**Glen Canyon Dam Technical Work Group Meeting**

October 28-29, 2014

**Conducting**: Vineetha Kartha, TWG Chair **Convened:**  9:30 a.m.

Shane Capron, TWG Vice-Chair

**Committee Members/Alternates Present**:

Jan Balsom, NPS/GRCA

Cliff Barrett, UAMPS

Charley Bulletts, Southern Paiute Consortium

Shane Capron, WAPA/TWG Vice-Chair

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

Evelyn Erlandsen, State of Arizona

Chris Harris, State of California

Chris Hughes, NPS/GLCA

Tony Joe, Jr., Navajo Nation

Glen Knowles, Bureau of Reclamation

Ted Kowalski, Colo. Water Conservation Board

Jerry Myers, Federation of Fly Fishers

Don Ostler, representing Wyoming & New Mexico

Larry Stevens, Grand Canyon Wildlands Council

Bill Stewart, Arizona Game and Fish Dept.

Jason Thiriot, State of Nevada

Michael Yeatts, Hopi Tribe

Kirk Young, FWS

**Committee Members Absent**:

Paul Harms, State of New Mexico

Chip Lewis, Bureau of Indian Affairs

Robert King, State of Utah

VACANT, State of Wyoming

**Grand Canyon Monitoring and Research Center**:

Lucas Bair, Economist

Helen Fairley, Social Scientist

Dave Lytle, USGS

Jack Schmidt, Center Director

Scott VanderKooi, Biology Program Manager

**Interested Persons**

Mary Barger, Bureau of Reclamation

Peter Bungart, Hualapai Tribe

Marianne Crawford, Bureau of Reclamation

Craig Ellsworth, WAPA (phone)

Beverley Heffernan, Bureau of Reclamation

Gerald Hooee, Sr., Pueblo of Zuni

Loretta Jackson-Kelly, Joint Tribal Liaison

Leslie James, CREDA

John Jordan, Federation of Fly Fishers

Kathy Kunysz, Metropolitan Water District (phone)

Dr. Sarah Rinkevich, Joint Tribal Liaison

Seth Shanahan, SNWA

**Meeting Recorder**: Linda Whetton

**Welcome and Administrative**: Ms. welcomed the members and the public. Introductions were made and a quorum determined.

* Approval of (1) June 24-25, 2014, Meeting Minutes; (2) July 15, WebEx Minutes; (3) August 4, WebEx Minutes; and October 17 WebEx Minutes. Motion to approve moved by Kevin Dahl, seconded by Jason Thiriot. Minutes were approved by consensus.
* Review of Action Items (***Attachment 1***).
* Ad Hoc Group Updates. Presentations by the AHAHG, BAHG, and SEAHG will be done later in meeting. The SMCAHG met and talked about the changing status of some species and integration of information into the administrative program and how to keep members informed about new sources of taxa information. The meeting notes (***Attachment 2***) were distributed this morning.
* Old Business:
	+ Programmatic Agreement Update. The PA is still being revised.
* New Business:
	+ The Annual Reporting Meeting will be held on January 20, 2015.
	+ The TWG meeting will be held on January 22, 2015.
	+ Selection of GCMRC Chief. Scott VanderKooi will be the acting chief of GCMRC until the chief position is filled. The hiring package is currently with the USGS. The job announcement will be open for 30 days to all U.S. citizens.

**2014 High Flow Experiment** (***Attachment 3a***) – Mr. Glen Knowles. Sediment conditions are such that a third HFE will be done under the HFE Protocol that was completed in May 2012. GCMRC estimated that 1.95 million metric tons of sand has entered the Colorado River from the Paria River since July 1, 2014. Based on that amount, GCRMC recommends conducting the largest HFE allowable under the HFE Protocol. Reclamation estimates that 6 of 7 units will be available at Glen Canyon Dam to conduct an HFE in November, and that a maximum of 37,500 cfs release (96 hours) will be possible given the outage of one unit and other factors such as the need to maintain 40 MW of system regulation. He provided copies of the memo (***Attachment 3b***) from Jennifer Gimbel, Chair of the Glen Canyon Leadership Team, to Brent Rhees, Acting Regional Director dated Oct. 24, 2014, Subject: Approval of Recommendation for Experimental High-Flow Release from Glen Canyon Dam, November 2014.

Next Steps:

* Reclamation will prepare a compliance report to the U.S. Fish and Wildlife.
* If an HFE occurs in FY2014, Reclamation will convene a spring 2015 workshop to review results of the prior three HFEs.
* GCMRC will provide initial results from the November 2014 HFE at the Annual Reporting Meeting.
* Reclamation will work with the “emissions” tool on the GCDAMP *wiki* site to determine the effects on air quality as a result of bypassing the powerplant during the HFE and report back to the TWG. meeting.

**Public Outreach and Administrative History Ad Hoc Groups** (***Attachment 4***) – Mr. Jason Thiriot. The video “I Am Glen Canyon” made by the Page High School Digital Devils was shown. This was recently shown at the Glen Canyon Dam Visitor Center in conjunction with the GCD 50th celebration.

