Glen Canyon Dam Adaptive Management Work Group Meeting
March 6 - 7, 2019

Motions Approved

- Minutes of the August AMWG meeting were approved with no objection.
- Motion approved by consensus: AMWG approves Table 1 from the GCDAMP Triennial Budget and Work Plan Process recommended by the TWG on October 19, 2016.

Please note that while DOI bureau representatives are members of the AMWG, they do not vote or participate in determining consensus.

Action Items

- AMWG members are invited to send to Kathleen Callister, by March 31, input for a planned guidance memorandum from the Secretary's Designee.
- AMWG members are invited to send to Kathleen Callister, by March 31, suggestions for a speaker with expertise to address the group on hydropower in the greater context of regional energy.
- Reclamation will send to the Secretary's Designee information on the $95,000 in tribal support.
- AMWG members are invited to contact Sarah Rinkevich if they have interest in attending this summer's Integrated GCDAMP Stakeholder river trip.

Wednesday, March 6, 2019

Start Time: 9:30 am
Conducting: Dr. Timothy "Tim" Petty, Assistant Secretary for Water and Science, Department of the Interior
Facilitator: Mary Orton, The Mary Orton Company, LLC
Recorder: Rosana Nesheim, Galileo Project, LLC

Welcome and Administrative

Presenters & Affiliation: Dr. Timothy "Tim" Petty, Assistant Secretary for Water and Science, Department of the Interior; Brent Rhees, Upper Colorado Regional Director and AMWG Designated Federal Officer, Bureau of Reclamation; Mary Orton, The Mary Orton Company

A quorum (13 required) was reached with 14 organizational members represented by their AMWG member or alternate. Attendees introduced themselves and Tim welcomed newly appointed and reappointed AMWG and TWG members.

Approval of August 22-23, 2018 Meeting Minutes

Secretary's Designee Dr. Timothy "Tim" Petty introduced the agenda item, changes to the minutes were discussed and clarified, and the Secretary's Designee asked if there was any objection to approval of the minutes with the following changes:

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Rod Smith clarified that the HFEs are sediment-based releases above power plant capacity under certain conditions, but there may be more flexibility for experimentation within normal operations below power plant capacity. Katrina added that there are operational constraints, but within those constraints there is flexibility every day to make sure electricity is produced. Leslie James stated she was satisfied that enough flexibility exists, as she thought.

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That annual sum was considered a constructive return and was applied toward interest and debt owed to treasury as if it had been returned. This year, however, the OMB has directed WAPA to pay that money directly to the Treasury instead of sending it to Reclamation via a constructive return.

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The Basin Fund is currently at a balance of $110 million; $198 million is the target per WAPA's current unobligated balance strategy. This strategy is necessary to manage unexpected costs.

... (Purchase power is power that WAPA must buy from other suppliers when they do not have enough Federal generation available to meet their contract commitments.)

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WAPA commends the Navajo Nation for developing a vision for post-coal generation.

There was no objection and the minutes were approved.

Administration and Reclamation Updates

Tim Petty offered the following updates:

- Kiel Weaver was introduced as the new Principal Deputy Assistant Secretary for Water and Science. He brings extensive experience including work with Congress.
- Brenda Burman, Commissioner for the Bureau of Reclamation, is working with the seven Colorado River Basin States on a Drought Contingency Plan (DCP). The Upper Basin states have been ready to sign the DCP for some time, which means they have agreed to a drought response strategy for moving water from the upper reservoirs of Flaming Gorge, Blue Mesa, and Navajo down to Lake Powell to protect the minimum power pool. The Lake Powell minimum power pool elevation is 3490 feet, while the triggering elevation is 3525 feet for allowing the Upper Basin to implement drought response operations. Another critical item is demand management storage, which sets aside portions of storage within Lake Powell and within the CRSP facilities to conserve water. Reclamation anticipates the states to sign off on the DCP over the next two weeks. The lower basin states' DCP considers voluntary contributions to maintain Lake Mead's elevation to prevent it from falling into the critical elevation range of 1025 or 1020 feet. The Secretary has an obligation not to allow the system to crash in either basin. The Upper Basin has significant storage to continue to meet its obligations to the Lower Basin and to Mexico.
- Internal and structural DOI reorganization has occurred within Reclamation, USGS, FWS, and NPS to facilitate communication internally within DOI and externally with other agencies like the US Department of Agriculture and the Environmental Protection Agency. AMWG is a good example of the importance of facilitating conversations among stakeholders, discussing issues and concerns, and resolving them locally.

- DOI has asked Brent Rhees to stay as Upper Colorado Regional Director until a replacement is named.

Kathy Callister reviewed the following updates:

- The AMWG Charter must be approved by September 2019 in order for AMWG to continue to hold meetings. Reclamation requested suggested changes from the AMWG and received no input. The Charter has been submitted to the Reclamation FACA coordinator who is working with a DOI FACA coordinator to complete the approval process.
- DOI has announced the position of Adaptive Management Group Chief position (most recently held by Katrina Grantz) on USA Jobs, and it will remain open until March 12, 2019. The application is open to the public and requires specialized experience. DOI hopes to fill the position prior to the May meeting. DOI also intends to fill Linda Whetton's position, which is temporarily being filled by Tara Ashby.

Action Item Tracking Report

- Kathy Callister reported that two items on the action item tracking report assigned to Katrina Grantz are still open:
  - AMWG will consider a process for planning for the next 20 years of LTEMP. The update from the August 2018 meeting was that DOI would be working on this over the next year with input from the AMWG, with a target to complete the process by the end of 2019.
    - Update March 2019: Personnel transitions in the program office and the government shutdown have impacted progress on this item. A more detailed update will be provided at the May webinar. This action item will remain open until the entire process is completed.
  - AMWG will solicit expertise to address the group on hydropower in the greater context of regional energy. DOI did attempt to add this as a presentation for the August 2018 meeting; however, the presenter had to cancel.
    - Update March 2019: DOI reached out to the same presenter, but he is now retired and was not available. Kathy proposed that this item be closed unless someone can suggest another speaker. Tim Petty asked that anyone with suggestions for speakers provide those to Kathy Callister.
- One item on the action item tracking report assigned to Reclamation and presented by Emily Omana Smith is still open:
  - Reclamation will send the temperature control paper to the AMWG when it is available. Connie Svoboda from Technical Services at Reclamation is working to document the current state of practice on temperature control devices, identifying needs and research gaps, developing partnerships, identifying subject matter experts, and then recommending future actions, which could potentially include a prize competition. Connie is delayed in completing this but expects to work on it soon.
- One item on the action item tracking report assigned to GCMRC and presented by Scott VanderKooi is still open:
  - GCMRC agreed to: (1) conduct a scientific assessment of the effects of past experimental high flows (including powerplant capacity flows) at Glen Canyon Dam on high valued resources of concern to the GCDAMP (i.e., recreational beaches, aquatic food base, rainbow trout fishery, hydropower, humpback chub and other native fish, and cultural resources); and (2) present initial findings in a written summary at the 2019 Annual Reporting Meeting and the March 2019 AMWG meeting for review and discussion. GCMRC will hold a panel discussion on this subject during the 2019 Annual Reporting Meeting. The Annual Reporting Meeting was originally scheduled to be held in advance of this March 2019 AMWG meeting, but was delayed until afterward due to the government shutdown. GCMRC will report the results to AMWG during the May 2019 webinar.

Progress on Nominations and Reappointments

Because of fall 2018 state and tribal elections, DOI received requests to allow different persons to be nominated to the AMWG and TWG. DOI will issue another call through the Federal Register to accommodate these requests. All names DOI has received are now scheduled for review. See Attachment 1 for a list of nominated individuals and status of reappointments.

Basin Hydrology and Operations

Presenter & Affiliation: Heather Patno, Hydraulic Engineer, Bureau of Reclamation

Presentation Summary

The 2018 snowpack has been at approximately 100% of median for most of the current year, and there have been some decreased forecasts from the lower portions of the Upper Colorado River Basin as a result of dry soil moisture conditions from 2018. However, a big storm events during February produced a significant amount of snow, including the first snow tornado in the United States, and put the area at 123% of the basin wide median snow water equivalent (SWE) as of March 4. We are at 99% of the seasonal median and 83% of the way through the snow accumulation season.

The area is expected to receive additional snow over the next couple of weeks with the active patterns continuing. Storage on the Green River for Flaming Gorge and storage for Fontenelle are at normal levels for this time of year. Morrow Point and Blue Mesa had a slight decrease in reservoir storage. Lake Powell is 38% full.

The remainder of the presentation is based on the official February 24-month study, which is the most recent that is available. Reclamation is currently working on the March 24-month study. Heather noted that all forecasts in the midmonth increased.

