Glen Canyon Dam Adaptive Management Program
Adaptive Management Work Group Meeting
February 9-10, 2022

Wednesday, February 9, 2022

Start Time: 8:30 AM Pacific Standard Time (PST)
Conducting: Wayne Pullan, Secretary's Designee to the Adaptive Management Work Group (AMWG) and AMWG Chair.
Recorder: Carliane Johnson, SeaJay Environmental, LLC.
Facilitator: J. Michael Harty, Kearns & West, Inc.

Welcome and Administrative

Opening Remarks

[Wayne Pullan, AMWG Chair] We are joined at this meeting by Daniel Picard, the AMWG's Acting Designated Federal Officer (DFO) at the Bureau of Reclamation (Reclamation) and by Christina Kalavritinos, Senior Advisor to the Assistant Secretary for Water and Science, Department of the Interior (DOI). One of the primary purposes of the February AMWG meeting is for members to hear from scientists from the Grand Canyon Monitoring and Research Center (GCMRC), partners tribes, and other subject matter experts regarding findings and project work.

- This meeting is taking place against the backdrop of extraordinary drought and historical low water levels in Lake Powell and Lake Mead. Water levels at Lake Powell may fall below 3,525 feet in a few weeks before runoff comes in. At the same time, Lake Mead continues to operate in its first ever Level 1 Shortage Condition, which requires reduction in water use by Nevada, Arizona, and New Mexico.
- The Drought Response Operational Agreement (DROA) is a critical tool to mitigate the effects of these conditions. Reclamation has implemented operational flexibility at Glen Canyon Dam and is holding back 350,000-acre-feet (350 KAF). This will keep water levels higher at Lake Powell. Reclamation is also considering DROA releases from the Upper Basin reservoir into Lake Powell.
- AMWG can help with these efforts. Adaptive management is more critical than ever as operations occur with less water and less elevation. Last year, the Secretary of the Interior renewed the charter for the Glen Canyon Dam AMWG, reaffirming the desire to continue to consult with a diverse group of stakeholders regarding the dam and the protection of downstream resources.

Introductions and Determination of Quorum

[Michael Harty, Facilitator] Roll call taken, and a quorum reached with 21 members represented.

Approval of August 2021 Meeting Minutes

[Wayne Pullan, AMWG Chair] The draft minutes were distributed on December 17, 2021. No edits or objections were received. The August 18-19, 2021, AMWG meeting minutes were approved by consensus.

Review of August meeting evaluation

[Terra Alpaugh, Kearns & West] Results of the August AMWG Meeting Evaluation were presented. In summary, there is an interest in a "Law of the River" seminar and suggestions were received about the format for future panels.

Administrative Updates

- **AMWG Charter**
- **AMWG Membership Status**
- **Action Item Tracking Report** **[Wayne Pullan, AMWG Chair]** Updates on the three action items are as follows:
    - **Monitoring Metrics** – GCMRC has developed draft metrics concurrently with the 2021 Annual Report, which are currently under review by Department of the Interior (DOI) bureaus.
    - **Budget Prioritization** – DOI bureaus have identified high priority activities. After leadership review, these priorities will be distributed to the Budget Ad Hoc Group (BAHG).
    - **Fiscal Year (FY) 2022 River Trip** – contemplating either June 22-July 1 or July 13-22.
- **FY2022 Program Funding Status** – Reclamation has been operating under a Continuing Resolution (CR) for FY22. Reclamation was authorized to use discretionary funding proportionate to the amount covered under the CR from October to February. Reclamation budget staff will be reaching out to the agencies to determine if authorization will be needed to use additional discretionary funds in the coming months. If a budget is not received, discretionary funding will be requested through appropriations rather than power revenues.

Basin Hydrology, Water Quality, and Operations

[PRESENTATION] [Heather Patno, Reclamation] The 2021 monsoon events recharged soil moisture leading into WY22, but it is still below average and that is going to affect the runoff forecast. As of February 7, 2022, the current basin snow water equivalent is at 99% of median. With current conditions, the forecasted unregulated inflow to Lake Powell is 7.3 million acre feet (76% of average).

The Drought Operations Plan is scheduled to be finalized in April 2022 with the draft framework currently under review. The draft release pattern for the 350 KAF adjustment at Glen Canyon Dam was shown, but this is subject to change. The February 24-month study will be published on February 15. All projections in the presentation were based on the January 24-month study. Even with the adjustment, Lake Powell elevation will briefly drop below 3,525 feet.

For unit outages, transformer replacement continues with recent extensions on Units 7 and 8. The last units (3 and 4) will be replaced in WY23. There is good stratification with penstock release temperatures around 10 degrees Celsius (^{o}C) and dissolved oxygen (DO) around 6 milligrams per liter.

Q&A and discussion

[Jim Strogen, Fly Fishers International (FFI)/Trout Unlimited (TU)] Are anticipated temperature and DO levels considered in the monthly releases or are they power dependent? **[Heather Patno, Reclamation]** Consistent with the LTEMP Record of Decision, Reclamation operates to support multiple resources, including for power generation. Temperature and DO are always under consideration.

[Erik Stanfield, Navajo Nation] What are the data sources for prediction of inflows? Are there any considerations for including datasets that would have longer timeframes? **[Heather Patno, Reclamation]** Reclamation uses the Colorado River Mid-Term Modeling System (CRMMS) for the 24-month study. Other datasets are used, most of which are for long-term probabilistic model runs such as Colorado River Simulation System (CRSS). Reclamation analyzed dendrochronology for Lees Ferry and the Colorado River Basin, and the current drought is within the five driest in those 1,200 years of record. Dendrochronology is being incorporated by using the most recent forecasts and making sure that the 20 years of drought (1991-2021) are included as a higher probability over the next one to two years.

[Larry Stevens, Grand Canyon Wildlands Council (GCWC)]: Is there any estimate for evaporative loss in the Upper Basin under warming temperatures? **[Heather Patno, Reclamation]** Reclamation uses an estimate for evaporative loss, but it is based on estimates from the 1980s. An evaporative study is currently being conducted to update that information in the Upper Basin.

[Kirk Young, U.S. Fish and Wildlife Service (USFWS)] When will we see projected temperatures based on the February forecast? This is critical to understanding risk from aquatic invasive species and other resources. Are temperature updates going to be available? **[Heather Patno, Reclamation]** The Water Quality Group is working on this, and temperature projections should be updated in the February 24-month study.

2022 GCDAMP Annual Reporting Meeting Update – Part 1

[Wayne Pullan, AMWG Chair] Particularly for those who are new, you might review the combined vision and mission statement for the Glen Canyon Dam Adaptive Management Program (GCDAMP), although it pre-dates the Long-term Experimental and Management Plan (LTEMP). The Record of Decision (ROD) states that DOI will work in consultation with the AMWG to update the GCDAMP guiding documents to reflect the environmental impact statement (EIS) and ROD.

[PRESENTATION Spring Disturbance Flow] [Ted Kennedy, GCMRC] One of the best outcomes of the spring disturbance flow was cross fertilization across different resource areas. Historically, in the pre-dam river, spring and early summer were the most prevalent timing of disturbance flows. Appropriately timed disturbances can have positive effects but can be very different at other times. The last spring HFE was in 2008. The presentation described findings from the studies that were conducted from the 2021 spring disturbance flows.

