

Glen Canyon Dam Adaptive Management Work Group Meeting February 14-15, 2018

Wednesday, February 14, 2018

Start Time: 9:30 am

Conducting: Andrea Travnicek, Deputy Assistant Secretary for Water and Science,
Department of the Interior

Facilitator: Mary Orton, The Mary Orton Company, LLC

Recorder: Lauren Johnston, The Mary Orton Company, LLC

Summary Actions

- Reclamation confirmed that attachments to the notes will be publicly available and easy to find on the AMWG website.
- Reclamation will look into making the meeting minutes searchable. (Note: The minutes posted on the website are searchable. Sometimes the minutes included in the packets are not searchable.)

Presentations and Discussion

Details of the presentations summarized below are included in PowerPoints available on the AMWG website when noted.

Welcome and Administrative

Presenters and Affiliation: Andrea Travnicek, Deputy Assistant Secretary of the Interior for Water and Science and Secretary's Designee Alternate; Brent Rhees, Upper Colorado Regional Director, Designated Federal Officer; Katrina Grantz, Chief, Adaptive Management Group; Mary Orton, The Mary Orton Company.

Attendees introduced themselves. Andrea welcomed newly nominated AMWG and TWG members Jim Strogon (recreational fly fishing, TWG), Richard Begay (Navajo Nation nominated AMWG member), and Steve Johnson (WAPA nominated AMWG member) to their first meeting. She noted that there were three stakeholders whose member and alternate status were awaiting confirmation, and though they could not participate in voting on motions, they were welcome at the table and in all discussions: State of Arizona, State of Colorado, and WAPA.

Announcements

There are no agenda item forms in this meeting's packet, and the plan is that there will be agenda item forms in the future only for agenda topics that seek action by the AMWG. Attendees were invited to provide feedback on this plan on the evaluation forms. They were also invited to provide input on the new minutes format.

Approval of September 20, 2017 Meeting Minutes

Approving the minutes was postponed until Grand Canyon River Guides, State of Colorado, and CREDA could provide their respective requested edits to be incorporated into the notes. Motion and vote to approve was delayed until the second day of the meeting on February 15, 2018.

Budget and Work Plan Update

All changes requested at the September 20, 2017 meeting were incorporated into the FY 2018-2020 Triennial Budget and Work Plan. Some of these changes required an update to the Budget Decision Document, which are in progress. Katrina is updating the Secretary's annual report to include the updates to the Triennial Budget and Work Plan.

Action Item Tracking Report

From last meeting, Action items 2006.Dec.02 and 2012.Aug.01 are now closed.

Katrina will work with Andrea to establish a process for developing monitoring metrics for measuring LTEMP progress and a updating and streamlining GCDAMP guiding documents as described in the LTEMP ROD under action item 2017.Sep.01.

Action items 2017.Sep.02, 2017.Sep.03, and 2017.Sep.04 were changes to the FY2018-20 Triennial Budget and Work Plan that were included in the final version of the Work Plan, and so will be closed.

Action item 2017.Sep.05, to solicit expertise to consider hydropower in a broader context, is still open. Andrea and Katrina are working together to determine the best way to approach this subject. This will likely be a discussion point at the next in-person AMWG meeting.

[Attachment 1](#): *Action Item Tracking Report*

Administration Update

Brenda Burman has been confirmed as the Commissioner for the Bureau of Reclamation. The Assistant Secretary of the Interior for Water and Science and the Secretary's Designee for the GCDAMP AMWG is now Dr. Timothy R. Petty. Dr. Petty may attend some of the AMWG meetings, schedule permitting; however, Andrea, who has been named Secretary's Designee's Alternate, will attend all of the meetings.

The process for nominating and re-nominating representatives to the AMWG is not yet complete. Andrea thanked members for their patience as this is finalized. An open call for nominations will go out next week. If you have already submitted your nomination, you need to do nothing further at this time. The AMWG chair and organizers will be working closely with the stakeholders to determine the appropriate nominees. DOI hopes to issue an update on the process soon.

The DOI administrative reorganization map is open for comment, with another draft of the map forthcoming, updated per public feedback. DOI is attempting to streamline decision-making by exploring the option of all bureaus and services within the Department of the Interior having the same 13 regional boundaries.

Brown Trout Workshop and Report Results

Presenter & Affiliation: Dr. Michael Runge, Research Ecologist, USGS, Patuxent Wildlife Research Center

Presentation Summary

The motion from the February 2017 AMWG meeting to address the rising population of Brown Trout (BT) at Lees Ferry prompted the September 2017 BT Workshop (Workshop). The purpose of the Workshop was to discuss scientific evidence for a perceived increase in the BT population at Lees Ferry, potential hypotheses for the causes of the increase, and possible management actions. A team of 10 GCMRC and GCDAMP partner experts worked together to evaluate the available data and document findings and hypotheses in a forthcoming report. The report will be

reviewed by outside experts coordinated by the Science Adviser. In short, there is a roughly 2/3 chance the BT population will increase to a new equilibrium level. If this occurs, this could negatively affect the population of HBC in the Grand Canyon. Because this is a natural system with many factors that cannot be experimentally controlled, there is a high degree of uncertainty in the analyses. There is no way, with the given data, to definitively determine which of the reports' hypothesis, or combination of hypotheses, is causing the increase in BT.

