

Glen Canyon Dam Adaptive Management Program Technical Work Group Meeting Jan 25, 2024

Day 1: Thursday, January 25, 2024

Start Time: 9:06 AM MT

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

Designated Federal Official: Daniel Picard and Kathy Callister, Bureau of Reclamation

Meeting Recorder: Beccie Mendenhall, SeaJay Environmental LLC

Welcome and Administrative

- **Introductions and Determination of Quorum (16 members):** A Quorum was reached (19 members present).
Meeting Minute Procedures: Tara Ashby (BOR) Final meeting minutes must be posted to the web site within 90 days. First draft will go to all TWG members and alternates for review and input. Minutes will be posted after all member input is received. This means there is no longer an agenda item for “adoption of minutes”, they will be considered “final” once posted.
- **Next Meeting Date(s):** April 10-11, 2024, in Tempe at the Embassy Suites. Also note, the plan is to host the June meeting at Navajo Nation. But Twin Arrows casino is not available for our original June dates, stay tuned for alternate dates in July.
- **Ad Hoc Group Membership and Updates:**
Larry Stevens (GCWC) There is interest in adding some administration history of the program to the GCDAMP Wiki. **Craig Ellsworth (WAPA)** The Wiki is easy to understand, I am happy to teach people how to post. **Larry Stevens (GCWC)** Maybe we can put together a workshop to train people, something virtual, an hour long. **Craig Ellsworth (WAPA)** The Wiki is supported by CRC Nevada, request they engage for training and support requests. (Action Item created)
Seth Shanahan (SNWA) Steering Committee Ad Hoc Group (SCAHG) continues to meet in advance of each TWG meeting. **Larry Stevens (GCWC)** Request that we post the dates for BAHG and SEAHG meetings somewhere. (Action Item created)
- **Review Action Items, Motions, and Votes Form:** Review completed, no additional comments.
- **Update on Monitoring and Research Trips to Occur from Today Until Next Meeting:**
January 30: Lees Ferry TRGD trip
February 14: Water quality, fine sediment
March 11th to 14th: TRGD trip
April 3rd to 17th: Mainstem nonnative electroshock
April 8th – 9th: Lees Ferry TRGD trip
April 9th – 26th: Aquatic food monitoring (drift)

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

Heather Patno (BOR) Hydrology and Glen Canyon Dam Operations

The system is currently at 42% capacity. January precipitation has been low, unusually dry for an El Nino year. Historically, drought years are not unusual following a high precipitation year. Inflow forecast for Lake Powell is below 2023 levels. Anticipate 2024 will operate in the mid release tier per management guidelines. But it is still very early in the year for forecasting. Spring weather can have a big impact on water inflow. Drought Response Operations Agreement (DROA) recovery should be achieved for all

basins within this Water Year. Projecting mid-tier release for Water Year 2025 as well. For Lake Mead, elevation projections have all three probability scenarios in the Level 1 shortage conditions for Water Year 2025.

The operational modeling presented today is 24 months. A 5-year model is done annually in January. We expect that to be ready next week. Reference the slides for the power plant maintenance schedule, unit replacement schedule and impact on power operations. The daily release pattern from Glen Canyon Dam is also included.

Robert Radtke (BOR) Water Quality Conditions

The reservoir is fixing itself from last year's low DO and high temps. Above penstock is uniform in December, below is a little more variable. Temperature differential is 6 degrees Celsius from the surface to the bottom. Lake Powell forebay temperature shows a seasonal increase in temperature at the top and greater differential. Due to the high volume of water last year, sediment continued beyond the spring to the end of summer. Forecast for the coming season shows temperatures above spawning for SMB starting in Aug in the canyon. Reference slides for comparison of water temperature and DO from Dec 2019 to current.

