GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM
TECHNICAL WORK GROUP MEETING
OCTOBER 14-15, 2020

Day 1: October 14, 2020
Start Time: 9:04 AM Pacific Daylight Time (PDT)
Conducting: Seth Shanahan, Technical Work Group (TWG) Chair
Meeting Recorder: Carliane Johnson, SeaJay Environmental LLC

Welcome and Administrative: Seth Shanahan, TWG Chair

- **Introductions and Determination of Quorum (16 members) [Seth Shanahan, Southern Nevada Water Authority (SNWA) and TWG Chair]** A quorum was met with 20 members present.
- **Adoption of Prior Meeting Minutes [Seth Shanahan, SNWA and TWG Chair]** The minutes are still in review and expect them to be out soon after this meeting. Will have several meeting minutes to adopt at the January meeting.
- **Next Meeting Dates: January 20-21 (Annual Reporting) and January 22 (TWG), 2021 [Seth Shanahan, SNWA and TWG Chair]** Plan for these meetings to be a webinar. **[Vineetha Kartha, Arizona Department of Water Resources (ADWR)]** Will schedule the conference room, just in case.
- **Ad Hoc Group Membership and Updates [Seth Shanahan, SNWA and TWG Chair]** These updates will be sent to the group today to consider if any participant changes are needed to the Ad Hoc groups or if you are willing to lead one of them.
- **Action Item Tracking Form Update [Seth Shanahan, SNWA and TWG Chair]** In the past, a form was used to track action items and votes. Several years ago, it was decided there was a need to better track information needs and thoughts but using this form has lapsed. The June TWG meeting example of the Tracking Form is a format that is being proposed. It is being called, "Action Items, Motions, and Votes." The term Action Items might be changed to Issue Tracking. No comments on the new approach.

Update on Any Activities Impacted due to COVID

Presentation [DOWNLOAD]

[Mike Moran, Grand Canyon Monitoring and Research Center (GCMRC)] A table was shown of the trips that were led by GCMRC or that have been postponed or cancelled. The good news is that the last cancelled trip was mid-August. Over the last few months, all the trips scheduled have occurred. A few that had been postponed will occur in the future. One is the survey control trip that will probably happen in Spring 2021. A trip to sample for e-DNA was also rescheduled for next year. A multiplexer (MUX) antenna installation in the Little Colorado River (LCR) will likely launch in early November.

Discussion

[Brian Healy, Grand Canyon National Park (GCNP)] Still trying to get a Havasu monitoring trip going but have had COVID complications. Still on track to start Bright Angel Creek brown trout (BT) suppression in next month or so. The spring Havasu monitoring trip was cancelled. **[Ryan Mann, Arizona Game and Fish Department (AZGFD)]** Only other thing was some of the contracted laboratory work on razorback

sucker and flannelmouth sucker hybridization was delayed until next year because the spawning events occurred in the spring. This is outside of the program, but we report on that occasionally. Will start that again in late spring. **[Joel Sankey, GCMRC**] The Park service-run trip for Long-Term Experimental and Management Plan (LTEMP) vegetation management was rescheduled for the fall and has occurred.

[Craig Ellsworth, Western Area Power Administration (WAPA) and Budget Ad Hoc Group (BAHG) Chair] Have there been any exposures to COVID or quarantines since this has been implemented? **[Mike Moran, GCMRC]** No confirmed cases of COVID-19. There were a few instances of potential exposure, but the subsequent tests for COVID-19 were negative. None of the river trips have had any cases of COVID. **[Brian Healy, GCNP]** There have been symptomatic people who may have exposed NPS crew and that is why the Havasu Creek trip was postponed. NPS staff have not had any positive tests. **[Ryan Mann, AZGFD]** Same with the AZGFD, which instituted enhanced precautionary measures on the trips to increase social distancing and other precautionary measures. These seem to be working well.

[Jim Strogen, Fly Fishers International (FFI)/Trout Unlimited (TU)] Where has the money gone with these COVID restrictions? And what about savings from travel? **[Mike Moran, GCMRC]** For GCMRC, some of the money has carried over to this fiscal year (FY). Don't think any of it has been lost. **[Lee Traynham, Reclamation**] GCMRC did anticipate carryover to support some out-year expenditures for part of the FY21-23 triennial budget and work plan (TWP). On the Reclamation side, the biggest impact was to the tribal partners who had a trip cancelled. Reclamation is working with them to figure out ways to use carryover funds for other project work. The money is not lost; it is being reprogrammed. The total dollar amount saved from webinars is not known. If there are savings from travel, Reclamation would anticipate reprogramming those funds. There is a list of items that were not funded but had been proposed in the TWP, which the funds might be applied to.

Update on Monitoring and Research Trips to Occur from Today Until Next Meeting:

[Mike Moran, GCMRC] A table was shown of all trips that have either occurred or will occur throughout 2020. The sandbar monitoring and GCMRC trips are currently on the river. An humpback chub (HBC) monitoring trip is leaving today. Only three more trips will be going out in October and November.

Updates on Items of Interest that are in Consideration for Implementation before next TWG Meeting

No items provided.

Update on Hydrology, Operations, and Reservoir/Release Conditions: Heather Patno, Bureau of Reclamation (Reclamation)

Presentation [DOWNLOAD]

[Heather Patno, Reclamation] Reclamation is still in the process of updating the October 24-month study. Significant changes have occurred this month and the upper basin storage is decreasing by 600-thousand acre-feet (kaf). Drying of the soils is impacting the water year 2021 (WY21) forecast. Projected operations are based on the September 2020 modeling. Something to note is that we are close to the inflection point to trigger balancing, so it is likely that operations will begin Balancing between 8.23 and 9.0 million acre-feet (maf). Reclamation received a request from WAPA for a deviation in the monthly release patterns from the LTEMP pattern. This is still being discussed in the Glen Canyon monthly coordination calls to reach consensus on the proposal. The hourly release patterns for August show the

last month of macroinvertebrate releases (i.e., bug flows). WAPA had requested an increase in releases up to powerplant capacity using the Emergency Exception Criteria to assist the California Independent System Operator due to an electric grid emergency during four days in August and two days in September. The September releases were shorter in duration so the impacts downstream attenuated fairly quickly, as can be seen in the Lee's Ferry gage as compared against the Glen Canyon observed releases. There is not sufficient sediment for a High Flow Experiment (HFE) at this time. Dissolved oxygen concentrations at Lake Powell had been of concern in WY2019, but not seeing the same conditions this year. Reclamation is currently undergoing an integrated modeling system update in the 24-Month Study and Mid-Term Operations Model to effectuate changes, provide greater efficiencies, and update the statistics. Please contact Heather for more details.

Discussion

[Kurt Dongoske, Pueblo of Zuni] How are the projected effects of climate change included in the WY20-21 forecast? **[Heather Patno, Reclamation]** One way is by using the Ensemble Streamflow Prediction traces from the River Forecast Center. The observed temperature and precipitation from 1981 to 2015 are run through the Colorado Basin River Forecast Center (RFC) model and current conditions are used with those historical traces. This incorporates all the drought years as well as the shifting environment over the past 20 years. **[Seth Shanahan, SNWA and TWG Chair]** That is a robust way of looking at it. **[Leslie James, CREDA]** When will the decision be made for monthly releases of Glen Canyon Dam in WY21? **[Heather Patno, Reclamation]** This is the pattern that was discussed in September, which is ongoing. One thing to note is that the patterns in October through December are the same for both WAPA and LTEMP, which allows us time for detailed discussions. It is pre-decisional whether we will incorporate WAPA's request for the 9.0 maf pattern in WY2021. Reclamation will keep its partners informed of those discussions. **[Larry Stevens, Grand Canyon Wildlands Council (GCWC)]** Has the dam maintenance schedule been prepared for late autumn and winter 2021 in anticipation of a winter or spring HFE? **[Heather Patno, Reclamation]** Still looking out for the schedule. GCMRC and others are also considering their schedules. Reclamation always considers a springtime HFE in its scheduling and balances needs between HFEs and maintenance. Will try to advance this out in January for WY2022. **[Craig Ellsworth, WAPA and BAHG Chair]** Are the repair crews working on Unit 1 and 2 transformers now? **[Heather Patno, Reclamation]** Yes, that is her understanding. **[Seth Shanahan, SNWA and TWG Chair]** ACTION: *Recommends that Heather include in her next presentations the threshold values for water quality such as temperature and dissolved oxygen that might be important to HBC and other resources.*

Discussion About Possible Experimental and Management Actions That May be Implemented in the Next 12 Months and Any Budgeting Issues: Lee Traynham, Reclamation; and Mike Moran, GCMRC

Presentation [DOWNLOAD]

[Lee Traynham, Reclamation] This presentation is focused on funding and budget considerations for the next 12 months. Reclamation is anticipating that FY21 will be fully funded; however, the Department of Interior (DOI) is still under a continuing resolution. There is a sort of prorated funding amount for agencies that are funded through appropriations. With respect to the Colorado River Storage Project Environmental Programs, the continuing resolution does not specify how those Programs would be

funded. There is still out-year uncertainty beginning in FY23 when a reduction in hydropower revenues is expected. Expect upcoming discussion on how to mitigate that. As for FY2021, currently considering a potential fall LTEMP experiment. By the January planning cycle, Reclamation will consider other experiments and proposed flow actions for spring and summer.

[Mike Moran, GCMRC] GCMRC is prepared for the HFEs but the Trout Management Flows (TMF) might require more work before they are implemented next year. **[Lee Traynham, Reclamation]** There is an action item to see where we stand with the knowledge base underlying TMFs and what are the critical design questions for that experiment. In addition, tribal partners have concerns about the taking of life. Reclamation will not move forward before engaging in those consultations, as requested.

Discussion

[Jim Strogen, FFI/TU] It seems there is no need for a TMF for rainbow trout, but is that still being considered for BT? **[Lee Traynham, Reclamation]** Some of the design questions are unique to rainbow trout, while others are unique to BT. There are constraints in the Record of Decision (ROD) regarding the timing of the TMF. That will be part of the discussion with feedback from the scientists. There is uncertainty in terms of effectiveness, but we recognize BT might now be considered a greater threat.