The referenced presentation and the forthcoming white paper (expected April 2018) detail the scientific analysis, hypotheses, and conclusions from the team of experts and the BT Workshop. The report will include an economic assessment of available potential management actions to address the BT population rise and its effects on other resources.

Discussion/Q & A

Points made during discussion included the following.

- The workshop report will include a section on monitoring and research considerations and the potential consequences from gathering further information.
- Any proposed management action to control the BT population is only effective if the factor the management action is designed to reverse is in fact causing the rise in BT population.
- There is still potential that natural weather factors, such as heavy rains in May and June causing turbidity in the waters, could also be having an effect on the BT population.
- There is inherent uncertainty in the report largely due to the small sample size. The most powerful way to resolve uncertainty is to design experiments with randomization and control. This effort would work at identifying causation rather than just correlation. It's hard to design random, controlled experiments with so many resources and tradeoffs. In the absence of these studies, the available course of action is to build up correlational evidence while addressing uncertainty by studying key parameters of each hypothesis for what is causing the BT increase.
- Deciding which resources to weight above others is the job of resource managers, with stakeholder input. A point to consider is that some management actions might cause reversible changes to certain resources, while others might result in irreversible changes.
- The group has jumped to the conclusion that an increase in BT is a bad thing, due to the impact the population increase has on the RBT fishery and HBC populations downstream. The Hopi Tribe is concerned that removal of BT is an unnecessary taking of life in the canyon. There is not enough evidence to predict where the BT will go in the river system or if they will establish a population in the LCR.
- There is the potential that an increase in BT population at Lees Ferry would increase migratory behavior of BT to the LCR, which could establish a population there. The question of whether or not an increase in the population of BT is a bad thing is a value judgement that science cannot address.
- The workshop paper used the LTEMP preferred alternative expectation of 20 HFEs over a 20-year period, with some of these HFEs expected in the Spring.
- The workshop paper looked at the BT population in Lees Ferry as problematic. This narrow research scope did not consider management actions in Marble Canyon. It's the AMWG's job to determine if an increase in BT overall would be problematic, and to recommend a change to GCMRC's research objectives if needed. The workshop included data from Marble Canyon to inform this research effort.
- Researchers are currently using sonic tags to track BT movements in the canyon.

- The workshop report does not consider any alternative actions that required waiting for additional data. Waiting for more data prior to action could result in irreversible changes in the river system. The AMWG can consider implementing any number of available management actions at different time points.
- The workshop report did not identify a combination of management actions that would present the best possible solution.

[Attachment 2](#): *Brown Trout in Lees Ferry: Evaluation of Causal Hypotheses and Potential Interventions PowerPoint Presentation*

Basin Hydrology and Dam Operations

Presenter and Affiliation: Paul Davidson, Bureau of Reclamation

Presentation Summary

Reservoir storage is adequate, however hydrology in the Colorado River Basin is significantly below average this year. Snow accumulation is at 44% of the 30-year median index as of February 12. The current most probable spring runoff forecast is 55% of average. The minimum and maximum probable hydrological forecasts are also below average. The Glen Canyon Dam operating tier in 2018 is the Upper Elevation Balancing Tier. Under all probable inflow scenario (minimum, maximum, and most), Glen Canyon Dam is scheduled to release 9.0 million acre-feet in water year 2018.

The projected water year release volumes for 2019, also in the Upper Elevation Balancing Tier, are between 8.92 and 11.57 maf.

Maintenance requirements at the powerplant caused some adjustments to the LTEMP release volume last year. In November 2018, all units will be available for a a potential High Flow Experiment, pending any unforeseen maintenance.

Discussion/Q & A

- Maintenance is planned on a 5-year schedule. Unexpected maintenance cannot be predicted or controlled. The AMWG chair will be discussing the option of planning a Spring HFE in 2020 and powerplant maintenance schedule will take into consideration the possibility of a Spring HFE.

[Attachment 3](#): *Basin Hydrology, Water Years 2018-2019 Operations PowerPoint Presentation*

Rainbow Trout Stocking

Presenter and Affiliation: James deVos, Assistant Director, Wildlife Management Division, AZGFD

Presentation Summary

The catch per unit effort (CPUE) of RBT decreased significantly in Lees Ferry from 2012 to 2016. This has caused a significant decrease in anglers using the fishery, resulting in economic strain in the area. The AZGFD is planning to introduce 16,000 sterile RBT in Lees Ferry between April 1 and October 15, 2018, when angler pressure is highest in the area. AZGFD has previously stocked RBT to maintain the fishery. AZGFD is working with the USFWS on a one-year

cooperative agreement to lead to a 20-year program with an agreed-upon stocking procedure consistent with management in the upper basin. AZGFD seeks input from the AMWG on the cooperative agreement. AZGFD has met with the TWG for input.

