Glen Canyon Dam Adaptive Management Work Group Meeting
February 25, 2015
(See abbreviations list, last page.)

Conducting: Jennifer Gimbel, Acting Secretary's Designee Start Time: 9:30 a.m.
Facilitation: Mary Orton, The Mary Orton Company

Committee Members/Alternates:
Tom Buschatzke, State of Arizona
James deVos, Arizona Game & Fish Department
Jayne Harkins, State of Nevada
Beverley Heffernan, U.S. Bureau of Reclamation
Leslie James, CREDA
Sam Jansen, Grand Canyon River Guides
John Jordan, International Federation of Fly Fishers/Trout Unlimited
Lynn Jeka, Western Area Power Administration
Chip Lewis, Bureau of Indian Affairs
John McClow, State of Colorado
Eric Millis, State of Utah
David Nimkin, National Parks Conservation Association
Don Ostler, State of New Mexico
Ted Rampton, UAMPS
Steve Spangle, U.S. Fish and Wildlife Service
Larry Stevens, Grand Canyon Wildlands Council
Tanya Trujillo, State of California
Dave Uberuaga, National Park Service (GRCA)
Steve Wolff, State of Wyoming
Mike Yeatts, The Hopi Tribe

Committee Members Absent:
Charley Bulletts, Southern Paiute Consortium
Tony Joe, Navajo Nation
Loretta Jackson-Kelly, Hualapai Tribe
Leigh Kuwanwisiwma, Hopi Tribe
Mark Martinez, Pueblo of Zuni
Frederick H. White, Navajo Nation
VACANT, San Juan Southern Paiute Tribe

USGS/Grand Canyon Monitoring and Research Center
Helen Fairley, Program Manager
Kyrie Fry, Communications & Outreach Coordinator
Paul Grams, Program Manager
Barbara Ralston, Program Director (by telephone)
Scott VanderKooi, Acting Center Director

Interested Persons:
Adam Arellano, WAPA
Eric Balken, Glen Canyon Institute
Jan Balsom, NPS/GRCA
Mary Barger, Bureau of Reclamation
Cliff Barrett, UAMPS
Rob Billerbeck, National Park Service
Jane Blair, Bureau of Reclamation
Peter Bungart, Hualapai Tribe
Dan Bunk, U.S. Bureau of Reclamation (phone)
Shane Capron, WAPA
Lori Caramanian, DOI
Marianne Crawford, U.S. Bureau of Reclamation
Katrina Grantz, U.S. Bureau of Reclamation
Kurt Dongoske, Pueblo of Zuni
Martha Hahn, NPS/GRCA
Lynn Hamilton, Grand Canyon River Guides
Paul Harms, State of New Mexico
Mark Holden, Utah Reclamation Mitigation and Conservation Commission
Chris Hughes, NPS/GCNRA
Simone Jackson, Hualapai Tribe
Loretta Jackson-Kelly, DOI Joint Tribal Liaison
Vineetha Kartha, State of Arizona
Robert King, State of Utah
Glen Knowles, U.S. Bureau of Reclamation
Ted Kowalski, State of Colorado
Jane Lyder, DOI, Fish Wildlife and Parks
Reed Murray, U.S. Bureau of Reclamation
Jessica Neuwerth, State of California
Jess Newton, USFWS (by telephone)
Daniel Picard, U.S. Bureau of Reclamation
Ben Reeder, Grand Canyon River Guides
Brent Rhees, U.S. Bureau of Reclamation
Dr. Sarah Rinkevich, DOI Joint Tribal Liaison
Brian Sadler, WAPA
Seth Shanahan, Southern Nevada Water Authority
Rodney Smith, DOI, Office of the Solicitor
Stacey Smith, U.S. Bureau of Reclamation
Justin Tade, DOI, Office of the Solicitor
Jason Thiriot, State of Nevada

Shana Tighi, U.S. Bureau of Reclamation (by telephone)
Jason Tucker, U.S. Bureau of Reclamation
Rich Valdez, SWCA Environmental Consultants
Larry Walkoviak, member of the public

Recorder: Linda Whetton, USBR

Welcome and Administrative. Ms. Gimbel welcomed the AMWG members and members of the public. She said she would serve as the Secretary's Designee, and her official title is *Principal Deputy Assistant Secretary – Water and Science* (PDAS). Because of the Vacancy Reform Act, she can only act under certain circumstances; however, she has the full authority of the ASWS Office. Ms. Gimbel has more than 20 years' experience as a water attorney, working first from the Wyoming Attorney General and then for the Colorado Attorney General on water, natural resources, and environmental issues. She has previously worked with DOI on water issues and with the State of Colorado in water policy. She is familiar with the AMWG as she used to be the AMWG representative from Colorado, and her staff has briefed her on the last four years of AMWG activities. She said she intends to be deeply engaged in this process.

A quorum was determined. While Mr. Peter Bungart (Hualapai Tribe, representing Loretta Jackson-Kelly who cannot represent the Tribe and also serve as Tribal Liaison) and Mr. Kurt Dongoske (Pueblo of Zuni) will represent their respective members, they will not be able to vote.

- Approval of August 27-28, 2014, Meeting Minutes. Motion to approve proposed by Mr. Ted Rampton and seconded by Ms. Tanya Trujillo. Pending edits submitted via e-mail from Scott VanderKooi, the minutes were approved by consensus.
- Ms. Gimbel reviewed the Action Item Tracking Report (***Attachment 1***).
- Progress on Nominations and Reappointments. Ms. Gimbel welcomed two new members: Eric Millis (Utah) and Steve Wolff (Wyoming). The following reappointments were noted: Sam Jansen, John Jordan, Leigh Kuwanwisiwma, Jerry Cox, and Don Ostler. Other appointments in process: Chris Cantrell (alternate, AGFD), Robert King (alternate, Utah), Larry Stevens (GCWC), and Charley Bulletts (Southern Paiute Consortium).
- Facilitation Contract Update. Ms. Gimbel welcomed Ms. Mary Orton back after a two-year hiatus. Ms. Orton reviewed agenda changes and other meeting information.

Basin Hydrology and 2015 Hydrograph (***Attachment 2*** = *AIF and PPT*) − Ms. Katrina Grantz. The February forecast for unregulated inflow into Lake Powell was 73% of average, and by mid-month it was at 68% of average. The forecast ranges from 47% to 117%, with a 10% chance that flows could be higher and a 10% chance they could be lower. The current forecast for April-July includes most of the runoff/inflow.

- The snowpack is currently at 80% of average in the Upper Colorado Basin. Lake Powell is about 45% full and has been below half for the past couple of years.
- Lake Powell operations are in the upper elevation balancing tier at 8.23 maf. This tier can include varied releases. The hydrology is determined in the April 24-Month Study and projects the end of the water year storage and necessary adjustments. If releases continue at 8.23 maf, balancing Lakes Powell and Mead will be necessary with equalization releases. Currently the minimum inflow forecast indicates 9.0 maf.
- Other upper basin reservoirs are in approximately the mid-60s. Flaming Gorge elevation is at 86% of average.
- Dam Maintenance Schedule. There are eight hydropower units available at GCD. Maintenance that takes units offline is continual. Management attempts to keep the maximum number of units online in November for a potential HFE.

