Glen Canyon Dam Technical Work Group Meeting
April 8-9, 2014

Conducting: John Jordan, TWG Chair **Convened:** 9:30 a.m.

Committee Members/Alternates Present:
Cliff Barrett, UAMPS
Charley Bulletts, So. Paiute Consortium
Shane Capron, WAPA/TWG Vice-Chair
Todd Chaudhry, NPS/GRCA
Kerry Christensen, Hualapai Tribe
Jerry Lee Cox, Grand Canyon River Guides
Kevin Dahl, National Parks Conservation Assn.
Bill Davis, CREDA
John Hamill, Int'l Federation of Fly Fishers
Paul Harms, State of New Mexico
Chris Harris, State of California
Tony Joe, Jr., Navajo Nation
Leslie James, CREDA
Vineetha Kartha, State of Arizona
Glen Knowles, Bureau of Reclamation
Ted Kowalski, Colo. River Conservation Board
Don Ostler, State of Wyoming
Larry Stevens, Grand Canyon Wildlands Council
Bill Stewart, Arizona Game and Fish Dept.
Jason Thiriot, State of Nevada
Michael Yeatts, Hopi Tribe
Kirk Young, FWS

Committee Members Absent:
Jan Balsom, NPS/GRCA
Bill Davis, CREDA
Kurt Dongoske, Pueblo of Zuni
Chris Hughes, NPS/GLCA
Robert King, State of Utah
VACANT, State of Wyoming

Grand Canyon Monitoring and Research Center:
Lucas Bair, Economist (phone)
Helen Fairley, Social Scientist
Kyrie Fry, Communications Coordinator
Ted Kennedy, Aquatic Biologist (phone)
Ted Melis, Sediment Resources Manager (phone)
Jack Schmidt, Center Director
Scott VanderKooi, Biology Program Manager

Interested Persons:
Peter Bungart, Hualapai Tribe
Marianne Crawford, Bureau of Reclamation
Craig Ellsworth, WAPA
Lesley Fitzpatrick, USFWS (phone)
Dave Garrett, M^{3}Research/Science Advisors
Gerald Hooee, Sr., Pueblo of Zuni
Loretta Jackson-Kelly, Hualapai Tribe
Lisa Meyer, WAPA (phone)
Gerald Myers, Int'l Federation of Fly Fishers
Joe Miller, Trout Unlimited
Sarah Rinkevich, Tribal Liaison DOI (phone a.m.)
Seth Shanahan, SNWA
Mark Van Vlack, State of California (phone)

Meeting Recorder: Linda Whetton

Welcome and Administrative. Welcome by Mr. Jordan.

1. Approval of January 30, 2014, Meeting Minutes – Pending one edit, the minutes were approved by consensus.
2. Review of Action Items (***Attachment 1***).
3. Old Business.
   - LTEMP EIS Update – Mr. Glen Knowles. Last week a LTEMP EIS workshop was held with AMWG and TWG members and other stakeholders to review the modeling results for the LTEMP alternatives. Mike Runge also reviewed and distributed the swing weighting materials for use in the multi-attribute tradeoff analysis portion of the structured analysis work. Kirk LaGory sent out the presentations from the workshop so all of the modeling results are now available in this format, and this should help participants complete the swing-weighting exercise. Swing Weighting responses are due by April 18. A webinar will be held in early May to review the swing-weighting results. A cooperating agency draft EIS will be provided in July and a public draft EIS released in September.
   - BOR Hydrology – Mr. Glen Knowles. The Upper Colorado River Basin total is at 113 percent of median. Because this year is a 7.48 maf release year and the low elevation in Lake Powell, there will be warmer water downstream. Monthly operation for GCD is now at 6,000–11,000 maf and will continue through May. In June it will be 7,000–13,000 maf. GCD releases will be around 10°

to 13°C at the dam. LCR temperatures will be above 12°C and stay above 12° through mid-October. The 2015 hydrograph will be discussed on the AMWG webinar on May 27, 2014; it's essentially the same hydrograph that passed last year.

