Document Title : GCMRC Response to TWG Comments
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#	Page	Line	Reviewer Name	Affiliation	Reviewer Comments	Identify Action Requested	Response Requested	GCMRC Response/Action Taken
					GENERAL COMMENTS			
	General		**Dave Speas and Dennis Kubly et seq.**	**BOR**	We find the GCMRC draft plan to be oriented largely toward the research (and monitoring) of nonnative (and native) fish, with limited attention to management. There is insufficient integration of these activities, and management seems largely to be a byproduct of, rather than a driver of, research and monitoring. By our count, 40 of the 49 pages in the main body of text primarily address research and monitoring.	Respond	Written	We believe that the length of the various sections in the document reflects information needs and availability. We tried to be succinct and not count pages as a measure of quality of the document. We think that the research and management presented will support development of management actions and/or mgmt. needs. Managers need to provide input on desired future conditions, desired management actions, management priorities, etc.
	General			**BOR**	We think the next draft of the plan will need to again be reviewed by the Science Advisors. In our review, we found that concerns of the Science Advisors were still not sufficiently addressed. We expect that the next version of the plan will contain sufficient changes to warrant this review.	Respond	Written	The SAs have commented that they found the document responsive to their review of the previous iteration. If the TWG doesn't agree then it seems more appropriate to have GCMRC work out concerns with TWG rather than confounding the discussion with the continued input of a 3rd party.
12	**46**	**1732 - 1733**		**BOR**	I would think prevention would be the "ultimate" key to nonnative fish control as well.	**Clarify role of prevention in this plan**		Section clarified. Please see Contingency Section.

	7	239	Bill Persons	AZGFD	Statement that recommendations for nonnative fish management approaches and priorities may change as new information is evaluated from annual nonnative fish workshops, literature reviews...etc. raises the possibility that control efforts may change from year to year, depending on the outcome of nonnative fish workshops. I urge caution in this approach of changing priorities every year. I had hoped for a nonnative control plan that includes control activities and necessary monitoring spanning several years (long term plan) to assess any control methods implemented. If annual meetings are to be used to guide a nonnative control program, they need to be well structured, include the right people, and produce recommendations.	Link monitoring to control efforts for the period through 2012.		Changes in control activities will be carefully evaluated with close attention to data from annual monitoring and research programs. Changes in priorities will be evaluated before implementation and will be reviewed with scientists and managers during annual nonnative fish workshops as well as the AMP program. Importance of the link between monitoring and control programs has been emphasized. Please see specifically revised Recommendations/ Annual Nonnative Fish Workshop and Implementation and Contingency Sections.
	47		Bill Persons	AZGFD	Summary Monitoring, Removal, Research, and Other Management Strategies. I think this section needs to be carefully reviewed and revised based upon more objective criteria.	Revise or move to implementation plan?	Yes	Because a number of reviewers have requested defined criteria we will work on adding process and criteria information to the document. However, we believe it is important to not become consumed by process and criteria, remaining attuned to the data for evaluating important studies and/or actions that are needed. It will also be important to recognize that quantification of priorities will still represent a subjective analysis. Please see Implementation Section.
8	na	na	LaGory	WAPA	The “Summary and Integration of Fish Sampling” section contains little if any integration.	Rewrite	Y	Our intent was to summarize fish projects that have been conducted by the GCDAMP for the past several years. Section title was changed. Please see Summary of Fish Projects.

7	na	na	LaGory	WAPA	The report is very repetitive treating the same topics several times at about the same level in the "Review of Recent Fish Sampling Activities" and the "Recommendations" sections. The recommendations section does not need to repeat the history of past efforts.	Rewrite	Y	Realizing that many readers of this document will focus their attention to limited sections, we attempted to write each section to 'stand alone'. To do this, important sections of text have been inserted in multiple sections of the document. The revised Recommendations Sections include sentences to justify the recommendation are more fully developed elsewhere.
12	na	na	LaGory	WAPA	The report should receive a thorough technical edit. There are numerous misspellings, omissions, and formatting problems.	Edit	N	Document formatting errors and misspellings we identified were corrected. We appreciate specific editorial comments.
22	8	278	Capron	WAPA	There are 250 information needs in the strategic plan – this is too unwieldy. A more limited list for the program to focus on might be more effective.		N	We agree that 250 INs is cumbersome. Although we continue to selectively cite the INs, we believe the Strategic Science Questions are much more useful and so we cite these, as well. The interested reader can find a crosswalk between INs and SSQs at the end of the Monitoring and Research Plan approved in 2008 (or we can provide, if desired).
23	8	283-321	Capron	WAPA	This is the typical approach in GCMRC documents, to list the SSQs, but nowhere does the document discuss our ability to answer the current ones and describe the missing information or how we plan to answer these. The current approach here, in the work plan, and other science plans to merely list the SSQs that a project relates to is of little utility to the program. A better approach is to list the SSQs, describe our knowledge and research pertaining to each one, and how the proposed work will add to our ability to respond to each SSQ. How will information be synthesized and analyzed to answer the questions?	Modify	Y	GCMRC strives to demonstrate the relevance of our work to the published TWG and SA guidance. The space required to list each SSQ and describe our work pertaining to each one would unnecessarily increase the length of this document. The 2009 Annual Reports GCMRC is preparing for January will follow suggested format.

38	29	1029	Capron	WAPA	It is beneficial to clearly articulate assumptions, however, I fail to see how these assumptions are being tested, how much of an assumption they are, or whether we have any information which would inform these assumptions?		Y	We agree with the importance of articulating assumptions and thus included them in the document. Testing of assumptions is implicit through the implementation of recommendations. If we observe an unexpected result, then we disprove the assumption. For example, if nonnative fish are removed and we do not observe a positive response in native fish communities, then we recognize that our assumptions may need specific testing through focused experimentation. In order to be as succinct as possible, we embedded the assumptions within the Recommendations Section.
45	35	1284	Capron	WAPA	Why is a literature search recommended? It seems this report draws on a literature search already.	Modify	Y	A literature search associated with historic stocking locations within the watershed, State sport fish stocking plans, and nonnative fish captures on tribal lands will assist in evaluating sources of nonnative fish into Grand Canyon. Text clarified in Sources, Literature Review Section.
	35	1287	Bill Persons	AZGFD	A more complete literature review needs to be done. I had hoped that this would be part of the planning.			We agree literature reviews take time. Studies relating to sources of nonnative fish have been initiated but not completed.
48	44	1690	Capron	WAPA	Annual workshops might be too often for this program, maybe every other year?	Modify	N	Nonnative fish issues can arise in a very short time frame (detection of a new species, evidence of large recruitment events). We feel, given the dynamic nature of organisms, that it is important to review annual monitoring information to quickly identify and formulate responses to nonnative fish problems. Participation in the annual workshop is voluntary.
	8	245	Bill Persons	AZGFD	Section on Efforts to protect Grand Canyon Fish should include references to previous projects; suggest keeping	References	Yes	References to previous projects are explicit in the Introduction

