

Date: April 15, 2020

Start Time: 9:00 AM Pacific Daylight Time

Conducting: Seth Shanahan, Technical Work Group (TWG) Chair

Meeting Recorder: Carliane Johnson, SeaJay Environmental

Meeting Attendees

TWG Members/Alternates Present

Jan Balsom, National Park Service (NPS),
Grand Canyon National Park (GCNP)

Clifford Barrett, Utah Municipal Power
Agency (UMPA)

Kelly Burke, Grand Canyons Wildlands
Council (GCWC) (Alternate)

Shane Capron, Western Area Power
Administration (WAPA)

Kathy Callister, Reclamation

Kevin Dahl, National Parks Conservation
Association (NPCA)

Bill Davis, Colorado River Energy
Distributors Association (CREDA)

Kurt Dongoske, Pueblo of Zuni

Craig Ellsworth, WAPA (Alternate)

Michelle Garrison, Colorado Water
Conservation Board (CWCB)

Jessica Gwinn, U.S. Fish and Wildlife Service
(USFWS) (Alternate)

Paul Harms, New Mexico Interstate Stream
Commission

Brian Healy, NPS, GCNP (Alternate)

Ken Hyde, NPS, Glen Canyon National
Recreational Area (GCNRA)

Leslie James, CREDA

Vineetha Kartha, Arizona Department of
Water Resources (ADWR)

Jakob Maase, Hopi Tribe

Ryan Mann, Arizona Game and Fish
Department (AZGFD)

Craig McGinnis, ADWR (Alternate)

Jessica Neuwerth, Colorado River Board of
California (CRBC) (Alternate)

Bill Persons, Fly Fishers International
(FFI)/Trout Unlimited (Alternate)

Ben Reeder, Grand Canyon River Guides
(GCRG)

Peggy Roefer, Colorado River Commission
of Nevada (CRCN)

Dave Rogowski, AZGFD (Alternate)

Seth Shanahan, Southern Nevada Water
Authority

Larry Stevens, GCWC

Jim Stroger, FFI/TU

Steve Wolff, State of Wyoming

Kirk Young, USFWS

United States Geological Survey (USGS)/Grand Canyon Monitoring and Research Center (GCMRC)

Lucas Bair

Ann-Marie Bringham

Helen Fairley

Paul Grams

Ted Kennedy

Josh Korman, Ecometric Research

Jeff Meuhlbauer

Mike Moran

Joel Sankey

Scott VanderKooi

Charles Yackulic

Bureau of Reclamation (Reclamation)

Clarence Fullard
Heather Patno

Lee Traynham

Interested Persons

Jeff Arnold, GCNRA
Peter Bungart, Hualapai Tribe
Richard Begay, Navajo Nation
Rob Billerbeck, NPS, GCNP
Martina Dali, Hualapai Tribe
Sinjin Eberle, American Rivers
Ed Gerak, CREDA
Alicyn Gitlin, Sierra Club
John Hamill, FFI/TU
Paul Hirt, Arizona State University
John Jordan, FFI/TU
Arden Kucate, Pueblo of Zuni
Sarah Larsen, Upper Colorado River
Commission (UCRC)

Kevin McAbee, USFWS
Scott McGettigan, State of Utah
Emily Omana Smith, NPS, GCNP
Municipal Power Systems
Theresa Pasqual, Joint Tribal Liaison
Noah Pleshet, Southern Paiute Consortium
(representing Charley Bulletts)
Sara Price, Colorado River Commission of
Nevada
Erik Skeie, State of Colorado
Melissa Trammel, NPS, GCNP
Mike Yard, GCMRC
Mary Ellen Walsh, Arizona State Historic
Preservation Office

Welcome and Administration: Seth Shanahan, TWG Chair

- Introduction and Determination of Quorum. A quorum was reached; altogether about 70 people were on the call.
- Next meeting dates: The June 23-24 meeting is likely to be via webinar followed by the October 14-15 meeting
- Ad Hoc Group Updates: **[Peggy Roefer]** The Flow Ad Hoc Group (FLAHG) charge was approved and objectives for spring capacity flows and monitoring have been developed. Next step will occur once GCMRC and WAPA have developed the hydrographs.
- Update on the Implementation of Experiments and/or Management Actions: **[Lee Traynham]** The tech team met about six times and considered a number of experiments. 1) On the spring high-flow experiment (HFE), there was neither sediment nor hydrologic conditions necessary, which resulted in no recommendation to conduct a spring HFE. 2) We will hear more on trout management flows (TMFs) later, but in general, more work needs to be done on the TMF design and other resource conditions need to be seen. 3) The bug flow experiment is moving forward for a third consecutive year; however, monitoring and other management actions will be constrained on this until at least May 21. **[Scott VanderKooi]** The main stem fish monitoring trip has been

cancelled; it is hoped to be rescheduled for the end of May. An April trout monitoring trip was also cancelled. A food base trip has been postponed for later in the season. A flight trip to Little Colorado River has been cancelled. Other trips that were planned to occur late in April will be postponed until the river opens up.

Questions/Discussion

[Jim Strogen] Do you have the ability to do work now that had been delayed? **[Scott VanderKooi]** We have been able to establish protocols for laboratory staff, which just got started working again this week. It depends on the position. Field work is down to a minimum.

Recent Results from the Bug Flow Experiment: Ted Kennedy, GCMRC [\[presentation\]](#)

The bug flow experiment was tested twice in 2018 and 2019. Response was equivocal. There was a big increase in caddisfly in 2018 and then it was reduced in 2019. Nothing was consistent across both years. There were some intriguing clues that caddisflies and midges were emerging later in 2019. Timing of emergence is an indicator of the quality of the growing conditions. Sunlight, flows, nutrients, and mud are all established levers on the food base. The bug flow experiment is meant to improve that flow lever, but these other environmental conditions were found to be much different. For example, water temperature in 2019 was the second warmest on record. There was also a big reduction in gross primary production (algae). There is no apparent relationship between water temperature and insect growth. Sediment is a really good predictor and there was ten times more mud in the spring of 2019 compared to 2018. We now have a model to predict timing of emergence, which will help to design strategies to mitigate the loss of citizen science. Right now, there are no river trips until May 22 because of Covid-19. Even if we lose those first weeks of the sampling season, the project would still have high statistical power because the peak emergences are expected to occur in June for midges and July for caddisfly.

Questions/Discussion

[Larry Stevens] By pooling all caddisfly species together, is this the right way to approach the question in relation to sediment? **[Ted Kennedy]** Individual taxa were looked at. Found that 2018 was a banner year and that suspended sediment is a good predictor across the groups.

[Ben Reeder] Is there a Plan B to get volunteers to hike in and get samples if the river trips don't open? **[Ted Kennedy]** The park is closed, but that is something we are thinking about perhaps getting crews to hike in if the deadline gets extended. **[Arden Kucate]** Recommends waiting until May when things are safer. **[Jan Balsom]** The sampling is not our highest priority; safety is. The worst thing would be doing the wrong thing. We don't need to push it. **[Theresa Pasqual]** Would there be a consideration to open the river and not the park? **[Jan Balsom]** A river trip is one of the best ways to spread the virus, which is not something we want to do. All

the commercial and non-commercial users are being affected. The resources also need to be considered in those decisions.

