

Glen Canyon Dam Technical Work Group Meeting

April 19-20, 2016

Conducting: Vineetha Kartha, TWG Chair
Shane Capron, TWG Vice-Chair

Convened: 8:15 a.m.

Committee Members/Alternates Present:

Melinda Arviso-Ciocco, Navajo Nation
Cliff Barrett, UAMPS (phone)
Charley Bullets, Southern Paiute Consortium
Chris Budwig, Int'l Federation of Fly Fishers/TU
Kerry Christensen, Hualapai Tribe
Jennifer Crandell, State of Nevada
Kevin Dahl, National Parks Conservation Assn.
Bill Davis, CREDA
Kurt Dongoske, Pueblo of Zuni
Craig Ellsworth, WAPA
Katrina Grantz, Bureau of Reclamation

Paul Harms, State of New Mexico
Brian Healy, NPS/GRCA (phone)
Jessica Neuwerth, State of California
Ben Reeder, Grand Canyon River Guides
Randy Seaholm, State of Colorado
Larry Stevens, Grand Canyon Wildlands Council
Bill Stewart, Arizona Game and Fish Department
Rosemary Sucec, NPS/GLNRA
Don Ostler, State of Wyoming
Michael Yeatts, Hopi Tribe
Kirk Young, U.S. Fish and Wildlife Service

Committee Members Absent:

Jan Balsom, NPS/GRCA
Evelyn Erlandsen, State of Arizona
Chris Harris, State of California

Robert King, State of Utah (phone)
Chip Lewis, Bureau of Indian Affairs
Steve Wolff, State of Wyoming

Grand Canyon Monitoring and Research Center:

Lucas Bair, Economist
Helen Fairley, Program Manager
Paul Grams, Program Manager (phone)

Scott VanderKooi, Center Director
David Ward, Scientist

Interested Persons

Mark Anderson, NPS/GLNRA (phone)
Eric Bobelu, Pueblo of Zuni
David Braun, Sound Science LLC (Science Advisors)
Kathleen Callister, U.S. Bureau of Reclamation
Bill Chada, U.S. Bureau of Reclamation
Marianne Crawford, U.S. Bureau of Reclamation
Paul Davidson, U.S. Bureau of Reclamation
John Dillon, Grand Canyon River
Jessica Gwinn, U.S. Fish and Wildlife Service
Dawn Hubbs, Hualapai Tribe
Leslie James, CREDA (phone)

John Jordan, Int'l Federation of Fly Fishers/TU
Nelson Luna, Pueblo of Zuni Fish & Wildlife Dept.
Lisa Meyer, WAPA (phone)
Dr. Sarah Rinkevich, DOI Federal Liaison
Peggy Roefer, UCRC/Nevada
Seth Shanahan, SNWA
Glenn Selby, Navajo Nation DFES
Cameron Staveley, Canyonland Explorations
Gaylord Stavelly, Canyoners Association
Gloria Tom, Navajo Nation
T. Kim Yazzie, Navajo Nation DFW

Meeting Recorder: Linda Whetton

Welcome and Administrative: Ms. Kartha welcomed the members and the public. Introductions were made and a quorum determined. Guidelines for participating in the webinar were reviewed.

- Approval of January 28, 2016, Meeting Minutes. Motion to approve proposed by Mr. Kevin Dahl, seconded by Mr. Larry Stevens. Approved by consensus.
- Review of Action Items (**Attachment 1**)
- Programmatic Agreement Update – Mr. Chada. There is overall dissatisfaction with language in the PA with some parties indicating they won't accept the PA without revision. BOR has looked a range of alternatives to change language for a new draft or start a new draft to have one in place before the LTEMP EIS is finalized. As part of Section 106, BOR has scheduled a consultation meeting with regulatory agencies and tribes this Friday. It will consist of full signatories and those include NPS, Western, and advisory councils. Hopefully the outcome will be a unified approach to moving forward to completing the 106 requirements and ensure cultural resources compliance.
- Current Status of the Lees Ferry Fishery (**Attachment 2**) – Mr. Stewart. The AZGFD is committed to providing updates on a regular basis, but the challenge is making real-time decisions. They're working with GCNRA on how to address the situation. Mr. Budwig added that it's a very critical situation and the loss of fish (1 million down to 200,000) has really impacted the guides at Lees Ferry significantly. Clients have been cancelling their

fishing trips and it's no longer a blue ribbon fishery up there. If recovery follows the pattern in the early 2000s, it will be a slow recovery process.

Grand Canyon River Running - (Attachment 3) Mr. Staveley. He discovered the Colorado River in 1956 and for more than 50 years he has lived and worked inside professional river running. His career has seen a period spanning the construction of the dams on the Colorado River system, the explosion of whitewater boating as popular adventure travel, and the developing fray over how the water is proportioned and for what uses. Before the construction of Glen Canyon Dam he organized and led commercial river trips in Glen and Grand Canyons. He talked about things that had occurred before creation of the Glen Canyon Dam Adaptive Management Program established, i.e., changes in the river's flow, hydropower agency restructuring, powerplant releases, and concluded with his hope that adaptive management and the increased emphasis on research-based river and dam management will lead to a fair balancing of hydropower and recreational interests. His most recent book, "Taking the Big Red: The Colorado River-Grand Canyon Water War;" 1970 to 2016, can be purchased online.

Hydrology & Draft Hydrograph (Attachment 4) – Mr. Davidson.

- Snow levels peaked on April 1 and the Upper Basin has been experiencing abnormally warm temperatures. Mid-elevation snow is rapidly melting. As of April 14, with 109 of 116 sites reporting, the basinwide SWE is 81% of median.

April – July 2016 Forecast	Potential Lake Powell Release Scenarios
<ul style="list-style-type: none"> • Apr Most Probable: 5.3 maf (74%) • Apr Min Probable: 7.65 maf (54%) • Apr Max Probable: 7.65 maf (107%) • Average = 7.16 maf (1981-2010) 	<ul style="list-style-type: none"> • 2016 Most Probable Inflow WY Unreg Inflow = 8.44 maf (78%) Powell Release = 9.0 maf • Minimum Inflow Scenario WY Inflow = 6.85 (63%) Powell Release = 9.0 maf • Maximum Inflow Scenario WY Inflow – 11.13 maf (103%) Powell Release = 9.0 maf

End of month elevations indicate projected based on April 2016 modeling. Mid = 3,575' tier, 3,525' Lower, and 3,490' at minimum pool. As of April 17, elevation at Lake Powell is at 3,591' and is 45% full. Water Year 2017 is a little more problematic and elevation may drop below projected.

- Maintenance at GCD. Typically there are 5-7 units available during the water year to meet all contractual requirements. For WY2017, there are at least seven turbines for the majority of the year. As of 4/18/16, there's not enough sediment input to trigger a spring 2016 HFE.
- Hydrograph Development for 2017. Using the 2016 hydrograph as a starting point, the projections for 2017 would be a 1) Most Probable Minimum at 8.23 maf, 2) Most Probable at 9.0 maf, and a Probable Maximum at 11.9 maf with projected April shift to equalization. Reclamation will consider feedback from the TWG and coordinate with DOI-DOE agencies in developing a hydrograph recommendation to be presented at the August AMWG meeting.