[Brian Healy, GCNP] Regarding NPS management activities, there were four vegetation treatments completed this year that are planned again in 2021 to increase camp-able areas and invasive plant control. Also did vegetation management to protect cultural sites and to support propagation for future restoration efforts. On the fishery side, NPS is starting fall/winter BT control, but will miss an opportunity to collect HBC for translocations in FY2021.

[Peggy Roefer, Colorado River Commission of Nevada (CRCN) and Flow Ad Hoc Group (FLAHG) Chair] Is there a desire to do Bug Flows again? **[Ted Kennedy, GCMRC]** There is a lot of value in doing another bug flow in 2021 given the limited data that was collected in 2020 to evaluate insect responses due to COVID-19. Jeff's talk on Day 2 will detail this further. **[Seth Shanahan, SNWA and TWG Chair]** This also dovetails into the FLAHG flow and costs that will be discussed later today. This topic needs to be explored more to understand what is coming up and how they can be balanced. As a reminder on TMFs, there was a lot of thought in how to control rainbow trout. We might not necessarily need a TMF, but there is certainly a need for information to make better recommendations to the Adaptive Management Work Group (AMWG).

Incentivized Harvest Program Implementation Update: Ken Hyde, NPS

[Ken Hyde, NPS] Over the last 7 to 8 years, NPS has been seeing increases in non-natives and higher risk species. Historically, the BT population was about 2% of the catch and this number will be used as the goal; BT numbers are now 12% of the catch. An incentivized harvest program was analyzed as one of the alternatives in the 2018 Expanded Non-native Aquatic Species Management Plan Environmental Assessment and found to be the most socially acceptable and least intrusive option. NPS now has the funds to do a three-year study on the incentivized harvest program with about $260,000 available for the first year. The Glen Canyon Conservancy will be paying the rewards and helping with implementation of the program.

Discussion

[Kevin Dahl, National Parks Conservation Association] Is there an upper limit that any one individual can receive? **[Ken Hyde, NPS]** Not at this time. We might have to rethink that if there is only one angler who starts making $100,000 per year. This is a study to see if we can entice angler participation. **[Kurt Dongoske, Pueblo of Zuni]** How will the results be evaluated on native fish, particularly HBC, or is this going to be inferred? **[Ken Hyde, NPS**] If we can maintain low BT numbers in Lees Ferry, that would be a partial indication of success. One thing we will be watching is whether there is an influx of BT in the LCR. We want to get the population back down to 2-5% of total catch and see that they are not moving. **[Seth Shanahan, SNWA and TWG Chair]** Is there a way to use HBC to evaluate the performance of the program? **[Ted Kennedy, GCMRC]** There are many uncertainties about the program. When we get the numbers on it, other evaluations can be done. It likely will be possible to evaluate the benefits to native fish, but a big part of that is how effective the harvest program is. **[Leslie James, CREDA]** Do the kayakers pay any type of use fee? Where can people get authoritative information about the program? **[Ken Hyde, NPS]** Anyone who comes into the park pays a user fee. Also, there are commercial use authorization companies that pay fees for the backhaul in which NPS receives a small part. NPS had been waiting on the final decision regarding a fall HFE before information on the program was rolled out to the public. By next week, the website and social media pages will have information on the program, and there will be a news release.

[Craig Ellsworth, WAPA and BAHG Chair] Will the fish capture locations be recorded? How are fish being tagged – in the body cavity or musculature? How will you prevent fish being caught from a different location and getting bounties for them? **[Ken Hyde, NPS]** Yes, the river will be split into 15 reaches, which will be indicated on the data cards. **[Ryan Mann, AZGFD]** The tags are typically in the body cavities especially for smaller fish. As they get larger, it is possible they will get tagged in the musculature. The majority of tags will likely be in the body cavity and will be found when the entrails are removed. **[Ken Hyde, NPS]** On the question of bounties being paid for outside fish, it is probably 2 to 2.5 hours away from the closest BT population. NPS has a method to check that the fish are from Lees Ferry, but initially that is not planned. Also, if someone catches a fish in Grand Canyon territory, which might happen, those are some of the highest risk fish in terms of likelihood of heading downstream. **[Ted Kennedy, GCMRC]** As to the tool to check, NPS can do a stable isotope analysis on the tissue to show differences from nearby populations. It takes a while for that type of analysis, but if fish are suspected, then it can be done. **[Ken Hyde, NPS]** There can be big fines and penalties if anglers try to game the system. They can also lose fishing privileges. They cannot bypass the creel surveys. So there are ways to check but it is hoped that honesty will be the main way.

[Craig Ellsworth, WAPA from chat @ 2:22] Do you expect the project to use Glen Canyon Dam Adaptive Management Program (GCDAMP) funds or Experimental Funds in the foreseeable future? **[Ken Hyde, NPS]** That is a possibility especially if other partner efforts on funding do not materialize. Right now, at least for Year 1, it is well funded and could roll that money into the second year, if funds are not all spent. **[Larry Stevens, GCWC]** Does capture avoidance happen with angled fish? **[Brian Healy, GCNP]** There is research that fish can learn but do not know how that will impact this program. **[Ken Hyde, NPS]** A lot of fly fisherman catch trout throughout the season. **[Ryan Mann, AZGFD]** Fishing exploits fish eating habits. If the fish are hungry, they will bite although there is some evidence it might be harder to target the larger ones. The bigger concern is targeting BT and getting fishermen to target the larger ones. We will have to see how effective the program is.

[CHAT] from tkennedy to everyone:	Here's a story about some folks trying to game a Bass fishing tournament
from tkennedy to everyone:	https://www.lakepowelllife.com/two-utah-men-admit-cheating-at-2018-lake-powell-fishing-tournament/
from lstevens to everyone:	Thanks - my question is whether we may also be creating "really smart" fish that get increasingly better at avoid capture.
from Ryan Mann to everyone:	I don't think that is a concern Larry. There are already anglers targeting Brown Trout and it is highly likely that they will always be susceptible to current angling techniques. Anglers are pretty good at adjusting approaches as well if one technique doesn't seem to be working.

Potential Fall HFE ≤ 96 Hours or ≤ 192 Hours; Status of Resources and Experimental Plan: Mike Moran, GCMRC and Clarence Fullard, Reclamation Presentation (DOWNLOAD)

[Clarence Fullard, Reclamation] Glen Canyon Dam disrupts sand supply and the pre-dam flow regime that included a cycle of flooding and building of sandbars. The LTEMP helps to determine when there are the correct conditions to trigger one of these HFEs. The LTEMP process includes many opportunities to meet with stakeholders and conduct consultations. Right now, Reclamation is within the accounting period for a fall HFE. **[Mike Moran, GCMRC]** Current sediment sand loads for the Paria River include the fall accounting period from July 1 through yesterday. There have a been a few small peaks in July, but since then, the flow has been low and steady. Cumulative sand load has increased and is at 3,500 metric tons. Sand mass balance for Upper Marble Canyon has been declining; Lower Marble Canyon has had a modest positive increase. By comparison with the last HFE in 2018, there is definitely a big deficit in Upper Marble Canyon. **[Clarence Fullard, Reclamation]** As of last week, the sand budget model results show insufficient sediment to support a fall HFE. The Planning and Implementation Team has discussed green sunfish at River Mile (RM) -12. Brian Healy will give a talk on this tomorrow. There is concern that a fall HFE could flush these fish downstream. Another call by the team is planned on October 16 as to whether to go forward with a recommendation or not, but it is looking unlikely given current sediment conditions. If there is no HFE, then this formal process will end around October 23 with notification to the AMWG and TWG.

FLAHG Findings and Recommendation: Peggy Roefer, FLAHG Chair

Presentation (DOWNLOAD)

[Peggy Roefer, CRCN and FLAHG Chair] After the FLAHG charge, objectives were developed for monitoring, then GCMRC developed a hydrograph and a document summarizing potential effects. First version of this was released on July 24. Because the hydrograph needed more work, no recommendation was made to the TWG. Running in parallel is development of a research and monitoring plan—Project O—to determine impacts of the hydrograph. AMWG made a motion for review of Project O with certain deadlines, which require the FLAHG hydrograph to be reviewed and potentially approved by the TWG. Version 4 of the hydrograph was distributed on October 6 and is now before the TWG for consideration. There was great participation in the FLAHG meetings with more than 30 people participating in each one.

Discussion

[Lee Traynham, Reclamation] The process looked easy under Peggy's leadership and guidance. **[Seth Shanahan, SNWA and TWG Chair]** Everyone did an excellent job organizing the information and coming up with ideas. This workgroup sets the model for how the AMWG, and particularly the TWG, can consider future ideas through a rigorous process to make the most informed decisions.

[Larry Stevens, GCWC] Can weather influence the apron repair effort? **[Heather Patno, Reclamation]** The maintenance repair requires a dive team so the releases will be low. *(Action: Heather will follow up with facilities staff on whether dive conditions could be impacted by weather.)* **[Craig Ellsworth, WAPA and BAHG Chair]** Isn't this a removal rather than pouring new concrete? **[Heather Patno, Reclamation]** There are two pieces: 1) Portions of concrete that have been uplifted and 2) Pins that need to be installed to see if there is erosion over time. Neither one of these will be impacted by weather; only the safety of the divers needs to be considered with respect to weather, which is unknown.

FLAHG Findings and Recommendation (continued): Ted Kennedy, GCMRC

Presentation (DOWNLOAD)

[Ted Kennedy, GCMRC] Floods are a key tool in the adaptive management program, but high flow events have generally occurred in the fall rather than the spring, when floods would occur under natural conditions. The FLAHG charge in 2019 was to consider conducting higher spring releases within power plant capacity. GCMRC and FLAHG coalesced on a hydrograph that builds on the apron repair, which will create an ecological disturbance due to low flow. The FLAHG focused on testing this hydrograph in March to simplify comparisons with past HFEs that happened in March and to avoid the motorboat season that starts in April. After developing the hydrograph, GCMRC was then asked to summarize potential effects on LTEMP resources based on a knowledge assessment template, which is a useful tool. To capture these effects in the knowledge assessment, the symbols were updated and GCMRC created a "weight of evidence" to indicate the degree of confidence. Colors now indicate whether the effects are consistent or inconsistent with program goals. There are some red flags for a spring disturbance flow (i.e., resources that would decrease if this hydrograph is tested), but these seem to be relatively small risks. A "no effect" finding could also be a potential "win." Brown trout are fall spawners and fall HFEs might be helping them. Spring timing is going to disfavor BT at the time the fry are emerging from gravel. There are many examples of this in the literature. A spring HFE would provide a contrast to the prior fall HFEs. As to the bug flow experiment, this should be complementary to the FLAHG flow. If they are tested together in 2021, this will complicate the data, but it is not believed the combined experiments will outright confound the data. There were several resources that stood out for a spring HFE: tribal resources, natural processes, and recreational experience.