- Tribal Perspectives Update – Ms. Sarah Rinkevich. The Tribal Consultation Plan is being reviewed by Lori Caramanian and should be available at the next TWG meeting. Tribal proposals will be presented at tomorrow's meeting by Mary Barger.

4. New Business
   - The next TWG meetings will be held (Tu-We) June 24-25 and (Tu-We) October 28-29 at ADWR. Additional information will be provided at a later date.

Management Agencies Perspective (***Attachment 2***) – Mr. Bill Stewart. The USFWS, NPS, AGFD, and USGS met recently to discuss aquatic resources and determine information needs for the next budget cycle from a management/resource managers' perspective. He presented a "management toolbox" which showed linkages between fish, habitat, and people. The NPS CFMP describes stocking triggers for RBT, translocation numbers, and removal triggers. It's important to have monitoring to detect any changes. The CFMP also provides information on the emergency response if there is an expansion of the most threatening fish species – brown trout, and warm water species, such as smallmouth bass, catfish, carp, and channel catfish. During their meetings the group took trips to the river to observe various responses and determined the important issues were:

- Lees Ferry: RBT – monitor to: assess trout stocking triggers; compare the fishery to other tailwater fisheries; identify links between RTELLS and AGFD monitoring; conduct rare bird and non-native surveillance; develop a long term foodbase monitoring program to identify conditions that would support extirpated taxa; utilize citizen science trips and include monitoring Quagga mussel, nematodes, and whirling disease.
- Downstream (Marble Canyon): Investigate alternatives to the Paria - Bader trout removal project, to help determine trout movement from Lees Ferry and the extent of RBT reproduction and recruitment in Marble Canyon.
- Downstream (Grand Canyon): continue juvenile chub and trout monitoring near LCR and mainstem HBC aggregations; continue spring mainstem electrofishing; add a seasonal component and integrate with Hualapai - Diamond Creek downstream surveys: consider additional sampling methods (angling for catfish); and coordinate with BioWest on razorback sucker monitoring.
- Little Colorado River: continue USFWS HBC mark/recapture monitoring in spring and fall; and translocations into mainstem aggregations; conduct LCR aquatic foodbase monitoring. Suggested modifications to research/monitoring includes; evaluating needs for summer hoop net sampling and consider excluding from FY15/16 work plan; phase out AGFD lower 1200m hoop net sampling and incorporate elements into USFWS sampling; and add remote PIT tag antennas at Salt and Coyote camps.
- Systemwide: water quality; HBC genetics monitoring; natal origins of HBC and BNT; non-native surveillance; invasive species threat assessment/surveillance of LCR watershed.

The estimated budget for the work being proposed is more than what's available in the budget. Dr. Schmidt cautioned there will be hard choices to make.

TWG Budget Process

- TWG Budget Guidance & Objectives – Mr. Shane Capron. The following documents were used in developing the budget: the Budget Process Paper, the Biennial Budget Process Table, and the Anne Castle memo dated April 19, 2012. The TWG needs to identify policy and technical issues, forward policy issues to DOI for response, resolve the technical issues, and ultimately develop a budget recommendation for AMWG's consideration at the August meeting.
- Technical Budget for 2015-17, New Process Guidance (***Attachment 3a***) – Dr. Jack Schmidt. The Department has approved a triennial work plan (TWP) process. He presented a timeline with targeted deadlines in order to prepare budget recommendation at the next TWG meeting.
- TWG Initial Budget Considerations – Mr. Shane Capron and Ms. Vineetha Kartha. Copies of the process agenda used for developing the FY13-14 BWP (***Attachment 3b***) were distributed.

TWG Budget Exercise. The participants broke into groups of five to six individuals and were instructed to write down policy (P) and technical (T) issues of concern. Upon returning from lunch, the group heard presentations from BOR and GCMRC on their proposed FY 2015-17 triennial budgets.

