

Glen Canyon Dam Technical Work Group Meeting

January 30, 2014

Conducting: Shane Capron, TWG Co-Chair

Convened: 8:20 a.m.

Committee Members/Alternates Present:

Cliff Barrett, UAMPS
Charley Bullets, So. Paiute Consortium
Shane Capron, WAPA
Todd Chaudhry, NPS
Kerry Christensen, Hualapai Tribe
Jerry Lee Cox, Grand Canyon River Guides
Kevin Dahl, National Parks Conservation Assn.
Bill Davis, CREDA
Kurt Dongoske, Pueblo of Zuni
Craig Ellsworth, WAPA
Paul Harms, State of New Mexico
Chris Hughes, NPS/GLCA
Tony Joe, Jr. Navajo Nation

Vineetha Kartha, State of Arizona
Robert King, State of Utah
Glen Knowles, Bureau of Reclamation
Ted Kowalski, Colo. River Conservation Board
Gerald Myers, Federation of Fly Fishers
Don Ostler, State of Wyoming
Larry Stevens, Grand Canyon Wildlands Council
Bill Stewart, Arizona Game and Fish Dept.
Jason Thirirot, State of Nevada
Mark Van Vlack, State of California
Michael Yeatts, Hopi Tribe
Kirk Young, FWS

Committee Members Absent:

Jan Balsom, NPS/GRCA
David Nimkin, Nat'l Parks Conservation Assn.

Chip Lewis, BIA
John Shields, State of Wyoming

Grand Canyon Monitoring and Research Center:

Lucas Bair, Economist
Helen Fairley, Social Scientist
Kyrie Fry, Communications Coordinator
Ted Kennedy, Aquatic Biologist

Ted Melis, Sediment Resources Manager
Jeff Muehlbauer, Research Biologist
Jack Schmidt, Center Director
Scott VanderKooi, Biology Program Manager

Interested Persons:

Mary Barger, Bureau of Reclamation
Peter Bungart, Hualapai Tribe
Carrie Cannon, Hualapai Tribe
Megan Chan, So. Paiute Consortium (phone)
Marianne Crawford, Bureau of Reclamation
Dave Garrett, M³Research/Science Advisors

Chris Harris, State of California
Loretta Jackson-Kelly, Hualapai Tribe
Lisa Meyer, WAPA
Sarah Rinkevich, Tribal Liaison DOI
Scott Wright, USGS

Meeting Recorder: Linda Whetton

Welcome and Administrative. Welcome by Mr. Jordan. Due to delays in getting the TWG Chair contract in place, Vice-chair Shane Capron conducted the meeting.

1. Approval of June 26, 2013 Meeting Minutes – Pending one edit, the minutes were approved by consensus.
2. Approval of November 6, 2013, Meeting Minutes – Pending one edit, the minutes were approved by consensus.
3. Review of Action Items (Attachment 1).
2010:03-15-16(4) – Mr. Kurt Dongoske. The Tribal Consultation Plan is still being reviewed by DOI and has been in draft form since 1999. This is symptomatic of the disenfranchisement problem the tribes have with this program.
4. Old Business.
 - LTEMP EIS Update – Mr. Glen Knowles. Progress is being made on the modeling of the draft alternatives. Swing weighting is being simplified by eliminating the performance metrics that may have overlap. More information will be provided at the next AMWG meeting. The cooperating agencies should see a draft by July with a public draft available in September.

Comments:

- *Simplifying swing weighting may result in choosing one species or resource over another which is inconsistent with ecosystem management.*
 - *What is the status for including attributes to organizations that provide input?*
 - *Concern for possible misuse of information that may come from swing weighting. Swing weighting is not being done because the Department was asked to do it.*
- Cultural Program Update – Ms. Mary Barger. (1) Funding for Project J will look at a landscape scale and include geomorphic analysis of archaeological sites or locations of archaeological sites for impacts that might be related to dam operations. That includes sandbar development as a result of HFEs that might be in a location where wind could move the sand up on sites that are eroding. (2) There have been attempts to amend the old PA for years with little success so with the LTEMP process occurring, a new PA is being developed. More discussion will occur at the annual PA meeting on February 12. GLCA to developing a monitoring plan for the HFE MOA.