DOI-DOE Hydrograph Development for Water Year 2016

- Objective is to retain sand inputs high in the system in anticipation of a potential HFE.
- August and September are typically the months of greatest sand inputs.
- Water has been shifted the past 5 years from the standard pattern to lower August and September releases, in order to retain sand inputs high in the system for a potential HFE in November.
- Operations have also avoided taking extra water in June to maximize warm temperatures at the mouth of the LCR for native fish purposes.
- In order to minimize impacts to hydropower, water is released in months that have equal or close to equal values to August, i.e., December and January.
- There is uncertainty for WY2016. The range of possible releases is: minimum 8.23 maf, most probable 9.0 maf, and maximum probable approximately 11.7 maf with an April adjustment to equalization. The LTEMP hybrid alternative may influence future hydrograph decisions.

A proposed DOI-DOE WY2016 hydrograph will be presented to the TWG in June, and to AMWG in August for a recommendation to the Secretary.

Panel on Current Projects and Issues in Utah (***Attachment 3a***) – Ms. Beverley Heffernan. Ms. Heffernan introduced the following topics and presenters:

- Central Utah Project (***Attachment 3b***) – Mr. Reed Murray. The CUP began construction in May 1959 with the Bonneville Unit Definite Plan Report completed in 1964. The CUP captures flows as they leave the Uinta Mountains and moves them to the Wasatch Front. The CUP began running out of authorized ceiling in the 1980s. Conservation groups objected to the pace of environmental mitigation but the Utah delegation was able to pass the CUP Completion Act (CUPCA), signed in 1992 by President George Bush. In part, the Act removed responsibility from completing the CUP from the Bureau of Reclamation and gave oversight to the ASWS for construction of the remaining features to the Central Utah Water Conservancy District. It created the Utah Reclamation Mitigation & Conservation Commission to finish all the environmental, mitigation, and conservation portions of the project. The Vernal and Jensen units have been completed. The Bonneville Unit includes Starvation Collection System, Strawberry Collection System, Municipal and Industrial System, Ute Indian Tribal Development, Diamond Fork System, and Utah Lake System. All but the latter, which is under construction, have been completed. Seventy-one oral histories regarding the CUP are being housed in the Utah State University Digital Collections.
- Utah Reclamation Mitigation & Conservation Commission (***Attachment 3c***) – Mr. Mark Holden. The Commission is a presidential Commission established in July 1994 under the Central Utah Project Completion Act of 1992 (CUPCA). Common issues facing GCDAMP and CUPCA include water supply and delivery, ecosystem needs, hydropower generation, endangered species, and funding. Mr. Holden reviewed the Provo River restoration project (emphasis on restoration of processes as well as conditions) and the Provo River delta restoration at the mouth of Utah Lake (to facilitate recovery of June sucker in Utah Lake). The Provo River Restoration Project Draft EIS was released in February 2014, the Final EIS will be released in April 2015, followed by the Record of Decision anticipated in May 2015.
- Utah Division of Water Resources (***Attachment 3d***) – Mr. Eric Millis. The UDWR is the state's water planning and development agency and assists local water suppliers and users with planning and anticipated future needs. Population growth is driving conservation efforts. Utah has a goal of a 25% reduction from 2002 water use by 2025. Other strategies are water use conversions, Water development, and innovation. Utah's Colorado River allocation is 1.369 maf and the current use is about 1.008 maf. The environmental review process is currently underway for the Lake Powell Pipeline Project. This project would take water upstream of Glen Canyon Dam and move it 139 miles to southwest Utah, terminating in Washington County (St. George area). Two water conservancy districts there would use the water.
- Provo Area Office, USBR (***Attachment 3e***) – Mr. Wayne Pullan. The Provo office has 17 projects including the Bonneville Unit. The area office provides services to the CUPCA Office and the Mitigation Commission. The majority of projects are the day-to-day operation, maintenance, and

replacement transfer for water users. Mr. Pullan described the various technical services provided by the office, including Force Account, Drill Crew, Surveys, Materials Lab, Construction Management and Inspection, Design, and Geology. Over the last 20 years, the Provo office has cultivated good working relationships with the water users.

Charter Ad Hoc Group Act Update (***Attachment 4***) – Ms. Beverley Heffernan. Discussion focused on proposed changes to the charter, which needs to be renewed by August 23, 2015. Action on a final recommendation from the CAHG will be accomplished at the May WebEx meeting. The CAHG was directed to address the following items:

- TWG's responsibilities in making technical recommendations to AMWG should be clarified.
- Clarification consistent with FACA is needed on furnishing compensation to non-agency individuals elected to official positions. For example, if the TWG chair is not with a Federal or state agency, is reasonable compensation appropriate?
- Review of the ex-officio, non-voting status of DOI agencies and a recommendation on whether to continue this current arrangement.
- Revisit a potential AMWG Executive Director or additional position within Reclamation.
- Revisit the TWG nominating process.
- Consider whether and where to codify the annual memorandum to the Secretary from the Secretary's Designee of AMWG findings and recommendations.
- Consider whether any recommendations for the Designated Federal Official (DFO) are warranted, such as the ASWS to delegate responsibilities.

AMWG members noted the following concerns:

- Section 3, paragraph 1: Please change this phrase, "operating criteria and plans adopted by the Secretary," to read "plans and operating criteria adopted by the Secretary" to make it clear that it includes all plans adopted by the Secretary, such as resource plans, and not only operating plans.
- Section 3, paragraph 4: Move the TWG paragraph to the Subcommittee section (Section 14).
- Section 4.f: Maintain the sentence about modifying the ROD and operating criteria, because there will be a new ROD after the LTEMP EIS is completed. Maybe refer to the "current ROD."
- Section 12: The Grand Canyon Protection Act specifies the inclusion of representatives from academia and science, who are not today represented on the AMWG. Consider adding them.
- Science Advisors are not mentioned and are crucial to the program.
- Define the process for amending the Charter, and include the opportunity for the public to comment. This can be in the minutes, operating procedures, or any other appropriate place.
- Please copy the AMWG members when the Annual Report is sent to Congress and the Governors.

Updates from the 2015 Glen Canyon Dam Adaptive Management Program Technical Work Group Annual Reporting Meeting (***Attachment 5a***). The Annual Reporting Meeting was held January 20-21, 2015, and covered research conducted by GCMRC and its cooperators for 2014, at the end of the 2013-14 work plan.

