

**Combined Preliminary Comments on the
Arizona State Aquatic Invasive Species Management Plan**

**From the Members of the Aquatic Nuisance Species Task Force
(April, 2011)**

1) From John Wullschleger, National Park Service, ANSTF Federal Member

Thank you for the opportunity to comment on the Arizona State Aquatic Invasive Species Management Plan. We applaud the state's efforts to highlight and coordinate management of aquatic invasive species in Arizona and look forward to continuing collaborating on AIS prevention, response and containment efforts. Overall the plan appears to be comprehensive but we note that most of the actions are fairly general and that implementation will require considerable additional funding, something that seems to be increasingly hard to come by at both the state and federal levels.

We have a few specific comments that we hope will be helpful to the author (s) in revising and finalizing the plan:

- Cover page: The number 47 appears centered at the bottom of the page. **Removed.**
- Pg. 3: TOC should have page numbers. **Page numbers added.**
- Pg. 6, 1st sentence: No page number for Implementation Table. **Added.**
- Pg. 7, 3rd sentence: Use of the adjective "sturdy" strikes us as unusual; consider an alternative, such as "robust". **Amended.**
- Pg. 9: Much of the text on this map and in the legends is difficult to read at this size. Consider a foldout or insert to increase readability. **Inserted as appendix.**
- Pg. 11, 1st sentence: "for the year" gives the impression this is a one year plan. Unless this is true you may want to consider dropping this text. **Removed "for the year"**
- Pg. 13, 2nd sentence: Are not all Arizona waters, inland waters? **Edited to remove redundancy.**
- Pg. 14, middle of 2nd paragraph: Consider revising this to identify which human activities are the primary means for overland dispersal (i.e., overland transport of recreational boats). **Inserted more detail concerning recreational boats and the transfer of mussel larvae.**
- Pg. 14-15, last paragraph on pg. 14 / 1st paragraph on pg. 15: This paragraph is a little confusing because it switches to the conditional form. The first sentence states that there will be a widespread impact on water users and electrical utilities across the state. The second sentence says that cost of eradication would be immense. "Would" implies a condition but the condition is not identified. Is the intent to suggest that eradication may be too expensive to undertake? If so, that should probably be stated more directly ... **Amended sentence to clarify meaning. Cost to fix problems caused by invasives in Arizona water infrastructure has potential to become immense. Next ¶ goes on to mention that prevention can minimize costliness to the state.**

- Pg. 16, 4th paragraph, sentence 1: We suggest identifying the two species of crayfish the first time they are mentioned. **Identified.**
- Pg. 16, 4th paragraph, 2nd sentence: Shouldn't ecosystem be plural? **Yes. Made plural.**
- Pg. 17, paragraph 1, sentence 1:
 - Since you are talking about a single species, replace "American bullfrogs" with "The American bullfrog ...". To accommodate this change, replace "were" with "was" **Changes made.**
 - Also, when you say the species was introduced as a food source, the reader is left to wonder, a food source for what? Seems likely it was a food source for humans but the sentence leaves this open for speculation. **Amended; Food source for humans.**
- Pg. 20, Potential Impacts and Threat Score: Last bullet – Intrinsic value of what? **Intrinsic value of native wildlife**
- Pg. 20, 3rd paragraph, 1st sentence: The meaning of this sentence is unclear. Is the intent to give a higher priority to AIS that are already present in the State? **Clarified. Most abundant, pressing threats to be high priority.**
- Pg. 20, "Actions to be considered": These seem out of place here – it would seem that there should be more space devoted to actions elsewhere in the report. **Actions to be considered are offered as a brief preparation for the Objectives, Strategies, Actions and Cost Estimates section, mentioned in the prioritization section to provide a summary of potential methods to approach priority situations. Additional detail is provided in the Objectives, Strategies, Actions and Cost Estimates section.**
- Pg. 22, "Goals", 7th bullet: There seems to be a typo, the statement doesn't make sense as it appears here. **Typo fixed.**
- How about goals related to control and containment of established AIS and prevention of new AIS? **Prevention of new AIS introductions mentioned. Control and containment listed as a goal of plan.**
- Pgs. 23 -26, Federal :
 - We're not sure why the National Park Service is not included in the list of Federal agencies. The NPS manages two National Recreation Areas (Lake Mead NRA and Glen Canyon NRA) that are partly within the State of Arizona. Both include large reservoirs and one (Lake Mead NRA) has a well established population of quagga mussels. These two Recreation Areas manage quagga / zebra mussel prevention and / or containment programs with combined annual budgets of over \$2 million dollars. The NPS also manages Grand Canyon National Park and 19 smaller units within the state of Arizona, several with aquatic resources that are vulnerable to AIS.
 - Organizationally we suggest separating the federal agencies from the various interagency / multi-state efforts / groups (i.e., Western Regional Panel, 100th Meridian, and possibly Western Governors Association