Initial FY 2015-17 Budget and Work Plan

- Reclamation Budget Overview (***Attachment 4a***) – Mr. Glen Knowles. The budget is split at 80% to GCMRC and 20% to BOR. The AMP budget is forecasted with a 3% CPI rate. Line items include:
  - Administrative responsibilities and personnel and travel costs are a large portion of the budget, about 30%.
  - Cultural Resources – Also a big percentage of the budget, 30%, Mary Barger will provide more detail tomorrow.
  - Experimental Fund – This is rolling over into the Non-native Fish Contingency Plan (FY15=1,189,127), forms about 25% of the budget. Based on Bill Stewart's presentation, funds could be used for work that he's identified.
  - AMWG and TWG facilitation will be in place by FY15.
  - Starting in FY15 the Science Advisor contract will be administered by BOR instead of GCMRC at $75,000 a year.

  Reclamation's portion of the budget is $2,135,665 and GCRMC's is $8,756,779.

  Comments:
  - *The NNFC budget seems to be subject to raiding. If the long-term goal is to build it up, then have a management objective identifying funds taken from it. It was reduced in FY13 due to sequestration and ended up being in the $500K range. Need for a running total of what the money has been used for. [Glen: It's currently in the $8K-$1M range.]*
  - *If non-native fish removal isn't done in FY15-17, this money could be spent on other program needs.*
  - *If money is being absorbed, it's not a management action that complies with the Law of the River. Where are the HFE's contained? [Glen: Monitoring of HFEs is in GCMRC's budget.]*
  - *There could be increased purchase power costs. Need to get through the water year before you can see the costs for moving water around.*
  - *Consider using a lower CPI rather than having to take funds away*.

- GCMRC Budget Overview (***Attachment 4b***) – Dr. Jack Schmidt. GCMRC's budget is developed and funds expended, to answer two big questions: (1) What is an appropriate rehabilitation goal for the physical habitat of the Colorado River given the limited supply of fine sediment and the characteristics of the large-scale flow regime? And (2) How can a non-native trout sport fishery in Glen Canyon co-exist with an endangered humpback chub population in Marble and Grand Canyons? Using a pie chart for FY13, he noted the following:
  - All personnel costs are reimbursable, not overhead.
  - The USGS burden rate is 11.3%, which is lower than Reclamation's and universities.
  - GCMRC's budget for FY13 was $10,441,000 which included carryover from GCDAMP, BOR and GCMRC.
  - The City of Flagstaff is planning to demolish the GCMRC campus buildings within two years which will significantly increase the rate for GCMRC to lease the new buildings.
  - Concerns have been raised about the numbers of helicopters in the LCR.
  - The relationship between money spent and the amount and relevance of monitoring and research is imperfectly known. The challenge in developing this budget is anticipating these relationships for different disciplines and different researchers.
  - Applied Decision Methods is a new element at $117K.
  - The USGS burden rate will go up substantially (FY15 ~16%, FY16 ~ 22%, FY17 ~ 28%). In FY17, there will only be around ~$7.3 million available. Jack has encouraged his Staff to seek funding from other sources for projects.

- *Comments:*

- *Need for program to be guided by an ecosystem model to prioritize work.*
- *It would be helpful to know which projects are being proposed or funded for FY15 and which will be a "one-time" project.*
- *The MSCP is doing some modeling. There might be some takeaways from other programs.*
- *The CRE model should be a goal – even bringing modelers to a workshop so we can perceive what projects we should be doing.*
- *Need to consider adding PEPs to the next 3-year budget cycle.*
- *There seems to be an absence of strategic planning going to this. It's been 7 years since the last strategic plan. Where's the broader thinking? Where's the rational thinking of where we're going?*
- *There's a certain amount of core monitoring that will go on despite LTEMP. There may be some tweaking when LTEMP comes out, but it will require some monitoring. The guts of the program we can handle. Let's not be scared of LTEMP.*

TWG Budget Exercise (cont) – The members used red (no), yellow (maybe), and green (yes) cards to indicate their preference on the issues noted. They broke into smaller groups to resolve duplicate issues. They reconvened and identified their concerns.

