

Glen Canyon Dam Adaptive Management Program Technical Work Group Meeting April 10-11, 2024

Day 1: Wednesday, April 10, 2024

Start Time: 9:00 AM PDT

Conducting: Seth Shanahan, Southern Nevada Water Authority (SNWA) and TWG Chair

Designated Federal Official: Daniel Picard (Bureau of Reclamation)

Meeting Recorder: Beccie Mendenhall, SeaJay Environmental LLC

Welcome and Administrative

- **Introductions and Determination of Quorum (16 members)** A quorum was reached (N=23).
- **Prior Meeting Minutes** January notes approved and posted prior to meeting.
- **Next Meeting Date(s)** July 9-10, 2024, at Little America in Flagstaff, AZ. Normally this meeting is in June, but we wanted to allow more time for budget work.
- **Ad Hoc Group Membership and Updates**
Seth Shanahan (Chair) Please review your membership status in the ad hoc groups online. If there are any changes notify Jeremy. There are standalone presentations from BAHG and SEAHG tomorrow so we will not discuss them here. The only other active group right now is the Steering Committee Ad Hoc Group (SCAHG). I continue to appreciate the help of this group in developing the agendas and meeting content. It has also been a useful forum to enhance communication about the small mouth bass initiatives.
- **Review Action Items, Motions, and Votes Form** Review completed.
- **LTEMP Environmental Impact Statement Update**
Bill Stewart (BOR) I want to thank everyone who provided comments. The comment period closed March 25th. There will be a response to all comments in the final SEIS. Comments will also be posted on the GCDAMP website. Target end of May for final SEIS with ROD expected by end of June.
- **Upcoming Monitoring and Research Trips**
Mark Anderson (GCMRC) Completed 6 trips so far this year with one going out today. Reference the posted Monitoring and Research Trip Schedule for details on upcoming trips.
Seth Shanahan (Chair) That's a lot of activity. Maybe we should talk about ways to share trips?

Discussion of Warmwater Nonnative Fish Actions and Discussion to Assess Effectiveness:

Background: Attachment G bullet number 5 to the document entitled "Invasive Fish Species Below Glen Canyon Dam: A Strategic Plan to Prevent, Detect and Respond" states that the Smallmouth Bass Ad Hoc Group (SBAHG) should convene on an annual basis prior to the Budget Ad Hoc Group (BAHG) Triennial Work Plan (TWP) discussions to discuss the agenda topic shown above. Bullet number 5 further states that the SBAHG may also review and recommend updates to the plan, as necessary. This agenda item is meant to allow TWG members, sitting simultaneously as the SBAHG, to continue a discussion about this topic that began at the February Adaptive Management Work Group meeting and will occur at future BAHG meetings. Agencies who are involved in implementing invasive fish management actions will be requested to provide updates on those actions.

Discussion

Seth Shanahan (Chair) We have heard people say there is not enough time for discussion. In response, we have created this agenda item to facilitate dialogue. The topic is around the actions and effectiveness as noted in the background above. We want to hear first from the agencies involved, then have an open conversation around that information. Bud, can you lead us through this discussion?

Bud Fazio (NPS) Last TWG we spoke about the Reclamation and NPS field trip NPS and Reclamation made to the slough to take a hard look at modifications needed to reduce or eliminate spawning of SMB. Rob Billerbeck was asked to lead an interdisciplinary team including NPS, Reclamation and GCMRC experts to tackle the tough questions of this project and evaluate what NEPA tool we will apply as we go through this. We have discussed channeling and flow and what impact that would have on SMB spawning. We started discussions with Reclamation about what size budget is needed. At the LTEMP meeting yesterday we opened dialogue with the tribes about this project, with follow-up letters to be sent next week.

Shana Rapoport (State of California) Has the park service decided this is something that they will move forward? **Bud Fazio (NPS)** We are moving forward but cannot confirm we will implement yet.

Shana Rapoport Can you advise a timeline? **Bud Fazio (NPS)** We are aware the desire is to have this complete before spring of 2025. If we decide to move forward with this project, we will target Jan or Feb 2025 to implement. That also aligns well with when Reclamation resources are available to do the work as well as minimizing disruption of activities on the river. **Rob Billerbeck (NPS)** When Reclamation got out to the site this January it was decided action this summer simply was not possible.

Christina Noftsker (State of New Mexico) Last meeting you talked about involving the Army Corps of Engineers for wetlands analysis, can you give an update on that? **Bud Fazio (NPS)** We had to cancel the original meeting due to weather, it is rescheduled for next week. We have representatives coming from 4 states looking at the wetlands and the amphibian species in the slough. We are trying to consider all these things in a compact timeline. **Seth Shanahan (Chair)** To follow on to Christina's comment, dredging or filling of materials requires permits. The Army Corp has nationwide permits for which the NEPA has already been done. If this work could fit into one of those permits, it would reduce the timeline. There is a permit related to stream restoration, I encourage you to look at that to help minimize effort and timelines. **Bud Fazio** We are considering those things, working with Matt from Reclamation. **Matt O'Neill (BOR)** I have been working with the Army Corp and we have two nationwide permits we can do this work under. They have assured me they do not get in the way of actions related to protection of endangered species.

Larry Stevens (GCWC) The slough is not a natural feature. And the salamander in the slough are derived from fishing bait early in the history of this region. **Rob Billerbeck (NPS)** We cannot restore everything to pre dam conditions. We must work within the realm of "partial restoration". Our goal is to look at natural functions and species and determine what is best for the future. **Bud Fazio (NPS)** We are trying to get to the answer on whether the salamanders are native or not. **Larry Stevens** We will be very interested to hear the genetics on the salamander, they are the first ever documented in the Colorado River. **Kelly Burke (GCWC)** I think there is some clarity needed about what is a natural feature. **Rob Billerbeck** We have looked through historical photos' decade by decade, there has been a feature at that location since the 1800's. The feature is dynamic and has changed over the years, both pre and post dam. Some things like this are not completely black and white. They are complex, we are looking at the history of that site in its totality.

Kurt Dongoske (Pueblo of Zuni) Is the implementation of any action dealing with non-native fish by the NPS covered under the 2019 non-native aquatic species management plan Programmatic Agreement?

Will the NPS develop an MOA to resolve adverse effects that result from lethal management on the Register-eligible TCP that is Glen Canyon and the Colorado River? To not develop an MOA and utilize “emergency situation” is no longer effective or meaningful. **Bud Fazio (NPS)** We have been following 2013 fish management documents and 2017 through 2019 non-native fish management documents. Rob, can you add insights? **Rob Billerbeck (NPS)** We are evaluating the specifics of this slough modification project. We are interested in the thoughts of the tribes. We started dialogue yesterday at the LTEMP meeting, as we continue that we will be able to talk more specifically about how we will respond.

Erik Stanfield (Navajo Nation) I would like to hear a discussion about the source of the water. Many of us assumed it was coming from the river, but I understand now it might be springs seeping in separately from the river. **Bud Fazio (NPS)** We have noted for many years we do not know the origin of the water source. Perhaps a spring or seep at the deepest part of the upper slough with a low flow rate. If you pump it down, it will refill itself in a few hours even if the river and lower slough are not in proximity to provide water. **Mark Anderson (GCMRC)** The conductance of water (salt content) in the slough is much lower than the mainstem river, pointing to a different source. **Bud Fazio** The temperature in the upper slough is also very warm, possibly impacted by a spring. We are very aware that many tribes have concerns about seeps and springs. **Edward Wemytewa (Pueblo of Zuni)** What Bud shared is that there is a process here. Once we receive the letter, we will present it to the circle. There is a process about how we deal with springs. **Erik Stanfield** Understanding the source of that water will have a big impact on the decisions from the Navajo related to this activity. **Edward Wemytewa** First of all, it is good to know there are more questions than answers. We want to know more about where the water source is coming from, then we can have a better response in terms of providing our input. The question is whether natural springs or induced springs. **Erik Stanfield** Any spring is important, but it is helpful to understand the source for management and to make decisions about changing things. **Seth Shanahan (Chair)** Yes, good to have data collection now that can help inform decisions.

Craig Ellsworth (WAPA) I do not think this action in the slough is going to make a difference unless we also address the entrainment risk and warm release temperatures. You can’t just treat one area and expect it to have an impact on the ecosystem. You need to address all three components contributing to the risk of establishment and treatments need to occur simultaneously: entrainment, release temperatures, and downstream habitat. **Rob Billerbeck (NPS)** I agree, the slough is only one piece of the actions that need to be taken. Temperature seems to be the key. These non-invasives did not turn into a large threat until the temperature increased. We don’t think any one of these actions will be successful alone. **Bill Persons (TU)** We need to move as quickly as we can to get the slough under control to make it unsuitable for warm water invasive species. The agenda item states we are going to discuss effectiveness. We haven’t spent any time discussing the effectiveness of this kitchen sink of actions.

Seth Shanahan (Chair) Putting some effort into measuring effectiveness is key. And modeling is critical to that measurement. I appreciate there is some attention to this in the new work plan. Maria, can you weigh in on effectiveness? **Maria Dzul (GCMRC)** It is going to be complicated. The modeling is probably the best way to look at it. GCMRC can model what the population of SMB would be if we did nothing. Then we make measurements on where we are today and make guesses at effectiveness. It is hard to decide which actions are having the impact. **Bill Stewart (BOR)** It is the WHY question that is hard. We have been talking a lot about this in the Rapid Response group. We have talked about Reclamation being the entity that shepherds this, ensuring to the best of our ability we can determine effectiveness.

