Glen Canyon Dam Technical Work Group Meeting
May 24, 2006

Conducting: Kurt Dongoske, Chairperson **Convened:** 1:05 p.m.

Committee Members Present:

Mary Barger, WAPA
Steven Begay, Navajo Nation
Kerry Christensen, Hualapai Tribe
Jonathan Damp, Pueblo of Zuni
William Davis, CREDA
LeAnn Skrzynski, So. Paiute Consortium
Lloyd Greiner, UAMPS
Norm Henderson, NPS
Amy Heuslein, BIA
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, GCRG
Bill Persons, AGFD
D. Randolph Seaholm, CWCB
Mark Steffen, Federation of Fly Fishers
Bill Werner, ADWR
Michael Yeatts, The Hopi Tribe

Committee Members Absent:

Christopher Harris, CR/CA
Don Ostler, UCRC
John Shields, WY State Engr. Office
Larry Stevens, Grand Canyon Wildlands Council

Alternates Present: **For**:

Interested Persons:

Matthew Andersen, USGS/GCMRC
Gary Burton, WAPA
Tom Czapla, USFWS
Tara Conrad, DOI-W&S
Amy Draut, USGS/GCMRC
Helen Fairley, USGS/GCMRC
Dave Garrett, Science Advisors
John Hamill, USGS/GCMRC
Joe Hazel, NAU
Leslie James, CREDA
Lisa Leap, NPS/GLCA
Paul Li, Bob Lynch's Office
Ted Melis, USGS/GCMRC
Anthony Miller, Colo. River Comm./NV
Dave Otis, USGS/Iowa State University
Clayton Palmer, WAPA
Dave Topping, USGS
John Weisheit, Living Rivers

Recorder: Linda Whetton, USBR

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Welcome and Administrative Items: The chairman welcomed the members, alternates, and interested persons. A quorum (16 members) was established and attendance sheets distributed.

Approval of the January 25-26, 2006. Without objection, the minutes were approved.

Review of Action Items

1. TWG Operating Procedures. Discussion of this item is indefinitely postponed until the AMWG Operating Procedures are revised in conjunction with the Roles Ad Hoc Group Report. Kurt will continue to try contacting Mike Gabaldon on the report and advise the TWG accordingly.

2. Humpback Chub Genetics Management Plan. Reclamation is finalizing a Scope of Work with the help of the Humpback Chub Comprehensive Plan TWG AHG and GCMRC. Glen Knowles reported that Connie Keeler Foster with the Dexter Fish Hatchery is slated to begin work. Glen thinks they are on schedule and a report should be ready in the next fiscal year.

3. SA's Review of the Knowledge Assessment Report. Dave Garrett said copies were provided to the SPG at the February meeting (this document was dated February, but not handed out to the SPG until April).

Agenda Change. Kurt said a tentative motion was listed on the long-term experimental plan proposal scheduled for 8:15 tomorrow but has now been changed to an information only item.

Dave Garrett said GCMRC and the SPG will complete their reviews of the MRP, SSP, and the FY07 Budget and Workplan and then the SPG will complete its final actions at a July 5-7 meeting. They are on schedule except for the fact that part of their assignment was also to develop an experimental plan. They have worked through six different options, four originally, and then re-worked those, and ended up with two options. They were continuing that process until some issues came up regarding the AMWG meeting scheduled for August resulting in that meeting being rescheduled to October. This leaves GCMRC's budget in limbo because they begin the fiscal year without knowing contractually how to run their program and what the budget will be. The Secretary, through Mark Limbaugh, has requested the SPG to look at several experimental plan options. Instead of working toward one option, the Secretary would like to have all the options fully vetted, analyzed, and forwarded so that each one can be evaluated by the Secretary's Office. The SPG has also been asked to provide information to a NEPA process which may require additional documentation to be completed by the July 5-7 meeting. If a meeting were scheduled two weeks after the July 5-7 meeting, the SPG could provide the TWG with the completed products by that time. Dave, John Hamill and Kurt Dongoske will be on a conference call with Rick Gold on June 28 to discuss some of the AMP priorities and will also ask about scheduling an AMWG conference call in August in order to discuss the FY07 hydrograph, budget, and workplan in order to forward a recommendation to the Secretary prior to the start of the next fiscal year.

Kurt said he would like the TWG to think about meeting dates in mid-July and what issues need to be addressed during the next month so they can keep the same dates for a June 23-24 meeting. If not, they could consider rescheduling the June meeting for some time in July.

OLD / NEW Business

Cultural Resources AHG (CRAHG) Report. As chair of the new CRAHG, Mary Barger said they met last month to evaluate the FY07-08 AMP budget and annual workplan. There was consensus on the USBR's line items. However, there was some disagreement about Helen Fairley's long-term monitoring plan and an alternative plan was proposed that modified Fairley's proposal by reducing how much monitoring would be done and how many sites would be monitored. They went through the list of projects she proposed, but didn't vote on them and also proposed some additional projects. The CRAHG will meet again next week to review the two proposals for the long-term monitoring plan to see whether some projects can be combined. The CRAHG will provide recommendations to GCMRC and will also forward a recommendation to the TWG when they do a full budget review in July.

Status of PA Signatory. Amy Heuslein asked for a PA Signatory update. Kurt said at the last meeting Mike Berry reported that the PA is moving ahead with developing a treatment plan for the sites in Grand Canyon. Once Jonathan Damp puts together a proposed treatment plan, then Reclamation will develop a Memorandum of Agreement (MOA) for compliance with Section 106 of the National Historic Preservation Act. Reclamation is working with GCMRC in preparing a Programmatic Agreement that addresses compliance with the GCPA with respect to cultural resources. Kurt said the existing PA would be terminated and a new MOA and a PA for the GCPA would be developed.

AGFD Plans for Stocking Trout in Lee's Ferry. Bill Persons provided a copy of the trip report (***Attachment 1***). The numbers are down, condition factors are up, and there are slightly bigger fish. The creel catch rate was very low in January and February, particularly two months of the year when typically they have pretty good angler catch rates. They were up slightly in March but so far this year they are still running less than one-half fish an hour in the anglers' creels. There have been discussions on stocking and to his knowledge a decision hasn't been made on where to go. He has gotten assurances from the managers that no fish will be stocked without a tag so the fish can be tracked. They are also looking at the possibility of stocking triploid fish, fish that can't reproduce.