Q&A and discussion

Leslie James (CREDA) What is incremental recovery? **Heather Patno (BOR)** There are two ways to recover water in recovery actions. The first is to meet elevation targets, the second is to recover every month a specific volume. This second method is called incremental recovery. **Leslie James (CREDA)** It is good to remind people that in the Record of Decision (ROD) there is a specific clause that requires BOR and WAPA to work together on releases. **Heather Patno (BOR)** You are talking about the Glen Canyon monthly releases. At this point, we are not planning to implement any of these additional measures. But thank you for pointing out that we have those options should water levels drop further. **Leslie James (CREDA)** On the maintenance schedule, where is the jet tube recoating project? **Heather Patno (BOR)** It is still in contracting, we expect to see it awarded in a few months. Start times will be available post award.

Craig Ellsworth (WAPA) Yesterday Bryce gave a presentation on the new model for temperature projections. What you presented today is using the old model, is that correct? **Robert Radtke (BOR)** Yes **Craig Ellsworth (WAPA)** When will you switch over to the new model? **Robert Radtke (BOR)** When Bryce is comfortable, maybe 2 months. **Clarence Fullard (BOR)** We just started vetting the model with Bryce. Model comparisons need to be done. I am hesitant to provide a specific date when it will be in use. **Craig Ellsworth (WAPA)** Is it in use anywhere yet? **Bryce Mihalevich (USGS)** The new model was used in the near-term analysis and the SEIS.

Larry Stevens (GCWC) Can you explain the variation in weekend flows? **Heather Patno (BOR)** WAPA coordinates those schedules, generally there is less demand on the weekends, so you see lower releases. **Ben Reeder (GCRG)** Can you point me to monthly outflows for April to September 2024? **Heather Patno (BOR)** The 24-month study will contain that information. The maintenance graphs in this presentation also have all the releases.

Betsy Morgan (State of Utah) In the water quality analysis, there was something odd with the January Max which I don't believe was shown today. Is there any information on that discrepancy? **Robert Radtke (BOR)** No, there has not been any resolution to this problem. The Max broke in October despite using the same data.

Long-Term Experimental and Management Plan (LTEMP) Biological Opinion Conservation Measures Update:

Matt O'Neill (BOR) Per the LTEMP, actions are required to conserve Humpback Chub, Razorback sucker, Native aquatic fish and two species of birds. There are two levels of actions:

Tier 1 – conservation actions when population declines

Tier 2 – predator removal if Tier 1 actions are unsuccessful.

Population metrics determine which tier of response is required. For Humpback Chub, all population metrics are above threshold, so no action is triggered. In 2023, 600 larval fish were moved to SNARRC hatchery. These will be available for translocation next year. Razorback Sucker monitoring found no young or larvae. For Willow Flycatchers, there were 6 possible detections, an increase over zero in previous years. Native Aquatic Species will be discussed at 11:15 presentation. In the forebay, August 2023 netting found a high volume of bluegill and green sunfish next to the dam down to 22 meters.

Q&A and discussion

Larry Stevens (GCWC) It is puzzling that fish are down 60 meters, any thoughts? **Matt O'Neill (BOR)** Those appeared to be young blue gill and sunfish. The dam is a protective structure. Maybe they are feeding. **Larry Stevens (GCWC)** It would be good to understand what they are doing. **Jeremy Hammen (BOR)** They seem to be literally stacked up against the canyon walls and not in the open water. **Bill Stewart (BOR)** Barrett reported on this earlier in the week, reference his presentation.

Larry Stevens (GCWC) Why is the program no longer looking at bald eagles? **Bud Fazio (NPS)** NPS does count bald and golden eagles throughout the length of Grand Canyon Park, that data is published.

Greg Holme (NPS) No bald eagles have been seen nesting in the Grand Canyon. They migrate through in January to March timeframe.

Seth Shanahan (SNWA) What is the going hypothesis why we are no longer catching Razorback Suckers? **Matt O'Neill (BOR)** Maybe there is not much habitat upstream. **Bill Stewart (BOR)** They are also rare, harder to detect. **Emily Omana Smith (NPS)** They found larvae in 2018 but have seen zero since then. The hypothesis is that Peirce Ferry is acting as a block to these fish coming upstream to spawn.