The August projection of December 31 elevation of Lake Powell put the area into the upper elevation balancing tier for water year 2019. The April forecast for releases from Lake Powell is between 8.23 million acre-feet (maf) and 9.0 maf. Unregulated inflow of 7.7 maf indicates an April adjustment to balancing with an 8.91 maf release. As a point of comparison, the release for water year 2018 was 9.0 maf. With the April adjustment, 9.0 maf are expected to be released. There was a decrease for January 2019 because of the dry weather in December 2018; however, Lake Powell had a 2 maf increase in the last four weeks and will likely see a 9.0 maf release for this year. Reclamation predicts releases in the mid-elevation release tier for 2020.

Reclamation is planning turbine maintenance at the Glen Canyon Power Plant over WY2019 and WY2020. The agency plans to stagger maintenance so that a minimum of four units are available during WY2019 and six in WY2020.

Additional details on this presentation are in Attachment 2.

Discussion/Q & A

- Brent Rhees asked whether the forecasted release for February's 8.91 maf is expected to continue to trend upwards. Heather responded that yes, and Reclamation expects it will reach 9.0 maf because the February 8.91 is based on 5.3 maf inflow. Inflow is now of 7.3 maf, which makes the April adjustment to 9.0 maf likely.
- Vineetha Kartha asked Heather to comment on the potential for a 7.48 maf release for Lake Powell in water year 2020. Heather responded that the slide with elevations shows they are very close to the trigger elevation for the mid-elevation release tier, with the 5.3 maf inflow forecast, at the end of December 2019. The reservoir would be at elevation 3572.17 feet, triggering a probable 7.48 maf release. However, the forecast has increased by 2 maf in four weeks, so Reclamation anticipates seeing an upper elevation balancing tier in water year 2020.

- John Jordan commented that modeling always shows projections going forward. He asked if Reclamation ever goes back 20-30 years to compare projections to actual results. Heather responded that Reclamation has looked at that, and that it is important to be aware of uncertainty with the forecast. Reclamation has determined that uncertainty in the forecast and range in variation is a more significant indicator of changes in the 24-month study projections than the model itself. Heather commented that she would be talking more about uncertainty in the forecast in another presentation later in the afternoon.

Technical Work Group Chair Report and Triennial Budget and Work Plan Process

Presenter & Affiliation: Seth Shanahan, Technical Work Group Chair

Presentation Summary

The government shutdown affected the Technical Work Group's (TWG's) schedule so they are trying to make up time without affecting processes in place, like budget planning and other activities. TWG's role is primarily technical and not to drive policy. TWG is brainstorming about HFEs and HFE design criteria and monitoring and is waiting on DOI direction to develop monitoring methods and metrics. TWG is also working on the third year of the Triennial Budget and Work Plan (TWP).

TWG recommended by consensus in October 2016 that AMWG approve the Triennial Budget and Work Plan Process, and a motion for AMWG to consider approving this is on the agenda. Major revisions from the previous process include the transition from a biannual workplan to a triennial workplan and revisions to section 2.7 with regard to what criteria would need to be met in order for a change to be considered to the second or third year of an approved three-year budget.

Additional details on this presentation are in Attachment 3.

Discussion/Q & A

- Steve Wolff confirmed with Seth that the TWP Process was considered by the TWG prior to the LTEMP ROD being signed. Steve asked whether it would be reasonable to reference the ROD and its guidance in the TWP Process, rather than referencing older documents. Steve added that some of the information in the TWP Process appears to be out of date compared to what is in the ROD. Seth responded that some of the language in the TWP Process could be improved or be more precise.
- Brent Rhees asked Steve if it would make more sense to reference the LTEMP in the motion, or to mention in the motion that the TWP Process preceded the LTEMP. Steve asked if AMWG should add information to the motion that specifies that there is an LTEMP ROD and to identify outdated information in the TWP Process.
- Leslie James questioned why TWG is bringing this document to AMWG at this point. The document was approved by the TWG prior to the issuance of the LTEMP ROD, and it contains a lot of information that preceded the LTEMP ROD. The minutes for the August 2018 meeting reflect confusion about how the LTEMP ROD meshes with previous documents tied to AMWG. Leslie expressed concerns about approving the TWP Process because it is more than just a process document. Leslie asked if everyone in the room understood the interplay between the TWP Process and the LTEMP ROD. Seth pointed to Section 2.1 of the TWP Process document as an avenue for more precise language. Seth added that the LTEMP ROD recognizes a need to look back on all the older documents and bring those forward. The TWP is an example of this needing to be done. Tim suggested that the group could ask TWG to go back and make adjustments to the TWP Process, that AMWG could consider just approving

the calendar table (Table 1) of the TWP Process, or the group could look at additional guidance for 2019 on what the LTEMP ROD contains.

- Vineetha Kartha supported Seth's statement that the TWP Process is based on guiding principles of the GCDAMP, and the referenced documents are based on memos from former Secretary's Designees Anne Castle and Jennifer Gimbel. Vineetha supports going back to the TWG and updating the TWP Process on those terms; however, she does not think it is necessary to look at the LTEMP ROD because the LTEMP ROD did not change the program's structure. Vineetha added that it might be helpful for TWG to fall back on DOI direction on how to proceed. Leslie agreed with Vineetha and suggested following a combination of Tim's second and third options. **Leslie moved to approve Table 1 as recommended by the TWG in October 2016**. Seth asked if the motion could reference Section 2.7 to help guide the process. Mary clarified that because Section 2.7 is referenced in Table 1, it would be approved as part of the motion.
- Steve asked if approval of Table 1 would help the TWG process. Seth responded that TWG would continue to follow the TWP Process as it has the last two years unless AMWG directs it to do something different. Seth's preference, however, is to strike the offending language from the document and approve the remainder. Steve asked if it would help TWG to have time to review and revise the document and then request AMWG approval during the next AMWG meeting. Seth responded that TWG would do what AMWG requests. Tim suggested that TWG provide guidance to AMWG on the TWP Process language during the May webinar.
- Leslie said she was not ready to withdraw her motion, and she thinks that more information is needed from DOI. Brent responded that because of recent changes, TWG might need to take on more tasks in Table 1. Leslie suggested staying with the original motion to approve Table 1 for now and that TWG then would not need to take further action.
- Scott VanderKooi asked if Seth could summarize the information in Section 2.7. Seth explained that Section 2.7 establishes the criteria for TWG to propose and make recommendations to AMWG for budgetary and work plan changes to years two and three of an approved three-year budget. It identifies three categories where revisions might be considered: 1) scientific requirement or merit, 2) administrative needs and, 3) a higher bar, which would be lowered in the third year, for new initiatives. Scott stated that these criteria constitute important guidance to include in the motion.

Action Taken

By consensus, AMWG passed the following motion: AMWG approves Table 1 from the GCDAMP Triennial Budget and Work Plan Process recommended by the TWG on October 19, 2016. (The motion was made by Leslie James and seconded by Steve Wolff.)

Upper Basin Dams: How Uncertainty in Water Volume Forecasts Correlates to Reservoir Operations

Presenter & Affiliation: Heather Patno, Hydraulic Engineer, Bureau of Reclamation

Presentation Summary

Heather started with a response to the earlier question about errors in the 24-month study. She explained that most errors are seen in the forecast Reclamation receives from the Colorado Basin River Forecast Center (CBRFC) and that this presentation would further explain.

The Upper Basin reservoirs like Flaming Gorge, Blue Mesa, and Navajo are operated based on water supply forecasts, which are received from CBRFC every month and are compared to the 1981-2010 precipitation and temperatures averages for those historic years. Reclamation also receives a three-month volumetric supply forecast. There is always some uncertainty in the

forecast because of uncertainties in predicting weather. March is almost above the maximum probable forecast from the Ensemble Streamflow Prediction.

Currently, 40% of the snow pack is on the ground for the current year. April is close to the peak snow accumulation season, and at that time Reclamation will have data reflecting 98% of the snow pack on the ground for the year.

Glen Canyon uses the LTEMP ROD and the Interim Guidelines for operating guidance between Lake Powell and Lake Mead. The Upper Basin reservoirs all have RODs based on authorized purposes, implementing endangered fish flows, and balancing different resources. Flaming Gorge is the second largest storage reservoir in the Upper Colorado River system and falls under the purview of the Upper Colorado Endangered Fish Recovery Program for the flow guidance released in 2000 and included in the 2006 ROD. The Yampa River contributes significant runoff to the Green River and has a natural pattern of low base flow and high runoff. Reclamation is obligated to implement flow targets that are measured downstream at Jansen.

The Flaming Gorge ROD was implemented for the 2016 endangered larval razorback sucker, so releases are timed based on a biological trigger. The Yampa River is based on a hydrologic trigger and is a tributary of the Green River. There is a decreased magnitude in the Green River when there are fish in the system. Storage between the Flaming Gorge Reservoir, the Yampa River, and the Green River needs to balance the interests of hydropower and endangered fish.