Discussion

[Jim Strogen, FFI/TU] Is March 2021 the date that is being targeted? **[Ted Kennedy, GCMRC]** Reclamation needs to decide that. **[Lee Traynham, Reclamation]** Should AMWG recommend and the Secretary approve this, then Reclamation will be ready. Whether or not conditions are appropriate to implement in spring 2021 is going to be subject to the usual process of evaluating real-time conditions and a potential recommendation to the Secretary. **[Leslie James, CREDA**] If you are considering bug flows in the same water year as the FLAHG hydrograph, then how would combined effects be considered? **[Lee Traynham, Reclamation]** This is something that the Planning and Implementation Team would need to consider. The January reporting meeting starts with the broader group discussing

these items. **[Leslie James, CREDA]** Was surprised to see the thinking about another summer of bug flows. Looking forward to seeing what is reported from the data. **[Ted Kennedy, GCMRC]** That slide on bug flows was not in presentation until the discussion came up this morning. There was limited monitoring this year because of COVID and GCMRC is only about halfway through the sample set right now. **[Seth Shanahan, SNWA and TWG Chair]** There is also the overflight period that will have low flow. That is the benefit of using resource tradeoff tools like the Knowledge Assessment. **[Larry Stevens, GCWC]** How have you considered the various Project O elements in relation to adverse weather conditions? **[Ted Kennedy, GCMRC]** Adverse weather could affect the resource response to the FLAHG hydrograph. For example, if the Paria and LCR are flooding when this gets tested, we might not see a low flow disturbance. GCMRC staff have not had a lot of time to collaborate on the study designs or contingencies such as adverse weather. We are excited to start engaging in those discussions.

[Seth Shanahan, SNWA and TWG Chair] There is a draft motion to the TWG from the FLAHG for consideration as to whether the TWG is ready to recommend the hydrograph to the AMWG, which would then recommend it to the Secretary of the Interior. **[Steve Wolff, State of Wyoming]** It seems to make sense to work the FLAGH motion first and then move to Project O. [**Jim Strogen, FFI/TU** and **Kelly Burke, Grand Canyon Wildlands Council]** Are both supportive of this approach.

[Leslie James, CREDA] Do we have other experiments besides flow? [**Seth Shanahan, SNWA and TWG Chair]** Don't think so. Flow is the action. **[Vineetha Kartha, ADWR]** Believes it should be specific to flow. **[Seth Shanahan, SNWA and TWG Chair]** For clarity on the process of what the TWG is doing, the following was added to the end of the motion: "as described in the FLAHG findings and recommendations presentation to the TWG on October 14, 2020."

[Vineetha Kartha, ADWR] Is there a reason why "test flow" is being used rather than spring disturbance flow hydrograph? **[Mike Moran, GCMRC]** GCMRC has tried to be as consistent as possible to refer to it as the spring disturbance flow.

[Vineetha Kartha, ADWR] Add "base operations" after procedures that are being followed to make it consistent with the LTEMP protocols. **[Lee Traynham, Reclamation]** Base operations are not typically subject to a collective review process. Agree that this falls within the range of normal operations but would like to emphasize the need for review and evaluation of the proposed flow. **[Seth Shanahan, SNWA and TWG Chair]** Don't think the term "tests" is ever used. It is important to make the point that it will be considered through the protocol for experiments.

[**Seth Shanahan, SNWA and TWG Chair]** Wanted to make "presentations" plural to refer to both Peggy's and Ted's presentations (see above). [**Ted Kennedy, GCMRC]** We should not lose information about the predicted effects document. [**Joel Sankey, GCMRC]** If anything, the effects document should be referenced rather than the presentations.

[Steve Wolff, State of Wyoming] Moves the following motion. **[Jim Strogen, FFI/TU]** Seconds the motion.

The TWG recommends that the AMWG recommend to the Secretary of <u>the</u> Interior, to implement, when conditions warrant and consistent with the LTEMP protocol for implementing flow experiments ~~and tests~~, the ~~test flow~~ <u>spring disturbance flow hydrograph</u> developed by the FLAHG in coordination with the

GCMRC, as described in the FLAHG Predicted Effects document and associated presentations to the TWG on October 14, 2020.

Motion passed by consensus with no objections.

(BAHG Review of Project O and Recommendation: Craig Ellsworth, BAHG Chair; Mike Moran, GCMRC; and Joel Sankey, GCMRC

Presentation (DOWNLOAD)

[Mike Moran, GCMRC] In the early versions of the TWP, there was no Project O. It was during the TWG meeting in June that a recommendation was made for monitoring and reporting on results of a spring disturbance flow. A work plan was developed and it was called Project O, which GCMRC submitted to the AMWG in August. There was not a lot of time for the AMWG to review Project O and there were some concerns. It also had not gone through a BAHG review. Stakeholder comments were received by September 25. These have been addressed in the document that was sent back around on October 5. **[Craig Ellsworth, WAPA and BAHG Chair]** The BAHG was reconvened and held three meetings to review Project O. The BAHG was also asked to talk about the different project elements of the proposal for Experimental Funds and whether that was appropriate from a stakeholder perspective. It was left to Reclamation to decide if the funds were appropriate. The new Project O revision contains a table that includes a ranking based on three tiers. Evaluating the direct results of the hydrograph was under Tier 1. The second tier are projects that provide information on resources in which not much knowledge is known. Tier 3 are proposals to collect information on LTEMP resources that are still important but had generally ranked at a lower level (maybe because more information is known about them). GCMRC also elected not to rank two project elements because they were already being funded through the TWP. The recommendation on funding source was developed as a short list of suggested criteria for appropriate use of the Experimental Fund. **[Mike Moran, GCMRC]** Discussed the major changes that GCMRC made to Project O since the original version. Not many changes were made to the budget request for Year 1. The main change is a new column on the right that shows where the requested funding is coming from. Sources are mostly from Experimental Funds except for Element O.11, which would come from C.4. For Year 2, there is a request for a slight increase in O.2 (sedimentation in Western Grand Canyon and channel mapping) to compensate for the deleted third year. This is also data intensive and requires modeling. GCMRC believes it needs an additional year to complete that analysis but have not identified the funding.

Discussion

[Seth Shanahan, SNWA and TWG Chair] Can you confirm that the three recommended criteria from the BAHG were also integrated into the October 7 version? **[Mike Moran, GCMRC]** Yes, see slide 7. All BAHG recommendations were incorporated and have been addressed. **[Craig Ellsworth, WAPA and BAHG Chair]** One issue on the last BAHG call was the proposed shift in funding source from Experimental Management Fund to the Science Advisors Fund for Element O.11. Did not have time to address that on the BAHG call so recommendations focused on how to use the Experimental Fund. Did not have a chance to respond to the shift of some of the project elements. **[Peggy Roefer, CRCN and FLAHG Chair]** Will there be sufficient funding for the Science Advisors work if the money goes to O.11? **[Lee Traynham, Reclamation]** There seems to be a disconnect. With respect to O.11, thought the intent of this proposal was to confirm that an evaluation would be conducted and that some of this effort could

be completed by 3rd party experts, such as the science advisors. This was not to suggest that C.4 funding would be stripped from the science advisors and redirected to support O.11. **[Mike Moran, GCMRC]** There was not much mention about how this funding would come about. Perhaps something needs to be added to reflect Lee's comments. **[Lee Traynham, Reclamation]** This is an open item for the group to discuss. We want to ensure that, if we implement this flow, we are well positioned to learn from it. **[Peggy Roefer, CRCN and FLAHG Chair]** This is not to suggest there would be a workshop with science advisor money? **[Lee Traynham, Reclamation]** That is correct. **[Craig Ellsworth, WAPA and BAHG Chair]** Element O.11 is a planning process. It is taking information obtained from the experiment and then synthesizing the information to determine what to do with it. It ought to be folded into the TWP process. **[Jim Strogen, FFI/TU]** Do we still need to identify in Year 2 where O.11 funding will come from? **[Craig Ellsworth, WAPA and BAHG Chair]** Yes, these are planning processes on how to take information and make decisions, which is an important part of adaptive management. How we do that should be a group decision. **[Larry Stevens, GCWC]** Agree with Craig. Maybe the science advisors can make a recommendation on how to translate this information.

[Steve Wolff, State of Wyoming] In Project O.11, are you talking about carryover funding from C.5? These are mostly salaries in Year 2. **[Mike Moran, GCMRC]** Hoping it would be carryover from C.5 but if everything planned for this year goes ahead, there might not be any carryover left in the Experimental Fund. Maybe it could be a combination. We would not be too certain about the funds. That is why we put in "unspent funding." We would not be requesting O.1 and O.2 in FY22 from the Experimental Fund. It would be from some other unspent program funds. **[Lee Traynham, Reclamation]** We discussed a tiered approach to evaluating potential funding sources for these elements. If there is a possibility to incorporate these elements in FY22 in the TWP, then that would be the first and best option in the out year. The second option is the possibility of end-of-year remaining funds, though availability is not guaranteed. The last option for those out years would be to consider the Experimental Fund. **[Mike Moran, GCMRC]** That reflects his understanding. The "unspent program funds" was meant to be vague. GCMRC is resigned for FY22 to not make a request from the Experimental Fund. **[Jim Strogen, FFI/TU]** The point is that all of Elements O.1 through O.11 are important. Let us not lose sight of that and to commit to other sources of funding that will need to be identified. **[Lee Traynham, Reclamation]** That second year funding is highly uncertain. It might be good for the group to understand the consequences in the second year if the funding cannot be found. What are those risks? **[Ted Kennedy, GCMRC]** Initially, three years of funding had been requested, but this was pared back to two years. Could still do work with one year of funding. GCMRC will be collecting a lot of data from this FLAHG hydrograph and would feel the loss of processing the samples but we would still be able to deliver products from a single year of funding. **[Craig Ellsworth, WAPA and BAHG Chair]** Can the samples be held until funding is available to process them? **[Ted Kennedy, GCMRC]** Yes, that could be done. **[Craig Ellsworth, WAPA and BAHG Chair]** For some project elements, such as O.2, we might not have as much success if we get shut down in year 2. It requires a lot of analysis and modeling.