					description of GCDAMP separate.			Section. The intent here is to link native fish protection efforts with the AMP. See revised section title: Native Fish Protection and the GCDAMP
	14		Bill Persons	AZGFD	Mainstem HBC Aggregation Monitoring was discontinued several years ago. I understand that aggregations will be sampled during 2010, but details are still not clear.	Revise table	Yes	Revised table. Mainstem HBC aggregation sampling is scheduled for 2010 and 2011.
	17	549	Bill Persons	AZGFD	Nonnative fish control program = nonnative fish control experiment. Objective was not just to reduce nonnatives, but to learn if the method would provide benefit to native fishes to direct future management efforts. I think that concept of learning by doing is at the heart of Active Adaptive Management.		Yes	Agree with comments, and so have maintained monitoring of natives in work plans to evaluate impacts of control.
					RISK ASSESSMENT			
1	na	na	Capron/La Gory	WAPA	**Risk Assessment**. The main component missing from this plan is a risk assessment similar to Johnson et. al. (2008). This is articulated as a priority effort to be completed after this plan is approved. This should have already been completed during this planning process. Without the risk assessment the plan is little more than a literature review. The plan is a helpful document, provides good background, and describes the tasks that generally need to be done, but little can be completed or meaningful decisions made without the risk assessment. That isn't to say that efforts can't be made to move forward, but knowing where the most benefit (or greatest risk lies) is critical to making good decisions. For example, the AMP is embarking on nonnative removal of trout in the LCR reach of the mainstem with little scientific rationale for the intended target (90% reduction) and without a fisheries perspective on the effort necessary to maintain those reductions. There is no discussion of when those reductions would be most effective (spring, fall, winter?), or how effort should be spread out throughout the year (e.g., quarterly removal trips). If immigration rates are high and movement occurs mostly in the spring/summer, then late winter removal trips might have little impact on HBC environment and might have little impact on predation rates. A risk assessment is needed to help elucidate these connections and help us target our efforts. Before any of the recommendations are implemented, performance of a risk assessment is needed to	Discussion needed	Y	We have not completed a risk assessment because we have been writing this plan. Since delivering the draft document for review we have been able to make progress on modeling which we intend will be the heart of the risk assessment. Labeling the plan "little more than a literature review" is insulting, condescending, and inaccurate. For example, a pure literature review would not attempt to develop recommendations based on the information presented. We have pushed ourselves to make all of the recommendations to managers that we think are scientifically/technically supported at this time. Stating that the risk assessment should already be complete demonstrates unfamiliarity with what is needed to develop a bioenergetic-based assessment. We agree with the reviewers that a risk assessment is needed and therefore are increasing our efforts. The

					determine what species and areas should be targeted.			reviewers' recommendation that nothing take place until the risk assessment is completed is inconsistent with their comments elsewhere, e.g., that efforts to remove rainbow trout should be increased because of potential immigration into the LCR reach. We think that the risks of doing nothing outweigh the risk associated with pursuing the highest priority recommendations in the near term, but that could be reviewed in consultation with the TWG. Professional judgment is currently used in this plan and by the AMP, as it is elsewhere (e.g., UCCRIP, San Juan RIP) to guide nonnative control efforts. We hope to build on this with the conduct of a risk assessment.
1	**7**	**202-243**		**BOR**	In their review of the NNF plan, the Science Advisors wrote (page 2, bottom) "Although much of the information necessary for an effective control plan exists in the document, it does not have appropriate context, organization and balance. Of particular importance is the omission of a general strategy for this program of work that speaks to its overall goal, processes for determining the key problems to address, areas of priority focus, balance of management and science required, integration with other ongoing programs, etc. As noted above and proposed by the authors, it is drafted more as a research and monitoring plan, rather than a Non-Native Fish Control Plan supported by research and monitoring activities." While we (Reclamation) believe that many of the ingredients for a strategy have been presented, they are not integrated into a strategic format. In their revision to include SA comments the authors included a section on a strategy at the onset of the document (Page 7 of NNF plan, "Overall nonnative fish management strategy"). However, the strategy appears to be one of many lists of activities without any associated timeline, breakdown of subtasks, order of implementation, appropriate management agencies, etc. A way to fix this might be to integrate the monitoring,	1. Work with management agencies to develop an implementation strategy that integrates monitoring, control and research priorities under each strategy bullet (page 7, NNF plan). 2. Review revised risk assessment		We believe the reviewers' 2 requested action items are constructive and we will incorporate as appropriate. We believe the annual nonnative meetings provide a regular forum for monitoring progress on an implementation strategy, and stand ready to participate in additional meetings with management agencies on this topic. We will add an implementation section to the plan to help frame implementation, though completing it will take input from management agencies. We received the revised risk assessment written by Valdez and Speas on 1 Sep. 2009. We will review and incorporate as appropriate. Based on these comments and others we see that we have not repeated our description of the

					control and research priorities under each strategy bullet (page 7, NNF plan), and do so in the form of an implementation timeline with management input. This would simultaneously satisfy at least four SA concerns, i.e., the need for formal strategy development, collaboration with managers, science and management integration, and development of a ten year strategy (first, second, fifth and eighth bulleted recommendations from SA comments, pages 3-4). Certainly some activities have to happen before others, some can be initiated concurrently with others, and linkages between science and management could also be more explicitly called out in this format as well. As they stand now, monitoring, control and research activities appear as disjunctive lists in the executive summary and could benefit by integration via an implementation framework. For example, development of remote PIT tag antennae and pheromone research are recommended as a means to learn more about carp for control actions, yet control of carp doesn't appear as priority under the control actions list (lines 44-51 of the draft plan, despite SA recommendations to do so); however it is implied later that carp control would take place in the LCR (lines 1140-1150). To avoid the need to flip back and forth between the various sections of the document, the relationships between research, monitoring and control actions should be explicitly defined at some point in the document, especially in terms of the 5-10 timeframe recommended by the SAs. Roles and responsibilities of the management agencies should also be identified therein. Finally, Reclamation has completed a revised risk assessment (Valdez and Speas) which addresses comments and concerns provided by GCMRC on September 25, 2007. We originally thought that this project would be referenced in more detail in the nonnative fish plan (see notes from 2006 NNF workshop), but that is not the case. Still, we hope that this document will still be of some use in characterizing the relative risk of nonnative fish proliferation in response to altered thermal regimes and will make it available for the final revision along with responses to GCMRC review comments. When completed, also, Reclamation will make available its hydroacoustic assessment of the Glen Canyon Dam forebay fish community to aid in the evaluation of entrainment risk	(Valdez and Speas) and summarize/ reference in plan as appropriate		prioritization of recommendations in all of the appropriate places in the plan; we will rectify in the next iteration. Prioritization of the most immediate needs is reflected in the AMP/BOR/GCMRC work plan for 2010-11. We have also prepared and distributed a table showing how high priority recommendations have been incorporated into the 2010-11 work plan.