Risk Assessment for Nonnative Fish Escapement Through Glen Canyon Dam (Attachment 5) –

Mr. Ward. Data from other places and Davis Dam revealed seven repatriated RBS went from Lake Mohave to Lake Havasu via Davis Dam. The Francis Style Turbines are well known for letting fish pass through them. Glen Canyon Dam has these types of turbines and based on data collected, fish are going through GCD as well (walleye, smallmouth bass, channel catfish, striped bass, and green sunfish) based on their length and frequency. The depth of the penstocks prevent fish from moving through GCD as most fish aren't at 75+ feet depths. Low water years at Lake Powell may explain when and why they're moving through the dam. When the surface of the lake starts to cool and the temperatures mix, it's more likely to have fish that get entrained. Limiting factors are spawning, larvae survival which are influenced by temperatures. Threats of the fish coming through dam are smallmouth bass because they can eat a lot of fish and are on the cooler end of things. The other one of concern is brown trout because they're extremely piscivorous. Walleye like turbid water. The following conclusions were presented:

- Interval of drought induced warming may play a critical role in whether or not new species of warm water non-native fish establish in Grand Canyon
- Cold water most of the time – although detrimental to Grand Canyon native fishes, may be the best way to conserve them.
- Annual invasive species monitoring and mechanical removal below the dam may be warranted.
- Removing areas that are habitat for warm water invasive fishes seems like a good idea

Review of Science Advisor Program Charter and Protocols (Attachment 6) – Dr. Braun. After providing a brief history of the Science Advisor program, Dr. Braun said the Charter and Protocols need to be approved by the TWG and then forwarded to the AMWG for their approval. Key steps to updating the charter include: reviewing guiding documents, AMWG assessment by Mary Orton, examined other RIPs for large multi-institutional AMP programs for large regulated western rivers, consulted with TWG, GCMRC, BOR COTR, and solicited input from the former EC Science Advisors. There is no longer a standing science advisor panel so once he receives a task order from Reclamation, he can get established a panel. He offered three possible modifications: 1) Allow option for establishing year-long or multi-year “standing panel” for ongoing/recurring needs, 2) Include a step/process for approval of potential SAs after EC identification and ranking, and 3) Include description of a procedure for amending charter and protocols in the future.

Comments:

- *Clarify the Executive Coordinator is David Braun not Sound Science*
- *Consider creating a timeframe or flow chart when independent review starts and ends*
- *Consider including tribal representatives in SA panel member approval process*
- *SA are empowered to hire good advisors. (If you hire crummy, you'll get crummy work.)*
- *Final selection of SA panel members should be reviewed by GCRMC chief*
- *If TWG and GCMRC are included in review of panel, then it's not an independent panel.*
- *The wording “Natural cultural resources affected by the dam” and “in coordination with balance and other resource programs” begs some kind of influence in terms of the cultural aspect from the tribes. It's important to say the tribes have that scientific-based approach in terms of cultural resources management. It doesn't stop at only archaeological resources, but it expands to other areas in terms of what is seen in the overall reporting, amendments, and recommendations.*

With the revised changes and comments provided, it was decided to table further action until June.

Abundance of Humpback Chub in the Western Grand Canyon – Mr. Capron. The purpose of this item is to follow up on information presented at the AR meeting about new things being seen in the Canyon with an eye toward possibly adjusting monitoring efforts and/or changes to the budget and work plan.

- Results from 2015 Seining Efforts (**Attachment 7**). Mr. Kirk Young. There wasn't a lot of sampling done in the Grand Canyon but illustrates that a much larger proportion of YOY of fish are being seined in Western Grand Canyon. In 2014 HBC larvae were found at Diamond Creek down to Columbine Falls. A similar trend was found in 2015 so the fish are pretty small (9-10 mm), which correlates to 9 mm fish being about five days old and 10 mm fish might be 8-11 days old. There's a lot of uncertainty why those fish are showing up now but it could be that fish are reproducing and getting to a critical mass. To better understand the changes, the following could be done: 1) revisit use of otolith microchemistry to identify off-channel spawning, 2) use Judas fish – sonic-tagged HBC released into W GC to determine habitat/geographic use/movement during spawning, or increase surveillance of younger fish via seining (planned for 2016).

Comments:

- *Reclamation, through the MSCP, has about \$50K for HBC work that if requested by FWS could purchase sonic tags.*
- *In the short-term seining trips will be done every year and in the backwaters, if possible.*
- *Need some purposeful take for small HBC to look at microchemistry to resolve the question of where fish are being born. May want to look at a non-listed species like speckled dace to frame the question before taking a lot of chub in the context of the next 3-year budget cycle.*
- *There could be some opportunistic or fall spawning occurring based on sizes showing up in October samples and other things.*

The fifth member for the Fish PEP Panel has been made. GCMRC is looking to convene the panel either the last week of July or the first week of August. There will be an opportunity for the TWG and AMWG to interact with the panel but probably not for the entire process. A one-day field trip up to Lees Ferry is being considered as a means of getting the panel on the river.

Tribal Reports – Dr. Rinkevich. Some of the AMP tribes are members of the Southwest Tribal Fisheries Commission (SWTFC) and she felt it would be informative for the TWG to know about their work. In addition there has been interest in the fisheries work being done by the Navajo Nation Fish and Wildlife Department and eagle work being done by the Pueblo of Zuni.

- Southwest Fisheries Tribal Commission (**Attachment 8a**) – Dr. Leon. He serves as the executive director for the SWTFC and prior to that he was the division chief for the USFWS Fisheries and Aquatic Resource Conservation Program in Washington. The SWTFC is a coalition of Tribes, Pueblos, and Nations with a strong desire to promote self-determination through the development of sustainable recreational and native fisheries programs. It was formed in April 2002 in response to the USFWS closing a fundamentally important fish hatchery on the Mescalero Apache Indian Reservation in New Mexico. They transferred it fee simple to the Tribe and left nothing there making it impossible to raise one fish. Recreational fishing is an economic driver for the tribes in the Southwest. The national fish hatcheries produced recreational fish species like RBT and supplied them to the tribe, who then in turn promoted recreational fisheries, sold permits, generated a basic economy that's quite unbelievable and allowed them to do other natural resource work and participate with partners in the recovery of listed species. When the USFWS walked away from the Mescalero fish hatchery, Butch Blazer (now undersecretary of Agriculture in DC and also a Mescalero Tribal member) got involved with other dedicated individuals formed the SWTFC to see about getting the Mescalero fish hatchery back into production. The hatchery produces more fish than when the USFWS did when it was there. The SWTFC has had many accomplishments and has become an important asset to the tribes in the Southwest. Through the power of youth in 2006, it has become a very successful hatchery.
- Navajo Nation Fish and Wildlife Department - Ms. Tom, Director of the NNFWD. They're located in Arizona, New Mexico, and Utah with about 18 million acres. Their department has been in existence since the 1960s. They have several programs and are the only tribe in the country that owns and operates a zoo for native wildlife found on their lands. She introduced Ms. Kim Yazzie, a fish biologist who runs the native fish program on the San Juan River, and Mr. Glenn Selby, another fish biologist.
 - Ms. Yazzie (**Attachment 8b**) runs the Navajo Agricultural Products Industry (NAPI) ponds and a fish ladder on the San Juan River and is involved in fish monitoring and non-native fish removals. The two main objectives of the program are: 1) to conserve Colorado Pikeminnow and the Razorback Suckers, and 2) proceed water development. They believe there are a lot of fish below Piute Falls and are proposing to put a satellite antenna pit reader there. This and other antennas are remotely located and all information is relayed to Utah State University. Every fish that comes through the capture basin is hand selected and is counted by either herself or another staff member. Last year it was open from April 1 – Oct 30 where all fish are counted and released upstream, native fish are weighed and length recorded, endangered fish are also scanned, weighed, and released; and non-native fish are measured and checked for tags and are permanently removed from the river system. The NAPI Razorback Grow-out Ponds are operated by NNDFW and account for approximately 40% of RBS stocking annually. They take measurements every day on the NAPI ponds and conduct passive and active harvests. NAPI Ponds have the best growth and return rates of RBS. RBS in-river survival is best from NAPI Ponds. Approximately 6,000-8,000 fish are stocked from the NAPI ponds into the San Juan River.
 - Fisheries Program (**Attachment 8c**) – Mr. Selby. He's responsible for the sport fishing and native fish management at the Chuska Mountains and Defiance Plateau. The goals for this program are: 1) Maintain, manage, and enhance the quality, abundance, availability, and diversity of sport fishing opportunities while contributing to the recovery of native fishes; 2) Increase public awareness of the Navajo Nation's sport fishing resources and opportunities;