Streamflow, Water Quality, and Sediment Transport in the Colorado River Ecosystem – Dr. Paul Grams

The Streamflow, Water Quality, and Sediment Transport Core Monitoring Project is focused on high-resolution monitoring of stage, discharge, water temperature, specific conductance, dissolved oxygen, turbidity, and suspended-sediment concentration and particle size at a number of mainstem and tributary sites located throughout the CRE. These data are collected to address GCDAMP Goal 7; they are used to inform managers about the physical status of the Colorado River in the CRE and how this status is affected by dam operations in near real time. The high-resolution suspended-sediment data collected under this project are used to construct the mass-balance sediment budgets used by managers to trigger controlled floods under the 2012-2020 HFE protocol. The data demonstrate that sand evacuation occurs

during periods of sustained high releases (equalization flows) and sand accumulation occurs during periods of sustained low releases.

During 2013-14, this project completed work on and delivered all data and publication products promised under the 2013-14 Biennial Work Plan. The single most significant accomplishment during the period of the 2013-14 work plan was the completion of the new database and website. This website provides access to all of the current and legacy data collected by the Streamflow, Water Quality, and Sediment Transport Project and to all of the historical unit-value gage height and discharge data collected by the USGS at USGS gaging stations with water quality and sediment data relevant to the CRE. The user-interactive tools available at this website to visualize and operate on the data are unique in the world. The two URLs to use to access this new website are: http://www.gcmrc.gov/discharge_qw_sediment/ or http://cida.usgs.gov/gcmrc/discharge_qw_sediment/.

Sandbars and Sediment Storage in Marble and Grand Canyons: Response to Recent High-flow Experiments and Long-term Trends – Dr. Paul Grams
The Sandbar Monitoring and Sediment Storage Dynamics project (Project A) monitors sandbars for HFE response, monitors the sand budget for effects from different flow regimes, and includes other elements such as modeling and sandbar geochemistry. In October 2013, approximately 11 months after the 2012 high-flow experiment (HFE), the median size of sandbar monitoring sites in Marble Canyon had increased from the low point measured one year earlier. Topographic surveys and images from remote cameras indicate that the fall 2012 and 2013 HFEs resulted in increases in sandbar size in both Marble Canyon and Grand Canyon. These results indicate that the implementation of the HFE Protocol is causing increases in sandbar size. However, it is still too early in the Protocol implementation to determine whether the repeated HFEs are resulting in a cumulative increase in sandbar size. Analysis of remote sensing images for select reaches does not indicate a significant trend (increase or decrease) in sandbar area above the 8,000 cfs elevation between May 2002 and May 2009. Analysis of these images together with images taken following the 1996 HFE indicate that sandbar area visible on these images is a function of the elapsed time between a HFE and image acquisition, supporting the hypothesis that sandbar area will increase, on average, with more frequent HFEs.

Repeat mapping of the river channel has demonstrated that changes in sand storage are highly variable from one storage location (eddy) to the next. Repeat mapping of sandbars and the river channel in lower Marble Canyon (RM 30 to 61) shows scour of the riverbed and decreases in sandbar volume between May 2009 and May 2012. Most of this erosion occurred during the 2011 equalization flows and most of the sediment loss was from the riverbed in the channel rather than from eddies or sandbars above the 8,000 cfs stage. The magnitude of this sediment loss was less than the average annual input of sand from the Paria River. This suggests that, despite the large amount of sediment evacuation caused by equalization flows, most of the evacuated sediment likely consisted of recently accumulated Paria River sand inputs rather than older deposits of pre-dam sediment. Analysis of this repeat map that includes more than 80 large sandbars in this segment has also been used to evaluate the representativeness of the long-term monitoring sandbars. This analysis shows that the mean change in sandbar elevation at the long-term monitoring sandbars (the Northern Arizona University monitoring sites) in lower Marble Canyon was consistent with the mean response at all sandbars mapped in the 2009 and 2012 channel mapping efforts.

Cultural Resource Monitoring and Research – Dr. Paul Grams. Sand deposited by HFEs temporarily filled some gullies through aeolian deposition at monitored cultural resources sites. This can slow or stop progressive erosion. The November 2012 HFE caused erosion near one cultural site.

Developing Riparian Vegetation-Flow Response Guilds for the Colorado River Ecosystem in Grand Canyon, Arizona – Dr. Paul Grams
River regulation in the semi-arid West has resulted in major changes to riparian communities and geomorphic patterns. To restore riparian vegetation communities and associated values, managers desire a better understanding of the linkages between flow variables and vegetation response. Riparian vegetation-flow response guilds provide a potential tool to mechanistically link flow attributes to the distribution and abundance of specific riparian vegetation groups.

In this study, GCMRC compiled physiological and morphological trait information for 114 vascular plant species collected in 2012 and 2013 sampling along the Colorado River in Grand Canyon. For these species, we conducted two guild classifications using hierarchical cluster and analysis and Principal Coordinates Analysis ordination using eight trait variables. The first guild classification was an unsupervised classification that used a Gowers distance metric to classify the pool of 114 species into 7 groups. The second guild classification was supervised, and intentionally upweighted three traits (Anaerobic Tolerance, Drought Tolerance, and Height at Maturity) to ensure guilds were strongly linked to flow and were visually distinct. The supervised guild classification yielded 10 groups, from which we recognized 7 guilds with at least three species.

For each guild classification, GCMRC constructed logistic regression models linking species probability of presence with flow exceedance (the proportion of time that a site was inundated during the period of detailed flow records from 1985-2013). Logistic regression models were used to map the probability of occurrence on a large, heterogeneous sandbar, which showed a range of patterns from xeroriparian guilds on the highest microsites to hydroriparian guilds which occurred near the water's edge or in lower side channels. The conclusion is that riparian vegetation flow response guilds present a new and valuable way of classifying vegetation into functional groups that may have direct application to riparian management and restoration.

Native-Nonnative Interactions: Factors Influencing Predation Vulnerability (***Attachment 5b***) – Mr. Scott VanderKooi. Predation on juvenile native fish by introduced Rainbow Trout (*Oncorhynchus mykiss*) and Brown Trout (*Salmo trutta*) is considered a significant threat to the persistence of endangered Humpback Chub (*Gila cypha)* in the Colorado River. Diet studies of Rainbow Trout and Brown Trout in Grand Canyon indicate that these species do eat native fish, but population level impacts are difficult to assess because predation vulnerability is highly variable depending on the sizes of the prey and predators as well as the water temperature and turbidity under which the predation interactions take place. GCMRC conducted laboratory experiments to evaluate how short-term predation vulnerability of juvenile native fish changes in response to fish size, water temperature, and turbidity using captive reared Humpback Chub, Bonytail Chub (*Gila elegans*), and Roundtail Chub (*Gila robusta*). Juvenile chub 45 to 90 mm total length (TL) were exposed to adult rainbow and Brown Trout at 10°, 15°, and 20° C and at turbidities ranging from 0 to 150 formazin nephelometric units (FNU). A 1° C increase in water temperature decreased short term predation vulnerability of Humpback Chub to Rainbow Trout by about 5% although the relationship was not linear. Results indicate that turbidity as low as 50 FNU can reduce predation vulnerability of bonytail to Rainbow Trout by 63% (95% confidence interval = 43% - 82%). Of the factors tested, chub size and turbidity had the largest effect on predation vulnerability to Rainbow Trout. By contrast, Brown Trout were highly piscivorous at any size >220 mm TL and at all of the water temperatures and turbidities tested. Understanding the effects of predation by trout on endangered Humpback Chub is critical in evaluating management options aimed at preservation of native fishes in Grand Canyon. We present a modeling tool, based on laboratory data, which can assist managers in evaluating these management options.