Informational Updates

- **LTEMP Supplemental Environmental Impact Statement (SEIS):**
Bill Stewart (BOR) We initiated scoping for the SEIS to evaluate options to disrupt SMB population and modify the HFE protocol. Two webinars were held in October 2023 to share initial draft resulting in 34 letters of comment. A summary report on the letters received is available online. We have engaged a contractor to incorporate the feedback into a public draft with release targeted for February 9th, 2024. There will be a 45-day comment period after publication as well as three webinars planned in Feb to facilitate public review. Our end goal is to have the SEIS in place by summer 2024. There will be a webinar next Wednesday hosted by GCMRC on the modeling used in the SEIS. You will be receiving an email from GCMRC with details. **Kathy Callister (BOR)** This is an amazing process to get a SEIS completed in 6 months! It usually takes several years. We appreciate everyone's input and support for this accomplishment. **Seth Shanahan (SNWA)** Do you anticipate the LTEMP SEIS and Record of Decision (ROD) will be released together? **Kathy Callister (BOR)** NEPA Regulations require we wait 30 days before proceeding with a ROD. **Leslie James (CREDA)** Can you talk a little more about the GCMRC webinar? **Bill Stewart (BOR)** We asked GCMRC to use their expertise for modeling resources in the SEIS. The webinar next week is a report on their modeling, a preview

of the data that will be released to the public in February. **Kurt Dongoske (Pueblo of Zuni)** I want to express my concern that the speed with which this document is being handled means ZUNI concerns will not be addressed. This SEIS failed to incorporate the Zuni input. There has been no one within Reclamation with the expertise to evaluate the impact on Zuni peoples and values. This includes the contractor that was chosen to incorporate the NEPA compliance. I would like to see Reclamation come out to the Zuni and speak about how they have dealt with the ZUNI concerns and issues that have been submitted. *(There were nods in the room from Reclamation representatives acknowledging they heard this point.)*

- **Brown Trout Incentivized Harvest Program:**
Jeff Arnold (NPS) Reference slides for details on quantity and size of fish captured each year of the program. Note that 50% of the trout in this 3-year program were harvested in 2023. They received \$200K in funding to continue the program for another 2 to 3 years. There is \$33K left from original project funding which they want to donate for tribal fishing trips. **Larry Stevens (GCWC)** Any thoughts to extend program to other invasive species? **Bud Fazio (NPS)** So far, no other species but that is under discussion. **Mel Fegler (State of Wyoming)** What other data is there to show impact of the incentivized harvest program outside the straight capture numbers presented? **Bud Fazio (NPS)** The program was not designed for this. **Jeff Arnold (NPS)** I am not clear on the question. **Ryan Mann (AZGFD)** We have the ability in surveys to ask specific questions of the anglers. That is a potential source for additional insights into the program.
- **WaterSmart and Other Funding Opportunities for GCDAMP Projects:**
Katherine Tucker (BOR) Water grants have been around for 20 years and are available to all parties outside the federal government. We encourage everyone to apply for grants! They can also be done on BLM land, so don't rule that out. They have assigned \$300K per year for the next 3 years to WaterSmart. Note that aquatic ecosystems projects have a co-funding requirement, given as a % of the total grant. **Justin Record (BOR)** IRA Drought Mitigation Projects are available to public entities and Indian Tribes. This is an upper basin program but there is another one that exists for the lower basin. Money can be spent on water conservation and ecosystem projects. There is roughly \$450M which must be spent by the end of FY26. It is possible for a private entity to be involved if they are adopted by a state or tribe as a partnership. **Seth Shanahan (SNWA)** We would appreciate support from both of you in coming BAHG calls.