Q*: Do you have a time frame on when a decision will be made? (Henderson)*
A*: We're facing some timelines on getting suitable fish to stock. I think we need to have a decision in early June. There are some fish available right now to us from Utah that are triploids that are about 4-6 inch fish and we're considering using those fish as a way to try and stimulate the fish. If we have to produce our own triploids, it would probably be a year out before we would have those fish ready. We hope to make a decision this summer. (Persons)*
Q*: Have you stocked triploids at Lee's Ferry before? (Steffen)*
A*: Not to my knowledge. (Persons)*
Q*: Are you comfortable with saying what you think has reduced the population because some of the anglers that fish up there think that the population has been reduced by almost 90% in the last two years. Can you put a figure on it? (Steffen)*
A*: I haven't tried to think of it in those terms. I could certainly take a look at the data and try to express it in those terms. I guess I'd say that our monitoring data density estimates or catch rates are the lowest they have ever been since we started monitoring in 1990. When you say down 90%, I guess I'm not sure what the starting point was. I think we're maybe at a quarter of what we were before but there's probably a 25% confidence interval. I don't think we've got more than about a quarter of what we had during the peak years of 2001-2002. (Persons)*
Q*: How does that jive with reports I've seen on the Internet that fishing is really great up in Lee's Ferry? (Johnson)*
A*: It doesn't agree with those reports. I guess I would say consider the source. If I were advertising trying to get clients to come fish with my shop, I wouldn't tell them it's the worse it's been in 15 years. They've had some good days but also a lot of bad days. However, there was one party that said they caught 70 fish in one day. (Persons)*
C*: The thing is that fishing did improve some in March and April due largely to some improvements in the aquatic food base. The Cladophora grew tremendously once spring came and there was more sunlight on the water and so the fish concentrated in certain areas where the Cladophora was growing the best. It was really odd to watch because the Cladophora started growing the best up close to the dam and then as the weeks went by, it progressed lying down towards Lee's Ferry and almost every day it improved so it may be now that the fish have spread out. The fact is that the fishing did improve in March and April if you could find the fish. You had to really go out and look hard to find them and then starting May 1, it got worse again and the fish are very hard to find right now. (Steffen)*
Q*: Two brown trout showed up in your samples, right? Has that been a regular occurrence and what do you do with brown trout? (Kubly)*
A*: The incidences of brown trout in our electrofishing catches have increased in the last few years. Right now we're pit tagging and releasing those fish, clipping an adipose fin, and releasing them so we can perhaps pick them up somewhere else to try and track movement. It's not our management policy right now to euthanize those fish. (Persons)*
Q*: What's the process AGFD will go through as they go to stock? Is there an authority you're going to follow, a management plan, something through the AMP? Are you going to start restocking? (McMullen)*
A*: I think my department would say we don't need the AMP's permission to stock those fish. We've always been open about what we're doing. We may decide to go before the Game and Fish Commission and update them. I think right now we're trying to figure out who is going to jump on them if a decision is made to stock fish and what the ramifications might be. We had an agreement with GCNRA and consulted with them and the Lake Powell group. The fishery managers on that recreational area didn't have a problem with it. We know there are issues with this group but we don't need the permission of this group to carry out our authorities. (Persons)*
Q*: Will there be any NEPA or ESA considerations? (Henderson)*
A*: My understanding is we have done Section 7 consultation on stocking that fishery already. (Persons)*

Shortage Criteria Update. Dennis Kubly said that in May 2005 the Secretary of the Interior sent letters to the governors of the basin states that they're going to engage in a NEPA process to develop lower basin shortage guidelines and coordinated operational plans for the two reservoirs (Powell and Mead). They've had scoping meetings. There are now cooperating agencies; WAPA, FWS, BIA, NPS, and the U.S. section of the International Boundary and Water Commission are involved. They anticipate there will be a draft EIS

published by December 2006, the final in September 2007, and a Record of Decision by December 2007. Amy Heuslein added that tribal consultation meetings will be held next week in Phoenix.

Final Results of Aeolian Sediment-Transport Study and Implications for Future Weather Monitoring in the Colorado River Ecosystem. Amy Draut said she began working on this project as a post-doctoral student in the fall of 2003 and is in the process of completing the final report. She gave a PPT Presentation (***Attachment 2***) and offered the following recommendations for future work:

- Long-term weather station network, with stations distributed along river corridor (minimum 6 stations, in representative areas of the canyon, located in little-visited areas and camouflaged). Broaden data collection by adding air temperature, relative humidity, barometric pressure sensors.
- Detailed numerical modeling of wind dynamics and aeolian sediment transport at selected (archaeologically relevant) sites. Build on modeling work done by this study to evaluate the effects of sediment-supply limitation on sand transport: important implications for management.
- Design new, automated, sand traps that record high resolution data (ideas in progress by Rubin, Chezar, and Draut at USGS, Santa Cruz).

***Q**: When you refer to dam operations, are you referring to releases above powerplant operations? (Greiner)*
***A**: When I refer to dam operations, I'm including both experimental flows and any flows that could change the area of open, dry, or vegetative sandbars. For instance, the post-flood flows in early 2005 were not above powerplant capacity but they definitely affected the area opened by sand sources. (Draut)*
***Q**: When you mentioned things like the 200,000 cfs flows, that's really a presence in the dam issue rather than dam operations since we can't run 200,000 flows. The second thing is up at Palisades. There is a dry basin back behind where the site is and it fills in so even if you have low rainfall when that thing fills up, it doesn't blow out so it does contribute to some changes. There are other things to look at in some of those areas. (Barger)*
***A**: When I say you would need 200,000 cfs to inundate that area, that's a stage you need to cover those deposits. Also, even if you did run a 200,000 cfs flow somehow, if you didn't run a sediment enriched flow, it wouldn't deposit sediment there. It would probably strip it out. In the two playa areas of Palisades, one of them is self-contained, self-drained but the other one as of April 2004 is actually extended back into the main playa area. (Draut)*
***Q**: Are there situations where you get the kind of deposits you would need to protect these archaeological sites? You need not only more sand to work with as deposited through BHBFs, for example, but also would you have to do some vegetation management? I can imagine there are places where you've got such incredible tamarisk colonization that it would trap all the sand very close to the river rather than letting it be blown up. (Johnson)*
***A**: I think that would be very interesting to do. Vegetation has the effect of slowing down the wind speed to the point where even if the wind is strong enough to constrain sand at higher elevations, if you're in a tamarisk field, you're not going to have strong enough wind speeds to kick up the sand and transport it. One of the interesting things about the 2004 flood deposit was that it not only deposited sandbars in areas that had not had sand on them before, it also covered up areas that were vegetation, rocks, and driftwood. By covering up vegetation, floods in 2004 had the additional benefit of reducing a surface roughness so that you can entrain sand and transport it better. (Draut)*
***Q**: What's the contribution of sand coming off the top of the rim? (Johnson)*
***A**: We really don't know. At the sites where we were working, we were only able to measure what was entrained and transported locally. (Draut)*
***Q**: Based on this, can you look through some kind of GIS process and see how significant this is throughout the canyon? You have six study sites and you probably have a few more that you would like to look at. Is there any way to determine the magnitude of impact throughout the canyon? (Seaholm)*
***A**: Because wind direction can be so variable spatially, I'm hesitant to extrapolate our data beyond a couple of miles upstream or downstream, even between Palisades and Comanche which are about 3-4 miles apart. There is a different enough wind direction that the sand sources look quite different. I think it's really important to look on a fairly local level if you want to be confident about assigning dam operation effects. (Draut)*
***Q**: How much more extensive of a network do you need to make that understanding? (Seaholm)*
***A**: It becomes a balance between getting enough data to have representative reaches in the canyon and having so much that the main ones and personnel to process the data becomes out of hand. I suggested six stations because I think that provides a pretty good balance between what an employee can manage half-time, the cost of the equipment, and also having representative data points from different parts of the canyon. The six I suggested would hopefully capture variation of the scale we saw during the wet winter of 2005. We could tell the western canyon was much wetter than the eastern canyon. As far as targeting specific areas for more intensive study, we picked our sites based on discussion with the Park Service archaeology staff who target specific sites based on the concerns they had about the archaeological sites themselves so my suggestion of having approximately six reaches for further experimentation*

would probably want to be modified based on discussions with archaeologists about what's most relevant to the sites they're concerned about. (Draut)
***Q**: You think that models are applicable as initial sampling? Would you be able to get to the point where you could assist management with the models? (Garrett)*
***A**: A lot of the modeling involved just testing how good aeolian models are. I took a set identical to the ones we used in Grand Canyon to an area of unlimited sand supply in Death Valley. I wanted to see how well those models performed in unlimited supply situations so I took the weather station and waited until the wind came up and measured the sand transport at wind speeds at a very high resolution in 10 seconds. The results were that some of the models performed better than others. None of the models that are currently published and used predicted sand transport in unlimited sediment supply study. We didn't take the modeling too far with the setups we had because we didn't like the results when there shouldn't have been any sediment supply. I don't think the models performed all that well. This is not a problem unique to us. (Draut)*

Sediment Conservation Results. Ted Melis said the aeolian study started as an element of the so-called integrated fine sediment R&D project that started in 2001 competitively as the FIST project. It was interdisciplinary in that each one of the programs contributed funds for five years of R&D on monitoring issues related to sand. Amy teamed up with Dave Rubin as one element of that project and conducted the studies as part of the FIST. There will be a review panel meeting on this project and three others on August 15-17 in Flagstaff at the USGS and the FIST and all of its various aspects will be evaluated by a panel of 8-10 external peer reviewers. He said the next three presentations relate to papers sent out by GCMRC to the TWG in the past six weeks.

