

GCMRC thanks AZG&F for taking the time to review the FY15-17 workplan. We appreciate the feedback, comments, and questions and have responded to each below. AZG&F comments are given in italics with responses provided below each question in regular text.

Project 5.1. *This is a very expense and comprehensive food base project (FY15 = \$421,452, FY16 = \$449,969, FY17 = \$517,973) Can GCMRC please provide a prioritized list of the project elements? I would like to know what would be lost if each element is not funded. I feel that there are many questions surrounding the impact of flows on food base, but not all need to be answered during the work plan.*

GCMRC response: We agree that this is a comprehensive project, but believe that we have proposed a cost-effective group of studies that will enhance our understanding of the aquatic foodbase and provide critical information in support of management of the Colorado River ecosystem and the fish that rely on the aquatic foodbase. The proposed funding from the GCDAMP for foodbase research and monitoring in FY15 is actually slightly less than was received in FY14; FY15 Project 5 + Project Element 7.5 = \$664,000 vs. FY14 Project Elements E.2 + F.7 + H.2 = \$672,000. Our initial prioritization, in the form of the FY15 recommended budget released June 6, 2014, would delay proposed laboratory experiments related to insect oviposition until more field data is available to help guide these experiments.

5.1.1 (Insect emergence in Grand Canyon via citizen science; Recommended for funding \$117,920)
Is the data collected via citizen science robust enough to evaluate changes in species diversity and density over time? In other words, if there was a core monitoring program for foodbase, would this be it? What is lost if we discontinue this work or reduced frequency of collection?

GCMRC response: This is a very robust data set that provides an unprecedented level of geographic and temporal coverage characterizing aquatic insect emergence throughout the Grand Canyon ecosystem. This project provides near continuous coverage during the motor season (April – September) and is being expanded to involve private river trips in hopes of improving coverage during other times of the year. This is an ideal, cost-effective tool to evaluate changes in species diversity and density over time. On a per sample basis, this is almost certainly the most cost-effective biology or aquatic ecology project conducted by GCMRC or its cooperators. Ending or reducing this work would only return relatively small savings to the program at the cost of one of our most informative data streams that is helping inform scientists and managers on the spatial and temporal dynamics of insect populations in the Colorado River ecosystem. Cutting funding to this project would also eliminate a powerful and effective outreach tool that currently involves the guiding community and the whitewater rafting public as active participants in the overall effort of gathering relevant scientific information in support of the GCDAMP.

5.1.2 (Quantifying the effects of hydropeaking on oviposition and egg mortality; Recommended for funding \$97,236)

It's difficult to assess the feasibility of this project element if details are lacking. How is this study going to be carried out? Is this river wide? Can funding be reduced if focus is at Lees Ferry where hydropeaking will likely have the greatest effect?

GCMRC response: Monitoring sites will be selected based on flow characteristics which will produce the greatest contrasts. Sites with wide and narrow varial zones will be selected to allow for comparisons of the effects of drying and warming on invertebrate production in areas where minimal proportions of the shoreline are exposed due to daily flow changes vs. areas where large proportions of the shoreline are exposed daily. Similarly, sites where minimum flows occur during the day will be selected for study and

compare with areas where minimums occur at night. More details on the proposed methods will be forthcoming once the study PIs return from conducting field work.

5.1.3 and 5.1.4 (Synthesis projects; Recommended for funding \$29,672 and \$29,672)

With restricted budgets I am concerned about the extent and cost of this project. I am not convinced that conducting a synthesis stressors and controls on EPT distributions and synthesis of foodbase in western tail waters takes 3 years and \$200,160 to complete. I would suggest reducing costs and time frame (ex \$75,000-\$100,000 for 2-years) and putting this out for competitive bid.

GCMRC response: We believe that any future management actions should be fully informed by the best available science. A thorough understanding of species-specific traits and stressors will be essential to designing potential mitigation strategies and target species and ensuring that they have the best chance for success. Further, we believe that it will be very helpful to our understanding of the current condition of the aquatic foodbase in Glen Canyon to compare it with tailwaters elsewhere in the Colorado River basin and the western United States. Placing Glen Canyon in the context of other tailwaters may provide insight as to how the current invertebrate assemblage became established and suggest approaches for management actions to develop a more diverse assemblage in the future. GCMRC will review the proposed budgets for FY16 and FY17 and re-evaluate the need to continue these Project elements for all three years of the workplan.