[Seth Shanahan, SNWA and TWG Chair] Perhaps we need to discuss how Project O.11 is written because currently the funding request is through C.4. The priority order recommendations from the BAHG were incorporated into the Project O draft of October 7. It had two projects at the top (O.1 and O.5) so would the decision to implement that work come later as opposed to a guaranteed implementation? **[Lee Traynham, Reclamation]** Yes, and Reclamation is going to retain discretion on which of the proposed monitoring and research funds get implemented. **[Seth Shanahan, SNWA and**

TWG Chair] Project O.11 revision should be made and the table changed to say something like, "*unspent funds, to be determined*." **[Mike Moran, GCMRC]** We can do that.

[**Peggy Roefer, CRCN and FLAHG Chair]** Will the Hualapai be able to provide feedback about the impacts on the flow within the first year for Project O.2? **[Peter Bungart, Hualapai Tribe]** The river guides will be outfitted with GPS units to collect data on navigability and changes to the channel that can augment the O.2 study. **[Seth Shanahan, SNWA and TWG Chair]** That information would be perfect to share at the annual reporting meeting.

[Craig Ellsworth, WAPA and BAHG Chair] Still concerned about making a TWG recommendation in which the funding mechanism being considered was not appropriate. In the TWG recommendation, we can specify that O.11 will be funded through the TWP. The concern is with O.1 and O.2. For O.1, heard Ted say that it could be possible to hit pause if funding is not available. Not so sure a pause can be made on O.2 if funding doesn't come through in the second or third year. **[Mike Moran, GCMRC]** For O.2, it is believed that the data can be collected in Year 1 and then hold it. Don't think it can't be paused. There just might not be much information from it. **[Joel Sankey, GCMRC]** It is short-sighted to launch into a project with only a plan in place. That was the whole idea of Project O. Year 2 work was to analyze that information. We should not launch into this by a narrow hope that funding will be available. **[Craig Ellsworth, WAPA and BAHG Chair]** Stakeholders did find this project to be important. **[Shane Capron, WAPA]** It was the second highest priority. If we have enough money in Year 1, does that then mean that Year 2 must be funded? How do we address this uncertainty?

Proposed motion language: *The TWG recommends that the AMWG recommend for approval to the Secretary of Interior, Project O for the Triennial Budget and Work Plan FY2021-2023.*

[Seth Shanahan, SNWA and TWG Chair] Suggests adding to the proposed motion: "as provided to the TWG on October 7, 2020, but with the following revisions: Element O.11 – Funding should come from unspent funds." **[Craig Ellsworth, WAPA and BAHG Chair**] Suggests changing "unspent funds" to "carryover funds." **[Cliff Barrett, Utah Municipal Power Agency (UMPA)]** Include TWP so it is clear where the funds will be coming from. **[Craig Ellsworth, WAPA and BAHG Chair]** Or the annual revisions? Would steer away from using Experimental Funds for this element. **[Cliff Barrett, UMPA]** Remove "or." **[Mike Moran, GCMRC]** It would be difficult for GCMRC to revise the work plan every year. **[Seth Shanahan, SNWA and TWG Chair]** The intention for the first year of the budget is to leave it as is, but to add criteria that would normally be used to justify the changes in Year 2 or Year 3. **[Joel Sankey, GCMRC]** Make sure the language is clear because the workplan is not revised each year. **[Seth Shanahan, SNWA and TWG Chair]** We could use the word "changes" but TWG uses the term "revisions" in the criteria and how the TWP can be revised. This does not mean a rewrite. **[Vineetha Kartha, ADWR]** Maybe we should say, "consideration" because the revisions are pre-decisional. It should be an annual consideration of the TWP. **[Seth Shanahan, SNWA and TWG Chair]** Maybe just use the term "review."

[Steve Wolff, State of Wyoming] Should this be considered a full project of the TWP? **[Seth Shanahan, SNWA and TWG Chair]** It is since we are considering the funding should come from any number of GCDAMP sources. **[Lee Traynham, Reclamation]** Because this is a proposal and the C.5 Experimental Fund element is already in the workplan, leans a little more towards to it being one of the multiple proposals in its own section or appendix of the TWP for consideration under the existing C.5 Experimental Fund project. **[Steve Wolff, State of Wyoming]** That makes sense. Add language to say that it is a "*proposal on the Reclamation side of the budget, if they approve it.*" **[Leslie James, CREDA]**

That is a good approach. **[Craig Ellsworth, WAPA and BAHG Chair]** Element O.1 and O.2 still appear to be multi-year funding requests. **[Steve Wolff, State of Wyoming]** It is important to mention in the motion the three tiers and that Reclamation will decide what gets funded. **[Jim Strogen, FFI/TU]** If there are projects outside of O.2, Reclamation still has to make a decision about which of those projects will be funded by the Experimental Funds. **[Larry Stevens, GCWC]** Add that some funding could be leveraged by GCMRC's partners.

Public Comment on Day 1:

None.

Adjourned at 3:50 PST.

GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM
TECHNICAL WORK GROUP MEETING
OCTOBER 14-15, 2020

Day 2: October 15, 2020
Start Time: 9:04 AM PDT
Conducting: Seth Shanahan, TWG Chair
Meeting Recorder: Carliane Johnson, SeaJay Environmental LLC

Welcome and Administrative: Seth Shanahan, TWG Chair

Introductions and Determination of Quorum

[Seth Shanahan, SNWA and TWG Chair] At least 16 members were present. [**Lee Traynham, Reclamation]** The meeting is being recorded. Clarence Fullard, Kerri Pedersen and Tara Ashby from Reclamation are in contractor training. In addition to myself, Daniel Picard, Reclamation's Deputy Regional Director for the Upper Colorado Basin Region and Acting Designated Federal Officer (DFO) for the AMWG, is also on the call.

Unresolved Issues from Yesterday's Meeting: Proposed motion for Project O

[Seth Shanahan, SNWA and TWG Chair]. Finished day 1 asking for themes on a proposed motion for Project O. These themes were then developed into the motion (shown to the group for its consideration). **[Larry Stevens, GCWC]** Timing is in March and as a reminder, there can be severe weather conditions at that time that could alter field data collection. **[Lee Traynham, Reclamation]** Noted that Heather Patno had made a correction about weather conditions and said that high winds could be detrimental to the apron repair. **[Craig Ellsworth, WAPA and BAHG Chair]** As currently written, Project O is requesting funding for the science advisors in O.11 for Year 1. Does that need to be addressed in these revisions? **[Joel Sankey, GCMRC]** The thinking was that it had seemed appropriate from TWG feedback to use those funds to support a "Mike Runge-type" of facilitator. **[Larry Stevens, GCWC]** The funds should come from an array of considerations rather than a specific fund. It also seems more of a Year 2 issue. **[Leslie James, CREDA]** Element O.11 is different than O.2. Don't know if everyone had been on board with funding for O.11 in Year 2 or even for Year 1. **[Seth Shanahan, SNWA**

and TWG Chair] A new bullet specific to O.11 is needed to not conflate funding with Elements O.1 and O.2. **[Larry Stevens, GCWC]** Question to Leslie: do you want the experiment to be reviewed in an unbiased way? **[Leslie James, CREDA]** Think it should be fundamentally part of any type of experiment, but don't think we all agreed on the source. **[Larry Stevens, GCWC]** It does not matter where the funds come from as long as the results are thoroughly reviewed, and that the implications of the experiment are brought back into the program. **[Leslie James, CREDA]** There are different views of how that gets done, by whom, and when. **[Cliff Barrett, UMPA]** This should apply to every project in the program. The funding should be up to Reclamation. **[Joel Sankey, GCMRC]** That is why, in this revision, GCMRC pulled out O.11 from being considered for C.5 Experimental Management funding and went the Science Advisor route. This was because of TWG comments on the first draft. **[Seth Shanahan, SNWA and TWG Chair]** Maybe the new bullet is a good balance. To Cliff's point, the goal of the annual reporting meeting is intended to review and learn. **[Mike Moran, GCMRC]** GCMRC does try to analyze and bring forward results, but O.11 goes further than that. Not only would it synthesize the results, but also include a decision analysis process to see where that leads us in the future. That is probably something GCMRC would not do with other experiments.

[Lee Traynham, Reclamation] Should we also say that it would include carryover funds through annual review or other Reclamation considerations? [Several agreed] **[Vineetha Kartha, ADWR]** Does the language preclude other funding sources? Perhaps use "may" or "could" from TWP carryover funds rather than "should". **[Steve Wolff, State of Wyoming]** Suggests keeping "should' for Elements O.1 and O.2, but O.11 funds can come from other places. **[Cliff Barrett, UMP**A] Agrees "could" is a better word to use.

[Mike Moran, GCMRC] A couple things came up from yesterday's discussion. The first was how would we prioritize carryover funding in the BAHG tiers. For example, what if we could do all of Tier 1 and only one project element in Tier 2? Right now, there is no prioritization. **[Steve Wolff, State of Wyoming]** There are scores attached to each of the elements. **[Craig Ellsworth, WAPA and BAHG Chair]** In the revision, GCMRC decided not to rank them in order within the tiers. The decision-making authority on the funding of one element or another is up to Reclamation. **[Mike Moran, GCMRC]** Maybe we should add language that the discretion on funding is up to Reclamation and the TWG. **[Craig Ellsworth, WAPA and BAHG Chair]** That seems to be captured in bullet 1. **[Lee Traynham, Reclamation]** Agrees with that perspective and appreciates bullet 1 verbiage. And of course, Reclamation would be talking with the BAHG and others if there was the situation where only a portion of the elements could be funded.