Relative Importance of Eddy versus Channel Sand Storage in Marble Canyon, 1996-2000. Joe Hazel distributed copies of the "Influence of a dam on fine sediment storage in a canyon river" published report (***Attachment 3a***) and then gave a PPT presentation (***Attachment 3b***). He offered the following conclusions:

- Two independent sediment budgeting techniques indicate that ~90% pf the sediment exported from Marble Canyon was derived from eddy storage.
- Given uncertainties in the methods, considerably more than half of the sand in Marble Canyon is stored in eddies under post dam conditions.
- The grain size distribution of the sand stored in eddies is far more similar to the distribution of the sand supplied by the Paria River.

***Q**: When you looked at the grain size in the sub-aerial vs. the main channel, did you account for armoring processes in the channel and the fact that your aerial stuff might be reworked finer particles? (O'Brien)*
***A**: They were sampled in the center of the main eddy and on the bar itself and then the main channel was sampled where we could actually dredge sand. (Hazel)*
***Q**: So it wasn't just a total surface, you did get down in? (O'Brien)*
***A**: Yes, but that .40 milimeters d50 for sand for a channel is where there is actual sand (h)?atches (Hazel)*
***Q**: You talk about high elevation sandbars which I assume ? . (Fairley)*
***A**: I didn't really define it but in this study it was above 8,000 cfs. (Hazel)*
***Q**: Does your modeling of transport account for the inputs that are coming from the higher elevation old flood terraces that are part of the system because I don't think they were actually topographically measured or included in your model. I'm curious because we just had a presentation by Amy which is talking about sites that are up much higher than most of what you're looking at there and yet we know there has to be a significant contribution coming off these higher elevation areas that are contributing to what's going downstream but that's not actually being counted for, right? (Fairley)*
***A**: If you lump the terraces, and terraces aren't found everywhere in the canyon, they're more predominant and a bigger player as a source for sand in Glen Canyon. They've mostly been stripped from up in Marble Canyon and then become more of an alluvial feature in the wider parts of the canyon around Palisades and eastern Grand Canyon. We did measure channel margin deposition or erosion in 2000. Our estimates for 1996 were based on trenching. They're not players of sorts downstream from Lee's Ferry. They're more of a sink. If the flows get up there, they will put sand up there. (Hazel)*

"Comparison of Sediment-transport and Bar-response Results from the 1996 and 2004 Controlled-flood Experiments on the Colorado River in Grand Canyon" report (***Attachment 3c***). Dave Topping distributed

copies of his report and PPT presentation (***Attachment 3d***). Ted said that in April 1999 five papers were distributed and the TWG established a sediment ad hoc group with Matt Kaplinski as the chair. The idea being that a smaller group could review the material and bring recommendations back to the TWG on what to do with the information. He wasn't sure if the TWG wanted to resurrect that ad hoc group again but encouraged them to think about it during Dave's presentations. Dave offered the following conclusions:

- Because subsequent dam releases do not result in full recovery of lower-elevation parts of bars scoured during such floods, controlled floods conducted under sand-depleted conditions (1996) cannot be used to sustain sandbar area and volume.
- Substantial increases in total eddy-sandbar area and volume are only possible during controlled floods conducted under the sand-enriched conditions (2004) that follow large tributary floods.
- In future controlled floods, more sand than was available during the 2004 controlled-flood experiment is required to achieve increases in total eddy-sandbar area and volume throughout all of Marble and Grand Canyons.
- Tributary inputs larger than 1 million metric tons are relatively rare, therefore "more sand" can be achieved directly by augmentation from sand trapped in the reservoir impounded by Glen Canyon Dam, or perhaps indirectly by following each large tributary input of sand with short-duration controlled floods.

"Regulation of sand transport in the Colorado River by changes in the surface grain size of eddy sandbars over multi-year timescales" (***Attachment 3e***). Dave distributed copies of his report and then gave a PPT presentation (***Attachment 3f***). He offered the following conclusions:

- *β*-analyses of suspended-sediment data can be used in conjunction with analyses of surface grain-size data to deduce which environments in a complicated setting are the most important environments for regulating sediment transport, regardless of whether these environments comprise a relatively large or small part of the total environment.
- In the case of the sand-supply-limited Colorado River in Marble and upper Grand Canyons, the best environment that is the dominant regulator of sand transport in the river over multi-year timescales, the eddy environment, comprises only a small percentage (~20%) of the total area of the river [Note eddies also dominate storage environment in post-dam river (Hazel *et al*., 2006)]
- 30-40% fining in eddy sandbar surfaces between 1986 and early 1990s corresponds to a factor of two increase in the concentration of suspended sand over these sandbars
- Increase in flux over the eddy-sandbar surfaces as the bar surfaces fined can lead to greater deposition and erosion rates in the eddies depending on the details of the flow fields in the eddies.

Q*: How much do you think you know about how you would actually propose to manage the sediment that comes in if you didn't elect to have an earlier trigger like you did in November? Say that you were trying to manage it for 2-3 months, can you tell the managers when the right time is for a BHBF under those conditions? (Kubly)*
A: *Our predictive modeling capabilities are still incomplete. We have an extensive network and can tell you within three days what's happening down there but we don't really have the ability to forecast what would happen with a million metric tons coming up from the Paria. If you ran flows that peaked at 15,000 or 16,000 cfs for a few months, we don't really have a way of telling what would happen if you did that for a few months. We know that 10,000 cfs, as a peak discharge, is probably too conservative if you're interested in having the sand a little more distributed prior to having a BHBF. My only suggestion is during periods of BHBF testing, the best approach would be to step upward slightly higher fluctuating dam releases, if that's what you want to do, rather than jump from the 10,000 cfs to a 20,000 cfs for example. Trying something in the lower teens would probably be a good peak and flow to see if you have sediment more distributed and not exported. If you did that, we have the capability of telling you where it turns out. We did the fluctuating flows and the sand is gone. We can do that because of the monitoring system we've developed. We do not have the modeling capabilities as yet to say with high confidence that if you were do this two months from now, this is where the sediment would be.(Topping)*
C*: There was a fourth paper that was distributed in the packet (***Attachment 3g***) that we're not presenting on today which had to do with an explanation of high resolution monitoring techniques that Dave has referred to and I just want to point out that maybe we can set a future TWG meeting to have Dave present on that. There have been some innovations here which I think give this program monitoring capabilities for looking at the suspended flux in this river*

that are unparalleled anywhere in the world and they were put in there not just because we could do it and it turned out to work but the idea was to provide the TWG with almost real-time monitoring data that you could use potentially as managers to figure out how to address that question. Ten years ago what we're doing today was literally a pipe dream and now you have that capability and the question is: How do you want to utilize or continue it as a management strategy? Is there a plan to continue with the Sediment Ad Hoc Group? (Melis)
***Q**: It seemed to me like through this presentation we have enough information now to adjust our sediment triggers. Is that something we should work towards and elevate to the AMWG? (Seaholm)*
***A**: That's being proposed in both of the proposals that are being forwarded. (Johnson)*

Ted said they drafted a motion (see below) because there was an historical precedent for this type of activity after a whole body of highly technical information was distributed to the TWG with the full realization not everyone has the background, expertise, or time to really study the papers and try to come up with what this means for management. In addition to the papers that were distributed to the TWG, Ted said there would be a lot more information discussed at the 3-day meeting in August.