Update on Action Items Related to the Non-Native Strategic Plan to Prevent Invasive Fish Establishment (e.g., Slough Modification, Thermal Curtain, Bypass Tube Generation, Tucker Trawl)

Bud Fazio (NPS) Slough Modification

Last meeting, we agreed to talk to Reclamation about proposed modifications to the Slough. The proposal involves a three-phase plan; drain upper slough, excavate between the upper and lower and then fill the lower slough. We had multiple conference calls followed by a site visit on January 18th attended by the National Park Service (NPS) and the Bureau of Reclamation (BOR) leadership as well as construction and environmental experts. We are coming to consensus on a way forward with the project.

A few key points:

- There is no direct NPS funding for this project, but BOR has helped identify options.
- To satisfy NEPA requirements we need to do a Supplemental Impact Report (SIR) or Environmental Assessment (EA), which will take time.
- Wetlands assessment is an important aspect, planning to engage Army Corp for assistance.
- Based on NPS assessment, it will be winter 2025 before this project can be implemented.
- Given the 2025 estimate, we probably still need a chemical treatment in July or August 2024.

This is a big, complex project. We want to make sure if we undertake this effort that we are successful.

Q&A and Discussion

Larry Stevens (GCWC) The slough is not a natural feature, please do not present it as such. **Bud Fazio (NPS)** There is controversy on that point of a natural feature. NPS believes there was a rock fall there before the dam was constructed.

Larry Stevens (GCWC) One other issue I have is engagement with Army Corp. Involving them to evaluate wetland status in this project will be time consuming and potentially expand to overhead for the greater GCAMP Program. **Matt O'Neill (BOR)** Reclamation Wetland folks are coming in Feb and will engage the Army Corp as well. We need a permit for this project so there is no option, Army Corp must be included. We do not anticipate this will expand to something more complicated.

Deb Williams (USFWS) You referenced a GO/NO GO decision by the NPS Superintendent. When will this call be made? And can it be done before the February AMWG meeting? **Bud Fazio (NPS)** Cost estimates should be done in 2 months, but there are other factors as well. I do not expect it to be done before the February meeting. **Bill Stewart (BOR)** The barge is the biggest unknown cost from the site visit. Maybe at a minimum we can have these costs by the AMWG meeting.

Craig Ellsworth (WAPA) Given the timeline, are there other temporary measures that can be put into place to keep fish from migrating into the lower slough? **Bud Fazio (NPS)** Jeff Arnold is very active trying to create that separation with netting or screens.

Deb Williams (USFWS) Can you provide clarity on the project timeline? Is that Dec 2025 or Jan 2025?

Bud Fazio (NPS) Jan 2025. **Deb Williams (USFWS)** Thanks, have you started the permitting process for chemical treatment for this year? **Bud Fazio (NPS)** Yes, already received. **Erik Stanfield (Navajo Nation)** We are supportive of the chemical treatments on a short-term basis but as they continue to repeat, we are going to have more comment against it. Can we just do more direct observations? We would like to see a strong effort to avoid chemical treatments. **Bud Fazio (NPS)** I understand and agree with the concern. We have acquired a water drone that may help in observation.

Kurt Dongoske (Pueblo of Zuni) This action may be viewed as an adverse effect to the Colorado River, a Register-eligible traditional cultural property. The National Historic Preservation Act requires agencies to recognize and accept the knowledge sovereignty of the tribes. A recent White House memo came out requesting that agencies treat knowledge from tribes at the same level as western knowledge. **Bud Fazio (NPS)** We understand these requirements. Zuni leaders, including council and religious leaders, visited with us at the slough last fall and opened the dialogue. We will continue to engage with the Zuni as we proceed.

Bill Stewart (BOR) Thermal Curtain / Exclusion Net

The goal here is to pursue means of preventing passage of invasive fish below the dam. There was a report in September of 2022 that explored fish escapement options. This report is available on the web. A panel analyzed all options and made recommendations on where to focus efforts. We investigated other places that implemented these options. Most of the examples we see of exclusion nets are not for a canyon release as we have here. Thermal curtains are based on reducing temperature below spawning levels. They are designed to block the warm surface water. These are the two alternatives recommended by the report. Reference slides for details on Baker Lake exclusion net and Whiskeytown Reservoir thermal curtain. Some design considerations in the Glen Canyon dam forebay, the area for an exclusion net would be 1000 ft wide with a depth from 50 to 200 ft depending on water levels. You cannot have a net right against the dam, there needs to be some space, which means it cannot be 100% effective. The

adjustable height is a big challenge in attaching to a canyon wall. We also have fish near the canyon walls to consider. And there may be biofouling that impacts effectiveness. Preliminary cost estimates are \$22 - \$23 Million. Reference slides for the next steps target for completion this year.