[PRESENTATION 1, PRESENTATION 2 Nutrients, Bugs, & Bug Flow Synthesis] [Bridget Deemer, GCMRC] This was an overview of the nutrient work that was done last year to understand controls on phosphorus in the Colorado River. **[Ted Kennedy, GCMRC]** Key findings on the bug flow experiments were also provided. Many comments have been received on improving the bug flow synthesis report.

Q&A and discussion

[Mike Moran, GCMRC] GCMRC had planned for Project O elements to be funded this year and had not anticipated using experimental funds. It should be possible to use end-of-year funds from FY21 to fund project elements that had extended into this year.

[Larry Stevens, GCWC] Has the reach-based effects of the flows been considered with stronger effects at the dam than downstream? There was sandbar development in the Glen Canyon reach but

monitoring for sandbars is not being done there. **[Ted Kennedy, GCMRC]** Bridget Deemer found that sediments from the dam were not leading to more nutrients, but it was a different story at Diamond Creek with very high nutrients. There may have been sandbars building in other areas that would not have been seen by the cameras although a few sites have seen small gains.

[Leslie James, Colorado River Energy Distributors Association (CREDA)] Were the survey questions comparable with data on the historic surveys? **[Ted Kennedy, GCMRC]** Believe they were, but will check with Lucas Bair to make sure that was the case.

[Billy Shott, National Park Service (NPS)] Are there expected impacts to sediment, DO, and bugs from increased temperatures? **[Ted Kennedy, GCMRC]** Temperature is a major regulator of biological processes. As it increases, algae and invertebrate growth are accelerated. The thinking had been that cold water affects invertebrate diversity, but flow also has a major role. Altered temperature is a big constraint but warming temperature might alleviate this. It is not known how it affects fish except it is known that brown trout do not do well in high temperature.

[Jim Strogen, FFI/TU] Do you have advice about DO situations with the predicted flow constraints from the dam in the future? Would it be beneficial to have multiple egresses to control DO? **[Bridget Deemer, GCMRC]** Yes, I think it will become increasingly important to have capacity to draw from different water depths to avoid the transport of low DO water into Glen Canyon in the future. GCMRC is exploring doing incubations to understand how much of these low DO events come from 1) chemical dissolved oxygen demand in deltaic sediments in Lake Powell, 2) biological oxygen demand in deltaic sediments in Lake Powell, and 3) mineralization further up-stream in the inlet rivers due to monsoons.

[Leslie James, CREDA] What is the next step for the Technical Work Group (TWG) and AMWG? Will there be a revised report? **[Ted Kennedy, GCMRC]** All comments are being considered, but not sure when a revised report will be finished.

[Brian Sadler, Western Area Power Administration (WAPA)] Is there an opportunity to have an in-person meeting to review the report and comments on the synthesis report? **[Ted Kennedy, GCMRC]** Open to having an in-person meeting but will defer to supervisors on that.

[Larry Stevens, GCWC] Are there long-term (decadal) drift data on midge abundance, and how do the bug flows results fit into those data? **[Ted Kennedy]** Did not see drift in Glen Canyon, but downstream was a different story. The details are in the report.

Potential Water Year 2022 Experiments

[PRESENTATION] [Lee Traynham, Reclamation] The LTEMP attempts to strike a balance between a prescriptive approach and an adaptive management approach. Each year is started with the best available information to consider upcoming flow experiments. Reclamation is also committed to provide notification at least 30 days in advance to its tribal partners. The Planning & Implementation Team (P&I Team) and their consensus recommendation to DOI are a key part of this process.

There are several types of HFEs. While sediment conditions were sufficient to consider a fall HFE in WY22, DOI elected to not conduct the experiment. The discussions today center around a spring HFE and the conditions needed to trigger that. Also need to consider ongoing drought response operations and the potential for monthly release adjustments that will need to occur later in the year.

Conversations have begun with tribal partners about Trout Management Flows (TMFs). Reclamation seeks comments on improvements to the planning and implementation process for LTEMP flow experiments.

[Mike Moran, GCMRC] Current conditions of sediment loading in the Paria River are not significant enough to trigger a sediment HFE. The spring HFE implementation window is March and April. Note in the historical record that overall inputs into the Little Colorado River (LCR) are lower than the Paria, but the LCR has higher inputs around January while inputs into the Paria do not tend to peak until around March.

[Lee Traynham, Reclamation] The best available science suggests there is a sediment enriched condition and perhaps that offers opportunities for other WY22 operations. However, the trigger conditions for a spring HFE have not been met. If they do occur, a Secretarial decision would need to occur no later than March 21st to achieve April implementation.

Other highlights in the presentation included work being done on TMFs, re-allocating future releases, and the pros/cons on a motion about directing the Flow Ad Hoc Group (FLAHG) to discuss emerging issues.

Q&A and discussion

[Leslie James, CREDA] Where are the LCR measurement taken? **[Ted Kennedy, GCMRC]** LCR estimates come from measurements at mouth (confluence with Colorado River). Sediment estimate inputs are also informed by independent gages on Moenkopi and upstream at Cameron. **[Craig Ellsworth, WAPA]** There are links and maps to all the GCMRC sediment gages and to the Sand Mass Balance Reaches on the wiki at: http://gcdamp.com/index.php?title=GCDAMP_Sediment. **[Scott VanderKooi, GCMRC]** Direct link to the GCMRC sediment gages is: https://www.gcmrc.gov/discharge_qw_sediment/.

[Larry Stevens, GCWC] The list of possible HFEs is a small number that could be considered. Is this list coming from the P&I Team or GCMRC's desired projects? **[Lee Traynham, Reclamation]** These are the experiments that were explicitly evaluated in the LTEMP EIS and are part of the preferred alternative under the ROD.

[Jim Strogen, FFI/TU] While the spring accounting window does not show a high sand accumulation, there is quite a bit of sediment that was not utilized this past fall in an HFE. When do we discuss the mechanisms for a reconsideration of the sediment accounting window to allow for more spring flow opportunities? **[Lee Traynham, Reclamation]** This was asked in 2018 and the response was that there is little flexibility in the accounting windows because DOI did specifically consider and evaluate those windows as part of the LTEMP EIS. This is a question for AMWG members. What is the threshold to get there? Not everyone is there yet. **[Jim Strogen, FFI/TU]** The current high sediment loads are not being considered in the accounting window, which is a human condition rather than a river condition. There needs to be two accounting windows to utilize conditions on the river as they become available. **[Larry Stevens, GCWC]** GCWC has presented this issue to the GCDAMP. There needs to be a longer discussion with a reactivated FLAHG. Also do not understand the discrepancies in the LTEMP appendix that states triggers can be adjusted. **[Michelle Garrison, Colorado Water Conservation Board (CWCB)]** In that footnote about the triggers can be changed, it also mentions that National Environmental Policy Act

(NEPA) compliance can't just be changed. Some consider this a more long-term question requiring a full NEPA analysis and this is fundamental as to when the FLAHG should tackle the issue.

[Sara Price, Colorado River Commission of Nevada (CRCN)] There is going to be push back by the states to do anything outside of the confines of LTEMP. The program is in place to do what we can. **[Larry Stevens, GCWC]** There needs to be a clear goal of this program to guide future management on the river. The language of LTEMP about the triggers needs to be clarified.

[Rod Smith, DOI] The menu of LTEMP experiments drove the resource analysis in LTEMP. One of the major drivers was the type and number of experimental flows and how they might affect fish, temperature, sediments, economics, etc. **[Sara Price, CRCN]** It is important to be able to consider why we are looking at other experiments. **[Jim Strogen, FFI/TU]** Makes a request that there is sufficient time to talk about this as a group. **[Wayne Pullan, AMWG Chair]** Will look to find time on tomorrow's agenda.