Emily Young (State of Arizona) We want to get to a place where we are no longer managing an invasive species. Is there testing planned this year to measure spawning at the slough? Any plans for eDNA testing? **Bud Fazio (NPS)** We are positioned to do a chemical treatment this year. Last year we expected water temperatures to be in our favor, too cool for spawning. But the temperatures did not follow expectations. If we are not able to be fully successful in the non-chemical measures at the slough this year we will have to take that step. **Seth Shanahan (Chair)** Are the approvals in place for a chemical treatment this year? **Bud Fazio** Yes, permitted through the end of 2024. The largest challenge is to have the required supplies of the right chemical. **Leslie James (CREDA)** You talked about chemical treatment in the event mitigation in the slough is not successful. What does success mean? How to you decide to do the treatment? **Bud Fazio** Good question. Jeff Arnold is out there all the time; he has a really good sense of what is going on in the slough. **David Ward (USFWS)** SMB are still infrequent, harder to detect spawning, but some of the other warm water species it will be obvious.

Seth Shanahan (Chair) On the eDNA testing, does it give us more information than we already capture from slough monitoring? **Kim Dibble (GCMRC)** It is a measure of relative abundance of a species. I have done a lot of this sampling in the Grand Canyon. There is an analogue between relative abundance and fish in an area. The methods are getting better. Right now, we do not have a project for using eDNA in the slough, but I would be interested in discussing that. **Emily Omana Smith (NPS)** In the near term we are planning to use more eDNA in the Grand Canyon areas and are working with the labs to get quicker processing and turn around.

Shana Rapoport (State of California) Can we get an update on the thermal curtain? **Bill Stewart (BOR)** The report is coming out soon with details on the findings relative to the net and thermal curtain. It will require a value planning study because estimates for either project are over \$10 million to implement. As we progress through the planning process, we will have more details to share. Expect this to take several years to implement. **Shana Rapoport** Do you have a timeline for the planning process? **Bill Stewart** That is a short one-week process, scheduled for July.

Seth Shanahan (Chair) The intended role of the SBAHG was to think about the points we have just discussed. I suggest we reactivate our SBAHG to continue these conversations. (*Action taken*)

Biological Opinion for the Bureau of Reclamation's Near-Term Colorado River Operations Supplemental Environmental Impact Statement:

Dan Leavitt (USFWS) This Monday, April 8th our field officer signed the Biological Opinion (BO). We have sent these to both Reclamation offices and they will be posted on the web sites. The presentation today will provide an overview of the official document. This opinion is being done to comply with Endangered Species Act, Section 7a (1) and (2) and includes:

- Recommendation to lower dam operations from 7 to 6 maf per year
- Evaluation of current dam operations at the 7maf level
- Specify Recommended Conservation measures

Reference the slides for details on the components that comprise the BO document.

Q&A and discussion

Leslie James (CREDA) Thank you, that was the clearest explanation for a lay person of a Biological Opinion that I have heard. Is this a Jeopardy Opinion? **Dan Leavitt (USFWS)** We do a Jeopardy analysis every time, but this is NOT a jeopardy opinion. **Leslie James** Does this opinion also cover the SMB SEIS? **Dan Leavitt** This opinion does not. This only looks at the annual flow, not the HFE. **Leslie James** Are you then doing a new opinion about the SMB SEIS? **Dan Leavitt** We are in early discussions, I will

defer to Reclamation. **Seth Shanahan (Chair)** Will you engage in Section 7 consultation for the SMB SEIS? **Bill Stewart (BOR)** I don't have much to add, we are in discussions with Fish and Wildlife service. **Seth Shanahan** It's a key question to answer – is there an anticipated impact to endangered species from SMB SEIS?

Larry Stevens (GCWC) Why is the Colorado Pike Minnow not included in these considerations? Is it because it has been extricated from the Grand Canyon and the lower canyon? **Dan Leavitt (USFWS)** Yes, the current distribution of this species is limited to the inflows of the Colorado and San Juan arms which are not impacted by this action.

Bill Persons (TU) Question about the population estimates for Humpback Chub and the trigger point of 6000. Whose population is that? Are you including the Little Colorado River (LCR)? How do you determine the population? It may have some impact on our TWP projects. **Dan Leavitt (USFWS)** We had to lean on the 2016 BO and that estimate, which is using the LCR estimate that comes from GCMRC. We recognized since the last action we have seen a growth in western Grand Canyon beyond expectations. We are going to continue evaluating this the same way we have for LTEMP. This will get us by until post 2026 when we have a new document. **Bill Persons** Do you use the “two pass mark recapture” method used in the LCR, or do we know enough now to use a more cost-effective Monte Carlo method? **Dan Leavitt** I am not familiar with how they are doing it, though I believe the Monte Carlo was enhanced. **Maria Dzul (GCMRC)** It is complicated again, a lot of moving parts. It would be hard to use something like a Monte Carlo in the LCR for that, but we will consider it. **David Ward (USFWS)** Great question Bill, there is work in the TWP trying to improve population estimate methods for the western Grand Canyon. **Maria Dzul** I just want to point out my previous response was about measurements in the LCR while David is talking about the Western Grand Canyon. Monte Carlo could be applied there. **Bill Persons** I may want to discuss this more as we get into the TWP.

Larry Stevens (GCWC) The Humpback Chub population in western Grand Canyon developed under low lake conditions. What trouble will we get in including them in this evaluation if Lake Mead should refill and then wipe out that population. **Dan Leavitt (USFWS)** In 2004 they identified the reach below Separation Rapid as having “a few” Humpback Chub. One year ago, Maria measured over 11,000 in the same reach. Valid point however and something we will continue to think about. I am hoping the expert science panel on the Western Grand Canyon population will help us understand it better. **Seth Shanahan (Chair)** I might just add, we have recovery goals and conservation goals related to this species. We should be careful not to mix terms.

Programmatic Agreement Update for the Long-Term Experimental and Management Plan:

Zachary Nelson (BOR) Earlier this week we had our semi-annual LTEMP Programmatic Agreement review which was two days of discussions with tribes and stakeholders. Here are some key points from that discussion:

- Reclamation is hiring an archeologist to work full time on LTEMP which will complement Zac's efforts and provide more support for this work.
- Two weeks ago, Zuni leaders met with Reclamation in person at the Zuni reservation. From that we came away with an MOA. The Zuni have been very concerned about extermination of fish in the Grand Canyon. We came to an agreement on balancing the taking of life with helping an endangered species on the Zuni reservation, the Bluehead Sucker. We have a proposal and language. Reclamation will begin Non-Native MOA meetings to finalize these documents.

- River trip recommendations from NPS and the tribes were discussed. The primary concern is with visitors who behave like they are on spring break, which is detrimental to the values of the tribes for this sacred space. Suggestions focused on ways we can educate visitors, through kiosks, films, publications. Any ideas from this audience are also welcome, please share.
- August AMWG we will host a day of cultural awareness presentations from the tribes the day before the regularly scheduled meeting. The actual schedule of those events will be published later as we solidify the presentations.
- NPS had an opportunity to discuss slough modifications with the tribal representatives.
- USGS presented information on methods for preservation of rock art and petroglyphs as well as watershed modeling, looking at where water is being held back from the lower Colorado River in small reservoirs and stock ponds and how that impacts the river.
- Grand Canyon Tribal Monitoring Group has received a national DOI Environmental Achievement Award. The group will travel to DC to receive the award on May 7th. There will also be a presentation of individual awards to the tribes at the August AMWG.

Q&A and discussion:

Daniel Bullets (Southern Paiute Consortium) The tribes call this “rock writing” not “rock art”. Art implies doodling and the tribes rock writing is there for a specific purpose.

Seth Shanahan (Chair) You mentioned an MOA for non-native fish, can you explain how this is related to the 2019 MOA? **Zachary Nelson (BOR)** Park service was not part of our consultation. The 2019 NPS MOA is out of scope. To include them we would have to convene a new consultation with the Zuni leaders. **Helen Fairley (GCMRC)** The park service has their own agreement with the tribes.

Bureau of Reclamation Priorities, Anticipated Funding Available for Triennial Work Plan and Budget FY2025-2027 (TWP), and TWP Initial Draft Summary:

Bill Stewart (BOR) I just wanted to start with a review of the GCDAMP Structure and particularly the 3 functions that advise the AMWG: TWG, GCMRC and Independent Science Advisors which is funded under Reclamation. **Shana Rapoport (State of California)** Do the TWG and the independent advisors interact? **Bill Stewart (BOR)** Yes, I absolutely think it is important that the TWG help formulate the questions we ask the science advisors to investigate.

Bill Stewart (BOR) There are a lot of federal “acts” under this program. GCDAMP FY 25-27 budget funding estimate for the TWP is \$12.5 million per year. This is not final until approved by congress. The split is GCMRC 80% (\$10M) BOR 20% (\$2.5M). Reference slides for details.