The Aspinall Unit, which includes Blue Mesa, Morrow Point, and Crystal, is used for hydropower peaking and is part of the Upper Colorado Endangered Fish Recovery Program implemented in the 2012 ROD. The 2015 example was dry before May, but a very wet May (dubbed the “Miracle May”) changed all the forecasts.

Although the San Juan River has 1.7 maf in storage, the Navajo Indian Irrigation Project takes some of that water, so the intake is around 1 maf for the Navajo Dam. The Navajo Dam has the San Juan River Endangered Fish Recovery Program and is a critical habitat for endangered fish. Navajo Dam uses a 2016 ROD with flow targets downstream and adaptive management with releases. The San Juan River has been extraordinarily dry during the last 15 years, so the CBRFC started to utilize only a 15-year historical average instead of the 35-year historical average.

Additional details on this presentation are in Attachment 4.

Discussion/Q & A

- Tim Petty commented that Heather had been the operations director for Flaming Gorge for a number of years and was now managing the Glen Canyon Dam, so her expertise as hydrologic engineer at Reclamation has benefited the Upper Basin and Glen Canyon Dam.
- David Nimkin complimented Heather’s presentation and commented that the information she provided underscores the complexities of the work Reclamation does. David added that AMWG provides counsel to the Secretary of DOI, and that a substantial amount of science and research goes into the recommendations AMWG makes. Heather’s presentation demonstrates the amount of science specific to the fish recovery programs that goes into the operational decisions Reclamation has to make. David asked how Reclamation gets that information and how those kinds of inputs are provided, as well as how national parks below the releases are considered. Heather responded that the Upper Colorado Endangered Fish Recovery Program and the San Juan Recovery Implementation Program have hydrologists and biologists on the ground in real time that help provide some of that information. In terms of implementing flows for endangered fish, NPS is part of the recovery program, so flow and temperature recommendations are made with input from that agency. The 2000 flow regulations and San Juan flow regulations are more focused on a natural flow hydrograph; NPS helped to review and write that publication, which includes the USGS gauge data for the Yampa. The CBRFC

also provides a 10-day deterministic forecast. Additionally, biologists on the river provide information from gauging data multiple times per day.

- Brent Rhees commented that while Reclamation gets input from outside parties on how to operate facilities, Heather and the group at Reclamation have done a good job balancing all their responsibilities and requirements. He added that although there is occasional flooding causing Reclamation to release more than anticipated, these occasions are infrequent.

Fiscal Year 2019 Funding and Budget Process Implications

Presenter & Affiliation: Kathleen Callister, Manager, Environmental Resources Division, Bureau of Reclamation Upper Colorado Region; Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center

Presentation Summary

Kathy explained that due to the new directive from the Office of Management and Budget (OMB) that was discussed at the last meeting, unlike all previous years of the program, AMWG has not received any hydropower revenues and is now operating solely on appropriated funds for FY2019. The annual federal budget process is complex and begins with a budget request three years in advance. While this was not done for FY2019 (because we were relying on hydropower revenues), funds were appropriated for the program for FY2019.

There will be changes if we continue to operate with appropriated funds. With hydropower funds, there was an available CPI increase in the amount received every year; that is not the case with appropriated dollars. Unlike hydropower funds, appropriated dollars cannot carry over from year to year, so Reclamation and USGS must obligate all funds by the end of the fiscal year. This includes ensuring that contracts and agreements are in place by the end of the fiscal year. This may impact the Experimental Fund, the Native Fish Conservation Contingency Fund, and the Section 106 Contingency Fund the program currently uses. Finally, continuing resolutions can impact appropriated dollars, unlike hydropower funds.

Scott noted that the biggest impact to the GCMRC budget is in the Experimental Fund and the Native Fish Conservation Contingency Fund. The Experimental Fund was included in the budget at about $400,000 per year. This money was used for unanticipated urgent items like the Brown Trout Workshop and the bug flow experiments. Reclamation could roll unused funds into the Native Fish Conservation Contingency Fund to prepare for urgent needs in that area. Appropriated dollars have less flexibility, which makes it difficult to budget extra dollars into the overflight fund each year. Additionally, the new budget model lacks automatic CPI increases, which helped to offset costs like salary increases. There is also concern that the projected increase in overhead costs for the new USGS building in Flagstaff will go from 16-18% in FY 2020 to 26% in FY 2021. The pass-through overhead rate, for funds GCMRC receives and distributes to its cooperators, is expected to remain at the 3% rate. Combined, these changes will likely result in less money available for doing the science for the program.

GCDAMP funds are divided between the GCMRC and Reclamation. Once the president's budget is released, GCDAMP will have a better idea of how much money will be available in FY2020. Reclamation did request over-target appropriated funding for FY2020. Because CPI is no longer available, the budget for FY2020 will be the same as the budget for FY2019 if the president's budget grants the full requested amount.

Reclamation is now starting to work on FY2020 budget planning with AMWG's FY2018-2020 recommended Triennial Work Plan. Presentations on the FY2020 budget will take place at the August 2019 AMWG meeting. Planning for the FY2021-FY2023 Triennial Work Plan will begin in FY2019.

Additional details on this presentation are in Attachment 5.

Discussion/Q & A

- Steve Johnson commented that until new guidance is received, WAPA would need to return unobligated money to the Treasury. Steve reminded the group that this was constructive return, and the money was made available to fund programs instead of going back to the Treasury to repay debt; however, it was accounted for as if it were payment on debt. WAPA will continue to work with OMB but will likely have to return about $20 million at the end of the year.
- John Jordan commented that it sounds like Reclamation will be "living hand to mouth" for the foreseeable future. Kathy explained that the challenge would be with the Experimental Fund, which puts aside money for experiments. Under appropriations, any leftover money from that fund in a given fiscal year will be returned to the Treasury, so if there are no experiments, Reclamation will need to have identified projects in the cue to obligate the money. John asked if the money currently in the Native Fish Conservation Contingency Plan would disappear. Kathy responded that since this is power revenue funding, she is unsure and is currently working with the Power Office on how Reclamation can access those funds. John commented that was an important LTEMP cushion for protecting native fish and asked, if a catastrophic event were to occur, whether Reclamation would have the funds to respond. Kathy responded that does present a higher risk, so Reclamation will need to reprioritize how to spend funding to ensure endangered fish are not in jeopardy. ESA compliance will always be our priority.
- Leslie James commented on the OMB situation and the idea that the directive continues until it is rescinded. If WAPA needs to return money to the Treasury, it will come from the Basin Fund, which does not receive appropriations and is funded under the CRSP Act when resources are not available. Leslie sees a potential situation that would put WAPA closer to a potential cost recovery charge adjustment that could affect several programs. Leslie questioned why, if the appropriated funds are found for environmental programs, should it be sent back. Leslie added that this takes decision-making discretion away from WAPA.
- Jan Balsom clarified with Scott that GCMRC overhead would increase from 16% to 26% and likely up to 29%, which reduces available funding. Jan commented that in working with an appropriated budget, when costs go up, less money is available each year, which creates a cumulative effect. Jan asked WAPA and DOI whether there is a plan in place for emergency contingencies that WAPA frequently faces and if there were a way to balance appropriations and maintain contingency funds. Scott responded that USGS knew the new building would eat into science dollars, but it would benefit the program greatly in the long run; however, the loss of yearly CPI will be compounded and will work against the program. Kathy added that until the OMB directive is rescinded or replaced, Reclamation is working under appropriations and does not yet know what will be in the president's budget.
- Brent Rhees commented that Reclamation is in a transitional period and is accustomed to using hydropower revenues. In 2019, Congress provided appropriated funds. Brent believes the president's budget will include the same and the trend will likely continue. There are different opportunities for unforeseen events. The Upper Colorado Region has used appropriated funds of about $150 million annually now, and $170 million annually in the future. There are fund transfer opportunities for unforeseen events. We can transfer funds within limits, so it is not absolute that no contingency funds are available. While in the transitional period, however, there are some unknowns.
- Steve Johnson commented that WAPA knew the constructive return program (in which payments to environmental and recovery programs are counted as repayment of debt to the federal government), at current levels, would be unsustainable. When the program was originally envisioned, it was believed that the fish would be recovered by now and that the dam debt would eventually be paid off. With some recovery costs now increasing, and monies collected for repayment on the original debt decreasing, the program continues to have cash

flow issues. Steve suggested consideration of multiple funding streams for the recovery programs and the GCDAMP.
- Tim Petty commented that this would be an ongoing discussion and that the group should continue to dialogue with Kathy, Scott, and Brent.