and 3) Aggressively pursue funding adequate to support all Tribal management activities for all sport and native fishes and their habitats. Their sport fishing consists of lake sampling, stocking, and tribal hatchery operations so fish come from their hatchery as well as Inks Dam and Alchesay-Williams Creek. They're currently stocking eight lakes with fish from the NNDFW hatchery and USFWS hatcheries. The NNDFW fish hatchery is located in Toadlena, NM, and began operation in 1983. They receive eggs twice a year in March and November and stock out twice a year in April and October. Hatchery tours are available and several schools and summer youth programs visit annually.

- Zuni Eagle Aviary (**Attachment 8d**) – Mr. Luna, Director for the Zuni Wildlife Department. Since emergence from the fourth underworld in the Grand Canyon, Zuni and other Pueblos have possessed and used wildlife and their parts in fulfilling their religious and cultural obligations. All Native Americans have reverence for both bald eagles and eagles. Zuni has historically conducted eagle husbandry practices since time immemorial. In order to obtain these resources they get fledgings when they're getting ready to fledge out of the nest. They've always conducted their religious and cultural activities using natural resources from eagles other wildlife. They looked at all the species to see how they could mitigate this issue expedite the process of obtaining the eagle feathers. When the USFWS developed the regulations negating their ability to collect these individuals from the wild, they established the National Eagle Repository in Commerce City, Colorado, but unfortunately that facility is very limited in its ability to distribute resources to 575 feather-recognized tribes throughout the United States and further restricts their ability to collect resources. It takes a tribal member from 6 months to 6 years for an eagle part. The most highly sought after would be the juvenile Golden Eagle with a brown tipped white tail which is only available in the first two years of its life. In 1993 the USFWS threatened to come into the village and get those eagles that were grandfathered in. To reduce that threat they looked at various options to collect feathers through the repository but knew that wasn't possible because of complications with other tribes. They reviewed options and found out there were non-releasable eagles that were being euthanized because of injuries from vehicle accidents, electrocution, and various infrastructures. It took from 1992 to 1998 to deliver a permitting system allowing Native Americans to possess live eagle possession for Indian and religious purposes. Groundbreaking for the Zuni aviary began in September 1998 with completion in 1999. They continue to do traditional eagle husbandry and since 1999 they've had 49 eagles transferred and from the United States.

Public Comment: None

Adjourned: 4:55 p.m.

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Robert King, State of Utah (phone)
Chip Lewis, Bureau of Indian Affairs
Steve Wolff, State of Wyoming

Grand Canyon Monitoring and Research Center:

Lucas Bair, Economist
Helen Fairley, Program Manager
Paul Grams, Program Manager (phone)

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David Ward, Scientist

Interested Persons

Mark Anderson, NPS/GLNRA (phone)
Rob Billerbeck, NPS
Eric Bobelu, Pueblo of Zuni
David Braun, Sound Science LLC (Science Advisors)
Kathleen Callister, U.S. Bureau of Reclamation
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Peggy Roefer, UCRC/Nevada
Seth Shanahan, SNWA
Glenn Selby, Navajo Nation DFES
Gloria Tom, Navajo Nation
T. Kim Yazzie, Navajo Nation DFW

Meeting Recorder: Linda Whetton

Welcome and Administrative – Ms. Kartha welcomed the members and the public. Introductions were made and a quorum determined. There were two issues carried forward from yesterday:

- Science Advisor Charter:
 - Hybrid PEP Panel – In talking with several members, it appears people are in favor of a hybrid panel. This would be a standing panel that would respond to quick turnaround issues but also have the flexibility to hire scientists with specific expertise.
 - Comment & Review Body - Most people feel the TWG doesn't need to be a decision-making body but rather a review and comment body. Nobody wants independence taken away from the SA. Mr. Christensen said the Hualapai Tribe developed some language regarding tribal input into the independent review panels and can introduce that today.
- A redline/strikeout version of the SA Charter will be provided to the TWG for another review.

- Lees Ferry Trout Fishery – Mr. Reeder. There are foodbase problems and within the LTEMP and the Alternative D, the bug flows would be a really good thing to do. Ms. James added that CREDA is still trying to work with Argonne and the co-leads on out how the bug flows modeling was done. In concept, they think bug flows could be potentially very helpful.

Ad Hoc Group Updates (Attachment 9)

- Steering Committee AHG (SCAHG) – Mr. Capron. The committee continues to meet and discuss preparation for upcoming TWG- meetings and other issues.
- Budget AHG (BAHG) – Mr. Capron. A meeting will be scheduled to help craft a budget recommendation for the TWG's consideration
- Trout AHG (TAHG) – Ms. Kartha. The AMWG provided a new charge to the TWG at the last meeting. As a refresher, she provided language from the previous charge and the new charge:
 - Old charge - The TAHG will evaluate the GCMRC Technical Review of the Lees Ferry Recreational Trout Fishery Management Recommendations per the AMWG motion on 8/27/15, and make a recommendation to the TWG at our January 2016 meeting. The TWG will consider the recommendation and make findings to the AMWG at its February 2016 meeting.
 - New Charge - The TAHG will consider the Lees Ferry Trout Fishery Management Recommendations and the Grand Canyon Monitoring and Research Center Technical memo with the caveats per the AMWG motion on 02/24/2016, as work plans and budgets are being developed and make a recommendation to the TWG through the Budget Ad Hoc Group.
- Administrative History AHG (AHAHG).
 - GCDAMP Wiki Page – Mr. Ellsworth. Links have been added for TWG and AR presentations from BOR's website. He demonstrated how to access specific information and would like to include more 101 training courses.
 - Administrative History AHG Contract – Ms. Crawford. It's been difficult to get a contract through BOR's acquisitions process so she's pursuing a contract through the Colorado Plateau CESU (Cooperative Ecosystem Study Unit). By using this mechanism, a sole source cooperative agreement can be set up with a university individual. The overhead would be much lower at 17% versus 26%. Several years ago there was a presentation given by Paul Hurt and Mark Tibo (Arizona State Univeristy) and both of these individuals are with the CESU. They should be able to provide a scope of work which will speed up the contracting process.
 - Cultural Resources AHG (CRAHG) – Mr. Dongoske. No assignments were given from the TWG so no updates to report. If the TWG wants the CRAHG to review and comment on the FY17 TWP, that assignment needs to be made to them. Responding to a question as to what role the CRAHG will play in the revision of the PA, Ms. Grantz said the PA is coming out of the LTEMP and the Section 106 Compliance needs to be competed as part of the LTEMP process; the CRAHG would then work on how to implement the PA. Since most of the people on the CRAHG will be representing their respective stakeholders in negotiating the language of the PA., Mr. Dongoske felt this could be a conflict of interest because they're not really representing the TWG. Ms. James said the CRAHG has historically given input to the BAHG but don't think the CRAHG has had involvement directly with the PA. Mr. Capron asked if there were any objections to asking the CRAHG to review the FY17 budget and provide input to the BAHG. No objections were noted. In following up on whether the CRAHG would provide input into the PEP review, Mr. Dongoske said it's appropriate for the CRAHG to comment on the review and then make a recommendation to the TWG about that review. Ms. Grantzsaid if the PA doesn't get signed, BOR still has a legal obligation to complete the Section 106 process with or without a PA and that will be done by the LTEMP Record of Decision is signed.
- Socioeconomics AHG (SEAHG) – Mr. Bair.
 - GCMRC Workplan – Information that was presented at the AR meeting on recreation research associated with creel data and a model that he and the cooperators had prepared is currently in review for publication. There are also associated recreational surveys with anglers in GLCA and whitewater rafters in GRCA .That data is being compiled and analyzed and a report should be available in early fall. Other things moving forward within the workplan include decision science and tribal-related research.
 - NPS Survey – This is a passive use survey looking at resource status in GLCA and GRCA and is nearing completion as far as the surveys go. The report should be completed by late summer.