Kurt read the proposed motion:

Proposed TWG Action: (1) Review/revise membership of the Sediment Ad Hoc Group and (2) have the Sediment AHG perform further analysis and provide recommendations to the TWG at their next meeting (June 14-15, 2006).

The Sediment Ad Hoc Group was reorganized with the following members: Mary Barger, Rick Johnson, Glen Knowles, Ted Melis, John O'Brien (Chair), and Mike Yeatts.

Management Actions and Treatments for the Long Term Experimental Plan. Kurt said there was a request from DOI to send all six experimental options up to them with more information about the positive and negative effects of each option. The agenda stated there might be possible action but now the long-term experimental plan proposal will be an information-sharing presentation. He introduced Dennis Kubly who will present information on the management actions and treatments for the long-term experimental plan.

Dennis distributed copies of his PPT presentation (***Attachment 4a***). He began with a brief history on how the TWG came to a decision to develop a hybrid design for the long-term experimental plan. He passed out copies of the SPG Survey of Management Actions and Treatments Survey Form (***Attachment 4b***) and said they would like to send it out to the workshop participants as a way of synthesizing the information to see what their response is in assigning management action or treatment to the different actions that were considered. They would then collate the information and bring those results back to the AMWG. He said there is no right or wrong answer but reflects the amount of risk that an individual is willing to face given a certain amount of information.

***Q**: The only thing that struck me was that you had 4, 8, and 12 years so how comfortable would that be to implement that over that time period. I wonder if given the uncertainty expressed by a lot of people whether 12 years is too long and maybe even 4 years might be too long and whether there might be something more relevant like 2, 4, 6 years or something much shorter to actually get some spread in terms of people's tolerance? (Johnson)*
***A**: Yes. Four years was chosen because it's the age of recruitment for HBC. It's the indicator that we probably know more than any other and it was used because if you're going to turn on and off treatments, classically that's the spread that's been used. It's a good point and it's subjective as to what period of time. We just want to get an idea of whether as you increase the amount of time, your risk tolerance changes? (Kubly)*
***C**: My guess is that for most people even 4 years might be too long and going beyond, you might not see any change. (Johnson)*
***A**: Yes, but then they would put it over in the treatment categories. (Kubly)*
***C**: I know you'll be surprised that I might have some issues with your survey. At the SPG there were some differences of opinion on what's the definition of a management action or a treatment. There were some questions on the survey and also now we're taking a look at what these non-flow actions are for six alternatives, really seven with the no action alternative. Those have not been pinned down so when you have up there something called the BHBF, there are*

different ways to run a BHBF. As we know, if you run a BHBF with a sediment-depleted condition, that might be a really bad idea. Even so, under the knowledge assessment that only came out as yellow. There are a lot of issues right now with doing the survey because we don't know what the specific actions are for each of the options so if you were going to vote on each of them, someone might feel more comfortable with something that's Option 1 rather than Option 4, or vice versa. I'm not sure how valuable a survey is at this time. (Barger)
***A**: I want to clarify this is not in any way an evaluation of the options. This is not an evaluation of sensitivity to risk by individuals given the same information. I think the resistance that we hear of this survey is because people think that you're somehow taking sides by assigning a management action or treatment to any of these actions. There is no right or wrong answer here. Ultimately all the AMWG will see is the distribution of responses by a group of individuals some of who are scientists and managers. And if they were willing to identify themselves and place themselves in that category, it might be interesting to see whether what Dave Garrett has told us over and over again that scientists are much more conservative than managers in taking risk is actually borne out by this survey. (Kubly)*
***C**: But even though Mary has a good point using BHBFs under enriched sediment vs. other sediment, you're going to get very different responses if people don't have that information. I don't know how you deal with that but maybe deal with that under BHBF under ideal conditions or something like that so you take away some of that range of possibilities so that you really get into people's sense of risk and not minimize it because it looks like under these conditions it looks like a really bad idea. We can always find reasons not to do anything. (Johnson)*
***C**: You're not commenting on whether it's a bad idea, you're just saying "do we know enough about this action to put it into place for this period of time without changing it." It's making a commitment before the fact of how you're going to treat this particular action. (Kubly)*
***Q**: With the BHBF under enriched sediment conditions, I would do it in a heartbeat. Under unenriched sediment conditions, it would be very risky to do. So given my assumptions, I'm going to score those differently. (Johnson)*
***C**: That may well be but there are other aspects of BHBFs. You say I'm going to do it. What does it mean to do it? What time of the year and with what triggers? Do you know how to manage the sediment as you move it downstream? And maybe that's what the text accompanying the survey needs to make clear. (Kubly)*
***C**: Because what I hear Rick saying is for him it would be a management action because he knows enough when to do it or not do it. It's not an experiment. People need to not see this as whether I want to do this or not but do we know enough about it to know whether it is a good idea or not. (O'Brien)*
***C**: Let's say for a moment that you didn't know a thing about this system and I gave you a 10-page book to read and then asked you to take a survey, you might not feel very comfortable but all the survey is trying to assess is what your collective responses are, how you vary on that continuum. You're not just randomly chosen off the street. You have a fair amount of involvement in this program so I think there is more meaning in your responses because of that. (Kubly)*
***C**: I could say that if we returned to pre-ROD flows of 3,000-33,000 cfs, I would call that a management action because I'd feel like I have a pretty good idea what the results are going to be and I think there are going to be some economic benefits and probably some negative sediment benefits but I feel like that's a management action. I don't really feel like a big experiment to see what's going to happen if we fluctuate from 3,000 to 33,000 cfs. (O'Brien)*
***C**: That's not one of the proposed actions but I understand the logic of why you would put it in that category. Part of this is to look at this hybrid design and see whether or not there is some validity in it at least in the sense that people look at a suite of actions and respond to them in these two categories. If there was so much disagreement across the spectrum of individuals that you survey, then how can you come to a conclusion that you have a legitimate hybrid design and that people see those two sets as being segregated. I would say no it's failed. (Kubly)*

Long-term Experimental Plan Proposal. John Hamill complimented the SPG on their commitment to producing a product for all the plans. He said there has been a change in direction on the experimental options based on the Secretary's Designee desire to look at all the options that have been considered. There is some confusion as to what the ultimate goal is, whether he wants an actual recommendation from the SPG on one option or if he wants to see them all fleshed out. They are trying to reach clarity on that but John still feels it is worthwhile to go through and inform the TWG where the SPG has ended up on the issue. He said this agenda item was slated for action tomorrow but the plan now is for a presentation to be made today, allow the members to think about the issues this evening, and then come back in the morning for further discussion. He passed out copies of the "Description and Summary Evaluation of Two Proposed Experimental Options for the Colorado River Ecosystem during Water Years 2007-2011" paper (***Attachment 5a***). He said the program managers would present information on their individual programs and then proceeded with a PPT presentation (***Attachment 5b***).

***C**: Regarding the 2007 issue now because the proposal was suppose to be 2007-2011 but that's not going to happen now. It will be 2008-2012 or whatever. A decision will need to be made on the 2007 hydrology because this isn't going*

to kick in. I understand the AMWG is going to have a conference call vote on that before the end of the fiscal year. It was discussed earlier at the SPG whether the TWG should try to have a meeting or a discussion about recommendations for the 2007 hydrology. There are several fallback positions and other recommendations so that is up in the air. If AMWG wants TWG input, we need to have that to them before they make a recommendation to the Secretary. (Barger)

John said they are trying to set up a call with Mark Limbaugh to get further guidance on where he would like to take this process. Preliminary indications are that the Secretary wants to see an assessment of all of the alternatives being considered. There is some uncertainty in terms of what kind of recommendations he is looking for from the group at this point.