Comments:

- *As part of monitoring HFEs, the Pueblo of Zuni has asked that Reclamation continue to monitor the cost to power generation as it might affect the Pueblo of Zuni. Provide that information to the AMP stakeholders.*
 - *Will Project J meet the needs for Section 106 under the original PA since it's taking a landscape approach? It's currently looking at processes and mechanisms for site erosion but isn't necessarily providing information on impacts to specific sites. There's a need to look at ways of filling the gap until a new PA is in place.*
 - *There is no coordination between the AMP and NPS on monitoring needs and results.*
- BOR Hydrology Update – Mr. Glen Knowles. The Upper Colorado and the Yampa are still in the 125% of median range, but other parts of the basin like the San Juan and Middle Rio Grande are in the 60-70% range. The Upper Colorado River Basin total is at 102 percent of median. Basinwide, it is close to average but starting to drift downward. Currently the most probable forecast is still slightly below average, about 7 maf inflow to Lake Powell, but the range is anywhere from 4 maf at the minimum to about 10 maf at the maximum. A lot could happen in the next few months. This a 7.48 maf release year so there will be lower volumes. March, April, and May will all be about 500 kaf. In terms of the 2015 forecast, the most probable is a 9 maf release; the maximum is 11 maf, and the minimum 7.48 maf. Because this year is a 7.48 maf release year with low elevation in Lake Powell, there will be warmer water downstream. GCD releases will be around 11°C in the July timeframe and the LCR will hit 12°C by mid-May and should stay above 12° for the remainder of the calendar year.
 - NPS Fish Management Plan Update – Mr. Todd Chaudhry. The FONSI was signed in December, 2013 and includes the alternatives, the selected alternative, the criteria that used for selection, and provides a justification for why an EIS was not required for this action. The proposed alternative was the moderate intensity fisheries management strategy because it best meets the purpose and needs of the EA. The plan was developed in an AMP framework and identifies triggers for certain actions to take place. The link to the NPS Fish Management Plan is:
<http://parkplanning.nps.gov/documentsList.cfm?projectID=35150>.

5. New Business

- Webinars vs. In-person Meetings – Mr. Glen Knowles. Even though sequestration isn't currently in effect, DOI leadership is questioning how often the TWG needs to hold in-person meetings because costs are significant.

Comments:

- *Webinars should be considered based on TWG workload.*
- *TWG function is to inform of ongoing science and have overall understanding of what's going on in the AMP so TWG members can convey important concerns to AMWG members to help inform policy decisions.*
- *Webinars restrict visual communication (facial expressions, body language, etc.)*
- *Great value in members being able to meet during lunches and breaks.*

- *It's beneficial to have TWG meetings planned in advance.*
- *Regular contact is important to smaller NGOs that don't have the same opportunities to interact with others outside TWG meetings.*
- *In-person meetings are more effective.*
- *Daily work demands interfere with being fully engaged in webinars.*
- *Webinar time constraints often hinder people from full participation.*

MOTION (proposed by Larry Stevens, seconded by Kevin Dahl): The TWG requests that DOI approve up to 4 in-person meetings, as necessary, per year for the TWG in order to maintain relationships, develop budget and workplans, and have full and meaningful interaction with GCMRC and its cooperators. The TWG believes that the current 2014 limit of only 2 in-person meetings per year is detrimental to a successful GCDAMP. Hearing no objection, the motion was passed by consensus.

- Next TWG Meetings (Tu-We): April 8-9, (Tu-We) June 24-25, and (Tu-We) October 28-29. If held, all will be at the Arizona Department of Water Resources.