Discussion/Q & A

- Eric Bobelu read a letter from the Pueblo of Zuni Governor registering Zuni opposition to the RBT stocking in Lees Ferry on the grounds that it would promote the unnecessary taking of life in the Grand Canyon.
- There is a 100+ year history of stocking RBT in Lees Ferry. This latest proposed stocking has been discussed several times at TWG meetings. AZGFD has reached out to Kurt Dongoske for consultation. AZGFD is meeting with their policy department and the Attorney General to discuss National Historic Preservation Act (NHPA) Section 106 concerns.
- AZGFD has a public meeting planned on March 5, 2018 for the stocking initiative. AZGFD plans to return to the AMWG and TWG after this year to present its 20-year program Memorandum of Understanding (MOU) for each committee's input.
- USFWS has completed Endangered Species Act (ESA) Section 7 compliance on its Federal Action, the 20-year program MOU. USFWS will be assisting with the logistics and planning of carrying out the stocking effort. As it stands, USFWS's role in the process is not yet entirely clear.
- While the NPS supports a healthy RBT fishery, GRCA does not believe the stocking effort is consistent with the GRCA management plan and requests the application of a research permit by AZGFD to further collaborate. GRCA does not feel the management requirements for NHPA Section 106 consultation have been met.
- There is concern that the restocking shouldn't be an ongoing effort. An increase in RBT could result in an increase in BT eating RBT, further causing an increase in the BT population.
- AZGFD's goal is to increase the number of catchable fish at Lees Ferry. The RBT population decline that precipitated the stocking action was potentially caused by several factors. These include low dissolved oxygen in the water, depressed food base, and a prior overpopulation. The understanding is that the population of RBT got too high, there was not enough food, and then low dissolved oxygen and changes in phosphorous levels resulted in a population crash.
- The current indication is that the RBT population is on the rise. This correlates with a rise in phosphorous, which is the main driver of food base increase.
- There is concern that stocking RBT would introduce another confounding factor into determining what's causing a BT increase. While AZGFD does not anticipate that adding this few fish would confound the data, the potential does exist.
- Members of the AMWG are concerned that federal and state powers are dictating actions to the AMWG without properly seeking input. There is also a question of why the AZGFD is stocking RBT when they could be stocking native species.
- The Southern Paiute Consortium does not approve of the political and monetary drivers of the stocking initiative.
- AZGFD feels it has maintained tribal relationships with this and various other actions, and that the department's goal is a balanced system. AZGFD has a responsibility to the community surrounding the Lees Ferry fishery, including anglers and fishing guides.

[Attachment 4a](#): *AMWG Desired Future Conditions PowerPoint Presentation*

[Attachment 4b](#): *Governor Val Panteah's Statement on the Proposed Stocking of Rainbow Trout at Lees Ferry by Arizona Game and Fish Department Presented to the Glen Canyon Dam Adaptive Management Work Group, Phoenix, Arizona, February 14, 2018*

Joint Tribal Liaison Report

Presenter & Affiliation: Theresa Pasqual, DOI/OWS; Sarah Rinkevich, DOI

Presentation Summary

The job of the Joint Tribal Liaison is to continue building the relationship between government agencies and the tribes. Tribes strive to emphasize the human connection to management actions, to participate in actions where impacts to tribes are involved, to expand tribal knowledge of the river system, to continue to discuss matters important to the tribes, and to identify common needs of all parties.

Reclamation is leading an effort to prepare a HPP for the LTEMP Programmatic Agreement; participants include the NPS, Reclamation, SHPO, WAPA, CREDA, BIA, Grand Canyon Wildlands Council, Grand Canyon River Guides, NPCA, the Navajo Nation, the Kaibab Tribe, the Hualapai Tribe, and the Pueblo of Zuni. The goals of the HPP are to identify, preserve, resolve effects, and foster awareness of historic properties. The writing group is meeting regularly.

There has been considerable discussion within the writing group about the AZGFD stocking proposal.

There is money in the budget for an integrated GCDAMP River Trip in 2019.

[Attachment 5](#): *GCDAMP Joint Tribal Liaison Report PowerPoint Presentation*

Stakeholder's Perspective – Utah Associated Municipal Power Systems

Presenter & Affiliation: Ted Rampton, Senior Political Policy Advisor, UAMPS

Presentation Summary

UAMPS provides a scale of size to members to meet energy needs and participate in the energy markets in ways they couldn't otherwise. UAMPS supports 17 energy projects, including wind and solar projects.

UAMPS members have a significant interest in Glen Canyon Dam operations, as they affect energy generation and pricing. The Colorado River Storage Project (CRSP) currently provides 30% of UAMPS member loads. Changes to the CRSP operation affects how UAMPS participates with other power resources. Initially CRSP power was generally more expensive; it is valued for its load-following properties. UAMPS' goal in AMWG participation is to represent energy stakeholder views on power production impacts due to changes in Glen Canyon Dam operations.