Seth Shanahan (Chair) The expectation is this will be appropriated dollars? **Bill Stewart** Yes, there were years this was funded by power but that is not the case in the current planning. **Seth Shanahan** Is the 80/20 split just from experience? **Bill Stewart** Yes, it has been this split for a long time. **Seth Shanahan** Is it still the case that BOR enters into 5-year agreements with resources they need? **Bill Stewart** Yes, it is good to point out how this works. The funding and agreements do not always align. Costs generally come in less, which means funds become available. **Seth Shanahan** When there are other fed agencies that are cooperators, do you contract with them or does USGS? **Bill Stewart** It depends on the contract. Some is pass through from one agency to the next, others are separate. **Seth Shanahan** Part of the reason for asking is to see if there are opportunities for efficiency in contracting.

Project 1 – Adaptive Management Work Group

Bill Stewart (BOR) The Public Outreach line item (1D) has room for improving use of these funds.

Project 2 – Technical Work Group

Bill Stewart (BOR) A line item for TWG Facilitation funding (2C) has been added. Reimbursement for the TWG chair was removed because of federal guidelines that do not allow funding time for subcommittee members. Some additional funds were added to the travel budget to compensate.

Project 3 – Project Management and Contract Administration

Bill Stewart (BOR) The final line item on this project (3D) is related to the LTEMP 10-year comprehensive review. We added funds in years 2 and 3 of this budget to support conversations on how to approach this review as well as providing funding for third party engagement if needed.

Project 4 – ESA Compliance and Management Actions

Bill Stewart (BOR) The Experimental Monitoring line item (4C) provides some flexibility for unplanned management actions and projects. In the past, the Experimental Fund was used to monitor conditions before and after HFEs. Leftover funds were put into the native fish contingency fund in the past. Now there are a number of projects associated with Smallmouth bass. The last line item (4G) was formerly Project N, now moved into the Reclamation budget. The intent for this funding is a workshop and report out in 2026 focused on Hydropower.

Seth Shanahan (Chair) If we use appropriated funds is it true there is no carry over? Money must be spent or given back? **Bill Stewart (BOR)** I think there are ways to address this but yes, that is the situation. **Craig Ellsworth (WAPA)** Do those need to be LTEMP experiments, or can they be other experimental projects that address high value questions for the program? **Bill Stewart** LTEMP has priority, but we can possibly expand if resources are available. **Seth Shanahan** Is it possible to make it available at the end of the fiscal year? **Bill Stewart** Yes, at the end of the fiscal year we should look at where funds are available and move to fund projects based on priority. **Leslie James (CREDA)** If this can only be used for LTEMP, that is a very finite set of experiments. Bill's comment around flexibility is important.

Seth Shanahan (Chair) LTEMP BO says Yuma Ridgeway Rails surveys are supposed to be done every 3 years. You mentioned this had been removed from line item 4E. **Bill Stewart (BOR)** We have some letters exchanged that this is no longer needed. **Dan Leavitt (USFWS)** When the waters receded, the wetlands dried up and the Rails were no longer evident **Seth Shanahan (Chair)** Is there a way to document or highlight the revisions / changes to the original document? The letters between agencies are not visible. (*Action Item taken*)

Seth Shanahan (Chair) Was there any reason why 4G was not advanced a year? (scheduled in 2025 instead of 2026) **Bill Stewart (BOR)** I think timing it closer to the comprehensive review planning was the idea but open to recommendations.

Bill Persons (TU) Is there a way to communicate the funding that is unspent at years end? **Bill Stewart (BOR)** The short answer is no. This funding is distributed in so many ways. When we have an agreement with GCMRC, it can take a year to identify spending on all the various agreements. We know we have obligated funds but that is all we can report on in an immediate timeframe. **Bill Persons** You must close the books at some point. **Bill Stewart** Obligations are not on the books. Once we obligate it to the agency it is spent. **Bill Stewart** There are funds that are not obligated and that rolls over year to year. This is where we might find some additional funds to work with. **Bill Persons** It would be nice to know how much carryover is available. **Bill Stewart** We can try to do a better job of communicating what is in the

buckets. Part of the problem is the funding for the budget is also partial. We don't know when the funds will really be available.

Shana Rapoport (State of California) Is the Program Review being expected to be prepped in the third year of the budget or executed? **Bill Stewart (BOR)** The plan is to do the prep work for the DOI comprehensive review in October of 2027.

Project 5 – NHPA Compliance

Bill Stewart (BOR) This contains funding for all the Cultural Resources projects. Specific Tribal projects are listed in line items 5E – 5J.

Craig Ellsworth (WAPA) The Contingency Fund (5L) was meant to be the same model as the Non-Native Fish. **Bill Stewart** It is like the Experimental Fund, it ensures funding is available for compliance activities that may arise. If not used, it could be another source for end of year reallocation.

New Tribal Proposals

Daniel Bullets (Southern Paiute Consortium) – We see a concern with visitor behavior in the canyon, we want to do a deep dive into outreach and education. We would like to have people visit the canyon with a respectful, observing standpoint, not to party. We did a pilot project with 360 monitoring highlighting the different cultural sites. It allows us to bring the canyon experience to people virtually.

Craig Ellsworth (WAPA) Is that project available to the public? **Daniel Bullets** Once we put this together, we will do a presentation to AMWG and TWG. **Craig Ellsworth** Will tribes present at the guide training seminar? **Daniel Bullets** Yes, we want to look at the whole thing. **Leslie James (CREDA)** Can you explain the survey, is that a visitor survey? **Daniel Bullets** The survey is reaching out to the people organizing the tours. **Leslie James** Some of this could be in Project J. Also, could be potential for using POAG funds (Public Outreach) for this project. **Mel Fegler (State of Wyoming)** I am concerned about the connectivity service that visitors might be capable of getting down in the canyon. It may be better to format this as something they download at the visitor center and take with them.

Erik Stanfield (Navajo Nation) We have proposed one new project working with Brent Powers to monitor bird inventory and habitat use at 20 locations. This will include conversations with tribal members about the species and its impact. We envision this as a pilot project that can grow. We are also working on the socioeconomic project Leslie was just talking about. How our monitoring program impacts decision making, probably outside of the funding here but have agreed to work on it.

Betsy Morgan (State of Utah) On the Navajo bird habitat project, would that come out of GCMRC or BOR budget? **Bill Stewart (BOR)** Good question, I am not sure. Maybe there is an opportunity to combine those two funds. **Andrew Schultz (GCMRC)** I just spoke with Jeremy about that, maybe more appropriate to fund one place or the other.

Bill Stewart (BOR) This final slide lists important related projects that are funded outside this budget. Support for this work comes from Hydropower, NPS, AZGFD, Science Technology Program as well as Reclamation funds outside of GCDAMP. Reference slides for details.

Shana Rapoport (State of California) Is there an option to add funds to the Native Fish Contingency fund? **Bill Stewart** This originally came from power revenues in the basin fund that was earmarked for Native fish. The funds have been transferred to Reclamation. We need to have more conversation about how to manage that.

Craig Ellsworth (WAPA) Is there any discussion of doing translocation further up the canyon where Humpback Chub are not present today? **Bill Stewart (BOR)** In the Endangered Species act information that Dan presented there are items for that. But whether that is part of GCDAMP funding or something

else remains to be seen. **David Ward (USFWS)** Dan had mentioned developing a plan for translocation of fish from LCR to other areas but that requires a plan for mitigating disease and other issues that arise. I do not know that there are direct plans for translocation but there are ideas in that direction.

Leslie James (CREDA) Is it possible when we have projects with multiple funding agencies that we can identify that in the budget? **Andrew Schultz (GCMRC)** It can become a little bit convoluted but if it is helpful to the people involved, we are happy to look at that. (*Action Item taken*)

Grand Canyon Monitoring and Research Center TWP Initial Draft Summary:

Andrew Schultz (GCMRC) We had a lot of feedback even before we put out this first draft, which we tried to incorporate. Our group has worked hard to make sure we are covering the program needs and what is important to the Colorado River Ecosystem. At a high level, the funding by project and category of spend is like the last 3 years. Reference slides for LTEMP goals, overview charts and funding details. We will spend the rest of this presentation walking through each project. Some things to point out in the terminology for project line items:

Ongoing = carry over project, largely unchanged

Modified = significant change in project

New = new element in the budget

Project A – Streamflow, Water Quality, Sediment Transport

Lead: David Topping

Bill Persons (TU) The numbers you are displaying for annual budgets seems to be quite a bit higher than actuals. **Andrew Schultz (GCMRC)** Yes, we had to really pair things down when we got to final approval and anticipate the same thing will happen in the TWP plan. We provide provisional numbers that are analogous to where we are in the planning process – i.e. before pairing things down. **Bill Persons** It might be useful to see the final numbers as well. **Andrew Schultz** At the next meeting that is what you should see, what we are working towards in the coming weeks. **Seth Shanahan (Chair)** The proposed amount of work effort is \$4 – 5 million per year over what is available. A third of what we are seeing needs to be cut. The effort for this group is to decide what to cut. I just wanted to set the tone for everyone.

Project B – Sandbar and Sediment Storage Monitoring and Research

Lead: Paul Grams

Bill Persons (TU) Can you tell me what was cut from the proposed project in FY23 that is being added back to the FY24 budget? **Andrew Schultz (GCMRC)** I will have to defer to Paul Grams for details but certainly we can get you that information, although the response may be somewhat complicated. **Bill Persons** If I am being asked to cut \$5 million, I need details. **Andrew Schultz** Prioritization is the key. We use the priorities of projects as recommended by TWG / BAHG to make decisions on how to pair this down.