5.1.5 (Natural history of oviposition for species present in Grand Canyon; Recommended for funding \$25,878)

It's difficult to assess the feasibility of this project element if details are lacking. This project element is not clear to me. Please explain what actually will be taking place under this element.

GCMRC response: Similar to Project element 5.1.3, we believe that understanding the current state of the aquatic foodbase in Glen and Grand Canyons should be fully informed by the best available science. A thorough understanding of species-specific traits and stressors for species currently inhabiting the Colorado River ecosystem will be essential to determine what support, or lack thereof, exists for the five hypotheses described for Project 5. GCMRC will review the proposed budgets for FY16 and FY17 and re-evaluate the need to continue these Project elements for all three years of the workplan.

5.1.8 (Natural history of oviposition for EPT via studies in the Upper Basin; Submitted for non-AMP funding \$25,878)

It's difficult to assess the feasibility of this project element if details are lacking. This project element is not clear to me. Please explain what actually will be taking place under this element. If this does not get funded will that impact project 5.1.5?

GCMRC response: GCMRC is not requesting GCDAMP funding for this project. We believe, however, that it will be very helpful to our understanding of the current condition of the aquatic foodbase in Glen Canyon to conduct comparative studies with tailwaters elsewhere in the Colorado River basin. Placing Glen Canyon in the context of other tailwaters may provide insight as to how the current invertebrate assemblage became established and suggest approaches for management actions to develop a more diverse assemblage in the future. If the study isn't funded, we believe learning will be considerably slower as will the development of potential management approaches to improving conditions in Glen Canyon.

5.2.2 (Continue Natal Origins drift monitoring in Glen, Marble, and Grand Canyons; Recommended for funding \$87,365)

Is the information we gather from this work in terms of changes in species diversity and density over time different from that of project 5.1.1 (citizen science)? What is lost if we discontinue this work or reduced frequency collection (ex. discontinue January NO trip)?

GCMRC response: Yes, this study is different in several key ways. This effort is focused on sampling invertebrates in the drift so provides information on food directly available to fish. It also includes sampling that occurs concurrently with sampling of fish at specific sites. Paired data will allow linkage of fish diets with abundance and distribution data collected concurrently with quarterly trout sampling. This data will also be used to parameterize rainbow trout bioenergetics models for Glen, Marble, and Grand Canyons.

5.2.3 (Link drift at Natal Orgigins project transects to channel bd shear stress; Recommended for funding \$20,619)

Why is this funding through FY17. The project states that this work can be done over the course of one NO trip.

GCMRC response: Data collection would occur in the first year with analyses and modeling occurring in the second and third years. GCMRC will review the proposed budgets for FY16 and FY17 and re-evaluate the need to continue these Project elements for all three years of the workplan.

6.2 (Humpback chub aggregation recruitment studies; Recommended for funding; \$83,750)

I support this project as determining the natal origins of humpback chub is important in understanding the areas we need to focus monitoring and management efforts. A similar project was budgeted for in the FY13/14 work plan (\$85,000) and as I understand it was not completed due to tribal concerns of the taking of life of humpback chub.

1. *If the project proposed in FY13/14 was not completed, what happened to the \$85,000 from FY13/14 and why is another ~\$84k in FY15, ~\$54k in FY 16, and ~\$50k in FY17 being spent on this project?*
2. *This question might be more appropriate for the tribe(s) that were concerned, but will the taking of life of the surrogate species be a problem?*

GCMRC response: 1. A portion of this funding went to Dr. Karin Limburg, our cooperator at SUNY, to purchase equipment and support a graduate student. Unspent funds will be carried forward into FY15. The extra funding in FY15-17 is to support GCMRC staff in efforts to sample YOY humpback chub from backwaters near aggregations, something that has not been done recently. Part of the sampling program will involve tagging YOY and juvenile fish (as small as 80 mm) as well as looking for VIE tags that are being applied to YOY humpback chub in the Little Colorado River during July sampling. We hope that over time some of these tagged fish will be captured and will help shed light on recruitment at downstream aggregations.