Stakeholder's Perspective

Presenter & Affiliation: Leslie James, Executive Director, Colorado River Energy Distributors Association (CREDA) and AMWG Member

Presentation Summary

The Colorado River Energy Distributors Association (CREDA) was formed in 1978 to help CRSP customers address rate increases. Its mission is "To preserve and enhance the availability, affordability, and value of CRSP facilities while promoting responsible stewardship of the Colorado River System." CRSP facilities generate power that is marketed by WAPA. CREDA members are in all Colorado River basin states except Nebraska. Individual CREDA members need to have a CRSP contract with WAPA or be eligible to have a CRSP contract, and by law must be non-profit. CRSP customers have a legal preference in the purchase of hydropower. CREDA meets five or six times per year and has several active committees. CREDA members all do resource planning to forecast customer demand and to make resource decisions. Sixty-two percent of Navajo Tribal Utility Authority resources are hydropower, and there is a mix of renewables driven by carbon-free objectives and technology.

CREDA has one full-time staff member and addresses local, regional, and national issues. Challenges for CREDA include availability and affordability, as well as differing interests in the wholesale market. Currently, there are 52-53 tribes who have CRSP contracts, some of which are in the most disadvantaged areas of the country. Leslie said that on the AMWG, CREDA hopes to bring its perspective because there is not a lot of knowledge about what CREDA does. She added that the CREDA mission is to address availability, affordability, and responsible stewardship of CRSP resources.

Additional details on this presentation are in Attachment 6.

Joint Tribal Liaison Report

Presenters & Affiliation: Sarah Rinkevich and Theresa Pasqual, Joint Tribal Liaisons for the Glen Canyon Dam Adaptive Management Program

Presentation Summary

Theresa said that tribal representatives have been discussing challenges they face, including the state of the relationship between the tribes, agencies, and other stakeholders involved in AMWG. Many of the projects associated with AMWG directly impact tribal communities, and solutions that may be straightforward for the tribes have legal implications for the agencies. Lack of adequate funding affects the tribal voice. The tribes ask that the $95,000 allocation to each tribe, which has been static since 1999, be assessed to determine whether it is adequate for tribal needs. Tribal representatives present at this meeting have ideas that will help tribes participate more fully and equitably and to be stronger within AMWG.

Sarah said the 2019 Integrated Tribal River Trip is scheduled for July 25 to August 2. The 2015 Integrated Tribal River Trip was entitled, "An Exchange of Western Scientific Values and Native American Perspectives." Each day began with a discussion and a prayer circle led by the tribes. Anyone interested in attending the trip should contact Sarah, who will put together an agenda

for the trip with input from AMWG. The trip is open to everyone at no cost. The 2015 trip included federal employees and stakeholders.

Additional details on this presentation are in Attachment 7.

Discussion/Q & A

- Leslie James asked if tribes have discretion over how to use their $95,000 funding. Sarah responded that the money goes to river trips, monitoring trips, and travel for attending meetings. Brent said Reclamation would provide Tim with the data on how funds are spent. Sarah commented that the issue of funding has been brought up many times.
- John Jordan asked if lump sum funding is in lieu of meeting attendance cost reimbursement or in addition. Kathy responded that the lump sum is used to cover those meeting costs. John added that funding associated with meeting attendance could be expanded for all participating members.
- Melinda Arviso-Ciocco commented that she appreciated discussing the river trips over lunch with individuals who have participated. She added that during the couple of years she has participated in the program, she has observed functions and interaction from budgets, technical work, river trips, and fieldwork, and she has a good idea on how to follow up discussions in terms of reviewing topics. Melinda stated that the Navajo tribal members have been discussing what participation means, and based on the number of Navajo tribal members, the budget of $95,000 allocated in the 1990s is not enough. There needs to be a change in allocations for the Navajo representatives. Melinda participated in the 2015 river trip, and she feels it is important for federal agencies to work with tribes, representatives, communities, and the people who use these places. It is a reminder that the areas are still used today, and that things like Navajo oral history have not changed. What is happening on the ground can affect Navajo communities.
- David Nimkin also participated in the 2015 trip and said he got a good idea of the challenges different entities face collectively and the objectives for this program. Objectives include protection of resources, and trip participants had opportunities to gain a deep understanding of the uniqueness of the area. The connection and bond with people on the trip are something that one cannot get otherwise. He added that he gained a deeper understanding of what the area means for the tribes.
- John McClow said he participated in the trip and commented that he learned the tribal perspective on the canyon, the depth of which is not available elsewhere. He said he found that to be valuable.
- Arden Kucate commented that although the Zuni Tribe does not have an AMWG representative at this time, he wanted to make a statement on the tribe's behalf. Tribal participation has significantly contributed to scientific theorems and cultural values through the management of tribal initiatives under current Programmatic Agreements (PAs). GCMRC has conducted science studies and federal agencies have implemented initiatives with minimal tribal participation. Participating tribes have contributed a worthwhile effort to ensure fostering of partnerships that continue to pave the way to perpetuating the general health of the ecosystem of the Grand Canyon and the Colorado River. Arden requested that federal agencies and stakeholders try to understand the significance of the canyon's meaning to the tribes today and in the future.
- Brian Sadler participated in the 2015 trip and was new to WAPA at the time. He commented that he gained a lot more than he gave on the trip and would not otherwise be as integrated into the program as he is today. Brian added that tribal representatives made themselves available during the entire trip and helped participants to understand cultural beliefs, their understanding of science, and tribal perspectives.

Grand Canyon Dam Adaptive Management Program (GCDAMP) Administrative History Project Update

Presenter & Affiliation: Paul Hirt, Professor, School of Historical, Philosophical and Religious and Religious Studies, Arizona State University

Presentation Summary

Paul is currently working on year three of the administrative history project. So far, his team has conducted 11 oral history interviews and is in the process of preparing an annotated bibliography of the key literature. Paul started a web archive but tabled it in summer 2018; however, this was rebuilt in fall 2018. The platform is now Wordpress, which is free, and he is seeking a long-term host on the ASU server. The full website should be up and running in a few months. Paul anticipates a reemphasizing of the oral history project in year three with an additional 15 interviews. He plans to complete a draft of the administrative history in year three and to work on revisions in year four.

Additional details on this presentation are in Attachment 8.

Discussion/Q & A

- Vineetha Kartha asked whether more interviewees would be sought beyond the list Paul presented. Paul responded that the original contract was for 30 interviews, which should be completed in year 4. If possible, he will conduct more interviews and is open to suggestions on other possible interviewees. He recommended listening to Dave Wegner and Jan Balsom's interviews.
- Jan Balsom commented that this AMWG has evolved over more than 20 years and asked if there is any way to allow for additions in the future. Paul responded that the Wordpress platform does allow for constant updating, and he hopes it would continue to be updated and made accessible.

2019 GCDAMP Annual Reporting Meeting Update, Part 1

Presenter & Affiliation: Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center

Presentation Summary

Scott began his presentation by noting he would focus on fish issues, and Mike Moran, during tomorrow's presentation, would have more diversity in subject matter. Scott's emphasis would be on recent results and long-term trends and would include an update on the bug flows. As noted before, the HFE assessment would be completed next week during the Annual Reporting meeting.

Levels of HBC are well above Biological Opinion action trigger levels in the Colorado and Little Colorado Rivers. Studies have found that years with low runoff result in low survival and low production levels of juvenile chub; however, increased numbers are expected this year with the high spring runoff. GCMRC is monitoring the numbers closely because low production of juveniles eventually affects the adult population.

FWS has been translocating humpback chub from the Little Colorado River to above Chute Falls (also in the Little Colorado River) to determine how that will affect populations. Translocated fish survive at higher rates: translocating 300 fish increases the adult numbers by 350. Whether this is beneficial depends on management's assessment and on the current population of fish.

NPS is restoring creeks for native fish and has been removing non-native trout for several years. One benefit is an increase in native fish at Bright Angel Creek. A reproductive event in 2018 led to an increase in brown trout, potentially due to the dry winter and resultant lack of spring flooding.

In Havasu Creek, HBC translocations indicate reproduction is occurring after translocation. Currently, half the population there is not translocated. Survival rate of translocated fish at Bright Angel Creek was 80% in the spring and is expected to improve with further data collection (to give more precise estimates).

At Glen Canyon, rainbow trout experienced unsustainable abundance rates seven or eight years ago. At Lees Ferry, many smaller fish were seen in 2016, and the fish are surviving and getting bigger. Increased angler catches per hour indicate recovery of the fish population. In November, AGFD released 526 triploid rainbow trout with pit tags and will now monitor recaptures.

For the bug flow monitoring, midges were stable and caddisflies increased significantly in 2018. Researchers found that midge adults are more abundant on the weekends. GCMRC will present more information on bug flow experiments at the Annual Reporting meeting next week.

Additional details on this presentation are in Attachment 9.