Mary asked if the meeting dates for the TWG need to be changed since it is currently scheduled for June 22-23. She wondered if they still wanted to keep one of the days in June to discuss the 2007 hydrology.

Kurt asked if there were any additional comments on the experimental options. He said the evaluation of the effects of both options on archeological sites is preliminary at best. It appears to him the work done by Amy Draut is very preliminary information about the effects of modeling and deposition of sand as a form of site preservation. He said he doesn't know if anyone can evaluate those options in terms of their benefits or their negative effects to archeological sites based solely on this one study.

Bill Persons said that one of the questions his AMWG member will have if he is faced with choosing between the various options is the cost. He asked if there will be economic analysis other than one option costs 3-6 times more than the other because if there isn't a baseline cost, he wouldn't know if it $3 more or $3K, or $3M. John asked Clayton if WAPA would be doing any cost predictions. Clayton said they shared some information with the SPG that there was some concern about the methods and models they used and wanted to make sure that they were viewed credibly by the SPG, the TWG, and by customers that are experts in the power market. They had a conference call a few days ago with some of the operators of utility systems that are owned by customers to have a workshop where they would hand to them the model and go over assumptions and process. Following that workshop, Clayton said they would prepare a report of their findings and provide that to the SPG and the TWG. They will then evaluate whatever option needs to be evaluated in the future using the agreed upon process. They have no objection to have their evaluations be reviewed independently. They expect there may be a NEPA requirement on any long-term plan recommended by the AMWG and so they would offer their analysis be made available for NEPA documentation.

Leslie James said WAPA has not modeled Options A or B. The preliminary assessment was on other options. Once the assumptions and models are understood then WAPA will have to model all the options on a like basis (apples-to-apples).

Amy Heuslein asked how mechanical removal listed under Option A would be accomplished. John said they didn't get into those details but a general concern was that whenever a large scale control program results in killing animals/fish, there can be a strong public reaction. The AMP needs to be sensitive and make sure people understand what is being done and conduct a proactive outreach effort to understand what is being done. Amy requested that any public outreach activities associated with the GCD AMP be vetted through the POAHG

Public Comments: None

Adjourned: 4:30 p.m.

Glen Canyon Dam Technical Work Group Meeting
May 25, 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
Lloyd Greiner, UAMPS
Norm Henderson, NPS/GCNRA
Rick Johnson, Grand Canyon Trust
Robert King, UDWR
Glen Knowles, USFWS
Dennis Kubly, USBR
Phillip S. Lehr, Colo. River Comm./NV
Ken McMullen, NPS/GCNP
John O'Brien, GCRG
Bill Persons, AGFD
D. Randolph Seaholm, CWCB
Mark Steffen, Federation of Fly Fishers
Bill Werner, ADWR
Michael Yeatts, The Hopi Tribe

Committee Members Absent:

Christopher Harris, CR/CA
Amy Heuslein, BIA
Don Ostler, UCRC
John Shields, WY State Engr. Office
Larry Stevens, Grand Canyon Wildlands Council

Alternates Present:	**For**:
Garry Cantley	Amy Heuslein, BIA

Interested Persons:

Matthew Andersen, USGS/GCMRC
Diane Austin. So. Paiute Consortium
Gary Burton, WAPA
Tara Conrad, DOI-W&S
Tom Czapla, USFWS
Amy Draut, USGS/GCMRC
Helen Fairley, USGS/GCMRC
Lisa Gelczis, GCWC
Mark Gruder, USFWS
Don Gwinn, USGS
John Hamill, USGS/GCMRC
Joe Hazel, NAU
Leslie James, CREDA
Lisa Leap, NPS/GRCA
Paul Li, Bob Lynch's Office
Ted Melis, USGS/GCMRC
Anthony Miller, Colo. River Comm./NV
Dave Otis, Iowa State University
Clayton Palmer, WAPA
LeAnn Skrzynski, So. Paiute Consortium
Dave Topping, USGS
John Weisheit, Living Rivers

Recorder: Linda Whetton, USBR

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Welcome and Administrative Items: The chairman welcomed the members, alternates, and interested persons. A quorum (16 members) was established and attendance sheets distributed.

Meeting Schedule. In addition to Mary Barger's concern to discuss the FY07 hydrograph and GCMRC making some scientific presentations, Kurt asked if there were other issues requiring a June 22-23 TWG meeting. Ted said the presentations would focus on the experimental fluctuating and stable flows conducted last September-October. Their proposal was to use the TWG meeting in June as the venue for those

presentations. If the TWG meeting is delayed or changed, he needs to know what the new dates are so he can see if the scientists are still available. Dennis asked Ted if he could check their availability for a meeting in July. Ted said that as an alternative, he and Matt could fill in for them and go through slides they had prepared. It was their hope that the modelers could come and report on the status of the temperature modeling. Ted said the draft report was going to be ready by June 30 and GCMRC would provide preliminary results, however, it won't be peer reviewed by that date.

Randy Seaholm would like to see a time scheduled to discuss how the research results are put into long-term management actions; for example, the current situation with the rainbow trout and mechanical removal. It is something that works under any particular condition but is there a process for putting that into a long-term management action rather than just making it part of a continuing set of experiments and things to research.

Mary ? (Barger?) said that any discussions on the plans wouldn't be ready for June. John said the SSP will be discussed later today and the MRP will be discussed by the SPG in early July with the idea that they would take action on it then or prior to their meeting.

Kurt said it's looking like the TWG should keep the June 22-23 meeting dates and that there are enough topics to cover a day and a half meeting. Looking ahead to July he said the SPG will be meeting July 5-7. Dave Garrett has asked for at least two weeks to turn around the comments from the SPG on the MRP and comments on the FY07 work plan to distribute to the TWG. That schedule would bring the TWG to the last week in July or the first week in August to hold a TWG meeting. Dennis reminded the TWG that there was a conference call being scheduled with John Hamill, Dave Garrett, and Mark Limbaugh and the outcome from that call would determine if there was going to be an AMWG conference call which requires information be sent to them 30 days in advance. It was decided the TWG would meet on August 2-3, 2006.

Experimental Options. John Hamill presented the experimental options which were developed cooperatively by GCMRC and the SPG:

1. Continue evaluating MLFF in spring/summer/ fall, with winter ramping experiments and Beach Habitat Building Flows (BHBF) in winter/spring.
2. Continue evaluating MLFF in spring and summer, w/ winter ramping experiments and BHBF in winter/spring and stable flows in September and October.
3. Increased fluctuating flows in summer and winter, BHBF in fall, and implementation of a wide-ranging suite of management actions.
4. Seasonally adjusted steady flows throughout the year, possible spring BHBF and implementation of a limited suite of management actions.
5. Seasonally adjusted steady flows implemented incrementally over a period of 6 years, possible spring BHBF, and implementation of a limited suite of management actions.
6. No action alternative – a continuation of the MLFF and other non-flow actions.

Option A

Enhanced Fluctuating Flows (10 months), in combination with ecologically stable flows (2 months), w/ Enriched BHBF (winter/spring)

Option B

Stable Flow Testing, initially in summer/fall (4 mos.), eventually moving toward Seasonally Adjusted Steady Flows in all months, w/ Enriched BHBF (winter/spring).