The Trout Fishery – A Review of the Key Takeaways from the Annual Reporting Meeting and an Opportunity for Additional Discussions: Josh Korman, Ecometric and Mike Yard, GCMRC [presentation]

[Mike Yard] This study was to assess both rainbow and brown trout. Started seeing recruitment beginning in 2015, which led to a slight increase in abundance, but only for the Lower Subreach 1C - not for the entire Grand Canyon. In 2017, it was the highest recruitment year since 2011. Finding that high recruitment years are infrequent over time. There is an overall decline in invertebrate production rates (the prey source for trout) with an overall declining trend from 2012 through 2017. Nutrient (particularly phosphorus) is likely the big driver. Three separate sub-reaches were established for rainbow trout abundance, which allows for replication although there is some variation. The relative condition of brown trout was much higher and their seasonal patterns are different than rainbow trout, which seemed to be more seasonally affected by food availability. Saw higher growth of rainbow trout in the spring than what was expected, while it was lower than expected for summer/fall. Still building up data on brown trout, but their growth rates are at or slightly less in spring, but their growth in late summer/fall far exceeds rainbow trout. Still in the process of establishing abundance information for brown trout, but have found brown trout spawn earlier (November to January) even though they are not seeing small fish in the catch records until September, which does not seem to be due to misidentification. Brown trout also failed to recruit in 2017. Maybe there is some interspecific interaction. Maybe they are not as affected by flow management actions. Mike felt pretty strongly that prey is likely the driving force behind the rainbow trout decline. It is inconclusive whether HFEs are having an effect on their growth. Under more stable flow conditions (“bug flows”) the data are not what you would expect so there are likely other factors involved. We need to look at this from a bioenergetics perspective. In general, large recruitments are seen every decade or so and then there is a delay when they show up in the Lower Colorado River area.

Questions/Discussion

[Larry Stevens] Were the changes in population dynamics over time in water years or calendar years? Did the drop off occur in the fall? **[Mike Yard]** Conditions and growth rates fall off in mid-summer to early fall for rainbow trout. Have not done any bioenergetics for brown trout.

[Brian Healy] Why are the conditions much higher at Glen Canyon? **[Mike Yard]** For rainbow trout, the downstream environmental conditions are partly nutrient-based. Glen Canyon has higher water clarity, it is a recently colonized area, and there is good reproduction.

[Ryan Mann] What happened in 2017 that led to high recruitment in rainbow trout and low recruitment in brown trout? **[Josh Korman]** Started seeing improved growth of rainbow trout in 2017, which meant more fish matured and devoted energy to reproduction. It is speculation as to what happened to poor recruitment of brown trout that year, but maybe there was some competitive interaction.

[Jim Strogon] Where are brown trout in the young stages if they are not in shallow areas?

[Mike Yard] Maybe they are using habitat farther offshore. It might still be misidentification at the really small sizes although that is not thought to be likely. **[Josh Korman]** It is hard to believe that very young brown trout are not using the shorelines. In other systems, they have poor recruitment during big floods with limited swimming ability regardless of where they are located. Perhaps they are less vulnerable in deeper water. This should be determinable. There may be ways to control brown trout due to flow. It just might not be a stranding flow. Given their low population numbers, it remains difficult to find their fry so that is a sampling challenge.

[Ted Kennedy] Quagga mussels if there are indications they are affecting trout growth and invertebrate availability? **[Mike Yard]** While doing 2015-2016 benthic sampling, a considerable amount of quagga was found in deep water usually attached to bryophytes, but the invertebrates being sampled were still in high densities similar to past sampling efforts since the 1990s. Literature would suggest some degree of competition. **[Josh Korman]** They are in high abundance. Usually quagga are filtering the water and will out-compete the zooplankton. With a benthic food web, it's not clear that they are out-competing anything. Best approach might be to see how invertebrate abundances compare pre- and post-quagga. Spring HFEs hammer macrophytes so having a spring HFE might be the best way to reduce quagga.

[Melissa Trammell] Any way to look at equalization flows and bring that information into your model? **[Mike Yard]** There was a large recruitment in 2011 that was believed to be because of nutrient-rich water. The flows were high and steady inundating terrestrial vegetation that created a rich environment for rainbow trout. If we had an equalization that was steady, we could be confident that recruitment would be high unless trout conditions were very bad going into it. High flows released from equalizations could be an ideal time to try a TMF.

[John Hamill] Can we predict phosphorus levels? **[Mike Yard]** Don't know, but others have been trying to get a better understanding of nutrient dynamics for Lake Powell.

[Jim Strogon] If timing was just right, such as after brown trout spawn and before rainbow spawn, would that have an impact on young-of-year? **[Mike Yard]** In some smaller systems, this could limit recruitment. In 2008, there was good rainbow trout recruitment, which may have been due to a nutrient effect rather than a high flow effect, or maybe it was a combination of both. The issue whether there was enough sediment to have a flood in March, which has been rare since high flow protocols have been in place. It would need to be a biologically-focused

flood, which would be at a cost to sediment. **[Larry Stevens]** This would be an important experiment to have and we should be considering this for the next three-year budget process.

Drivers Affecting Sediment Conditions in the Western Grand Canyon: Paul Grams, GCMRC [presentation]

[Peter Bungart] While sediment has been accumulating along the Western Grand Canyon and as Lake Mead has dropped, there have been enormous sediment banks that are clogging up the navigation channel. Boats have beached in the shallow water areas, which presents a safety issue as well as a potential for damage to equipment. We should look at this beyond the triennial workplan. It will likely be a problem for years.

[Paul Grams] This presentation has not resulted in any study, but it offers some suggestions. Cumulative load has been increasing sand transport since 2002. When lake levels dropped, the river moved over and the Pearce Ferry Rapid formed, which controls sediment transport. The current river bed is somewhere between the tops of the banks and the original, pre-1935 river bed. Changes in the rapids affect flow and transport. There have been ongoing adjustments of the channel as Lake Mead drops. Potential next steps will be affected by certain drivers that will be difficult to control (study ideas were outlined in the presentation). Also, what the river bed does during high flow is a long-standing issue that can be difficult to predict without studying it.

Questions/Discussion

[Craig Ellsworth] Can in-river sandbars be mitigated? **[Paul Grams]** It depends on what flow conditions are forming and whether there are patterns of operations to reduce them. One potential is if high flows reduced sediment and increased channel navigation. This might involve timing a spring high flow closer to the summer boating season.

[Bill Persons] Is the channel meandering in the reach? **[Paul Grams]** As it gets wider, some meandering might be likely in the high banks. **[Peter Bungart]** Anecdotally, at least immediately after a high flow, the channel opens up and then it gets more difficult to navigate as the channel fills up again. It also seems to meander.