HUMPBACK CHUB (Kerry Christensen, Paul Harms, Gerald Hooee, Leslie James, Jerry Myers)

P or T	#	Budget Description
T	1	Humpback chub natal origins. • Continue funding with non-lethal ways to move forward and utilize HBC that are a result of incidental take.
T	2	Continue LCR studies. • Lower 1200m effort discontinued, enhance existing spring and fall monitoring with remote sensing.
T	3	Effect of temperature vs. trout on humpback chub. • Continue existing studies and monitoring • Potential TCD and/or impellor temp modification devices
T	4	Humpback chub aggregation monitoring, continue and add new sites. • Randomize sites, access 2013/14 work • Utilize citizen science and remote tag readers
T	5	humpback chub aggregations funding • Augment aggregations • Continue requirements of BO
T	6	Humpback chub aggregation enhancement by translocation. • Support pilot study
T	7	More money for trout-humpback chub interactions. • Evaluate current research before moving forward determine potential management actions to increase turbidity
T	8	Support development of the Yackulic humpback chub population model. • Validation • If viable future policy questions
T	9	Spring/fall humpback chub LCR monitoring. • Lower 1200m effort discontinued, enhance existing spring and fall monitoring with remote sensing
T	10	Temperature effects on fish. • Evaluate existing results and potentially continue
T	11	Re-evaluate funding to Chute Falls translocations/monitoring. • Required • Provides significant contributions • Minimize cost w/o effecting objectives- efficiency

MODELING (Craig Ellsworth, Joe Miller, Larry Stevens)

P or T	#	Budget Description
T	1	What model elements need to be better understood to develop/refine the CRE ecosystem concept model to improve the predictive capability for effects of dam operations? • Fish studies (trout, chub, others) • Sediment transport • Hydrology • Foodbase • Recreation • Riparian ecology* • Nutrient budget* • Climate change* • Cultural values and perspectives/TEK* *these elements need considerably more information/instruction on how to incorporate these elements into a CRE ecosystem model.
T	5	How do we incorporate Traditional Ecological Knowledge (TEK) into CRE management for the co-production of knowledge and helping to contribute to management outcomes?

FOOD BASE

P or T	#	Budget Description
T	1	What food base experiments could be conducted that would help understand mechanisms that influence invertebrate ecology?
P	2	Could we experiment with types of food base enhancement if the impetus is for increasing diversity in the CRE?
T	3	The priority for developing food base projects should be a higher priority because of its potential importance to the CRE ecosystem in general and native fish recovery in particular.

NONNATIVES (Todd Chaudhry, Bill Davis, John Hamill, Ted Kowalski)

P or T	#	Budget Description
T	1	Provide annual report and synthesis of nonnative species monitoring data with recommendations for monitoring, research or management actions (fund with NN Contingency fund)
T	2	Increase invasive species surveillance in the LCR and from Diamond down (fund with NN Contingency fund?).
T	3	Review and synthesize tamarisk mortality impacts in upper basin based on review of literature and on-going studies ($10K).

TROUT

P or T	#	Budget Description
T	1	Continue funding support to resolve questions about whether rainbow trout at the LCR originate from Glen Canyon. Provide additional funding to assess whether RBT reproduction is occurring in Marble canyon. Provide management recommendations.
T	2	Continue to fund Lees Ferry rainbow trout monitoring (electrofishing, RTELLS, and CREEL).
P	3	GCMRC should participate in the development of a more detailed fish management plan for Lees Ferry consistent with the NPS Comprehensive Fish Management Plan and other agency policies and mandates.
T	4	Provide funding to map the channel in Glen Canyon and assess the effect of low flows on fish habitat.

T	5	Continue funding projects to assess competition and predation between Humpback chub & trout
T	6	Continue to fund system-wide electrofishing for natives and nonnatives using techniques intended to be non-lethal.