Endangered Humpback Chub Translocations to Colorado River Tributaries in Grand Canyon National Park – Mr. Scott VanderKooi. Historic fish communities in Grand Canyon National Park consisted of eight species, six of which are endemic to the Colorado River Basin. Today, reproducing and recruiting populations of only four native species are known to occur in the Park, including Humpback Chub, *Gila cypha*, which is listed under the Endangered Species Act. The Colorado River in Grand Canyon contains the largest remaining population of Humpback Chub, one that faces significant threats, including the presence of nonnative fish and parasites and altered temperature and flow regimes. Additionally, the Grand Canyon population primarily spawns in one location, the Little Colorado River, which is threatened by watershed-wide impacts. In accordance with the Comprehensive Fisheries Management Plan for Grand and Glen canyons (NPS 2013), Grand Canyon National Park, with the assistance of the Bureau of Reclamation and others, initiated a series of Humpback Chub translocations in Havasu and Shinumo creeks to contribute towards the long-term goals of establishing additional spawning aggregations and/or increasing mainstem aggregations of the Humpback Chub within the park.

Growth in translocated Humpback Chub was generally high in the Little Colorado River (Chute Falls site), including the larger size classes, suggesting favorable rearing conditions in translocation reaches. Growth in translocated Humpback Chub high in Havasu Creek, too, suggesting favorable conditions for rearing. Translocated Humpback Chub comprise a high proportion of mainstem aggregations associated with translocation tributaries.

Bright Angel Creek Trout Reduction Project – Mr. Scott VanderKooi. The Bright Angel Creek Trout Reduction Project is an NPS-led interagency cooperative effort with the USGS, funded by the Bureau of Reclamation, to enhance native fish populations and contribute towards the fulfillment of Humpback Chub (*Gila cypha*) conservation measures for the operation of Glen Canyon Dam. The results of this adaptive management project will be measured against objectives included in the NPS Comprehensive Fisheries Management Plan, following implementation of five consecutive years (2012-2017) of nonnative trout control in and around Bright Angel Creek. Trout reduction efforts consist of the installation and operation of a weir to trap and remove spawning trout in the mouth of Bright Angel Creek, backpack electrofishing depletion sampling in Bright Angel Creek (approximately 10 miles), and boat mounted electrofishing depletion sampling in the Bright Angel Creek Inflow. The third year of reduction efforts is underway and will conclude in March 2015. Preliminary results indicate that weir captures have varied from year to year, and reduction efforts in the creek have yielded 12,456 and 10,545 Brown Trout (*Salmo trutta*) and 1,735 and 1,400 Rainbow Trout (*Oncorhynchus mykiss*) in 2012-2013 and 2013-2014, respectively. From 2012-13 to 2013-14, there was a shift to smaller size classes captured for both Brown Trout and Rainbow Trout. Over the same period, there were considerable declines in biomass for both Brown Trout (55%) and Rainbow Trout (44%).

A Bright Angel Creek Inflow depletion sampling feasibility study occurred in November-December of 2013-14. While catches were limited due to turbid water, a depletion was still achieved with a total of 332 Brown Trout and 1,375 Rainbow Trout removed. Population estimates, length frequency data, and native fish survival analyses will be used to evaluate the effectiveness of the project. All nonnative fish removed during the project have been put to beneficial use, consistent with a Memorandum of Agreement with the State Historic Preservation Office, following NHPA Section 106 consultation with Traditionally Associated tribes.

Lees Ferry Fishery Monitoring: Electrofishing Surveys, Angler Surveys, and Spawning and Rearing Surveys – Mr. Scott VanderKooi. Glen Canyon Dam on the Colorado River in Arizona was completed in 1963. The resulting cold-water releases created a popular Rainbow Trout tailwater fishery known for trophy-sized Rainbow Trout. Arizona Game and Fish Department has been monitoring the Lees Ferry fishery since the early 1980s using angler (creel) surveys and boat electrofishing. Dam operations have had a significant effect on the Rainbow Trout population. Flow from the dam was regulated in response to power demands, with water levels fluctuating up to 15 feet daily, until 1996 when MLFF was implemented. MLFF significantly reduced the variance in flows. Before the MLFF, the Rainbow Trout fishery was maintained via stocking. However, stocking ceased in 1998 when the majority of Rainbow Trout were maintained via natural reproduction. Since 1981, the median size of reproductively mature Rainbow Trout has declined, as has the percent of large fish (>456 mm; 18 inches) in the population. Consistent flow levels have allowed Rainbow Trout to naturally reproduce every year, thereby increasing density and competition for a limited food base. Rainbow Trout populations have been somewhat cyclical with a recent record peak in catch per unit effort (electrofishing) in 2011-2012 after record young of the year production from 2008-2011; catch per unit effort has since declined. Rainbow Trout abundance in Glen Canyon has declined by more than 80% since early 2012 when abundance was the highest ever observed (approximately 1,100,000 fish). Abundance likely to decline in 2015, approaching the past GCDAMP goal of 100,000 trout at Lees Ferry.

While numbers are declining, as of Fall 2014, Rainbow Trout condition is at the lowest value since standardized monitoring began 24 years ago. Current conditions favor fish that mature and reproduce early, resulting in smaller fish, which means a concern for the status of this important blue ribbon fishery. While managers have trigger points for action when there are too few Rainbow Trout (minimum catch rates, percent young of the year), there are no metrics for when there are too many fish. Future management goals are to reduce these extremes in recruitment and fish condition.

Biological Opinion Trigger Update – Mr. Scott VanderKooi. The Bureau of Reclamation received a biological opinion on the operation of Glen Canyon Dam from the U.S. Fish and Wildlife Service in December of 2011. To date only one criterion, Rainbow Trout abundance just downstream of the Little Colorado River confluence, has exceeded trigger levels identified in that 2011 BiOp, as demonstrated in the following chart.

