page (**Attachment 10b**). He reviewed the timeline for FY11. He encouraged people to read the original report before the January meeting. Workshop I would focus on eliciting expert opinions from scientists individually and then allow them to discuss views prior to the second round. He referenced a Causal Mechanism Handbook to help the TWG better understand cause and effect of the resources. If anyone wants a copy, they should contact Ted. If anyone wants a copy of the "The use of Bayesian networks to guide investments in flow and catchment restoration for impaired river systems" by Stewart-Koster, they should contact Ted directly since the material is copyrighted and can't be posted to the website.

Ted asked for input from the TWG. The following were captured:

- *Support your idea that the TWG and the stakeholders as well as the scientists need to come up with the questions. I support your proposed use of the AM method that is more quantitative. (Palmer)*

- *Would it be possible to include translocations in the next workshop to evaluate where they've been and where they're going? (Sponholtz)*
- *On the 2005 SCORE Report, you have to put cutoff dates in that report, it showed a very bad picture of the HBC but when the report came out, there was a better picture. Ted said that when the report came out, there was more information. (Ostler)*
- *The fact sheets are very helpful and should be put in a binder so they can be referenced with the KA whenever possible. (Seaholm)*
- *The POAHG has been developing fact sheets and there should be some coordination between the POAHG and what GCMRC is developing. (Heuslein)*

GCMRC Updates.

LSSF Synthesis. Barbara Ralston gave a PPT, "Low Summer Steady Flows Report Status and Preliminary Conclusions" (**Attachment 11a**). She is currently accepting peer review comments and anticipates it will be out as USGS file report in January of February 2011. John said Barbara will take over the LSSF work since Matthew Andersen is leaving the Center.

Nonnative Fish Technical Report. Matthew said the nonnative fish technical report will be coming out. He and Kara Hilwig worked on this. They are still in the process of working through the review comments. Kara was working on a fish database series. It was an outgrowth of the spring workshops and is a summary of native and nonnative captures.

Cultural Resources Work Plan & Geomorphic Workshop. Helen gave a PPT presentation (**Attachment 11b**). For the FY2011 Plan, they would like to get with the CRAHG and inform the cultural people on how much they've accomplished during the last fiscal year. She said there is a lot of data they have to process and then they will try to put out a pilot monitoring plan and implement a pilot monitoring program in spring 2011. They're looking at late winter to hold a geomorphic workshop. Mary asked whether she thought pilot monitoring plan would be in place by the geomorphic workshop. Helen said they want to structure the monitoring program around a conceptual model on how it works. Helen said it's going to take awhile to develop the framework for the workshop. Shane said he thought the CRAHG should be tasked with the 2010 results and report back to the TWG with recommendations. It might not happen until after our next TWG meeting but wanted the CRAHG to get started.

HFE Synthesis. Ted said that in the past year they've been pursuing a team effort on producing a book on the synthesis of 2004 and 2008 experiments. Chapter 3 is the heart of the book and recounts the results with interpretations of the three high flows. Chapter 4 is the equivalent of chapter 3 but gives the biotic response information. Chapter 5 focuses on what conditions are best for high flow experiments in the future. They hope to have through the complete review process by Dec-Jan and have available for the AMWG in February. They will also be preparing a Fact Sheet.

Update from Second Ecosystem Modeling Workshop. Ted thanked those individuals who have helped Carl Walters in his work. He said with limited budgets in the past two to three years, it hasn't progressed past the aquatic level. Ted gave a PPT presentation, "Preliminary Update from Second Ecosystem Modeling Workshop," (**Attachment 11c**).

Update on Water Quality and 2010 Sand Input. Paul Grams gave a PPT presentation, "Update on Water Quality and 2010 Sand inputs" (**Attachment 11d**).

Symposium Update. Ted said if people are interested in the symposium, to contact him. Clayton said that both discussions on the hydrograph process from USBR and WAPA occurred outside the EAs and that responses on an HFE should be considered more fully by the TWG. He would like to have a further consideration and discussions with the managers over the question of responding to sediment enriched

conditions. The recent events have occurred outside the HFE EA and it's his belief the full array of responses haven't been considered. He asked that this concern be added to the science workshop.

Reports Tracking Update. When he came into the program, Shane said there wasn't any tracking of the projects so this is an attempt to account for things that have been accomplished or are in the process of being completed. Marianne Crawford is a contracting representative on the GCMRC contract and said that the spreadsheet (**Attachment 12**) will be continually updated. She said Reclamation was recently informed by their Contracting Office that more detail needs to be written into the contracts. As such, she is tracking the Scopes of Work. The following suggestions were made to improve the report: 1) Include a "due date" column, 2) Add a footnote on publication types (OFR = open file report), 3) Keep the actual project number on projects until they're completed, and 4) Include the "review process dates."

GCMRC Website Update. Anwar Al-Mallah introduced himself as the new GCMRC webmaster. He gave a demonstration of GCMRC's new website.