2. We can collect surrogate species with NPS samples from Shinumo and Havasu Creeks taken as part of trout removal activities that were covered in the NPS fish management plan. Bio/West and NPS have agreed to use ethanol to preserve samples (preserves otolith structures unlike other preservatives)

collected as part of their razorback sucker seining surveys (monthly samples through the summer downstream of Lava Falls). They can then provide specimens to us for Dr. Limburg to examine. We anticipate that they will likely have humpback chub incidental mortalities as a result of their sampling.

6.4 (System Wide Electrofishing; Recommended for funding; \$283,722)

I appreciate GCMRC for incorporating the comments we provided on an earlier draft of this project. The system wide electrofishing program has been the cornerstone of long term monitoring of native and non native fish species in the Colorado River through Marble and Grand Canyons. Species interaction, habitat availability, food availability, and water quality dictate the presence and distribution of fish species throughout the CRE. The standardized collection of relative fish abundance and distribution collected from the long term monitoring is important as it is very difficult to conduct biological experiments in a largely uncontrolled environment. While we agree that a reduced effort and duplication of effort is warranted we have not been convinced that a focus on abundance measures instead of CPUE is warranted nor has it been shown that this is feasible, or an acceptable alternative to the long term monitoring currently occurring. While we agree that abundance estimates at certain locations of high interest (e.g. at the confluence of Bright Angel Creek and the Little Colorado River) should be pursued the standard monitoring program should not be abandoned for short term goals, that may or may not be achievable. Changes to this program must be done with caution.

GCMRC response: GCRMRC is not proposing to reduce the overall effort applied by the SWEF project, but have in fact proposed to expand this work by adding a second survey downstream of Diamond Creek. For the sake of efficiency, we have proposed coordination between this project and the Natal Origins of rainbow trout study (9.2) to avoid duplicate sampling of the same sites in Marble Canyon. We have proposed to add experimental mark-recapture efforts at one or more sites to be selected in conjunction with cooperating agencies, but not at the expense of maintaining continuity of this important long-term monitoring project.

6.5 (Brown trout natal origins through body pigmentation patterns in the Colorado River; Unfunded, moderate priority \$16,146)

Not sure I would consider this a moderate priority project in the context of other projects that are listed as funded. Identifying the source of brown trout and other high risk nonnatives has been identified as an information need in the NPS comprehensive fish management plan.

GCMRC response: Dr. Limburg (SUNY) has agreed to examine YOY brown trout and other salmonids collected from Bright Angel Creek to determine if there are markers that can be used to identify fish that originate in BA Creek. The idea of using pigment patterns to evaluate natal origins of brown trout is appealing, but we believe it would be better to wait to determine if the ongoing approach with otoliths will be successful before funding a second study on the same topic.

6.6 (Mainstem translocations of humpback chub; Recommended for funding \$9,790)

This project might be more appropriate in under project 8. Also is there adequate funding for this project (FY15 = \$9,790)? This is much less for what appears to be similar work in project 8.2 (FY=15 \$88,600)

GCMRC response: This was included to provide some staff time to examine the feasibility of this project and to begin initial NEPA compliance efforts that would be required. The USFWS also indicated this level of funding was inadequate so GCMRC will withdraw the request to fund this element.

6.7 (Rainbow Trout Early Life Stage Survey; Recommended for funding \$77,024)

This might be more appropriate under project 9.

2009 PEP recommended:

Monitoring age-0 trout habitat use and movement is not routinely needed because the electrofishing survey provides a direct index of pre-recruit trout density. Similarly, redd counts are not needed because the electrofishing survey provides a direct index of adult trout density. This program's strength is in evaluating the impacts of flow manipulations on early life history, and it should be part of the evaluation of future flow tests.

The need to conduct annual RTELSS work should be considered when evaluating a standardized monitoring program for Lees Ferry as proposed in project 9.1.