Criteria	Exceeded Trigger Levels (Yes/No)
Adult Humpback Chub <7,000 fish OR	No
All Three	No
- 3 of 5 years 150-199 mm HBC in the LCR drops below 910?	No
- Temperature <12° C for 2 consecutive years at LCR?	No
- Annual survival of 40-99 mm Humpback Chub in Juvenile Chub Monitoring Reach (JCM) drops 25% from preceding year	No
AND Rainbow trout abundance over 760? Open model estimates exceed threshold for three of four trips in 2014	Yes
AND Brown trout abundance over 50? 2014 catches lower than in 2013, only 5 total caught in Sept. 2014 – catches too low to generate abundance estimate	Unknown

Joint Tribal Liaison Report (***Attachment 6***) – Ms. Loretta Jackson-Kelly and Ms. Sarah Rinkevich.

The Liaisons and other DOI staff met with the Zuni Cultural Resources Advisory Team (ZCRAT), represented by Councilman Hooee and Councilman Martinez, to provide information on the LTEMP EIS process.

- The ZCRAT is not in favor of trout management flows because they are similar to trout removal.
- The ZCRAT expressed appreciation to the Park Service for providing trout for beneficial use.

The Liaisons participated in the GCMRC Workshop to discuss Projects 11, 12 and 13 with tribal representatives, in order to integrate scientific processes in the Canyon with tribal perspectives.

- Project 11: There is a need for better integration between Project 11, focused on the riparian ecosystem, and Project 12, a retrospective view of changes. How are these to be evaluated by the tribes in the future?
- Mr. Yeatts reported that the Hopi Tribe does not have preconceived notions of what they want the environment to look like, but they need the information to assess the health of the system.
- Project 13: "Tribal perspectives for and values of resources downstream of the Glen Canyon Dam." If the LTEMP EIS receives a ROD, how will the HFEs be implemented? The Hualapai Tribe has a river operation that operates downstream from Diamond Creek, and they want to understand how the HFEs are affecting the build-up of sandbars in that reach. They are considering conducting a feasibility study to determine if sand could be dredged out of the lower system. Due to extensive coordination required, this project may not get underway until 2017.

Proposed Integrated River Trip: The dates being considered are July 17-27, 2015 with the theme of developing "an exchange of Native American and Western Scientific Values and World-Views."

The Liaisons will attend the Native American Fish and Wildlife Society Southwest Regional Conference to be held August 11-13, 2015, in Reno, Nevada, where they will make a presentation and network with other tribes.

Ms. James said the AMP tribes might be interested in activities of the Navajo Tribal Utility Authority (NTUA). She would be happy to arrange for a future AMWG presentation.

Technical Work Group Report (***Attachment 7a***) – Ms. Vineetha Kartha. The Annual Reporting Meeting was formalized as a TWG meeting in order to enhance TWG membership participation. Findings will be further discussed at the next TWG meeting, April 21-22, 2015 at the Wyndham Hotel in Phoenix, Arizona. Initial questions for the TWG to consider include:

- What HFE flow regime, in relation to the natural supply of fine sediment from the Paria and Little Colorado rivers, results in the largest distribution of sediment along the channel banks and eddies?
- What are the implications of continued declines in trout condition and numbers in Lees Ferry?
- Can the mainstem Colorado River, under current dam operations, support self-sustaining populations of Humpback Chub?
- What are the implications for Type C sites going forward?
- Do fall and spring HFEs have different effects on foodbase in the Lees Ferry reach?

Socioeconomics Ad Hoc Group (SEAHG) Update (***Attachment 7b***) – Ms. Leslie James. The SEAHG was reestablished several months ago for the purpose of updating Table 1 (***Attachment 7c***), which includes tribal information needs, recreation INs, hydropower INs, and general INs. Ms. James presented the updated Table 1 for review by AMWG members.

Public Outreach Ad Hoc Group Update (***Attachment 8***) – Mr. Jason Thiriot. The POAHG was established under the AMWG in February 2011, while the Administrative History Ad Hoc Group (AHAHG) is under the TWG. Both groups want to work closely together. The POAHG recently updated its goals. A key product of the AHAHG is the "wiki" page (www.gcdamp.com). The program needs to create an inventory of products they have available for public displays (GCD Visitor's Center) or other venues. He thanked those who purchased an AMP t-shirt as a means of publicizing the program. The POAHG plans to make a video on the AMP so people are aware of the work being done. He presented a sample "year in review" video. For a copy of the DVD, contact Linda Whetton (lwhetton@usbr.gov).

Fiscal Year 2015-17 Budget (***Attachment 9a***).
Reclamation Budget Overview – Mr. Glen Knowles. Even though a three-year budget for FY2015-17 was established and recommended to the Secretary, the federal budget process and Congress require an annual review and a recommendation to the Secretary in August for the FY2016 budget. Also, the AMWG will consider what changes, if any, to make to the budget for FY2018-20. The budget is drafted with a 3% CPI and then is adjusted when the true CPI is known. In October, CPI was determined to be 1.7% and the budget was adjusted accordingly (refer to spreadsheet, page 6 of Attachment 9a). Highlights from Reclamation's FY2015 budget:

- The Mary Orton Company, LLC was selected to provide facilitation for the next year with four option years.
- Acoustic flow meters (for more precise measurement of flows) will be installed in Glen Canyon Dam jet tubes.
- The administrative history pilot project will develop an annotated bibliography of important AMP literature and create a web-based library.
- A Native Fish Conservation Contingency Fund was developed to implement nonnative fish control, should it be needed.
- The Cultural Program includes $500,000 for a project with the Hualapai Tribe to utilize TEK in a vegetation restoration project and propagation of species important to the Hualapai. The Zuni Associated Values Project will work with Zuni spiritual leaders in the Grand Canyon to discuss the Zuni connection to the Colorado River, the LCR, and Ribbon Falls and the importance of these places to the Zuni culture. DVDs will be produced and provided to Zuni school systems, libraries, and the AMP.
- The AMP Integrated River Trip will be conducted to better understand what the Colorado River means to the tribes. AMP members interested in going should e-mail Sarah and Loretta.

GCMRC Budget (***Attachment 9b***) – Mr. Scott VanderKooi. Funds were used from the Native Fish Conservation Contingency Fund for continuing native fish work. GCMRC's burden rate will increase over the next few years. GCMRC will be moving into a new facility in 2017 because the current buildings have been determined by the City of Flagstaff to have outlived their useful life span and will be demolished. The USGS burden rate was projected to increase to about 15% for FY2015, 21% for FY2016, and 27% for FY2017. To balance the budget due to these increases, GCMRC prioritized monitoring and research activities, shortened research projects from three to two years, delayed start times on some projects, and removed some projects from GCDAMP funding. The good news is that lease rates will remain the same in the near term, which means that the burden rate for FY2015 will be 13.5% and in FY2016 it will be 13%. It is unknown what FY2017 will be. They anticipate being in the new facility by early 2017.