TWG Management Issues. Shane went over possible meetings/events:

- March 8-9, 2011 → TWG meeting in Phoenix
- Late June 2011 TWG meeting
- AMWG Meeting in late April or early May
- Possible high flow in March 2011

Possible workshops:

- Economics 101
- CRAHG meeting in early the year with possible tribal monitoring meeting
- Geomorphic Workshop in late winter
- Knowledge Assessment (June ?)
- Integrated PEP review (interact with TWG beforehand) – Can we do with March Mtg or a separate standalone meeting. Separate INs discussion.
- Expert solicitation in March or April
- Nonnative Fish Workshop (held between Dec-Mar for last 4 years)
- Workshop for Integrating Criteria (Appendix B) -> Jan-Feb timeframe

Public Comments: None

Adjourned: 2:05 p.m.

Other Documents Distributed at the Meeting:

Attachment 13: Incorporating thermal regimes into environmental flows assessments: modifying dam operations to restore freshwater ecosystem integrity by Julien D. Olden and Robert J. Naiman (University of Washington, Seattle)

Attachment 14: The use of Bayesian networks to guide investments in flow and catchment restoration for impaired river ecosystems by B. Stewart-Koster, S.E. Bunn, etc. Causal Criteria Methods Manual – Methods for applying the multiple lines and levels of evidence (MLLE) approach for addressing questions of causality (University of

Attachment 15: Canberra)

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General Key to Adaptive Management Program Acronyms

ADWR – Arizona Dept. of Water Resources
AF – Acre Feet
AGFD – Arizona Game and Fish Department
AIF – Agenda Information Form
AMP – Adaptive Management Program
AMWG – Adaptive Management Work Group
AOP – Annual Operating Plan
BA – Biological Assessment
BAHG – Budget Ad Hoc Group
BCOM – Biological Conservation Measure
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
CAHG – Charter Ad Hoc Group
CAPA – Central Arizona Project Association
GCT – Grand Canyon Trust
CESU – Cooperative Ecosystems Studies Unit
cfs – cubic feet per second
CMINs – Core Monitoring Information Needs
CRBC – Colorado River Board of California
CRAHG - Cultural Resources Ad Hoc Group
CRCN – Colorado River Commission of Nevada
CRE – Colorado River Ecosystem
CREDA – Colorado River Energy Distributors Assn.
CRSP – Colorado River Storage Project
DAHG – Desired Future Conditions Ad Hoc Group
DASA - Data Acquisition, Storage and Analysis
CWCB – Colorado Water Conservation Board
DBMS – Data Base Management System
DOE – Department of Energy
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
FY – Fiscal Year (October 1 – September 30)
GCD – Glen Canyon Dam
GCT – Grand Canyon Trust
GCMRC – Grand Canyon Monitoring & Research Ctr.
GCNP – Grand Canyon National Park
GCNRA – Glen Canyon National Recreation Area
GCPA – Grand Canyon Protection Act
GLCA – Glen Canyon National Recreation Area
GRCA – Grand Canyon National Park
GCRG – Grand Canyon River Guides
GCWC – Grand Canyon Wildlands Council
HBC – Humpback Chub (endangered native fish)
HMF – Habitat Maintenance Flow
HPP – Historic Preservation Plan
INs – Information Needs

KA – Knowledge Assessment (workshop)
KAS – Kanab ambersnail (endangered native snail)
LCR – Little Colorado River
LRRMCP – Lower Colorado River Multi-Species Conservation Program
LTEP – Long Term Experimental Plan
MAF – Million Acre Feet
MA – Management Action
MATA – Multi-Attribute Trade-Off Analysis
MLFF – Modified Low Fluctuating Flow
MO – Management Objective
MRP – Monitoring and Research Plan
NAU – Northern Arizona University (Flagstaff, AZ)
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NPS – National Park Service
NRC – National Research Council
O&M – Operations & Maintenance (USBR funding)
PA – Programmatic Agreement
PEP – Protocol Evaluation Panel
POAHG – Public Outreach Ad Hoc Group
Powerplant Capacity = 31,000 cfs
R&D – Research and Development
RBT – Rainbow Trout
RFP – Request For Proposals
RINs – Research Information Needs
ROD Flows – Record of Decision Flows
RPA – Reasonable and Prudent Alternative
SA – Science Advisors
Secretary – Secretary of the Interior
SCORE – **S**tate of the **C**olorado **R**iver **E**cosystem
SHPO – State Historic Preservation Office(r)
SOW – Scope of Work
SPAHG – Strategic Plan Ad Hoc Group
SPG– Science Planning Group
SSQs – Strategic Science Questions
SWCA – Steven W. Carothers Associates
TCD – Temperature Control Device
TCP – Traditional Cultural Property
TES – Threatened and Endangered Species
TWG – Technical Work Group
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)

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

Updated: May 12, 2010