HFE Updates

- Lessons learned from the 2013 HFE (**Attachment 2a**) – Mr. Glen Knowles. Because the Paria River sand inputs were very large last September the model selected the largest HFE possible under the HFE Protocol, 45,000 cfs for 96 hours. Only seven units were predicted to be available at Glen Canyon Dam for a release of approximately 37,000 cfs. Consequently a 96-hour HFE at 37,000 cfs was proposed based on seven units being available. At the time of the HFE, only six units ended up being available for a release of projected release of 35,000 cfs. The actual release was 37,000 cfs. There appears to be an error in Reclamation's measurement of flow through the jet tubes, and we are working to correct this. The estimated cost of the HFE was \$1.76 million and WAPA will provide an actual accounting of the cost at the end of the fiscal year. Reclamation will prepare a report with analysis of HFE effects to humpback chub and other resources to the FWS and share that information with the stakeholders in February.
- Results from the 2013 HFE (**Attachment 2b**) – Dr. Schmidt provided the following information:

Between July 1 – Nov 17, 2012	Between July 1 – Nov 10, 2013	Between July 1 – Nov 10, 2013
617,000 – 769,000 mt entered Colorado River from the Paria River	~1,800,000 mt entered Colorado River from the Paria River	
550,000-770,000 mt accumulated in upper Marble Canyon	140,000 mt were transported past the RM 30 gage	Between 1,300,000 and 2,300,000 mt accumulated in upper Marble Canyon
~46,000 mt accumulated in lower Marble Canyon	110,000 mt were transported past the RM 60 gage	64,000 mt accumulated in lower Marble Canyon
~170,000 mt accumulated in east-central Grand Canyon	390,000 mt were transported past the RM 87 gage	120,000 mt accumulated in east-central Grand Canyon
~14,000 mt accumulated in west-central Grand Canyon	570,000 mt were transported past the RM 166 gage	160,000 mt accumulated in west-central Grand Canyon
~27,000 mt accumulated in eastern Grand Canyon	520,000 mt were transported past the RM 225 gage	22,000 mt was eroded from eastern Grand Canyon
~450,000 mt accumulated in western Grand Canyon and Lake Mead	240,000 mt entered Colorado River from the Little Colorado River	540,000 mt accumulated in western Grand Canyon and Lake Mead

- The 2012 HFE did not fully mobilize the sand available for redistribution.
- A small amount of the sand delivered during the 2012 fall season remained in Marble Canyon at the beginning of the 2013 accounting season.
- The primary input came in floods in mid-September 2013.
- Sandbar response to sediment-rich high flows November 2013 HFE:
 - Images from remote cameras;
 - 53% (21 out of 40): noticeable gain
 - 30% (12 out of 40): no substantial change

- 18% (7 out of 40): noticeable loss
- The 2013 HFE mobilized a small part of the supply that was available for redistribution.
- Sand on the bed has accumulated in upper Marble Canyon since July 1, 2012. We are not fully mobilizing the sand available for redistribution.
- Rainbow trout are above the removal trigger in the LCR, although Humpback chub are stable or increasing.
- Trout populations are declining in Glen and Marble Canyons.
- There's no evidence of trout being flushed downstream.

Dr. Ted Melis. In October and December Ted Melis and Dan Buscombe repeated imagery measurements of all of Glen Canyon in the middle of the river and at both shorelines. Most of the sand inputs came from Water Holes Canyon and affected the bed and the shorelines between Water Holes (-3.9 RM) down to just below Cove Canyon. Suspended transport measurements were taken at Lees Ferry in 2012 and 2013, but Dr. Melis hasn't seen that data. Josh Korman, Mike Yard, and Dr. Melis want to investigate those sand inputs to determine if there was an influence on the bed and an effect on trout catch abundance in that reach. They anecdotally reported that the fish catch in October and December decreased. It is not apparent if that this is a response to the waterholes inputs. It appears there are flow-sediment interactions with the fish habitat that have the possibility to affect trout use of nearshore habitats. It's important in the short-term process to understand how the tributaries are influencing the mainstem with respect to sand and coarser material because those are the habitats that invertebrates and fish utilize. An estimate is necessary from Dave Toppings' crew, of peak discharge in the August Water Holes flood and the amount of sand input. The gravel deposit can be assessed and monitored as part of the Redds monitoring campaign.

Mr. Mike Yeatts - The Hopi Tribe is concerned because it appears that the Eastern Grand Canyon has lost sediment from both HFEs. Can the protocols be modified in order to redistribute the sand better into that area? Dr. Schmidt said the scientists are struggling to understand the relationship between the sand mass budget differences and where sand gets evacuated or accumulated. The channel mapping project may provide some answers.