Budget Ad Hoc Group Presentation – Mr. Shane Capron. The TWG will make a recommendation to the AMWG on the FY2016 budget to consider at its August meeting. Following up on Anne Castle's direction to develop a triennial budget planning process, the TWG briefly reviewed a detailed process draft in October that was written by Mr. Capron and Jack Schmidt It includes many steps between GCMRC and the DOI agencies and also the AMWG and TWG. Work has paused until the new GCMRC chief is onboard because the development of the work plan and timing will be part of the chief's responsibilities. GCMRC, the TWG, and DOI will work together to revise the draft timeline; they hope to have a revised draft for review in April and a final draft in June. That would replace the May 6, 2010 biennial work plan and process that the AMWG approved in 2010.

Welcome to Larry Walkoviak – Ms. Gimbel recognized Mr. Larry Walkoviak, former regional director of the Upper Colorado Region of the Bureau of Reclamation, who retired last September. Mr. Walkoviak said he has been working on getting well. He has been diagnosed with Deep Vein Thrombosis, or blood clots in his leg. On July 5, he was taken to the ER where it was determined that blood clots had moved to both lungs. Now, the blood clots are gone and as of 10 days ago, he is off the medication. He said it was great to see people again and said retirement was the exactly right thing for him because he needed to work on getting well.

Ms. Gimbel said that everyone probably has their own special story about Mr. Walkoviak; she wanted to thank him for the partnership that she had with him from the State of Colorado and also as she moved to the Federal Government. She thanked him for always being a "steady as you go" guy and being straightforward. She mostly wanted to thank him for giving us an incredible staff. Even though Ann Gold retired last September, she was replaced by a very qualified Daniel Picard as the new deputy regional director.

Public comments: None

Adjourned: 4:05 p.m.

Glen Canyon Dam Adaptive Management Work Group Meeting
February 26, 2015
(See abbreviations list, last page.)

Conducting: Ms. Jennifer Gimbel, Secretary's Designee Start Time: 8:00 a.m.

Committee Members/Alternates:
Tom Buschatzke, State of Arizona
James deVos, Arizona Game & Fish Department
Jayne Harkins, State of Nevada
Beverley Heffernan, Bureau of Reclamation
Leslie James, CREDA
Sam Jansen, Grand Canyon River Guides
John Jordan, Federation of Fly Fishers
Lynn Jeka, Western Area Power Administration
Chip Lewis, Bureau of Indian Affairs
John McClow, State of Colorado
David Nimkin, National Parks Conservation Assoc.
Don Ostler, State of New Mexico
Ted Rampton, UAMPS
Steve Spangle, U.S. Fish and Wildlife Service
Larry Stevens, Grand Canyon Wildlands Council
Tanya Trujillo, State of California
Dave Uberuaga, National Park Service (GRCA)
Steve Wolff, State of Wyoming
Mike Yeatts, Hopi Tribe

Committee Members Absent:
Charley Bulletts, Southern Paiute Consortium
Tony Joe, Navajo Nation
Loretta Jackson-Kelly, Hualapai Tribe
Leigh Kuwanwisiwma, Hopi Tribe
Mark Martinez, Pueblo of Zuni
Frederick H. White, Navajo Nation
VACANT, San Juan Southern Paiute Tribe

USGS/Grand Canyon Monitoring and Research Center
Helen Fairley, Program Manager
Kyrie Fry, Communications & Outreach Coordinator
Paul Grams, Program Manager
Scott VanderKooi, Acting Center Director

Interested Persons:
Adam Arellano, WAPA
Eric Balken, Glen Canyon Institute
Jan Balsom, NPS/GRCA
Mary Barger, U.S. Bureau of Reclamation
Jane Bird, Upper Colorado River Commission (by telephone)
Peter Bungart, Hualapai Tribe
Rob Billerbeck, National Park Service
Shane Capron, WAPA/TWG Vice-Chair
Lori Caramanian, DOI
Marianne Crawford, U.S. Bureau of Reclamation
Katrina Grantz, U.S. Bureau of Reclamation
Martha Hahn, NPS/GRCA
John Hamill, International Federation of Fly Fishers/Trout Unlimited (by telephone)
Paul Harms, State of New Mexico
Chris Hughes, NPS/GCNRA
Simone Jackson, Hualapai Tribe
Loretta Jackson-Kelly, DOI Tribal Liaison
Vineetha Kartha, State of Arizona
Robert King, State of Utah
Glen Knowles, U.S. Bureau of Reclamation
Ted Kowalski, State of Colorado
Jane Lyder, DOI, Fish Wildlife and Parks
Reed Murray, U.S. Bureau of Reclamation
Jessica Neuwerth, State of California
Jess Newton (by telephone)
Daniel Picard, U.S. Bureau of Reclamation
Dr. Sarah Rinkevich, DOI Federal Tribal Liaison
Seth Shanahan, SNWA
Rodney Smith, DOI/Office of the Solicitor
Stacey Smith, U.S. Bureau of Reclamation
Bill Stewart, Arizona Game & Fish Dept. (by telephone)
Justin Tade, DOI/Office of the Solicitor
Shana Tighi, U.S. Bureau of Reclamation (by telephone)
Jason Thiriot, State of Nevada
Rich Valdez, SWCA Environmental Consultants/States

Recorder: Linda Whetton, USBR

Welcome and Administrative – Ms. Gimbel welcomed the members and public. She thanked Ms. Kyrie Fry and Mr. Stacey Smith for their invaluable technical and audio-visual assistance.

- Update on GCMRC Center Director Position – Mr. Scott VanderKooi. The position was advertised last fall and two people were interviewed with several AMP stakeholders involved in that process. Neither candidate was selected so the position will be re-advertised in the new few weeks.

Lees Ferry Management Plan (LFMP) Update (***Attachment 10***) – Mr. John Jordan. The goal of the LFMP is to create a quality blue-ribbon trout fishery. The conditions that support that fishery also support a thriving native fish community. Recreational fishing representation's intent is that the final draft be reviewed by the relevant agencies and revised as necessary for inclusion into the Grand Canyon National Park's Comprehensive Fishery Management Plan and the appropriate provisions of the Long-Term Experimental and Management Plan. Among the factors addressed are enhancing aquatic food base, managing the numbers of young trout to avoid a trout population that exceeds the carrying capacity of the river, and addressing the threat of increasing water temperatures.

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) (***Attachment 11***) – Mr. John Swett. The LCR MSCP is a multi-stakeholder, federal and non-federal, partnership that seeks to balance the use of Colorado River water resources with conservation of native species and their habitats in compliance with the Endangered Species Act. This year marks the 10-year anniversary of LCR MSCP implementation. The upstream boundary of the program is full-pool elevation of Lake Mead, which overlaps the AMWG project area.