Project C – Riparian Vegetation Monitoring

Lead: Emily Palmquist

Shana Rapoport (State of California) Can you give us an idea of changes in the modified projects?

Andrew Schultz (GCMRC) I don't know the details, but if it is helpful, we can compile a list of what changed in the modified. (*Action Item taken*)

Project D – Effects of dam operations and vegetation management for archeological sites

Lead: Joel Sankey

Joel Sankey (GCMRC) The budget for this one has increased. The original element D1 was separated into lines 1 and 3 in the current proposal. Element 3 was expanded to add collaboration with the Hopi and potentially other tribes to explore traditional tribal practices for vegetation management. Then two new project elements were added. **Andrew Schultz (GCMRC)** Can you share why the new elements are important to include? **Helen Fairley (GCMRC)** The eDNA element is to understand the sedimentary deposits in terms of the cultural and ecological information they contain. It is a pilot project to see if we can extract information about historical use. **Joel Sankey** Monitoring the rock art (rock writings) is based on another pilot done at the panel “sufi man”. We want to expand this to other archaeological sites. **Andrew Schultz** How much of the increased budget is due to these added elements? **Joel Sankey** All of the increase is here. **Seth Shanahan (Chair)** One of the methods to cut these budgets by 30% is to think about the frequency of collecting data. Can you react to what kind of information you lose if you reduce the frequency of monitoring? **Joel Sankey** We have done that in the past, our current plan reflects that. I would caution about cutting back any further on the frequency. **Helen Fairley** That is how we came up with not monitoring all the sites annually but breaking it apart across a 3-year period.

Project E – Controls on Ecosystem Productivity: Nutrients, flow, temperature

Lead: Bridget Deemer

Bridget Deemer (GCMRC) In this project we expanded the phosphorous uptake monitoring and added some analysis of the food web in the new element. **Leslie James (CREDA)** How much of the proposed increase is attributed to the new project? **Bridget Deemer** That is a good question. I did not look at that breakdown, but I can provide that. **Leslie James** I found the details. If they secure outside funding for the Columbine gauge will the budget line item go down by 72%? **Bridget Deemer** No, the gauge is only \$40 thousand of the proposed budget.

Project F – Aquatic Invertebrate Ecology (Food Base)

Lead: Ted Kennedy

Andrew Schultz (GCMRC) The modifications in this project are related to methodology. **Shana Rapoport (State of California)** It looks like there is no planning for bug flows in the next 3 years, but the budget is going up significantly. **Andrew Schultz (GCMRC)** We will have to dive into the details to provide that data. **Dani Greene (State of Nevada)** Is bat monitoring still included? **Andrew Schultz** I believe it is. **Craig Ellsworth (WAPA)** Anything related to bug flows is covered by the Experimental Fund. All of this is just the normal monitoring independent of whether bug flows occur or not. **Andrew Schultz (GCMRC)** That is true, this does not include any Experimental Fund monitoring. **Larry Stevens (GCWC)** Are there opportunities to have one Aquatic monitoring program rather than three of them? **Andrew Schultz** Thank you Larry, that is good feedback.

Project G – Humpback Chub Population Dynamics throughout the Colorado River

Lead: Maria Dzul

Maria Dzul (GCMRC) Most of this monitoring is ongoing. The new element at Sampling Blue Springs is to find out if there is potential for Humpback Chub in this area. In the western Grand Canyon, we have some uncertainty about the longevity of fish, so we are increasing noninvasive pit tag monitoring. It also includes a citizen scientist component, having river guides deploy antennas during their trips.

Seth Shanahan (Chair) I am wondering about why things might be so expensive. For instance, in element G3 the GCM trips are half the budget. **Maria Dzul (GCMRC)** Those trips are a big effort, 21 days, many people, a huge investment. There is also a helicopter trip in July. Another big cost is contracting experienced fish technicians. **Seth Shanahan** Same things for element G2? **Andrew Schultz (GCMRC)** Yes, those helicopter costs really add up. **Leslie James (CREDA)** Are those contracted helicopters? **Andrew Schultz** Yes, USGS contracts this through a third party. **Leslie James** We were just going through budget work at WAPA and noted that they have 4 helicopters. Is there an opportunity to

leverage this to reduce costs? **Andrew Schultz** Great idea. There could be significant savings, worth exploring. (*Action Item Taken*)

Project H – Salmonid Research and Monitoring

Lead: Brian Healy

Brian Healy (GCMRC) This project is about trout modeling. The main change is a reduction in cost due to increased efficiencies in monitoring and removal of a few trips. We also cut out the brown trout monitoring. One other small addition to this project is dissolved oxygen monitoring. **Andrew Schultz (GCMRC)** I just want to confirm, we can still answer the same questions as before? **Brian Healy** Yes, based on analysis that Charles has done we should be able to provide the same information. **Seth Shanahan (Chair)** I see this special burden rate percentage I don't understand. I thought it was always the same percentage. **Andrew Schultz** I came prepared for this question. The GCDAMP Special Rate includes our cost centers % of DOI rate, which recently increased from 7% to 15%, and a USGS facilities rate which varies annually. When you have cooperators in a line item, the rate can also be different. This GCDAMP Special Rate has zero USGS overhead. Then there is the USGS Contributing Fund, which is used to balance any deficits caused by the special burden rate. These funds are not guaranteed.

J. Barry (Public – Angler) – Could you tell me the primary or root cause of the decline of the Lees Ferry/Glen Canyon trout fishery? **Seth Shanahan (Chair)** Barry, we plan to answer that question at the end of the day in the public comment section.

Project I – Non-Native Species monitoring and research

Lead: Kim Dibble

Kim Dibble (GCMRC) There was a significant increase in this budget which includes 3 new projects. I1 is modified because they moved the parasite monitoring to I3 so we can do cross sampling. The new project is looking at the kinship of fish, which gives us an idea of diversity of nests and origins. I3 is focusing on new technology to identify emerging threats. I4 has many elements related to non-native fish modeling and forecasting. The increased cost for this project is because we are trying to be responsive to feedback.

Project J – Socioeconomic Research

Lead: Lucas Bair

Andrew Schultz (GCMRC) This budget is 3 times higher than last year, with expansions to the original two elements plus a new cultural resource element added. **Leslie James (CREDA)** Two questions as I look at the plan, did the BAHG or SEAHG talk about the sub element piece? **Lucas Bair (GCMRC)** The SEAHG did not talk about this. This line item is in response to BAHG and TWG meetings. **Leslie James** Is that a different spin on structured decision analysis? **Lucas Bair** Similar but different. The value of information analysis is another way to think about how to prioritize. **Leslie James** I am trying to sort out the sub element for hydropower metrics here from the work we expect to be done under the Reclamation hydropower piece. I would think that would be an input into the integrated modeling work. I am confused about these two sub elements. **Lucas Bair** Under the metrics effort GCMRC is required to report on resource status annually, that is why those two sub elements have been added. **Seth Shanahan (Chair)** I want to add that I was one of the people that suggested we use value of information analysis on the sub elements as a tool for looking at cuts and tradeoffs. **Larry Stevens (GCWC)** At these meetings we have discussed that a longer-range view is needed as we prepare for the larger LTEMP program review. Do you anticipate project J1 will get us there? **Lucas Bair** Yes and No. I think it is a combination of J1 and other projects. **Larry Stevens** It is an ongoing struggle to see where we need to be in 12 years. We just need to keep moving towards that goal. **Leslie James** In your work on integrated models are you willing to work with other modeling sources? Such as the Hopi monitoring work on cultural resources? I see important

inputs coming in from the modeling WAPA is required to do as well. **Lucas Bair** That is a good introduction to J3 line item of this project. The idea is to leverage on going work with tribes and outside collaborators. **Leslie James** I just want to make sure the same collaboration applies to the hydropower monitoring. **Lucas Bair** Absolutely. **Craig Ellsworth (WAPA)** I still feel like we are not in agreement on some of the hydropower metrics. We need to get on the same page and understand each other's positions. **Lucas Bair** I think the differences may be around how you interpret government documents. **Jakob Maase (Hopi Tribe)** Socioeconomic value is foreign to the tribes. To them it is not about the "value" of the resource, it is about the resource itself. You can't put value on that. **Erik Stanfield (Navajo Nation)** The way we approach this, puts some of the tribal values at a disadvantage. We don't have a way to translate that into numbers. We need to look at how we can translate into something that the western system can understand and measure. I believe work by Kristin and Lucas can help to bridge this gap. **Edward Wemytewa (Pueblo of Zuni)** Now I understand the need. I feel the Zuni need to come up with our own metrics. **Seth Shanahan (Chair)** We can set up more time to talk about this tomorrow.

Project K – Geospatial science, data management and technology

Lead: Thomas Gushue

Andrew Schultz (GCMRC) The large increase in this project is due to staffing, the elements themselves are largely unchanged.

Project L – Overflight remote sensing in support of GCDAMP and LTEMP

Lead: Joel Sankey

Andrew Schultz (GCMRC) The budgets here go up and down with the overflights that are scheduled.