GCMRC response: For the current workplan, we decided to include ongoing monitoring of native and nonnative fish in the mainstem in a single project. We believe that annual RTELSS surveys are needed given that frequent flow manipulations are already being conducted as part of the HFE protocol and operations like equalization and other release levels. In addition, it seems likely that Trout Management Flows (TMF) will be included the final LTEMP EIS. These RTELSS data will inform those experiments and operations and provide more resolution than other studies which would include only fall electrofishing surveys of juvenile trout. While fall electrofishing of juvenile trout may provide good information on the strength of a cohort, it will not provide information on possible mechanisms that affect cohort strength (redd deposition, early juvenile survival, survival through the summer). Understanding these mechanisms will be key to understanding the potential for compensation and tailoring the exact design of TMFs. Key questions in the design of TMFs include how many cycles, how should they be spread out over the summer, and what will each cycle look like. Relying on fall catch alone would likely answer these questions eventually; however, the slow rate of learning, possibly on the order of decades, makes this approach undesirable.

7.3 (July Little Colorado River juvenile humpback chub marking to estimate production and outmigration; Recommended for funding \$112,172)

What will be lost if this work is not conducted? I have a concern about costs (\$112,000), additional helicopter flights, handling of chub in summer for this project. I am not sure if the benefits of this project outweigh the costs. There will always be some level of uncertainty around the actual population of HBC. I think at some point we just need to accept it and focus more on the population over the long term. Is it going up or is it going down. At some point ASMR became unacceptable yet we were able to make decisions based on the population estimates that came from that model. This project is planned for an additional three years why is that necessary?

GCMRC response: Although the information gathered as part of this study will help generate more accurate and less biased estimates of humpback chub population (see Project element 7.10), the main objective is to help resolve uncertainties about the drivers of humpback chub population dynamics by testing hypotheses. Understanding humpback chub production and outmigration rates are significant for managers for two key reasons: 1) it's practically impossible to determine what levels of trout abundance and temperatures can be tolerated while meeting humpback chub population and/or recovery goals without a better understanding of these rates and 2) understanding how and why the values vary may allow managers to improve the timing of certain management actions. For example, managers would not want to implement expensive actions like LSSF or trout removal if it was known that a humpback

chub recruitment year like those observed in 2000, 2002, or 2006 was likely (we think these years were poor recruitment years based on fall catches of YOY in the Little Colorado River, but it's possible outmigration was unusually high). Others have noted the importance of understanding humpback chub production and outmigration in the Little Colorado River. As part of the LTEMP process, modelers conducted simulations to predict the consequences of alternative management strategies. The order of importance of various factors in introducing uncertainty in predictions were: 1) humpback chub production and outmigration rates, 2) Hydrologic trace, 3) Trout flow-recruitment and outmigration, 4) HBC vital rates, and 5) uncertainty in trout-temperature-chub interactions. This study will provide information on the degree to which production and outmigration vary inter-annually and will allow us to test some of the assumption of the multistate models (e.g., is it true that ~20% of juvenile outmigrants end up in the JCM reach or does this rate vary between years). Once we have a reasonable set of replicates, potentially by the end of this workplan, we can likely discontinue this research project and rely on the Juvenile Chub Monitoring and fall sampling. Another advantage of this project is that we hope to leverage the large number of marks being put out prior to dispersal to determine what proportion of recruitment at different aggregations is attributable to the Little Colorado River. Since directed take of otoliths is not currently allowed, we hope that comparison of recapture rates of marked humpback chub at mainstem aggregations from fish marked in the Little Colorado River will allow us to make formal inferences.

Concerning the comment about ASMR, this model assumed that all individuals in the population had similar growth and survival rates. It's now clear that this assumption was grossly violated (see Yackulic et al., 2014 plus January 2013 and 2014 annual reporting meeting presentations) which could have misled informal inferences in the past and thus decisions. In addition, most of the information to inform population estimates was from fish caught in the Little Colorado River, but fish are not available in this tributary in all years because of skip spawning. This creates heterogeneity in capture probability which leads to biased low estimates of adult population size. Finally, ASMR is not a predictive tool so it does not help formal decision making. In past instances when predictive information for was needed for management documents like EAs and EISs, modelers would develop simulation models that were entirely separate from ASMR. As part of the LTEMP EIS for example, Charles Yackulic worked with Lew Coggins and Josh Korman to develop such a model which would more closely link estimation and predictive tools with the goal that predictions can eventually be updated based on new learning. Moreover, review of the published papers on ASMR will make it clear that the developers tried to fit models that differentiated the Colorado River and Little Colorado River. They were unsuccessful, however, because they lacked critical data on young fish now available due to successful implementation of projects like Near Shore Ecology, Juvenile Chub Monitoring, and this project.