Effects on Hydropower from Macroinvertebrate Production ("Bug") Flows

Presenter & Affiliation: Steve Johnson, Senior Vice President and Colorado River Storage Project Manager, Western Area Power Administration and AMWG Member

Presentation Summary

Levels of macroinvertebrates during bug flows tended to be above levels at normal operations. WAPA purchased more energy on the weekends and sold more energy on the open market on the weekdays. WAPA also likely had more energy to sell during off-peak hours. WAPA benefited from this pattern in May and June 2018 because energy is cheaper on the weekend during those months. WAPA originally estimated about $330,000 of cost for this experiment, but the actual cost was $165,000. Steve praised GCMRC and Reclamation for the collaborative efforts in implementing this experiment.

Additional details on this presentation are in Attachment 10.

Discussion/Q & A

- Leslie James asked if, at the Annual Reporting meeting, GCMRC would report whether the increase in trout would cause GCMRC to rethink bug flows, since their purpose was to bolster food base to increase trout populations. Scott responded that some of the concerns in studying the aquatic food base are the low productivity and the lack of diversity. An abundant and diverse food population is needed to benefit native fish as well as the trout population. Food webs should be complex and having only one or two food sources makes the food base susceptible to sudden decreases. More diversity will create a more resilient and stable food web. The bug flow experiments address concerns about food diversity over the benefit of helping trout populations.
- Ben Reeder commented that bug flows and increased food for fish also benefits other species like birds, bats, and lizards. This is encouraging for boatmen and has a positive impact on the ecosystem.
- Steve Johnson commented that every year is different and a greater differential is better for hydropower. He hopes to see similar patterns going forward.

Public Comment

There were no public comments. Tim Petty announced that he would not be present during the second day because of other unexpected obligations that will require him to fly back to Washington. He will, however, review all the PowerPoint presentations. Brent Rhees will facilitate the second day of the meeting.

End of Day 1 meeting.

Thursday, March 7, 2019

Start Time: 9:00 am
Conducting: Brent Rhees, Bureau of Reclamation Upper Colorado Regional Director and AMWG Designated Federal Officer
Facilitator: Mary Orton, The Mary Orton Company, LLC
Recorder: Rosana Nesheim, Galileo Project, LLC

Report on a Recent Science Trip

Presenters & Affiliation: Peggy Roefer, Natural Resource Analyst, Colorado River Commission of Nevada and State of Nevada Technical Work Group Member

Presentation Summary

Peggy participated in a vegetation and sediment monitoring trip to the Grand Canyon with the GCMRC in September and October 2018. Paul Grams participated and took pictures of the beaches to compare changes over time and to monitor erosion. The group also maintained stationary cameras and a weather station to ensure quality data. Botanists and volunteers (including Peggy) visited sites and measured three to four transects per site, including different areas such as active channel, active flood plain, and inactive flood plain, to count the number of plants. Other areas the group visited included the Spencer Steamboat, Lees Ferry, Red Wall Cavern, Nankoweap Granaries, Anasazi Bridge, a plane crash site where debris still remains near the Little Colorado River. Peggy also participated in a six-hour hike out on the South Kaibab Trail. She praised the GCMRC scientists for their hard work and commitment to the science.

Additional details on this presentation are in Attachment 11.

Discussion/Q & A

- Vineetha Kartha commented that she participated in a trout removal trip with the NPS and recommended the experience.
- Scott VanderKooi thanked Peggy for volunteering and added that, while the work is challenging, it is also very rewarding. Scott recommended the trip to other stakeholders.
- Brent Rhees commented that Peggy's presentation highlights the magnificence of the canyon, as well as the excitement it brings to mind.

Review by Executive Coordinator for Science Advisors of Grand Canyon Monitoring and Research Center Fiscal Year 2018 Annual Project Report

Presenters & Affiliation: David Braun, Executive Coordinator for GCDAMP Science Advisors Program (Sound Science, LLC)

Presentation Summary

The GCMRC FY2018 Annual Report (Report) offers details of work performed and results achieved. The Science Advisors Executive Coordinator was tasked by Reclamation with reviewing the Report. David's review focused on four areas: protocols used in scientific activities, long term monitoring plan, annual monitoring and research plans, and recommended next steps based on an adaptive management approach. Most projects are on target with four exceptions. Each project is subject to several layers of external peer review. Recommendations included more systematic documentation of protocol changes and presentations to GCDAMP of predictive models to enhance their understanding. Recommendations for enhanced adaptive management include: 1) More use of "strong inference" in project designs, 2) Track and report

indicators of LTEMP priority resource condition, and 3) Track and report indicators of all crucial inputs. The report will be finalized after the Annual Reporting meeting.

Additional details on this presentation are in Attachment 12.

Discussion/Q & A

- John Jordan asked whether the group would receive the report when completed, and David said that was correct.
- Cliff Barrett asked if the table in slide 10 of peer review by project includes publications from fiscal years prior to FY2018. David responded that the table includes only what was reported in the FY2018 report. Some publications might have been prepared and drafted in previous fiscal years, but they were published in FY2018.
- Surabhi Karambelkar from University of Arizona asked what would serve as a baseline for tracking progress regarding resource conditions. David responded that this was discussed during the knowledge assessment in 2017 and that they are looking more at desired future conditions and reference conditions, as opposed to baselines. He explained that this is a novel ecosystem with unknown expectations. The goals for all priority resources and objectives are stated in the LTEMP EIS and reinforced in the ROD. Another way to measure is less against reference conditions than against desired conditions. Some data streams are not old enough to go back even 20 years. This is not unique to adaptive management programs, and GCMRC and other cooperators will need to start engaging in that conversation. Scott VanderKooi added that it has been a challenge to develop a baseline. Brent commented that this highlights the need to do something, including work that needs to be done by TWG and Reclamation.
- Dave Wegner commented that when tribal participation began in 1989, the biggest challenge was to protect the interests and sensitivities of the cultural properties. He asked whether tribally sensitive information, like the location of the tribal salt mines, is being made public when they should not be. David responded that tribal surveys are being conducted, which has been difficult because tribes might not always want to make public certain types of information. This can be worked on with the tribes, but it is complicated because something that is acceptable to one tribal member might not be acceptable to another.

Possible Long Term Experimental and Management Plan (LTEMP) Experiments in 2019

Presenter & Affiliation: Emily Omana Smith, Biologist, Bureau of Reclamation Upper Colorado Region; and Scott VanderKooi, Chief, GCMRC

Presentation Summary

Emily reviewed the process for evaluating potential experiments for 2019 as required in the LTEMP ROD. Possible LTEMP experiments in 2019 are none, Macroinvertebrate Production Flows (bug flows), trout management flows (TMFs), a fall HFE, and an extended duration fall HFE. Bug flows and TMFs could begin as early as May 2019. One decision to be made is whether to do both or whether the results would be confounding. The goal of the bug flow experiments is to improve egg-laying conditions for the macroinvertebrates to help increase abundance of midges, increase the diversity of insects, and improve fish conditions. GCMRC will report the results of the experiment during the Annual Reporting meeting. TMFs are designed to reduce and manage trout populations during boom and bust cycles. Delays in researching TMFs have occurred due to contracting issues as a result of new DOI policies and procedures and issues with planned in situ experiments.

Scott said GCMRC would continue to think about fish behavior and come up with new ideas for taking advantage of normal hydropower operations for fish studies, including TMFs. Another possibility is half-TMF in order to test the flows without stranding fish. The stranding is a tribal

concern due to loss of life. He also noted this would be a very expensive experiment and it might be worthwhile to do a partial test before engaging in it fully. High flow experiments are also an option. A 60-hour event was conducted last fall, and there could be one that lasts up to 192 hours.

Additional details on this presentation are in Attachment 13.

Discussion/Q & A

- Leslie James thanked Scott for addressing her previous question about the bug flows. She expressed concerns for the use of the word "hydropeaking" in studies and suggested wording like "fluctuation v. steady," because flows are not actually peaking. Scott responded that he tries to avoid use of the word, but that it sometimes slips in.
- John Jordan asked if the temperature change experiments are related to TMFs or to management of the food base. Scott responded that initially, the idea was to look at nutrients and ecosystem drivers through Project E. Ultimately, the focus is the food base, but they are also trying to understand phosphorus as an important driver in the ecosystem. It was an attempt to take advantage of having access to the Colorado River, being on site, and testing some hypotheses. It was an attempt at being efficient, but not being able to manage temperature changes was a challenge.
- John Jordan commented on early discussions on TMFs and added that it is encouraging to see GCMRC take a thoughtful approach and progress in that direction. Scott responded that it seems like an expensive experiment and he wants to have a solid idea for why and how to do it prior to proposing it. Scott noted he is also skeptical that it would work and so is moving cautiously.
- Ben Reeder commented on recent concerns for low numbers of rainbow trout. He asked what the trigger point would be for conducting TMFs. Scott responded that there is no set trigger, which is challenging. The relationship between adults and juveniles is not always straightforward because the production of large amounts of juveniles does not always lead to large numbers of adults. This can lead to crashes and makes managing the trout fishery more challenging.
- Ben Reeder asked if 2020 would be the first opportunity to have a spring HFE, and Scott confirmed that. Ben mentioned that in one of the previous day's slides, turbines were scheduled to be replaced during the time that a spring HFE might be scheduled. He asked if it would be possible to adjust the maintenance schedule to have enough turbines available for a spring HFE. Emily responded that this could be investigated. Scott added that they have worked hard to keep the fall windows open, but spring is another complicating factor. Brent commented that there is flexibility in the timing for routine maintenance, and not as much for turbine replacements.