Discussion of a Potential FLAHG Charge

[Larry Stevens, GCWC] Given the level of uncertainty about the ecosystem, a reactivated FLAHG could consider both high and low flow options to achieve program goals. **[Matt Rice, American Rivers]** Supports reauthorizing the FLAHG. **[Sara Price, CRCN]** Appreciates the concerns but this is already the charge of the TWG. If it does move forward, then it has to be confined to the existing program. **[Clint Chandler, Arizona Department of Water Resources (ADWR)]** The motion language is too broad and there is no expiration date. **[David Brown, Grand Canyon River Guides (GCRG)]** These conversations need to happen outside the bounds of LTEMP because LTEMP is not working. The LTEMP planning horizon is too long for what is happening now. It needs to be adaptive to recognize changing conditions. **[Billy Shott, NPS]** Would support the FLAHG to stay in touch with what needs to be accomplished. **[Jim Strogen, FFI/TU]** One dilemma about the TWG is what it can or cannot engage on. This process worked very well for the March flow. **[Mike Moran, GCMRC]** The FLAHG was very useful in achieving the spring disturbance flow in 2021. Much was learned. One concern about the motion is its vagueness on overall actions. **[Sara Price, CRCN]** It is important to state that we follow the process that was established in LTEMP. **[Wayne Pullan, AMWG Chair]** This discussion was constructive. Recommends small group of interested parties work on the motion overnight and will find time on the agenda to consider it tomorrow. Also suggests that AMWG members review the decision document on the HFE last fall. That document is a reminder of the range of issues that were considered.

BREAKOUT SESSION *on potential motion regarding reactivating the FLAHG occurred after hours on 2/9/2022.*

GCDAMP Tribal Liaison Report

[PRESENTATION] [Jamescita Peshlakai, Tribal Liaison] Is a member of the Navajo Nation growing up in traditional ways in a small town (Cameron) on the rim of the Colorado River. Shared information about the tribe's creation stories and its ceremonies. Since becoming part of Reclamation and the GCDAMP, sees that hundreds of people are involved in taking care of the river and its resources. Will be working with the tribes to find resolutions. Is also a former veteran and a committee staffer with the Arizona State Legislature. Started in the Tribal Liaison position on January 3. Has met with five of the partner tribes to discuss funding issues, updates to the budget, tribal metrics to incorporate traditional knowledge, and holding quarterly meetings. Annual meetings are being proposed for each April. Cultural

sensitivity training will also be developed. A Memorandum of Agreement on non-native fish control is currently being developed. Will be holding a meeting on February 18 to get tribal perspectives on Reclamation's TMF white paper with comments requested by March 11.

Q&A and discussion

[Larry Stevens, GCWC] In growing up, you must have seen large floods come through. What is your perspective for the need for naturally timed floods? **[Jamescita Peshlakai, Tribal Liaison]** Grew up along the LCR east of Wupatki National Monument. Family had sheep, horse, and cattle. Would bring sheep to river to drink and then dig down when livestock needed water during the dry season but did not drink water from the river because of the Church Rock uranium mine spill in 1979. As kids, mostly swam and harvested cottonwood, and were not aware of river flooding. Knows now there are impacts from river levels on the tribes drawing water and collecting revenues from the Antelope Marina. There are also potential impacts to cultural artifacts from lower river levels.

2022 GCDAMP Annual Reporting Meeting Update – Part 2

[**PRESENTATION** Sediment] **[Paul Grams, GCMRC]** Project A focused on monitoring of stream flow and water quality. Project B is the monitoring of sandbars and sand storage. Findings of studies were shown including a graph of sand accumulation and depletion and its quantification related to dam releases. The sand model is a useful tool to interpolate sandbar size between the time they were last monitored. Picture of sediment in the water is a reminder that 90% of the sand occurs in the bed of the river. Monitoring data can be viewed on GCMRC's website. The sandbar model as a way to compare the different HFE durations and how that was used in last fall's technical assessment was also discussed.

[**PRESENTATION** Vegetation/Terrestrial] **[Emily Palmquist, GCMRC]** The presentation covered NPS's experimental vegetation work in both Glen Canyon and Grand Canyon. Results were shown from GCMRC's work on Project C (vegetation monitoring), Project D (effects of dam operations on vegetation management at archeological sites), and Project L (overflight remote sensing, which also has a vegetation component).

Q&A and discussion

[Leslie James, CREDA] Does your hypothetical also look at a within power plant option? **[Paul Grams, GCRMC]** It could. What was modeled was an HFE that could have been done last fall, which was 33,000 cubic feet per second (CFS).

[Larry Stevens, GCWC] What are thresholds for sand storage eddies – is it a continuum or a threshold that regenerates the bar size? **[Paul Grams, GCMRC]** There are thresholds because of the relation between transport rates and flow but they may not be building sandbars. Pretty sure there would be more sandbar building with higher HFEs, but smaller ones will build sandbars, too.

[Billy Shott, NPS] Is the "live within your means" option somehow based on sediment conservation and/or erosion prevention? **[Paul Grams, GCMRC]** It is based on the premise that having HFEs will build sandbars, but not drive the sand storage into depletion. This means operations that result in sand deposition along the banks while minimizing the overall natural erosion.

[Larry Stevens, GCMRC] In the graph on vegetation removal that resulted in dune formation, was that coupled with the depletion of the underwater sand? **[Joel Sankey, GCMRC]** That sand blew off the lower portion of the sandbar, which got very steep along its face.

Public Comment

[Lynn Hamilton, GCRG] The beaches shown in Paul Gram's presentation are still like that because there has not been a high flow event to replenish them. There are also a million metric tons on the river bottom waiting to be used. This is the importance of being adaptive. Adaptive management is a structured, iterative process in the face of uncertainty, which is even more important in times of drought and climate change. There has not been a more pressing need for this since the inception of this program. It is critical that science informs policy. If we do not adapt, we will fail, and we cannot fail. The Grand Canyon, a natural wonder and a sacred landscape, is at stake.

[Alicyn Gitlin, Sierra Club - Grand Canyon Chapter] Sierra Club was unhappy with the LTEMP because comments were not analyzed or addressed such as spring disturbance flows, climatic uncertainty, water delivery, and temperature. Recommendations had been made on high and low flows. The purpose and need of LTEMP expressed the need for adaptive management that is not happening in the way that advocates are asking for that reflects the science. If LTEMP is not working, and Grand Canyon cannot be improved because of LTEMP, then it needs to be scrapped. Grand Canyon is too important to not listen to these ideas.

[John Dillon, Grand Canyon River Outfitters Association] Echoes the concerns and disappointment that an HFE was not scheduled last fall. The Grand Canyon River Outfitters Association strongly hopes an HFE will be considered and scheduled soon for all the benefits it brings.

[Wayne Pullan, AMWG Chair] Thanks everyone including the public comments and the presenters.

Meeting adjourned at 3:31 P.M. PST

Thursday, February 10, 2022

Start Time: 8:30 am PST
Conducting: Wayne Pullan, AMWG Chair
Recorder: Carliane Johnson, SeaJay Environmental, L.L.C.
Facilitator: J. Michael Harty and Kearns & West team.

Welcome and Administrative

Introductions and Determination of Quorum

[Michael Harty, Facilitator] Roll call taken, and a quorum reached with 22 members represented.