PROGRAM PLANNING (Chris Harris, Don Ostler, Larry Stevens, Jason Thiriot)

P or T	#	Budget Description
T	1	GCDAMP administrative history funding. Yes, but clarify the advantages to the AMP. Proceed with proposed effort.
P	2	Cost for new GCMRC facility in Flagstaff. Devastating reduction of research. Review at higher level. Important issue to move forward to AMWG and DOI.
P	3	Utility of the POAHG - some funding may be appropriate, but review the costs - less $ may be appropriate. LTEMP co-lead by BOR and NPS will need review. Forward question to AMWG - should power revenues pay or should DOI agencies. Review costs, Admin. History project may supersede. Discuss at AMWG.
P	4	Role of Science Advisors in GCDAMP. TWG needs to be involved, SA budget needs to be increased. PEP reviews, especially for trout, humpback chub, research and monitoring. Reinstitute after LTEMP, FY16; Have SA review FY15-17 work plan. Use of stream-riparian ecosystem assessment protocols.
T	5	Cultural resources treatment plan, resolution of tribal issues needs to occur. On-going discussion needs to be resolved by DOI before budget is approved. This is needed to develop the new PA.
T	6	Need for TWG facilitator? Could money be used better on science? No need for TWG facilitator.
T	7	What are we "required" to do under the biological opinion for monitoring? Clarify biological opinion requirements within the GCDAMP.

CORE MONITORING

P or T	#	Budget Description
T	1	Core monitoring needs and SSQs should be considered after LTEMP is completed.
T	2	Develop system model linking aquatic and terrestrial ecosystems. This is the framework on which core monitoring can be established. Establish a discussion in the FY15-16 time frame to learn how to undertake this effort - review other systems model (e.g., MSCP). After LTEMP approval, request review by SAs, etc. No significant budget implications at this stage, but FY16+ may involve SA review and project formulation.

NEW PROJECTS (Cliff Barrett, Jerry Lee Cox, Kevin Dahl)

P or T	#	Budget Description
P	1	Should the cost of AMWG river trips be a budget item, and if so, how many trips should be provided? This should be an AMWG decision.
T	2	Sand Bar Model. Develop it and peer review and fix it. LTEMP has attempted this, and not come up with a useful model. We think it would take too much money to fix this, and that high quality sand bar monitoring is sufficient for our program.
T	3	Driftwood (CWD) history, distribution, movement, HFE & normal flows (citizen science). Initial steps would be to think about projects, and implement with volunteers. For instance, river guides could try to recapture marked wood. Should only be a very small line item.
T	4	Need to understand impacts at historic properties. We need more information on this. A question of clarification: is this a permit issue?
T	5	Razorback sucker monitoring, need more funds for translocations and monitoring. Evaluate the adequacy of existing programs to determine whether this species needs more funding.

T	6	Discuss options for equalization that minimize resource degradation. Restatement of issue: Discuss options for scheduling equalization releases that minimize resource degradation. This should be a technical issue, and not a budget issue. We ask that this be placed on a future agenda.
T	7	Assess cataract canyon as a control for CRE DFCs. We encourage cooperative work without using AMP funding.
T	8	More money for work below Diamond Creek. Needs more clarification.
T	9	What is the question needing an answer regarding mapping habitats program? (320k) We need more discussion about this project and its objectives. We want to know more about all Lee Ferry's reach work. Refer back to TWG.

SUPPORT IN QUESTION

P or T	#	Budget Description
T	1	Can't support bat/bird/spider work. Need more information about this. Some of us like it just from the title, but some have concerns.
P	2	Reduce habitat map below GCD totally. We need more details and discussion about this project. Refer back to TWG.
P	3	Expansion of AMP into Powell and Mead, what is the funding source and is it legal? TWG and AMWG not qualified to make legal determination – if this is a concern, check with DOI solicitor office.
P	4	$500k for experimental carry over fund. TWG should discuss whether this fund be capped at some number.
P	5	Socioeconomic costs? Are more funds needed for unfunded science? Socioeconomic studies are appropriate and needed.
T	6	The increase in cultural resources work from $371k to over $500k does not seem justified, more info needed. This is an accounting change and not a real increase – formerly overhead costs are now being directly assigned to this work.
T	7	The socio-economic DSS work is a low priority. Clarification – this means Applied Decision Methods (ADM, not DSS). Needs more discussion. How does this fit in with work being done for LTEMP. Please justify.
T	8	How does socio-economics fit into the program? It is an important part of our program.
T	9	Reduce trout turbidity funding, pipeline. Clarification: the thought is, if there is nothing we can do to control turbidity, why study it. Needs more discussion.