7.6 (Potential for gravel substrate limitation for humpback chub reproduction in the LCR; Recommended for funding \$11,600)

I have a hard time understanding how this will apply to management decisions. With budget restraints I do not see this as a high priority project and do not recommend this project element for additional funding at this time. I would suggest seeking outside funding or propose this during the next workplan.

GCMRC response: If humpback chub reproduction is limited by gravel substrate, this would allow us to predict future years when reproduction would be low and could lead to relatively cheap management interventions. Additionally, if this is an important process for humpback chub production and climate change predictions are accurate, then this may actually be more important than any other intervention for avoiding extirpation. A long-term decline in production in the LCR would be a much more

detrimental than anything occurring in the mainstem. GCMRC had this project identified as unfunded in the May 9 prospectus, but moved this to recommend for funding at the suggestion of the BAHG.

7.7(Evaluate CO₂ as a limiting factor early life history stages of humpback chub in the LCR; Recommended for funding \$86,420)

I have a hard time understanding how this will apply to management decisions. This project is expensive (FY15 = \$86,420, FY16 = \$98,210, FY17 \$118,272). With budget restraints I do not see this as a high priority project and do not recommend funding for this project element. I would suggest seeking outside funding or propose this during the next work plan.

GCMRC response: It will be difficult to assess the effects of dam operations (or other management actions) on humpback chub without understanding the factors that really limit fish populations within the Little Colorado River. Carbon Dioxide has the potential to completely structure fish communities within the Little Colorado River and if we are not accurately accounting for CO₂ effects, it is likely to confound interpretations of any management actions. The laboratory work to evaluate CO₂ tolerances of Little Colorado River native and nonnative fishes, relative to the published literature, should be complete within one year. Field assessments of CO₂, however, will need to take place over three years (which adds cost) to account for differences in hydrology that will affect the timing and duration of high CO₂ levels in the Little Colorado River and its effects on early life history stages of fish.

7.9 (Development of a Non-Lethal tool to assess the physiological condition of humpback chub in the Colorado and Little Colorado Rivers; Recommended for funding \$41,876)

I have a hard time understanding how this will apply to management decisions. This project is expensive (FY15 = \$41,876, FY16 = \$95,526 FY17 \$103,808). With budget restraints I do not see this as a high priority project and do not recommend this project element for additional funding at this time. I would suggest seeking outside funding or propose this during the next work plan.

GCMRC response: The hope is that new technology may provide an alternative to weighing humpback chub to calculate condition factor and monitor growth. We have generally discontinued weighing humpback chub because of the extra time and stress on the fish, and our inability to find tools to provide accurate weights under windy conditions or on a moving boat. Moreover, preliminary data from ultrasound work suggests that humpback chub in the field have considerably fewer eggs than humpback chub held at the USFWS Southwestern Native Aquatic Resources and Recovery Center in Dexter, NM. If this holds, it suggests that humpback chub in Grand Canyon may be chronically in poor condition. This is not accurately measured by traditional fish condition indices and warrants further evaluation of the proposed approach.

8.1 (Efficacy and Ecological Impact of Brown Trout Removal at Bright Angel Creek; Recommended for funding \$96,396)

As I understand it, this project was cut in half due to the HFE this past fall. If another HFE is planned in the fall can we expect a similar impact? I suggest using funding from project 9.9 (FY15 = \$72,616), which is designed as contingency during HFE years, to fund this project during non HFE years? In other words in HFE years spend money on project 9.9 and in non HFE years spend money on project 8.1 and not try to do both at the same time especially if the HFE is going to affect data collection for project 8.1.