Potential Budget and Work Plan Considerations for FY2015 – Mr. Shane Capron. There were two proposed changes to the existing FY14 budget:

- (1) Reprogramming Request from International Federation of Fly Fishers (IFFF) - Mr. John Jordan (**Attachment 3**). IFFF is concerned that minimum low flows in the range of 5,000 to 7,000 cfs in 2012 and 2013, could adversely impact the aquatic foodbase by dewatering key riffle areas that account for a large amount of aquatic productivity. Low minimum flows reduce water velocity which may also impact invertebrate drift (or lack thereof) which is an important component to trout health. According to GCMRC staff there is little data available on the possible impacts of a 5,000 cfs minimum flow below the dam. The IFFF is concerned that minimum flows at or below 5,000 cfs will become a common occurrence in the future as part of low water year delivery plans or sediment conservation flows prior to fall or spring HFEs. IFFF requests the TWG recommend that GCMRC implement a study in FY 2014 to determine the minimums flows needed to protect the aquatic foodbase and the Lees Ferry trout fishery. IFFF believes the work can be done as part of the existing channel mapping program with minor reprogramming required in order to incorporate Lees Ferry channel mapping.

Dr. Schmidt said the low flows are most likely to occur in spring and fall. The time for getting the information and incorporating it into GCD operations is difficult. At this point there is no hope of getting information from Dr. Melis's presentation to effect a decision to influence the low flows in April since those projections are already included in the monthly updates. From a geomorphology standpoint, a comprehensive channel mapping program is necessary. Dr. Grams is going to look into the possibility of some channel mapping this summer, but it's a huge logistical effort and GCMRC has

a big and complicated channel mapping program launching in May. It may be possible to initiate a channel mapping program in Glen Canyon in FY15 but money would need to be reallocated. Dr. Melis has rejoined the GCMRC team and will be spending half his time leading the effort to understand the geomorphology of tailwaters and the geomorphic basis of fish habitat, and the other half of his time working on special projects that are administrative in nature.

- (2) Economics Research at GCMRC: FY14 (**Attachment 4**). Mr. Lucas Bair. As the new economist at GCMRC, he will be developing a program to identify opportunities to implement economics research. One thing that stood out in the FY14 budget was recreation. Some research was done in the Canyon in the late 1980's with the first extensive study done in 1987. It looked at Glen Canyon angling and day-use rafting and Grand Canyon whitewater boating. Unfortunately, NPS efforts to expand that work as part of the LTEMP EIS were discontinued due to different constraints. Project K would include Glen Canyon and Grand Canyon rafting surveys and take about two years at a budget of \$240K to complete surveys, analysis, and reports. Draft surveys have been developed and a draft OMB package completed.

Mr. Shane Capron - This project was in the SEAHG workplan that went forward to AMWG, then to the Secretary. The Secretary directed the AMP to implement this program. Dr. Garrett said the SEAHG originally proposed a group of socioeconomic projects and this particular project was considered because it responds specifically to market analysis of recreation opportunities in the CRE reach. It does not include Lake Powell or Lake Mead assessments.

Comments:

- *The GLCA has more people on rafting trips than GRCA river trips combined. They're shorter, half-day trips, but the number is in the 60,000 range with the Colorado River concessionaires. This survey doesn't take into account how flow levels on the river relate to economic values.*
- *Need to include accounting for those people who come to sight-see, bird watch, boat, camp, etc.*
- *There is a huge economic value besides boating and angling so suggest adding "other" as another value*

Potential Budget and Work Plan Consideration for FY 2015-16 (Attachment 4a). Mr. Shane Capron; **Attachment 4b**: GCDAMP Biennial Budget Process Paper dated May 6, 2010; and **Attachment 4c**. Streamlined GCMRC Biennial Work Planning Process Table 1 dated March 20, 2011. Policy issues eventually work their way up to the AMWG and technical issues go to DOI. There should be a revised budget and workplan sometime in May. The BAHG will begin looking at that in May and June along with SA input back to the BAHG and TWG. The TWG will develop a budget recommendation at the June meeting.

Dr. Jack Schmidt (**Attachment 4d**). The budget update for FY13 funds was shown broken down into GCMRC budget categories. Sequestration and 2-week Government shutdown created a lot of chaos. GCMRC has been informed by the City of Flagstaff that their offices will have to be torn down which is in line with the GSA mandate to reduce federal office space. Consequently, there are going to be more demands on the budget.