Discussion/Q & A

- UAMPS' daily operations include managing power generation with resources and loads, tracking revenue from each power project, transmission planning and resource development, and federal and state agency communication.

- UAMPS only works with nonprofits, i.e. cities, and not private companies. UAMPS seeks to help nonprofit entities by providing resources they couldn't otherwise get on their own.
- CREDA represents 90% of agencies involved with the CRSP. UAMPS and CREDA find efficiencies by working together.
- Decisions made by the AMWG can cause UAMPS to have to find alternative energy sources when GCD capacity is reduced. UAMPS is looking for reliable, renewable energy sources that can meet load requirements. UAMPS strives to keep participating organizations informed about what type of energy the association is purchasing.

[Attachment 6](#): *UAMPS Stakeholders Perspective PPT*

2018 GCDAMP Annual Reporting Meeting Update

Presenter & Affiliation: Scott VanderKooi, Chief, and Mike Moran, Deputy Chief, GCMRC, USGS

Presentation Summary

The Annual Reporting meeting did not take place due to the government shutdown in January. The referenced presentation provides a preview of what will be discussed at the meeting, yet to be scheduled.

[Attachment 7](#): *GCMRC 2018 Annual Reporting Meeting Preview PowerPoint Presentation*

Public Comment

Sinjin Eberle with American Rivers thanked the AMWG for their work and notified the group that a representative from American Rivers will be in attendance at future AMWG meetings.

Thursday, February 15, 2018

Start Time: 8:30 am

Conducting: Andrea Travnicek, Deputy Assistant Secretary for Water and Science,
Department of the Interior

Facilitator: Mary Orton, The Mary Orton Company, LLC

Recorder: Lauren Johnston, The Mary Orton Company, LLC

Summary Actions

- The next AMWG meeting is a webinar scheduled for May 23, 2018.
- The next in-person AMWG meeting is scheduled for August 22-23, 2018, location TBD.

Presentations and Discussion

Details of the presentations summarized below are included in PowerPoints available on the AMWG website when noted.

Welcome and Administrative

Presenters and Affiliation: Andrea Travnicek, Deputy Assistant Secretary of the Interior for Water and Science, and Secretary's Designee Alternate; Brent Rhees, Upper Colorado Regional Director, Designated Federal Officer; Katrina Grantz, Chief, Adaptive Management Group; Mary Orton, The Mary Orton Company, LLC

Approval of September 20, 2017 Meeting Minutes

Steve Wolff moved, and Larry Stevens seconded, to approve the minutes with the following edits:

Page 2, under "Administration," second line:

Change "Travenick" to "Travnicek."

Page 4, under "FY 2018-2020 Triennial Budget and Work Plan," first bullet, last sentence:

Colorado ~~expressed concern regarding whether certain proposed projects adhered to~~ wants a clearer tie between Basin Funded GCMRC actions and GCPA authorization for use of the Basin Fund goals and ~~shared~~ wrote an explanatory memorandum to that effect (Attachment 4d).

Page 5, under "Discussion/Q&A," third bullet:

Colorado's requested language additions to project elements C4, D1, and F3 (approved in the motion noted on page 1) were offered to address concerns that Basin Fund should be used for projects that address matters related to dam operations or mitigation for dam operations ~~changes to the budget are meant as a guide to GCMRC for experimental design to stay within the authorities of the GCPA.~~

Page 8, under "Interested Persons:"

Add Carlee Brown, Colorado Water Conservation Board.

Regarding attachments: In the future, please either include attachments in the digital version of the minutes or indicate that they can be found on the website.

Page 5, under “Discussion/Q&A,” fourth bullet:

Ms. James echoed Colorado’s comments that CREDA requested Basin Fund expenditures revenues should be scrutinized so as to not be used for regular management actions, or actions under the LTEMP that are not tied directly to dam operations (such as visitor use, section 106 outside or mitigations in the CRE).

Page 5, under “Discussion/Q&A,” add a bullet after the third bullet:

GCRG asked what specifically about those projects did Colorado feel was not related to dam operations. Colorado reiterated its point, restating its opinion that the projects were not related to dam operations and therefore were outside the authorities of the GCPA.

The meeting minutes were approved as edited by consensus. The final version of the minutes can be found on the AMWG website.

DOI Invasive Species Initiative

Presenter(s) and Affiliation: Hilary Smith, Senior Advisor for Invasive Species, Department of the Interior; Jolene Trujillo, Invasive Species/Integrated Pest Management Coordinator, Bureau of Reclamation; John Wullschleger, Fish Program Lead, National Park Service; Diane Waller, Research Fisheries Biologist, U.S. Geological Survey; and Sherri Pucherelli, Biologist, Bureau of Reclamation

Presentation Summary

Quagga mussels have spread in the Great Lakes region via recreational watercraft. Negative impacts from infestation include those to hydropower, irrigation, water delivery, fishing, and threats to native species. The DOI is working with critical urgency to address the substantial costs of invasive species. This includes an increase in funding of \$1 million for FY 2017 and proposed \$4.5 million in FY 2018 for mussel-related activities.