Joel Sankey (GCMRC) The added elements L2 and L3 are new instrumentation and acquisition methods. Element L1 modification is expanding analysis for the new methods as well as collaborating with projects A through D to measure sand deposits. **Seth Shanahan (Chair)** Given where we are in the budget, I recommend that we delay the Lidar for another workplan. **Hannah Chambless (NPS)** I know about Lidar monitoring in the 3Dep program at NPS, are you aligned with that? **Joel Sankey** Yes, we just identified that, could significantly reduce the costs. That project is focused on the rest of the national park. We would try to leverage their data, which is broader. But we need to coordinate when the river is being held at a low level. **Bill Persons (TU)** A few years ago you suggested using drones with Lidar, but it was not allowed in national parks. **Joel Sankey** Yes, that is true in the Grand Canyon, drones have not been approved for any research in that ecosystem. We have been able to get drone permitting for Glen Canyon Recreational Area. **Bud Fazio (NPS)** It is possible, but it requires a lot of work. **Leslie James (CREDA)** We have been reviewing savings from using unmanned aircraft in our helicopter fleet. I would suggest this is an area to pursue. **Andrew Schultz** Joel, can you speak to Seth's suggestion that we move this to the next workplan? **Joel Sankey** People don't realize how universal this data set is. It is used in every project. Ideally you have three data points per decade. We want to make sure we have data from this decade included. What they are proposing is overflight in YR1 and YR3 of this workplan.

Project M – Leadership, Management and Support

Andrew Schultz (GCMRC) This project is salaries, training, and operational costs for GCMRC. The increases are largely related to filling vacant positions.

Project N – Native Fish Population Dynamics

Project Lead: Brian Healy

Andrew Schultz (GCMRC) There was a different project N which was retired, we kept the letter N, but this is a completely new project. **Brian Healy (GCMRC)** Most of this cost is salary, analyzing data related to LTEMP, adjusting some of the metrics, demographic modeling, focused on decision making processes for native fishes. **Andrew Schultz** What will be missing if we remove this project? **Brian**

Healy We would not be able to measure how native fish are responding to the changes in the system. It should also help us better understand the razorback sucker, which we know very little about today.

Closing Questions

Shana Rapoport (State of California) How much discretionary funding is built into the budget?

Andrew Schultz (GCMRC) We don't really budget for unknown costs. **Seth Shanahan (Chair)** Let's put this as an item to discuss during the BAHG tomorrow. **Christina Noftsker (State of New Mexico)** In prior years, have you had trouble finding funds to cover the USGS portion of the funding? **Andrew Schultz** No, not in prior years but we have been warned there will be no additional funding going forward.

Public Comment: None

Meeting adjourned at 4:42 PM PDT

Day 2: Thursday, April 11, 2024

Start Time: 9:00 AM PDT

Conducting: Seth Shanahan, Southern Nevada Water Authority (SNWA) and TWG Chair

Designated Federal Official: Daniel Picard (Bureau of Reclamation)

Meeting Recorder: Beccie Mendenhall, SeaJay Environmental LLC

Welcome and Administrative

- **Introductions and Determination of Quorum (16 members)** A quorum was reached.
- **Unresolved Issues from Yesterday's Meeting**

Seth Shanahan (Chair) Charles Yackulic sent an email with reactions he had about the recent Smallmouth Bass report that Bill Pearsons shared yesterday. There is a series of chats about the role of turbidity in that report. Since the chat is no longer visible to participants, Jeremy will capture it and send it via email. There was a public comment yesterday about factors influencing the decline of rainbow trout in the Ferry. We will have a presentation by Brian Healy today at 2:30 that will cover that. Also, we should have some time to visit questions about the budget work plan again later in the day.

Report from the Socioeconomic Ad Hoc Group (SEAHG) and Discussion of Next Steps:

Jeremy Hammen (BOR) After November TWG there was a charge to analyze and recommend a project N workplan given to this group. As a result of that work, we moved project N to the Reclamation side of the budget and renamed it "Hydropower Monitoring and Research". Now that this is done, there is a proposal to change the charge for SEAHG to focus on review of models and concepts that can help achieve LTEMP goals for Hydropower, Recreation and Cultural Resources.

Q&A and discussion

Seth Shanahan (Chair) Are there items that people want to bring up about the models? **Helen Fairley (GCMRC)** There has been a lot of history about hydropower economics that predates EIS that I think would be helpful for this group as they revisit the models used by GCMRC. **Seth Shanahan** Are there some key findings from those previous studies that you might be able to share? **Helen Fairley** I think it would be better for you to read. When we tried to create economic models there was a lot of interest and discussion, we had an outside panel that made recommendations. That led to the hiring of an economist in GCMRC. It is important to know the history so that you do not repeat mistakes of the past. **Seth**

Shanahan The general goal is to maximize our impact given our budget? **Helen Fairley** Yes, but also recognition that there are different and broader ways to look at the value.

Kelly Burke (GCWC) Can you post these documents on the Wiki? (*Action Item taken*)

Seth Shanahan (Chair) Back to the original SEAHG Charge from Nov, it was to recommend a Project N workplan. Had this charge been met? Is that the conclusion? **Leslie James (CREDA)** When the revised TWG documents come out, look at Project 4G and see if there are any questions or concerns. I don't think we need a separate meeting. How are revisions to the other projects being done? **Seth Shanahan** Through the BAHG. **Ryan Mann (AZGFD)** I think it might be beneficial to have a 10-minute review of the conclusions to this charge. **Seth Shanahan** We can put this on the BAHG plate, a description of the hydropower projects in Reclamation budget. Or from SEAHG, this is how we have accomplished this charge. **Ryan Mann** I am certainly interested in the information that is going to come out of this project 4G.

Seth Shanahan (Chair) We agree then, the current SEAHG charge is accomplished, any changes to be managed through BAHG. Let's discuss the proposed new charge to look at the models and concepts, discussing benefits and limitations of each. **Craig Ellsworth (WAPA)** We agreed to broaden the language to include cultural resources. **Jakob Maase (Hopi Tribe)** Yes, it is important for the tribal members to be involved in this group to discuss the cultural aspects. **Craig Ellsworth** We will not talk about everything all at once. I think GT Max and GCMRC models will be first. But over time we can switch the discussion to other SEAHG groups. **Leslie James (CREDA)** Jeremy used a good word, SEAHG is a "vessel". I see the SEAHG as the overseer or conduit or vessel for some of the efforts in Project J. That is where the science comes to an Ad Hoc, with ideas formulated through that Ad Hoc. **Seth Shanahan** I think that is an important comment because some of us don't understand what the actual efforts are. It is helpful to think SEAHG is the place where ideas can be discussed and then presented for agreement by the larger group.

Betsy Morgan (State of Utah) There were a few metrics that did not have consensus yet, tribal and hydropower. Is it AMWG who is working on this or TWG? **Seth Shanahan (Chair)** TWG has not been tasked with changing metrics. **Bill Stewart (BOR)** That is correct, it is a DOI responsibility.

Seth Shanahan We do have the opportunity to review and comment on metrics. Bill, is it reasonable to expect we will have another version of metrics for review at some point? **Bill Stewart** This has been going on for a long time, the request to revisit hydropower and tribal metrics. I don't know when we can put these out to the public. We need to talk about this more. **Seth Shanahan** Maybe SEAHG can be a forum for discussion on metrics.

Shana Rapoport (State of California) What Jakob is talking about sounds like it might be a separate charge. **Jakob Maase (Hopi Tribe)** In the past there was a separate Cultural Resource ad hoc group (CRAHG) for tribal concerns, but it fell by the wayside. Sometimes in the larger TWG group, however, the tribal input gets lost. The SEAHG opportunity seems like a nice alternative. **Leslie James (CREDA)** I think the cultural aspect does fit within the SEAHG. It would be informative to have the tribes tell us how they use and benefit from the hydropower benefits that they receive. I think it is very different from how other groups use them. This could be appropriate for a SEAHG presentation. **Seth Shanahan (Chair)** Including Cultural Resource in the language opens opportunity without being restrictive. **Leslie James** I think Ben might say the same thing applies to recreational people.

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

Erik Skeie (State of Colorado) A lot has happened since the January TWG meeting. We ran through every project in the entire TWP plan from Jan to March. Then we spawned a project prioritization group.

This resulted in the prioritization forms that went to all the TWG members yesterday. There is \$4 million that needs to be discussed because it does not fit in the budget. Here are the key dates:

April 12 – Deadline for prioritization evaluation forms

May 28 – Second draft of TWP is due

June 19 – Science Advisors provide feedback

June 25 – Third draft TWP is due

July 2 – BAHG recommendation to TWG, to be discussed / finalized at July TWG meeting

Aug 7 – Final adoption of TWP to be done at August AMWG meeting

Q&A and discussion

Hannah Chambless (NPS) Can we extend the due date for the prioritization forms to April 15? **Erik Skeie (State of Colorado)** No, we need this date to stay on our timeline. **Andrew Schultz (GCMRC)** Is it possible to give people more time? GCMRC wants to be responsive to the concerns raised about more time. **Seth Shanahan (Chair)** Maybe the PI can be on the call on Tuesday to address questions in the meeting. **Erik Skeie** As many GCMRC PI as possible would be great. **Andrew Schultz** I know there is a lot of field work going on, but I will try to coordinate that.

Mel Fegler (State of Wyoming) I think the evaluation form is great for highlighting the high-level areas and questions. Is there something you can add to the form to say which PI you want to ask questions of? I also would like to discuss prioritization within a project, particularly when you see large budget items.

Seth Shanahan (Chair) The disadvantage of this extended first draft phase is that we don't get all that detail. Hopefully in the next phase the document will be better.