[Wayne Pullan, AMWG Chair] The system is now 20 years into drought and facing another difficult and dry year. The elevations at Lake Powell have dropped to unprecedented levels with new record lows each day. There are new and unique environmental and funding challenges. It makes 2022 a remarkably difficult year. The end of the water year is September 30 and there are big decisions on what to do before and after runoff, to the degree that it does come. The best thing the AMWG can do with the limited time we have together is to focus on the most urgent challenges before us.

Proposed changes to the agenda: 1) *Stakeholder Update* moved from 10:30a to 2:15p MST, truncate to 30 minutes; 2) *Temperature Management and Predicted Effects* moved from 2:15p to 10:30a MST, duration of 45 minutes; and 3) Utilize one hour of the lunch window for continued discussion of motions, with 15 minute breaks before and after lunch. [No objections to this approach.]

Federal Agency Updates

- Staffing Updates, Building Status **[Scott VanderKooi, U.S. Geological Survey (USGS) Southwest Biological Science Center]** Mike Moran is the acting GCMRC chief, and Ted Kennedy is GCMRC deputy chief. Thanks to Joel Sankey for his detail. Will let everyone know about the search for the new chief position. Flagstaff has decided not to move forward with the lease on the new building. GCMRC will remain at its current location and look for a new space in the future.

- Endangered Species Act (ESA) Update: Humpback chub, Razorback sucker **[Kirk Young, USFWS]** Humpback chub downlisting was proposed in January 2020 and finalized in November 2021. The species is now listed as threatened. Razorback sucker downlisting was proposed in July 2021; final rule is being prepared. Kanab amber snail was removed from the Endangered Species List in July 2021. **[Larry Stevens, GRWC]** Did the threatened status reduce conservation of the humpback chub? **[Kirk Young, USFWS]** Have not seen that. It still needs management actions to continue its recovery trends.

- Non-native Aquatic Species Management Plan **[Taryn Preston, NPS]** There have been 728 fish caught as part of the Brown Trout Incentivized Harvest program with the second highest month in January 2022. This did not meet the program's goal, but it seems as if things are picking up. For green sunfish, NPS plans to do a slough pumpout this spring. USGS just reported they caught a lot of green sunfish upstream of the slough so will keep watch on that. NPS is also working with partners to develop a rapid response regarding smallmouth bass. **[Billy Shott, NPS]** NPS is optimistic that the Incentivized Harvest program can be effective. Still looking for more engagement with the fishing community. Mechanical harvest remains part of the plan, but other tools are under consideration. **[Jim Strogen, FFI/TU]** Is the rapid response plan part of the environmental assessment or is it specifically for smallmouth bass? **[Billy Shott, NPS]** It is part of the existing plan, but a rapid response would allow for emerging issues. The identification of smallmouth bass would trigger a rapid response. **[Larry Stevens, GCWC]** A presentation at the TWG meeting about fisheries research in the lower portion of Lake Powell said green sunfish were not detected. Are they along the shoreline? How are they coming through the dam? **[Billy Shott, NPS]** Green sunfish have been found in the reach above the slough, which suggests they are passing through.

- LTEMP Litigation **[Rod Smith, DOI Solicitors Office]** This suit was filed in 2019 against DOI alleging there were NEPA infirmities related to the climate analysis in LTEMP. The opening brief was filed in late February. DOI's brief will be filed in early March.

- GCDAMP Program Funding short-term and long-term [PRESENTATION 1] [PRESENTATION 2] **[Kathleen Callister, Reclamation]** For FY22, Reclamation is under a CR and there might be another CR that runs through March 11. Can start talking about the FY23 budget when that is released in maybe March or April. Tribal participation funding is being prepared now.

Reclamation received $2.0 million in drought funding to be used for appraisal studies of Glen Canyon Dam intakes and bypass generation. The Technical Services Center will complete a value planning study as a precursor to an appraisal level study. **[Jim Strogen, FFI/TU]** Will this be part of the temperature discussion later in the agenda? **[Lee Traynham, Reclamation]** This addresses and may resolve part of the proposed motion. **[Kathleen Callister, Reclamation]** The $2.0 million is in addition to the $800,000 for studies of fish distribution in the forebay and entrainment prevention.

- GCDAMP Program Funding short-term and long-term **[Brian Sadler, WAPA]** As of October 1, 2021, the Basin Fund balance was $79 million. Last week, it was $73 million. Projected estimate at the end of September 2022 is $92 million primarily due to Reclamation finding alternative sources of funding for environmental programs. In addition, Reclamation has been able to use other sources to fund a large portion of their annual requirements. The new two-year rate was implemented December 1. WAPA is not going to meet its contracted allocations for customers. WAPA received funds from the infrastructure bill for purchase power; however, these are reimbursable to the U.S. Treasury. **[Leslie James, CREDA]** The net effect is that customers will be seeing a subset of the first two months of the rate implementation, which was higher than 11%. This was due to the timing of the assumptions that were made. It is a new world for customers.

Emerging Issues – Temperature Management and Predicted Effects [MOTION]

Part 1: Discussion – 10:30am MST

[Lee Traynham, Reclamation] The first part of the proposed motion relates to temperature releases this year and in the future. The second part was a recommendation seeking specific funding for infrastructure alternatives. At the time this motion occurred, Reclamation did not know it was going to receive the funding described earlier this morning. This paragraph might be obsolete now. The last paragraph relates to what the program can do to address temperature impacts.

[Kirk Young, USFWS] Lake Powell releases have historically provided suitable conditions to both humpback chub and rainbow trout. The temperature risks are a big threat to the gains that have been made for these fish. There is urgency in managing this risk and making sure that the humpback chub population in the Grand Canyon stays there. **[Leslie James, CREDA]** This issue of temperature should be a high priority for this group. The timing might be fortuitous such as with BAHG updates to the Triennial Budget and Work Plan. Now is the time to potentially look at reordering some of the budget priorities. Would GCMRC provide their best guess on how much funding it would take to work on this so the BAHG can consider where the tradeoffs would be?

[Lee Traynham, Reclamation] Regarding infrastructure alternatives, depending on the results of the value planning study, which will likely take several months, this would lead to an appraisal study, which would take at least a year. Reclamation would like to provide more information about temperature risks, resource thresholds, etc., to the Technical Services Center staff working on these studies. The appraisal study is a precursor to a feasibility study, which requires Congressional authority. There is also NEPA. These are not short processes. **[Rod Smith, DOI]** For background on the timeline, this centers around a law that Congress passed circa 1966, which required Reclamation to get authorization even for feasibility studies. That is the basis for the long timeline and hesitancy to establish the timing.

Part 2: Discussion – 12:30pm MST

[Lee Traynham, Reclamation] Relative to the draft motion provided in advance of the meeting, feedback from today's discussion thus far was to streamline and simplify the language such as striking paragraphs #1 and #2, but there was not consensus on striking paragraph #2. There was a suggestion to support Reclamation's appraisal study of potential infrastructure retrofits, and to specify a timeline by which the study should be completed. Proposed changes to paragraph #3 were intended to remove the specific focus on temperature and DO, and instead look at broader water quality parameters. There was interest in including a cost estimate for the proposal and tasking the BAHG to identify appropriate funding.

[Ted Kennedy, GCMRC] Would also like to see language to get the staffing needed for a full synthesis of the water quality data that Bridget Deemer described. That is a critical need. The synthesis needs to be done first and then the downstream modeling. The Lake Powell water quality part will inform the infrastructure study. **[Jim Strogen, FFI/TU]** What would GCMRC fund and what would be outside of GCMRC funding? **[Lee Traynham, Reclamation]** Water quality sampling and modeling for Lake Powell is not supported by funding from outside of the GCDAMP.