As the new chair, Mr. Thiriot said the POAHG will update their earlier goals. The POAHG and AHAHG activities will be kept separate, but there could be future shared tasks/products. He encouraged people to look at the Upper Colorado River Basin Recovery Program website (<https://www.facebook.com/coloradoriverrecovery>) as an example of how the AMP may want to make changes to the POAHG’s *wiki* website. There are a lot of opportunities to get the word out about the program including checking out displays from Reclamation and doing more video outreach similar to what the MSCP has done (<http://www.youtube.com/watch?v=HLA7LkFxcI8>). He found it difficult to find a map of the GCDAMP and feels that is one activity that could easily be accomplished. There is approximately $113,000 available in the combined POAHG and AHAHG budgets.

**The Lower Colorado River Multi Species Program** (***Attachment 5***) – Mr. Chris Harris. California recognized they would run into more endangered species management issues so representatives from the various water and power entities in southern California started a planning process in 1994. The Lower Basin is managed significantly differently than the Upper Basin with a little crossover in the Glen Canyon area between the two basins. In the context of Lake Mead operations going south, it’s really the 1928 Boulder Canyon Project Act that starts driving Lower Basin operations and the 1944 Treaty with Mexico. There are approximately 40 million people relying on the water resources and 5.5 million acres of irrigated agriculture. They decoupled the river from its floodplain through channelization, building of high levies and large boulder riprap bankline. Species have a very difficult time moving in between the major facilities. For almost the last century and a half there has been significant introduction of non-native aquatic species, terrestrial species, and plant species. The planning area of the LCR MSCP is largely from Glen Canyon to the Southerly International Boundary, but functionally it’s really from Lake Mead down. New programs are being developed to allow the transfer of water between Colorado River water users. The collaborative partnership meets the regulatory requirements of ESA Sections 7 and 10 and CESA which gives them long-term regulatory certainty for any impacts to species and habitats associated with a total movement of up to 1.6 million acre-feet. The 50-year program has a budget of $626 million and covers 31 species. More information can be found at: [www.lcrmscp.gov](http://www.lcrmscp.gov)

**FY 2015-17 Budget Process and Planning Discussion**

* Budget Process Timeline (***Attachment 6a***) – Mr. Shane Capron. The revised timeline was reviewed.
* Dr. Jack Schmidt (***Attachment 6b***) offered the following:
	+ It was his intent to make the AR meetings more substantive, having moved them from simple accounting to an educational process with lengthy talks and poster sessions.
	+ TWG meetings following AR meetings are good in that the information is fresh in everyone’s memory but bad in that the meeting follows two days of information overload.
	+ The review process for the TWP is too compressed and SA comments are developed in too short a timeframe. Need to reconsider how to get high level science review.
	+ Tribal meetings aren’t really effective as tribes feel decisions have already been made
	+ GCMRC overwhelming TWG with information and TWG’s lack of expertise to deal with it.

*Comments*:

* *Poster session is a good opportunity to interact with scientists.*
* *Consider scheduling a mid-year review of the TWP.*
* *Is TWG asking the right research questions?*
* *Important to have integrated resource panel discussions following AR & poster meetings.*
* *Don’t lose track of how presentations fit into the whole picture.*
* *Need to spend more time on educating members and allow tribes to make presentations.*
* *Scientists need to report on what’s been learned to support the program, not the mechanics of counting fish/field work.*
* *TWG should review the AMWG’s “visioning” discussion (****Attachment 6c****) at last AMWG meeting.*
* *The Core Monitoring Plan (****Attachment 6d****) has a lot of good information and should be combined with other reports, included in the TWP, and reviewed every 3 years.*
* *Need a workshop to discuss how to effectively incorporate Native Americans into the AMP process.*
* *Need to figure out what the “goal posts” are to know what things have been achieved.*
* *Need to quantify the DFCs and a core monitoring plan, they’re all interconnected.5*

Mr. Capron suggested the following motion for consideration: **The TWG recommends that the AMWG begin working on the specific goals for the DFCs and call them GCDAMP desired conditions. We recommend that AMWG task the TWG to develop these as a recommendation to the AMWG**.

Having served on the DFC Ad Hoc Group, Mr. Christensen said a lot of work went into developing the DFCs and that the CMP and the Strategic Plan are more important.

Mr. Capron suggested another motion: **The TWG requests that AMWG task the TWG to work with GCMRC to develop a chapter within the Triennial Work Plan to include the strategic objectives of the science and monitoring program including core monitoring, tribal values, and the key hypotheses addressed by the work plan**.

Mr. Davis said working on the DFCs is one of the most important things the program can do and that postponing the work won’t solve the problem. Mike added that the most troublesome work the DAHG dealt with was policy and management decisions which will require the AMWG’s attention. Given there is some time before the next AMWG meeting, the motions were tabled.