Secretary Zinke suggested DOI play a leadership role in controlling invasive species to prevent the Columbia River Basin and the waters of the West from becoming infested. The DOI is focused on collaboration with tribal and state governments to address aquatic infrastructure, inspection and decontamination, monitoring, research and innovation, education and outreach, and policy and coordination in relation to controlling invasive species. The initiative meets monthly to discuss progress and prepare a progress report. Members of the initiative provide outreach to affected and interested groups as well.

A partnership of federal agencies published “[Safeguarding the West from Invasive Species: Actions to Strengthen Federal, State, and Tribal Coordination to Address Invasive Mussels](#)” to identify actions to strengthen federal, state, and tribal coordination to address invasive mussel species. NPS has focused \$2 million annually on watercraft inspection and decontamination. The USGS is actively researching molecular tools for rapid response for controlling invasive mussels. Reclamation is researching cleaning and operational methods, including UV light treatments and changes in water temperature and turbulence at its facilities to help control mussel infestation.

Discussion/Q & A

- The 43 recommendations in the “Safeguarding the West from Invasive Species” report have provided needed direction to agencies in the West.
- It’s not possible to predict where mussels will establish with 100% accuracy. There are several places with good mussel habitat where they don’t establish. They don’t establish everywhere that they initially appear and don’t move upstream. With continued inoculation from, for example, contaminated equipment, it is more likely that mussels will establish. The best the group can do is to plan. The initiative has developed site-specific vulnerability assessments to identify locations most at risk for mussel infestation to help in this effort.
- The likely cost of a mussel infestation in the Columbia River Basin is \$500 million per year.
- A component of the early detection and rapid response research by the USGS and partners is to try to predict which species may become invasive in the future. This could allow more proactive rather than reactive treatments.
- While the decontamination efforts are targeted at mussels, they can also help to prevent the spread of other invasive species.
- AMWG requested additional information on quagga mussel effects on each specific resource under AMWG consideration, as a helpful tool for weighing management options.
[Attachment 8](#): *U.S. Department of the Interior Invasive Mussels Initiative PowerPoint Presentation*

Report and Status Update on the NPS EA: “Expanded Non-native Aquatic Species Management Plan in Glen Canyon National Recreation Area and Grand Canyon National Park below Glen Canyon Dam”

Presenter & Affiliation: Rob Billerbeck, Colorado River Coordinator, National Park Service

Presentation Summary

The goal of the non-native aquatic species management EA is to identify additional tools NPS can use to help control invasive species in an adaptive and effective way. A key component of the purpose and need for the EA is to maintain the RBT fishery in Lees Ferry.

The EA team is developing a table of management tools the agency can use where specific conditions and/or native species are found, as well as what may trigger certain actions and what mitigations may be required after certain actions.

NPS is currently reviewing scoping comments and refining the suite of alternatives for the EA. A cooperating agency meeting is forthcoming. An offer of consultation is open to all interested tribes. NPS plans to meet with the Pueblo of Zuni for consultation.

Discussion/Q & A

- NPS will continue to consider the Lower Colorado River multi-species conservation program papers as resources in the development of the EA.
- The AZGFD agrees to be a cooperating agency for this effort with the caveat that AZGFD is interested in pursuing the following, per its January 14, 2018 letter to NPS:
 - Bounty system for angler removal of invasive species
 - Modifying the slough habitat

- Shifting emphasis from Fall to Spring HFEs
- Opposing electrofishing and lethal trapping in Lees Ferry
- Opposing introduction of pikeminnow and HBC in Lees Ferry
- Researching introduction of pikeminnow and HBC in the West Grand Canyon
- CREDA and Trout Unlimited request NPS to post full scoping comments (not only summaries) to the NPS website to help inform the next round of comments.
- Trout Unlimited requests NPS consider reopening scoping after the publication of the EA. This would be a highly unusual action.
[Attachment 9: Expanded Non-Native Aquatic Species Management Plan below Glen Canyon Dam PowerPoint Presentation](#)

Science Advisors' 2018 Work Plan

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

Presentation Summary

The Science Advisors have recently conducted external, independent reviews of two brown trout reports. In addition, the Science Advisors plan to reinstitute a five-person standing independent review panel with non-staggered membership cycled on a three-year term. Suggestions from the AMWG on which individuals should be included on the panel are welcome.