Public Comment: None

Adjourned: 5:10 p.m.

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Lisa Meyer, WAPA (phone)
Joe Miller, Trout Unlimited
Sarah Rinkevich, DOI
Seth Shanahan, SNWA

Meeting Recorder: Linda Whetton

Welcome and Administrative. Welcome by Mr. Jordan.

Ad Hoc Group Updates

- Species of Management Concern (***Attachment 5a***) - Mr. Larry Stevens. The following lessons were learned from the Hidden Slough and Leopard Frog Marsh Aquatic Habitat Enhancement and Restoration Project: Phreatophytes require water table depths of ≤ 2m; beaver fencing is essential; at remote sites planting poles into the water table is more efficient than use of artificial irrigation; and upper terrace planting requires irrigation for 2-3 years. He reviewed the project objectives for the Leopard Frog Marsh and said that between March 28-31, 2014, GCWC and NPS staff and volunteers will begin construction of open water ponds.

  Mr. Chaudhry reported on the Granite Camp Rehabilitation Project- 28 days on site and1,662 tamarisk were removed. The average canopy cover of tamarisk decreased from 33% to 5% with river camp canopy cover decreasing from 72% to 30%. He reported on the number of plants that survived and new ones that were planted. Much of the work was done by volunteers.

Mr. Kerry Christensen reported on the zebra-tailed lizard (ZLT) project. After the flood in 1983-84 ZLT could not be found at the Diamond Creek dunes, ZLT are extirpated in Grand Canyon. ZLT were present farther south in Peach Springs Canyon. In 2012, Reclamation provided funding for the Hualapai Tribe and Stevens Ecological Consulting to implement a translocation and monitoring effort at the Diamond Creek dunes. On April 23, 2012, 5 males and females were captured in Peach Springs Canyon and transported to the Diamond Creek dunes. Monitoring began on May 1, 2012 and continued monthly until October 2013. Locations of every species of lizard were identified on an aerial photograph.

Mr. Larry Stevens reviewed the charge of the committee and said the White Paper would be updated. The following members joined the group: Shane Capron, Marianne Crawford, Bill Davis, Craig Ellsworth, Paul Harms, Sarah Rinkevich, Scott VanderKooi, Peter Bungart, and John Spence.

- Administrative History Ad Hoc Group (AHAHG) (***Attachment 5b***) – Mr. Jason Thiriot reported that documents have been added to the "GCDAMP "wiki" site and the "dashboard" feature is gaining a lot of interest from stakeholders. If people want to receive an e-mail notifying them of recently posted items, they can add their e-mail address under the "Mailing Lists" link. The members were encouraged to participate in the online training courses and make the wiki site a collaborative product by adding information, posting articles, and reporting broken links, etc.

- Socioeconomics Ad Hoc Group (SEAHG) (***Attachment 5c***) - Dr. Garrett. The SEAHG is recommending the following for FY15/16: (1) FY 2015 Market/Non-market Workshop at a cost of $8-10K with FY15 funds; (2) FY2014-16 Assessment of CRE Recreation Economic Value and Regional Expenditures at a cost of $240K with FY13/14 carryover funds; and (3) FY15/16 Evaluation of Decision Support Methods for AMP at a cost of $240-300K with FY15/16 funds.

- Steering Committee Ad Hoc Group (SCAHG) – Mr. John Jordan. The SCAHG continues to prepare for scheduled TWG meetings. Election for the FY15-16 TWG Chair will occur at the June meeting.