**Tribal Perspectives**. The five AMP tribes shared information about their individual tribes.

Pueblo of Zuni – Mr. Gerald Hooee. The word “Zuni” is the Spanish name for their tribe but they recognize themselves as the Ashiwi Tribe. As told by their elders, their tribe emerged from Ribbon Falls (the fourth underworld). Their father, the sun, went around the world every day and saw nothing and had nothing to focus on so he thought about what he wanted in this world. He told the morning star and the evening star that he heard people talking from Mother Earth but he didn’t know where the talking was coming from. He told them he would make them into physical beings to come to earth and find where these people were at. They discovered the talking was coming from Ribbon Falls. There is a rock in Lava Falls that depicts how they came out - standing upright but not as upright as they were, had tails, were a lot shorter, had protrusions from their foreheads, their eyes and ears were big, and they were covered with moss. The two beings, the morning star and the evening star, shaped them into who they are. The Whitmore panels in the Grand Canyon verify what their grandfathers were told and what they’ve been taught. When they visit the Grand Canyon, they are visiting their birthplace and offer prayers to their ancestors. Different sectors of their people went to different regions of the country. The medicine societies went north and performed healing ceremonies and their practices are secret. Belonging to a medicine society is a lifelong commitment. The main group went west and their history is depicted in the petroglyphs. Using Zuni as a GPS starting point, the directional arrow was exactly in line with the Supai Man at 129 miles to Zuni. There are other directional arrows in Arizona, Utah, Colorado, but they point to the North Star. There are hundreds of thousands of sites. They’ve gathered a lot of information working with different national parks. Everything they do is committed to their religion, traditions, history and culture. Their prayers are for everyone in the world to have long lives, to prosper, and be safe.

The Hopi Tribe (***Attachment 7a***) – Mr. Mike Yeatts. The Hopi Tribe ancestral territory is surrounded by the Hopitutskwa, the plaza area for their original territory, and is bounded by shrines. There are currently 13 villages on the three “Mesas.” The Hopi Tribe is a collection of people with differing histories and knowledge. They became Hopi once they got to the Hopi Mesas. The Hopi consider the Grand Canyon a traditional cultural property for the following reasons: (1) it’s an area where there is significant events that have occurred, (2) it’s a location where important deities and people reside, and (3) it continues to maintain and inform the Hopi history. The Hopi have significant riparian plant concerns: 141 plants were identified during the Hopi ethobotany work in four major groups – ceremonial/religious, medicinal, food, and utilitarian. Often how a plant is identified depends on its use. A plant could be used for ceremonial purposes because it has yellow flowers, but the same plant might also be used for other things depending on its growth stage. Within the riparian plant community, the Hopi view a function of the plant species that would be considered just “food” plants, as extirpated species – corn, beans, squash – all were down there for over a thousand years.

The Hualapai Tribe – Mr. Peter Bungart. In doing their monitoring, the Hualapai visit archeological sites that are ancestral or TCPs. Some of the tributary side canyons were the routes to different locations outside the bottom of the Canyon. There were also places that were mineral and plant gathering areas and that’s been going on for over 20 years. Because of recent developments that are part of the AMP, the Hualapai Tribe has shifted their focus in response to those, in particular the HFEs. They’ve noticed that there are places in the Canyon, particularly in the Western Canyon, where sandbars are being developed which could affect how some native plants are being reestablished. Some native plants no longer grow in the Canyon whether it’s a result of flow actions or possible beaver predation and the Hualapai are integrating those results into their monitoring protocols. There’s advocacy for a more ecological approach to studying the river corridor and many of the tribes would also be onboard with that. They would like to see how the life along the river corridor is varying and be able to intervene if things aren’t doing well. They’ve proposed to do some native plant restoration at some select sites. One could look at TEK as the original adaptive management program because it was inherently based on a long history of observations and adjusting to changing conditions similar to what gets implemented in the AMP. When tribal members go on the monitoring trips, they’re reconnecting with the canyon and that’s just as important as monitoring the resources.

Navajo Nation (***Attachment 7b***) – Mr. Tony Joe. He thanked Vineetha Kartha, Beverley Heffernan, Helen Fairley and others who participated in the August river trip. Their tribe is concerned with the reintroduction of native plants and trees. A lot of invasive species dominate the river corridor. Flash floods in the Paria River washed out the sediment and more erosion was observed. The Gouldings Willow is highly valued for its medicinal and ceremonial uses. The Hualapai Tribe is taking take the lead in translocating the Goodings Willow. He felt that the Cardanus area might be a good place since it would just involve removing the dead trees and replanting the willow. However, the only time to take clippings is during the fall/winter. He’s planning to discuss additional options with Helen. Currently tribal members must go to the San Luis Valley in Alamosa, Colorado, to get the willow. Having the willow available in the Grand Canyon would lessen travel time and make it easier for the tribes to obtain. He requested the stakeholders think about how to work collaboratively on the willow.

Southern Paiute Consortium – Mr. Charley Bulletts. The Consortium has been doing photo matching, water quality testing, and botany in the Grand Canyon. The Southern Paiute come from the mountains of Mount Charleston in Las Vegas. When the waters were receding during the first ice age, their tribe took refuge in Mount Charleston. It was highly vegetated but is now mostly rock because the mountain sheep and the birds have eaten the plants. They’re looking to hire a botanist to help them with research. The elders are particularly concerned for the evasive Tamarisk Beetle and what will happen to it once the tamarisk is eradicated. They’re going to start some plot plant sites along the Colorado River where the White Canyons are and the Tamarisk Beetle comes into. They’ve noticed that the arrow weed and some of the other plants are coming pretty healthy amongst the dying tamarisk. Photo matching works well for comparing plants at previous sites and times. Through native eyes water is the most important element they have as human beings, but an elder recently told him to watch the lifestyle of a river as the river provides abundancy down to the smallest insect. He never noticed that before until he watched the sediment going through the Paria River. If the water is moving, then there is a different type of sediment which made him think about Whirling Disease. Mother Nature will show us what is natural and the program may need to look at ways to work with the disease.