BREAKOUT SESSION *on proposed motion for "Revised Draft Motion Language for AMWG on River Outlet Tube Hydropower Generation."*

Part 3: Motion Deliberations (Water Quality Studies) – 4:00 pm MST

[Larry Stevens, GCWC] Reported out from the Breakout Session. The revised motion is trying to be as non-specific as possible as to who would do the work. This is related to the feasibility of the work. **[Jim Strogen, FFI/TU]** This was also supposed to include Reclamation working on bypass considerations and there was supposed to be a timeframe to action. **[Larry Stevens, GCWC]** It is assumed that the long-term approach would be considered in the water quality assessment. The timeframe is an issue. Most considered it would take ten years for approvals and for construction to get underway. **[Jim Strogen, FFI/TU]** Would like to mention that we support modifications that will result in improvements to the system and the dam. **[Rod Smith, DOI]** One concern about that, given the potential timeframe, is that it would be best to not to get too far ahead and speak for those who are not at the table yet. **[Jessica Neuwerth, CRBC]** An earlier version was clearer on how the TWG assessment would complement the infrastructure modification. What is the actual deliverable in the short term? **[Dave Rogowski, AZDFG]** Need to include there will be a report after assessment for clarification. **[Kirk Young, USFWS]** A lot of this uncertainty will be part of the scope of work, which can be addressed when looking for the funding.

[Larry Stevens, GCWC] Moved the motion. **[Jim Strogen, FFI/TU]** Seconded the motion.

Motion regarding Water Quality Studies was approved by consensus at 4:20 pm MST.

2022 GCDAMP Annual Reporting Meeting Update – Part 3

[PRESENTATION Archeological and Cultural Resources] **[Joel Sankey, GCMRC]** This is a recap of two presentations from the Annual Reporting Meeting on archeological and cultural resources monitoring by USGS and NPS. Archeological sites along the river corridor in Grand Canyon represent human habitat going back 7,000 years and a number of factors can impact these sites.

Q&A and discussion

[Leslie James, CREDA] Which of the bars in the chart would include visitor/human disturbance? What is the average frequency of human disturbance compared to "natural" disturbance? **[Joel Sankey, GCMRC]** The blue bars labelled artifact displacement (7), camping (1), structural modification (3), and trailing (4) are human disturbances. NPS would have the exact long-term estimate, but the 2021 results showed the proportion of natural to human disturbances is roughly 60%:40%.

[Billy Shott, NPS] NPS is always looking at ways to mitigate risks and protect cultural resources in both Grand Canyon and Glen Canyon as lake levels decline. The number of sites is staggering. The easiest and most natural way to protect these sites is through sediment conservation, but there are many tools and NPS is working on this all the time.

[Larry Stevens, GCWC] Are there impacts on buried archeological resources on deeply eroded terraces? **[Joel Sankey, GCMRC]** Have not observed that.

[**PRESENTATION** Fishes] **[Charles Yackulic, GCMRC]** Rainbow trout in Lees Ferry are not doing well right now, while brown trout continue to steadily increase. The data show that brown trout are always growing but rainbow trout are not when they get to a certain size. The good news is that brown trout are mainly in Bright Angel Creek and Lees Ferry; they are not system wide. A gentle decline of humpback chub continues, which was expected because of the past years of poor recruitment. One observation this year was the highest growth of humpback chub near the LCR associated with the warmest water temperatures. There are various data sources showing stable populations of other native fish.

Q&A and discussion

[Billy Shott, NPS] Is there a connection to migration for the decreasing numbers of brown trout? **[Charles Yackulic, GCMRC]** There is spill over in places where they are not normally seen when there has been very big recruitment. This was seen in rainbow trout in Marble Canyon and with humpback chub in the main stem of the LCR. The 2011 reference point with brown trout was a period when there had been good recruitment, maybe prior to when NPS started removing trout in Bright Angel. Brown trout could still spill over to Lees Ferry, but the habitat might not be right for them to get a well-established, self-sustaining population. This was seen with rainbow trout.

[Leslie James, CREDA] To reduce brown trout abundance, would it be better to not do bug flows that would increase their food? **[Ted Kennedy, GCMRC]** Bug flows were designed to enhance food resources of native fish and also rainbow trout (i.e., aquatic insects). Brown trout prey on *Gammarus* (a crustacean) and snails especially. These prey species that brown trout prefer are abundant in macrophyte beds where brown trout occur. Disadvantaging prey species that brown trout prefer could reduce these macrophyte beds. **[Charles Yackulic, GCMRC]** Would not expect bug flows to be advantageous to brown trout. Having disturbances in Bright Angel in spring and summer seem to be leading to low brown trout reproduction. Maybe that is what is missing in the system. [**Billy Shott, NPS**] What does warming temperatures mean for brown trout? **[Charles Yackulic, GCMRC]** In the literature, brown trout and rainbow trout do okay in somewhat warmer temperatures, but only if they have enough food. Looking at Josh Korman's growth plots, if it gets warmer, that is going to make it harder on the bigger rainbow trout that are already having difficulty finding food. Eventually, it will get too warm for even brown trout. Might begin to see new species with a lot of warming.

[Kirk Young, USFWS] What is the magnitude of the risk of smallmouth bass establishing in the canyon given the temperatures? **[Charles Yackulic, GCMRC]** There are many factors that go into making a site suitable for a species, but there is a good chance that temperatures will be suitable for smallmouth bass in the coming years. It is maybe 33% to 50% that temperature will be warm enough in Lees Ferry, which might have habitat that is most appropriate from other factors (i.e., clear water, egg laying areas, etc.). Downstream, the temperature is more suitable, but other factors are not favorable such as turbid water.

Technical Work Group Chair Report

[PRESENTATION] [Seth Shanahan, SNWA and TWG Chair] Next TWG meeting is April 12-13. The TWG can have special meetings at any time because it is not restricted by the Federal Register process. The Ad Hoc groups can meet even less formally. The TWG is hearing many of the same topics as the AMWG, so AMWG members should be getting briefed on these from their TWG counterparts. The TWG needs more policy direction on some activities and whether goals are being reached about the status of resources. Hydrology and how it affects drivers in the system are a big part of these TWG conversations.

Stakeholder Updates

- States: **[Craig McGinnis, Arizona Department of Water Resources (ADWR)]** No updates. **[Dave Rogowski, AZGFD]** Finished draft annual reports, which were submitted to GCMRC, and they can be provided to the TWG or AMWG after this review. Will be going to Lees Ferry in about a month for the springtime monitoring. **[Jessica Neuwerth, CRBC]** No updates. **[John McClow, CWCB]** No updates. **[Christina Noftsker, New Mexico Interstate Stream Commission (NMISC)]** No updates. **[Sara Price, CRCN]** No updates. **[Candice Hasenyager, Utah DWR]** No updates. **[Charlie Ferrantelli, State of Wyoming (WY)]** No updates.
- Tribes: **[Jakob Maase, Hopi Tribe]** Hopi continue to be in a Phase II shutdown until March. **[Erik Stanfield, Navajo Nation]** Navajo are working with GCMRC to develop new monitoring protocols. Just scheduled a river trip, and busy with project funding for drought and infrastructure. **[Kurt Dongoske, Pueblo of Zuni]** Still trying to understand TMFs and the non-native fish Memorandum of Understanding, which does not seem to appreciate Zuni perspectives. If lethal management proceeds because of ESA concerns, then what about the trust responsibility? **[Daniel Bulletts, Southern Paiute Consortium]** Scheduling a river trip for June.
- Non-Governmental Organizations (NGOs): **[Kelly Burke, GCWC]** Getting close to launching the Paria Beach restoration, which will start with a burn plan that is being signed now. **[Matt Rice, American Rivers]** Engaged in the DROA process and are also working on strategies to advance permanent protections for our last, best rivers and other water management issues. **[Leslie James, CREDA]** No updates. **[Kevin Garlick, Utah Municipal Power Agency]** No updates. **[Jim Strogen, FFI/TU]** The anglers and businesses at Lees Ferry are very concerned about rising temperatures and DO effects on non-natives. **[David Brown, GCRG]** GCRG will hold a stewardship project and guides seminar on April 1-16 to teach them about the canyon. GCRG is entering into a philanthropic support agreement with the NPS above Whitmore Exchange, where people fly in. NPS was provided with a spreadsheet about observations and mitigation strategies on crowding and congestion on the river corridor. Also provided NPS photos of beach change due to vegetation encroachments such as Clear Creek Beach.