Reclamation Cultural Program and Programmatic Agreement Update (***Attachment 6***) – Ms. Mary Barger. Much of the work proposed for FY13-14 didn't get done. The following updates were provided:

  - Treatment: originally proposed to do treatment on a number of sites, however, GRCA field-checked some sites and there were no effects from the HFEs. GLCA is still working on their proposal so the work at Minus 9 Mile will be in the next budget cycle.
  - Associative Values: There was a pilot program to be done by the Pueblo of Zuni. They've been really busy so their proposed work will be in the next budget cycle.
  - NNMOA Consult: No non-native fish control was necessary so funds were transferred to other projects but will be reestablished in FY15-16.
  - GCMRC Support; - the Amy Draut Aeolian Study that is complete.
  - Tribal TEK: a pilot project for the Hualapai Tribe and if successful, other tribal TEK projects may be undertaken.
  - Implement LTEMP Recommendations: The Hualapai Tribe, Hopi Tribe, and Southern Paiute Consortium were funded $20K each to provide assistance to the BOR and NPS on obtaining tribal input for use in the LTEMP EIS.
- There is $500,000 in the cultural budget for both FY15 and FY16- projects slated for FY15-17 have been reviewed but are awaiting approvals.
- The PA is in draft and will have recommendations for monitoring that are different from those in the previous plan. Previous treatment plans will be used to rewrite a new treatment plan.
- Tribal River Trip. Will not replace annual tribal monitoring trips but provide an opportunity for tribal reps and others to discuss issues on proposed or ongoing projects.

The FY15-16 budget is still very fluid and new monitoring efforts coming out of the LTEMP EIS will need to be reviewed by various stakeholders to assist in developing more efficient monitoring strategies.

TWG Initial Budget Consideration – Mr. Shane Capron and Ms. Vineetha Kartha: Copies of the "Biennial Budget Considerations for FY2015/16 Considered by the BAHG on February 25, 2014," (***Attachment 7***) document were distributed to the individual groups. Because there were over 20 policy items, Mr. Capron cautioned that it is too many to be sent to the AMWG and the list would need to be reduced. The groups were instructed to use the Feb. 25th document to help clarify the items they put on their lists and to rewrite in one or two sentences. The individual groups were reconvened for further discussion.

Following lunch, the TWG reconvened and deliberated further. Based on their comments, Mr. Capron submitted a memo on April 22, 2014, to Deputy AS-WS Lori Caramanian (***Attachment 8***) noting their technical and policy issues:

Technical Issues for Consideration by DOI

Humpback Chub

1. Humpback chub natal origins. Continue looking into non-lethal methods, and utilize HBC that are taken as a result of incident take.
2. Continue LCR studies. Lower 1200m effort discontinued, enhance existing spring and fall monitoring with remote sensing.
3. Effect of temperature vs. trout on HBC. Continue existing studies and monitoring on the effect of temperature vs. trout on HBC.
4. HBC aggregation monitoring, continue and add new sites. Randomize sites, assess 2013/14 work. Utilize citizen science and remote tag readers.
5. Increase HBC aggregations funding for monitoring. Continue requirements of BO.
6. HBC mainstem aggregation enhancement by translocation. Support pilot study.
7. More money to study the influence of turbidity on trout-HBC interactions. Evaluate current research before moving forward, determine potential management actions to increase turbidity.
8. Support further development of the Yackulic HBC population model.
9. Support project, but also support changes to reduce costs for Chute Falls translocations/monitoring.

Modeling

1. The following model elements need to be better understood (consider a workshop) to scope the utility and cost of developing a CRE ecosystem model to improve the predictive capability for effects of dam operations:
    a. Fish studies (trout, chub, others)
    b. Sediment transport
    c. Hydrology
    d. Food base
    e. Recreation
    f. Riparian ecology*
    g. Nutrient budget*
    h. Climate change*
    i. Cultural values and perspectives/TEK*

    *These elements need considerably more information/instruction on how to incorporate these elements into a CRE ecosystem model.

2. Continue to develop research projects that would incorporate TEK into CRE science and management and help contribute to management decisions.

Food Base

1. The priority for developing food base projects should be a higher priority because of its potential importance to the CRE ecosystem in general and native fish recovery in particular.