[Larry Stevens] The photographs point to the need to continue a photo documentary. How well do we understand debris flow events on these deltaic processes? **[Paul Grams]** We have not thought about this.

[Seth Shanahan] Is the primary concern the effect that sediment has on the recreational experience? **[Peter Bungart]** This is probably the main driver, but it goes beyond that. Virtually everyone who is on the river such as for research, are affected by this.

The Glen Canyon Dam Adaptive Management Program (GCDAMP) Administrative History Project: Paul Hirt, Arizona State University [\[presentation\]](#)

The new website (gcdamphistory.org) contains the recorded oral histories. Some interviews are still being processed, which need to be transcribed and annotated. Each one takes about 20 to 30 hours of effort, which has been delayed since the pandemic. Dr. Hirt welcomes ideas on how to prioritize the current list of ten down to seven to complete them by September. The archive is a major deliverable on the new website. It is a robust and user friendly way of displaying and accessing the oral histories. Interview transcripts can be searched by key word. Can also download the recordings and transcriptions, which are cited. Arizona State University has a digital repository in which all the material will be stored in perpetuity. The material can be searched for titles, key words, collections, etc., and these links will remain permanent. Recommendations are requested on the content of the new member orientation packets. See “Key Readings” (under Archives) on the website that links to documents that the interviewees had said were most important toward understanding GCDAMP history. This is fully searchable through different filters. Please also send feedback or suggestions to: paul.hirt@asu.edu.

Questions/Discussion

[Craig Ellsworth] Is there a way to continue to add information to the website? **[Paul Hirt]** It is being built on a Word Press platform. This means it will be easy to maintain and for others to continue to add documents.

[Larry Stevens] It has been a long-term goal to have this information. Two suggestions: 1) it might be useful to bring the knowledge assessment documents into the new member orientation packet, and 2) when David Braun was science advisor, he prepared a bibliography, but don't know where that information is now. **[Paul Hirt]** All of the knowledge assessment documents are in the Key Readings and would be easy to add to the orientation packet. David sent all his information to Dr. Hirt who will be going through it to determine what to put on the website. He can provide a copy of those documents to anyone who would like them.

[Jan Balsom] This is fantastic. Are there gaps in the early history that would allow us to make better recommendations on the priority order of the last seven interviews? **[Paul Hirt]** For the ones done so far, the time frame covers the earliest research to the administrators of today. Gaps might not be temporal, but perhaps in perspective. For example, one high priority is to interview someone from AZGFD, which has not been done yet. Maybe look at the list of those already interviewed and consider gaps in perspective to see if we have covered all the major research and types of stakeholders.

Anticipated Funding Available for Triennial Workplan and Budget Fiscal Year (FY) 2021-2023 (TWP): Lee Traynham, Reclamation

Each year, the budget needs to be consistent with the workplan. We typically frame this in terms of long-term and short-term funding uncertainties. For the Short-term, recall the 2019 Office of Management and Budget (OMB) directive that WAPA would not send hydropower revenues to the program for environmental work. Congress then provided appropriated funding for GCDAMP. This was a one-year fix. Nothing rescinded the OMB directive so each year a Congressional action is needed on how these programs should be funded. There is general support in Congress for this Program. In 2020, Congress used the Appropriations bill to specify the transfer of hydropower revenues to the program, which was a one-year fix. This is going to continue to 2021, and likely to future years. The Appropriation bills are not always signed by October 1. This can cause funding delays. Currently, there is \$21.4 million to support the environmental programs, but have been hearing that this level of support is not sustainable with hydropower revenues, which is going to be reduced to \$12.5 million. Programs with established workplans are not going to have the necessary funding in a few years. We have to figure out other sources of funding, create efficiencies, and to manage short-term and long-term funding uncertainties.

Questions/Discussion

[Seth Shanahan] We have a process that we follow. Is that process not going to be enough?

[Lee Traynham] First priority is to get the budget to within the current \$11.3 million level. Would also like to see what we would do in 2023 when we are faced with reductions. The sooner we prepare for that, the better we will be in future years. Still need to think about the process for that.

[Vineetha Kartha] Do we need to anticipate a 50% reduction in 2023? Are you planning to offset this reduction? **[Lee Traynham]** We don't know yet, but believe the reductions will take effect in 2023. If that happens, there is uncertainty how that funding would be distributed. The federal agencies are discussing that, too. All the agencies operate on a three-year cycle. Reclamation will request some appropriation dollars, but it will not be enough to make up the difference. We will be looking outside for the program funding especially for endangered fish.

[Jim Strogen] Where will the funds be used with the shutdown of trips? **[Lee Traynham]** It seems people are doing their best to reschedule this work. For those trips that are cancelled, we will need to discuss at the end of the year carrying these funds into the future to help mitigate the reduction in out years. **[Scott VanderKooi]** We are tracking this and are maintaining close communication about those trips. Some costs would be saved, but a big chunk of that funding is in salaries that needs to be considered. He cautions how much can be saved from the cancelled trips. It is not a cure-all for the out years.

TWP Initial Draft Summary and Discussion of Other Project Proposals: Lee Traynham, Reclamation, Scott VanderKooi, GCMRC, and TWG members [[presentation 1](#)] [[presentation 2](#)]

[Lee Traynham] Presented the preliminary FY21-23 workplan. We are now in Year 1 of the process in which the TWG will present a final draft for the vote of the Adaptive Management Work Group (AMWG) in August. A lot of feedback has been received through a number of opportunities. The science advisor will provide comments on the second draft. We are all trying to strategize for uncertainty. Total budget being planned is \$11.36 million with 80% going to GCMRC and 20% to Reclamation. For Reclamation's FY21 budget, there was a question about a facilitator. Response ranged from not needing one to needing one. Reclamation will move forward on that contract. Many agreements with partners will have also come to term in FY22 that will need renewal, which is why there is a bump on that line item. Reclamation will be soliciting for a new Science Advisor and welcome feedback on the funding level of \$150,000 for that. A third-party review is critical and is outlined as a requirement in the long-term experimental and management plan (LTEMP) decision. For the temperature control and fish exclusion projects (C.9 and C.10), those are not anticipated to be zeroed out, but the work specifics are still being discussed. Work is being done elsewhere that will be used to leverage that, which should be included in the next draft. Cultural resources support (D.2) was for outside support to help with the historic preservation plan, which has since been completed. This is up for discussion. This would be a nice place to get an intern to help with that work. Tribal representatives are also interested in it. Element D.5 (associative values studies and mitigation) is a placeholder for project proposals that have been received. Elements D.6 and D.7 (cultural sensitivity video and support) totals \$150,000 for the three years. Element D.9 reflects \$35,000 to each of the tribes for cultural resources monitoring. Tribal participation funding comes through federal agency appropriations and is not included in the total.