Jeremy Hammen (BOR) Hydroacoustic Monitoring

We plan to put transducers on the trash racks of the penstocks to identify what organisms are going through the penstocks. These devices will monitor 24x7x365, measuring number and size but not species. To address the species question, we contracted with the USGS Western Fisheries Research Center that deals with entrainment at other facilities. They are going to deploy Tucker Trawl Nets next week as a pilot in the tail waters right behind the outflow. This would provide sampling of actual species coming through.

Q&A and Discussion

Craig Ellsworth (WAPA) When you put the trawl net close to the tail waters you might be impacting efficiencies. **Jeremy Hammen (BOR)** We already talked with dam operations about that. The original idea to put the net snug was vetoed. We will keep them engaged as we find out what works. **Colleen Cunningham (NMISC)** Is the flow strength enough at that location to prevent fish from avoiding the net? **Jeremy Hammen (BOR)** Yes. **Deb Williams (USFWS)** What is the smallest size transducers can pick up? **Jeremy Hammen (BOR)** 150 – 200 mm **Emily Omana Smith (NPS)** What timeline do you expect to start? **Jeremy Hammen (BOR)** We are tied to funding from Congress. We would like to be live this summer for the nets. The transducers require a longer timeline to avoid impact to dam operations.

Budget and Socioeconomic Ad Hoc Groups Update:

Erik Skeie (CWCB) and Budget Ad Hoc Group (BAHG) Chair

We are working on the Triennial Work Plan Budget with weekly meetings starting next week. The initial draft is targeted for March 31st, second draft May 6th, third draft June 7th. The final recommendation will go to the Secretary of Interior. If you want to be added to the process, reach out to Erik or Jeremy.

Ben Reeder (GCRG) and Socioeconomic Ad Hoc Group (SEAHG) Chair

Thank you to everyone who has joined, participation has been great. Our key topic has been hydropower metrics and modeling. Modeling for hydropower is extremely complex. The current gold standard for modeling is GTMAX not the GCMRC model of impacts to hydropower. February 1st at 11 am we will be diving into the metrics from WAPA and GCMRC. Our goal is to facilitate conversation between the two organizations and compare results for the two different models they use. **Leslie James (CREDA)** - To facilitate collaboration and bring some efficiency to the project, CREDA is recommending the money for modeling impacts to hydropower using GTMAX go to the Reclamation side of the budget. GTMAX is the model that Reclamation traditionally uses for all of its NEPA processes.

Mel Fegler (State of Wyoming) Those of us in SEAHG think it might be beneficial for the TWG to see the two models presented side by side by their experts. **Leslie James (CREDA)** I support the idea of a side-by-side presentation to everyone. It is not efficient to have dualling models. **Seth Shanahan (SNWA)** We may need to expand the current charge to SEAHG to include this model comparison. The current scope is only to address Project N. (*Action Item Created*)

Seth Shanahan (SNWA) The other thing I want to address is the potential for standing up the Smallmouth Bass Ad Hoc Group (SBAHG) again. In the strategic plan there is a requirement for an annual review on Smallmouth Bass (SMB). I would like to see that included in the Non-Native fish discussion coming up in February. Rather than spin up another Ad Hoc Group for this short timeline, it may be more efficient to have the BAHG address this directly.