Bill Persons (TU) When can you get us the list of contacts at GCMRC so we can follow up with PI?

Andrew Schultz (GCMRC) I will send out the email contacts at lunch today, will try to follow up with phone numbers on the weekend.

Bill Persons (TU) I assume response to the forms will be anonymous, so I don't upset a PI? **Seth Shanahan (Chair)** In some cases it is helpful to know who made a specific comment. **Andrew Schultz (GCMRC)** There is a way that Erik can know who the comments came from, but the PI does not. It will allow folks to be more forthcoming in response if they are anonymous. But I do agree with Seth that the information on who is important to those conducting the survey.

Mel Fegler (State of Wyoming) I noticed a lot of merging of trips between projects which I think is great, but it is not clear how much. Are the shared costs split between the sharing projects? Or does the entire sum appear in all three projects? **Andrew Schultz (GCMRC)** When you see costs within a project, they should be only the portion for that project. **Mel Fegler** It is still helpful to know where there is sharing going on. Then you know that project is already being as efficient as possible. Then we can help untangle relationships that have not been leveraged yet. **Ryan Mann (AZGFD)** It is hard to lock in those details this early in the planning because we are still defining which projects will be funded. **Mel Fegler** That is fair. **Seth Shanahan (Chair)** It might be worth getting a report with details on the fish cooperators and trip sharing. **Andrew Schultz (GCMRC)** I am hearing you want this in the next draft, we can work on that. **Seth Shanahan** We also heard from Leslie that we need to show connections between BOR and GCMRC projects.

Kelly Burke (GCWC) When results from the prioritization forms go to GCMRC, is there an opportunity for GCMRC to come back and say by cutting this it creates these problems? **Seth Shanahan (Chair)** The expectation is that the BAHG is the forum for that feedback, subsequent meetings will be having a dialogue with the PI about impact of cuts.

Kelly Burke (GCWC) Is the reduction in budget also being felt on the Reclamation side? Anything on that side that can provide opportunities to reduce cuts at GCMRC? **Bill Stewart (BOR)** There is a lot of uncertainty about what we get. It is a 3-year process, we don't always get what was requested.

Christina Noftsker (State of New Mexico) Can you explain the difference between logistics and travel? **Andrew Schultz (GCMRC)** Logistics is operations out on the river, travel is for GCMRC resources to attend training classes and conferences. **Helen Fairley (GCMRC)** There are some occasions where we cover travel for people coming to join river trips. So, there is a small amount of travel expense included in logistics. **Christina Noftsker** Why does GCDAMP have to pay for training of USGS resources? **Andrew Schultz** I will investigate that more, but I think it is training specific to things we are doing for this program.

Seth Shanahan (Chair) One thing I didn't see called out is a reserve fund. Every year we end up with funds we did not expect in the Reclamation budget. It might be nice to have something like that on the USGS side. **Andrew Schultz (GCMRC)** We do have a small equipment fund, about \$25 thousand, which is used for emergency logistic funds. Something larger would take away from the projects, so I don't know where that would come from. **Jeremy Hammen (BOR)** To provide an open-ended fund like that through contracting is becoming very difficult. It is seen as a red warning to everyone. **Seth Shanahan** That is helpful to know, maybe it is just a matter of broadening the description for using these funds on the Reclamation side.

Seth Shanahan (Chair) One of the highlights of the program at USGS is that all the PI publish results. I have struggled because the science publications can take away from the requirements to manage or make decisions. Is there an institutional need to publish papers? **Andrew Schultz (GCMRC)** This is what drives the science group. What do you mean by the publication process getting in the way of the program? **Seth Shanahan** If we must set priorities, my priority is to develop information for decision making in the management of the program. **Andrew Schultz** There is a lot of work getting things into the publication process, but that is the gold standard for accepted science process, peer reviewed journaling. I do not believe it is taking away from us being responsive. Is it a requirement for us? Our scientists get evaluated on the products they produce. But we seek to provide information, and not delay that information because it has not yet been published. **Kelly Burke (GCWC)** The publication and presentation of the science from this program is critical in terms of peer review and quality. It is core to the value of that information. That includes presentations because that is often where these things get discussed with the experts. **Colleen Cunningham (State of New Mexico)** I want to drill down on a point I think Seth intended. It is not so much that publication is getting in the way or delaying information but there may be a different focus of information shared for publication versus for management decisions. It may be good science, but it is not necessarily presented to us in a way that helps us make management decisions. **Andrew Schultz** We have listened to prior feedback and made improvements in how we present information. We have tried to make our science applicable, and tried to present our information so it is useful to the program. **Jeremy Hammen (BOR)** I agree with how crucial the publications are. We need the best science available to make our decisions. To Colleen's point, one of the hardest things to do is present this science in a digestible way to the non-science audience. We have worked with GCMRC to make improvements here. Please provide us with comments and feedback if you see more areas for us to improve. **Shana Rapoport (State of California)** I think we are all in a balancing act. Andrew, I am excited to hear you have made some changes to how the science is presented. I also want to make sure we are sensitive to the needs of the scientist to publish, that is important for attracting quality scientists.

GCMRC Budget Evaluation Exercise:

Background: The TWG will engage in an evaluation exercise for the GCMRC proposed projects but not the Reclamation proposed projects.

Erik Skeie (State of Colorado) This evaluation form does not serve as a recommendation. It is intended to guide discussions in the BAHG process. Results will be used at the April 16th BAHG meeting. Each project line has 2 questions associated with it:

- 1) how necessary is this project in meeting LTEMP goals?
- 2) relative to the current effort, what is needed to appropriately support this project?

Answers to these questions are selected from a short drop-down list. If there are more details you want to put into this project, enter this in the comment field which will be presented to the GCMRC as is.

Reference slides for examples on how the evaluation form data will be used.

Hannah Chambless (NPS) In the presentation yesterday, there was a comparison of the previous TWG budget to current. Is there information on older budgets that is accessible? **Craig Ellsworth (WAPA)**

Yes, on the WIKI we have a budget page. If you click on that, there is a page for each TWP going back to 2010.

Bill Persons (TU) I looked at the budget and work plans to see how much was planned to be spent in a year, then looked at the annual reports to see if that gave a measure of the actual spent. They don't always agree. **Andrew Schultz (GCMRC)** I mentioned how overhead had changed a lot, which impacts what is spent. We can get the numbers on what is spent but it is not in a document right now. **Bill Persons** But the annual report provides information on money spent. **Andrew Schultz** The annual report will have what was done for the work, but the actual amount spent on each project can differ over time. We can provide more details on that if needed.

Seth Shanahan (Chair) Erik can you review the section on LTEMP resource goals at the end of the form?

Erik Skeie (State of Colorado) This section is asking if efforts should be increased, remain the same or reduced for every LTEMP resource goal in the ROD. Then at the very end there is a question that asks if there are any critical elements that would assist in meeting these goals. This is another open comment question which will be provided to GCMRC and BAHG as is.

Christina Noftsker (State of New Mexico) Once we all complete the form and the BAHG has our recommendations, how does it get reconciled? Does the PI recommend or approve the cuts? **Seth Shanahan (Chair)** The evaluation information is submitted and processed, data is shared with USGS, the BAHG has discussion about the results and then adjustments go into Draft 2. Remember at the end of the day, we just recommend a work plan to the Secretary. Once it gets into DOI space, we have no control over what finally gets funded.

Andrew Schultz (GCMRC) We used to do a review "where are we at with the state of our knowledge".

Seth Shanahan (Chair) Are you looking for us to pursue a knowledge assessment? **Andrew Schultz** No, but we are part of an Adaptive program, and priorities can change. What GCMRC presents is what we feel is critical and responsive for the program. **Seth Shanahan** I agree wholeheartedly. What we miss in this program is a recurring assessment of knowledge and how that can be used to drive better recommendations to the Secretary. I think those processes are critical. They reveal how much we know about the resources, status of resources, and effects from our management actions. Will the metrics program help us here? Yes, but we need more. It takes a lot of effort. But it is a worthy goal. **Bill Persons**

(TU) I always appreciated the protocol panel reports and activities. They were usually scheduled by GCMRC, triggered by a change in a protocol. **Seth Shanahan** Maybe we can find some room in the TWP budget for that would allow this knowledge assessment to occur in a more formalized way.

Helen Fairley (GCMRC) I struggle because this is a stakeholder program where all of you are there to represent your agencies. It is helpful to know how these different agencies view the projects. For this reason, I would suggest we do not anonymize. It is not just a voting exercise. The point is about making sure each perspective is represented. **Erik Skeie (State of Colorado)** There was a recommendation at recent meetings to have a facilitated discussion between GCMRC and stakeholders to allow more open conversation. This could help bridge the gap of sensitivity that prevents open dialogue. If we are not there now, then we must leave the anonymity in place. But I agree with Helen, this is a larger problem that needs to be addressed going forward.