[Scott VanderKooi] The focus when developing the workplan is based on LTEMP implementation. One thing that changed in FY21 was for the remote sensing overflights. Another big change between FY21 and the out years is due to overhead rate, which is because of a new building; however, the timing of that is now uncertain. Summary detail of each of the projects and their proposed budgets were shown in the presentation. There are more good ideas than dollars to fund them. Now is the time to work on a budget that fits our anticipated funding amounts.

Questions/Discussion

[Peggy Roefer] We know nutrients are important and are driving response, but we are still not doing anything to augment the system during low flows. What is acceptable to do and make sure this does not go away? **[Scott VanderKooi]** There are things that can be done, but there are significant challenges to them. Nutrient additions in a river the size of the Grand Canyon is no small hurdle and that does not even address compliance concerns. We need to better

understand sources. Maybe the biggest lever is Lake Powell and its operations. It is an interesting problem, but a big challenge. **[Charles Yackulic]** This work is being done in big rivers, particularly in the Pacific Northwest, but there are issues. We have talked a bit about a small pulse to understand some things. This could be done, but how long and where it should be done are unknown. These will be in the current workplan. WAPA is also going to be providing a literature review by the end of the year on existing research.

[Jakob Maase] Why do we feel it's important to enhance productivity in an unnatural way? Lake Powell water quality monitoring is to be expanded into the lake. What changed our thinking as to what we've been doing for the last 20 years? **[Scott VanderKooi]** We are proposing to continue the work with Reclamation outside of GCDAMP. It is not funded by the program, but it is important to the program.

[Webinar chat question] What were the actual budget expenditures for the past year? **[Seth Shanahan]** That presentation can be provided to the members.

[Kurt Dongoske] When will Reclamation consult with Arizona State Historic Preservation Office (SHPO)? **[Lee Traynham]** There were discussions about meeting with the Arizona SHPO on the initial draft during our meetings that were scheduled for this week in Phoenix, but that did not happen because of the closures. It is planned that the second draft will be shared with the SHPO.

[Kelly Burke] How does the boundary of the lake relate to whether it is in or out of the scope of the program? **[Jan Balsom]** The work being done is inside the park and within the program.

[Jim Strogen] What about actual Reclamation work in Elements C.9 and C.10? There is general agreement that mitigation for temperature and invasive pass-through need to happen as soon as possible. Is that in the next budget? Is there is a plan in place for mitigating low dissolved oxygen? **[Lee Traynham]** There are opportunities to evaluate new innovative technologies for site-specific application at Glen Canyon Dam. We need to be prepared to evaluate those alternatives that might be successful and feasible. There is still a lot of work that needs to be done. Regarding dissolved oxygen, this is an ongoing discussion, but to date it is an infrequent effect that is resolved below Lees Ferry.

[Ben Reeder] What about testing slower down ramp rate of HFEs that might erode less? Only one study has been done. If the positive effects can last longer, can we be more efficient with the HFEs? **[Paul Grams]** This had been in the last workplan, which could be resurrected, but then it would have to replace something else. Have not addressed whether changing the down ramp would change the beach slope. **[Jan Balsom]** That topic was evaluated and a lot has been done on this subject.

[Craig Ellsworth] How can the TWG help prioritize the projects to trim the budget? **[Scott VanderKooi]** We need to know your thoughts on what's important, what the priorities are, and maybe what things need to be done, but not at the same level as in the past. **[Lee Traynham]**

There are so many good ideas and good proposals, that if anyone has a new or additional item, please carefully consider those trade-offs.

[Kelly Burke] Is there any other written document to review? **[Lee Traynham]** Only the draft workplan that was distributed April 2.

[Jim Strogon] Project H on the predictive models for humpback chub talks about rainbow trout but not brown trout. Is this because there's not enough data? Do you also anticipate including brown trout in those studies? **[Scott VanderKooi]** The approach is to beef up modeling of brown trout. **[Charles Yackulic]** The plan is to look at what is driving out-migration of brown trout.

[Erik Skeie] Describe again the large increase in burden between FY21 and FY22? **[Scott VanderKooi]** GCMRC's building is being leased by the City of Flagstaff and the city has determined the building has out-lived its useful life span. GCMRC has been looking for another location. The increase in overhead rates relate to the cost of that new building, which has been a drawn out process and still not sure when this will happen. Posting the increase in FY22 is conservative. We will probably have to revisit that.

[Jim Strogon] It seems as if the wording on the F.5 project supports the need for spring HFE being biologically good for the system, but the ability to study that is not likely in the near future. What is the plan? **[Scott VanderKooi]** A number of GCMRC staff participated in the FLAHG calls and were asked to think about what might be done in a spring release flow. It was GCMRC's understanding that those flows could go as high as 25,000 cubic feet per second (CFS) and staff are skeptical that would be high enough to create enough of a disturbance that an effect could be seen with any certainty. Originally, it was thought that flows could go up to 30,000 CFS, which might have been high enough to see effects of a routine spring HFE. Where we are now is that if the proposed maintenance flow drops to below 5,000 CFS for a week next spring, then this could be combined with a ramp up to 25,000 CFS. The combination might give enough information to show what a spring flow would look like and provide enough confidence to detect it.

[Kelly Burke] Will the constraints last through the entire workplan? **[Lee Traynham]** The 25,000 CFS constraint is the maximum under normal operations. That is tied to the LTEMP and the operating criteria that were developed for Glen Canyon Dam. Would need to seek approval for any operations or releases that are outside of normal operating conditions. **[Scott VanderKooi]** From GCMRC's perspective, there is a lot to be learned from a spring HFE. Have been able to do five fall HFEs under those protocols and have a good understanding of them. The last spring high flow was in 2008. It looks like conditions under which they would be triggered are relatively rare so we are looking for potential ways to help that learning while not having to wait for those conditions to appear.

[Seth Shanahan] There is \$11 million of proposed work, all of which is helpful to meet our goals, so it is going to be hard to think about how to cut \$2 million or more in future years. Perhaps let's not think about it in terms of "low priority" projects, but rather what is most important for the next three years while the rest can be delayed for future years? The actual process of adaptive management is a struggle while not having a formal way of knowing whether the objectives have been achieved or not. It is still important to consider the priorities even when the outcome is not clear such as on the modeling projects. Craig Ellsworth was also asked to put together a list of the points of disagreement or concerns from the BAHG. For Day 2 of the TWG meeting, the focus will be on these most difficult ones where we lack consensus.

Public Comment

None submitted.

Meeting adjourned at 2:35 PM Pacific Daylight Time

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Meeting Attendees

TWG Members/Alternates Present

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Sarah Larsen, UCRC

Scott McGettigan, State of Utah

Erik Skeie, State of Colorado

Randy VanHaverbeke, USFWS

Welcome and Administrative: Seth Shanahan, TWG Chair

- Introduction and Determination of Quorum.