- Oklahoma University Survey – This is ongoing research looking at broader scenarios with not only impacts to resources in GLCA and GRCA due to operation of GCD but also how people place preferences on scenarios where air emissions might change or there's adverse impacts to rural or tribal communities. That research has been published and the SEAHG may take a look at that.
If anyone is interested in joining this group, let Lucas or Linda know.
- Core Monitoring AHG (CMAHG) – Mr. Capron. This group is tabled until after the LTEMP EIS is completed and will be re-established if needed.

Comments:

- *The need to put metrics on the DFCs will be addressed after the LTEMP is completed.*
- *The list of priorities for this program needs to be revisited and what the TWG's role will be.*
- *Once the LTEMP is in place it would be good for the TWG to look at the GCDAMP guidance documents.*
- *Need to review the past 20 years and frame future questions.*

Triennial Workplan Budget Process (Attachment 10a) – Mr. Capron. The previous budget process was very time consuming and contentious at times. It was decided to do a 2-year budget and with the success of that, it was felt that a 3-year budget would be even better. In a memo from Anne Castle in May 2014 she directed the program to develop a triennial work plan and also that the TWG revise the guidance document for doing a 3-year work plan. The Steering Committee has been working on this document and a new draft will be sent to the TWG for review. The TWG will have three weeks to review and provide comments for the Steering Committee's consideration. Another draft will be presented to the TWG for its approval and a recommendation developed for the AMWG's acceptance in August.

CommentsL:

- *Keep the hydrograph component separate from the budget process.*
- *This isn't a complicated process and we just need to do it and not burden GCMRC or SA in their work.*
- *The metrics for the DFCs need to be done, but it's separate from the budget and workplan process.*
- *The TWG needs to decide what it wants to accomplish in the next three years concurrent with the science occurring.*
- *Need to discuss role of GCDAMP in context of post-LTEMP because of new responsibilities for experimentation which will involve AMWG and TWG.*

Science Advisor Work Plan (Attachment 10b) – Dr. Braun. He's been meeting with people trying to identify tasks for the next fiscal year, reviewing the GCDAMP history, capturing topics people have brought up at meetings, and looking at the LTEMP EIS for upcoming assignments/involvement. He reviewed past program concerns and looked at other independent programs around the western U.S. to see what they've been undertaking. He's identified some potential tasks and will eventually prioritize those and submit to BOR. He's looking for tasks that have the potential to synthesize multiple knowledge inputs, data, methods, models and assumptions used by AMWG and the Secretary in the GCDAMP. Details were provided for how science advisors are selected for panels, panel reporting requirements, possible modifications which may be needed, panel duration, panel member approval, and potential changes to the SA Charter/ protocols.

Some additional considerations for the FY17 planning cycle needs to be information that will feed into the FY18-20 TWP. It's feasible for him to run tasks when the reviews get produced and the results are available by July or August of 2017. Any information that comes out of a review until the summer of 2017 won't have much impact on the next TWP so it's best to get information that feeds into the planning process. The scheduling is crucial and whatever is done in terms of SA program in FY17 incorporates the feedback that he receives from the TWG and culminates in the revised charter and protocols.

He offered four preliminary ideas that have emerged from his conversations with AMP stakeholders and from other searches. These are just placeholders to help facilitate the transparency that's crucial to the program:

1. Reviewing a review panel to look at the overall state of knowledge that is guiding adaptive management.
2. A review panel on one or more aspects of the AMP's cultural resources management programs.

3. A review panel to look at the draft TWP after there is a draft.
4. Executive Coordinator's participation in the development of the TWP for FY2018.

Comments:

- Like idea of having an individual science panel to tease out some of the conclusions.
- Having a review of the status of state of knowledge is critical and will require a lot of group discussion. Suggest this be conducted as a facilitated meeting.
- It would be good to have a single guidance document but let's not spend a lot of time in the past.
- Try to make the Annual Reporting less dense by having the first day focused on synthesis followed by a half-day overview process with review and SA input.
- There was a lot of work done in the KA workshop and development of DFCs and one panel to synthesize all that and other data is a huge undertaking.
- Two major components - history of guidance documents (MRP, SSP, etc.) vs. a knowledge assessment. The month of October would be a good time for TWG to review those older documents and bring forward key components/concepts.

Comment from Yesterday's Meeting – Rosemary Sucec. I was struck in observing the comments made about what's transpiring in the reservoir which really is the Colorado River. By calling it Lake Powell I think we inadvertently disconnect it from what it is, a river, and what is happening there is affecting downstream. It's critical we invest in knowing more about dissolved oxygen and the effects to downstream life including trout, reduced lake levels, the warming of water also related to trout, and natives and non-natives, and quagga effects downstream, and issues related to plankton and nutrients. I think we're beginning to recognize the importance of what goes on in the river above the dam to what happens below and it is the Colorado River. It does have the ability to effect the Colorado River ecosystem in the future significantly. I want to mention that GLNRA is part of the Grand Canyon Protection Act. It's unfortunate from my perspective that it was omitted from the naming of the Act and again I think we're realizing how important that place is to the future. It affects all life below the dam and the four land managers who are Hualapai, Navajo Nation, GLCA and GRCA and our responsibility to manage those resources in collaboration with all of you.