					(line 1297).			
	General			**BOR**	Although the plan uses the word "strategic" often, we do not think there is sufficient emphasis placed on a strategic approach to nonnative fish management. The implied strategy appears to be one of many lists of activities without any associated timeline, breakdown of subtasks, order of implementation, appropriate management agencies, etc. We encourage greater attention to species prioritization, risk assessment, source of threats, authority to address threats both inside and outside of Grand Canyon National Park, and temporal and spatial application of control mechanisms, including dam operations. As is too often the case with other aspects of nonnative control, the GCMRC section on dam operations provides a review and then delays new hypotheses, experiments, or management activities in lieu of "a comprehensive review of native and nonnative life history." There is insufficient recognition that managers sometimes have to make decisions and take actions with limited information, which reinforces the notion of assessing the risk of different actions early in the development of control mechanisms.	Respond	Written	We are currently working on a bioenergetic risk assessment which we think will be responsive to many of these comments. We do not intend to assign agency authorities to addressing threats; that would be beyond our authority. We will specifically mention the need of managers to act on the best available information. Please see Implementation Section.
4	**Multiple**			**BOR**	The SAs commented (page 6 of their review) that, "Specification of the overall problem or problems by GCMRC and TWG. What is to be accomplished by scientists, and managers, both in collaboration and, individually. What native (s) are most threatened, what age classes, where? What non-natives are the greatest threat, where?" We do not believe that the problem of nonnative fish has been adequately characterized in the revised plan. Considerable attention has been paid to distribution of nonnative fish (although much of it is relegated to the appendix) and their vulnerability capture, etc., but explicit comparisons of NNF distribution to that of native fish and occurrence in relation to physical habitat gradients in Grand Canyon (mainly temperature) have not been made. Like many other recommendations from the SAs, this risk assessment has been deferred, which effectively extends the planning period through 2010 or beyond. We share their concerns about the length of time it has taken to complete this plan.	Information on distribution and relative abundance of native and nonnative fishes, source populations, etc. should be integrated to identify areas where native fish are most at risk to predation by		Information on species distribution and composition is presented in new figures within the Review of Fish Captures in Grand Canyon. Other information included in new figures includes land ownership, reach and HBC aggregation designations, and tributary streams of Grand Canyon.

						(which?) nonnative species. Authors could consider a graphical approach similar to figure 11 of the revised risk assessment (Valdez and Speas 2009).		
	1	23	Bill Persons	AZGFD	We are concerned that a risk assessment and control methods are not more fully developed.	Explain		We are working on risk assessment now; development of this plan and conduct of the 2008 HFE were deemed to be higher priorities and so they were completed first.
	1	24	Bill Persons	AZGFD	Will the Valdez and Speas risk assessment be included in a later draft?	Explain	Yes	We received this document 1 Sep. '09. We'll review and include as appropriate.
37	29	1015 - 1019	LaGory	WAPA	The text here describing the risk assessment by Valdez and Speas may confuse a reader that does not recognize that that effort looked specifically at the risk of installing and operating a selective withdrawal system rather than the risk of various nonnative fish populations.	Modify	Y	We agree with importance of distinguishing the purpose of the Valdez and Speas 2008 assessment. Text clarified in Recommendations/Risk Assessment Section
7	**20**	**659**		**BOR**	The SA's wrote on page 9 of their review that, "The key in this assessment is to begin to focus on what would be considered to be your predator fish of highest risk and habitats of highest risk. Of these what fish and habitat areas create highest threat to HBC? We assume this objective process was followed to identify catfish as a target species." Line 659 of the NNF plan says that catfish are "generally agreed to be one of the nonnative fish species posing risk to native fish in Grand Canyon", but the criteria or process for this determination was not given. How much risk do catfish pose in relation to other nonnative fish species, including species occurring in the immediate watershed but	Clarify process for determining risk		As has been stated in a few previous forums, such as TWG meetings, channel catfish were deemed to be a risk because: 1. They are already present in the system 2. their numbers can be high around the LCR 3. they can be very fecund 4. they are known voracious piscivores 5. we know that few, if any, of our current methods capture the species effectively. GCMRC and cooperating agencies have not

					haven't invaded the mainchannel yet?			identified any other species posing greater risks with the exception of rainbow and brown trout. Relative risk from various species is being investigated with the developing risk assessment.
	6	163	Bill Persons	AZGFD	Question the statement that RBT "is the fish thought to pose the greatest risk to humpback chub, and, as a result, it has been the primary, though not sole, target of nonnative control efforts to date." In the next sentence you state that a risk assessment has not been completed. As I recall a decision was made to use rainbow trout removal as an experimental treatment based primarily on 2 factors: 1) it was thought possible to control RBT with available electrofishing techniques and 2) there was a low risk of unintended consequences from removal activity compared to other actions such as a temperature control device or modifications to flow regimes. I had hoped this plan would devote more time to a risk assessment and complete consideration of warmwater nonnative risks to HBC.	Change language to explain uncertainty and low risk to other resources as reasons for mechanical removal experiment.	Yes	While we agree that testing methods and low collateral risk were reasons to consider the experimental removal, certainly the nonnative fish were removed because it was anticipated there would be a benefit to native fishes. We can include the additional considerations in our discussion. Risk assessment being developed. Work by Yard et al. (in prep.; presented to TWG in '08) demonstrates that trout diets near LCR include native fish.
9	**12, 29, 34**	**430, 1015, 1265,**			The science advisors remarked at several points (page 14 of their review, in particular) that "The authors might also benefit from interactions with authors who have conducted at least informal risk assessments of some of these species i.e., Valdez and Speas (2007)." We (BOR and consultants) interacted with the authors to some extent via attendance of the 2005, 2006, 2007 and 2008 nonnative fish workshops. The draft risk assessment which became Valdez and Speas (2007) had been mentioned in the meeting notes from the 2006 and 2007 workshops, but we were never contacted to assist with integration of the findings into the present work plan, and reference to the risk assessment in this revision is scant despite several SA comments to discuss the findings in more detail. Also, the authors say on line 1265 that the Valdez risk assessment is a justification for moving forward with a bioenergetics/ecosystem model, yet there is no summary of the risk assessment findings to base this on. We have received comments from GCMRC on the risk assessment in September of 2007, however, and have revised the document to address those comments. We can make it available to the NNF plan authors and are willing to assist in integrating elements of it into the final version of the plan.	Reference risk assessment conclusions to support statements made at line 1265; Work with risk assessment authors to determine how much of it can be used in future planning or prioritization processes.		We received the Valdez and Speas risk assessment 1 Sep. '09. We'll review and work with authors to include as appropriate and requested.

24	10	340	Capron	WAPA	The risk assessment map in the unpublished Valdez and Speas report (BOR) is a helpful way of showing the information in the table. Perhaps that work could be completed or incorporated in this plan? In the GCMRC responses to the Science Advisors, this is rejected, but I agree with the SAs that it should be referenced as an unfinished document. It is much further along than the risk assessment GCMRC is working on.	Modify	N	We received the Valdez and Speas risk assessment 1 Sep. '09. We'll review and work with authors to include as appropriate and requested.
					CONTROL/IMPLEMENTATION STRATEGY			
5	**Multiple**			**BOR**	The SA's wrote on page 8 of their review that, "It is presumed AMWG directed a collaborative GCMRC/TWG approach to incorporate all ongoing and planned activities of both managers and scientists regarding non-native fishes, and selected native fishes. Yet, there is limited specification of management controls and discussion of the collaborative efforts with TWG and resource managers to define the needed controls. We are aware that managers and scientists are collaborating in the Non-Native Fish Ad Hoc Group and important recommendations and planning are formulated in the group. Also, very critical non-native control activities proposed by the Humpback Chub Comprehensive Plan Ad Hoc Group are considered in these discussions. However, these management/scientist discussions are not documented as potential management controls for implementation. Management planning and management controls are not made an explicit part of the plan in balance with science proposals." We believe that the latter two items have not been adequately addressed in the revision. There is referenced to a series of "three workshops" on line 1013 of the NNF plan, but proceedings from these workshops are not discussed or referenced herein; In the case of the proceedings from the 2005 workshop and the initial draft outline for this plan, for instance, there was supposed to be included in the plan a "risk analysis. Initiate in 2006. AMP funded. Incorporate BOR study as appropriate. Deliver draft report early 2007"; additionally, it also called for a "policy review of nonnative control. AZGF conducts with GCMRC input as requested, reports back to AMP". If these assignments were completed, they should be included in this plan, as they	Work with management agencies to integrate their roles and responsibilities in implementation of the plan.		We intend to revise plan by including an implementation section. However, we cannot assign tasks to other agencies as that is beyond our authority. We stand ready to work with other agencies to develop strategies to implement actions. We believe it is important to recognize that we are not dealing with a static system. One standing recommendation is unlikely to be useful for all future applications. That is why we recommend an annual meeting to review current data. We have been remiss in not distributing more notes from the annual meetings to date but plan to do so in the future. We do not anticipate preparing full, published proceedings of these meetings as they are expected to be less formal working meetings. We are not aware of any recent activity of the nonnative fish ad hoc group.