[**Mike Moran, GCMRC]** The other item needing clarification was from the June motion regarding the TWP and that GCMRC should "*prioritize the use of available, unprogrammed and unspent funds from FY 2020, 2021 and 2022 towards funding GCMRC G.6 (JCM-West) in 2023."* How does everything in Project O relate to the prioritization of funds? **[Seth Shanahan, SNWA and TWG Chair]** That priority takes precedence over this one because it is in the TWP and budget. Project O would be a second tier of priority. Do we need to be more specific than that? **[Craig Ellsworth, WAPA and BAHG Chair]** Concurs with that. **[Jim Strogen, FFI/TU]** Project O should be on equal footing with all the other projects that have been approved. **[Seth Shanahan, SNWA and TWG Chair]** So does that mean if there is $50,000 in carryover funds for the Juvenile Chub Monitoring-West Reach (JCM-West), Element O.11 would need to be equally considered? **[Jim Strogen, FFI/TU]** Yes; just because this element came later, it should not be considered any less.

[Craig Ellsworth, WAPA and BAHG Chair] Is the second half of the BAHG recommendation (i.e., whether to use C.5 funding for multiyear commitments such as salaries, etc.) encompassed in the third bullet point or should it be under the first bullet related to Reclamation's decision-making authority? **[Seth Shanahan, SNWA and TWG Chair]** This is in reference to not using Experimental Funds for regular work. Since JCM-West is considered "regular type" work, would this eliminate the use of Experimental Funds? **[Craig Ellsworth, WAPA and BAHG Chair]** The third bullet only considers the prioritization. **[Kelly Burke, GCWC]** Agree with the equal funding prioritization. **[Seth Shanahan, SNWA and TWG Chair]** If carryover funds become available, does it go to Priority 1 or to JCM-West during an out year? Do we need to be specific in our guidance or would this be part of the routine discussions with GCMRC? **[Craig Ellsworth, WAPA and BAHG Chair]** We would be discussing the prioritizations during the annual review. **[Lee Traynham, Reclamation]** Recommends keeping as much flexibility as possible for those discussions. Keep in mind that JCM-West and Project O were not the only items not funded within the TWP. **[Seth Shanahan, SNWA and TWG Chair]** That seems to be a good approach. **[Mike Moran, GCMRC]** That makes sense. Also, what was meant by the bullet, "*O.11 revisions and refinements"*? This suggests further wording changes. **[Seth Shanahan, SNWA and TWG Chair]** These were notes that will be deleted.

[CHAT]	from Kelly Burke to everyone:	For the revision to Year 1 and Year 2, is the strong desire to implement in 2021 captured somewhere else?
	from ROB BILLERBECK to everyone:	For what it's worth, I agree with Cliff - Reclamation ultimately will make the decision on funding and does so very well and carefully. Maybe we don't need to get too in the weeds here?
	from Bill Persons to everyone:	I think we got ahead of ourselves with prioritizing JCM West in outyears, not knowing the full range of possible projects.
	from Brian Healy to everyone:	Wouldn't we want to know how this FLAHG flow experiment might impact humpback chub recruitment and population dynamics? Truncating JCM west would limit our ability to understand drivers of HBC. Something to think about.

Motion made by **Larry Stevens, GCWC** and seconded by **Jim Strogen, FFI/TU**. No objections heard; motion passed. [FINAL MOTION]

Administrative History Ad Hoc Group (AHAHG) Status Update: Larry Stevens and Craig Ellsworth, AHAHG Co-chairs

Presentation (DOWNLOAD)

[Larry Stevens, GCWC] Provided a presentation on the Administrative History Project, the oral histories, the Orientation Packet that includes key readings, the GCDAMP History website, and a narrative of the process. There is not a mechanism to continue this process. Would like to have a discussion as to whether it is useful to keep track of the administrative history.

Discussion

[Seth Shanahan, SNWA and **TWG Chair]** The components on the Wiki page are the go-to source for program information. It is so valuable. **[Larry Stevens, GCWC]** There are really four sources of information: the Reclamation site, the Wiki, the (largely ignored) GCMRC photo archive that contains many of the older reports, and the GCDAMP Administrative History project. **[Craig Ellsworth, WAPA and**

BAHG Chair] The Orientation Package is still being developed. That would be important for new people who come into the program. It should be updated regularly. **[Kelly Burke, GCWC]** Has been following histories of other contentious stakeholder groups. There is a lot of advocacy for integrating these histories into the difficult conversations. Perhaps we can think of a mechanism to bring it in during the annual reporting meeting or TWP review to ensure that it is integrated in an ongoing way. **[Larry Stevens, GCWC]** Has not called an AHAHG meeting in a long time so that might be something worth doing to make recommendations to the TWG. **[Seth Shanahan, SNWA and TWG Chair]** Many others have been commenting in the chat about the usefulness of the Wiki site and the value of the data from this process. **[Brian Sadler, WAPA]** Suggests highlighting one or more of the interviews during the annual reporting meeting or at other TWG meetings. **[Craig Ellsworth, WAPA and BAHG Chair]** Suggests doing a monthly highlight of an interview or something that just got updated. It would remind people of the resources available. **[Seth Shanahan, SNWA and TWG Chair]** We might want to use our Ad Hoc agenda items for updates. **[Kelly Burke, GCWC]** Question to GCMRC – is there a place they go to for information in developing their reports that could be linked to this? **[Larry Stevens, GCWC]** Integrating the science into this is a separate issue and doing that would be a huge undertaking because the information is enormously complex. **[Kevin Dahl, National Parks Conservation Association]** Suggests having a "blooper reel" during a happy hour whenever the group might meet again. **[Peter Bungart, Hualapai Tribe]** Suggests providing laptops loaded with this information that people could look at during the annual reporting meeting. **[Larry Stevens, GCWC]** Will try to convene an AHAHG meeting before the annual reporting meeting to consider these ideas.

Green Sunfish Status and Trends in the Western Grand Canyon: Brian Healy, NPS and David Ward, GCMRC

Presentation (contact Brian Healy, GCNP)

[Brian Healy, GCNP] The presentation shown provided background, ecology, trends, risk to natives, and potential management and monitoring options for green sunfish in Grand Canyon. The hotspots from the 2020 catches were compared to the historical data (1978-2019) and they occurred in the LCR, near Kanab creek, in the JCM-West reach, and at a backwater at RM243 as well as in Surprise Creek.

Discussion

[Larry Stevens, GCWC] What is the normal spawning time? Are there centrarchid disease control strategies? Any evidence of sunfish in Nankoweap? **[Brian Healy, GCNP]** When the temperatures are suitable, they can spawn for several months and potentially for a protracted period. Introducing a disease would have to be taxon specific and there would be risks to other species. **[Ryan Mann, AZGFD]** Chad Field, a PhD student at University of Arizona, is working on the wild YY male strategy on green sunfish. That is a potential option although it comes with other ethical considerations. **[Brian Healy, GCNP]** Environmental DNA (e-DNA) is being considered. Don't think anyone has looked at Nankoweap lately, but it probably would be a good spot.

[Jess Gwinn, U.S. Fish and Wildlife Service (USFWS)] Were the 2020 surveys affected by the timing of previous years? **[Brian Healy, GCNP]** Don't think that was a problem although some early spawning in June might have been missed. **[Kurt Dongoske, Pueblo of Zuni]** What fish prey on green sunfish? When and where were they introduced to the Grand Canyon system? **[Brian Healy, GCNP]** Bass is one. Sunfish have spiny fin rays that might be a problem for predators. They might have been introduced from a

stocking project. *ACTION: Will look into that and provide an update.* As to entry points, it is fairly certain they are coming through Glen Canyon Dam and Kanab Creek and other tributaries during flood.

[Jim Strogen, FFI/TU] What would be the main concern? **[Brian Healy, GCNP]** That green sunfish will become established in the LCR given the temperature and native fish assemblage there. **[Leslie James, CREDA]** Has there been any consideration to open the slough to make it a passthrough rather than a backwater? **[Brian Healy, GCNP]** That alternative was analyzed in an environmental assessment. Other options for control are being tried before moving dirt is done. **[Ken Hyde, NPS]** Channel flows don't help there. The next preferred option is a weir between the two sloughs to control and drain the upper slough quicker than the current pumps. A passthrough would be a last option and difficult to do. **[Rob Billerbeck, NPS]** Ken and his staff go in periodically and treat the sunfish using mitigation with respect to tribal concerns. Things are working. The full channelization that was evaluated would have had large costs. **[Ken Hyde, NPS]** Eight baited minnow traps were placed in the lower slough and they only caught one mid-sized sunfish. Think we are zeroed in on the right solution. **[Larry Stevens, GCWC]** They might be more difficult to control in the tributaries in Grand Canyon and that could impact speckled dace, a species that the Program ignores. These common native fish are in the size range that green sunfish would prey upon. We also have invertebrates in Kanab Creek that would be a prey species. More rigorous control efforts should be prioritized.

[CHAT]	from lstevens to everyone:	Thanks much for the entirely scary presentation. Can you reiterate the normal spawning timing for GSF. Also, are there any centrarchid disease control strategies?
	from lstevens to everyone:	Also, any evidence of GSF in Nankoweap Creek?
	from jess gwinn to everyone:	Very thankful for this presentation. Were the 2020 surveys conducted at the same time of year as years past, or were the surveys postponed due to COVID-19? Could an adjustment in time of sampling affect the results?
	from kdong to everyone:	To which species are green sunfish prey? When and where was green sunfish introduced to the Colorado River system? Is the Glen Canyon Dam the main entrance point into the Colorado River ecosystem; or, do they also enter through the LCR and other tributaries?
	from Leslie James to everyone:	Is there ever any reconsideration of "opening" the slough so that it is a pass-through and not "reservoir"?
	from Jim Strogen to everyone:	Brian, If seining and electrofishing aren't effective. What sampling technique is best? More concern from Powell or Mead or inflow from tribes?
	from Bill Persons to everyone:	Sampling Nankoweap extensively in the mid 1990's didn't capture green sunfish. Relatively cool water, reduced flow.
	from lstevens to everyone:	Nankoweap - yes, but it warms considerably in the summer months.
	from lstevens to everyone:	That GSF have not yet established the lower LCR from upstream sources, it seems highly unlikely that such colonization will take place.
	from jess gwinn to everyone:	How fecund are green sunfish?
	from Bill Persons to everyone:	Larry, I agree with your assessment of the lower LCR and wonder if the same logic applies to much of the mainstem Colorado River. Western Grand Canyon/Lake Mead provides suitable habitat.
	from Bill Persons to everyone:	https://www.azgfd.com/fishing/species/greensunfish/
	from Seth Shanahan to everyone:	Brian, what does the weight of evidence tell us about the conditions we need to observe for us to then implement a management action?
	from Brian Healy to everyone:	Jess I'm looking into the fecundity question, but I would say its probably high, but not quite like a razorback sucker, given the

tradeoffs between egg production and parental care invested by adults (nest guarding).