- Unresolved Issues from Yesterday. **[Seth Shanahan]** Are there any unresolved issues from yesterday? We worked through some high level comments and points of clarification. Today we will discuss the projects in detail. **[Bill Davis]** There was one conversation regarding oxygen mitigation below the dam. Has there been any change to that? **[Seth Shanahan]** The thought of using the dam to operate in a way that is not authorized is not being contemplated. **[Lee Traynham]** There are no plans to explore dam operations as a form of mitigation, but Reclamation supports continued discussion and water quality monitoring.
- Update on hydrology, operations and reservoir/release conditions. **[Heather Patno]** Conditions have been pretty stable from the beginning of the year. Not showing any April adjustment for the water year. The release for Glen Canyon Dam is going to be 8.23 million acre feet. In water year 2021, it will likely be operating in the upper elevation balancing tier.

Report from the Budget Ad Hoc Group (BAHG) and Discussion of Next Steps: Craig Ellsworth, WAPA

See the Wiki page for a lot of information on both BAHG and TWG including links to the webinars and notes. The first BAHG call starts on April 17. Want to discuss how long the studies are forecasted to last, which should help provide feedback on their prioritization. Knowing how long projects last informs us as to how intently we need to monitor.

Questions/Discussion

[John Jordan] He requested that Lee resend the BAHG invitations for the calls.

[Leslie James] Thinks the format for the BAHG calls is very helpful. If the federal agencies could provide information linking each project to compliance requirements, such as the Biological Opinion or Programmatic Agreement, that guidance from the action agencies would be very helpful. How long the study will last and how long to monitor are also very important. Really appreciates this slide and how to frame the comments.

[Scott VanderKooi] That's a good point. We also look to the USFWS on their feedback. As to prioritization, we need to be really clear about the science program. That's the job of the stakeholders and federal agencies to prioritize. That is not the role of the science advisor. There needs to be a discussion on how much work is necessary and how often. **[Craig Ellsworth]** We need to know from the scientists how important their projects might be, such as the need to continue, because they are most familiar with the work.

[Cliff Barrett] The issue of prioritization is very important. Everyone sees it differently. The bottom line is that the people responsible for this work are the agencies. We need to hear from them as to what they need to meet the biological opinion and the record of decision. **[Lee Traynham]** We are trying to strike a balance. There is the guidance from Dr. Petty to stay the

course and implement the LTEMP. We have general goals to better improve and understand the resources in the Record of Decision (ROD). At the same time, the federal agencies have to be in compliance with a number of requirements. Some of these are more prescriptive than others. This is the challenge of an adaptive management program. We like the flexibility, but when it comes to developing a budget and constraints, it's hard not to have a prescription on what to do.

[Larry Stevens] Urges the group to think about the need for a revised ecosystem model in the context of where we want to get.

[Rob Billerbeck] What we need to tease out is those things that might be a threat such as brown trout. We also need to look really hard at the monitoring this year. What are the things where we can't follow through on our commitments versus what would be nice to have?

[Jess Gwinn] The biological opinion was designed in an adaptive framework so it would be flexible such as managing emerging threats, but we need to make sure we are not "over-meeting" our responsibilities.

[Seth Shanahan] All comments have been captured in a Google document that was shared with the group. There seems to be a strong sense of where we lack consensus and the document orders those points. The document will be available for the full TWG to reference.

[Shane Capron] Given that this workplan is \$2 million over budget, how are we doing this? It's a much harder task to reach consensus when we need to cut. **[Seth Shanahan]** The intention is that as points of disagreement are identified, we can hopefully work towards agreement on those items. **[Craig Ellsworth]** Have time on the BAHG calls to address the small problems, but the TWG needs to address the big problems.

[Bill Davis] What is the date to submit comments? Will comments be provided to members?

[Seth Shanahan] Written comments are due by April 22. They have always been shared, but how they can be provided, is not known. **[Craig Ellsworth]** He recommends not sharing comments because some would rather keep them private. **[Lee Traynham]** The comments received are attached to the projects and not ascribed to any one person. These comments are very helpful. Any additional ones we receive can be added to the Google document.

[Randy VanHaverbeke] What might be missing is an overall view of prioritization of resource categories as a whole. Looking at each project element by itself gets to details, but the general resources would be important from a broader perspective. **[Seth Shanahan]** Reclamation has legal obligations in the LTEMP that need to be met. Monitoring humpback chub and cultural resources are always going to be at the top of the list. We do understand the priorities; the struggle is the magnitude of those actions. For example, can we reduce some monitoring that does not affect decision-making? The intention is to get into the details and use the TWG as a way to dial back some of that work. It is difficult and we're trying to do our best.

[Jess Gwinn] What is the particular order in which we have disagreement on? **[Seth Shanahan]** The table of contents on the Google Doc reflects that order of discussion.

[Jim Strogen] What is the possibility of using the Native Fish Conservation Contingency Funds (NFCCF)? What can that money be used for? **[Lee Traynham]** The contingency fund consists of carryover funds from prior years such from the experimental budget. Currently it has a balance around \$1.7 million. It was originally envisioned as an emergency insurance fund. That was the first priority. These funds are on the table for consideration and open for discussion. **[Scott VanderKooi]** We have tapped into that fund in the past. The way it was justified is that it was for projects that benefited humpback chub, but there was always caution about using it for an emergency purpose and there was consensus. It might be better to think about using the experimental funds first. That's usually from current year rather than the emergency fund.

[Larry Stevens] Don't really understand the extent of roll-over. Field work might be stopped for six months, which would save \$2 million. We could decide to do two years of the bug flow work and save that money. It would interrupt people's lives, but given the current disruption, the amount of money that could be saved for next year might be an easy solution. **[Lee Traynham]** Have discussed this and we understand the point, but there are some limitations on how flexible we can be. **[Scott VanderKooi]** There may be some savings, but having the authority to furlough employees has to come from high up in the administration and that may not be an option. We are looking at other options although maybe not to the degree of the shortfall in this first draft. **[Seth Shanahan]** It's probably better to not hold out hope for lack of doing things this year due to Covid. We need to have the harder conversation of reducing the work effort with an eye to what we can add if funds are available in the future.

[Ben Reeder] If we do webinars instead of meetings, can we save those travel expenses? What studies are needed for compliance versus the others? Can we reduce the amount across the board? **[Larry Stevens]** It is the easier way to approach, but maybe not satisfactory for certain individuals who need a certain amount to do their work. **[Peter Bungart]** Supports sharing the burden, but probably some projects that can be considered a lower priority than others. It would be good to get into the weeds and figure out which ones these are. **[Rob Billerbeck]** We still need to prioritize and have those hard conversations because we'll get stuck with funding nice-to-haves, rather than the must-haves. **[Kelly Burke]** Maybe we can run the two parallels to do the hard work of determining the priorities and also fill in with other projects if the savings are available later. **[Ryan Mann]** A straight cut across the board is not realistic. It has the potential to cripple all of the programs. **[Seth Shanahan]** We should have the hard conversations, but maybe keep in mind what a straight cut might mean to each program.

[Jim Strogen] Can we identify those that have requirements for compliance issues and decide if they are at the levels they need to be? **[Seth Shanahan]** Think we can get there in the order outlined in the Google Doc.