Bureau of Reclamation FY17 Workplan (Attachment 10c) – Ms. Katrina Grantz. The direction from Anne Castle in 2014 was to organize the TWP around the four DFCs (CRE, cultural resources, recreation, and hydropower), TWG recommendations, and a need to be responsive to the outcomes of the LTEMP EIS. The budget is usually based on 3% CPI rate but having internal agency discussions, we may not want to use that rate because it most likely will be much lower than that. The FY16 budget was prepared using a 3% CPI but it actually came it at 0% resulting in a shortfall. The amount of money for FY16 is the same as Reclamation's proposed budget for FY17: \$2,083,000. Reclamation feels it may not be wise to use 3% in preparing the budget but instead use 0%. It's easier to find extra things to do with money rather than cutting projects at the end. She presented Reclamation's budget for FY17:

AMWG	\$376,180
TWG	\$248,845
Other	\$1,368,002 (not \$1,613,766 as listed on slide)
Cultural	\$793,722
Tribal Contracts	\$475,000

Comments:

- The Native Fish Conservation Contingency Fund currently has a balance of \$824,079 but should be around \$1 million if it were allowed to grow.
- Need to determine what is correct amount for Cultural Program Implementation is because Tribes don't think \$500K was spent. Is the \$500K carried over or is that new money? Tribes would like a formal breakdown on priorities versus what's going for the treatment plan.
- Would like to see FY15 obligations and expenditures displayed.
- Carryover funds should not be included in annual forecast of funds.
- Confusion around two carryover funds (NFCCF and Experimental Flow).

In preparation for today's meeting, Mr. Dongoske said he went through the annual workplan and there are some specific projects that were identified under cultural resources and asked if those funded for 2016 were integrated into the cultural program implementation. He asked if the tribal synthesis project is still planned as he thought he had heard it was going to be dropped for something else because it's to be funded this fiscal year at \$50K and next year at \$70K.

Mr. Dongoske gave an update on the Zuni Associative Values Project. He spent several days with the Zuni religious leaders and a film crew as they documented the Zuni Association and the important place on the landscape between the Pueblo of Zuni and the Grand Canyon. It was a very exciting three days as the Zuni leaders expressed their feelings and association between different places on the landscape and its connection to the Grand Canyon and Pueblo of Zuni. They also gave their views about the impact of impounding waterways. This morning they launched for a 9-day river trip.

As a newcomer to Reclamation, Ms. Callister is currently setting the priorities for her office and getting a handle on all the budgets. She committed to provide a better accounting of Reclamation's budget.

TWG Discussion on FY17 Workplan (Attachment 10d) – Mr. Scott VanderKooi. Updates provided:

- Project 1. The lead scientist for the project retired last year and BOR has decided to revoke and pull funding back into BOR. The monitoring for Lake Powell will be done by the BOR's UC Region, not GCMRC staff. Since USGS will not be collecting the data, they will not be able to certify that data since it's not USGS data. They're working with BOR on how to do that. USGS had a small amount of carryover funds and are working with BOR on how to do the forebay monitoring and other projects. Mr. Shanahan requested this topic not get lost in the process and that BOR provide frequent updates.
- Projects 2 and 3. Information can be found on the USGS website. Work will continue into FY17.
- Project 4. Work will continue into FY17.
- Project 5. Some work has been funded in conjunction with WAPA. Some of the work is sunsetting in FY16.
- Project 6. Work is being done by USGS, AZGFD, and USFWS in conjunction with NPS. They added evaluation of mainstem augmentation of aggregations or other sites. This work will also be part of the LTEMP EIS discussions and the Biological Assessment.
- Project 7. This is HBC work primarily focused in the LCR but also includes PIT tag work and some other smaller studies looking at potential limitations for spawning and distribution of fish.
- Project 8. This work also includes GCMRC portion in support of the brown trout control efforts at BAC. The NPS does the lion's share of work in BAC. Ramping up in FY17 is invasive species surveillance and genetic monitoring of Lower Basin HBC.
- Project 9. A lot of effort of routine monitoring the fishery in GLCA and natal origins study looking at movement of trout out of GLCA and downstream. This project will sunset this year. The natal origins ending is looming large as they've relied on that study and have added a lot of things on that and learned a great deal about the trout and the dynamics of those trout populations and how they move from the dam down to the LCR. With that ending, they will need to decide how to move forward with that. The amount of funding proposed for FY17 to continue monitoring this population is probably inadequate. He may have cut the budget too much when developing the workplan. The natal origins work had been tied with the juvenilve chub monitoring work because that work occurs near the LCR confluence and they have to continue that work for a biological opinion. The budget isn't currently structured for enough money to do that monitoring. The PEP panel will help identify a path forward in terms of what amount of monitoring is needed and at what scale and frequency.
- Project 10. Work is continuing.
- Project 11. Work is continuing and they're starting to look at refilling the (Daniel Sarr) position.
- Project 12. Work is continuing.
- Project 13. Some work is sunsetting in FY16 but tribal values and perspectives will begin in FY17.
- Project 14. GIS work will continue.
- Project 15. Continuation of administration and support for GCMRC. The bid for building GCMRC's new facility is being sent out any day now and the projected groundbreaking would be about a year from now with occupancy occurring in January 2018. There will be increased overhead rates due to increased facilities costs and also had to deal with budget shortfalls. Because of the delay in getting a new facility, the overhead rates dropped considerably. GCMRC also received some funding through the WaterSmart Program and some SWBC discretionary funds have been made available to some GCMRC staff to fund post-docs, bought equipment, and some internal USGS RFPs. As of this morning, they have 100.135% of funding going into FY17.

Comments, Q&A:

- Concern for shortage in natal origins funding.
 - Appendix 4 "... discuss options for equalization that minimize resource degradation." We have operations with respect to GCD and 2007 Guidelines and those were to be sideboards at least in the LTEMP.
 - Vineetha: this was something in background discussions and is not a new project.
- Project 8, #6. Is it possible to maybe add or modify that project to include otolith microchemistry using the MSCP dollars?
 - Scott: Because we had proposed to fund it, we had actually gotten the permitting in place and then the tribal concerns were raised about directed take of fish and so we decided to forego that. It's an important issue raised by the tribes. The genetic work would be on fin clips.
- What's strategy for how to deal with vegetation project?
 - Scott: Emily Palmquist has been moving forward on that but I realized that as we moved into this year, that there would be a need to refill the (Daniel Sarr) position. Two options for continuing work is use a post-doc and hire a more senior level scientist.

TWG Discussion on FY17 Workplan – Mr. Capron. There's need for a BAHG meeting between now and the June TWG meeting so a doodle poll will be sent for availability. Send budget items to Linda.

- *Aeolian studies Aeolian deposition and vegetation work - look at pictures of pre-dam conditions to see that they are in fact affected by the dams. Those studies are very valuable and important work.*
- *Project 10 – Is there the potential to move some funds around from that project to what Bill was talking about for the natal origins?*
 - *Scott: Possibly. We funded a graduate student who has been working with Dan Bumscombe. One of the areas of focus has been to characterize the shoreline areas in terms of sediment and substrait. Dan has gotten data and been able to convert it into useful information. Continue to have discussions with Mike Yard and Scott Wright how to move forward on this project and meet all the deliverables.*
- *Need more clarity on how the Experimental Flow Fund and Native Fish Conservation Contingency Fund work and current balances.*
 - *Marianne: Currently there is between \$800K – \$1 million in the fund. John J*

TWG Discussion on LTEMP DEIS – Ms. Kartha. She received several responses to her request for items to be discussed which included bug flows, low summer stead flows, and vegetation management.