Discussion/Q & A

- There is no proposed overlap of review panel membership. The Science Advisors recommend giving each member of the panel an equal amount of time and background to assess each triennial workplan.
- The panel will ideally be made up of individuals with expertise in engineering, science, cultural concerns, socio-economics, and socio-ecological systems.
- There were no standing review panels in FYs 15-17. There is no mechanism in place for a continuing review panel. The charter from Reclamation for the Science Advisors is in the process of being updated and formally revised. The changes this year were reflected in the latest triennial work plan.
- USGS has its own external review panel system to audit particular parts of the GCMRC research program. In addition, USGS goes through a formal peer review process.
- It's not clear why the cultural review panel did not happen last year, nor how cultural considerations will be brought into the Science Advisor panel's review of the triennial work plan.
- Reclamation is working to get specific monitoring metrics in place to help evaluate progress toward the LTEMP goals. The AMWG can direct the science advisors to review specific goals and the status towards reaching those goals. In the past the science advisors performed a knowledge assessment to address any gaps in knowledge that needed to be addressed.
- There is no one set model for the science advisors and the independent review panels. Recently, Reclamation utilized the science advisors in reviewing a final NPS contract report related to conservation measures and fisheries management in Bright Angel Creek.
[Attachment 10: Science Advisors Program Work Plan for FY2018 and Beyond PowerPoint Presentation](#)

Technical Working Group Chair Report

Presenter & Affiliation: Seth Shanahan, TWG Chair

Presentation

As one of its standing responsibilities, TWG has been discussing how to identify appropriate metrics for monitoring how well the LTEMP is doing at reaching its goals and objectives. Appendix C of the LTEMP provides a basis for future conversation on this topic. RECLAMATION is working with the new chair, Andera Travnicek, to discuss the best path forward for developing metrics.

The cultural resources ad hoc group has been disbanded, per Kurt Dongoske's and TWG's recommendation, as the work of the group can now be handled through the PA. Bill Chada will provide future cultural updates through his role as lead for the PA.

The water quality science review panel study, which was designed to evaluate past water quality work and provide recommendations on future modelling protocols and tools that could be better utilized, is forthcoming.

The adult population of HBC is robust and, thus, did not trigger any tier one actions identified in the LTEMP BO. No tier two actions to preserve HBC are triggered at this time either.

For its next meeting, the TWG requested to hear presentations on considerations of changes to the triennial work plan, potential 2018 experiments, discussion about Spring HFE planning, RBT stocking, amount of life taken in the canyon as a result of management and experiments, status of temperature control device feasibility studies, how climate change affects inflows to Lake Powell, and non-market value studies.

Discussion/Q & A

- GCMRC prepared a mussel risk assessment 10 years ago, which addresses several questions on the quagga and zebra mussel invasive species risks. Several GCMRC studies are tracking changes to mussel populations in the system, including nutrient dynamic studies.
- If AMWG wants TWG to spend more time on any topic, then AMWG needs to authorize more time. If there are more specific data needs that go beyond what AMWG is already looking at, then TWG can explore those and report back to AMWG.

[Attachment 11: Technical Work Group Chair Report PowerPoint Presentation](#)

Possible LTEMP Experiments in 2018

Presenter & Affiliation: Katrina Grantz, Chief, Adaptive Management Group, Upper Colorado Region, Bureau of Reclamation, Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center

Presentation Summary

There is guidance from the LTEMP as to which experiments can be initiated in any given year. Consultation direction in the ROD involves looking at past scientific data and discussing experiments with TWG, AMWG, and a technical team to recommend a course of action to DOI. The Secretary of the Interior makes the final decision on which experiments are implemented.

The possible experiments for this year include: no experiments, bug flows, trout management flows, a Fall HFE, and an extended duration Fall HFE.

Big oscillations in fish populations (as we have seen in the RBT populations in Glen Canyon) are not desirable. AMWG wants to manage those so they don't result in a crash, or in overpopulation that results in further colonization. A trout management flow (TMF) could be used to manage trout population and to analyze fish behavior.

The goal of bug flows is to increase the aquatic food base by periodically creating ideal insect egg-laying conditions, while minimizing impacts to hydropower. The bug flow design is steady-low weekend releases and normal fluctuating releases during the weekdays. Recent analysis shows that bug flows may have different impacts as you move downstream; an ideal bug flow at Lees Ferry is less ideal at Diamond Creek, as daily waves move downstream. Slightly increasing the steady weekend release could produce a more beneficial result of the bug flow across the system.

Discussion/Q & A

- Appendix K of the EIS states that bug flow cost per experiment is \$871,000 for energy value, but an overall \$2.49 million capacity benefit. There is then a net benefit of \$1.62 million per experiment. The energy costs for this year are lower due to a myriad of factors. There is an increase in cost due to adding water on the weekend before a bug flow. The models of bug flows and energy costs are sensitive to energy prices and can fluctuate with time of day, temperature, etc. The current models for maximizing effect of bug flow and minimizing energy cost use WAPA's current energy prices.
- Financial effect of bug flows could result in cash out of the basin fund, which could result in a rate bump for energy purchasers.
- Bug flows could be designed to mimic historic low flow events in the summer. Floating microcosms for egg laying could also be added to the bug flow design, simply for the purpose of experiment and to inform future bug flow experiments.
- It's important to continue tribal, SHPO, and THPO consultation for complete trout management flows and the proposed take in these management actions. These things were not considered in development of the PA, and will need to be addressed with an MOA. Compliance should be figured out before, not after, experiments.
- TMFs were designed to control RBT populations. Not much is known how these flows could affect BT.