[Larry Stevens] This is a bold discussion that probably also needs to be discussed with the AMWG. It has been years since we developed the LTEMP goals. Maybe we need to revisit the ecosystem model. We also need to understand how to resolve the experiments such as how to conduct a springtime HFE. That might be a critical piece on how the ecosystem works. The other thing is mitigating equalization flows that will devastate our sediment budget, which we've worked so hard to manage. **[Seth Shanahan]** The goals of the program are set very clearly in the LTEMP so don't think there is a need for additional conversation about the goals and objectives. The more difficult part is how to accomplish those goals and objectives. We need metrics. That is an obvious area that we need to make progress on and that fits in with the continuing difficulty of implementing adaptive management. We struggle with taking exceptional monitoring data, assessing it, making modeling predictions, and weighing trade-offs. We need to dedicate in a line item, probably in Reclamation's budget, that we should spend some money for someone to lead this issue. We have not achieved it as quickly in the three years that the LTEMP has been signed and this is what is hampering us. Not sure what that will look like. The science advisor is part of this. It needs to be a line item.

[Scott VanderKooi] Not in favor of an across-the-board cut. There are lots of problems and will push back on that. Also not sure a solution is a line item to fix our issue with metrics.

[Kelly Burke] She is inclined to look at each project to reduce it to make it more efficient.

Discussions on Reclamation Budget

- 1. Project D. Cultural Resources includes nice sub-elements such as staffing, various support activities for monitoring, associative values studies, mitigation, training, video preparation, contingency funds and tribal cultural resources monitoring**

[Bill Persons] He supports the tribal activities, but we need to separate out which ones are required and which are not. That could help dictate the funding sources. **[Lee Traynham]** All of these line items are tied to the programmatic agreement and support compliance with the National Historic Preservation Act (NHPA). For the D.5 projects with tribal partners, they are waiting on agency comments, which will be reviewed for consistency with NHPA.

[Peter Bungart] Tribes have been monitoring for quite a number of years. We continually learn and adjust these efforts. The new proposals enhance that knowledge and also tie into NHPA.

[Kelly Burke] It would be very interesting to see how much debris has been removed to create garden spots. She supports that project.

[Sarah Larsen] If nothing was completed in last triennial workplan, does that money carry over? How much was carried over under D.8? **[Lee Traynham]** In the current workplan, funds will be re-programmed if they are not spent. They would likely be moved to the NHPA contingency fund to honor a commitment to fund it at \$200,000.

[Craig Ellsworth] Is this the best format to get tribal input? Reading Kurt's letter from last week, there are issues that the tribes have tried to relay to the program. How are those concerns being addressed by Reclamation? Seems to be one of the perennial problems of the program.

[Seth Shanahan] Yes, there have been many comments already.

[Helen Fairley] Is the contingency fund for when there was a need for mitigation? **[Lee Traynham]** Believe that was consistent with the funds. We can refine under what conditions we will spend these funds.

[Sarah Larsen] What is the difference between the contingency fund versus new funding commitments? We are building up the contingency fund so how does that affect current obligations for monitoring and mitigation? How does D.9 differ from D.3? **[Lee Traynham]** Monitoring is always going to be in the budget to support the programmatic agreement. We are trying to budget for mitigation to the extent possible, but if we were in need because of an unexpected and urgent action, then we could use the contingency fund. D.3 and D.4 are both monitoring and surveys that the NPS does. D.9 supports funding to the tribes to conduct river trips and to monitor during those trips. These are independent activities.

2. Reclamation Project C includes administrative support, contract administration, river trips, science advisor, experimental fund, vegetation fund, native fish contingency fund, fish passage prevention, and surveys for rails and flycatchers

[Peggy Roefer] Is the science advisor a yearly funding? Is there a plan for the vegetation treatment measures? Seems like the money for the flycatcher and rail surveys are not allocated correctly. Should there be money in FY22? **[Lee Traynham]** We need to think about how we use the science advisor's time. Do we engage with the science advisor each year? For the rail and flycatcher survey, the total is correct, but the breakouts need to be corrected. **[Rob Billerbeck]** There is a white paper on the vegetation work. It is tied to dam operations and working with the GCMRC. This is for monitoring and feedback to meet the ROD's environmental commitments and the Tim Petty memo.

[Jim Strogen] Would there be funds to deal with a fish kill in Lees Ferry? **[Lee Traynham]** That is something we need to consider. The emphasis has been on monitoring to anticipate the development of low DO plumes near the penstocks. We need to discuss how to determine in advance when these conditions are coming. **[Larry Stevens]** in the past, the water through the turbines was aerated which increased the dissolved oxygen in the release water. Might be good to look at those costs in an emergency and where those funds would come from. **[Seth Shanahan]** The monitoring side is in the program already, but what we need to do if it happens is a different issue. Do we need to identify funds if that were to occur? **[Ryan Mann]** What has changed from the past? **[Bill Persons]** Who has the responsibility to prevent or mitigate such a fish kill in the future? **[Lee Traynham]** We tried an experimental aeration in 2005 that did provide some benefits. After the fact, we reviewed to assess how well it worked and any

concerns. We determined that we do not have authority to operate the dam in a way that could be detrimental to the facility. That's the problem with using the dam as mitigation. **[Jim Strogen]** We need something to ensure that it does not happen. **[Seth Shanahan]** This is a line item that's needed.

[Seth Shanahan] An annual assessment is important and need a science advisor for that. Someone still needs to be in charge of connecting the dots. Either this is an additional line item or we expand the science advisor line item. **[Larry Stevens]** The need for a science advisor has been a need that is recognized from Day 1, but it takes years for someone to come up to speed. These contracts are only for three years. The duration of those contracts needs to be looked at. **[Lee Traynham]** These contracts are for five years. The challenge under the previous contract was that the contractor expended all of the budgeted funds before he could complete all the tasks. The funding level is the same as FY18-20. **[Jakob Maase]** From the administrative history, perhaps we can discuss the previous science advisors as to what went well and what did not to get the most out of this line item.

[Sarah Larsen] Is no funding allocated for C.9 and C.10? **[Lee Traynham]** These are placeholders for the evaluations of fish passage and temperature control methods that are in the biological opinion. We know we need to make progress on these items, but what to accomplish has yet to be determined. Would welcome feedback on these tasks. The Reclamation Technical Service Center is also exploring this from a broader agency-wide perspective. There is a white paper on temperature control and we expect more from them. There are number of things outside the program that we might be able to leverage. Still have some site-specific work to do. Hope to have those ideas by the second draft of the workplan.

3. Other Projects Funded Outside of GCDAMP (razorback sucker monitoring, brown trout control, humpback chub, translocation work, Lake Powell water quality monitoring, temperature control methodology, etc.)

[Peggy Roefer] Is Reclamation going to work with NPS on a dissolved oxygen string above Glen Canyon Dam? Would like to consider either a platform or dissolved oxygen string. **[Bridget Deemer]** There is a thermistor string, but currently no platform. **[Jeff Arnold]** Ken was trying to get funds for a platform maybe up near Bullfrog?