Nonnatives

1. Provide annual report and synthesis of nonnative invasive species monitoring data and options for monitoring and management (fund with Experimental Fund).
2. Increase invasive species surveillance in the LCR and from Diamond down (fund with Exp. Fund).
3. Review and synthesize data on tamarisk mortality impacts in the upper basin based on review of literature and ongoing studies ($10K). DOI should consider whether this project is appropriate for the use of power revenues.

Trout

1. Continue funding support to resolve questions about whether RBT at the LCR originate from Glen Canyon. Provide additional funding to assess whether RBT reproduction is occurring in Marble Canyon. Provide management recommendations.
2. Continue to fund Lees Ferry RBT monitoring (electrofishing, RTELLS, and CREEL).
3. GCMRC should participate in the development of a more detailed fish management plan for Lees Ferry consistent with the NPS Comprehensive Fish Management Plan and other agency policies and mandates.
4. Provide funding to map the channel in Glen Canyon and assess the effect of low flows on fish habitat.
5. Continue funding to map the channel in Glen Canyon and assess competition and predation between HBC and trout.
6. Continue to fund systemwide electrofishing monitoring for natives and nonnatives using techniques intended to be non-lethal.

Program Planning
1. GCDAMP administrative history funding. Proceed with proposed effort.
2. PEP reviews should be funded in the budget, especially for trout, HBC, research and monitoring.
3. Cultural resources treatment plan, resolution of tribal issues related to treatment needs to occur. This needs to be resolved by DOI before budget is approved. This is needed to implement the new PA.
4. What are we "required" to do under the BO for monitoring? Clarify for the TWG, the BO requirements within the GCDAMP.

Core Monitoring
1. Core Monitoring needs, Strategic Plan, and SSQs should be considered after LTEMP is completed.
2. Develop system model linking aquatic and terrestrial ecosystems. This is the framework on which core monitoring can be established. Establish a discussion in the FY15-16 time frame to learn how to undertake this effort – review other systems model (e.g., MSCP). After LTEMP approval, request review by SA, etc. No significant budget implications at this stage, but FY16+ may involve SA review and project formulation.

New Projects
1. The TWG supports GCMRC's proposal to continue funding the physics based sandbar model and the empirical based sandbar model.
2. GCMRC should consider a study directed at driftwood (CWD) history, distribution, movement, HFE & normal flows (citizen science). Initial steps would be to think about projects and implement with volunteers. For instance, river guides could try to recapture marked wood. Should only be a very small line item.
3. TWG supports further development of the monitoring program (e.g., Lidar) to assess dam effects on historic properties.
4. Assess Cataract Canyon as a control for CRE DFCs. We encourage cooperative work without using AMP funding.
5. More money for work below Diamond Creek. For example, sediment following HFEs and fish monitoring including tribal participation.
6. The TWG supports the proposed research to investigate trout habitat and aquatic food base and the relationship to flows in Lees Ferry but is concerned about the proposed cost.

Support in Question
1. Can't support bat/bird/spider work. Need more information about this. Some of us like it just from the title, but some have concerns.
2. The socioeconomic DSS work is a low priority. Clarification – this means Applied Decision Methods (ADM, not DSS). Needs more discussion. How does this fit in with work being done for LTEMP? Please justify.

Policy Issues for Consideration by AMWG
1. Evaluate the feasibility of options to maintain water quality (e.g., temperature) needed to support a quality trout fishery in Lees Ferry and native fish downstream (TCD, water management options, etc.)
2. Cost for new GCMRC facility in Flagstaff. Devastating reduction of research due to increased USGS burden.
3. Utility of POAHG. Some funding may be appropriate, but review the costs and benefits – less money may be appropriate.
4. Role of Science Advisors in GCDAMP. TWG needs to be involved in the development of the role of the SA, and SA budget may need to be increased.

Public Comment: None

Adjourned: 3 p.m.

Respectfully submitted,

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Key to Glen Canyon Dam Adaptive Management Program Acronyms

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

(Updated: 2/7/2014)