[Attachment 12a](#): *Possible LTEMP Experimental and Management Actions for 2018 PowerPoint Presentation*

Considerations for Seasonal Scheduling of HFEs

Presenter & Affiliation: Katrina Grantz, Chief, Adaptive Management Group, Upper Colorado Region, Bureau of Reclamation; and Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center

Presentation Summary

Larry Stevens requested this item to open the dialogue about scheduling Spring HFEs and to understand what triggers a Spring HFE.

Anytime Reclamation considers an HFE, they must first plan the HFE, model what might happen, and then consult with tribes, agencies, AMWG, and TWG prior to implementation.

There are two kinds of Spring HFEs in the LTEMP: sediment-triggered and proactive (to mobilize and “park” sediment prior to high equalization releases). There is no consensus on whether a proactive HFE will work. There are approximately 5.7 Spring HFEs projected in the 20-year LTEMP period. The sediment trigger for a Spring HFE is the same as for a Fall HFE, just at a different time of year. The planning considerations for a Spring HFE include the need for research and monitoring, which may require scientists to access the reserve experimental fund.

Discussion/Q & A

- The rationale for the Spring HFE sediment accounting period is not universally agreed upon. When HFE events are scheduled, the sediment accounting clock needs to be reset as to not run into a sediment deficit. There is still debate over at which interval to reset the clock in order to take advantage of sediment inputs. The Fall HFE accounting period starts July 1, which is the typical official start of monsoon season. The Spring HFE season accounts for the other half of the year. There is still debate over what the accounting periods should be. As it stands, a trigger for the Spring HFE would occur less reliably.
- The accounting period does not seem flexible enough to adjust for changing conditions. More flexibility needs to be built in. The potential for restarting sediment accounting could begin in December. The winter months are high volume release months.
- There is always uncertainty with deciding on whether or not to do an HFE, as we cannot predict sediment loads.
- Adaptive management should be adaptive, and AMWG should explore the possibility of a Spring HFE. Spring HFEs appear to be important for fish behavior, and having an HFE in the Spring is important to recreation.
- If a Spring HFE is triggered then the AMWG can do experiments to determine the impacts. It appears to be important enough to explore. Running a Spring HFE without it being triggered runs the risk of reducing the sand mass balance.
- It's unclear how much flexibility is in the LTEMP ROD to allow for an untriggered Spring HFE. Actions outside of the ROD could require additional NEPA compliance. Andrea requested time to consider what is allowed with the assistance of the DOI Solicitor's Office.
[Attachment 12b](#): *Considerations for Seasonal Scheduling of High Flow Experiments (HFEs)*
PowerPoint Presentation

GCDAMP Administrative History Project Update:

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

Presentation Summary

Professor Hirt is preparing an administrative history of the AMWG through 30 video and oral history interviews. The website for this project is being built and will be available soon. Professor Hirt requests suggestions on persons to interview for the project and institutions from which to gather maps and other data for the website.

Glen Canyon Dam Adaptive Management Program: AMWG Meeting, February 14-15, 2018

[Attachment 13: GCD AMP Administrative History Project PowerPoint Presentation](#)

Meeting Adjourned at 3:00 pm

Meeting Attendees—Wednesday, February 14, 2018

AMWG Members and Alternates

Melinda Arviso-Cioccio, Navajo Nation
Jan Balsom, NPS-GRCA
Richard Begay Navajo Nation
Eric Bobelu, Pueblo of Zuni
David Brown, Grand Canyon River Guides
Charley Bullets, Southern Paiute Consortium
Kathleen Callister, Reclamation
Chris Cantrell, AZGFD
Kerry Christensen, Hualapai Tribe
Kevin Dahl, NPCA
James deVos, AZGFD
Ed Gerak, CREDA
John Hamill, IFFF/Trout Unlimited
Jayne Harkins, State of Nevada
Dawn Hubbs, Hualapai Tribe
Leslie James, CREDA
Steve Johnson, WAPA
John Jordan, IFFF/Trout Unlimited

Vineetha Kartha, Arizona
Chris Lehnertz, NPS-GRCA
Chip Lewis, BIA
John McCLOW, Colorado
Eric Millis, State of Utah
Jessica Neuwerth, Colorado
David Nimkin, NPCA
Don Ostler, State of New Mexico
Daniel Picard, Reclamation
Ted Rampton, UAMPS
Brent Rhees, Reclamation
Peggy Roefer, State of Nevada
Brian Sadler, WAPA
Steve Spangle, USFWS
Larry Stevens, Grand Canyon Wildlands Council
Andrea Travnicek, DOI
Steve Wolff, State of Wyoming
Mike Yeatts, The Hopi Tribe

USGS/GCMRC Staff

Helen Fairley
Michael Moran

Michael Runge
Scott VanderKooi

Bureau of Reclamation Staff

Bill Chada
Marianne Crawford
Paul Davidson
Katrina Grantz

Corinne Horner
Shana Tighi
Christopher Watt
Linda Whetton

Interested Persons

Rob Billerbeck, NPS
David Braun, Science Advisors
Carlee Brown, State of Colorado
Jeanne Calhoun, NPS-GRCA
Shane Capron, WAPA
Bill Davis, CREDA
Sinjin Eberle, American Rivers
Jessica Gwinn, USFWS
Ken Hyde, NPS-GLCA