[Bill Persons] Does the project include quagga mussel and glass carp monitoring? **[Jeff Arnold]** We monitor for quagga throughout the reservoir, but not for glass carp.

[Larry Stevens] GCWC has done two restoration projects and is about to engage in another one that are not well known. These might be informative for the vegetation work. GCWC has also been looking at the benthic and hypoxic issues that seem to be related to low flows. Those projects have not received much attention either, but the results are about to be published.

[Jim Strogen] Happy to see what was listed in Project J for incentivized harvest. In terms of additional money, it would be best to format that in the same way as other GCMRC programs.

4. Reclamation Budget for Implementation of AMWG and TWG (travel, facilitation, support, contract administration, outreach, etc.)

[Seth Shanahan] As long as he is TWG chair, he will not use the travel reimbursement, which opens up \$25,000 in the budget.

Discussions on GCMRC Budget

1. Project N. Economic Impact of Electrical Production at Glen Canyon Dam

[Leslie James] This project is significantly different from last year's program. CREDA has strong concerns about this proposal and are in discussions with WAPA to look at the original intent. When those conversations have concluded there will be suggestions on a revised project N. CREDA is willing to entertain comments from others. The original purpose was to represent one of the resources in LTEMP to encourage evaluation as to whether there was an opportunity to improve or mitigate. The current project is laudable, but in regards to current budget constraints, the project is not appropriate at this time. **[Seth Shanahan]** The budget is \$90,000. What would be the level of effort after those conversations? **[Leslie James]** Don't know how much the original budget was but think it was about \$13,000. It was not to be burdened by this program or to take away funding from other projects. **[Scott VanderKooi]** Thought we had funds that were not used in Project J that were obligated to another cooperator. **[Lucas Bair]** Leslie is correct about the original project. The majority of that money would be dedicated to his salary. **[Seth Shanahan]** Perhaps it would be best to discuss this in the BAHG.

2. Project D. Effects of Dam Operation and Vegetation Management for Archaeological Sites

[Larry Stevens] The experiments done last year did not seem to be very successful. Many of these plants are clonal species. The rate of regrowth is very rapid and may not match the work. There seems to be a brief opportunity for sand to move in after the vegetation is removed. How much modification of the plans will take place given what we know about these species? **[Joel Sankey]** This is recognized. The NPS is removing the vegetation on sandbars, which is viewed as keeping campsites open with continued maintenance. A trip was going to occur this spring. Another thing is that we are hoping to both remove vegetation and then ideally have an HFE shortly after to bring in more sand. **[Bill Persons]** The project on experimental vegetation removal seems to fit in the nice-to-know category. Perhaps this is something NPS should be doing. **[Joel Sankey]** Project D.1 is closely coordinated with the Reclamation budget for vegetation. We need to talk about both of them. NPS does the management and helps Reclamation design the experiment. **[Rob Billerbeck]** See section 6.4 of the LTEMP ROD to work together on experimental treatment and mitigation. It is an important commitment in the ROD based on many years of study of dam operations on vegetation. Also refer to Tim Petty's memo on priorities of the GCDAMP where this vegetation work is highlighted. The whole reason why the GCDAMP exists is because of those resources below Glen Canyon Dam. This is just a small

part of the program. For D.1, one of the five objectives could not be completed in the ROD without this information. It is key that we develop the right places and right methods to remove vegetation to protect cultural resources. It is critical to continue so if there is an HFE, we can determine effects on those sites. It would be a waste of previous efforts if we did not continue. **[Joel Sankey]** It makes more sense to see this through since we are a year into the experiment, rather than stopping and starting. It has taken a lot of cooperation and coordination to get it going. **[Seth Shanahan]** Maybe the challenge is how much is needed? Perhaps look at a reduction in scope. **[Craig Ellsworth]** What is the timeframe of this project? **[Joel Sankey]** Three years makes a lot of sense given that we are a year into it. We could also think about reassessing it after an HFE. **[Peggy Roefer]** Another point of confusion is that we are using existing projects to evaluate the vegetation experiment, but using methodologies and approaches that are tied into a longer compliance issue. It is trying to take advantage of an existing project and is relatively inexpensive because of this. **[Peter Bungart]** He supports comments that if we lose momentum, it will set us back. Once it goes away, it might be difficult to get it back into the program and it is a relatively inexpensive project. **[Ben Reeder]** Tribal consultations in regards to vegetation and archeological sites are very important, but when the project talks about camping beaches, there seems to be room for efficiencies. There are a lot of river guards that could be utilized and who are invested in those places that could be tapped into. **[Larry Stevens]** Each time down the river he documents new non-native vegetation, but there's no one to report that to. **[Rob Reeder]** Send those comments to Lonnie. For Glen Canyon, direct them to John.

[Seth Shanahan] Although D.2 (repeat photography) and D.4 (Holocene map of fluvial sediments) are important, maybe these can be delayed in a future budget cycle? **[Helen Fairley]** This work was not in the last workplan and had used volunteers collect the photographs. A lot of information has been amassed with no funding. We would like to get it published so it can be accessible in future years. Twenty-five percent of this funding is for Helen's salary, which may not change the final budget number if the project is removed. D.4 is in a similar situation in which information has been gathered and has not been organized. A portion of that is also part of Helen's salary. There is no field work involved.

[Seth Shanahan] There seems to be consensus to perhaps refocus work effort on D.1. **[Bill Persons]** Would like to see a plan from the scientists on how that might be scaled back so we know what we are up against. **[Craig Ellsworth]** Always go back to the guidance documents that we have from Tim Petty and the LTEMP goals to make sure we are doing those things first. There needs to be strong justification if the project is not tied to our current guidance.

3. Project A. Streamflow, water quality, and sediment transport

[Seth Shanahan] This is probably the largest project of \$1.3 million. **[Peggy Roefer]** The project description says there are ungauged tributaries. How many are there and is that of value to

continue to collect tin time of climate change? **[David Topping]** Those things are real cheap and we have the longest time series in the world for these types of ephemeral stream channels. We use them to inform HFE design and evaluation because they are clustered around Upper Marble Canyon. Each gauge is about \$1,000 to 2,000 per year depending on how many samples are collected. Altogether they are less than \$10,000. There seems to be some misunderstanding of which gauges are used and for what. Some are for biological purposes, which cost closer to \$20,000 per year. Other gauges are half funded by the USGS toxics program for monitoring uranium. GCDAMP only pays for half of those. At Lees Ferry, there is a well worked-out schedule for field work that depends on that gauge. Others are not paid for at all by the GCDAMP. **[Bill Persons]** Is USGS showing any interest in picking up these gauges? **[David Topping]** They are probably not.

[Craig Ellsworth] Project A.1 is over a million dollars and the gauges only cost \$10,000? **[David Topping]** A lot of that work is interpretative and in maintaining the database. It is a lot of salary time and overhead.