Mr. Shane Capron. The TWG is requested to review the proposed science questions dated October 2013 (**Attachment 4e**) and the science questions in the work plan dated December 16, 2013 (**Attachment 4f**). At the request of Dr. Schmidt, Reclamation will assume oversight of the Science Advisors' contract and conduct peer review of GCMRC reports.

Comments:

- *It's important to reestablish the TWG facilitation contract. It's very beneficial to keeping the TWG organized, preparing agendas, capturing motions, and ensuring meetings run smoothly. It also allows the TWG Chair to focus primarily on TWG needs.*
- *John Hamill suggested in the past, an executive director for the AMP position.*
- *This is an important point in this new 2-year budgeting process. It's probably a good idea at the end of the year to allocate money for new projects.*

Action Item: TWG will review the budget documents provided at today's meeting with particular attention to the *Information Needs* and the *List of Future Budget Items* as part of the SCAHG document. TWG should provide comments and/or questions to Glen and Jack by close of business February 14, 2014. (Done: 2/14/14)

Action Item: Linda will post the Annual Reporting Meeting presentations to the AMP website by Feb. 5, 2014 and set up a Doodle poll for scheduling the next BAHG meeting. (Done: 2/3/14)

Action Item: Linda will send a "doodle" poll to the TWG requesting their availability for the 2015 Annual Reporting and TWG meetings.

Action Item: Linda will send a "doodle" poll to the BAHG asking for their availability to participate in a conference call during the week of Feb. 10-14, 2014. (Done: 2/4/14)

Mr. Capron advised there is a list of 13 projects in the Steering AHG report (**Attachment 4g**) that were provided in the fall that had budget implications. Those will be carried forward to the BAHG but if no one champions any or all of them, they'll be dropped.

Discussion of FY 2015-16 Budget Issues: Foodbase Enhancement Suggestions from Federation of Fly Fishers (**Attachment 5**) – Mr. Gerry Myers. Food base enhancement should include:

- Review/develop data on flows and temperature to determine what flow regimes are most positive to higher densities of aquatic invertebrates.
- Test stream habitat augmentation to improve colonization. Establish host colonies of invertebrates on rocks, boulders, wood and logs. Consideration should also be given to nutrient supplementation.
- Translocate native insect taxa in the main stream

During the 2015-16 budget process GCMRC in coordination with the other relative agencies, should schedule a workshop to discuss a foodbase enhancement project. A good foundation may be data collected in the tailwater synthesis project. The result of the workshop could be to provide a basic outline to the TWG of a logical investigative approach to address this issue.

Mr. Scott VanderKooi- (**Attachment 5b**) Food web comparison from GLCA versus the rest of the GRCA. Simplicity in food webs equals instability and there has been a shift from what was a more complex, more stable foodbase to one that is very unstable. A lot of trout can be grown in GLCA and there are hundreds of thousands of trout in that reach of the river, but that could come crashing down very quickly. Having only two types of insects in GLCA is not a healthy situation and when making comparisons to other regulated rivers, GLCA really stands out as having an EPT value of zero (the proportion of the population made up of mayflies, caddisflies and stoneflies). The proposed actions by the fly fishers have the potential to improve the fishery and the potential to improve the prey base by moving the assemblage to include mayflies, caddisflies, and stoneflies. IFFA is very interested in developing a new project focused on resolving uncertainties related to enhancing the foodbase. After the analyses are complete, a proposal to convene an expert panel to provide an external evaluation of the likely causes of why mayflies, caddisflies and stoneflies are missing from this stretch of the Colorado River. This is a logical next step in terms of science, learning and resource enhancements and will require close work with GLNRA and GCRA.

Mr. Todd Chaudhry - NPS supports additional research, but NPS has concerns about habitat manipulations because of the dynamics and potential unintended consequences to the system. A similar proposal was identified as an alternative in their Comprehensive Fisheries Management Plan but was dismissed due to some of those concerns. NPS policies do not allow augmentation of prey populations to boost numbers of harvested species. They welcome further discussion on what's in the scope. A second step would be to do some laboratory experiments to identify those native

species in the system and tributaries and if they can persist in laboratory conditions that are comparable to what they would experience in the mainstem before any on-the-ground habitat manipulations.