Lauren Johnston, The Mary Orton Company
Ryan Mann, AZGFD
Joe Miller, Trout Unlimited
Mary Orton, The Mary Orton Company
Theresa Pasqual, DOI-OWS
Bill Persons, IFFF/Trout Unlimited
Sarah Rinkevich, DOI
William Shott NPS-GLCA
Rodney Smith, DOI Solicitor's Office

Webinar Attendees

Mark Anderson, NPS-GLCA
Lucas Bair, USGS/GCMRC
Eric Balken, Glen Canyon Institute
Clifford Barrett, UAMPS (AMWG Alternate)
Winkie Crook, Hualapai Tribe
Kurt Dongoske, Pueblo of Zuni
Craig Ellsworth, WAPA
Amy Haas, UCRC
Brian Healy, NPS
Ted Kennedy, USGS/GCMRC
Robert King, State of Utah (AMWG Alternate)

Josh Korman, Ecometric Research
Kirk LaGory, Argonne National Laboratories
Ted Melis, USGS
Clayton Palmer, WAPA
David Rogowski, AZGFD
Seth Shanahan, SNWA
Jim Stroger, Trout Unlimited
Melissa Trammell, NPS
Jeffrey Woner, KR Saline
Charles Yakulic, USGS/GCMRC
Kirk Young, USFWS (AMWG Alternate)

Meeting Attendees, Thursday, February 15, 2018

AMWG Members and Alternates

Melinda Arviso-Cioccio, Navajo Nation

Jan Balsom, NPS-GRCA

Richard Begay Navajo Nation

Eric Bobelu, Pueblo of Zuni

David Brown, Grand Canyon River Guides

Charley Bullets, Southern Paiute Consortium

Kathleen Callister, Reclamation

Chris Cantrell, AZGFD

Kerry Christensen, Hualapai Tribe

Kevin Dahl, NPCA

Ed Gerak, CREDA

John Hamill, IFFF/Trout Unlimited

Jayne Harkins, State of Nevada

Dawn Hubbs, Hualapai Tribe

Leslie James, CREDA

Steve Johnson, WAPA

John Jordan, IFFF/Trout Unlimited

Vineetha Kartha, Arizona

Chris Lehnertz, NPS-GRCA

Chip Lewis, BIA

John McCLOW, Colorado

Eric Millis, State of Utah

Jessica Neuwerth, Colorado

David Nimkin, NPCA

Don Ostler, State of New Mexico

Daniel Picard, Reclamation

Ted Rampton, UAMPS

Brent Rhees, Reclamation

Peggy Roefer, State of Nevada

Brian Sadler, WAPA

Steve Spangle, USFWS

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Steve Wolff, State of Wyoming

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Corinne Horner

Shana Tighi

Jolene Trujillo

Christopher Watt

Linda Whetton

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Rob Billerbeck, NPS

David Braun, Science Advisors

Carlee Brown, State of Colorado

Jeanne Calhoun, NPS-GRCA

Shane Capron, WAPA

Bill Davis, CREDA

Sinjin Eberle, American Rivers

Bret Esslin AZ Department of Water Resources

Jessica Gwinn, USFWS

Ken Hyde, NPS-GLCA

Lauren Johnston, The Mary Orton Company

Ryan Mann, AZGFD

Joe Miller, Trout Unlimited

Mary Orton, The Mary Orton Company

Theresa Pasqual, DOI-OWS

Bill Persons, IFFF/Trout Unlimited

Sarah Rinkevich, DOI

Seth Shanahan, State of Nevada

William Shott NPS-GLCA

Rodney Smith, DOI Solicitor's Office

Jim Stroger, Trout Unlimited

Webinar Attendees

Colleen Allen, NPS

Mark Anderson, NPS-GLCA

Clifford Barrett, UAMPS (AMWG Alternate)

Winkie Crook, Hualapai Tribe

Craig Ellsworth, WAPA

Paul Harms, State of New Mexico

Denise Hosler, Reclamation

Ted Kennedy, USGS/GCMRC

Robert King, State of Utah (AMWG Alternate)

Kirk LaGory, Argonne National Laboratories

Ted Melis, USGS/GCMRC

Jenny Rebenack, NPS

David Rogowski, AZGFD

Melissa Trammel, NPS

Kirk Young, USFWS (AMWG Alternate)

For a presentation on invasive species through the webinar and telephone: Hilary Smith, DOI; Robert Radtke, Reclamation; Lisa Vehmas, Reclamation; John Wullschleger NPS; Diane Waller, USGS; and Sherri Pucherelli, Reclamation.

Abbreviations

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

Glen Canyon Dam Adaptive Management Program: AMWG Meeting, February 14-15, 2018

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