GCMRC response: The timing of last year's HFE did interfere somewhat with planned mainstem trout removal near the confluence of Bright Angel Creek and resulted in less effort in the mainstem. GCMRC staff instead helped NPS crews conduct removals by backpack electrofishing in Bright Angel Creek itself

during and immediately following the HFE. Mainstem removals were planned to coincide with the timing of brown trout spawning with the goal of removing fish as they staged near the creek mouth to move upstream so rescheduling this effort may reduce the effectiveness of this project. We are open to discussion about this project, but it should be noted that this project is identified as a conservation measure in the USFWS 2011 Biological Opinion and is also part of an overall effort described in the NPS Comprehensive Fish Management Plan to control nonnative fish in and near Bright Angel Creek in an effort to benefit native fishes. One option could be to utilize the HFE's to target those brown trout that move into the creek out of the turbid mainstem (where they can be caught much more effectively) and limit electrofishing in the mainstem, but this would need to be discussed with NPS to determine if they could support this change. Alternating funding between this project and project element 9.9 might be a feasible solution if HFEs were infrequent, but note that HFEs have been triggered in two of two years since the HFE EA was implemented. This change would also have to be reconciled with the USFWS and NPS given the recommendations described in the management documents mentioned above.

8.3 (Glen Canyon Dam Adaptive Management Program Fisheries Research, Monitoring, and Management Actions Protocol Evaluation Panel; Recommended for funding \$0)

I fully support funding a Fish PEP to evaluate the fish program. I would suggest this occurs in FY16 and not FY17 so there is time to work PEP recommendations into the FY18-20 work plan.

GCMRC response: We agree that a PEP will be valuable. There are advantages to conducting the review in both the proposed years. Convening a panel in FY16 could bring a relatively quick resolution to outstanding issues. On the other hand, it would limit the amount of time available to collect and analyze data from some projects as compared to postponing the review until FY17.

Project 9.1 (Rainbow Trout Population Dynamics – ongoing modeling and future monitoring; Recommended for funding \$37,120)

Maybe I am missing something here, but this is a dramatic shift from the long term monitoring program that has been in place since 1991. This long term monitoring project has done a good job of monitoring trends and as one of the primary stakeholders for this fishery do not feel like we are missing population changes to the fishery. The NPS comprehensive fish management plan outlines stocking triggers based on this long term monitoring, which will no longer be valid under the proposed changes. There are certainly tradeoffs with doing mark/recapture vs CPUE and those tradeoffs should be evaluated by the stakeholders.

1. *Is this replacing the standardized trout monitoring at Lees Ferry? If so I do not agree with this project as proposed. Lees Ferry standard monitoring should be funded. Funding for this project in FY13/14 was \$217,000/yr.*
2. *Similar to what is proposed in project 6.4, AZGFD in coordination with GCMRC, would like an evaluation of the standardized sampling at Lees Ferry with what is proposed in project 9.1. However, before this is done we should not change the standard sampling at Lees Ferry as proposed.*

GCMRC response: 1. During the proposed 2-year hiatus (2015-2016), the NO sampling will provide data that is more robust spatially and temporally, as well as include other additional population metrics besides CPUE. These metrics include actual abundance and vital rates like survival, growth and movement (which are not currently estimated by the AZG&F long-term monitoring program). Secondly, because CPUE data are also measured as part of the NO program, reducing other efforts will not affect

how managers use CPUE metrics for assessing stocking triggers, however, these other metrics will provide the additional information mentioned above. We believe this information is critical to providing a full understanding of the effects of past and ongoing dam operations including HFEs, equalization, and steady flows on rainbow trout population dynamics and movement in Glen and Marble Canyons. It should be noted that our proposal would in fact only be a partial hiatus since we have proposed to retain the fall electrofishing survey in 2015 to maintain continuity and provide trigger information identified in the NPS Comprehensive Fish Management plan and provide an additional year of overlap of different approaches. 2. We agree that an evaluation of sampling approaches would be worthwhile and some preliminary analyses have already been conducted. There are multiple years of overlap for the two data sets such that comparisons should be relatively straight forward. In addition, this project along with all other GCDAMP supported fisheries projects will be evaluated in the PEP proposed in Project Element 8.3.