[Dan Leavitt, USFWS] In the Monitoring and Effectives section of the Strategic Plan there are 7 key items identified for off ramping actions related to SMB. We need to make sure these 7 items are included in the annual review. **Leslie James (CREDA)** It seems of all the Ad Hoc groups, SBAHG should be the most important one. It should be informing all the other activities. **Seth Shanahan (SNWA)** I assume that communication is already happening between groups. If not then yes, we have a key activity that is missing.

Discussion Followed

Seth Shanahan (SNWA) It does seem there is opportunity for coordination. I am going to ask the leaders of the two recurring federal meetings that take place as part of the Invasive Species Strategic Plan MOU (Memorandum of Understanding) to work on this. (*Action Item Created*)

Breakout Group Discussion:

TWG Members

The purpose of this agenda item is for TWG Members to breakout into four to five smaller but assigned groups to have a group-interest-directed discussion about the following. Considering what you learned during day 1 and 2 of the Annual Reporting meeting and/or additional knowledge that you have:

- 1) what are your perspectives on the health of the Colorado River Ecosystem (CRE) and/or whether the LTEMP FEIS goals and objectives are being met.*
- 2) what input can you provide to the developers of the next triennial workplan and budget that will help support a healthy CRE and/or meet the goals and objectives of the LTEMP FEIS.*

Report Out from Breakout Groups:

TWG Members

The purpose of this agenda item is for the spokespeople of the breakout groups to describe the outcomes of their discussion to the full group. 25 minutes = 5 minutes per group

Zachary Nelson (BOR) Group 4

Direction to Work Plan

- Set aside resources and funding to study emergent problems.
- Remove the word “rapid” from Rapid Response. Need to be planning 3 years in advance.
- Recognize the importance of the tributaries – this is where the natives have and continue to live, need to keep these healthy as well.

Health / Goal / Achievement

- We think the ecosystem is doing well.
- Worry is what will come in the next wave – forward thinking.

Colleen Cunningham (NMISC) While we said 3-year plan, we also acknowledged we need to look even further forward, add climate change. Create a more resilient system, include more of the tribal input.

Erik Skeie (CWCB) Group 2

Direction to Work Plan

- What are the federal priorities as they relate to the projects, that will help us advise the projects.
- Time to do a third-party review, it has not been done since the mid-nineties.
- Research needs to be tied to management actions. We also need open, facilitated discussion between GCMRC and stakeholders to help mitigate conflict.
- Refocus some GCMRC resources from things we know well to know less, like tribal needs.

Health / Goal / Achievement

- Other native fish
- Non-native invasives – monster of the week scenario – what will it be moving forward.

Bill Stewart (BOR) Good point about the third-party review. It is supposed to happen in 2027 per the agreement, likely towards the end of this new triennial workplan.

Sinjin Eberle, (American Rivers) Group 5

Direction to Work Plan

- How does post 2026 impact the Triennial workplan? Overlaps with mid-term view.
- Metrics need to be included in the plan, including hydropower, how changes will be detected.
- What will the Secretary of the Interior want to be advised on, how do we prepare for that.
- Look at aquatic food, maybe a specific effort around gammarus.
- Keep tracking of action and impact for SMB.
- Impact of flows and Lake Mead elevations on western Grand Canyon.
- Are there redundant projects between the different orgs – GCMRC, NPS, BOR?

Health / Goal / Achievement

- From a hydrology perspective we had a reprieve.
- Concerns were raised about the health of rainbow trout.
- High flows all summer long caused some problems.
- Rafting people had a great summer, lots of beaches, cleaner.
- Discussion about transition of power, impacts of Argonne study, moving to a clean energy future.
- Given the cost and logistics of the HFE, diminished impact with high flows that followed.
- Concern about integrity of cultural resources, also some sites being exposed in Lake Powell
- Concerned we are not getting enough input on fish removal.