Stakeholder's Perspective

[PRESENTATION] [Jakob Maase, Hopi Tribe] The presentation provided background on the Hopi Cultural Preservation Office (HCPO). Hopi lands refer to more than reservation boundaries and include migration routes and shrines in the Grand Canyon area. The HCPO has been involved in the GCDAMP since its inception with both the AMWG and TWG. Yearly river trips are conducted to monitor cultural and natural resources. Two surveys are done, one at the beginning of the trip and one at the end. Archeological resources are assessed whether they are eroding naturally or are disturbed by humans. Hopi do not make a distinction between natural and cultural resources. A humane approach to resources should also be taken. Fish electrocution for removal should not be an alternative. Cultural sites are not abandoned areas for the Hopi, who still visit to make offerings. HCPO has received funding to hire someone to digitize past canyon research and to conduct an ethnographic project. Next river trip is May 7-17, 2022.

Q&A and discussion

[Larry Stevens, GCWC] How important are natural ecological processes for the Hopi in the canyon? **[Jakob Maase, Hopi Tribe]** Ecology is the way to look at the river. It is the interconnectedness of the resources. **[Stewart Koyiyumptewa, Hopi Tribe]** Cultural beliefs are that all archeological sites should rejoin mother nature because everything has a life span. This is the same for human remains. Hopi were not at the table when governmental laws were established.

[Shana Rapoport, CRBC] Do Hopi monitoring reports note that data includes only male perspectives? **[Jakob Maase, Hopi Tribe]** The reports mention that only data from the male perspective is included.

Facilitated Discussion: LTEMP Process for Flow Experiments

[PRESENTATION] [Lee Traynham, Reclamation] The elements for considering LTEMP flow experiments, which are explicitly identified in the ROD, were shown. Section 1.4 of the ROD relates to stakeholder engagement and consultations, the planning and implementation process, and a broad list of resource considerations. About twelve weeks are needed to conduct this coordination before a DOI decision is made. The process is often bookended. It starts with an AMWG and/or TWG meeting as a foundation for the best available information, but a DOI decision needs to be made well before (usually 4-6 weeks) the implementation date.

[Larry Stevens, GCWC] What about outside comments that did not seem to have a role in that decision-making process? **[Lee Traynham, Reclamation]** Feedback from broader stakeholder groups is intended to be considered. The AMWG informational webinar allows the P&I Team to report out and provides an opportunity for stakeholders to weigh in. They can also submit formal comment letters.

[Bill Persons, FFI/TU] The technical report was very helpful in understanding the HFE decision last fall. Can that be provided to the AMWG early in the decision window? **[Ted Kennedy, GCMRC]** It would be hard to get that report out any earlier. **[Lee Traynham, Reclamation]** The informational webinar might be done earlier, but there would be a tradeoff in terms of limited data from the P&I Team.

[Kurt Dongoske, Pueblo of Zuni] Would you describe the process of how tribal concerns/issues conveyed during consultation are related to the Secretary as part of the decision-making information? **[Lee Traynham, Reclamation]** That would be a concurrent process. Reclamation leadership receives

feedback directly from tribal partners as part of that conversation. That feedback would be provided for consideration by DOI decisionmakers. To date, most tribal consultations on the implementation of LTEMP flow experiments have been informal conversations. **[Kathleen Callister, Reclamation]** Do not recall any request for consultations on experiments over the past six years. **[Kurt Dongoske, Pueblo of Zuni]** The concern is related to the past issue raised by Zuni regarding the mechanical removal and whether or not that information made it to the DOI Secretary. **[Lee Traynham, Reclamation]** That is independent of the P&I Team process. Reclamation has heard these concerns and is engaged in consultations regarding non-native fish management with the Pueblo of Zuni and with other Parties to the Programmatic Agreement. **[Scott VanderKooi, GCMRC]** GCMRC was involved in a consultation process years ago with the Zuni about a proposal to sacrifice juvenile humpback chub to collect otoliths to better understand where they were coming from. The outcome was the project was dropped. **[Mike Moran, GCMRC]** GCMRC also had a consultation in 2018 for the bug flows that was approved.

Opportunities to Reallocate 350,000 acre-feet of Releases in WY 2022 [MOTION]

Part 1: Discussion – 1:00pm MST

Discussion of revised draft motion language as reported out from the overnight breakout session.

[Larry Stevens, GCWC] It was phrased as general as possible to explore those opportunities and recommendations. There could still be routing issues but stayed away from defining it as an HFE because of concerns about the process. The rapid timeframe was related to marketing issues and power plant operations. **[Clint Chandler, ADWR]** Is the timing possible for the TWG to report to the AMWG given the requirements for posting in the Federal Register? **[Larry Stevens, GCWC]** The FLAHG would report to the TWG and then the TWG would be responsible for communicating with AMWG.

[Seth Shanahan, Southern Nevada Water Authority (SNWA) and TWG Chair] As a listener, the intent of this language is understood for the TWG to direct the FLAHG to undertake the activity. Some of the procedural questions are important. Because there would not be a TWG meeting in that timeframe, the communication between the FLAHG and TWG would probably occur through email. The TWG Chair could also communicate the recommendations to the AMWG, but the TWG itself would need to meet to discuss. The communication chain is important. What it means to be "consistent with the LTEMP ROD" is also something that AMWG needs to tell the TWG because it is currently understood to mean that the project is authorized and does not require additional effort.

[Clint Chandler, ADWR] When would AMWG have the opportunity for input? **[Lee Traynham, Reclamation]** There is a time crunch. The 350 KAF does not preclude other opportunities, but Reclamation is trying to work through these reallocations and there is an opportunity through DROA to move 350 KAF that can best benefit the resources. The decisions on those monthly volumes need to be done soon. The intent here is to give the program the opportunity to weigh in on those concepts, but May, when the AMWG next meets, is probably too late. What can be done to reconcile this timing with the process? **[David Brown, GCRG]** A tremendous opportunity was missed with sediment still in the system. The bigger picture is the need to better manage the resource. We need to be solution oriented and make use of these special circumstances. **[Billy Shott, NPS]** This is taking advantage of a potential opportunity. Is it worth this effort to see if something does emerge knowing that the AMWG will get a change to weigh in at the time of the recommendation? **[Larry Stevens, GCWC]** It would be good to

know if there is consensus. This is also a good example of how the AMWG is not able to be nimble in this process.