9.2 (Detection of Rainbow Trout Movement from the upper Reaches of the Colorado River below Glen Canyon Dam/Natal Origins; Recommended for funding \$440,512)

1. *What information is lost if we eliminate the January NO trip?*
2. *How much money will be saved if we eliminate the January NO trip?*

GCMRC response: 1. The types of data that would be lost include rainbow trout abundance and vital rates like survival, growth and movement in Lees Ferry, Marble Canyon, and the Little Colorado River confluence area during January. Additionally, if trout movement is episodic (e.g., as occurred in the winter of 2011-2012) and occurs primarily in winter for age-0 fish, we are likely to miss the event. Additionally, we will lose the same information for humpback chub during the winter, which will make the humpback chub state model less precise in its estimation of juvenile humpback chub survival in the Colorado River mainstem. 2. There would be approximately \$50,000 in savings if the January 2015 NO/JCM trip is cancelled.

9.3, 9.4 and 9.5 (Multiple projects)

9.3 is recommended for funding, 9.4 is unfunded and 9.5 if partially funded. I have a difficult time seeing the ties to management of each of these projects and do not feel that these projects are high priority. What information is lost if we do not conduct each of these projects?

GCMRC response: These different studies are attempting to understand the mechanisms that control demographic states and rates of rainbow trout. Currently, the GCMRC program has demonstrated that there is a negative relationship between rainbow trout abundance and humpback chub survival at the Little Colorado River confluence area. Understanding the mechanisms that regulate abundance levels at the Little Colorado River has considerable bearing on whether or not the Lees Ferry fishery is actively managed, or the Little Colorado River confluence area is actively managed or if trout numbers can be controlled by other physical factors such as flow or sediment. Knowing the mechanisms that drive rainbow trout populations allows managers to act in a cost effective manner, make informative decisions in selecting management actions, and make future predictions regarding resources of concern based on monitoring data.

9.7 (Application of bioenergetics model in a seasonally turbid river; Recommended funding \$33,234, Unfunded High Priority \$33,234)

Maybe I missed something here, but I do not recall seeing result from FY13/14 work plan. Half of the funding for this project is recommended. Can this project be completed if only half funded?

GCMRC response: This project would help us better understand through modeling physical and biological factors how certain management actions or environmental conditions outside of our control might influence the demographic characteristics of rainbow trout in Marble Canyon. This modeling approach allows for us to evaluate the different mechanisms that are potentially regulating population parameters for the species of concern. This type of information allows managers to be proactive rather than reactive. A preliminary poster for this project was presented at the January 2014 Annual Reporting Meeting and a presentation was given in May 2014 at the Joint Aquatic Sciences Meeting. If there is interest, the May presentation can be presented to the TWG via webinar. A manuscript is currently in development with a draft scheduled to be completed later this year. While partial funding is not ideal, we believe progress can be made on this project and useful information can be provided at a reduced funding level albeit on a longer timeline.

9.9 (Effects of High Experimental Flows on Rainbow Trout Population Dynamics; Recommended for funding \$72,616)

See comment for project 8.1

GCMRC response: Evaluating the effects of HFEs on rainbow trout was identified as a needed activity in the HFE and Nonnative Fish Control EAs. GCRMC needs to be prepared to implement this work in the event of HFEs being triggered during the course of the FY15-17 workplan.

Project 10.

Will this project provide a comprehensive fish habitat assessment? I would like to see system wide assessment of physical habitat suitability for fish species of interest in the CRE and not just rainbow trout. For example I would like to know where and how many miles of suitable (physical) habitat exist for adult Humpback Chub. I like and support the concept of this project and would like to see it fully funded.

GCMRC response: No, this study is focused on assisting project 5 researchers in determining what effects lower flows like those seen in 2014 might have on key components of the aquatic foodbase by disproportionately dewatering shoreline areas that may be critical to these organisms. In addition, we are proposing to evaluate the effects of high-flow dam operation on channel-bed sediment conditions in Glen, Marble and eastern Grand Canyons that might be contributing to local rainbow trout production downstream of Lees Ferry. We believe the habitat assessment proposed by AZG&F would require an extensive multi-year effort considerably larger than what is proposed here.

Project 13.1 (Economic Values of Recreational Resources along the Colorado River-Grand Canyon Wiewater Floater and Glen Canyon Angler Values; Recommended for funding \$69,801)

We suggest collaborating on the interviews and experimental design to make use of AGFD expertise in angler surveys at Lees Ferry.

GCMRC response: This is a good suggestion and should be evaluated. Initial discussions about collaboration with AZG&F have already occurred.