[Larry Stevens] He would like to see a strategy for how to minimize the impacts of equalization flows and the development of a contingency plan. This would be mostly a paperwork exercise.

[David Topping] We can evaluate those flows, but what would be nice to do when we get to equalization would be to discuss what could be done and define that as an interpretive item in the budget. **[Seth Shanahan]** Have heard that these are all essential activities, which is important to know, particularly as this is a large budget item, but the magnitude of the work needs to be reduced. Maybe the challenge is to come back with a more detailed budget that identifies projects that won't suffer the consequences. Some of us don't know what that fine line is. **[David Topping]** This can't be done. A lot of the budget is tied up in permanent salaries. The budget has been reduced already. There is not a lot of room to cut, especially 20%, which would mean cutting staff. The staffing levels were designed to collect the data that the program requires. The budget is already quite slim and that should be apparent when the workplan is submitted. **[Scott VanderKooi]** We need to work this out internally. **[Seth Shanahan]** It is the TWG's task to at least identify opportunities recognizing that there are institutional limitations.

4. Project B. Sandbar and sediment storage monitoring and research

[Bill Persons] Is the Aeolian transport part of this project? This could be done on a less frequent basis. Some years there are no HFEs. Does that work in the Western Canyon need to be done or can it be delayed? **[Paul Grams]** Aeolian is not in Project B. The management actions go on every year. We typically provide an assessment before each HFE and an evaluation afterwards. Only one HFE survey is collected each year. For the Western Canyon work, we need to know when people want to have that information. There are some concerns that have been expressed for 5-6 years. It has been a long-standing issue that is directly affected by dam operations. **[Scott VanderKooi]** There are several elements that are proposed to be funded

through the experimental fund that would only occur if one of those experiments occur. **[Seth Shanahan]** The Western Grand Canyon project was proposed by a stakeholder who had concerns about the impact on their boat operations along the river corridor. **[Peter Bungart]** Paul summarized the situation really well, but where this area is in relation to the dam is not material. It is part of the system. It is based on navigability of the river corridor. This has been discussed. If some stakeholders are willing to push it off for several more years, we may never understand the situation in that part of the system. We are also finding a lot more native fish species in that part of the river that is only recently getting attention. **[Seth Shanahan]** This is an opportunity to work with a tribal partner. Do we want to pass on that? Are there opportunities to do less research along other parts of the river? **[Larry Stevens]** That reach is also a hotspot of endangered species and perhaps the biggest population of humpback chub and razorback suckers. **[Paul Grams]** Pushing some of that into the next workplan is possible, but it gets problematic to meet the 10-year LTEMP assessment. Those are the kinds of tradeoffs. If there is direction to prioritize that work in the Western Canyon over sediment storage, we can do that.

[Peter Bungart] It seems as though in recent years we've learned that rainbow trout are not the villain predators on the chub that we used to think they were. Is there room to reduce some of that research if it boils down to a recreation issue?

[Seth Shanahan] Next steps are to submit written comments by April 22. The BAHG meetings will be held April 18, 20 and 21. After this, the federal agency will submit a new document on May 18. From then to June 8, the TWG, BAHG and science advisors will be reviewing. Then more calls in June before the AMWG meeting on June 23. This will give us all more opportunities to provide input.

Discuss any emerging issues and agenda items for next meeting

[Larry Stevens] Are there sister agency communications that TWG or AMWG are not privy to? For example, Department of Interior agencies get together to talk about their policies that might be relevant to TWG or AMWG discussions. **[Seth Shanahan]** Believe these occur before the AMWG meetings. Are there reports on these that can be provided? **[Lee Traynham]** These are side meetings common among all agencies to coordinate internally. If there are items that are relevant to the group, these would be shared, but there is not information that is being kept secret.

[Bill Persons] Would like to see oxygen depletion and plans to mitigate that discussed at next meeting because it involves a mix of agencies.

[Jim Strogen] Are we approaching a point at which we have met the desired goals with respect to data collection for humpback chub and trout? **[Bill Persons]** Perhaps this is the downlisting efforts for rainbow and humpback chub? **[Seth Shanahan]** This relates to being informed within

an adaptive management format. If you can clearly say, and we all agree, that one goal is being met, then it seems natural to try to focus on other goals. That's the tradeoff. That is a difficult question to answer and not sure we all agree, which is the conversation we need to have.

[Larry Stevens] Would like to be more informed about other research projects outside of GCMRC such as NPS, WAPA and others. **[Seth Shanahan]** That's on the agenda along with rail and flycatcher work.

[Larry Stevens] Can we have a conversation with Zeke about the GCRG's sandbar photography project and with Paul to see if that data are lining up with program expectations? The driftwood distribution could be part of that, too. **[Paul Grams]** Have been discussing this already and it is an element in Project B.1 (Adopt a Beach Program).

[Bill Persons] Can we get an update about what happens if there is no access to the river to do the bug flows or whether they will be losing a couple of years' worth of effort? **[Larry Stevens]** We might be able to get around the data lost through modeling.

[Leslie James] What is the AMWG being asked to do if the redraft of the triennial workplan is May 18 and the AMWG meeting is May 20? **[Seth Shanahan]** The Triennial Workplan Guidance says the draft will be provided to the TWG for review and comment. It does not direct the AMWG on what they should do at their May meeting. The idea is that they will receive a summary presentation of the items. **[Lee Traynham]** We try to get a lot in during the May webinar. Will likely request additional input through email and written comments.

Public Comment

None submitted.

Meeting adjourned at 2:30 PM Pacific Daylight Time

Abbreviations

ADWR – Arizona Department of Water Resources

AMWG – Adaptive Management Work Group

AZGFD – Arizona Game and Fish Department

BAHG – Budget Ad Hoc Group

CFS – cubic feet per second

CRBC – Colorado River Board of California

CRCN – Colorado River Commission of Nevada

CREDA – Colorado River Energy Distributors Association

CWCB – Colorado Water Conservation Board

FFI – Fly Fishers International

FLAHG – Flow Ad Hoc Group

FY – Fiscal Year (October 1 – September 30)

GCDAMP - Glen Canyon Dam Adaptive Management Program

GCMRC – Grand Canyon Monitoring & Research Center

GCNP – Grand Canyon National Park

GCRG – Grand Canyon River Guides

GCWC – Grand Canyon Wildlands Council

GRNCA – Glen Canyon National Recreational Area

HFE – High Flow Experiment

LTEMP – Long-Term Experimental and Management Plan

NFCCF – Native Fish Conservation Contingency Fund

NHPA – National Historic Preservation Act

NPS – National Park Service

OMB – Office of Management and Budget
Reclamation – Bureau of Reclamation

ROD – Record of Decision

SHPO – State Historic Preservation Office

TMF – Trout Management Flows

TWG – GCDAMP Technical Work Group

TWP – Triennial Workplan

UMPA – Utah Municipal Power Agency

UCRC – Upper Colorado River Commission

USFWS – United States Fish & Wildlife Service

USGS – United States Geological Survey

WAPA – Western Area Power Administration