Mr. Larry Stevens - There is misunderstanding about interpretation of previous documents by the USGS on aquatic invertebrates in the river. This needs to be thoroughly reviewed. Larry also stressed the importance of developing the GCDAMP administration history.

- Socioeconomics AHG Report – Dr. Dave Garrett-

Attachment 6a: Memo, Subject: Outcomes of SEAHG Committee Conference Call, 12/5/13

Attachment 6b: Draft SEAHG Proposal on Socioeconomic Research to TWG Mtg., 1/29/2014 dated January 22, 2014

Attachment 6c: Memo from Dr. Garrett to SEAHG, Recommendations to TWG on the Socioeconomics Implementation Plan: FY 2015/16 and PowerPoint presentation

The SEAHG reviewed the AMWG approved SE Program and outlined a 5-year program with socioeconomic research project activities. The following recommendations for the FY15-16 budget included:

- Market/Non-market Workshop – Cost \$8K-10K
- Assessment of CRE Recreation Economic Value – Cost \$240K/FY14 carryover funds
- Evaluation of Decision Support Methods for AMP – \$240K-300K

Market valuation of hydropower has been done for a long time by Argonne, but is not part of the LTEMP EIS process. It was recommended and approved by the AMWG as an area of work that should be pursued. Another area of work not being done is the tribal preference social values work which will require more discussion by the TWG.

Mr. Bair - "Subject: Summary of Findings of SEAHG Committee Meetings on Socio-Economic Program Proposals for TWG" (**Attachment 6d**). There is uncertainty in this program and not a lot of resources. A structured approach is a good investment. Transparency and simplicity are important values.

- Cultural Resources AHG Report (**Attachment 7**) Kurt Dongaske. CRAHG concerns for the AR meeting. There were two tribal panels at the AR meeting; one on native and non-native fish, and one on cultural resources. Ten issues from the CRAHG were brought up including funding issues. CRAHG would like Reclamation to report on:
 1. Progress toward revising the existing PA,
 2. Efforts/perspective of how compliance is maintained with the existing PA, and
 3. The MOA regarding the implementation of the 2012 and 2013 HFES and related compliance. How is Reclamation tracking the concerns raised by the Tribes regarding the HFES?

The CRAHG questions their role in the GCDAMP because the focus is on physical and biological programs. The cultural program is also morphing into a physical/geomorphological program. As a result, there is a sense of increasing disenfranchisement by Tribal representatives.

Due to time constraints, Mr. Jordan asked if Mr. Dongoske's questions could be addressed at the April meeting. Mr. Dongoske was agreeable to that. Mr. Knowles said there were a number of activities that were funded by BOR and they will make a greater effort to share those results with the TWG.

Mr. Capron said the following items would be deferred to the April meeting:

1. HBC update
2. NPS monitoring

3. Report on the Annual Cultural Resources meeting.

Administrative History AHG Report (Attachment 8) – Mr. JasonThiriot. Due to time constraints, a short report was presented on what the AHAHG has been working on and the funding needs to develop the prospectus for the administrative history effort. They also need to start working on the oral history interviews.