Hydrology, Glen Canyon Dam Operations, and Water Quality Conditions in Lake Powell and Below Glen Canyon Dam:

Alex Walker (BOR) - Presentation on Water Quality

Mid-March data collection shows the lake is still cool, 10°C at the penstock which is normal for this time of year. Dissolved Oxygen also looking good. Looking at a new graph, the Wahweap profile, we get some additional information. The temperature at the surface is warmer than the last 2 years while dissolved oxygen is higher. Dam observations also show higher release temperatures in 2024 compared to the previous 2 years and as well as higher dissolved oxygen. Modeling predicts we will hit spawning temperature of 15.5°C at the Little Colorado River sometime in June. For downstream temperature modeling Reclamation is using a model from Dibble et al published in 2021, developed from actual data 1985 to 2015. The Dibble model has been found to perform better down river and is also easier and faster to use. The model was validated against actual temps measured in 2022 and it performed well. Predictions are less accurate moving downstream.

Q&A and discussion

Kelly Burke (GCWC) Are there water quality release issues regarding EPA limits on conductance? **Alex Walker (BOR)** Conductance is an analogue for total dissolved solid matter. The EPA criteria is 500 mg/liter. I believe we are somewhere in the 400 range but not certain. But we are well below the legal criteria established by the Solid Control ACT, so not a significant issue.

Craig Ellsworth (WAPA) What causes the large swings in the forward forecasting of temperature?

Alex Walker (BOR) Probably our boundary conditions which use historical weather data which is not smooth. When you see variability in these datapoints you see it in the model. **Craig Ellsworth** So it is the historical weather data that causes these large swings in the model? **Bryce Mihalevich (BOR)** Yes, typically it is the variability in the weather and Inflow information that is supplied to the model. **Seth Shanahan (Chair)** If there is no basis for these wide swings in the observed data, maybe we need to smooth the data out a bit with some post processing. **Bryce Mihalevich** It's a good question, we will investigate that.

Christina Noftsker (State of New Mexico) Will the model be updated with 2023 data soon? There is such a large gap between the grey area and the black line. Is it that much warmer? **Alex Walker** There is a lot of data going into this slide, but the last two years of data have been extreme. **Christina Noftsker** On the Dibble model, is there any attempt to bring this up to current? (calibration ended in 2015). **Alex Walker (BOR)** That would be a GCMRC task. **Bryce Mihalevich (BOR)** That is good feedback, it could be updated.

Kim Dibble (GCMRC) Currently there are no plans to update this model with data beyond 2015 but we can discuss that. **Seth Shanahan (Chair)** Are we seeing something in the more recent data that says we should update the model? **Alex Walker** Going back to the black line, we are in a period where we've seen some very warm temperatures. As shown by the data in the slides, the model is performing well without that data. But we will investigate adding the data per Christina's point.

Shana Rapoport (State of California) It will be the Dibble model we use to determine thresholds to trigger SMB flows in the future? **Bill Stewart (BOR)** If flows are triggered it will likely be due to observed data, but the model will be used for planning. **Shana Rapoport** I am trying to understand that. You need forecasting to plan, observed data is too late. **Seth Shanahan (Chair)** It seems like we are going to need not just the Dibble model for downstream but the CE-Water 2 model for release from the dam.

Shana Rapoport My follow up then is given there is some error in the model, does there need to be an error correction? **Kim Dibble (GCMRC)** The model does well from Glen Canyon dam down to the LCR, within a quarter degree. **Seth Shanahan** What is our tolerance rate? How much uncertainty can we live with? **Craig Ellsworth (WAPA)** One of the comments WAPA made on the SEIS is that we will need 6 weeks' notice for their operations. If the model shows triggers by the middle to end of June, we are there. Just to point out, triggers are rapidly approaching. There are also lots of other things that need to happen, like a ROD. **Seth Shanahan** That's right, no decision has been made.

Rainbow Trout Status Update:

Brian Healy (GCMRC) We have reports from Anglers on low catch rates with a perception of fishery collapse. Are we meeting the LTEMP goal for rainbow trout? This presentation reviews preliminary data from Jan – Apr 2024 to try to answer that question. The health of fish has been generally good since the crash in 2014, except trending negative so far in 2024. While there has been very little increase of population in recent years, a decline is not yet visible. The April GCMRC trip measured a 71% decline in rainbow since Jan 2024, brown trout also down but less significant. AZGFD trip in April measured the lowest catch record since 1991.

Theories for decline

- Temp and DO have both trended negative for fish, DO in fact lower than any ever recorded below the dam, even hitting the acute morbidity thresholds for a period of time each year.
- Impact for fish is reduced growth and reproduction (first energy to be given up when conserving resources). We expect this decline for trout with warmer water temperatures.
- New species expansion creates competition for limited food source as well as predation by Brown Trout

Next Steps

- Cancel Sept TRGD trips when DO is low and fish are already stressed
- Assess the causes of decline with modeling

Q&A and discussion

Jakob Maase (Hopi Tribe) Is predation from SMB or Walleye also included in this analysis? **Brian Healy (GCMRC)** Yes, many non-native species, I was not intending predation was exclusive to brown trout.

Seth Shanahan (Chair) You mentioned a lag from months with low DO to the decline seen in fish condition. Any thoughts on why? **Brian Healy** Hard to say, the fish are agile at moving to find DO. **Ryan Mann (AZGFD)** Up until recently the health of the adults was high. We had hoped from that to see recruitment with younger fish. But we expect that with the low DO, the adults conserved energy and are just aging out without reproducing. From our perspective we have not been meeting metrics for this fishery for several years now. We are well below our management goals.

Bill Persons (TU) We are hearing from anglers that the fishery is as poor as they have ever seen it. There are still people able to catch good size fish. But they are not fly fishing, they are fishing deep. The prognosis doesn't look good given our projections for higher water temps and lower DO. **Brian Healy (GCMRC)** To your point we have not heard of dead fish surfacing anywhere. But what to tell them about the future is hard to predict. **Ryan Mann (AZGFD)** It is a challenge. We had anticipated seeing more acute mortality with the low DO measures. We are trying to understand that better. The issue only exists about 5 miles south of the dam, but it is one of the most important for that fishery. Water temp is the number one factor influencing what happens with that population. The only way I see improvement is if water temperatures released from the dam stay below 16°C. **Brian Healy** Agree, keeping the water temperature below 16°C would be ideal. But the other thing to tell anglers, this issue is beyond just Glen Canyon dam. Water temperatures are an issue everywhere.

Seth Shanahan (Chair) Do we have any data showing the food base is changing? **Brian Healy (GCMRC)** Good point, I think it is something we need to be talking about. Phosphorous is a big driver of that. **Ryan Mann (AZGFD)** I don't know of any long-term shifts in the food base, but that section of the river is classified as food limited for trout. It probably exacerbates a lot of these issues. **Seth Shanahan** You used the term collapse, I am familiar with boom/bust. Is there a definition for collapse?

Bill Persons (TU) We talk about boom/bust cycles, but if there is a bust with no boom in sight that is collapse. I am glad to see there is money for this in the TWP.

Hydropower Update:

Jerry Wilhite (WAPA) The trend of CRSP generation from all sources in the period 1971 – 2023 shows significant decline in generation. Glen Canyon accounts for about 75% of the total from all sources. Note that 8 of the 10 worst years are after 2000. In December 2021 they implemented a new rate action aimed at reducing purchase power. This included a new concept, Deliverable Sales Amount (DSA), which was the main factor in avoiding a 50% rate hike. In the initial two-year period, they avoided about \$211 million in purchase costs by passing the burden for generating this energy on to their customers. For the customers, that was a better deal than paying 50% more for their power. A new 5-year rate action was implemented January 1, 2024, that kept rates steady and continued DSA implementation. Reservoir elevation is a hidden impact. Higher water elevation means less acre-feet of water is required to generate 1 MWh of power. There is a cost associated with doing experiments. An HFE costs about \$1.5 million per event, Bug Flows are \$300 - \$400 thousand. Reference slides for details on the future planning and modeling for hydropower.

Q&A and Discussion

Seth Shanahan (Chair) When you say observed cost for experiments, it seems like you must dole out \$1.5 million to do the HFE. But that is not what really happens. These costs are missed revenue, you could have made this much money but did not. **Jerry Wilhite (WAPA)** It was actual cost before DSA because we had to go out and buy the power that was not generated. Now we adjust the power available instead of buying the power, so still lost revenue but no cash is required to replace it. **Leslie James (CREDA)** If you go back to the DSA slide showing generated power versus needed power, the customers must make up the difference in power. **Seth Shanahan** I am curious, the customers could have taken a 50% increase in rate. Do you have feedback from the customers? **Leslie James** The customers think it was painful, but we kept it in place at the 5-year. Each customer's experience is different, but in general they like the flexibility to manage it at their discretion. I would like to hear from the tribes at some point because their impact is different. **Craig Ellsworth (WAPA)** Some of the customers have their own generation, they can probably do better generating it themselves than having us buy it for them on the

market. Some of the customers do not have access to the market and they request WAPA to buy it for them at a direct pass through.

Jerry Wilhite (WAPA) Renewable energies are changing the way customers are scheduling power. This graph shows average power usage over the course of a 24-hour day as it has changed over time. **Craig Ellsworth (WAPA)** What would it be like if we changed the flow from the dam to match this graph?

Bill Persons (TU) It would impact boats and fish and who knows what other things.

Kelly Burke (GCWC) I am excited to hear it might not be a drought. But what is the potential for acceleration of these conditions? That is what has gotten us to a place where emergency actions are required. Is the modeling looking out in a linear fashion? Can you integrate climate modeling with this, which might be a multiplier to the model? Are we really planning for a future where things are happening faster than anticipated? **Jerry Wilhite (WAPA)** Great questions. The biggest driver for energy generation is the hydrology. Hopefully we can mitigate this by looking at a wide range of hydrology's.