Comments:

C: When you talk about increased fluctuations, people get the perception that we're going to start going up to 32,000 cfs but what is really happening is that the peak release for the day really isn't moving upward. The minimums are moving downward. That is where you get the increase of the daily deviation. That is where the increased fluctuation comes from. It isn't going upwards above the release that was in the ROD for those months. In other words if there was a 17,000 cfs flow for ROD under this proposal, the 10,000 would take it down to 7,000 cfs. It's not 8 + 10 or 10 + 10. It's not going way beyond what the ROD would've gone. A graph would show that and not give people the perception that this is wildly increased fluctuations. (Greiner)
***C:** Increased fluctuations imply that the larger increase occurs in the summer when actually the larger increase occurs in the winter. (Steffen)*
***Q:** We can't do compliance on "possibly" November so at what point will the proposers clarify that? (Kubly)*
***A:** That was captured in an SPG meeting with the GCMRC to come back with a proposal for how steady flows would be tested and the option of extending steady flows into November was left on the table and so we haven't given a lot more thought as to whether that is worth doing. I agree it needs to be nailed down. (Hamill)*
***C:** There needs to be more work by the SPG to flesh out some of these options and then come back with more specific details on all the alternatives. (Henderson)*
***C:** I think at this stage it makes the most sense to ask the TWG if all the potential options have been captured in the six options and then take the additional input and bring back to the TWG. (Knowles)*
***C:** Let me add one more piece to Option A and that is that WAPA is working with FWS and NPS on some mini experiments related to foodbase so we are putting together a science plan for foodbase as well as juvenile humpback chub and washing out the mainstem of the LCR. They are in draft right now. (Barger)*
***Q:** I've heard discussion from AGFD that they may go into some stocking and yet we have some stranding options proposed. It seems to me that is one thing that needs to be fleshed out and coordinated. With respect to some of these experimental flows, I don't how to even wind end? overlapping with the shortage and coordinated operation between Powell and Mead because we are now providing the option of going less than 8.23 maf perhaps to some extended period. I don't know if that has been factored into the evaluation. (Seaholm)*
***A:** My understanding is that we would use those stranding flows when we thought it was necessary or would be beneficial to that fishery. We went through a period in the late 1990s where we had unrestrained recruitment. We had no control over that. Mother Nature has taken care of that to some extent so our population is low right now. So at least right now limiting recruitment doesn't seem like a good idea we'd have to have some kinds of triggers built in or some kind of a prescription for when we thought it was advisable to limit recruitment and when we thought we could let recruitment go. I don't think we'll know what that prescription is until we've run some different flows and we'll see how the fishery recovers over time. (Persons)*

Kurt reminded the TWG that the purpose of the discussion was to get a response whether they understood all the options or whether they needed more clarification. In listening to the discussion, he said it appears the TWG wants a daily hydrograph on each of the options to see if GCMRC is on the right track and if the management actions are appropriate.

John said he would welcome any input from the TWG and that this is a work in progress with the SPG. He said he would be really surprised if there was anything new brought up that hadn't already been considered. The economic analysis will be provided at a later date when the options have been vetted with the SPG.

Synopsis of Findings. Matt Andersen said he was asked to give a status report on native fish based on recent publications. He said the data was very preliminary and not a lot of analysis has been done. He passed out the following documents and then gave a PPT presentation.

Attachment 6a - Grand Canyon Native Fishes Update PPT
Attachment 6b - Court order: Grand Canyon Trust vs. Gale Norton (DOI)
Attachment 6c - Effect of Baiting on Hoop Net Catch Rates of Endangered Humpback Chub
Attachment 6d - Effect of Repeated Hoopnetting and Handling on Bonytail Chub
Attachment 6e - Distribution and Movement of Humpback Chub in the Colorado River, Grand Canyon, Based on Recaptures
Attachment 6f - Abundance Trends and Status of the Little Colorado River Population of Humpback Chub
Attachment 6g - Ontogenesis of Endangered Humpback Chub (Gila cypha) in the Little Colorado River, Arizona
Attachment 6h - Age-Structured Mark-Recapture Analysis: A Virtual-Population-Analysis-Based Model for

Analyzing Age-Structured Capture-Recapture Data

***Q**: Did they say the upper basin methods, the close population methods, were appropriate for Grand Canyon? (Johnson)*
***A**: No. The methods being used in the upper basin are appropriate for the upper basin and the methods being used in the lower basin are appropriate for what's being done there. (Andersen)*

Recovery Goals

Matt reported that Earthjustice, on behalf of Grand Canyon Trust, filed a lawsuit against Gale Norton and the USFWS on March 31, 2004. There are two claims the judge brought together through various portions of the plaintiff's suit:

First Claim:

Recovery goals violate ESA
Don't provide for HBC Recovery
No Objective, measurable criteria for recovery
No estimates of time and cost
No population goal

Second Claim:

Recovery Goals violate APA because
- FWS ignored relevant facts
- Did not employ best available science
- Failed to support conclusions

The following ruling occurred on January 18, 2006:

- First claim proceeds
- Second claim dismissed
- Granted: Summary judgment for plaintiffs
    - Defendants violated non-discretionary duties to provide time and cost estimates
- Denied: remainder of plaintiffs' motion for summary judgment
- Defendants ordered to withdraw 2002 Recovery Goals

There are no recovery goals at this time. Matt said the USFWS had intended that in 2007, five years after the original publication of the goals, a review would be initiated. The judge is quite adamant that the review proceed and from what Matt understands, the USFS anticipates doing that review. Tom Czapla (attending today's meeting) concurred with Matt.

***Q**: You talked about reduced growth rate from the handling. What about mortality? (McMullen)*
***A**: I think their study was short enough that they didn't see a whole lot of mortality. It was just that they saw reduced growth rates. I guess in the wild you would anticipate those fish that were not as strong would not fare as well over time. (Andersen)*
***A**: When I read the paper, there was a subset of fish in there that was never recaptured and overall mortality between the subset that was never recaptured and the ones that were, were not significantly different. (O'Brien)*
***Q**: Would you agree there should be some considerations on the number of fish that enter a net deciding whether or not to bait those nets? (Kubly)*
***A**: Sure. As I said at first, these are partial answers. (Andersen)*
***Q**: That information on the micro habitat use, was that just in the LCR? (Czapla)*
***A**: Yes. (Andersen)*
***Q**: When they review the recovery goals, will this requirement that pointed to the one method we used for estimating population be reviewed? (Henderson)*
***A**: This is the subject of our tentative motion today. This is after Dave Otis' is finished. My proposal to the TWG is to consider putting forward a motion that both open and closed models be considered. (Andersen)*
***Q**: Tom, is that open for a review with the revision of the recovery goals? Population estimates that we could possibly use – the one down in Grand Canyon for Grand Canyon, AMSR, and the other methods in the upper basin? (Henderson)*
***A**: I think we've considered that all along. We just wanted to start with mark-recapture in order to start the clock. The Service can make the decision as to when that clock started. It states right in the recovery goals that we will work with*

population biologists, ecologists, etc., in order to recommend to the Service what estimates should be used. Before we had our first population estimate workshop between upper basin and invited the Grand Canyon folks up there and Lew was up there to present that information, Ken Burnham was there. They were just starting their population estimates on humpback chub at that time. Ken said that as the data is developed over time, they're going to want to move into an old fashioned mode so we've always considered that. We just don't have the length of information, time, and data points as you folks have down here. We're certainly not objecting to using older testing methods at all. (Czapla)
***Q**: There is a policy group now that's working on recovery goals, right? (Barger)*
***A**: The process, through the recovery goals, is we try to be all inclusive in fact with the stakeholders. Although the judge did vacate the goals, he basically said the only problem was the time and cost estimates apparently to meet ESA requirements although he didn't want to place that burden on programs that were already in existence to recover these species. So we felt that maybe using the processes of adaptive management and the various five programs that were identified covering the species, we would rather let go to particular groups to make that decision on how their money should be spent and how long it would take to achieve management actions. (Czapla)*
***Q**: How does this fit into the group set up by Mark Limbaugh to look at HBC recovery goals? (Barger)*
***A**: The strongest guidance that I read for this program is that we're to be avoiding jeopardy for those listed species. There is not a mandate that I can find that this program recover this species and that's the largest impetus for the Asst. Secretary starting to pursue a recovery program. (Andersen)*
***C**: The AMWG asked that an ad group be formed within the AMWG to go up and look at whether or not a recovery program in the lower basin was necessary. Sam is in charge of that ad hoc group and has convened two conference calls. They're pretty well along the way of developing a recommendation and will be bringing that back to the AMWG. (Knowles)*

HBC Concurrent Estimates. As mentioned in his presentation, Matt said there was direction given to GCMRC to continue looking at different modeling approaches with their strengths and weaknesses. He introduced Dr. Dave Otis who is with the USGS unit at Iowa State University and had been involved with the Kitchell panel in 2003. Dr. Otis presented a PPT presentation entitled, "Evaluation of the Statistical Properties of Mark-recapture Estimators of Grand Canyon Humpback Chub Abundance and Trend" (***Attachment 7***).