The goals of the program are: (1) conserve habitat and work toward recovery of threatened and endangered species as well as reduce the likelihood of additional species being listed, (2) accommodate present water diversions and power production and optimize opportunities for future water and power development, and (3) provide the basis for incidental take authorizations. The total program costs are $626 million (2003 dollars), which is adjusted annually for inflation with a 50/50 split between federal and state agencies. He provided a list of accomplishments of the program and conservation measures completed and noted the following challenges: (1) securing land and water in California to meet California Endangered Species Act requirements, (2) increasing native fish survivorship within the constraints of the program, (3) developing long-term management guidelines for created habitats, and (3) dealing with the "unknown," i.e., drought, climate change, invasive species, etc.

Stakeholder's Perspective: The National Parks Conservation Association (NPCA) (***Attachment 12***) – Mr. David Nimkin. The NPCA is an independent, nonpartisan organization working to address major threats facing the National Park System. The NPCA was established in 1919 (the same year NPS was established) with the purpose of creating an independent voice – outside the political system – to ensure that the national parks would remain unimpaired for future generations. The NPCA has more than 875,000 members and supporters. In addition to their LEED-certified headquarters in Washington D.C., they have 11 regional offices and 23 field offices around the country. Every $1 of federal investment in the national parks creates $4 of economic value to the public. Total visitor spending of National Park visitors in the U.S. was $14.6 billion in 2013. The NPCA's Southwest Region has 68 of America's 407 National Parks units and is focused on the following priorities: air quality, energy development, new parks, parks as larger landscapes (Canyonlands), and the Grand Canyon (development pressures, overflights, infrastructure, uranium, and funding / concessions). The Southwest Region relies heavily on the science provided by the GCDAMP, which helps guide them in their work.

The NPCA serves on the AMWG to:

- Protect the Grand Canyon river system
- Encourage management choices that affect the entire Colorado River Basin
- Collaboration with others
- Ecological and recreational values

Responding to a question on the NPCA position on oil and gas leases in the Canyonlands area and how they might affect the river corridor, Mr. Nimkin said they are very concerned and have brought that information into the master leasing process that is occurring in Moab. They are advocating that a similar effort occur south of there as well, particularly into some of the cultural areas where there is proposed development. The idea behind the master leasing is to take a more detailed view, beyond the BLM resource management plan, and question what impacts oil and gas development will have on air quality, cumulative impacts from development, night sky pollution, and water requirements.

Long-Term Experimental and Management Plan (LTEMP) EIS Update (***Attachment 13a***) – Ms. Gimbel thanked Dr. LaGory and DOI staff for all the hard work on the LTEMP EIS. There will be a "subject matter experts" conference call in the next two weeks for an in-depth and technical discussion on the hydropower modeling component.

Dr. LaGory said the new "hybrid" alternative would be known as Alternative D in the EIS. It has a more even pattern of monthly volumes than the No-Action Alternative and will provide a daily range of 10 x kaf in July, July, and August, 9 x kaf in other months as displayed in the Alternative Key (***Attachment 13b***). Some alternatives have associated long-term strategies and they are considering full modeling on the 19 different long-term strategies. All the performance metrics will be included as an appendix (USGS Open File Report) to the EIS. The No-Action Alternative has so few HFEs because it implements the current HFE Protocol that ends in 2020.

Responding to questions posed during the break, Mr. Knowles said the base level analysis completed in April is on par with other analyses Reclamation has performed at Flaming Gorge, in the shortage guidelines, and using GTMax Lite. Based on concerns from the cooperating agencies regarding the level of that analysis, they decided to do an extended analysis using GTMax Lite along with the AURORA Model, to develop a more in-depth analysis of capacity impacts under a limited set of the alternatives. They kept alternative strategies they thought would have the maximum path to hydropower. They thought it was a logical way to proceed and did not need to analyze every single adaptive strategy that they had for the initial set of modeling presented at the April workshop.

Ms. James commented that at the SDA workshop, the hydropower analysis did not include any capacity and while she can understand about GTMax-Lite and the comparabilities cut through EISs, the hydropower modeling was not complete and lacked some elements. She and others had sent a letter including some data on capacity, cost, and discount rates. She asked if that information was taken into consideration or used. Mr. Knowles said the capacity analysis was completed shortly after the workshop with initial GTMax runs on all of the alternatives and every one of the adaptive strategies. That information was provided in follow-up SDA workshops and webinars.

Action Item: AMWG members were requested to send their technical questions on hydropower modeling to Rob Billerbeck and Glen Knowles in preparation for the WebEx/conference call to be held in two weeks with the hydropower experts on the LTEMP EIS.

Dr. LaGory said there are big differences among alternatives in terms of the number of HFEs that are triggered. There would be big effects on sediment, trout production, Humpback Chub numbers, recreational effects, and cultural resources. The number of HFEs is important to the modeling effort. The GCD maintenance schedule was not included in the modeling of HFEs because it changes over time. More HFEs equal a higher sand load index. There are not many differences among the alternatives, but Alternative D performs well compared to Alternative A and is very similar to the long-term strategies for Alternative E. Alternative D performs well with regard to:

- Compliance with operating tiers
- Capacity and generation value, rate payer impacts
- Bar-building and sand mass balance
- Chub and trout numbers
- Riparian vegetation (native communities, diversity, and wetland abundance)
- Recreational values
- Potential for cultural resource protection

Comments:

- *You have tried to select the experimental options that will best benefit the system based on the 15 years of knowledge that's been developed since completion of the last ROD and achieve a balance between the continuing the experiments with enough flexibility not to tilt things out of whack.*
- *During the Swing-Weighting workshop, some constraints on the NEPA analysis were taken off the table. I wonder about the possibility of those being analyzed and included in the DEIS.*
- *Daily fluctuations are a big issue for river guides.*
- *In order for the river guides, other stakeholders, and the public to intelligently comment on these alternatives, they need the ability to understand the relative differences among them. The more you can embellish things such as "doing well," and "lower" or "higher," the better the document.*
- *The Pueblo of Zuni have identified that increased recreation can have a negative effect due to visitor use and that needs to be recognized in the EIS. Also, we would appreciate seeing the wetlands and Native American analyses. I am troubled by reducing cultural resources to just an archaeological site.*
- *There is a need for some framework for how the models can be revisited and tested.*
- *There is little or no information on TEK.*
- *The hybrid alternative with a continued fluctuation of 8,000 cfs is of concern to river guides. On a river trip, it really limits the amount of camping places and creates bottlenecks in the canyon. It would be good to minimize the amount of fluctuations and prioritize the HFEs.*
- *After the high flow events, the water goes out fast and builds haystacks on the beaches. Can anything be done to let the water out slower to mitigate this?*
- *The impacts from flows are more detrimental and have significant impacts to the Hualapai Tribe, especially on the beaches and some of their boat docks.*

Public Comment. Ms. Gimbel asked if members of the public wished to make any comments.