**Presentation of Gifts to Jack Schmidt**.

* Jack was given a framed print of “Living Impasse” by Serena Supplee. While on his first USGS research trip to Lava Falls in 1984, he saw a boat go straight up on its side. He got the name of the person who was rowing the boat and it was Serena Supplee.
* Ms. Jan Balsom presented Jack with a hat, GRCA water bottle, and an NPS placque.

**Adjourned**: 4:50 p.m.

**Glen Canyon Dam Technical Work Group Meeting**

October 28-29, 2014

**Conducting**: Vineetha Kartha, TWG Chair **Convened:**  8:10 a.m.

Shane Capron, TWG Vice-Chair

**Committee Members/Alternates Present**:

Jan Balsom, NPS/GRCA

Cliff Barrett, UAMPS

Charley Bulletts, Southern Paiute Consortium

Shane Capron, WAPA/TWG Vice-Chair

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

Evelyn Erlandsen, State of Arizona

Chris Harris, State of California

Chris Hughes, NPS/GLCA

Tony Joe, Jr., Navajo Nation

Glen Knowles, Bureau of Reclamation

Ted Kowalski, Colo. Water Conservation Board

Jerry Myers, Federation of Fly Fishers

Don Ostler, State of Wyoming

Larry Stevens, Grand Canyon Wildlands Council

Bill Stewart, Arizona Game and Fish Dept.

Jason Thiriot, State of Nevada

Michael Yeatts, Hopi Tribe

Kirk Young, FWS

**Committee Members Absent**:

Paul Harms, State of New Mexico

Robert King, State of Utah (phone)

VACANT, State of Wyoming

**Grand Canyon Monitoring and Research Center**:

Lucas Bair, Economist

Helen Fairley, Social Scientist

Josh Korman, Scientist

Ted Melis, Sediment Resources Mgr.

Jack Schmidt, Center Director

Scott VanderKooi, Biology Program Manager

Charles Yackulic, Scientist (phone)

Mike Yard, Scientist

**Interested Persons**

Mary Barger, Bureau of Reclamation

Peter Bungart, Hualapai Tribe

Marianne Crawford, Bureau of Reclamation

Craig Ellsworth, WAPA (phone)

Katrina Grantz, Bureau of Reclamation (phone)

Beverley Heffernan, Bureau of Reclamation

Gerald Hooee, Sr., Pueblo of Zuni

Loretta Jackson-Kelly, Joint Tribal Liaison

Leslie James, CREDA

John Jordan, Federation of Fly Fishers

Kathy Kunysz, Metropolitan Water District (phone)

Dr. Sarah Rinkevich, Joint Tribal Liaison

Seth Shanahan, SNWA

Rich Valdez, SWCA

**Meeting Recorder**: Linda Whetton

**Welcome and Administrative**: Ms. Kartha welcomed the members and the public. Introductions were made and a quorum determined.

**Upcoming Meetings**:

* (M) Jan. 20, 2015 Annual Reporting Meeting at Wyndham Hotel in Phoenix
* (Tu) Jan. 21, 2015 TWG Meeting at ADWR
* (W-Th) Feb. 25-26, 2015 AMWG Meeting in Phoenix (location TBD)
* (Tu-W) April 21-22, 2015 TWG Meeting at ADWR
* (late) May \_\_\_, 2015 AMWG Meeting via webinar
* (W-Th) June 10-11, 2015 TWG Meeting at ADWR
* (late) August \_\_\_, 2015 AMWG Meeting in Flagstaff (location TBD)

**LTEMP EIS Update** (***Attachment 8***) – Mr. Glen Knowles. The group has been working hard to develop a hybrid alternative. Even though there are a lot of modeling capabilities available, they’re still developing the variables. In response to stakeholder concerns, they will add another eight weeks into the schedule to do the modeling before preparing a draft EIS. He reviewed the characteristics and benefits of the hybrid alternatives. The PA is still being reviewed and will help define impact analysis in the EIS. Reclamation met with the Pueblo of Zuni and they have serious concerns about the trout management flows (TMF). They consider the “egg” a living being and TMF are very offensive to them. Modeling indicates the TMF could be a powerful tool and could help them develop a more healthy trout population in Glen Canyon. They’re proposing to test those in the first two years and then potentially in the first five years. If effective, they would develop the triggers for when they would be implemented. However, they’re currently focused on mitigating tribal concerns. It’s possible they may be able to use fish from TMFs for human consumption, something the Zuni approves. The tribes also want to be involved with Section 7 Consultation with FWS.