Proposed U.S. Fish and Wildlife Service (USFWS) downlisting of Humpback Chub and Razorback Sucker from Endangered to Threatened

Presenter & Affiliation: Jessica Gwinn, US Fish and Wildlife Service

Presentation Summary

USFWS makes species' designations using three steps: 1) a five-year review and recommendation, 2) rule-making and proposed action, and 3) federal rule publication and public review. USFWS now uses the Species Status Assessment (SSA) to provide the science for these decisions. The SSA is a more transparent and defensible method and involves clearer and more concise documents.

The 4(d) Rule of the Endangered Species Act (ESA), which directs the USFWS to issue regulations deemed "necessary and advisable to provide for the conservation of threatened

species," is important to USFWS planning. The proposed downlisting for both species will be open for public comment once the Federal Register Notice is issued. A final rule is expected as early as next winter, depending on the comments.

Additional details on this presentation are in Attachment 14.

Discussion/Q & A

- Steve Wolff commented that he appreciates the efforts of the USFWS in making this information available.
- John Jordan inquired about the current status of the Kanab ambersnail. Jessica responded that USFWS is revisiting the species' designation but she does not have additional information at this time. John asked how well USFWS is staffed for this work. Jessica responded that USFWS relies heavily on partners to provide external resources. She acknowledged and thanked the seven basin states, USGS, Reclamation, and consultants who participate as researchers. Jeff Humphrey added that the lead for the HBC and razorback sucker downlisting efforts is in the Upper Basin, and they are staffed at a higher level for listing recovery. The San Juan River Basin Recovery Implementation Program is also well staffed. In the Lower Basin, staffing is a fraction of what they need.
- John Jordan asked at what stage in the process do organizations and groups tend to raise objections to USFWS action. Jeff Humphrey said there is a spectrum of time for when objections can be made, and that it normally occurs during the process and even after the decision has been made. The SSA is expected to alleviate some objections because everyone will be eligible to contribute and comment to develop this document that will inform all decisions. The most effective time to make comments is during the development of the SSA and not after the decision has been made. Once USFWS makes the 4(d) Rule and proposal, the public can comment, but the inertia in a particular direction has already been established.
- David Nimkin asked whether the change in status from endangered to threatened will impact GCMRC's program of research and monitoring. Scott responded that a lot of what GCMRC does is in support of the biological opinions and the action agency's conservation measures. Jessica added that species are reliant on activities from the various agencies, and she has not heard that any partners are asking to do less because of the possible downlisting. The risks are still in the environment when a species is downlisted, and those risks still need to be managed. Jeff Humphrey added that the downlisting determination provides inertia for species conservation. There is no 4(d) Rule for endangered species, so it can become stagnant on people's radar. Seeing the needle move with a downlisting reenergizes people to maintain that positive inertia.
- Ben Reeder commented that he has heard the razorback sucker and humpback chub are doing well in the Grand Canyon and asked if there are similar trends in the San Juan and in the Upper Basin. Jessica responded that there are other groups working in those areas and will provide more information at the Annual Reporting meeting. The fish in the Grand Canyon are doing well.

National Park Service (NPS) Expanded Non-Native Aquatic Species Management Plan and Environmental Assessment Update

Presenter & Affiliation: Ken Hyde, National Park Service

Presentation Summary

This EA was developed to identify new tools and to implement a four-tiered approach to managing non-native aquatic organism populations, including fish, in order to protect native fish in Glen and Grand canyons and the recreational trout fishery in the Glen Canyon Reach. A significant concern is ensuring that non-native predatory fish do not gain access to the system. This EA is almost completed. NPS completed ESA Section 7 consultations and the Biological

Opinion is expected to be released soon. NHPA Section 106 consultation is in process. Consultations have occurred with the Zuni and Hopi and final consultations are scheduled with Zuni, Hopi, and the Navajo Nation. The final step of the process will be for signature of the EA and release of the Finding of No Significant Impact (FONSI).

Ken referred to a question raised earlier regarding green sunfish. NPS uses metal screens to keep the green sunfish from entering or escaping the Upper Slough; however, green sunfish found a hole under the screens in 2018. NPS re-dug the trench for the screens and added gravel to allow the water to flow through while keeping the fish from passing through. Fish netting was also draped over the screens as a secondary measure. NPS pumped nearly 350,000 gallons of water last fall in an effort to remove 12 adult green sunfish and about 6,000 young-of-year; when this and a subsequent soda ash treatment were not 100% effective they worked with GCMRC staff and did another trial ammonia treatment in order to ensure a 100% removal before the HFE. The day after the HFE, NPS staff replaced the screens in order to exclude green sunfish. While putting in the screens, a few unidentified fish were observed in the Upper Slough. NPS will need to repeat the pumpout process to remove those fish in April 2019 and will utilize electrofishing instead of chemical treatments to ensure 100% removal of adult green sunfish and removal of 97% of any small green sunfish.

Additional details on this presentation are in Attachment 15.

Discussion/Q & A

- Leslie James asked whether the Section 106 consultation would include the signatories to the Memorandum of Agreement for Non-Native Fish Control in the Colorado River below Glen Canyon Dam (MOA). Ken responded that was a Reclamation document. NPS is incorporating the information from the Comprehensive Fish Management Plan into the EA so the tribes don't receive too many documents. NPS is glad to work with Reclamation if it updates the MOA. There are a lot of opportunities for additional consultations. NPS will also consider providing more advance notice if there is a need to go to a higher-tiered approach. Leslie commented that CREDA was a party to the MOA and asked where CREDA fits in with this EA. Kathy responded that one of the stipulations in the PA was to look at the MOA and revise or replace it if necessary. Bill Chada will focus on that this summer.
- John Jordan commented that some of the actions in this EA depend on knowing the population numbers of brown trout, and asked if this information was known. Scott said there might be a delay in the information analysis because data is still being collected. GCMRC currently has an agreement with NPS for marking the vast majority of captured brown trout. Scott thinks this will be a benefit and expressed appreciation for NPS. Data is still coming in and delays will mostly be with analysis due to the contracting issues associated with new DOI approval requirements. While preliminary information will be available, it will not be as thorough. Tim Petty is aware of the contracting situation.
- John Jordan asked if the delay in the completion of the consultations caused a delay in the completion of the EA. Ken responded that this was true, and issues with the new DOI funding and review process also contributed. NPS is trying to start marking fish soon. John complimented the work that the NPS has done on this project.
- Joe Miller thanked the NPS for making the comments on the EA available.

Lees Ferry Rainbow Trout Stocking Update

Presenters & Affiliation: Scott Rogers, Fisheries Program Manager Region II, Arizona Game and Fish Department

Presentation Summary

Lees Ferry began as a put-grow-and-take fishery, which means that small fish were put in, those fish grew, and the adults were taken through fishing. The Lees Ferry fishery operated in this

manner until 1998 when it became a self-sustaining rainbow trout fishery. The current plan calls for 16,000 triploid (sterile) fish to be stocked in a year, but the department will likely not stock that many. Stocking has resulted in larger fish and higher catch rates. The plan is now to stock 6,000 fish starting the first week of May 2019. All will have a clipped fin and will be pit-tagged for monitoring longevity and movement. Resources have also been diverted so that 50-100 fish receive sonic tags each week. These will allow real-time monitoring for a short amount of time and are more easily tracked than pit tags. The infrastructure for sonic tags for razorback suckers is already in place. AZGFD wants to work with NPS to ensure that the existing sonic gates work to track downstream movement, and wants to ensure opportunities are in place for anglers to take advantage when they catch tagged fish.