- Walker Mackay, one of the owners of the Colorado River and Trail Expeditions. I took my first river trip through the Grand Canyon as a passenger in 1985 and personally guided well over a hundred trips in the Grand Canyon over the last 20 years. The Grand Canyon is my favorite place on Earth and I consider preservation and protection for our children and future generations on par with the love for my family. It is that important to me. I think it is the most sacred and spiritual place I have ever been. As a Grand Canyon concessionaire, the well-being of the river corridor is essential to the economic well-being of myself, my family, our river guides, and the businesses that depend on us economically, both in local small towns and nationally. As a river guide, I have had the opportunity to guide about 3,000 people through the Grand Canyon, spending on average nine days with them. It is an incredible place. I can speak from experience that the Grand Canyon has a huge impact on people. Rafting the Grand Canyon changes people's lives and there is no better way to promote preservation and protection of wild places than experiencing such a place firsthand on its own terms. The biggest change I have seen over the short 30 years that I have experienced the Grand Canyon is erosion of the sand and beaches that were once abundant. In fact, most of the river concessionaires

in Grand Canyon now carry camp cots because the beaches have eroded to a point where it is hard to find a beach big enough to comfortably sleep. Therefore, I support these high flow experimental beach-building flows. The sandy camping beaches are essential for the geological, natural, economic, and spiritual components of the Grand Canyon. In addition to the beach building accomplished by these HFEs, these events are necessary for the cleansing of the beaches. I also support a flow regime that minimizes the loss of sand after an HFE. I have seen the total taken from the large fluctuations directly following a beach-building experiment. I also support a minimum constant flow of the 8,000 cfs and the overall minimum of 7,000 cfs. The Grand Canyon in my mind is the most important player in this game. Assuming that the low flows at a minimum of 7,000 cfs, I would support Alternative D or the hybrid alternative.

- Lynn Hamilton (Executive Director, Grand Canyon River Guides). I am so honored to have so many people from the river community here today. This is a measure of how passionately important the LTEMP EIS is to us. I wanted to bring up something that I have talked a little bit about in the past but I think it is particularly relevant at this point especially in light of the LTEMP is. Ten years ago, the Adaptive Management Work Group crafted a vision statement on a river trip. We had as many opinions as there are stakeholders, but eventually they came together and one of the sentences that they wrote was this: "In honor of past generations and on behalf of those of the present and future, we envision an ecosystem where the resources and natural processes are in harmony under a stewardship worthy of the Grand Canyon." That really says it all. To parse it out a little bit, the word harmony really speaks to the values for which Grand Canyon National Park was created. It also speaks to the interdependency of everything in this river system. It is a beautiful notion, especially in light of all the focus on metrics, numbers, and models. It is important that we remember that this is a living and breathing system. It is an ecosystem. It is all interconnected. I would really like to focus on natural processes because this is a wilderness experience, it is a premier wilderness experience, and the level of naturalness is incredibly important. And last but not least, "a stewardship worthy of the Grand Canyon." That is exactly why we are trying to do here with this LTEMP EIS and that is what I hope that our future will be. What this all points out to me is that it is not enough to settle for the minimum that we can do under law, but what we need to do and what we need to ask is, what more can we do for the Grand Canyon? What more can I do to move us forward towards a future where we are actually improving the resources and their associated values for a future that is worthy of Grand Canyon?
- Joe Bennion (Grand Canyon River Guides) - Lynn and Walker have pretty much said what I wanted to say and said it very well. Thank you. I have been going down the river for about 22 years, started guiding even later. Recreation is a word that came into use about 600 years in the English language. Its original meaning was "refreshment or curing of a sick person." The Latin root means to re-create or to bring to rebirth. Recreation is a spiritual concern, not an economic one. I realize a lot of us make our living that way, but being able to go into a natural hospital and being healed and reborn is essential. I hope this is at the core of what the Grand Canyon and the national parks are about – America's best idea. Any decision that is going to degrade the quality of life in the Grand Canyon is going to detract from that. It will make me less healthy and anyone in the canyon less healthy. Please keep in mind that the life in the canyon is very important and the original life is there. Thank you.
- Mikenna Clokey (Board Member, Grand Canyon River Guides) – This will be my 14th season as a river guide. I just keep revisiting this idea of perspective when we are talking about all of these things and it is important to take a step back from models, turbines, clients, and customers and really just come back to the point of reference that the Grand Canyon is such a massive, colossal place in terms of time and scale, and complexity of the ecological system that lives down there. It is easy to get caught up in the next 20 years but it is really important to remember a reference that the Grand Canyon is much bigger and much more complex than a lot of the systems that we're talking about here. It is not to diminish any of the work that has been done here because that work is incredibly important. If anything, it is to put more emphasis on that responsibility that we have to the Grand Canyon because it has been around for almost 2 billion years. We need to remember that. Thank you.
- Earlene Havatone (Hualapai Tribe) – I think it is important to let everyone know that to the Hualapai, the Grand Canyon is more than just a river trip. It is our way of life and it sustains us as a people. We feel very strongly about the Colorado River; it is the backbone of the Hualapai people. With that, the Hualapai River Runners has taken the opportunity to help our Hualapai people and our youth

because we employ so many youth workers during the summer; we do that to help them reconnect with their values, culture, and traditions. The river corridor is sacred to us and the landmarks are important to us. It is also significant because that is where our origin stories start so it has a very great deal of spiritual significance. We use river trips as an opportunity to educate the world—and I say "the world" globally—to understand who we are as the American people and as Hualapai people. We are taking the opportunity to sustain ourselves and be able to have economic growth for the Hualapai people to sustain us as a people and community. Thank you.

- Written comments from Lee Udall Bennion (***Attachment 14***).

Wrap-Up and Adjourn: Ms. Gimbel thanked the members of the public and the river guides who came to the meeting. She said she appreciated any group or individual that is interested in looking at the GCD AMP work that has been done. She also said she appreciated the feedback and asked that they continue to offer the feedback, as it is very important.

Ms. Gimbel thanked the staff for all the incredible presentations, conversation, and the work they continue to do on behalf of the AMWG and the Federal Government. She also thanked the AMWG members. She said it was nice seeing again those she knew, and she looked forward to getting to know the rest. I appreciate that. Finally, she thanked Linda Whetton for setting up the meeting. She reminded the group that the HFE Workshop would start at 2:15 p.m.

Adjourned: 1:04 p.m.

Next AMWG Meeting: Thursday, May 28, 2015 - via WebEx/Conference Call

Respectfully submitted,

Linda Whetton
Bureau of Reclamation
Upper Colorado Region

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
ASWS – Assistant Secretary, Water and Science
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
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
IG – Interim Guidelines
INs – Information Needs
KA – Knowledge Assessment (workshop)
kaf – thousand acre feet
KAS – Kanab Ambersnail (endangered native snail)
LCR – Little Colorado River
LCR MSCP – 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 – Nonnative Fish Control
NOI – Notice of Intent
NPCA – National Parks Conservation Association
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
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
TMF – Trout Management Flows
TWG – Technical Work Group
UAMPS – Utah Associated Municipal Power Systems
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: 11/28/2014)