Ryan Mann (AZGFD) Group 1

Direction to Work Plan

- Desire to make proactive rather than reactive decisions, understand that it is hard for this program to be proactive. Whether due to speed of decisions or funding concerns.
- To improve that, suggestion to refine the decision-making process.
- Look at how we identify and respond to emerging issues.
- Issues noted about funding uncertainty.
- Look at microbial communities, smaller scale ecosystems that may have impact on the other parts of the system. Request for risk assessment modeling on this, including impact to humans.
- Concern about liquidity of funds, ability to spend and use for the purposes they were intended.
- Making sure the program is keeping tabs on Invasives, new issues (green sunfish)

Health / Goal / Achievement

- Concern with uncertainty in hydrology conditions, sustainability of the program.
- Native fish are doing well but there is high potential for risk.
- Acknowledge the resources that are not doing as well – rainbow trout and hydrology.
- Difficult to assess health of resources that appear to be doing well based on today's measures.

Erik Stanfield (Navajo Nation) Group 3

Direction to Work Plan

Health / Goal / Achievement

- Tribal values – we have not much progress on the cultural sensitivity trainings, difficulty collaborating to develop metrics, impacts at cultural sites, communicating to recreational community about consideration for this special space.

- Tie between response and monitoring is delayed, how can we make the connections more efficient.
- Hydropower study is underfunded, could use more resources. The problem of competing models was noted and need to communicate well.
- Rainbow trout, better anticipation of environmental changes in the future.
- Recreation goal some difficulties, sand has improved but missed or add opportunities to study impact to surrounding communities.
- Using surveys to collect tribal / community input – add studies for this to program.
- Natural Processes – considering seasonal / astronomical cycles / lunar cycles, see how this can be incorporated into our metrics.
- Success: Science monitoring and reporting contributed to changing the HFE protocol process. Can we follow this model for improvement in other elements of the program?
- More directly tying research to the (11) LTEMP goals.
- How can we communicate complex topics so it can be interpreted by the diverse background of people that are in this group or in the public domain?
- How can we proportion the budget to align with the goals?

Andrew Schultz (GCMRC) Goals can change over time. We need to be nimble enough to catch that change and move resources to align. **Larry Stevens (GCWC)** Program review in 2027 is a good time to look at the goals again and clarify them.

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

Craig Ellsworth (WAPA) WAPA would like to present a hydropower update at the April meeting.

Bill Persons (FFI/TU) I would like to see a presentation on how GCMRC models work and have them dive deeper into some of the fish models.

Larry Stevens (GCWC) Adding to that point, I would like to evaluate what we do and don't know about modeling life histories of the fish. Explore what we should include in the next workplan for this research. Another topic would be an update from Fish and Wildlife on restoration activities at Paria beach.

David Ward (USFWS) Fish and Wildlife would like to update the group on the potential reintroduction of Colorado pikeminnow in the Western Grand Canyon.

Public Comment: None Noted

Meeting adjourned at 4:23 PM PDT.

Participants

TWG Members, Alternates, and Leadership

Ben Reeder (GCRG)	Hannah Chambless (NPS-GRCA)
Betsy Morgan (State of Utah)	J Paya (Hualapai Tribe)
Bill Persons (FFI/TU)	Jakob Maase (Hopi Tribe)
Brent Powers (Navajo Nation)	Jeremy Hammen (BOR)
Brian Hines (BOR)	Kelly Burke (GCWC)
Bud Fazio (NPS-GLCA)	Kurt Dongoske (Pueblo of Zuni)
Carrie Cannon (Hualapai Tribe)	Larry Stevens (GCWC)
Christina Noftsker (State of New Mexico)	Leslie James (CREDA)

Cliff Barrett (UMPA)
Colleen Cunningham (NMISC)
Craig Ellsworth (WAPA)
Dan Leavitt (USFWS)
Dani Greene (SNWA)
David Rogowski (AZGFD)
David Ward (USFWS)
Deb Williams (USFWS)
Emily Young (ADWR)
Emily Omana Smith (NPS-GRCA)
Erik Skeie (CWCB)
Erik Stanfield (Navajo Nation)