from Brian Healy to everyone: For sampling efficiency questions; I think seining and e-fishing can be somewhat effective under the right conditions, but Heidi Blasius with BLM found baited minnow traps to work very well.

from Ryan Mann to everyone: Hey Brian, good presentation! Any thoughts on why the colonization now? I think understanding that might be important for understanding risk and how they might spread in the future. We pick up GSF here and there in our mainstem monitoring as far back as 2007. Obviously putting a focus on back water areas will be important moving forward.

from Ken Hyde to everyone: The fecundity of female Green Sunfish is largely unmatched by any other freshwater species. Females may produce 10,000 to 50,000 eggs, which are 1.0-1.4mm in diameter (Taubert 1977), depending on her size.

from Brian Healy to everyone: We are also monitoring speckled dace in the tributaries (Shinumo, Havasu, Bright Angel), but yes, I agree with Larry that the impacts to tributary native fish assemblages are a big concern.

from tkennedy to everyone: Great presentation, Brian. However, 2018 paper by Dennis Stone suggests CO2 may be too high in LCR for green sunfish to become established there.

from tkennedy to everyone: Stone, D. M., Young, K. L., Mattes, W. P., & Cantrell, M. A. (2018). Abiotic controls of invasive nonnative fishes in the Little Colorado River, Arizona. The American Midland Naturalist, 180(1), 119-142.

from Brian Healy to everyone: I think if we found sources in areas where the sunfish are "controllable" in some ways, we would implement a management action. They are spawning in Kanab, but implementing an effective control there would be very difficult.

from Brian Healy to everyone: Jess - "females are moderately fecund bearing 2000-10000 ova (Beckman 1952 cited in Freshwater Fishes of Virginia.)

from Brian Healy to everyone: Kurt - here is what I found on the introduction into the Col. River - " It may have reached the upper part of the Colorado River either by moving upstream from Lake Mead or by being introduced separately in that region (Holden and Stalnaker 1975)."

from Craig Ellsworth - WAPA to everyone: http://gcdamp.com/index.php?title=Green_Sunfish_Page

from Brian Healy to everyone: Hi Ted - re: Co2 - David didn't think it would limit GSF in the lower LCR, but would in the upper. We had some discussion about that before the presentation.

from Brian Healy to everyone: No problem! Also, I forgot, on the CO2 issue. David pointed out that they dominate other streams in Arizona that are similar to the LCR in water chemistry. I think he meant parts of Fossil Creek, but I'm not sure.

National Park Service Monitoring that Overlaps with the Colorado River Ecosystem: Mike Kearsley, NPS

Presentation (contact Mike Kearsley, NPS-GRCA)

[Mike Kearsley, NPS-GRCA] This presentation provided the history of the Colorado River Management Plan (CRMP), for which a ROD was issued in 2006. Studies of the park go back to the 1880s, primarily focused on inventories. In the 1980s, the focus shifted to resources. In the 1990s, studies continued in the river corridor. The CRMP includes regulations, monitoring, and education. Initially the plan was

focused on controlling user days. There is no standard on carrying capacity, but use levels were created to address natural and cultural resource conditions. The monitoring program stressors focused on river and visitor use levels and their impacts on the campsites such as crowding, soils, vegetation, cultural and birds.

Discussion

[Seth Shanahan, SNWA and TWG Chair] *ACTION: Requested that, Mike and his colleagues at U.S. Geological Survey (USGS) show at the annual reporting meeting how the data is being used to help LTEMP track its resource goals.* This would be really useful since that work is not always seen. **[Leslie James, CREDA]** Why was the river shut down? **[Mike Moran, GCMRC]** It occurred because of sexual misconduct of the river rangers and they ended all river work until it could be done safely.

Update on the Bug Flow Experiment: Jeff Muehlbauer and Ted Kennedy, GCMRC

Presentation (DOWNLOAD)

[Jeff Muehlbauer, GCMRC] This presentation gave an update on bug flows monitoring from 2020. Data are from citizen science light traps and sticky traps at Lees Ferry. COVID has caused a lot of impacts that were not expected. Certain analyses will not be able to get done. Don't think there is any scientific issue with doing both a FLAGH flow and a bug flow in 2021.

Discussion

[Leslie James, CREDA] How might the low flows for the aerial photography be interpreted with the bug flows? **[Jeff Muehlbauer, GCMRC]** It would be complicated, but not necessarily confounded. Might see a situation like we saw in May 2020 where the patterns are unusual from bug flows alone, but don't think it interferes with what we will be tracking from bug flows or FLAHG flows. **[Leslie James, CREDA]** What happened on the slide with the May hydrograph being "unusual"? **[Craig Ellsworth, WAPA and BAHG Chair]** Not sure why May was scheduled that way, but May is a shoulder month. Maybe there was no reason to fluctuate highly or there was a transformer issue that needed repairs that resulted in less fluctuation.

[Larry Stevens, GCWC] The hope here is that you can develop a model that relates dam flow discharge and system-wide bug production. Do you think there will be appropriate data for this and how will 2021 contribute toward that model? **[Jeff Muehlbauer, GCMRC]** The model gets better every year, and it gets better with or without bug flows. Nonetheless, bug flows in 2021 give us the ability to model the effect of hydrology on the sine wave in a much more robust way. Right now, we have one year showing a sine wave breaking during bug flows and a bunch of years showing a stable sine wave. With a second year of the sine wave breaking, in theory, we would be able to better incorporate bugs flows into the model and be able to understand emergence.

Ecological Studies of Tapeats Creek: Larry Stevens, Grand Canyon Wildlands Council

Presentation (DOWNLOAD)

[Larry Stevens, GCWC] Oftentimes, investigations of a single site can provide insight into how the whole system functions. This presentation provides information on studies from 2017 at Tapeats Creek that were done with Joseph Holway (now a graduate student at LSU) and Craig Ellsworth. The context of the study is to understand why Tapeats Creek is loaded with organisms that do not occur in the adjacent river ("benthic discontinuity") and how this information can inform dam management. Grain size turns out to be an important part of the story. Tapeats Creek is predominantly gravel and boulder with little sand, while sand and boulders dominate in the mainstream. Artificial habitats placed in the mainstream adjacent to the creek confluence (i.e. the "Lower Colorado River" habitat) that mimicked the creek habitat were colonized by benthic macroinvertebrates and Ephemeroptera, Plecoptera and Trichoptera (EPT).

Discussion

[Lee Traynham, Reclamation] The study paper was distributed to everyone. **[Jim Strogen, FFI/TU]** Is there information on fish body health just before the Tapeats confluence where bugs would get flushed into the river? Do they benefit? **[Larry Stevens, GCWC]** This could be better answered by Brian Healy and others who are doing the fish studies. There are very few native fish because of the cold water. It is guessed that the contributions to the creek are so small relative to the mainstream that the effects would not be detectable. **[Ryan Mann, AZGFD]** Would agree although we could look at fish above and below the tributaries to assess this. **[Peggy Roefer, CRCN and FLAHG Chair]** Have you tried to clean the rocks in the mainstream? **[Larry Stevens, GCWC]** The artificial basket habitats were informative. We did an analogous study in Glen Canyon where the rocks were scraped and turned over in 3-square-meter areas then looked at rate of colonization, which lasted about three months – similar to what would be seen during a high stage flow. There is still much to be learned. **[Paul Harms, State of New Mexico]** Are EPT primarily limited by habitat? **[Ted Kennedy, GCMRC]** The quality of habitat for larvae and egg mortality from loading could both be limiting. It may not be possible to manage for sand and EPT simultaneously. Think the channel could be scoured annually. **[Larry Stevens, GCWC]** The Colorado River is a cobble-floor system with sand moving through. This has been recognized since 1991. The concept of sediment mass balance is to minimize the loss of sand as much as possible. Therefore, sand remains on the floor except in the rapids even though a lot is exported to the upper stages. When we go to other sections of the river such as Flaming Gorge below Hoover Dam, sand has been largely eliminated from the floor of the channel. During a trip to Parker a couple years ago, it was seen that EPT are actively colonizing the floor of the river there. It seems to be related to different grain sizes in different reaches of the river. Grand Canyon is a bit of exceptional reach in that sand and fine grain sediments are being retained. It is a complicated story. There are a few species of EPT that can adapt to some of the conditions that they encounter in the Grand Canyon; however, stoneflies and mayflies are not too likely. Other reaches where sand has been lost, they are colonizing. **[Seth Shanahan, SNWA and TWG Chair]** In the interest of time, there are several questions in the chat that Larry will respond to.

[CHAT] from Jim Strogen to everyone: Great stuff! Is there any information on fish body health above and below the Tapeats confluence (where bugs would get swept into the river from the creek) in the mainstem?

from Peggy_000 to everyone: Have you tried to clean the rocks?
from Peggy_000 to everyone: In the mainstream Colorado River?
from Bill Persons to everyone: Jim, not enough samples to be able to detect
from Paul Harms to everyone: Do Ted and Jeff agree that EPT are primarily limited by habitat?
from Ben Reeder to everyone: Great presentation Larry! Because you have mentioned phosphorus often in the past, do you think the lack of cobbles or lack of nutrients in the main stem are bigger factors.
from Helen Fairley to everyone: Larry's observations are consistent with findings and conclusions from studies in the 1950s in Glen Canyon. Bugs were noted near trib mouths but mainstem river was described as an "aquatic desert" and attributed to the dynamic sand-bedded river.
from Jim Strogen to everyone: Any thoughts about importing desirable EPTs to Lees Ferry and seeing how they do?
from jess gwinn to everyone: Are these species below Davis Dam the same species as in the GC?
from Craig Ellsworth - WAPA to everyone: The problematic caddisfly below Davis is different than the caddis found in GC.
from Peter Bungart to everyone: I've read where the Colorado R. below the dam has the lowest EPT index of all western rivers. If I read that correctly, what makes the Colorado stand out from the others?
from Leslie James to everyone: Interesting, Helen, so those observations were pre-dam.
from jess gwinn to everyone: Thanks Craig. Are there species differences that would explain the differences between these two locations? Wondering about this comparison?
from Helen Fairley to everyone: To Leslie: yes, studies done Glen Canyon before dam construction
from Craig Ellsworth - WAPA to everyone: Jess: yes, there could be species differences but the habitat below Davis is still very different than the habitat below Glen or in Grand Canyon.
from tkennedy to everyone: Peter, in my opinion you get to very low EPT index with multiple stressors (completely new physical template including altered temperature, flow, nutrient, and sediment regimes). That said, our comparison of EPT across dammed rivers shows that load-following tides are a major explanatory variable.
from Craig Ellsworth - WAPA to everyone: RE: Because you have mentioned phosphorus often in the past, do you think the lack of cobbles or lack of nutrients in the main stem are bigger factors. The Tapeats Creek study indicated there was a habitat signal in EPT distribution going from the creek itself, to the mouth, and into the mainstem. Phosphorus may increase the PRODUCTION of the foodbase that is there, but probably wouldn't increase the DIVERSITY of the foodbase (i.e. having more EPT)
from Craig Ellsworth - WAPA to everyone: And its not for lack of cobbles, its just that the cobbles (and boulders) are heavily embedded in sand and silt which reduces the habitat quality for many EPT species.