Comments, Q&A:

- *The State of Nevada is concerned about water quality in Lake Mead for low summer flows. That would have negative impacts on the water quality in Lake Mead.*
 - *Rob: We share your concerns. The modeling did show that extreme hydrological conditions can affect Lake Mead so when water levels are really low, there may be water quality changes in Lake Mead. Built into this process is to look at resource conditions and so if there were water quality issues were getting to be a problem at Lake Mead and that was a year in which LSSFs were even considered, that would be something be carefully considered prior to implementation of that experimental element.*
- *The Argonne models are important elements of the program. What happens to those models?*
 - *Rob: The models will be available for continued use.*
- *It's my understanding that LSSF will become available in second 10 years but is dependent upon a certain lower level of chub population and a certain temperature level at the same time. It seems sort of a mitigation measure that's kind of thrown out there as at least something that might be done if the chub population declines rather than an actual management issue that comes on. I'm not sure that it quite ranks up to the MLFF on a daily basis.*
 - *Katrina: It's a tool in the toolbox. All of things such as Lake Mead water quality, impacts to hydropower and the state of the all the resources in the canyon would be evaluated prior to doing a LSSF.*
 - *Rob: You're absolutely right about the second 10 years and that it would only occur in a particular temperature band. You're absolutely right that in all of our discussions with FWS and others, it's being looked as a potential tool that might be necessary someday but there's definitely not going to be any casual use of that. There is nothing else in the document that has had so much time spent on careful wording as the LSSF.*
- *It seems appropriate during annual reporting meeting to use those models as part of our assessment of where we are every year - take some models and do a re-run at the beginning of the year to look at conditions and*

results and how things have changed from the LTEMP and then as we implement various components of the preferred alternative as recommended by the Secretary.

- *Katrina: We can run CRSS an infinite number of different ways and different assumptions but it be difficult moving forward to always compare it to what was run in the LTEMP EIS because initial conditions change.*
- *And certainly some models would make sense to apply it but thinking of the HBC model - linkages to the trout immigration model out of Lees Ferry. Some of that we'd get anyway but to nod back to the LTEMP and its development of those models would be good. They're going to be improved upon anyway and those initial conditions are always going to change too. It should give us the information that we've talked about over the years in this organization.*
- *CREDA has significant concerns:*
 - *LSSF should be eliminated from further consideration.*
 - *Hydropower impacts are significantly understated and they're currently working with DOI on the modeling of them.*
 - *Currently only one alternative meets hydropower objectives, all others continue to negatively impact the resource that has already been reduced by one-third.*
 - *Concern about other steadier flow elements, fluctuating flow factor and load following curtailment after HFEs.*
 - *The 8,000 cfs artificial caps should be removed as it's not supported by science and it is an unnecessary reduction in operational flexibility*
 - *Reduce frequency of HFEs due to their impacts to the foodbase, hydropower and the air emissions from replacement power sources.*

Bug Flows. Ms. Kartha. We don't know much about bug flows because they've never been conducted. It doesn't seem to have any confines around it, the off-ramps are not well thought out or maybe there are none and there are no on-ramps either.

- *Ted Kennedy: We had some conversations with EIS team a year or so ago detailing off-ramps and things like that and I'd be happy to work them on those.*
- *Rob: It's an experimental element that hasn't been tested in this system so it may well be appropriate to look at that. We're very eager to receive more comments.*
- *Where would the effects of the bug flows have their greatest magnitude?*
 - *Ted: We expect bug flows would increase production of aquatic insects throughout Glen and Grand Canyon. There's certain parts of the canyon where you have low tide, low water in the late afternoon when aquatic insects are laying eggs along river shorelines. There are other places where the tide is high in the late afternoon and so it would be those places where essentially the tides are out of phase. We expect we'd see the greatest benefits in Lees Ferry and then also sort of in the middle, ranite Gorge and places like that and the other location where the tide is completely out of phase with angling but we think it would actually benefit aquatic insects everywhere.*
- *There's general acknowledgement and acceptance that we have a severely impaired foodbase in the river and this experiment is one of the few things, if not the only thing within the LTEMP, that might begin a process of trying to address that if it's successful. This is an opportunity to do some science down in the river and if the worst thing about bug flows is that it turns out successful and it works, it puts another tool out there to be used to help enhance the aquatic foodbase.*
- *Let's say we conduct the bug flows and the insect production increases, what kind of impact will that have on the trout numbers and how do you think it could effect chub?*
 - *Ted: Ultimately what matters is how many chub are out there and if we get more insect production and more diverse insect assemblages. We actually expect that we'll see more chub and also more trout but ultimately it's the chub numbers that really matter. I think it's reasonable to expect that both species of fish will benefit. I realize there's concerns that trout may disproportionately benefit at the expense of chub but we don't have any basis for thinking that. What's good for the goose might be good for the gander too. If we get chub expanding into the downstream reaches where you have warm water temperatures every year, maybe risks of predation by trout on chub at the LCR isn't going to be as big of a deal. Maybe you don't have chub moving downstream and establishing robust, self-sustaining populations is because conditions in the mainstem weigh down there in the western canyon aren't amenable to drift feeding, insect-feeding fish. One thing that comes up a lot is that any time there's talk about trying to improve the ecosystem, folks will pull out the non-native card. You do that, it's going to benefit non-natives disproportionately to the detriment of native fish and so I posed a question to 20*

scientists that work in GRCA and asked if the potential benefits of improving habitat for native fishes outweigh the risks posed by non-natives. I think 17 out of 20 answered in the affirmative that the benefits of trying to improve the GRCA ecosystem outweigh the risks. There's clearly no wrong or right answer.

- How frequently were bug flows modeled in the preferred alternative? Was it every year or upon certain specific on-ramp conditions?
 - Rob: It was not every year. There's a huge number of runs so it varied by run. I think on average it was like every third year or something like that. That's an average of a range of runs. I'd have to look that up to give you an exact answer.
- It might be helpful somewhere in the appendices to clearly show what experiments were put in, when over those periods of time, or the different alternatives and specific long-term strategies of those alternatives. It's confusing because you're reading an interpretation of C4 when it's really an interpretation of all of the C runs put together.
- What's the financial analysis of bug flows?
 - Rob: This continues to be discussed.
- There's two components to the financial impact, one is the capacity value effect and the other is the impact on energy value. The capacity value was the big one described in Appendix K so roughly about \$10 million of the negative impact was attributed to energy for the hybrid alternative. I think total was about \$90 million in capacity. When we looked at those numbers, it didn't chive with our mental models. We've been supporting these for awhile and thought it would be a wash for WAPA, roughly neutral. It didn't meet our mental model so we did some modeling ourselves using GTMax and kind of what our assumptions on how the water would be moved from the weekend to the weekdays and so in our discussions with Argonne we think that one of the big differences in how you look at capacity value. If you're using August, the weekday that has the largest capacity need you would look at capacity available on that one day whereas Argonne looked at it for a week within one month so you had two days of the week where you took all that water you had on the weekend following load and now you drop that to flat, right? And you put that water during the week so now you have five days that are a little bit more capacity than 2 days that lost all that capacity and so that's what we think may be driving those big capacity numbers in the analysis. Whereas our recommendation was to just look at the largest day within that month and look at capacity. We've asked that the numbers be recalculated and that's a post-modeling analysis be done and we think the end result is going to be a benefit not a cost because once you move the water from the weekend which is relatively lower needs for capacity, the peaks are actually during the week. We're actually moving a little bit more water onto the week when that peaking capacity happens in August and so it should be, based on our mental models, be a benefit and I think that's how it may turn out. It hasn't been done yet but we believe the direction. Instead of a big negative, it's likely to be a smallish, positive on the capacity side. When you look at the energy side of it, the way we interpret Ted's approach to doing bug flows was that the daily minimum for those peaks during the week would be the same minimum on the weekend so you move water from the weekend to the week. The whole baseline comes up and you have one consistent baseline all month long so that consistent shoreline stays in the same spot for the whole month and so when you model it that way, you end up with less of an impact to energy value as well. It's still negative but it's more – when we looked at it on a 8.23 maf year, it's more in line of about \$200,000 a year for that type of year. And that's four months of implementation of bug flows. WAPA's analysis looks at ... probably have a slightly negative impact to energy, smaller than the potentially the \$10 million estimate and the analysis but it all depends on how it's implemented, right, and it all depends on prices in any given year because we're using one set of prices. There's different ways to implement this that would probably have different levels of effect. We would want to be adaptive on how we exactly implemented this and where we put the water and there's ways that WAPA can move this water around slightly and kind of makes a big difference in the energy value and that we would try to minimize that, keep to the important components of the experiment to try to have as low an impact as possible so that would be described post-analysis description in the EIS showing some bookends, showing two different hydrographs of how this would be implemented, but that the changes that would come would be in the post-analysis approach that Argonne took to describe in a capacity value.
 - Katrina: For the EIS we've bookended it in terms of the cost and what Shane is saying is that it may not be as large of a cost in terms of hydropower as what the current draft shows. We're not planning to change the actual efficacy of the bug flows themselves rather the assumptions that went into how hydropower was moved around outside of bug flows.
- Would that mid-week fluctuation be over the 8,000?
 - No, the rules still stay in place. If you picture a hydrograph for the week right before bug flows with a weekend peak, over here's the two weekend days and the 5 week weekdays, we're going to take that water and just move the whole baseline up but the distance you go up and down will stay the same