Discussion/Q & A

- Ben Reeder asked how AZGFD communicates with anglers and how sonic tags are returned. Scott responded that communication occurs through public outreach, social media, clerks communicating with anglers, and through staying in touch with guides to ensure they are aware of the sonic tags. AZGFD also wants to intensify creel surveys to understand what percent of fish is caught. The purpose is to ensure better fishing for anglers.
- Ben Reeder asked how much a pit tag and a sonic tag cost and whether there is a reward for returning the tags. Scott responded that the sonic tags last 90 days and that 80 sonic tags cost $30,000 (approximately $375 each). Arizona does not currently have a structured reward system in place. Scott VanderKooi added that pit tags cost between $2 and $2.25.
- Emily Omana Smith asked if there was an updated capture rate at the walk-in area at Lees Ferry. Scott responded that there is no updated capture rate after the stocking with the 525 fish. There were not many anglers there in November, so AZGFD has not updated the data. Anglers might have inflated the catch rates. Scott hopes that the stocking rate will eventually be high enough to be measured.
- Jan Balsom asked what is the likelihood that anglers who catch the fish will report the catch, especially in the walk-in area. Scott responded that anglers are informed that the fish exist and how to identify them. Scott is unsure of how many anglers are aware of or are capable of reporting. One of the best measures is noting increased measures of catch rates. If there were an increase from less than one fish per hour to one fish per hour, it would be safe to say the stocking had an impact. Jan asked how often AZGFD surveys the anglers. Scott responded that he would need to check the current rate. Scott added that the best available science suggests that many of the fish die soon after being stocked and that at many of the put-grow-and-take fisheries, the goal is to try to have most fish captured within the first two weeks. Scott hopes to get a better idea of mortality with the sonic tags to better inform modeling in the future. Jan asked how many of the walk-ins know to report back to AZGFD and what the likelihood is that anglers will know to report back on the fish they catch. Many of the people in the walk-in and the area downstream are there frequently and Scott hopes that the message is eventually received by all of them.
- Vineetha Kartha asked if there are plans to stock more in the future and if so, what would AZGFD do differently. Scott responded that he hopes the stocking will be a useful management tool and hopes to be responsive instead of reactive in the future. AZGFD hopes to be better informed on how the fish move, how long they live, and how many are captured.
- Helen Fairley asked whether there are concerns about genetically modified organisms (GMOs) since walk-in anglers typically use the fish for food. Scott clarified that triploid fish are not GMO because there is no change to the triploid's DNA or to its proteins. A triploid is an organism with three sets of chromosomes instead of two. They are sterile, and this occasionally occurs in nature. Helen commented that she felt there was an ethical obligation to notify people of the manipulation that occurs to create sterile fish. Scott responded that it has not been an issue in the past, but that AZGFD can work with groups to get the information out.

He asked Helen to contact him with the information. Jessica Gwinn added that triploid trout are common throughout the U.S. and are often used to manage populations as a conservation tool to help with ESA concerns. This does not fix the issue completely, but she wanted the group to know that it is a conservation effort.

- Melinda Arviso-Ciocco added that, with regard to outreach, Navajo Parks and Recreation handles much of the fisheries permitting, including for Navajo Fish and Wildlife. Internally, there will need to be some discussions on this subject as well. Scott responded that he has been in discussions with Navajo Fish and Wildlife, that a coordination meeting took place about two weeks ago, and that the discussions are ongoing. Scott asked for ideas to get the messaging out to the public.

Microwave Communication Site at Mount Elden

Brent showed a photo of the microwave communication site at Mount Elden in Flagstaff that was iced over, which caused serious communication issues between Glen Canyon Dam, Flagstaff, and Pinnacle Peak, which are three main substations. As a result, high-speed relaying capability was lost. It was partly thawed out by the next day, but there were questions for why this dish does not have heaters like other utility dishes do. Hundreds of thousands of dollars were lost because of this issue. This is something that was unplanned but highlights the importance of cooperation and communication between WAPA and Reclamation.

2019 GCDAMP Annual Reporting Meeting Update, Part 2

Presenters & Affiliation: Mike Moran, Deputy Chief, GCMRC

Presentation Summary

Mike reported that staff transitions and the recent government shutdown halted work on various projects, so the results from the latest HFE are not yet available. After each of the last five HFEs, there was a increase in the proportion of sandbars accumulating sand. With each successive HFE, data shows the proportion increases, and the latest HFE had 66% of sandbars gaining sand. As of February 14, 2019, only 16% of those are showing a significant loss, which indicates the latest HFE was successful. The smallest sandbars show little change over time, while heavily vegetated and large unvegetated sandbars show an overall increase in the sandbar volume. There are different ways of measuring sandbars and Paul Grams will expand on this information during the Annual Reporting meeting next week. Additionally, Scott Wright from the State of California developed a method for modeling the Marble Canyon sand budget that GCMRC has been using since 2012 for HFE planning. Scott is updating the model with the latest data and will present the results at the Annual Reporting meeting.

GCMRC has developed a monitoring protocol for riparian vegetation that is sufficiently detailed for application in other similar river systems. They are also developing a model for how hydrological regime and climate interactively shape riparian plant composition. Project D looks at the effects of dam operations on bare sand, an important resource for recreation, habitat, and cultural resources. HFEs supply sand for 113 large dunefields that comprise half of the bare sand in the Canyon. GCMRC is examining the effects of dam operations, including HFEs, on hydropower generation and recreation. Lake Powell water quality has also been studied.

Additional details on this presentation are in Attachment 16.

Discussion/Q & A

- Mary Orton asked at what point HFEs were initiated only when there was a sufficient amount of sediment in the system. Jan Balsom responded that the HFEs were called for in 1996 in the initial ROD because there was a belief that there was always accumulation. The first HFE was

a success, but when more detailed work was done, it was found not to be an ever-accumulating bank of storage. There was a shift in the 2000s when GCMRC started getting more detailed information, and the March 2008 HFE occurred after that. Scott VanderKooi added that there were a lot of unknowns during the 1996 HFE. Since the 2012 protocols were put in place, GCMRC has learned how to utilize sediment volume triggers.

- Leslie James asked if a chart for data on the sandbar presentation would be presented at the Annual Reporting meeting the following week. She is interested in the comparison of each of the HFEs volumes and the sediment impacts. She questioned whether sand is staying around longer because there haven't been lower volumes, and is interested in comparing the background data. Mike responded that he would need to check with Paul Grams since he is likely conducting those types of analyses.
- Leslie James expressed concern for the Project N study on emissions. She was not aware that was the defined project. She had hoped that SEAHG would have had some involvement in what would be done under Project N because of the small amount of funding associated with the project. Leslie commented on the possibility of surveying entities purchasing power at the time of the HFE about how much was purchased and when. Leslie added that she believed there is a 99.9% inability to segregate sources such as solar, natural gas, nuclear, and coal in those purchases. Leslie is interested in reading the study and asked to have more conversations about Project N. Mike said he assumed that Lucas Bair was working with the SEAHG on that and is unsure the source of the data. Lucas will present more information on Project N at the Annual Reporting meeting. Ben Reeder, chair of the SEAHG, offered to work with Lucas to get clarification.
- Seth Shanahan commented that the latter part of the afternoon of the TWG meeting would be a good time for this topic to come up and for TWG to be able to provide some direction on the SEAHG.
- Brent Rhees commented that Seth and others should look at Project N during the Annual Reporting meeting as an opportunity to experiment on generation opportunities as opposed to economic impacts of the experiments we are doing. A good example is how Project N and hydropower are wrapped into the bug flow experiments. The historic economic impact might be something for the group to look at since it is low on the funding priority list right now. Mike said that he believes that is on Lucas's radar.

Public Comment

There were no public comments received.

Wrap-Up

Presenter & Affiliation: Brent Rhees, Bureau of Reclamation Upper Colorado Regional Director and AMWG Designated Federal Officer

Brent thanked everyone for their participation and the good meeting that just concluded. He reviewed the action items that came out of this AMWG meeting and announced the next two AMWG meetings.

Meeting Adjourned at 3:00 pm

Meeting Attendees–Wednesday, March 6, 2019

AMWG Members, Alternates, and Leadership

Melinda Arviso-Ciocco, Navajo Nation
Jan Balsom, NPS-GRCA
Eric Bobelu, Pueblo of Zuni
Charley Bulletts, Southern Paiute Consortium (webinar)
Kathleen Callister, Reclamation
Kevin Garlick, UAMPS
Leslie James, CREDA
Steve Johnson, WAPA
John Jordan, IFFF/Trout Unlimited
Vineetha Kartha, State of Arizona
Tim Petty, DOI and Secretary's Designee
Daniel Picard, Reclamation
Brent Rhees, Reclamation and Designated Federal Officer
Brian Sadler, WAPA
Warren Turkett, State of Colorado (webinar)
Steve Wolff, State of Wyoming
Kirk Young, USFWS (phone)

USGS/GCMRC Staff

Helen Fairley
David Lytle
Michael Moran
Scott VanderKooi

Bureau of Reclamation Staff

Tara Ashby
Bill Chada (webinar)
Emily Omana Smith
Heather Patno
Alex Pivarnik
Shana Tighi
Lee Traynham
Christopher Watt