The Paria Beach Restoration Project: Larry Stevens, Grand Canyon Wildlands Council; Ken Hyde, NPS

Presentation (DOWNLOAD)

[Larry Stevens, GCWC] This is a project that Larry, Ken Hyde and Kelly Burke were involved in to do restoration at RM 1 on Paria Beach downstream from Lees Ferry. This is one of the most heavily visited spots on the Colorado River. **[Ken Hyde, NPS]** Several staff were part of this during preparation of the application materials and will continue to be involved because the project is at the break between the

two national parks. **[Larry Stevens, GCWC]** During prior restoration efforts, GCWC got to learn how recovery takes place in restored landscapes. Vegetation and bird life recover quickly, small mammal recovery is much slower. Also learned that more educational outreach and visitor use issues need to be addressed with NPS. Another restoration site that is more remote was conducted at Hidden Slough. It is now a jewel of a restoration site. **[Ken Hyde, NPS]** Glen Canyon National Recreation Area's (GLCA's) "Lunch Beach" project was funded by Reclamation and restored by NPS staff in which it was decided not to burn and removed about 15 cords of wood, which was made available to local Native American community. This is one of the river guides' stopping place. It was a lot of work and tried the use of chippers. NPS is re-evaluating the use of fire. **[Larry Stevens, GCWC]** With these good examples, the Paria Beach rehabilitation project was developed. There was no expectation for the activities in the first couple of years before native vegetation can take over. It should then be a very welcoming place for the public. GCWC plans to work with the local tribes on the work. This restoration would also allow the public a full view of adaptive management.

Discussion

[Kelly Burke, GCWC] The outreach includes working with Glen Canyon staff to develop a curriculum and an outdoor classroom. Also, because of the accessibility and easy access by the public, it is going to be a showcase for the funding provided by the Arizona Protection Plan. It is going to make for a stronger partnership. Received letters of support from the FFI/TU that helped with the funding. She also thanked the Hopi Tribe for their support in the project. **[Craig Ellsworth, WAPA and BAHG Chair]** Is the Paria River available for river rafting camping? **[Ken Hyde, NPS**] No, we are re-evaluating the heavy use along this reach of the river. There is already camping available at Lees Ferry. This will be a discussion topic in the future. **[Helen Fairley, GCMRC]** Recommends a social science component based on her own experience in Grand Canyon at Granite Rapids. There is value for the recreating public on how these projects benefit both wildlife and human life. She would be willing to help support this. **[Larry Stevens, GCWC]** That is a great point. It would be interesting to know how this would contrast with their experience downstream. **[Kelly Burke, GCWC]** Have a qualitative assessment from Colorado River Discovery and others. There could also be very different feedback such as at the beginning of the project when there might only be tumbleweed. **[Ryan Mann, AZGFD]** Do you think demand for camping on Paria Beach would be high given its proximity to the Launch Point? **[Ken Hyde, NPS]** Demand could also be high for either private or commercial trips leaving the river that would allow them to leave early in the morning. It could be a high demand. This area is also considered the lower end of the walk-in fishery. It is heavily utilized, but 90% of it can't be walked through because of old growth tamarisk. We hope this is noticed by everyone. **[Jakob Maase, Hopi Tribe]** Appreciates everyone giving the Hopi youth an opportunity to work on this project.

2021 Annual Reporting Meeting - Planning: TWG Members

[Seth Shanahan, SNWA and TWG Chair] This is intended to give feedback and direction to Reclamation and GCMRC staff before the annual meeting. **[Peggy Roefer, CRCN and FLAHG Chair]** Would like to hear about razorback sucker stocking in the Grand Canyon. Also, AZGFD and Bio-West are doing work around Pearce Ferry Rapid and would like to know what they are planning as this is a barrier to the movement of non-native fish. **[Ryan Mann, AZGFD]** We had planned to include a discussion about work around Pearce Ferry Rapid. **[Bill Persons, FFI/TU]** Would like a discussion about how Larry's project at Tapeats Creek and bug flows work at Lee's Ferry relate to one another. There are many things that we need to

get into more depth. Don't see a conflict, but there are differences in application. Larry seems to be showing that managing for sand and EPT may not be feasible; whereas it might be feasible to manage for midges and sand. Don't know how to approach this but it seems that some sort of dialogue needs to take place. **[Craig Ellsworth, WAPA and BAHG Chair]** Oftentimes, the annual meeting is an information download but as a Program, we don't take the opportunity to talk about how we are going to apply the information and move the Program forward with this information. Maybe we should set aside time to talk about the application. It goes back to the discussion on O.11 – what sort of decisions do we make on moving forward with this information. **[Cliff Barrett, UMPA]** The annual reporting meeting is great to hear about all this work, but what we don't hear much about is how this affects dam operations. This whole program is about Glen Canyon Dam and yet we seldom hear about what we can do to make it better. **[Ted Kennedy, GCMRC]** Excited that the FLAHG hydrograph was recommended for approval to the AMWG and will start reaching out to Larry soon about the study plan. One of the key hypotheses for the FLAHG hydrograph is that it will improve the quality of benthic substrates for these insects. **[Larry Stevens, GCWC]** Part of the results of his study is that we may not be able to manage for everything at the same time or even one of the primary goals that may restrict the benthic food base. Understanding this helps us to understand dam management. **[Jim Strogen, FFI/TU]** On one of Ted's slides, he said we know a lot about certain areas but not so much of others. Could we get a presentation on this? **[Ted Kennedy, GCMRC]** This sounds like a knowledge assessment.

[Seth Shanahan, SNWA and TWG Chair] Are we hearing that we need to continue to focus not just on status and trends, but on what the application is and what has been learned? Can we use the knowledge assessment from the FLAHG approach to get people to orient their presentations in the same way to get at this? **[Ted Kennedy, GCMRC]** One of the things that made that process manageable was that the group was small, and they did not revisit other things such as the stressors. The formation of a Knowledge Assessment team, getting people to lead a certain resource, and to bring in the experts is difficult. A standing Knowledge Assessment team would make it easier to do regularly and avoid the contentious process of forming a new team.

[Jim Strogen, FFI/TU] As difficult as it is to find funding for projects, it seems we need to decide that we have enough information on some resources that allow us to move onto something that is more critical. **[Ted Kennedy, GCMRC]** The Knowledge Assessment is one tool to help stakeholders with those decisions. **[Seth Shanahan, SNWA and TWG Chair]** Understands the level of difficulty to do that this year, but thinks others still need to present information that says why the data is important to measure some resource or improve understanding. Could maybe do another Knowledge Assessment in the 2022 Annual Meeting but could not do it for the next one in January. **[Jim Strogen, FFI/TU]** As difficult as it is to find funding, can we get to a point where we can say "we have enough on this particular resource" and move on to something more important? **[Ted Kennedy, GCMRC]** The Knowledge Assessment is one tool that can help with those assessments. **[Seth Shanahan, SNWA and TWG Chair]** By showing it in a simple way, we can all see the same picture. Can understand Ted's point that it would be difficult to do something of similar effort for this year, but it is still a request to GCMRC and others to present information in such a way that tells why the data collection was important and relevant to achieve some measurable increase in understanding.

[Mike Moran, GCMRC] Had asked GCMRC Principal Investigators to show their results in a Knowledge Assessment format. Don't know if everyone did that. It is something GCMRC can do again this year. Or perhaps create a slide template that shows their results in a particular manner like the Knowledge

Assessment, which would become a standard part of the presentations. **[Seth Shanahan, SNWA and TWG Chair]** That would be helpful. **[Bill Persons, FFI/TU]** Eventually we need to work on recommending monitoring metrics. Maybe this can be a future TWG agenda item after the January reporting meeting. **[Seth Shanahan, SNWA and TWG Chair]** What would be the timing of this? **[Lee Traynham, Reclamation]** Reclamation and GCMRC have started these conversations and can provide an update at the annual reporting meeting. It is hoped there will be in-depth conversations by the August 2021 meeting with the AMWG and TWG, but don't want to get ahead of staff conversations on this.

[Larry Stevens, GCWC] Maybe have the National Park Service provide more presentations about their work in the Grand Canyon.

[Seth Shanahan, SNWA and TWG Chair] Had heard that maybe not all models for determining predictive effects of the FLAHG flow are useful. *ACTION ITEM: a request for Mike Moran to develop a special session that describes the different modeling tools that are either currently in use or have been used, which describes what they can or can't do and how they fit (broadly) into the different metrics that will eventually be developed.* Also encourages everyone that, if they have any special requests or guidance, they start talking to GCMRC staff now.

[CHAT]	from Brian Healy to everyone:	It sounds like a more structured process to assess critical uncertainties and "value of information" to be gained would be beneficial.
	from Bill Persons to everyone:	Eventually we need to work on recommending monitoring metrics. Don't think thats an annual reporting issue, but maybe a future TWG agenda item, perhaps after the annual reporting meeting.
	from tkennedy to everyone:	I definitely see value in an annual Knowledge Assessment. At GCMRC We also recently talked about doing a KA as part of each new TWP. Budget decisions around the TWP could be informed by "wt of evidence" and "uncertainty" metrics that are part of KA.
	from Michelle Garrison to everyone:	YES - a modeling overview would be extremely helpful!
	from Bill Persons to everyone:	Be sure and include the guide community in any discussions about the kayak back hauling. It has turned into a major source of their revenue.