Current Schedule:

Dec 2014 Complete hydropower analysis

Jan 2015 Internal administrative draft EIS

Jan/Feb 2015 CA Draft distributed

Feb/Mar 2015 Public Draft

Spring 2015 Draft Biological Assessment Review

Spring-Summer Draft Biological Opinion Review

Winter 2015/2016 Final Draft

**Update – Colorado River Annual Operating Plan** (***Attachment 9***) – Ms. Katrina Grantz. This report includes Colorado River hydrology and river operations for the past year and projections for the coming year. The 2015 AOP report is in the final stages of development and will be submitted to the Secretary of Interior in a few weeks. It will be available at: <http://www.usbr.gov/uc/water/rsvrs/ops/aop/index.html>. The Upper Basin snowpack this year was slightly above average, peaking at 111%. Current storage at Flaming Gorge is 88% while Lake Powell is at 51%. At the end of water year 2014, unregulated inflow into Lake Powell is 10.38 maf or 96% of average. The August 24-Month Study projection of January 1 elevations establishes the Lake Powell operating tiers for the upcoming year. If in Upper Elevation Balancing, April 24-Month Study projection of Sept. 30th elevation, storage could shift to Powell operations to balancing or equalization for remainder of the water year. We’re currently in the upper elevation balancing tier so we’ll continue to plan and look to next April to determine whether we’ll shift to balancing and/or equalization or remain at 8.23 maf. The 2015 Most Probable Unregulated Inflow = 10.6 maf and Powell release = 9.0 maf and the Maximum Probable at 12.1 maf release.

Drought Contingency Planning – Inflow into Lake Powell has been below average 12 of the past 15 years so 2000-2014 was the driest 15 years in over 100 years of record keeping. We were fortunate that the start of the drought in 2000 was at nearly full conditions. A wide range of future outcomes is possible through 2020, including an “extended drought.” Putting water back into the system, through a range of options, improves system resiliency and helps to avoid critical reservoir elevations. Reclamation has been working with Upper Basin states and other stakeholders throughout the basin to develop a contingency plan with the primary objective to preserve power production at Glen Canyon Dam.

**Socioeconomics Update** (***Attachment 10a***) – Mr. Lucas Bair. The following updates were provided:

* Project Element 13.1-Economic Values of Recreational Resources along the Colorado River – Grand Canyon Whitewater Floater and Glen Canyon Angler Values. Two surveys have been proposed, one for anglers and one for whitewater floaters in the GRCA. There was a little confusion about the notice (***Attachment 10b***) that was sent on 9/5/14. The FRN was posted as an NPS project, but it’s a USGS project. The next steps are for a DOI review based on comments received, OMB approval, and then another FRN will be published with additional time to comment. At that time the survey and other materials will be available for public comment and review. Hopefully the OMB process will be ended by the calendar year and the survey can be implemented. He’s going to dovetail on AZGFD creel surveys to collect angler contact information and has also talked with Jan Balsom to collect whitewater floater contact information. He will provide additional information via e-mail.
* He recently spoke at Colorado Mesa University about how social scientists think about managing resources in the Colorado River Basin. He provided background information on the AMP, system analysis, the economic value of energy, and how GCMRC approaches research. An economist will typically approach the work on resources and landscape from a benefit cost standpoint where he will get any type of management action and try to add up the increase in social welfare from taking an action or benefit compared to a decrease in social welfare or costs associated with these types of management action. Costs and benefits in the future are weighted less than costs and benefits faced in present day. There is a time value to money. Economic benefit is willingness to pay, or demand, for a good or service (demand is function of price, individual income, and prices for all other goods and services). Economic cost is foregone opportunity to use in other sectors on the economy (labor, capital, resource input). An economist will look at the resource portfolio as a series of marginal costs (gas, hydro, etc.) and each of the technologies have a different marginal cost to production with hydro being relatively cheap. It’s important to understand the context of the resources and the conditions we find ourselves in to appropriately apply economic questions.

**NPS Shinumo Creek Updates: Fires, Floods, and Humpback Chub Translocations** (***Attachment 11***) – Ms. Jan Balsom. Shinumo Creek was determined to be an excellent location for HBC translocations. The NPS has been working for a number of years with Havasu and Shinumo to meet the conservation measures of the 2008 and 2011 biological opinions to establish the second populations of HBC breeding populations in the system and meet FWS recommendations. They continue to work with Reclamation and the Service in developing a second spawning population and provide rearing and grow-out opportunities off the mainstem. Since 2009, 1100 HBC have been translocated and in June the population in the Creek was still about 125-190. They think a large portion of fish are going into the mainstem. This summer there was a large lightning strike fire in the upper drainages of Shimumo Creek at Galahad Point that led to some ash flow into the drainage. The flash floods were epic and the entire creek system has changed. In September they went in but didn’t find any HBC and overall there was a >99% decline in fish. Before and after shots show the creek is unrecognizable. The only place that hasn’t been affected is Merlin Abyss which is one of the small side drainages. The crews will go in and remove the remaining trout. There will need to discussions with partners as to what needs to be done.