					should form the basis for the strategy.			
	General			**BOR**	We think, in retrospect, that the assignment given to GCMRC by the AMWG to develop a nonnative control plan should have enjoined the management agencies in the effort. We appreciate that GCMRC has been the leader in developing the science necessary to undertake adaptive management of Colorado River resources below Glen Canyon Dam. The GCDAMP has matured sufficiently and knowledge has increased to the point where the roles of the science institution and the management agencies need to be better integrated. The development and implementation of this nonnative fish plan is an excellent place for that integration to ensue. USGS is not a management agency, and it seems inappropriate for them independently to develop a management plan directed at fish and wildlife species. This shortcoming was previously recognized by the Science Advisors. In looking forward, we believe this shortcoming needs to be rectified by greater involvement of the management agencies in both planning and implementation of nonnative fish management. For example, the proposed workshops on nonnative fish management should be jointly developed by USGS/GCMRC and the management agencies. We include Reclamation in that group because of our environmental compliance responsibilities and as the agency that operates Glen Canyon Dam.	Respond	Written	If the AMP wishes to have an independent review of the activities needed to support nonnative control, one good way to prepare that is to assign it to GCMRC as was done by the AMWG. A multi-agency document is more likely to include a number of agency agendas, if it could be completed at all, given the contentious nature of this subject.
2	**46-49**	**Multiple**		**BOR**	The SA's wrote on page 3 of their comments that "The plan lacks specific discussion of resource needs, especially budget needs. Information is necessary for transition of science application to management control actions, who is likely to complete control actions, external budget needs, and all contingency and anticipated new GCMRC research and monitoring needs." We feel that this concern has not been addressed adequately. While it is true that cost estimation is difficult (page 49, NNF plan), it is apparent that there are some activities that will almost certainly happen (risk assessment, trout control, etc), and others that may happen (contingency funds, page 46, NNF plan). Placeholders for these tasks should be identified in an implementation timeline (again, a more robust strategy would aid in this) so that the needs can	Work with management agencies to develop an implementation strategy that integrates monitoring, control and research priorities under each strategy		Please see GCMRC response to BOR general comments above. Revisions of Cost Section incorporate information on 2010 and 2011 fiscal planning. Also see Implementation Section.

					at least be identified in the planning phase, more accurate budget planning can take place. Roles and responsibilities of implementing management agencies need still to be identified.	bullet (page 7, NNF plan).		
3	**44-46**	**1720 - 1788**		**BOR**	The SAs wrote in their comments (page "Inclusion of the contingency plan is an important element of the document. The SAs agree with GCMRC in its review request that this element needs more development. The approach needs leadership of management agencies and tribes to craft appropriate public relations, rapid response control, triage, and monitoring assessments." We agree with the Science Advisors (TWG call, 7/22/09) that this element is still largely unchanged from earlier versions and should be revised to address SA concerns.	Work with management agencies to improve this section.		We agree with the SA comment regarding the need for leadership from management agencies. We have emphasized this discussion in the Implementation Section of this document. We anticipate management roles and responsibilities for implementation of nonnative control and rapid responses to be further refined during discussions at the annual nonnative fish workshops.
	7	202	Bill Persons	AZGFD	Overall Nonnative Fish Management Strategy section suggests that this plan is a strategic plan to develop control methods. It reads as a plan to develop a plan. I had hoped to have a control plan more fully developed at this stage of the project. Where do we go from here?	Review and explain next steps in nonnative control.	Yes	Development of a strategic plan to implement nonnative fish control requires definition of agency roles and responsibilities as well as definition of experimental versus control actions. These discussions have been initiated among management agencies and during AMWG meetings. We emphasize this need in the Implementation Section.
	2	40	Bill Persons	AZGFD	What process was followed in deciding relative importance of different monitoring strategies, control strategies, and research strategies? Criteria developed by the Upper Basin (technical feasibility; time to implement; cost; and effectiveness) and their process to prioritize projects seem to provide a good model. I believe that document (memo to Biology Committee) was distributed at the 2008 nonnative fish workshop.	Identify process used, or suggest options for use in future.	Yes	Within the Implementation section, we have suggested at least two methods for scientists and managers to prioritize recommendations within this document and others brought forth by participants in the annual nonnative fish workshops. We have included the memo cited here as an Appendix to this document.
	6	191	Bill Persons	AZGFD	The section on Integration of Science and Management is unclear and incomplete. Any nonnative control efforts need to be well integrated with other research and monitoring activities, and any management efforts that may fall outside of the AMP also should be closely coordinated with the AMP programs.	Rewrite	Yes	Not sure what the reviewer intends here. Because we are the science provider to the AMP providing documentation of non-AMP activities is beyond our charge. We believe that the ongoing AMP

								work plan demonstrates what projects will be implemented in a given year, and so some sense of integration can be gained from reading that document. For example, nonnative removal from the LCR reach is planned for 2010, as is monitoring of native fish in this reach, so if there is a response to removal we are positioned to capture those data.
4	na	na	Capron	WAPA	**Scientific Approach**. What generally seems missing from GCMRC science plans is a scientific approach to hypothesis testing. For example, this plan provides background information on nonnative catches, nonnative control efforts, and then talks about potential strategies. It may be beneficial for GCMRC to replace Coggins with a biometrician that would be available to construct science plans that are designed more around hypothesis testing and designing plans to answer these critical questions, illustrate how that will be done, and how information will be synthesized and what analytical techniques will be used to do that. This issue is more evident in the Fall Steady Flow science plan but is here as well.	Discussion needed	Y	This is a plan for nonnative control, not an experimental plan, so the request for hypothesis testing does not seem appropriate. Further, we design few experiments (an exception would be the HFE; HFE Science Plan did include hypotheses). It is particularly difficult to describe and defend hypotheses when one does not design the experiment. These broad comments that denigrate GCMRC work in general and critique other documents specifically don't contribute to refinement of the document in question, the nonnative plan.
5	na	na	LaGory	WAPA	The approach outlined in this plan is not sufficiently targeted or prioritized given the limited resources available. The plan does not describe a coherent monitoring and control strategy.	Rewrite	Y	Prioritization of recommendations clarified. Please see Implementation Section.
9	na	na	LaGory	WAPA	The "Summary of Monitoring, Removal, Research, and other Management Strategies" section is a laundry list of activities. There is no prioritization, no sequencing, and considerable overlap. For example, would you really do sonic telemetry and remote PIT tag detection at the mouth of the Little Colorado River to determine nonnative and native fish movements? Both are listed as recommendations.	Rewrite	Y	Prioritization of recommendations clarified. Please see Implementation Section. Remote Pit tag technology can be used to compare large scale movement patterns and Sonic technology can be used to compare habitat overlap of known size classes of fish. Please see revised Recommendations/ Remote PIT tag and Sonic Telemetry Sections.