Leslie James (CREDA) A few years ago the TWG had a presentation by Randy Dietrich from SRP that talked about utility resource planning. That is a whole different ball game now with the carbon free transitions and renewables. If this group is interested, we could get one of the utilities back to share how utilities are responding to renewables. **Kelly Burke** I think that would be wonderful.

(Action Item taken)

Discussion of Emerging Issues, Updates on Items of Interest That Are in Consideration for Implementation Before Next TWG Meeting, and Request for Agenda Items for Next Meeting:

Seth Shanahan (Chair) I will start with the SBAHG that we will charge with activities and the SEAHG which has a new charge.

Erik Skeie (State of Colorado) Just a reminder about the evaluations, due by COB tomorrow.

Andrew Schultz (GCMRC) The presentation on GCMRC project aspects of the budget as well as email and phone numbers for all project leads was sent to everyone.

Kelly Burke (GCWC) I have several points:

- I want to support the suggestion to add knowledge assessment as part of this TWP.
- I would like to see some studies in the budget that reflect tribal interest and collaboration. Something implemented in this TWP to integrate tribal values and traditional knowledge into the science that is being conducted.
- We are Interested in the potential of having a riparian ecosystem symposium, looking at how to move towards integrated studies that could help inform our management decisions.
- I think it would be wonderful to have a presentation from the Grand Canyon Outfitters on the socioeconomics of the river recreation industry.

Jeremy Hammen (BOR) I have not yet sent the phone numbers, I will be sending an email shortly with that plus some other information that may be useful in the evaluation process.

Bill Stewart (BOR) Update on comments for the LTEMP SEIS, the public comment letters are now online.

Public Comment:

Dave Foster (Grand Canyon River Guides) I have guided in Lees Ferry since 1986 and my family has owned a lodge there since the 1940's. I should have been guiding today but my customers cancelled, which happens about 50% of my days now. The economic impact of the situation up there is huge to our group, not just the guides but the hotels, transportation, and food. I just came off a trip where the catch per hour was only 1.5 fish, some anglers came away with zero. I want to thank Brian Healy for making that

point about maintaining a self-sustaining trout fishery above the Paria River. The most decimated area is the first three miles below the dam. It occurred to me that low DO might be somewhat mitigated by vegetation, which is why the area near the dam with minimal vegetation is so impacted. Someone asked why didn't we try some aeration methods up there? It may not have worked but we could have at least tried. Suggestions I would like to bring to the TWG:

- Consider halting or reducing electrofishing at Lees Ferry reach. Last year there were 32 nights, it is currently slated to increase to over 100 nights. There is mortality related to electrofishing, potentially up to even 5%. We would like to see that 5% back in the system.
- Initiate population augmentation with reproductively viable fish. Take action to locate fish, identify funding options, consider logistics and initiate discussions with other concerned agencies. I felt like this should have happened three years ago when we saw this coming.
- Implement simple, inexpensive plans for aeration immediately below Glen Canyon dam.
- Request GCMRC utilize their staff economist to model the economic impact that the decline of this population will have on the local economy.
- Suggest GCMRC and AZGFD engage in a Glen Canyon trout fishery recovery assessment through a workshop or knowledge assessment that includes local guides and evaluates options such as stocking, nutrient augmentation, DO enhancement and reduced electrofishing.

Meeting adjourned at 4:01 PM PDT.

Participants

TWG Members, Alternates, and Leadership

Betsy Morgan (State of Utah)	Kurt Dongoske (Pueblo of Zuni)
Bill Persons (FFI/TU)	Larry Stevens (GCWC)
Brent Powers (Navajo Nation)	Leslie James (CREDA)
Brian Hines (BOR)	Mel Fegler (State of Wyoming)
Bud Fazio (NPS-GLCA)	Michelle Garrison (State of Colorado)
Christina Noftsker (State of New Mexico)	Rob Billerbeck (NPS-GLCA)
Cliff Barrett (UMPA)	Rudy Keedah (BIA)
Colleen Cunningham (State of NM)	Ryan Mann (AZGFD)
Craig Ellsworth (WAPA)	Scott McGettigan (State of Utah)
Dan Leavitt (USFWS)	Seth Shanahan (State of Nevada)
Dani Greene (State of Nevada)	Shana Rapoport (State of California)
Daniel Bulletts (Southern Paiute Consortium)	Sinjin Eberle (American Rivers)
David Ward (USFWS)	Stewart Koyiyumptewa (Hopi Tribe)
Deb Williams (USFWS)	Ted Rampton (CREDA)
Emily Omana Smith (NPS-GRCA)	Hannah Chambless (NPS-GRCA)
Emily Young (State of Arizona)	Jakob Maase (Hopi Tribe)
Erik Skeie (State of Colorado)	Jeremy Hammen (BOR)
Erik Stanfield (Navajo Nation)	

Kelly Burke (GCWC)

Other GCDAMP Members and Interested Persons

Andrew Schultz (USGS)

Matt O'Neill (Reclamation)

Ann-Marie Bringhurst (USGS)
Brian Healy (USGS)
Bridget Deemer (USGS)
Bryce Mihalevich (BOR)
Charles Yackulic (USGS)
Clay Allred (USGS)
David Dean (USGS)
Drew Eppheimer (USGS)
Erica Byerley (USGS)
Gerard Salter (USGS)
Helen Fairley (USGS)
Joel Sankey (USGS)
Kim Dibble (USGS)
Lucas Bair (USGS)
Maria Dzul (USGS)
Mark Anderson (USGS)
Meredith Hartwell (USGS)
Paul Grams (USGS)
Thomas Gushue (USGS)
Alex Pivarnik (Reclamation)
Alex Walker (Reclamation)
Bill Stewart (Reclamation)
Clarence Fullard (Reclamation)
Daniel Picard (Reclamation)
Dave Speas (Reclamation)
Heather Patno (Reclamation)
Jamescita Peshlakai (Reclamation)
Kerri Pedersen (Reclamation)

Tara Ashby (Reclamation)
Teo Melis (Reclamation)
Zachary Nelson (Reclamation)
Alyx Richards (UCRC Commission)
Beccie Mendenhall (SeaJay Environmental)
Bill Pine (SWCA)
Brittnee Shows (USFWS)
Christina Kalavritinos (DOI)
Dan Valentine (Cox)
Dave Foster (Grand Canyon River Guide)
David Braun (Sound Science)
Edward Wemytewa (Pueblo of Zuni)
Emily Halvorsen (State of Colorado)
Heidie Grigg (NPS)
Jeff Arnold (NPS)
Jerry Wilhite (WAPA)
Jess Newton (USFWS)
Jim Strogon (TU)
John Fennell (AZGFD)
Julie Carter (AZGFD)
Kevin Bulletts (Southern Paiute Consortium)
Lisa Kim (BIA)
Lori Taitano (SRP)
Melissa Trammell (NPS)
Michelle Kerns (NPS)
Pilar Wolters-Rinker (USFWS)
Warren Turkett (State of Nevada)

Acronyms

ACHP - Advisory Council on Historic Preservation
ADWR – Arizona Department of Water Resources
AHAHG – Administrative History Ad Hoc Group
AMWG – Adaptive Management Work Group
AZGFD – Arizona Game and Fish Department
BAHG – Budget Ad Hoc Group
BIA – Bureau of Indian Affairs
BO - Biological Opinion
BOR – Bureau of Reclamation
C° – degrees Celsius
CFS – Cubic Feet per Second
CRBC – Colorado River Board of California

CRCNV – Colorado River Commission of Nevada
CREDA – Colorado River Energy Distributors Association
CRSP – Colorado River Storage Project
CWCB – Colorado Water Conservation Board
D.O. – dissolved oxygen
DOI – Department of the Interior
DROA – Drought Response Operations Agreement
DSA - Deliverable Sales Amount
DWR – Department of Water Resources
EA – environmental assessment
EIS – environmental impact statement

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
GCPA – Grand Canyon Protection Act
GCRG – Grand Canyon River Guides
GCWC—Grand Canyon Wildlands Council
HFE – High Flow Experiment
LCR - Little Colorado River
LTEMP – Long-Term Experimental and Management Plan
mm – millimeter
MOU – Memorandum of Understanding
NEPA – National Environmental Policy Act
NMISC – NM Interstate Stream Commission
NPS – National Park Service
NPS-GLCA – NPS Glen Canyon National Recreation Area
NPS-GRCA – NPS Grand Canyon National Recreation Area
P&I Team – Planning and Implementation Team

PDT – Pacific Daylight Time
Reclamation – Bureau of Reclamation
ROD - Record of Decision
SEAHG – Socioeconomic Ad Hoc Group
SEIS – supplemental environmental impact statement
SHPO - State Historic Preservation Office
SMB – smallmouth bass
SNARRC – Southwestern Native Aquatic Resources and Recovery Center
SNWA – Southern Nevada Water Authority
TRGD – Trout Recruitment and Growth Dynamics
TU – Trout Unlimited
TWG – GCDAMP Technical Work Group
UCRC – Upper Colorado River Commission
UMPA – Utah Municipal Power Agency
USFWS – United States Fish & Wildlife
USGS – United States Geological Survey
USU – Utah State University
WAPA – Western Area Power Administration
WY - Water Year
YoY – Young-of-Year