**New Insights on Trout from the Natal Origins Study** (***Attachment 12***) – Mr. Josh Korman. The project began in Nov 2011 and runs from Glen Canyon Dam to about 60 miles downstream of Lees Ferry and includes five study reaches. They’ve done 16 trips and have caught over 190,000 trout. They released about 68,000 tags with about 42,000 in Lees Ferry and about 10,000 in upper and middle Marble Canyon. They’ve recaptured about 8,000 pit tags which is about 12% of the total number of releases. They are putting in more marks than they’re losing due to mortality and movement. As the mark rate goes up, the imprints of the population should increase. There is about 15% of that population marked. As you go downstream where the population drops in abundance, there is 20-25% of the population is marked. Reach 1 at 6 kilometer section has dropped down to about 12K or 13K fish per kilometer. If you take 13K fish and multiply it by 25 kilometers, you end up with well over 300K fish in the Ferry currently. Things have been on the decline in House Rock with currently 4K fish per kilometer so about one-third of the density in House Rock than in Lees Ferry. There is a declining density as you work your way downstream and a declining abundance trend in Lees Ferry and upper and middle Marble Canyon in contrast to above and below the LCR. There was a large cohort produced in 2011 which led to really large abundances in the upper part of the system, but that abundance has been declining as that cohort dies off. Based on the 8K recaptures, 95% of the fish moved less than 2.5 km upstream or 5 km downstream. The majority of fish have not moved or moved very little. They have recaptured 2,228 in GLCA. Movement across reaches is rare, but it does happen. Typically the fraction of moving to other reaches is below a percent. There is more evidence for downstream than upstream movement. In total, they’ve recaptured about 8,000 pit tags with one-quarter coming from Lees Ferry. They’ll be able to make good inferences from all the study reaches because they have large numbers of recaptures over time.

Conclusions - Mr. Mike Yard. There is high abundancy in Lees Ferry in the Upper Marble Canyon area and it’s much more reduced near the LCR. The abundance declines in the upstream reaches and is now currently increasing below and above the LCR. There is very limited movement for most individuals that are recaptured. However, some individuals show some long distance movement. Even though a small number, it’s sufficient to explain the increase in abundance that they’re currently observing in and around the LCR. Additionally, the movement of trout from the Lees Ferry to Marble Canyon can be episodic. It appears that in the April 2012 period we missed our opportunity to see the age 0 fish move into the Upper Marble Canyon, however, based on length frequency analysis strongly suggests that that cohort that showed up in the House Rock area was likely from the Lees Ferry area in the fall. So whenever that movement occurs, it’s likely episodic and we just missed it. The other is that more recently during the Sep time period this year we’ve seen some evidence of fairly large movement occurring across both small and large fish into that downstream reach. The recent increase in downstream may be driven by poor condition. There is seasonal condition change in relative condition and that there is an overall trend to reduce growth that may be the impetus underlying this movement in this system. We also have low reproduction that is likely maintaining to a certain degree in these populations as far as recruitment – the size, the immigration. Growth is variable over time and space. Growth varies between Lees Ferry and downstream and there’s seasonality to this, that it’s highest in April-July time period and less in the winter. The fastest growth is occurring in the Marble Canyon area, but Marble Canyon is strongly influenced by the monsoonal inputs that are occurring in the late July-Sep time period. They see seasonal differences in condition and there is this trend towards an inner annual decline overall in conditions.

Modeling Long Term Effects on HFEs on Trout and HBC (***Attachment 13***) – Dr. Charles Yackulic. They’ve been doing some modeling of HBC population dynamics and use the framework in which they potentially use two different environments, the LCR of the Colorado River and which they break up the data to define size in each of these two locations. Fish 40-100, trout 100-150, trout 150-200, chub 200-250, and chub 250 plus. One of the key points is that dynamics in the LCR versus the Colorado River are very different. In the LCR fish grow to adulthood fairly quickly, within 3-4 years and have a good chance of making that transition. Whereas in the Colorado River it’s quite a bit longer to become an adult because of slow growth rates. While the actual monthly survival appears to be higher in the Colorado River, at least under low RBT conditions, not a lot of them survive to adulthood just because it takes them so long to get there. However, if one survives to adulthood in the Colorado River, it could be around for a long time. One of the implications of this is in the Colorado River you have large timelines so when you have effects on the juveniles and when you start to see those effects manifest themselves in the adult population. During the period of July 2009 to July 2010 70% of juvenile chub would’ve survived, while 30% would’ve died. In contrast, in 2011-2012 the modeling suggests that only roughly 25% of chub would survive a full year under the conditions that were present. Growth rates depend on temperature but they also depend on how many trout are in the system. There is a lot of uncertainty at higher temperatures, partially because they don’t have a lot of data. Temperature also affects the growth rates of all the larger size classes although trout do not.

The point behind lambda is it’s supposed to be an intrinsic population growth and the idea is that if you took the conditions from a given year and ran them on repeat for 20 years, what would happen to the population. Would it increase or decrease from a starting value of 7,000? Short term trends can be misleading in that the population may be responding to what happened the last year or two as much as what’s happening in the current year. To illustrate, he took two different populations that have different starting population structures so they’ve had the same amount of adults in year 0, but they have different amounts of sub-adults in juveniles which reflect the last couple of years. The number of RBT is kept constant over the 20-year period. If you run it out a few more years, that first year interval was very misleading from where the system was going. Referring to the black line in the graph on slide 16, it was a system where there were a lot of juveniles and sub-adults already in the system because there had been good years in the last couple of years, but the current conditions are quite poor. So while there was an initial growth in the population, over time it begins to decline because that scenario has a lot more RBT and lower juvenile survival rates.