10	na	na	LaGory	WAPA	The "Nonnative Fish Removal Recommendations" section should describe the overall strategy including priorities, sequence of activities, the level of effort, and adaptive nature of the program.	Rewrite	Y	Implementation recommendations clarified. Please see Implementation Section. The adaptive nature of implementing nonnative fish control is exemplified in the recommendation for annual workshops and in the revised Contingency Section.
56	48	1863	Capron	WAPA	It would be helpful to have a prioritized list of activities here. For example, the development of a bioenergetics model to estimate the potential population level impacts of the trout removal project on HBC should be a high priority. This isn't evident here with this list of seemingly un-prioritized recommendations. The GCMRC responses to the SA comments was that this was prioritized, but that is unclear to the reader.	Modify/clarify	Y	Prioritization of recommendations clarified. Please see Implementation and revised Recommendations Sections.
	30	1082	Bill Persons	AZGFD	Recommendation to start monitoring program in tributaries needs to be further considered following a more complete literature review and review of the GCMRC fish database. How was this priority arrived at? How does it fit in with the rest of the AMP?		Yes	Monitoring in tributaries is recommended to track sources of nonnative fish into Grand Canyon which may negatively impact HBC. Control of new invaders entering through the tributaries is potentially more effective than trying to control them once they reach the mainstem. Recommendation will be further considered in future discussions with GCDAMP scientists and managers. Text clarified in Recommendation/Fish Monitoring in GC Tribs section.
	34	1250	Bill Persons	AZGFD	What criteria were used to recommend renovation of tributaries over other projects?	Explain prioritization process, or develop one to be used in the future.	Yes	Stream renovation is a tool that has demonstrated success in removing nonnative species and sources of nonnative fish in many areas, including within National Parks. The risk of stream renovations unintentionally harming native fish should be fully assessed. Please see Recommendations for prioritization process used and Implementation Section for

								suggested methods of prioritization.
					UPPER BASIN NNF CONTROL SUMMARY			
2	na	na	Capron	WAPA	**Nonnative control efforts in the upper basin**. The plan should include a more comprehensive review of the nonnative control efforts from the upper basin, including lessons learned, methods used (as described in the Science Advisor comment). For example, one lesson learned from the upper basin is that programs must move quickly to suppress invasive species in order to have success in controlling them. This supports an argument for the contingency fund, however this concept is not very well understood without a discussion of the efforts in the upper basin.	Add discussion	Y	This document is not intended to be a comprehensive review of any other nonnative fish control program. We realize that each program has species and habitat distinctions different from that of Grand Canyon. We have cited several projects and approaches within this document that we believe can be applied to Grand Canyon. If there are specific projects we fail to reference, please provide specific references. Please see comment below.
8	**6**	**158**		**BOR**	Also on page 9 of the SA review, they state "This document could be strengthened by acknowledging nonnative fish control problems and control efforts in the upper basin, where fish control has progressed from strategic planning to site specific actions. It would help the rewrite of this document to evaluate a process that has already occurred in the basin with the same fish species. The first strategy in the upper basin was to identify the major nonnative fish issues and problems, and then consider management controls, science strategies, potential problems and conflicts in each area, and resolution in each instance. Also, all known and potential non-native predator fishes were evaluated for how they might threaten the existence of each native fish, to identify high priority areas for implementing control areas, etc (Tyus and Saunders, 1996)." This recommendation has not been addressed. References to nonnative control strategies and their relative levels of success in areas outside of the Grand Canyon are few, and references to programmatic processes for development of strategies are not included.	The authors needn't expand the scope of the document to provide a rigorous review but rather provide a summary to address the concerns identified by the SA's (overall program effectiveness, obstacles, etc. and how that might affect efforts in		Summary of the over all approach to nonnative fish control with examples from the Upper Basin included in the Implementation Section. Major nonnative fish issues in GC are identified and we make recommendations to pursue control, improve monitoring and specific research recommendations to address the issues identified. While GCMRC completes the risk assessment, this information is the best available upon which to move forward with nonnative fish control in Grand Canyon. Please see Implementation and revised Recommendations Sections.

						GC).		
6	na	na	LaGory	WAPA	The report does not draw sufficiently on experience in nonnative fish monitoring and control in the Upper Colorado River Basin. That program has an existing monitoring program in place, has extensive annual control efforts, and has studies to examine the response of native fish species to nonnative fish controls.	Rewrite	Y	We are communicating with the Upper Basin Program to gain additional insights from their efforts, though we have been doing this to date. Based on our interactions to date we believe that program has only recently implemented studies to evaluate the effectiveness of nonnative removal.
14	2	59	Capron	WAPA	This approach was attempted in the upper basin, Johnson et. al. (2008) looking at smallmouth bass, channel catfish and other predators on native fish. But Johnson et. al. (2008) is not cited in this document. A broader look at efforts in other regions is necessary.	Modify text	N	Manuscript has been reviewed and included in revised Research Recs/Risk Assessment Section.
19	6	165	Capron	WAPA	You should cite Johnson et. al. (2008) bioenergetics paper from the upper basin as a possible approach, are there others out there?	Modify	N	Manuscript has been reviewed and included in revised Research Recs/Risk Assessment Section.
44	34	1260	Capron	WAPA	Should cite Johnson et.al. (2008), bioenergetics paper from upper basin.	Edit	N	Manuscript has been reviewed and included in Research Rec/Risk Assessment Section.
20	7	201	Capron	WAPA	The upper basin nonnative control efforts were not cited in this section, and it is noticeably lacking. We agree with the Science Advisors comment that further discussion, and reflection, from the upper basin is needed in this document.	Modify	N	Please see GCMRC response to LaGory comment # 6 above.
40	30	1056 - 1067	LaGory	WAPA	This discussion of monitoring efficacy of various gear types should reference and draw on the experience gained in the Upper Basin.	Modify	Y	We have learned much from the Upper Basin and many other programs, however, we focus discussions in this document on gears and methods most appropriate for safe and effective application to Grand Canyon.
					MECHANICAL REMOVAL			
17	3	101	Capron	WAPA	This section should be completely rewritten. First, based on the current removal data, and some estimates of immigration, it could easily take 4 trips per year (similar to effort in '03/04) to result in abundance estimates of 600-800 trout in the LCR reach. Second, the cost estimate here for what would go into the contingency fund makes no sense as this money is going to be used each year to fund the trips, thus no money will be built up. In years that the AMP does	Modify	Y	We will revise this section to describe the relationship between number of removal trips, suspected immigration rates, and modeled trout abundance to assist with determining the level of effort required to achieve trout control goals. Please see revised