Discussion of Emerging Issues and Request for Agenda items for Next Meeting

[Larry Stevens, GCWC] Still remains interested in how driftwood moves through the ecosystem and how it is not coming into the river anymore. It might be playing a larger ecological role than has been given credit.

[Peggy Roefer, CRCN and FLAHG Chair] Can provide an update on the FLAHG hydrograph.

[Craig Ellsworth, WAPA and BAHG Chair] We heard about the increased usage in Glen Canyon, particularly the backhaul services, and would like to hear an update from NPS about their use management plan that they are updating. Would like to have a discussion about minimizing impacts from the backhauls and whether there is any better way of doing that. Already have the public launching below the dam on a concession. There needs to be some way to accommodate additional concessionaires or be able to launch from the dam rather than traveling 20 miles upriver on a jet boat. **[Larry Stevens, GCWC]** That is a good point. Had never before seen such intense visitation at the Launch Ramp as there was in September. It is staggering how many people and boat traffic are going upstream. **[Jim Strogen, FFI/TU]** Is worried about the safety of those people. Many of them are ill-prepared and

not wearing life jackets. **[Craig Ellsworth, WAPA and BAHG Chair]** Agrees. Had written about the safety issues encountered on the river in WAPA's internal magazine. There could be a little more oversight on safety. **[Brian Healy, GCNP]** There are rangers that patrol the river and there are a lot of reports on incidents they encounter. **[Larry Stevens, GCWC]** Maybe that patrol needs more support. There are people who are using standup paddleboards that can be in a difficult position if there is wind and they go into that cold water. **[Ken Hyde, NPS]** The NPS has already started gathering some of this information. Have to remember that this year was unusual in that COVID brought people out. A quarter of boaters to Lake Powell were new, and in most cases, had just bought the boat. NPS is aware of the safety issues. Have also had hiring problems both COVID and non-COVID related. The raft trips had been the ones to do most of the backhauling, but because they elected not to do those trips, several of the angler guides' commercial use authorizations allowed them to do those backhauls instead, which became their main income. It would be good to have these discussions.

[Craig Ellsworth, WAPA and BAHG Chair] Had suggested at the last meeting to have a Western Grand Canyon HBC presentation. **[Seth Shanahan, SNWA and TWG Chair]** Yes, Kirk and Randy are prepared to give this at the annual reporting meeting.

[Jim Strogen, FFI/TU] Will there be any information about BT decreases? **[Ken Hyde, NPS]** Planning to have the two months of data presented on the incentivized harvest program and will also have Brian's information about catch percentages from their trips this year. It looked like a good year for BT.

[Craig Ellsworth, WAPA and BAHG Chair] Will have an update on nutrient synthesis of the Pacific Northwest by Josh Korman.

[Jim Strogen, FFI/TU] Would like to hear about mitigation strategies for dissolved oxygen.

Public Comment on Day 2:

None.

Final Remarks

[Lee Traynham, Reclamation] Reminds everyone about next steps for the Project O motion by Nov 20th. Working on scheduling a special session of the AMWG on Nov 17th. TWG members should also speak with their AMWG representatives so that they are informed about the FLAHG hydrograph and Project O budget proposal that they will be seeing. We may consider an informal information session in advance of the special AMWG session. Some revisions still need to be made by GCMRC on Project O. **[Mike Moran, GCMRC]** Prepared to make the revisions to Project O as soon as possible based on the motion but don't know if there needs to be any other type of review or if this is the last step. **[Seth Shanahan, SNWA and TWG Chair]** Assumes that any revisions will be in accordance with the motion. The report to the AMWG would be to demonstrate how those revisions were made. **[Lee Traynham, Reclamation]** Agree. It would be similar to the workplan process to submit revisions ahead of time (i.e., two weeks in advance) and describe the changes made.

Meeting adjourned at 2:36 PDT

Meeting Attendees – Wednesday, October 14, 2020

AMWG Members, Alternates, and Leadership

Cliff Barrett, UMPA (Alternate)
Richard Begay, Navajo Nation
Peter Bungart, Hualapai Tribe
Charlie Ferrantelli, State of Wyoming (Alternate)
Michelle Garrison, State of Colorado (Alternate)
Paul Harms, State of New Mexico (Alternate)
Leslie James, CREDA
John Jordan, FFI/Trout Unlimited
Vineetha Kartha, ADWR (Alternate)
Jakob Maase, Hopi Tribe
Jessica Neuwerth, CRBC
Daniel Picard, AMWG DFO
Matt Rice, American Rivers
Peggy Roefer, CRCN (Alternate)
Larry Stevens, Grand Canyon Wildlands Council
Steve Wolff, State of Wyoming

USGS/GCMRC Staff

Lucas Bair
Kimberly Dibble
Helen Fairley
Ted Kennedy
Michael Moran
Jeff Muehlbauer
Joel Sankey
Scott VanderKooi

Reclamation Staff

Tara Ashby
Clarence Fullard
Heather Patno
Kerri Pedersen
Daniel Picard
Lee Traynham

Interested Persons

Rob Billerbeck, NPS
Kelly Burke, Grand Canyon Wildlands Council
Carrie Cannon, Hualapai Tribe
Shane Capron, WAPA
Kevin Dahl, National Parks Conservation Association
Kurt Dongoske, Pueblo of Zuni
Craig Ellsworth, WAPA
Alicyn Gitlin, Sierra Club
Jessica Gwinn, USFWS
Brian Healy, NPS
Ken Hyde, NPS-GLCA
Carliane Johnson, SeaJay Environmental
Sara Larsen, Upper Colorado River Commission
Ryan Mann, AGFD
Scott McGettigan, State of Utah
Craig McGinnis, ADWR
Emily Omana Smith, NPS-GRCA
Amy Ostdiek, State of Colorado
Bill Persons, FFI/Trout Unlimited
Ben Reeder, GCRG
Gene Seagle, NPS
Seth Shanahan, TWG Chair and SNWA
Erik Skeie, State of Colorado
Jim Strogen, FFI/Trout Unlimited

Meeting Attendees – Thursday, October 15, 2020

AMWG Members, Alternates, and Leadership

Cliff Barrett, UMPA (Alternate)
Peter Bungart, Hualapai Tribe
Charlie Ferrantelli, State of Wyoming (Alternate)
Michelle Garrison, State of Colorado (Alternate)
Paul Harms, State of New Mexico (Alternate)
Leslie James, CREDA
John Jordan, FFI/Trout Unlimited
Vineetha Kartha, ADWR (Alternate)
Jakob Maase, Hopi Tribe
Jessica Neuwerth, CRBC
Daniel Picard, Reclamation, AMWG DFO
Matt Rice, American Rivers
Peggy Roefer, CRCN (Alternate)
Larry Stevens, Grand Canyon Wildlands Council
Steve Wolff, State of Wyoming

USGS/GCMRC Staff

Helen Fairley
Ted Kennedy
Michael Moran
Jeff Muehlbauer
Joel Sankey

Reclamation Staff

Tara Ashby
Clarence Fullard
Heather Patno
Daniel Picard
Lee Traynham

Interested Persons

Rob Billerbeck, NPS
Kelly Burke, Grand Canyon Wildlands Council
Shane Capron, WAPA
Kevin Dahl, National Parks Conservation Association
William Davis, Grand Canyon University
Martina Dawley, Hualapai Tribe
Kurt Dongoske, Pueblo of Zuni
Craig Ellsworth, WAPA
Alicyn Gitlin, Sierra Club
Jessica Gwinn, USFWS
Brian Healy, NPS
Ken Hyde, NPS, GLCA
Carliane Johnson, SeaJay Environmental
Mike Kearsley, NPS
Sara Larsen, Upper Colorado River Commission
Ryan Mann, AZGFD
Scott McGettigan, State of Utah
Craig McGinnis, ADWR
Emily Omana Smith, NPS-GRCA
Bill Persons, FFI/Trout Unlimited
Ben Reeder, GCRG
Bob Schelly, NPS
Gene Seagle, NPS
Seth Shanahan, TWG Chair and SNWA
Erik Skeie, State of Colorado
Jim Strogen, FFI/Trout Unlimited

Abbreviations

AHAHG – Administrative History Ad Hoc Group
AMWG – Adaptive Management Work Group
AGFD – Arizona Game and Fish Department
AZDWR – Arizona Department of Water Resources
BAHG – Budget Ad Hoc Group

BT – brown trout

CREDA – Colorado River Energy Distributors Association
CRCN – Colorado River Commission of Nevada
CRMP – Colorado River Management Plan
DFO – Designated Federal Officer
DOI – Department of the Interior
e-DNA – environmental deoxyribonucleic acid
EPT – Ephemeroptera, Plecoptera and Trichoptera
FFI – Fly Fishers International
FLAHG – Flow Ad Hoc Group
FY – fiscal year
GCDAMP – Glen Canyon Dam Adaptive Management Program
GCMRC – Grand Canyon Monitoring & Research Center
GCNP – Grand Canyon National Park
GCWC—Grand Canyon Wildlands Council
GLCA – Glen Canyon National Recreation Area
GRCA – Grand Canyon National Park
CRCN – Colorado River Commission of Nevada
HFE – High Flow Experiment
HBC – humpback chub
JCM-West – Juvenile Chub Monitoring-West
KA – knowledge assessment
kaf – thousand acre-feet
LCR – Little Colorado River
LTEMP – Long-Term Experimental and Management Plan

maf – million acre-feet

MUX – multiplexer
NPS – National Park Service
PST – Pacific Standard Time
Reclamation – Bureau of Reclamation
RFC – River Forecast Center
RM – river mile
ROD – Record of Decision
Secretary – Secretary of the Interior
SNWA – Southern Nevada Water Authority

TMF – Trout Management Flows

TU - Trout Unlimited

TWG – GCDAMP Technical Work Group
TWP – Triennial Budget and Work Plan
UMPA – Utah Municipal Power Agency
USFWS – United States Fish & Wildlife Service
USGS – United States Geological Survey
WAPA – Western Area Power Administration