***Q**: Going back to your answer of effect of decrease in capture probability in the LCR, based on single simulation, what was the basis behind that? What if we reduced the number of trips in the LCR? (Brouder)*
***A**: No, what if we reduced effort every time we took a trip. I think that got into the issue of handling. There are two things that cost - how many times you go down but then perhaps if you didn't spend as much time or you did less nets, that would be a savings. (Otis)*
***C**: I think we also had a concern that the fish might become net shy over time as they aged. It looks like is not a big deal. It's good to know. (Persons)*
***Q**: Any thoughts on why you did the 3-4 comparison? What about 2-3? (Kubly)*
***A**: We didn't do the 2-3.*
***Q**: Is it a reasonable, legitimate comparison? Certainly from an efficiency of operations and financial standpoint. (Kubly)*
***A**: I think probably with the standard capture probabilities so to speak from purely statistically, if you went down the river and if you did it twice instead of three times, I think the results would still be pretty good. Because basically it would be fine for the open models because what you're doing with those open models is your pooling the data over all those occasions so a fish is either caught or not caught in those two, three, or four trips. I think the open models with two trips with the same capture probabilities would still be pretty good. (Otis)*
***Q**: So when you're talking about open models, that's the Jolly-Seber standard? (Andersen)*
***A**: Both the Jolly-Seber and ASMR. (Otis)*
***Q**: Is it reasonable to think that with the closed models using only three capture occasions that the model fit test offered by the open capture would be able to function properly? (Who?)*
***A**: It's not going to do very well. The model selection will be a problem with only three trips. (Otis)*
***Q**: Is there any difference in closed and open? Does the difference in bias precision propagate into the next interval the same way in closed and open models? You've got a progressive change over time. Does that error propagate into the next iteration? (Kubly)*
***A**: Iteration or next year? It does in a sense for the open models because there is sort of this sharing of data across years. I don't know if I can articulate exactly how that does propagate but I feel it has to. It's not going to with the closed models because they stand alone every year. They don't share data across years. (Otis)*
***Q**: With the ASMR model, there seems to always be a general decline. Does that give you any concern? (Czapla)*

***A**: I don't have intimate knowledge of these ASMR models that Lew and others have but I feel it has to have something to do with the fact that they all work backwards. They start at the end and work backwards and the Jolly-Seber things don't really work that way. Maybe in those later years somehow there is some bias showing up in the capture probabilities or they're over estimated and it causes the populations to be too small. (Otis).*
***Q**: Your second bullet states that your summary statistical conclusion, "Both ASMR and Open Jolly-Seber type estimator produce good results, except for significant bias with GCMRC sampling design." Is this bias significant enough to where you should be considering evaluating how we do our estimating? (Who?)*
***A**: Well, it's bigger. How big a bias is of concern. I guess it's more a biological question than a statistical one so I'll duck. If you think about that sampling scheme, it's not really exactly clear which population you're estimating. In other words, what's the time here? You start in February and you end in October. Well, the populations do a lot to stuff in between there. We actually compared it to what the population was in August as opposed to the others when you start in February. Over that long period of time it's not clear exactly what you're estimating. (Otis)*

Matt said he would like the TWG to consider making the following motion:

The TWG proposes, based on results of peer-reviewed literature and simulation modeling, the AMWG recommend to the Secretary of the Interior that either open or closed population estimates are acceptable when estimating the core adult humpback chub population in the Grand Canyon.

Rick said he didn't think the motion says anything. Given the situation in the Grand Canyon, he hears that Jolly-Seber and ASMR are the most appropriate models. Matt said that if the recovery goals were to come back in the form they had in 2002, they would still be constrained to using the closed model. Matt feels that is the motivation for suggesting the motion. Dave said he thought the motion should be more specific and that they want to see the Secretary of Interior recommend an open estimator be used for the Grand Canyon population which in the shelved recovery goals doesn't have that opportunity for them.

Dennis said that since Dave's report hasn't been through GCMRC's standard peer review process, it's too early to propose a motion. The TWG needs to honor the review process they established. He also said that when they come back with a motion, they should consider the sampling design right along with the model question and then GCRMC can prepare a recommendation for the TWG to consider.

Several members expressed concern that the motion was premature and was being brought forth for political reasons. Dennis reminded the TWG they also can't make recommendations to the Secretary, only the AMWG can.

Norm said it would be useful to see what the AMWG motion was with regard to the issue. He read the following from the AMWG minutes:

- Motion: approve the TWG-approved budget as distributed to the AMWG, with the following changes:
  - reprogram the budget amount in Line 91 to allow for concurrent multi-pass mainstream and mark-recapture mainstem and LCR population estimates in the spring
  - direct GCMRC to do as much simulation modeling as possible [vis-à-vis the two fish-counting protocols] and report to AMWG at its Fall 2004 meeting
  - Voting Results: Yes = 22 No = 0 Abstaining = 0

Motion: The TWG recommends to the AMWG that open models, e.g. Jolly-Seber or ASMR, for humpback chub not be precluded from use for the Grand Canyon.
Motion seconded (Bill Werner).
Call for the question.
Voting Results: Yes = 13 No = 6 Abstaining = 1
Motion Passes.
Kerry Christensen (abstaining): We don't need the motion.
Lloyd Greiner (voting no): We don't need the motion.

Bill Davis (voting no): I stated my concern. The motion isn't necessary. We pass information along and this is just another piece of information that can be used by Region 6. It takes out of the science realm into the political realm.
Randy Seaholm (voting no): We didn't follow the process. It was beyond the direction that we got from AMWG. We still have some issues that need to be addressed.

Chair Update. Kurt said he would be leaving the meeting early today so Dennis Kubly will chair the afternoon session.

Agenda Update. Dennis said when the agenda was being formulated, they were well on the way to developing the experimental options with the intent of bringing forward two options one of which was based on the FY07-08 work plan and budget at that time. He said the SPG has spent some time looking at what there is for the FY07-08 budget and work plan operating as the Budget Ad Hoc Group. As a result of the call from Interior to move all the options forward, it has put them in the position of preparing two separate budgets, a FY 07 budget and a FY 08 and beyond budget. Consequently, there won't be much information presented today on the FY07 budget and work plan because the SPG will come back to that in early July and the TWG will then get an opportunity in late July to vote on the FY07 budget and workplan.