					not implement removals it would make sense to build up a fund. If the program concludes that nonnative fish abundances are a concern, then the AMP should consider a funding approach similar to the experimental fund in which substantial funds are set aside each year.			Recommendations/Mechanical Removal Section and table within.
18	6	163	Capron	WAPA	Is there a citation for this statement? What is this based on? Yard unpublished results? Have we integrated the predation rates with abundance estimates and had this integrated with the ASMR model to evaluate what level of population level impacts that we might expect? Or are there compensatory mechanisms which might ameliorate any removal activities? Elaborate on whatever efforts may be underway with Dr. Carl Walters using bioenergetics modeling.	Modify	Y	Yard and others, in prep cited within statement.
29	17	548	LaGory	WAPA	This section on "Mechanical Removal" seems out of place in a section on sampling.	Modify	Y	Headings changed to clarify section content. Please see revised Review of Fish Projects in GC.
30	17	569-576	Capron	WAPA	This paragraph is technically correct but may be misleading to the casual reader. It is true that electrofishing is probably an effective removal method. However, that doesn't mean the activity is effective at either reducing abundance over the long term (multiple years) or at having a population level impact on the HBC population. Immigration rates may be high enough to overcome substantial removal efforts over a relatively short time scale, especially if recent year-class strength is high as it has been in Lees Ferry recently – this could result in more emigration from the Lees Ferry reach. These issues are discussed somewhat in the next paragraph but additional language is needed here to clarify this for the reader.	Modify	N	Agree with need for clarification of 'effective' removal techniques. Text added to Review of Fish Projects/Mechanical Removal Section.
49	46	1807	Capron	WAPA	My analyses of the available data doesn't agree with these statements that only two trips are needed per year to maintain 10-20% of January 2003 levels. I don't think this is consistent with Makinster's presentation at the AMWG either.	Modify	Y	Please see GCMRC response to Capron comment # 17 above.
50	47	1844	Capron	WAPA	You should state the actual abundance value, 20% of January 2003 is 1290 trout in the removal reach to be reduced to 645 fish to reach the 10% threshold.	Modify	Y	Actual abundance levels inserted in Nonnative Fish Removal Recommendations and Responding to Perceived Nonnative Threats Sections.
	6	163	Bill Persons	AZGFD	Question the statement that RBT "is the fish thought to pose the greatest risk to humpback chub, and, as a result, it has been the primary, though not sole, target of nonnative control efforts to date." In the next sentence you state that a risk assessment has not been completed. As I recall a	Change language to explain uncertainty and low	Yes	Decision criteria cited by reviewer added to Review of Fish Projects/ Mechanical Removal Section

					decision was made to use rainbow trout removal as an experimental treatment based primarily on 2 factors: 1) it was thought possible to control RBT with available electrofishing techniques and 2) there was a low risk of unintended consequences from removal activity compared to other actions such as a temperature control device or modifications to flow regimes. I had hoped this plan would devote more time to a risk assessment and complete consideration of warmwater nonnative risks to HBC.	risk to other resources as reasons for mechanical removal experiment.		
					COSTS			
	49		Bill Persons	AZGFD	Cost estimates section is inadequate.	Revise		Please see comment below as well as Implementation and revised Cost Estimates Sections.
11	na	na	LaGory	WAPA	The "Cost Estimates" section describes the high cost of implementing programs in the Grand Canyon. As this section closes the report and follows immediately after a long list of obviously very expensive programs, it calls into question the recommendations made in the report.	Rewrite	Y	Cost estimates for monitoring and research components GCMRC will be implementing in 2010 and 2011 have been included in the Table within the Cost Estimates Section. Costs for control projects will be more accurately developed as agency roles and responsibilities are defined in the near future.
					TARGETS			
3	na	na	Capron	WAPA	**Rationale for 90% reduction in nonnative species**. Melissa Trammel provided some background to GCMRC on this issue from a March 7, 2005 memo. At the Upper Colorado River Basin Recovery Program Nonnative Fish Removal Workshop held in December 2004, Gordon Mueller stated that a 90% reduction in nonnative fish abundance is necessary to induce a positive population response by native fishes. The workshop was followed by a Biology Committee (upper basin) meeting where achieving target densities of nonnative fishes was discussed as a possible criterion for successful nonnative removal efforts. On request, Gordon Mueller provided several citations to support his suggested target of a 90% reduction. Melissa Trammel summarized those six citations in her memo. Yet, none of this information is used in this document with regard to the proposal of the 90% reduction target for trout in the LCR reach. What is GCMRC's scientific rationale for proposing the 90% reduction target? I don't disagree that it	Add discussion	Y	Thank you for providing this information. Excerpts from these manuscripts have been included in the Recommendations/Mechanical Removal Section. GCMRC will continue to evaluate removal targets.

					is reasonable, but further work is necessary to support that proposal. (2005 memo is attached to this comment)			
13	2	44	Capron	WAPA	This is the first place that a target for trout removals have come up in an official AMP document. This should be a well reasoned proposal that AMWG can adopt. What is the process for approving this with FWS, informal consultation? Is this an annual target, as measured every few years? There needs to be a recognition that abundance fluctuates around these targets, and consideration of the general issues described above in comment #3.	Modify text to form a cohesive argument for targets	Y	We will try to address comment in our revisions to specify the levels of effort required to achieve various levels of certainty. The level of certainty required by managers to initiate control efforts is not clear and should be discussed during the annual nonnative fish workshops. We will recommend conducting annual trout abundance monitoring in the LCR reach.
16	3	89	Capron	WAPA	This plan suggests establishing triggers for nonnative fish control. This should be followed up with a clear management discussion for AMWG consideration. This document poses the question, but further discussion is needed at TWG/AMWG. What process does GCMRC envision for this discussion?		N	In this document we suggest that the process for evaluating triggers to initiating nonnative control should involve discussions among scientists and managers during the annual nonnative fish workshop. Here, scientists will present their most recent findings related to nonnative fish monitoring and research. This information should form the basis of discussions regarding whether or not to initiate nonnative control actions.
43	31	1094 - 1136	Capron	WAPA	This section doesn't help the program move forward, it merely reiterates our question again, how do we set goals for nonnative removal?		N	Goals for nonnative removal should be based on our evaluation of the potential benefits to native fish. Goals for nonnative fish management will also require coordination of management agencies and their respective management objectives. Goals for nonnative fish management will be refined at annual nonnative fish workshops. Please see Implementation Section for clarification.
					SPECIFIC COMMENTS			

10	**16**	**516-528**		**BOR**	In these sections you say that electrofishing may be adequate for smallmouth bass and walleye because of their vulnerability to the method, citing unpublished AG&F data. But earlier you state that capture probability for the two species are unknown.	**Clarify.**		Text clarified to exemplify the unknown efficiency of capturing species that occur in Grand Canyon in low abundance. Please see revised Review of Fish Projects/Mainstem Sampling
11	**33**	**1214**		**BOR**	I believe the the primary gear type used in Elverud (2008) was electrofishing, not angling	**Check/correct**		Report reviewed and statement amended appropriately.
6	**10, 58-71**	**Table 1, Appendix A**			The SAs recommended on page 9 of their review that "In this document Table 1 lists "dominant" nonnative predator fish by reach. Thirteen potential nonnative predator fish have been identified in the CRE, but all are not addressed here. Only 7 are presented in Appendix A. Projected future changes in water temperatures or flows in Grand Canyon might allow one or several of these other non-natives to proliferate rapidly." There are still only 7 descriptions in Appendix A; see also comment 4, above.			We recognize that a long list of species are potentially of concern but don't believe that means every conceivable species needs to be included in the appendix. The material in the appendix is relatively easy to obtain from the scientific literature.
15	3	81	Capron	WAPA	Change "list" to "listed"	edit	N	Edited
21	7	208-231	LaGory	WAPA	There is a fair amount of redundancy in this list (e.g., bullets 2 and 4). Eliminate bullet 8.	Modify	N	Bullet 2 addresses prevention of fish from invading GC. Bullet 4 addresses detecting fish that DO invade GC. Bullet 8 not eliminated. With this bullet, we are stressing the importance of maintaining monitoring programs to evaluate the effectiveness of control programs. Please see Implementation Section.
25	12	428	Capron	WAPA	A Korman et. al. final report to GCMRC is cited here, are these available to TWG/AMWG? Perhaps a better citation is the Korman et. al. 2005 paper?	Modify as appropriate	Y	Citation maintained as final report to GCMRC to cite specific statement.
26	13		LaGory	WAPA	The text of "Review of Recent Fish Sampling Activities in Grand Canyon" does not map closely with the summary Table 2. Some activities are included, but some are not. Also, the discussion of removal efforts in this section seems odd since the topic is sampling.	Modify	Y	Section headings changed to better reflect content. Table and text updated to address comment. See revised Review of Recent Fish Projects Section
27	15	469	LaGory	WAPA	Table 2 shows this effort as occurring twice annually, but the text describes an annual effort.	Modify	Y	Table and text updated
28	15	473-474	Capron	WAPA	This information is somewhat dated, should be brought up to date with recent trips, through 2009?	Modify	N	Information updated. See Review of Fish Projects/Mainstem Electrofishing.