roughly and the shape of the peaks will stay the same roughly. We won't violate the 8,000. We won't violate the daily fluctuation.

- *We understand that there's a provision to go from 5,000 to 8,000, etc. so is 8,000 really a number that rafting guys don't want to go below or are they okay at 7 and 6 because it seemed that that was okay number?*
 - *Certainly flows below 8,000 are really getting expeditiously more difficult to get a big motor rig for example through the rapids, rocks and post more of a safety concern. It makes it more challenging. You're going to have more incidences where you're damaging equipment but as far as the guides are concerned, we care a lot about the ecology of the canyon and the health of the fish population. While some guides care more about the low flow, as a group we want to see the quality of the ecology improve.*
- *What happens when it comes time to implement one of these other experiments?*
 - *Rob: There would be a discussion between DOI with GCRMRC about the upcoming year, about what sort of experiments might be appropriate. There would be a series of meetings with all of the government entities and would include the basin states and AZGFD and they would be looking at the condition of all the resources. The experimental proposal for the year would roll out to the TWG. If necessary, there would be consultation with FWS or with tribes on a given year or given issue.*
 - *From the fishing guides standpoint, it's apparent that engagement has expended as time has gone by from what it was in those early meetings.*
- *Regarding the vegetative management piece, is that experimentation going to be below the 45,000 cfs flow line or are you looking at experiments above that line?*
 - *Rob: I think so but we'll have to check on that. It was framed as the new high water zone so I have a technical question to ask about route zones, but I think that's basically the gist that if it's not the 45,000 line, it would be close to it.*
- *Because you've done so much work in that vegetative zone, what would those experiments look like in your mind?*
 - *Rob: We are looking at language to clarify that a bit more, but the pieces to that adaptive experiment are to look at the removal of non-natives so that's probably going to have a heavy focus on tamarisk but also the re-planting of natives. There are key places where that might apply. A proposal from CREDA was to look at places where vegetation has encroached on some of the campgrounds so we're looking at strategic places for that as well as some places where there's been mono cultures of some even native species that are growing in mono cultural now. And then there are a few key places that GCMRC has identified where they believe there is vegetation barriers to some areas where if the vegetation was removed, it might help protected cultural resources. Those are the four categories of places that would be identified. Basically these are very small acreage locations along the river corridor where there would be strategic reasons to do vegetative improvement. The tribes have also been very interested in providing input on some of these for particular reaches.*
- *Given the extensive work that has already been done with vegetative management, is there really that much new left to be learned?*
 - *Rob: Absolutely. You may be aware of the Granite Creek area and that really was a tiny acreage area compared to the rest of the river corridor and a lot was learned from that but again, GCMRC has been looking into this and there is quite a lot to do. Larry Stevens provided us a lot of information for getting into this but one of the things that Jack Schmidt when he was on a river trip with Glen and I, had said was this is really one of the things you can do with vegetation along here. It's not a lot of acres but it's one of the things you can and should do and he really felt there was lot to learn.*
- *The biggest concern we have is the use of the word "restoration" in the document as this is supposed to be an experimental thing.*
 - *Rob: We've gotten comments on that and we've had some discussions with cooperators. There might be a better way to describe the overall vegetative experiment and we're open to receiving language on that.*
- *Regarding the scope of the socioeconomics study, it was very broad and didn't address the same type of information for the power or water. It seemed to us what we're talking about here is experiments that looked really refined the operations between MLFF and a flow regime that has some of these experimental aspects into it probably in the long run. Could that socioeconomics piece be reduced to something that really related to the scope of those changes as opposed to the way it's presented in there? It looks like it goes to the entire canyon.*

- *Rob: We've received comments in both direction from a number of cooperating agencies and tribes. So when we're hearing that it's too big and too small simultaneously, then maybe we've gotten just right. We're open to input on that but really there are socioeconomic concerns to power, to recreation, to a number of things that we tried to capture in there.*
- *Given the idea of capturing a range then, you've got the big range in there, could you include a range that would be more compact and really relevant to dam operations?*
 - *Rob: It would be interesting to get specific comments on that to understand exactly what you mean by that. We have worked closely with WAPA on the hydropower pieces and we've worked with a number of entities including some work with Lucas and some experts at Reclamation on some of the recreation issues. We'd be interested to know technically exactly what you're suggesting, maybe sending something in writing through the Upper Basin Commission or something like that might be a way for use to consider specifically what you mean.*
- *We want to see socioeconomics evaluated on a consistent level so that when the Secretary goes to look at this document to help make decisions, he or she has the entire range of potential socioeconomic impacts.*
 - *Rob: In terms of the money spent, the modeling time, certainly hydropower was the most extensive modeling effort. We might have to talk offline to understand more of what you mean. We welcome more comments on that if there's something we didn't analyze.*
- *Your modeling has been extensive but a lot of the socioeconomic piece doesn't lend itself to what I would call modeling-eze if you will. The socio part of the socioeconomics really depends on how you frame the question that you then want to take and statistically analyze. That's the piece we'd like to see a little more effort put into. We'll provide some comments on that.*
- *Was the preferred alternative subject to the same comprehensive modeling as all the other alternatives but for those few little minor changes that were made to it associated with changing the monthly volume of August and September and no loads following curtailment before a full HFE? There's two or three small things that I recognize you guys put in the preferred alternative and there were minor tweaks, but I just want to confirm that that was the case and were subject to the same extensive modeling as shown in that great spaghetti diagram going from one place to the other as all the other alternatives?*
 - *Rob: Absolutely. The fact that there were substrategies where we turned options on and off but indeed the hybrid alternative was modeled similarly to the rest of the alternatives. We did quite a lot of modeling and I think absolutely passes the test for sufficient analysis and probably far exceeds what is done for many other processes.*
- *What do you do after this LTEMP? Because keeping you engaged here as we work through those questions and relationships might be quite useful to this program and hoping you won't just go skipping off to some other fun EIS some place?*
 - *Rob: I'll continue as the Colorado River Coordinator but I think much of the team has been involved in all of this is probably going to be around. I think the expectation is that there will be a lot to be figured out in the first year or two of implementation of a new LTEMP alternative. Once we get to the point where we're sure that there's going to be a ROD in place, then all of the discussions that came up earlier of switching gears to starting to think about all that will happen.*