**Endangered Species Discussion: Update on the Recovery of Listed Species**

Humpback Chub Recovery Plan Revision. Mr. Tom Czapla. Input was received from the Upper Basin on what the Recovery Plan should look like. Invitation letters to the team members will be sent within a few weeks. Rich Valdez will serve as the lead and Tom Czapla as the agency lead. Other assignments:

* Writing Team: Rich Valdez, Tom Czapla, Bob Millis, Tom Chart, and Kevin Macabee.
* Science Advisor Group: The majority of members are from the Lower Basin or are working in the Grand Canyon, one person who will work for Upper and Lower Basins, and another individual from the Upper Basin.
* Implementation Group: This 10-member group will consist of upper level managers who will determine how recovery criteria will be implemented.

Recovery of the four big river fish (pikeminnow, humpback chub, bonytail and razorback) is under the authority of FWS Region 6 whose regional director has requested this team to produce a draft with coordination from Region 2 (Albuquerque) and Region 8 (lower basin) within 18 months. There will also be Service advisors from each of the participating regions.

*Concerns:*

* *Involvement of the AMP in review process of pikeminnow and HBC recovery goals before they’re released for public comment.*
* *Encourage involvement with the tribes in early development of the teams’ work.*
* *Ability to integrate other organizations into the process to pre-emptively remove issues of challenge that they might have.*
* *Fish & Wildlife Service is sensitive to potential for different views on recovery.*

Down-listing and De-listing of HBC (***Attachment 14a***) – Mr. Kirk Young. Down-listing requires five years and de-listing is an additional three years. Over this 5-year period the six populations have been maintained in a stable capacity – the adult population is stable and the sub-adults recruiting in the population are replacing at or above the adults that are falling out of the population at any given time. It’s one core population in East Upper and Lower Basins that have a population size of at least 2100 individuals. He provided results in the following areas:

* Grand Canyon LCR – The population is stable and increasing and would meet the criteria based on the time frame that’s been established.
* Desolation-Gray Canyons – The population is small but considered stable. There are few enough individuals in this population that they’ve gone to a catch index in lieu of actual population estimates.
* Black Rocks – Large declines in 1990s. Since then the population appears fairly stable. The last four estimates ranged from 200-400 fish.
* Westwater – Large declines in late 1990s. It dropped below 2100 fish in 2008. The last four estimates range from 1300 to 1700 but would still be below the 2100 threshold identified in the recovery plan. The recovery team will have to consider whether to combine Black Rocks and Westwater.
* Yampa – Currently it’s unknown if there is a viable population of HBC there.

The FWS will need to determine when the dataset starts as far as stability for the 5-year period. The FWS has prepared a new minimum viable population estimate and that will also be considered by the recovery team.

Kanab Ambersnail De-listing – Mr. Kirk Young. Becky Loric (Utah, Upper Basin) has the lead for this species. In talking with Jeff Sorensen and Becky, everybody is aware of the 2013 publication (***Attachment 14c***) that clarifies the taxonomy. Any action to re-list or de-list the species probably won’t happen until the MDL (multi district litigation) process is complete and that will be 2016-17. This is a court mandated timeframe to evaluate the listing of a bunch of other species. There are three ways to begin the process: (1) by petition from anybody at anytime, (2) could do it in a 5-year species review, or (3) through an agency prioritization/agency initiative.

* Razorback Sucker in Grand Canyon (***Attachment 14b***) – Mr. Glen Knowles. The Department issued a press release in June announcing that researchers had recently discovered razorback suckers spawning in the lower Colorado River within Grand Canyon National Park. The detection of larval RBS, believed to have been missing from the Grand Canyon since the 1990s, provides evidence that these fish may be naturally reproducing in an area where the species has not been seen in over 20 years.

**Gift Presentation** - Mr. Gerald Hooee presented Jack with a bumper sticker for his truck and also some native tobacco that had been blessed by the Hualapai and by him. He cautioned that Jack not smoke it but to use for protection when going through tough times.

**Remarks from Outgoing GCMRC Chief** (***Attachment 15***) – Dr. Jack Schmidt.

Building Sandbars is a result of three factors: (1) how much good during the flood themselves, (2) how much erosion goes on between, and (3) how frequently. This has been the work that GCMRC and other scientists have done for over 20 years. Perhaps this is the debate of LTEMP, the imagined discussion is how to limit the gains that we’ve already got an HFE Protocol to implement and how frequently do conditions allow. One of the great successes of the program has been to make the sediment input information available to everyone via GCMRC’s website. There’s much more potential for bar building.

In the years of equalization minimal inputs come in from the Paria and the Little Colorado River and we had net erosion out of Upper, Lower, Marble and Eastern Grand Canyon. If all four years are added together, so two years of equalization, one of those being a good sand year and one being a bad sand year, and then two good sand years during the HFE Protocol, this is a balance for four years. The goods of the HFE Protocol have only taken us back. If there was erosion in these two reaches during equalization, all that the mass balances of the last two years do to make us feel so good is to replace what was lost in the previous two years. We still have a net evacuation of sediment in Eastern Grand Canyon and further downstream we can’t tell. And so this is what as scientists have to tell you and what you do with that is a matter of policy. If you look at mass balances going back in time, there has been net erosion out of Eastern Grand Canyon for five years of time. There’s been a net accumulation of sediment in East Central Grand Canyon, about 10 million tons of sand delivered to Lake Mead, and 30 million tons of mud delivered to Lake Mead. When we go to monsoon season after monsoon season that don’t have inputs and we have high release years, it’s going to go the other way. Nothing matters in this system more than the quantity of water, which is a water supply issue that’s not part of LTEMP, and the monsoon floods which nature controls.