Public Comment: None

Adjourned: 3:32

Respectfully submitted,

Linda Whetton
Upper Colorado Regional Office
Bureau of Reclamation

Key to Glen Canyon Dam Adaptive Management Program Acronyms

ADWR – Arizona Dept. of Water Resources	HMF – Habitat Maintenance Flow
AF – Acre Feet	HPP – Historic Preservation Plan
AGFD – Arizona Game and Fish Department	INs – Information Needs
AIF – Agenda Information Form	KA – Knowledge Assessment (workshop)
AMP – Adaptive Management Program	KAS – Kanab Ambersnail (endangered native snail)
AMWG – Adaptive Management Work Group	LCR – Little Colorado River
AOP – Annual Operating Plan	LCRMCP – Lower Colorado River Multi-Species Conservation Program
ASMR – Age-Structure Mark Recapture	LTEMP – Long-Term Experimental and Management Plan
BA – Biological Assessment	LTEP – Long Term Experimental Plan
BAHG – Budget Ad Hoc Group	MAF – Million Acre Feet
BCOM – Biological Conservation Measure	MA – Management Action
BE – Biological Evaluation	MATA – Multi-Attribute Trade-Off Analysis
BHBF – Beach/Habitat-Building Flow	MLFF – Modified Low Fluctuating Flow
BHMF – Beach/Habitat Maintenance Flow	MO – Management Objective
BHTF – Beach/Habitat Test Flow	MRP – Monitoring and Research Plan
BIA – Bureau of Indian Affairs	NAU – Northern Arizona University (Flagstaff, AZ)
BO – Biological Opinion	NEPA – National Environmental Policy Act
BOR – Bureau of Reclamation	NHPA – National Historic Preservation Act
BWP – Budget and Work Plan	NNFC – Non-native Fish Control
CAHG – Charter Ad Hoc Group	NOI – Notice of Intent
CAP – Central Arizona Project	NPS – National Park Service
GCT – Grand Canyon Trust	NRC – National Research Council
CESU – Cooperative Ecosystems Studies Unit	O&M – Operations & Maintenance (USBR Funding)
cfs – cubic feet per second	PA – Programmatic Agreement
CFMP – Comprehensive Fisheries Management Plan	PBR – Paria to Badger Creek Reach
CMINS – Core Monitoring Information Needs	PEP – Protocol Evaluation Panel
CMP – Core Monitoring Plan	POAHG – Public Outreach Ad Hoc Group
CPI – Consumer Price Index	Powerplant Capacity = 31,000 cfs
CRBC – Colorado River Board of California	R&D – Research and Development
CRAHG – Cultural Resources Ad Hoc Group	RBT – Rainbow Trout
CRCN – Colorado River Commission of Nevada	RFP – Request for Proposal
CRE – Colorado River Ecosystem	RINs – Research Information Needs
CREDA – Colorado River Energy Distributors Assn.	ROD Flows – Record of Decision Flows
CRSP – Colorado River Storage Project	RPA – Reasonable and Prudent Alternative
CWCB – Colorado Water Conservation Board	SA – Science Advisors
DAHG – Desired Future Conditions Ad Hoc Group	Secretary – Secretary of the Interior
DASA – Data Acquisition, Storage, and Analysis	SCORE – State of the Colorado River Ecosystem
DBMS – Data Base Management System	SHPO – State Historic Preservation Office
DOE – Department of Energy	SNARRC – Southwest Native Aquatic Resources and Recovery Center
DOI – Department of the Interior	SOW – Statement of Work
DOIFF – Department of the Interior Federal Family	SPAHG – Strategic Plan Ad Hoc Group
EA – Environmental Assessment	SPG – Science Planning Group
EIS – Environmental Impact Statement	SSQs – Strategic Science Questions
ESA – Endangered Species Act	SWCA – Steven W. Carothers Associates
FACA – Federal Advisory Committee Act	TCD – Temperature Control Device
FEIS – Final Environmental Impact Statement	TCP – Traditional Cultural Property
FRN – Federal Register Notice	TEK – Traditional Ecological Knowledge
FWS – United States Fish & Wildlife Service	TES – Threatened and Endangered Species
FY – Fiscal Year (October 1 – September 30)	TMC – Taxa of Management Concern
GCD – Glen Canyon Dam	TWG – Technical Work Group
GCES – Glen Canyon Environmental Studies	UCRC – Upper Colorado River Commission
GCT – Grand Canyon Trust	UDWR – Utah Division of Water Resources
GCMRC – Grand Canyon Monitoring & Research Center	USBR – United States Bureau of Reclamation
GCNP – Grand Canyon National Park	USFWS – United States Fish & Wildlife Service
GCNRA – Glen Canyon Nat'l Recreation Area	USGS – United States Geological Survey
GCPA – Grand Canyon Protection Act	WAPA – Western Area Power Administration
GLCA – Glen Canyon Nat'l Recreation Area	WY – Water Year
GRCA – Grand Canyon National Park	
GCRG – Grand Canyon River Guides	
GCWC – Grand Canyon Wildlands Council	
HBC – Humpback Chub (endangered native fish)	
HFE – High Flow Experiment	