[Sara Price, CRCN] Not opposed to looking at the 350 KAF release, but the timeframe is tortured and not sure about the process. Couldn't the TWG report its findings to the AMWG, which makes a determination at that point? It might not require a report out to DOI depending on the findings but if it does, then it has to fall under the LTEMP process for making these kinds of recommendations **[Wayne Pullan, AMWG Chair]** The point of the motion is to provide an avenue by which the TWG can provide input on the 350 KAF release that needs to be rescheduled later in the WY. **[Clint Chandler, ADWR]** Is there any way that AMWG can provide input? Understand the need for operational planning, but this motion is going to short circuit the AMWG's opportunity for input. **[Larry Stevens, GCWC]** Do we really want AMWG involved in this process for considering options? If so, these are the timeframes and the constraints. **[Sara Price, CRCN]** Do not know how TWG can be involved and not AMWG.

[Daniel Picard, Reclamation and Acting DFO to AMWG] Stakeholders are important for general operation and especially with the current WY. Reclamation needs to do as much as possible to coordinate operations of the 350 KAF over the next few months. It benefits Reclamation to have this input through AMWG. This is breaking new ground during drastic hydrological conditions. It is a difficult process based on the tight timelines and made more difficult because of the drought. **[Rod Smith, DOI]** There are provisions for special sessions, but the timing is an issue. Part of complying with DROA is living with all the processes and groups that advise on the operations. This is what the motion is trying to capture to work in this compressed timeframe and the drought conditions. The purpose is to get input from everyone.

Part 2: Motion Deliberations (Reallocation of 350 KAF) – 4:20 pm MST

[Wayne Pullan, AMWG Chair] Do the AMWG members feel there is consensus on the motion? **[Sara Price, CRCN]** Might be closer if the reported findings go to AMWG and not simultaneously to DOI. **[Brian Sadlier, WAPA]** Reminds AMWG members about Shane's comments earlier regarding TWG's ability to evaluate this and can make recommendations to Reclamation outside of the formal AMWG process. That may be a path to get at the goals of this motion without requiring another AMWG meeting for this effort. WAPA still has concerns about the 350 KAF but understands Reclamation's goal. **[Clint Chandler, ADWR]** That is exactly the opposite of what ADWR is asking for in that AMWG members should have that opportunity for input.

[Brian Sadler, WAPA] Maybe it is two separate actions: look at experiments this spring, and then another effort to provide input to Reclamation on a 350 KAF release. **[Shane Capron, WAPA]** There are two things going on at the same time that is causing a struggle. One is that Reclamation would like input on how best to apply the 350 KAF across these months. The TWG has done a good job on these kinds of recommendations without a formal process. This has been done in the past. However, if the second part of this is to consider an experiment this year because of a variety of conditions, that is a whole other process. It was a lot of work with the FLAHG last year on a spring release. The TWG could meet to address this, but it depends on where the focus is between these two things. They could be split.

[Wayne Pullan, AMWG Chair] The ROD is fairly narrow about what can be done in the spring, and it sets conditions, particularly on proactive experiments, which cannot be met such as being in an equalization year with high delivery. An experiment would be a huge lift from a practical matter. There is 350 KAF

that needs to be reprogrammed. It is important to do as much good with it as possible, or at least minimize problems associated with its release. Input from AMWG members would need to be received in a short time. Preference would be to go through a process that leads to consensus. Tasking the TWG to do this work would help in that effort and that would be preferred. Reclamation has said it would be willing to conduct a webinar for AMWG members to describe the 350 KAF release. AMWG members could make comments or recommendations at that webinar or in writing. This may not lead to consensus, but it would allow for a variety of perspectives. These views could be integrated into the decision process. If consensus cannot be reached on this motion, then Reclamation is committed to holding this webinar. **[Clint Chandler, ADWR]** How would the TWG be involved in that? **[Lee Traynham, Reclamation]** The preference is to reach consensus on a motion for the TWG to engage; however, if that does not happen here today, then Reclamation will provide an avenue to share information and receive input. In this case, the TWG would have less of a role and their evaluation would be limited if the TWG does not receive a charge. Instead Reclamation would offer an informal, information sharing webinar opportunity that would be open to both AMWG and TWG members. **[Rod Smith, DOI]** The difference would be individual member input rather than group input. This would address the exigencies of time and allow an alternative way of receiving information.

[Jim Strogen, FFI/TU] This motion needs to move forward. There is a process through the TWG and FLAHG that has worked, and an informal process might slow it down. **[Sara Price, CRCN]** This is a tortured effort about valid concerns that cannot be addressed in this way. A webinar would allow greater input. **[Brian Sadler, WAPA]** WAPA could abstain to not block consensus.

Revised motion moved by [**Larry Stevens, GCWC]**, seconded by [**Erik Stanfield, Navajo Nation**].

[Leslie James, CREDA] Supports the webinar. It is because of the time constraints. This is the middle of February and have no idea how much time is needed to occur behind the scenes before products got to the FLAHG. The webinar is an opportunity for anyone to provide input to Reclamation about this water in a quicker, more effective way. **[Sara Price, CRCN]** Thinks the webinar would be a more effective tool to explore the 350 KAF. **[Scott McGettigan, State of Utah]** Agrees that the webinar provides that flexibility, which is preferred. **[Jim Strogen, FFI/TU]** The TWG is a webinar process that people can become engaged in. What is the difference? **[Leslie James, CREDA] [Rod Smith, DOI]** The difference is that the AMWG process is seeking consensus or collective input while the webinar concept leaves open collective input but allows individual input given the time constraints. **[Kelly Burke, GCWC]** One distinction between the webinar and going through the FLAHG is how to take advantage of GCMRC's insight on both how to move sediments and the impacts of monthly volumes. It is critical to have input from GCMRC. **[Mike Moran, GCMRC]** GCMRC can be involved in either case and to provide information on predicted effects. **[Christina Noftsker, NMISC]** Would an experiment need more than 350 KAF? In last fall's discussion about a fall HFE, a 96-hour HFE would take 210 KAF of water reallocated to the fall HFE and 415 KAF for a 192-hour HFE (bypass volume would be 126 KAF and 245 KAF). **[Lee Traynham, Reclamation]** No, an experiment would not need a certain volume, but it does need a compliance pathway. **[Billy Shott, NPS]** Surprised this is as difficult as it is because this is just to see what tools might be available. Would support moving to a webinar.

[Larry Stevens, GCWC] Supports a webinar, but sees the motion as a more formal information process that will benefit the decision process. **[Charlie Ferrantelli, WY]** If the decision is to support a webinar,

does it ultimately still go before the AMWG? **[Rod Smith, DOI]** Ultimately it is not an AMWG process. The process would not include going through the formal AMWG motions. It is always better if there are consolidated views. **[Kelly Burke, GCWC]** Does one preclude the other? **[Jim Strogen, FFI/TU]** Is it possible to do both? Who would do the heavy lifting for a webinar? **[Wayne Pullan, AMWG Chair]** Would rely on Reclamation to schedule that and prepare the content in cooperation with GCMRC to provide as much background, as possible, on the reprogramming of the 350 KAF. **[Jim Strogen, FFI/TU]** Can FLAHG participate in that or is it precluded? **[Lee Traynham, Reclamation]** The FLAHG is an Ad Hoc group. They would need direction from both the TWG and AMWG. **[Jim Strogen, FFI/TU]** Would accepting the webinar mean opposing the motion? **[Sara Price, CRCN]** Supports the webinar and opposes the motion.