HFEs are planned based on the Paria inputs, but the estimated mass balance is actually calculated in Marble Canyon. This number is kind of like this, it’s about 90-95% of this and in these big gang buster years, it doesn’t seem to matter. But if we start planning HFEs that are right on the cuff, is this going to be a 6-hour HFE or a 12-hour HFE, then these little differences might start to matter and more discussion is needed. The model significantly under predicts how much sand gets moved out of Marble Canyon, not by a little bit but by a lot. The nice thing is the planning tool we use we never mobilize what the model predicts. That’s good in one sense in that we don’t risk that sort of erosion but decision makers may need to tell GCMRC to improve that tool.

Sand Mass Balance Versus Bar Campsite Change. This is one of Paul Grams’ studies in which he looked at total mass balance in lower Marble Canyon and how much of a change occurred in the channel bed. The place we really care about is a tiny percent of the whole mass balance change and so we use the mass balance data because it’s wonderful except that it’s a tiny sliver of what we’re really concerned about. We have to wrestle with this.

Patterns in Grain Sizes. We need to understand what’s going on in West Central Grand Canyon. Maybe a full 8-year time series needs to be done before it show’s we’re in balance. And if we have monsoon season after monsoon season that fails and an equalization year after equalization, then we’re going into the tank and that’s out of your control right now.

Reporting There is always going to be a struggle between the stakeholders and the scientists. GCMRC gives you everything as quickly as possible, but it’s not enough. More discussion is needed.

Accountability and Reporting. He reorganized GCMRC two years by eliminating the concept of program managers except for a biology program manager because that program involves many cooperative efforts. Basically research groups will work in one project area be comprised of research grade evaluation scientists. Their grade levels are based only on their national research status and capacity for high productivity. That’s the best way to ensure the best science coming from GCMRC.

Stakeholders. Upon arrival at GCMRC three years ago, he would ask the stakeholders what the questions were the program was trying to answer. Many said they weren’t sure and that the issues were too complicated. The question is: How do you manage sand in the system that doesn’t have any sand and how do you recover a fish species when you’re also trying to have a recreational fishery of another species that eats the one you’re trying to recover? This might be a good time for more discussion.

Program Documents. The time is right to do another core monitoring plan and the program needs to be re-packaged in that context. It may be time to consider doing a new SCORE Report. And we need to figure out whether we’re doing the best science on Lake Powell to predict what’s going to happen in the Colorado River ecosystem. We need to figure out what all the sediment being poured into Lake Mead does to the Hualapai in terms of navigability of the Delta and issues like that. We took this fish population monitoring program issues about as far as we can, we need to bring in external reviewers. We’ve already talked about non-native vegetation control.

**Public Comment**: None

**Adjourned**: 2:30 p.m.

Next Meetings:

(Tu-Wed) April 21-22, 2015 at ADWR

(W-Th) June 10-11, 2015 at ADWR

 Respectfully submitted,

 Linda Whetton

 Upper Colorado Region

 Bureau of Reclamation

Key to Glen Canyon Dam Adaptive Management Program Acronyms

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

ASMR – Age-Structure Mark Recapture

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

BWP – Budget and Work Plan

CAHG – Charter Ad Hoc Group

CAP – Central Arizona Project

GCT – Grand Canyon Trust

CESU – Cooperative Ecosystems Studies Unit

cfs – cubic feet per second

CFMP – Comprehensive Fisheries Management Plan

CMINS – Core Monitoring Information Needs

CMP – Core Monitoring Plan

CPI – Consumer Price Index

CRBC – Colorado River Board of California

CRAHG – Cultural Resources Ad Hoc Group

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

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

FWS – United States Fish & Wildlife Service

FY – Fiscal Year (October 1 – September 30)

GCD – Glen Canyon Dam

GCES – Glen Canyon Environmental Studies

GCT – Grand Canyon Trust

GCMRC – Grand Canyon Monitoring & Research Center

GCNP – Grand Canyon National Park

GCNRA – Glen Canyon Nat’l Recreation Area

GCPA – Grand Canyon Protection Act

GLCA – Glen Canyon Nat’l Recreation Area

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

HMF – Habitat Maintenance Flow

HPP – Historic Preservation Plan

IG – Interim Guidelines

INs – Information Needs

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

MAF – Million Acre Feet

MA – Management Action

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 (USBR 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

RFP – Request for Proposal

RINs – Research Information Needs

ROD Flows – Record of Decision Flows

RPA – Reasonable and Prudent Alternative

SA – Science Advisors

Secretary – Secretary of the Interior

SCORE – State of the Colorado River Ecosystem

SHPO – State Historic Preservation Office

SOW – Statement of Work

SPAHG – Strategic Plan Ad Hoc Group

SPG – Science Planning Group

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 – Technical Work Group

UCRC – Upper Colorado River Commission

UDWR – Utah Division of Water Resources

USBR – United States Bureau of Reclamation

USFWS – United States Fish & Wildlife Service

USGS – United States Geological Survey

WAPA – Western Area Power Administration

WY – Water Year

(Updated: 11/28/2014)