Interested Persons

Ernie Atencio, NPCA
Richard Begay, Navajo Nation
David Braun, Sound Science, LLC
Rachel Bryant, WAPA
Danielle Carmon, NPS-GRCA
Winkie Crook, Hualapai Tribe
Kevin Dahl, NPCA
Sinjin Eberle, American Rivers
Michelle Fink, WAPA
Ed Gerak, CREDA
Jessica Gwinn, USFWS
Amy Haas, Upper Colorado River Commission
Jeff Humphrey, USFWS
Ken Hyde, NPS-GRCA
Surabhi Karambelkar, University of Arizona
Chase Kassel, Senator McSally's Office
Arden Kucate, Pueblo of Zuni
Craig McGinnis, ADWR
Rosana Nesheim, Galileo Project, LLC (note taker)
Jessica Neuwerth, State of California
David Nimkin, NPCA
Mary Orton, The Mary Orton Company, LLC (facilitator)
Amy Ostdiek, State of Colorado
Brian Parry, Reclamation
Theresa Pasqual, Joint Tribal Liaison
Richard Powsky, Hualapai Tribe
Ben Reeder, Grand Canyon River Guides
Sarah Rinkevich, DOI Water and Science, Joint Tribal Liaison
Peggy Roefer, State of Colorado
Seth Shanahan, SNWA
Billy Shott, NPS-GRCA
Justin Tade, DOI Solicitor's Office
Richard Turner, Grand Canyon Private Boaters Association
Kiel Weaver, DOI
David Wegner, Woolpert

Webinar Attendees

Clifford Barrett, UAMPS
Shane Capron, WAPA
Bret Esslin, State of Arizona
Paul Harms, State of New Mexico
Beneir Junior, unknown affiliation
Ryan Mann, AGFD

Meeting Attendees, Thursday, March 7, 2019

AMWG Members, Alternates, and Leadership

Melinda Arviso-Ciocco, Navajo Nation
Jan Balsom, NPS-GRCA
Eric Bobelu, Pueblo of Zuni
Charley Bulletts, San Juan Southern Paiute (webinar)
Kathleen Callister, Reclamation
Kevin Garlick, UAMPS
Leslie James, CREDA
Steve Johnson, WAPA
John Jordan, IFFF/Trout Unlimited
Vineetha Kartha, State of Arizona
John McClow, State of Colorado
Daniel Picard, Reclamation
Brent Rhees, Reclamation and Designated Federal Officer
Brian Sadler, WAPA
Steve Wolff, State of Wyoming

USGS/GCMRC Staff

Helen Fairley
David Lytle
Michael Moran
Scott VanderKooi

Bureau of Reclamation Staff

Tara Ashby
Bill Chada (webinar)
Emily Omana Smith
Alex Pivarnik
Lee Traynham
Christopher Watt

Interested Persons

Ernie Atencio, NPCA
Richard Begay, Navajo Nation
Rachel Bryant, WAPA
Winkie Crook, Hualapai Tribe
Kevin Dahl, NPCA
Sinjin Eberle, American Rivers
Grace Ellis, Galileo Project, LLC
Ed Gerak, CREDA
Jessica Gwinn, USFWS
Jeff Humphrey, USFWS
Ken Hyde, NPS-GRCA
Arden Kucate, Pueblo of Zuni
Craig McGinnis, ADWR
Joe Miller, Trout Unlimited Arizona
Rosana Nesheim, Galileo Project, LLC (note taker)
Jessica Neuwerth, State of California
David Nimkin, NPCA
Mary Orton, The Mary Orton Company, LLC (facilitator)
Amy Ostdiek, State of Colorado
Bill Persons, Trout Unlimited
Ben Reeder, Grand Canyon River Guides
Sarah Rinkevich, DOI Water and Science and Joint Tribal Liaison
Peggy Roefer, State of Colorado
Scott Rogers, AGFD
Billy Shott, NPS-GRCA
Justin Tade, DOI Solicitor's Office
Richard Turner, Grand Canyon Private Boaters Association

Webinar Attendees

Clifford Barrett, UAMPS
Kelly Burke, GCWC
Shane Capron, WAPA
Kurt Dongoske, Hopi Tribe
Paul Harms, State of New Mexico
Ryan Mann, AGFD
Megan, unknown affiliation

Abbreviations

ADWR – Arizona Dept. of Water Resources
AF – Acre Feet
AGFD – Arizona Game and Fish Department
AIF – Agenda Information Form
AMP – Adaptive Management Program
AMWG – Adaptive Management Work Group
AOP – Annual Operating Plan
ARM – Annual Reporting Meeting
ASMR – Age-Structure Mark Recapture
ASWS – Assistant Secretary of Water and Science (DOI)
AZGFD – Arizona Game and Fish Department
BA – Biological Assessment
BAHG – Budget Ad Hoc Group
BCOM – Biological Conservation Measure
BE – Biological Evaluation
BHBF – Beach/Habitat-Building Flow
BHMF – Beach/Habitat Maintenance Flow
BIA – Bureau of Indian Affairs
BO – Biological Opinion
BOR – Bureau of Reclamation
BT – Brown Trout
BWP – Budget and Work Plan
CAHG – Charter Ad Hoc Group
CAP – Central Arizona Project
CESU – Cooperative Ecosystems Studies Unit
CFMP – Comprehensive Fisheries Management Plan
cfs – cubic feet per second
CMINS – Core Monitoring Information Needs
CMP – Core Monitoring Plan
CPI – Consumer Price Index
CRAHG – Cultural Resources Ad Hoc Group
CRBC – Colorado River Board of California
CRCN – Colorado River Commission of Nevada
CRE – Colorado River Ecosystem
CREDA – Colorado River Energy Distributors Assn.
CRSP – Colorado River Storage Project
CWCB – Colorado Water Conservation Board
DAHG – Desired Future Conditions Ad Hoc Group
DASA – Data Acquisition, Storage, and Analysis
DBMS – Data Base Management System
DFO – Designated Federal Officer
DOE – Department of Energy
DOI – Department of the Interior
DOIFF – Department of the Interior Federal Family
EA – Environmental Assessment
EIS – Environmental Impact Statement
ESA – Endangered Species Act
FACA – Federal Advisory Committee Act
FEIS – Final Environmental Impact Statement
FRN – Federal Register Notice
FTE – Full Time Employee
FWS – United States Fish & Wildlife Service
FY – Fiscal Year (October 1 – September 30)
GCD – Glen Canyon Dam
GCDAMP - Glen Canyon Dam Adaptive Management Program
GCES – Glen Canyon Environmental Studies
GCMRC – Grand Canyon Monitoring & Research Center
GCNP – Grand Canyon National Park
GCNRA – Glen Canyon National Recreation Area
GCPA – Grand Canyon Protection Act
GCRG – Grand Canyon River Guides
GCWC – Grand Canyon Wildlands Council
GLCA – Glen Canyon National Recreation Area
GRCA – Grand Canyon National Park
GSF – Green Sunfish
HBC – Humpback Chub (endangered native fish)
HFE – High Flow Experiment
HMF – Habitat Maintenance Flow
HPP – Historic Preservation Plan
IG – Interim Guidelines
INs – Information Needs
IFFF – International Federation of Fly Fishers
KA – Knowledge Assessment (workshop)
KAS – Kanab Ambersnail (endangered native snail)
LCR – Little Colorado River
LCRMCP – Lower Colorado River Multi-Species Conservation Program
LTEMP – Long-Term Experimental and Management Plan
LTEP – Long Term Experimental Plan
MA – Management Action
MAF – Million Acre Feet
MATA – Multi-Attribute Trade-Off Analysis
MLFF – Modified Low Fluctuating Flow
MO – Management Objective
MRP – Monitoring and Research Plan
NAU – Northern Arizona University (Flagstaff, AZ)
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NNFC – Non-native Fish Control
NOI – Notice of Intent
NPCA – National Parks Conservation Association
NPS – National Park Service
NRC – National Research Council
O&M – Operations & Maintenance (Reclamation Funding)
PA – Programmatic Agreement
PBR – Paria to Badger Creek Reach
PEP – Protocol Evaluation Panel
POAHG – Public Outreach Ad Hoc Group
Powerplant Capacity = 31,000 cfs

R&D – Research and Development
RBT – Rainbow Trout
Reclamation – United States Bureau of Reclamation
RFP – Request for Proposal
RINs – Research Information Needs
ROD Record of Decision
RPA – Reasonable and Prudent Alternative
SA – Science Advisors
SAEC – Science Advisors Executive Coordinator
Secretary – Secretary of the Interior
SCORE – State of the Colorado River Ecosystem
SHPO – State Historic Preservation Office
SOW – Statement of Work
SSQs – Strategic Science Questions
SWCA - Steven W. Carothers Associates
TCD – Temperature Control Device
TCP – Traditional Cultural Property
TEK – Traditional Ecological Knowledge
TES – Threatened and Endangered Species
TMC – Taxa of Management Concern
TMF – Trout Management Flows
TWG – GCDAMP Technical Work Group
UAMPS – Utah Associated Municipal Power Systems
UCRC – Upper Colorado River Commission
UDWR – Utah Division of Water Resources
USFWS – United States Fish & Wildlife Service
USGS – United States Geological Survey
WAPA – Western Area Power Administration
WY – Water Year