31	18	585	Capron	WAPA	The word “protocol” is used twice.	Edit	N	Word removed
32	19	595	Capron	WAPA	Update through 2009.	Edit	N	Figures intended to demonstrate trout abundance declines and temperatures concurrent with mechanical removal. For updated catch rate information, please see 2007 and 2008 mainstem monitoring annual report. For Updated temperature information, please contact Bill Vernieu, GCMRC.
33	19	613	Capron	WAPA	Hunt is not in the literature cited section, I’m not sure what 2008 is, Theresa’s draft thesis?	Edit	N	Completed Hunt thesis cited.
34	26	869	Capron	WAPA	This unit is installed already right? update.	Edit	N	Updated. See revised Other Fish Projects/Remote PIT Tag Detectors Section.
35	27	940-941	LaGory	WAPA	The statement that “Monitoring activities should initially be conducted in proximity to humpback chub aggregations and tributary inflows” seems particularly important, but is buried in this section and does not even appear in the summary of recommendations.	Modify	Y	Statement emphasized. See revised Recommendation Section.
36	28	969-970	LaGory	WAPA	The statement “electrofishing to reduce mainstem trout abundance and potentially smallmouth bass due to their susceptibility to this method” contradicts earlier and later statements regarding the lack of susceptibility of smallmouth bass.	Modify	Y	Efficiency and susceptibility clarified. See Summary of Fish Projects and Review of Fish Projects.
39	29	1040	Capron	WAPA	The term “jeopardy” should not be used here. First, the recent biop was “no-jeopardy”, and second it is an ESA term of art. “status” might be a better term.	Edit	N	Word removed.
41	30	1089 - 1090	LaGory	WAPA	Why is a “centralized and accessible database” only recommended for this topic? It seems appropriate for all of the nonnative fish work.	Modify	Y	A centralized database is already in place for mainstem and Little Colorado River sampling data. Sentence clarified; please see revised Fish Monitoring in Grand Canyon Tribs.
42	30	1091	LaGory	WAPA	Although a monitoring program is recommended here, the approach to be used is not mentioned.	Modify	Y	Development of monitoring protocols will be discussed among participants of the annual nonnative fish workshops as priorities and implementation strategies become more clearly defined.

46	35	1315	LaGory	WAPA	"Identification of continued and new sources of nonnative fish into Grand Canyon" is recommended, but how that would be done is not described. Why are "tributary and watershed inputs" mentioned here but not described? Only dam passage is described and yet this seems to be a much less important, even negligible, source of nonnative fish to the river.	Modify	Y	See comment above. Tributary inputs have been described in the text and in a new figure. Please see revised Research Recommend/ Source Identification Section.
47	37	1370 - 1390	LaGory	WAPA	This section on remote PIT tag detectors is very general. What species would be targeted? Would this only work for large fish?	Modify	Y	Text inserted to clarify size class and species that could be targeted, to include channel catfish, common carp, and bullhead spps.
51	47	1849	LaGory	WAPA	"Expansion" of the mainstem monitoring program is not mentioned in the recommendations on page 30, yet it appears in the summary of recommendations here. What is the recommended expansion--more frequent monitoring or more coverage?	Modify	Y	The term 'expansion' inserted into text for clarification. Please see revised Monitoring Recommendations/ Mainstem Monitoring Section.
52	47	1851	LaGory	WAPA	Which tributary and confluence areas should be monitored long-term?	Modify	Y	Information added. Please see Review of Fish Projects/ Trib Sampling, and Monitoring Recom/ Fish Monitoring in GC Tribs Sections.
53	47	1854	Capron	WAPA	Update, this event occurred, listed here as "scheduled"	Edit	N	'Scheduled for 2009' removed from text.
54	47	1861	LaGory	WAPA	Are you recommending implementing chemical renovation and barrier construction or just a feasibility study?	Modify	Y	The literature indicates that it is feasible to implement stream renovation and barrier construction to control nonnative fish. We are recommending this tool be evaluated for use in meeting the program's nonnative fish management objectives.
55	48	1864	Capron	WAPA	Maybe identify the Johnson et al. 2008 paper here as an example?	Edit	N	Johnson and others 2008 appropriately cited in revised Research Recommendations/ Risk Assessment Section.
57	48	1871 - 1872	LaGory	WAPA	What is the purpose of this "research" project—determine habitat use, distribution, abundance, age-structure?	Modify	Y	Purpose developed in body of document. Please see revised Research Recommendations/ Small-Bodied and YoY Nonnative Species Section.
58	48	1873 - 1878	LaGory	WAPA	The PIT tag and sonic telemetry studies seem duplicative. What is the purpose of these studies and why would you do both? Are you recommending feasibility studies or implementation?	Modify	Y	Purpose developed in body of document. Please see revised Research Recommendations/ Remote PIT tag Detection and

								Sonic Telemetry. We are currently implementing a remote PIT tag project and researching the feasibility of using sonic telemetry (Nearshore Ecol)
59	48	1881 - 1883	LaGory	WAPA	What would the flow and temperature manipulations be based on? Are experiments planned?	Modify	Y	Basis developed in body of document. Please see revised Research Recommendations/ Targeted Manipulation of Dam Releases. No experiments are planned.
60	48	1884	LaGory	WAPA	The Williams Carp Cage does not sound practical based on the description on page 41 and 42.	Clarify	Y	Practicality of novel methods will be discussed among scientists and managers during annual nonnative fish workshops. Input from interested parties is encouraged.
	1	13	Bill Persons	AZGFD	Change "promote the Lees Ferry trout fishery" to "maintain a naturally reproducing population of rainbow trout above the Paria River, to the extent practicable and consistent with the maintenance of viable populations of native fish.	Revise	Yes	Change made.
	6	185	Bill Persons	AZGFD	Does "(supported with modeling)" refer to determining the presence of new invasive species? Unclear	Clarify	Yes	Terms removed.
	10	346	Bill Persons	AZGFD	Table 1. Descriptions of dominant nonnative species do not look correct. For example, I believe the reach from RM 56.1-68.6 is dominated by rainbow trout, not carp. The column of other nonnative species captured is incomplete.	Revise	Yes	Table removed and new figures revised to reflect most recent monitoring data.
	11	363	Bill Persons	AZGFD	"Little is known about the importance of tributary streams to native and nonnative fish in the mainstem in relation to source and sink population dynamics". Unclear. Why 'in relation to source and sink population dynamics'. Much is known of use of tributary streams by natives and nonnatives (see esp. Maddux and others 1987), and much can be inferred about sources of nonnatives from those tributaries based on close to 20 years of mainstem Colorado River sampling..	Revise	Yes	Source/sink changed to indicate the unknown importance of tributaries to fish spawning and recruitment. Many fish species have been captured in tributaries; however, their importance for spawning and recruitment of these species is not clear. Please see revised Review of Nonnative Fish captures in GC. Maddux and others included in text.
	11	368	Bill Persons	AZGFD	Proofread and spell check paragraph.			Errors edited.
	11	381	Bill Persons	AZGFD	Title of section seems redundant with page 8 line 245			Section titles revised. See Native Fish Protection and the GCDAMP and Review of GCDAMP NNF Control efforts in GC.