Due to opposition, consensus is not achieved. A vote is held with the results being six (6) support, seven (7) oppose, four (4) abstained, four (4) not present, and four (4) non-voting de facto (DOI bureaus). Per the AMWG operating procedures, support from at least a 60% majority of present voting members is required to pass a motion.

Motion regarding the consideration of opportunities to reallocate 350,000 acre-feet of releases does not pass at 5:00 pm MST.

Public Comment

None.

WRAP-UP

[Wayne Pullan, Acting Secretary's Designee to the AMWG] Thanks given to everyone who has committed their time and provided their contributions to protecting this resource.

Next AMWG meeting dates

- May 18, 2022 (webinar)
- August 17-18, 2022
- January ??-??, 2023 (Annual Reporting and TWG Meetings).
    - **ACTION**: Provide feedback on these dates in the meeting evaluation summary (https://forms.gle/AQ28YH4WTsoSQMyXA)

Meeting adjourned at 4:34 PM PST

Meeting Attendees

AMWG Members, Alternates, and Leadership

Arden Kucate (Pueblo of Zuni)
Brian Sadler (WAPA)
Candice Hasenyager (Utah Division of Water Resources)
Charles "Chip" Lewis (Bureau of Indian Affairs)
Charlie Ferrantelli (State of Wyoming)
Cliff Barrett (UMPA)
Clint Chandler (AZDWR)
Daniel Picard (Acting Designated Federal Officer, Reclamation)
Jessica Neuwerth (CRBC)
Jim Strogen (FFI/TU)
John McClow (State of Colorado)
Kelly Burke Burke (GCWC)
Kevin Garlick (UMPA)
Larry Stevens (GCWC)
Leslie James (CREDA)
Michelle Garrison (State of Colorado)
Peggy Roefer (CRCN)
Richard Begay (Navajo Nation)
Rod Buchanan (FFI/TU)
Scott Mcgettigan (State of Utah)
Wayne Pullan (Acting Secretary's Designee)
William "Billy" Shott (NPS-GLCA)

Department of the Interior

Christina Kalavritinos
Rod Smith

TWG Members and Alternates

Ben Reeder (GCRG)
Brian Healy (NPS-GRCA)
Christina Noftsker (State of New Mexcio)
Clarence Fullard (Vice Chair and Reclamation)
Craig Ellsworth (WAPA)
Daniel Bulletts (Southern Paiute Consortium)
David Brown (GCRG)
David Rogowski (AGFD)
Erik Stanfield (Navajo Nation)
Jakob Maase (Hopi Tribe)
Kirk Young (USFWS)
Kurt Dongoske (Pueblo of Zuni)
Ryan Mann (AZGFD)
Seth Shanahan (TWG Chair and SNWA)
Sinjin Eberle (American Rivers)
William "Bill" Persons (FFI/TU)

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Ernie Rheaume
Heather Patno
Jamescita Peshlakai
Jenny Erickson
Kathy Callister
Lee Traynham
Nicholas Williams
Shana Tighi
Teo Melis
Zachary Nelson

Interested Persons

Alan Kasprak
Alicyn Gitlin (Sierra Club)
Amy Haas (Upper Colorado River Commission)
Amy Schott (NPS)
Betsy Morgan (Utah)
Brian O'Donnchadha (WAPA)
Carliane Johnson (SeaJay Environmental)
Christina Armold (GCC)
Colleen Cooley
Craig Mcginnis (ADWR)
David Braun (Sound Science)
Dennis Smoldt (Arizona Raft Adventurs)
Ed Gerak (Arizona Power Authority)
Emily Halvorsen (State of Colorado)
Emily Omana Smith (NPS-GRCA)
Eric Balken (Glen Canyon Institute)
Eric Scholl
Erik Skeie (State of Colorado)
Frye
Gary Tallman (Northern Arizona University)
Gene Seagle (NPS)
Heather Cole (Arizona Power Authority)
Hyrum Curtis
Jackie Brown (Tri-State Generation & Transmission)
Jacob Carothers
Jan Balsom (NPS-GRCA)
Jason Tea
Jeff Armold (NPS)
Joe Giddens
Joel Barnes
John Dillon
John Jordan
Julie Carter (AZGFD)
Justin Salamon
Kevin Arms
Kevin Bulletts (Southern Paiute Consortium)
Kevin Mcabee (USFWS)
Kristen Johnson (ADWR)
Laura Dye (State of Nevada)
Lew Kleinhans
Lynn Hamilton (GCRG)
Mark Braden
Mark Lamb (USFWS)
Martina Dawley (Hualapai Tribe)
Matt Rice (American Rivers)
Mckenna Murray (Utah)
Mel Fegler (State of Wyoming)
Melissa Trammell (NPS)
Mike Harty (Kearns & West)
Natalia Bergander
Paul Harms (State of New Mexico)
Peter Bungart (Hualapai Tribe)
Rachel Ellis (American Rivers)
Randy Van Haverbeke (USFWS)
Rebecca Koller (NPS)
Richard Turner
Rj Neff
Rob Billerbeck (NPS)
Robert Schelly (NPS)
Rodney Bailey (WAPA)
Sara Larsen (Upper Colorado River Commission)
Sara Price (CRCN)
Shana Rapoport (CRBC)
Shane Capron (WAPA)
Taryn Preston (NPS)
Ted Rampton
Terra Alpaugh (Kearns & West)
Tony Mancuso (State of Utah)
Trent Keller
Walker Mackay
Will
Zak Podmore (The Salt Lake Tribune)

Abbreviations

ADWR	Arizona Department of Water Resources
AMWG	Adaptive Management Work Group
AZGFD	Arizona Game and Fish Department
BAHG	Budget Ad Hoc Group
BIA	Bureau of Indian Affairs
CFS	Cubic Feet Per Second
CR	Continuing Resolution
CRBC	Colorado River Board of California
CRCN	Colorado River Commission of Nevada
CRE	Colorado River Ecosystem
CREDA	Colorado River Energy Distributors Association
CRMMS	Colorado River Mid-Term Modeling System
CRSS	Colorado River Simulation System
CWCB	Colorado Water Conservation Board
DFO	Designated Federal Officer
DO	Dissolved Oxygen
DOI	United States Department of the Interior
DROA	Drought Response Operational Agreement
ESA	Endangered Species Act
FFI/TU	Fly Fishing International/Trout Unlimited
FLAHG	Flow Ad Hoc Group
FY	Fiscal Year
GCDAMP	Glen Canyon Dam Adaptive Management Program
GCMRC	Grand Canyon Monitoring and Research Center
GCRG	Grand Canyon River Guides
GCWC	Grand Canyon Wildlands Council
GLCA	Glen Canyon National Recreation Area
GRCA	Grand Canyon National Park
HCPO	Hopi Cultural Preservation Office
HFE	High Flow Experiment
KAF	thousand-acre-feet
LCR	Little Colorado River
LTEMP	Long-term Experimental and Management Plan
MAF	million-acre-feet
MW	megawatts
NEPA	National Environmental Policy Act
NGOs	Non-Governmental Organizations
NMISC	New Mexico Interstate Stream Commission
NPS	National Park Service
°C	Celsius
P&I Team	Planning and Implementation Team
P.L.	Public Law
PST	Pacific Standard Time
Reclamation	Bureau of Reclamation
ROD	Record of Decision
SNWA	Southern Nevada Water Authority
TWG	Technical Work Group
UMPA	Utah Municipal Power Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
Utah DWR	Utah Division of Water Resources
WAPA	Western Area Power Administration
WY	Water Year