Science Planning Documents

Strategic Science Plan (***Attachment 8***). John Hamill said the SSP has been reviewed by the SPG twice and at the last meeting, they endorsed the plan and instructed him to forward it to the TWG with a positive recommendation and their approval. Dave Garrett said the Science Advisors approved the plan at their last meeting.
Q*: What grade would the Deputy Chief position be? Is that new funding: (McMullen)*
A*: It would not be new funding. It would be a realignment of existing staff to create that position. There should be no additional costs. (Hamill)*
C*: In the Background (page 3), we have a reference in there starting with Section 1802 and then quoting. We've had extensive discussions about all of this and it needs to fit within the parameters of existing guidance. My suggestion would be to delete that quotation and just start with "The AMP was established . . . " (Seaholm)*
C*: On page 21, you have "assure that the AMP Strategic Plan is kept current." I don't think that historically it's been a GCMRC responsibility. It's a minor change. I'm more interested in the second part which is "design a partnership plan and program to transition major science treatments into management actions with appropriate responsibilities, authorities, and funding." Can you give us a closer look into that? (Kubly)*
R*: I don't think the intent was that this was ever supposed to be simply a research and monitoring program. As we transition from research into the management, I think it's appropriate that we start giving consideration to how those management actions are going to be funded and how this program is going to be run. I think that's just a natural evolution. We need to start talking with folks about how that transition is going to occur, what kind of authorities are needed, what kind of funding will be needed, and what is the strategy for getting funding to institutionalize this process at a management level. I think over the next five years we would like to participate in that so there isn't continued reliance on GCMRC to fund every management activity that comes along and there is a specific plan for moving things from research into management. (Hamill)*
C*: I agree. There are a number of management agencies out there who could do these jobs on the long-term basis. How do you make that transition into funds going to them to do the work? (Davis)*
C*: I really appreciate the forward thinking going on here. I do think we want to have a strong science program going forward but also think that as we learn things in terms of management actions and/or operations, those are things that need to be set into the long-term management action. We are learning a lot of good things here. I would like to see benefits of that knowledge move forward and not just continually experimented with. (Seaholm)*
C*: With regards to the new deputy chief position, I don't feel comfortable that the TWG should make those kind of personnel decisions. It seems that is made somewhere else so I don't want approval of this document necessarily saying that the new deputy chief position is also approved. (Johnson)*

John said he feels the report is 98% complete and he'd like to see it finalized after a few minor changes have been made.

Dennis read the tentative motion listed in the agenda:

Motion: The TWG recommends that the AMWG adopt the Strategic Science Plan accepted by the TWG on May 25, 2006**.**
Motion seconded.

The motion was revised to include the above comments/changes:

Motion: The TWG recommends that the AMWG adopt the Strategic Science Plan accepted by the TWG on May 25, 2006, subject to the recommended revisions forwarded by the TWG:

(1) That clarification shall be added to the Section "Critical research and monitoring needs outside the scope of the AMP" to incorporate changes shown in the PPT presentation by the GCMRC Chief.
(2) That the first part of the Background section be deleted (the first 5.5 lines that specifically mentions Section 1802, but not the other sections). Add/Replace with "The 1992 GCPA directed the Secretary of the Interior to establish and implement long-term monitoring and research programs."
(3) Page 5 – Mission elements, Include revisions added to the Mission by the GCMRC Chief.

Motion seconded.
Discussion.
Passed by consensus.

Draft Monitoring and Research Plan (***Attachment 9***. John Hamill distributed copies of the plan and provided the high points. Comments will be accepted until June 9. The SPG will review in early July and then it will be presented to the TWG in August for approval.

Q*: On your definition for experimental research elements, it says a suite of flow and non-flow treatment and/or management actions designed to meet peak?? conditions. I thought the definition of a management action was something that was already known so how is it experimental? (Henderson)*
A*: You got me on that one. I don't think we can ignore the management actions that are going on. (Hamill)*
C*: It infers there you're experimenting with them and I don't know. It seems like the definition for a management action is "we already know." (Henderson)*
R*: We'll play around with the language on that. (Hamill)*
C*: We don't know whether trout removal has an effect on humpback chub. Was the intent originally to just remove trout in which case, yes, we already know that. If in a hybrid design, we can't treat that as a management action because we don't know if it's having an effect on humpback chub. That was the intent of doing the action or experimenting with the action in the first place. I can't see how you can get to a management action from removal of trout. This is implying that the purpose for which it was experimented with in this program is now being relegated to a management action and it's sort of like switching gears and saying we're going to switch it to a management action because now it's the Park Service because they just want to remove trout rather than removing trout for benefiting humpback chub which was the intent of this program. (Henderson)*
C*: John, one way of removing the contention is to put it in that category you have for managers and scientists working together, establishing a process for determining whether or not, and then some people won't feel like it's just jumping too far too fast. (Kubly)*

John said the proposal is to set aside about $350,000 a year for the experimental program and accumulate funds up to about $2 million to allow for conducting the experimental tests related to flows, BHBFs, and other kinds of actions that would be carried out. There is about $400,000 currently in that account. They are anticipating up to two BHBFs during the five-year period. This will allow them to do a BHBF in FY08.

Dennis said it would be of interest to the states to know that if Reclamation keeps the dollars, they're not removed from the basin fund which is important to CREDA because it affects how they set their rates. It's a way of having the money available but not using it until it's needed and it's not subject to reprogramming.

Mike Yeatts said in looking at the cultural line item, he noticed that a lot of the tribal monitoring is falling under the R&D and doesn't appear after that. He wondered if it was an oversight because it was integrated into archaeological site monitoring but certainly TCPs are bigger than that and he was curious about that. Also related is under the Springs and Riparian which has a strong cultural component to that and this doesn't capture anything other than vegetation. John said it was his intent to develop a cultural tribal monitoring program and asked Helen if she would address Mike's concerns.

Helen said they still hope to get TWG guidance about the approaches that have been proposed by the tribes and now to incorporate those values and interests into the program. They hope the work the tribes are doing with the funding in terms of defining what those programs are will then lead to presentations to the TWG where GCMRC can get feedback on how to best incorporate those objectives more effectively.

John will send an e-mail regarding the outcome of the FY07 budget discussion with Dave Garrett, Rick Gold, and Mark Limbaugh, and follow up at the AMWG meeting scheduled in October.

FY 2007-2008 Budget and Workplan Update. Dennis said no presentation will be given today and that the FY07 budget and workplan will be developed between now and the July meeting.

Next TWG Meeting. John said they should know by the end of next week whether there will be an August meeting which will determine if there will be a June 22-23 meeting.

Cultural Resource Agreement. John Hamill passed out an agreement on cultural resources (***Attachment 10***). It is a working document between the NPS, USBR, and USGS designed to set up a process by which they can coordinate on issues related to the cultural program and hopefully be more effective. This lays out the general principles, how they're going to do business, and hopefully result in a more streamlined and effective program.

Public Comments: None

Adjourned: 2:45 p.m.

General Key to Adaptive Management Program Acronyms

ADWR – Arizona Dept. of Water Resources
AF – Acre Feet
AGFD – Arizona Game and Fish Department
AGU – American Geophysical Union
AMP – Adaptive Management Program
AMWG – Adaptive Management Work Group
AOP – Annual Operating Plan
BA – Biological Assessment
BAHG – Budget Ad Hoc Group
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
CRAHG - Cultural Resources Ad Hoc Group
CMAHG – Core Monitoring Ad Hoc Group
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
FY – Fiscal Year (October 1 – September 30)
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 & Electrical Districts Association of Arizona
IN – Information Need
IT – Information Technology
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
MO – Management Objective
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
POAHG - Public Outreach Ad Hoc Group
Powerplant Capacity - 31,000 cfs
Reclamation - United States Bureau of Reclamation
RBT – Rainbow Trout
RFP - Request For Proposals
RPA - Reasonable and Prudent Alternative
SA - Science Advisors
Secretary - Secretary of the Interior
SCORE = **S**tate of the **Co**lorado **R**iver **E**cosystem
SPAHG – Strategic Plan Ad Hoc Group
SPG - Science Planning Group
SWCA - Steven W. Carothers Associates
TCD - Temperature Control Device
TCP - Traditional Cultural Property
TES - Threatened and Endangered Species
TWG - Technical Work Group
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)