Next TWG Meeting. The next meeting will be held June 14-15 in Salt Lake City. Ms. Grantz offered the following reasons for choosing this location:

- ADWR is moving to a new location and their facility is no longer available so it makes this particular location not an option.
- Securing conference room space in Phoenix can be expensive and would incur extra staff time to transport and set up the AV equipment from Flagstaff to Phoenix.
- The BLM training center in mid-Phoenix provides very limited wi-fi capability and requires daily sign-in by all attendees which can be a time-consuming process.
- The Lower Colorado Boulder City office has a conference space but no microphone capabilities so the mics add another layer of logistical challenge.
- The TWG hasn't met in SLC since the old Transition Work Group (1996-97). The UC Regional Office can provide the space, wi-fi capability and microphones
- There were challenges finding a specific space in Flagstaff. With the AMWG meeting scheduled there in August, we felt the added costs might be costly for people to get there.
- There is increased tourists in Flagstaff during the summer which could impact the availability of hotel rooms.

If anyone has suggestions for other potential meeting sites, please provide those to Linda. Ms. Arvisco-Ciocco suggested Twin Arrows outside Flagstaff (24 miles from GCMRC).

Proposed dates for FY17 TWG meetings are:

- January 25-26, 2017 AR/TWG Meeting
- April 18-19, 2017 TWG Meeting
- June 20-21, 2017 TWG Meeting
- October 24-25, 2017 TWG (webinar?) meeting

Public Comment: None

Adjourned: 2:50 p.m.

Respectfully submitted,

Linda Whetton
Upper Colorado Region
Bureau of Reclamation

Next TWG Meeting:

(Tue-Wed) June 14-15, 2016
Bureau of Reclamation
125 S. State Street, Room 8102
Salt Lake City UT 84138

Key to Glen Canyon Dam Adaptive Management Program Acronyms

ADWR – Arizona Dept. of Water Resources	HPP – Historic Preservation Plan
AF – Acre Feet	IG – Interim Guidelines
AGFD – Arizona Game and Fish Department	INs – Information Needs
AIF – Agenda Information Form	KA – Knowledge Assessment (workshop)
AMP – Adaptive Management Program	KAS – Kanab Ambersnail (endangered native snail)
AMWG – Adaptive Management Work Group	LCR – Little Colorado River
AOP – Annual Operating Plan	LCRMCP – Lower Colorado River Multi-Species Conservation Program
ASMR – Age-Structure Mark Recapture	LTEMP – Long-Term Experimental and Management Plan
BA – Biological Assessment	LTEP – Long Term Experimental Plan
BAHG – Budget Ad Hoc Group	MAF – Million Acre Feet
BCOM – Biological Conservation Measure	MA – Management Action
BE – Biological Evaluation	MATA – Multi-Attribute Trade-Off Analysis
BHBF – Beach/Habitat-Building Flow	MLFF – Modified Low Fluctuating Flow
BHMF – Beach/Habitat Maintenance Flow	MO – Management Objective
BIA – Bureau of Indian Affairs	MRP – Monitoring and Research Plan
BO – Biological Opinion	NAU – Northern Arizona University (Flagstaff, AZ)
BOR – Bureau of Reclamation	NEPA – National Environmental Policy Act
BWP – Budget and Work Plan	NHPA – National Historic Preservation Act
CAHG – Charter Ad Hoc Group	NNFC – Non-native Fish Control
CAP – Central Arizona Project	NOI – Notice of Intent
GCT – Grand Canyon Trust	NPCA – National Parks Conservation Association
CESU – Cooperative Ecosystems Studies Unit	NPS – National Park Service
cfs – cubic feet per second	NRC – National Research Council
CFMP – Comprehensive Fisheries Management Plan	O&M – Operations & Maintenance (USBR Funding)
CMINS – Core Monitoring Information Needs	PA – Programmatic Agreement
CMP – Core Monitoring Plan	PBR – Paria to Badger Creek Reach
CPI – Consumer Price Index	PEP – Protocol Evaluation Panel
CRBC – Colorado River Board of California	POAHG – Public Outreach Ad Hoc Group
CRAHG – Cultural Resources Ad Hoc Group	Powerplant Capacity = 31,000 cfs
CRCN – Colorado River Commission of Nevada	R&D – Research and Development
CRE – Colorado River Ecosystem	RBT – Rainbow Trout
CREDA – Colorado River Energy Distributors Assn.	RFP – Request for Proposal
CRSP – Colorado River Storage Project	RINs – Research Information Needs
CWCB – Colorado Water Conservation Board	ROD Flows – Record of Decision Flows
DAHG – Desired Future Conditions Ad Hoc Group	RPA – Reasonable and Prudent Alternative
DASA – Data Acquisition, Storage, and Analysis	SA – Science Advisors
DBMS – Data Base Management System	Secretary – Secretary of the Interior
DOE – Department of Energy	SCORE – State of the Colorado River Ecosystem
DOI – Department of the Interior	SHPO – State Historic Preservation Office
DOIFF – Department of the Interior Federal Family	SOW – Statement of Work
EA – Environmental Assessment	SPAHG – Strategic Plan Ad Hoc Group
EIS – Environmental Impact Statement	SPG – Science Planning Group
ESA – Endangered Species Act	SSQs – Strategic Science Questions
FACA – Federal Advisory Committee Act	SWCA – Steven W. Carothers Associates
FEIS – Final Environmental Impact Statement	TCD – Temperature Control Device
FRN – Federal Register Notice	TCP – Traditional Cultural Property
FWS – United States Fish & Wildlife Service	TEK – Traditional Ecological Knowledge
FY – Fiscal Year (October 1 – September 30)	TES – Threatened and Endangered Species
GCD – Glen Canyon Dam	TMC – Taxa of Management Concern
GCES – Glen Canyon Environmental Studies	TMF – Trout Management Flows
GCT – Grand Canyon Trust	TWG – Technical Work Group
GCMRC – Grand Canyon Monitoring & Research Center	UCRC – Upper Colorado River Commission
GCNP – Grand Canyon National Park	UDWR – Utah Division of Water Resources
GCNRA – Glen Canyon Nat'l Recreation Area	USBR – United States Bureau of Reclamation
GCPA – Grand Canyon Protection Act	USFWS – United States Fish & Wildlife Service
GIS – Geographic Information System	USGS – United States Geological Survey
GLCA – Glen Canyon Nat'l Recreation Area	WAPA – Western Area Power Administration
GRCA – Grand Canyon National Park	
GCRG – Grand Canyon River Guides	
GCWC – Grand Canyon Wildlands Council	
HBC – Humpback Chub (endangered native fish)	
HFE – High Flow Experiment	
HMF – Habitat Maintenance Flow	