Mel Fegler (State of Wyoming)
Michelle Garrison (CWCB)
Rob Billerbeck (NPS-GLCA)
Rudy Keedah (BIA)
Ryan Mann (AZGFD)
Scott McGettigan (State of Utah)
Seth Shanahan (SNWA)
Shana Rapoport (CRBC)
Shane Capron (WAPA)
Sinjin Eberle (American Rivers)
Ted Rampton (CREDA)

Other GCDAMP Members and Interested Persons

Andrew Schultz (USGS)
Brian Healy (USGS)
Bryce Mihalevich (BOR)
Charles Yackulic (USGS)
Drew Eppheimer (USGS)
Emily Palmquist (USGS)
Helen Fairley (USGS)
Joel Sankey (USGS)
Kim Dibble (USGS)
Lauren Tango (USGS)
Lucas Bair (USGS)
Maria Dzul (USGS)
Mark Anderson (USGS)
Mark Grippo (USGS)
Paul Grams (USGS)
Shannon Sartain (USGS)
Alex Walker (BOR)
Amee Andreason (BOR)
Bill Stewart (BOR)
Clarence Fullard (BOR)
Daniel Picard (BOR)
Dave Speas (BOR)
Heather Patno (BOR)
Jamescita Peshlakai (BOR)
Justin Record (BOR)
Katherine Tucker (BOR)
Kathy Callister (BOR)
Kerri Pedersen (BOR)
Margaret DiGiorno (BOR)
Matt O'Neill (BOR)

Zachary Nelson (BOR)
Amanda Podmore (Grand Canyon Trust)
Amy Schott (NPS)
Beccie Mendenhall (SeaJay Environmental)
Bill Pine
Brittnee Shows (USFWS)
Cassandra Reed (NPS)
Chip Lewis (BIA)
Christina Kalavritinos (DOI)
Conor Clancy NPS-GLCA
Craig McGinnis
Dan Galvin (BIA)
Dave Worthington (Grand Canyon Conservancy)
David Braun (Sound Science)
David Rheinheimer (CRBC)
Elyssa Shalla (NPS)
Emily Zmak (CWCB)
Eric Balken (Glen Canyon Conservancy)
Greg Holme (NPS)
Jeff Arnold (NPS)
Jess Gwinn (USFWS)
Jess Newton (USFWS)
John Dillon
John Jordan (FFI/TU)
Josh Korman (Ecometric Research)
Katharine Dahm (DOI)
Melissa Trammell (NPS)
Michael Pillow (USFWS)
Michelle Kerns (NPS)
Peggy Roefer (CRCNV)

Matthew Alinsod (BOR)
Melynda Roberts (BOR)
Robert Radtke (BOR)
Tara Ashby (BOR)

Pilar Wolters-Rinker (USFWS)
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Acronyms

°C – degrees Celsius

AMWG – Adaptive Management Work Group

ADWR – Arizona Department of Water Resources

AHAHG – Administrative History Ad Hoc Group

AZGFD – Arizona Game and Fish Department

BAHG – Budget Ad Hoc Group

BOR – Bureau of Reclamation

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

DWR – Department of Water Resources

EA – environmental assessment

EIS – environmental impact statement

FLAHG – Flow Ad Hoc Group

FFI – Fly Fishers International

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

LTEMP – Long-Term Experimental and
Management Plan

MOA – Memorandum of Understanding

mm – millimeter

NEPA – National Environmental Policy Act

NMISC – NM Interstate Stream Commission

NPS – National Park Service

NPS-GLCA – Glen Canyon National
Recreation Area

NPS-GRCA – Grand Canyon National Park

PDT – Pacific Daylight Time

P&I Team – Planning and Implementation
Team

Reclamation – Bureau of Reclamation

ROD - Record of Decision

SEAHG – Socioeconomic Ad Hoc Group

SEIS – supplemental environmental impact
statement

SMB – smallmouth bass

SNWA – Southern Nevada Water Authority

SNARRC – Southwestern Native Aquatic
Resources and Recovery Center

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

YoY – Young-of-Year

WAPA – Western Area Power Administration