	12	425	Bill Persons	AZGFD	"inconclusive results" Results were that baited 1-m diameter large mesh hoop nets captured larger sizes of catfish than other methods. Can you cite this as a presentation to the TWG or do you need a reviewed document?	Revise	Yes	In discussing this project with the authors of the TWG presentation, the authors suggested that the results were interesting but warranted further study due to a small sample size. If other information is available, we would insert it into this section as appropriate.
	14		Bill Persons	AZGFD	Mainstem electrofishing – I would suggest "target" species are native and nonnative fish vulnerable to boat electrofishing. The target species you list are the species most commonly encountered, which may not be the same thing. We target the entire fish community that is vulnerable to the gear we are using. That could include species such as smallmouth and largemouth bass if they become more common.	Revise	Yes	We agree with the need for clarifying target species for monitoring. Text revised as suggested. See Review of Fish Projects/Mainstem Electrofishing and Little Colorado River
	23	747	Bill Persons	AZGFD	Target species for lower 1200 m nets are native and nonnative fishes rather than humpback chub, again we sample the entire fish community, and are not targeting one species.	Revise	Yes	Agree, see comment above.
	15	458	Bill Persons	AZGFD	"Two parameters can be used to evaluate the effectiveness of current nonnative fish monitoring efforts and monitoring gears as removal methodologies: the coefficient of variation (CV) and the capture probability." I think cost and time are also important parameters to evaluate effectiveness of monitoring efforts. That said, I'm not sure if this paragraph even belongs here in the document.	Revise	Yes	Use of CV and capture probability is clarified for the context of evaluating program effectiveness. See revised Review of Fish Sampling/ Mainstem Monitoring and Implementation Section.
	15	482-484	Bill Persons	AZGFD	"intensive sampling…exemplifies effort necessary to detect localized annual trends" is unclear. Were local trends estimated with 'intensive sampling'?	Clarify	Yes	Term 'intensive' was specifically used in the report from which information was cited. Term edited to clarify 'increased effort' required. Please see revised Review of Fish Projects/ Mainstem Electrofishing.
	19	595	Bill Persons	AZGFD	Figure 2 does not match figure title.	Revise	Yes	Figure formatting corrected.
	22	734	Bill Persons	AZGFD	Oral commun. 2007. Are you not able to cite our annual reports?		Yes	Oral commun moved to reflect portion of text not included in annual report. Please see revised Review of Fish Projects/ Little Colorado River.

	24	786-788	Bill Persons	AZGFD	"This suggests that the brown trout composition may have been reduced by removal of brown trout during periodic operation of the weir in combination with backpack electrofishing." The statement is a stretch, and change in percent composition of the catch does not support the statement. Were there changes in catch rates that might be used to support this?	Revise	Yes	Catch rate information for the initial phase of this project has been requested, however, we have not received it.
	24	810	Bill Persons	AZGFD	Delete 'potential' source of brown trout, BA Creek is a clear source of brown trout.	Revise	Yes	Term deleted.
	25	836	Bill Persons	AZGFD	Recommendation to continue studying effficacy of backpack electrofishing in Shinumo creek does not consider recent translocation of humpback chub into the creek. Seems to me that efforts in Shinumo might be better directed at other methods, esp. in light of recent data (angling > shocking).	Revise	Yes	Section updated to reflect HBC translocation. Please see revised Review of Fish Projects/ Shinumo Creek.
	28	978	Bill Persons	AZGFD	''This demands continued testing of novel control strategies through pilot projects conducted in Grand Canyon'' What novel strategies are proposed? Suggest delete.	Revise	Yes	Sentence revised. Please see revised Summary of Fish Projects
	31	1132	Bill Persons	AZGFD	10 percent should read 10 to 20 percent (see line 1122).	Revise	Yes	Revised
	31	1133	Bill Persons	AZGFD	"There is the potential that mechanical removal above the Little Colorado River reach of the Colorado River could achieve this target abundance". I would remove this statement until after further discussion and consideration. Think it is premature at this point.	Revise	Yes	Statement revised to reflect GCDAMP consideration of tribal concerns. Please see revised Nonnative Fish Removal Recommendations/Mechanical Removal
	31	1138	Bill Persons	AZGFD	Can you provide citations for the "many researchers that recommended nonnative fish reduction in three Grand Canyon tributaries"?	Provide citations	Yes	Sentence revised. Please see revised Nonnative Fish Removal Recommendations/ Nonnative Fish Removal in Tribs
	32	1170	Bill Persons		What is the suggestion that backpack electrofishing in Shinumo creek to remove rainbow trout be continued based on? Benefit to native fish in the mainstem? Does it consider time and cost of these operations? Periodic electrofishing in Shinumo creek to reduce contribution of rainbow trout to the mainstem will not be expected to have a substantial population level effect on rainbow trout in the mainstem. Please don't "sell" the project as such. Shinumo seems like an excellent candidate for chemical renovation if desired by NPS because it has a natural barrier in place.	Revise	Yes	Section revised to emphasize acknowledged unknown contributions of RBT to the mainstem, and recommendation for the use of a combination of several gears. Please see revised Nonnative Fish Removal Recom/ Shinumo Creek and Chemical Renovation and Barrier Construction Sections.
	33	1225	Bill Persons	AZGFD	I don't disagree with the statement that chemical renovations have benefited T&E species. There is a wealth of literature available. Can you offer a more complete		Yes	Other citations included in coverage of topic. Please see revised Nonnative Fish Removal

					coverage of the topic with citations?			Recommendations/ Chemical Renovation and Barrier Construction Section.
	33	1226	Bill Persons	AZGFD	Change “can be combined with a physical barrier” to “MUST BE” combined with a physical barrier (see previous comment about literature review of barriers and renovations for native fish repatriations)	Revise	Yes	Term edited.
	36	1353	Bill Persons	AZGFD	Occupancy modeling may be a useful method to analyze data, especially for presence/absence of rare nonnative species. I don’t believe the ASMR is an example of occupancy modeling as stated. Can you provide some other citations for occupancy modeling approach?	Revise	Yes	Occupancy modeling description revised. Please see Research Recommendation/ Occupancy Modeling for Improving Nonnative Fish Monitoring and Detection.
	36	1364	Bill Persons	AZGFD	The statement “Implementing a long-term monitoring protocol to detect changes in nonnative fish abundance and distribution using the occupancy framework is recommended” seems premature. There are a lot of recommendations in this plan. The authors should pare them down to a workable set, with an explanation of how and why priorities were established.			Statement revised to indicate importance of evaluating the potential utility of an occupancy model. Please see revised Research Recom/ Occupancy Modeling for Improving Nonnative Fish Monitoring and Detection