NPS included in list of Federal Agencies. Management of NRAs and other areas containing aquatic resources mentioned above included.
- Pg. 33, Strategy 1A1, reorganize in what way and for what purpose? How will this support the plan, AIS prevention? Doesn't need to be detailed but it should make the connection clear. **New inclusion of aquatics-specific working group. This will support progress in prevention and management of AIS.**

- Pg. 34, Strategy 1A6: Courses in what and for who? **Abatement, removal and management methods. For AIS personnel, WIT training and otherwise.**
- Pg. 34, Strategy 1A8: Who would be the target audience for this forum? Agencies? Researchers? The public? **Forum to streamline communication between agencies, research findings, and the public.**
- Pg. 36, Gaps in State Prevention Programs and Authorities: How about monitoring and regulation of aquaculture, private fish ponds and the aquarium trade? **Included.**
- Pg. 37: Strategy 2B1 and 2B8 seem very similar. **Identification of gaps in policies versus efficacy of existing regulations are separate but equally important to Strategy 2B.**
- Pg. 40, Strategy 3B3 seems out of place in the Rapid Response section. **HACCP is best implemented in a preventative way; it in fact should occur as part of a rapid response to minimize later complications.**
- Pg. 40, 3C, 3C1, 3C2: Isn't this one of the objectives of rapid response – doesn't it belong under 3B? **Rapid response may not always include eradication efforts. Eradication programs should be developed separately and concurrently to avoid biasing the most effective rapid response plan.**
- Pg. 41, Strategies 4A, 4A1-3, 4B, 4B1. These seem to be aimed at containment and control, not at eradication. Consider changing the header section. Also, how is 4B different than 4A? **Header section amended with content also amended to include eradication. 4B merged into 4A.**

We look forward to the finalization and implementation of the plan and congratulate the State of Arizona on taking this big step toward addressing the AIS issue. Please feel free to contact me with any questions concerning our comments,

2) From Ron Johnson, University of Wisconsin, ANSTF Ex-Officio Member (Representing the National Association of State Aquaculture Coordinators)

- The AISMP does a good job of identifying the broad scope and nature of AIS prevention and management including the numerous agencies both state and federal that has some authority and responsibility. Objective 1 states, “There is no clear state authority or agency charged with limiting and managing AIS” and goes on to state, “Establishment of AzAIS with appropriate implementation, authority and resources will permit effective prevention and management of AIS.” In Recommend Strategies and Actions, there are good strategies outlined including coordinate all AIS management programs, re-organize the Arizona Invasive Species Advisory Council (AISAC), and create an Aquatic Invasive Species Coordinator position. These and the others listed are all good recommendations but it was unclear in the plan how much authority is allocated to the plan and how much authority the coordinator position will have to carry out these recommendations, due to overlapping jurisdictions.

The plan's goal of AISAC reorganization has been amended; it seeks to include an Aquatics-specific working group, with authority similar to other working groups. The Coordinator position, detailed responsibilities and authorities could be decided by said working group, and used to efficiently mesh aquatic invasive species issues and programs with the Arizona

Invasive Species Management Plan. Detail pertaining to this matter was written in to strategy 1A.

- In the section on Threatened Impact of Aquatic Invasive Species in Arizona on page 17 is listed “Other species of concern include Northern Snakehead, Asian Carp (i.e. Silver, Bighead, and Black Carp), Gizzard Shad, Redshiners, and Mosquitofish”. Then in Appendix A listed as “species of concern” on page 68-69 under fish are listed a rather long list of species including many families of fish, several of which are species commonly kept and permitted in Arizona aquaculture as listed in “Licences Issued by the Arizona Department of Agriculture” on web site <http://ag.arizona.edu/azaqua/> . It would benefit the reader to understand in Appendix A what restricted in ARTICLE 4. LIVE WILDLIFE, R12-4-406 means – can these species be kept, are they prohibited to possess, under what circumstances are they allowed? **Amended to be more inclusive to variety in species of concern details. Appendices updated to include clarified list, restrictions and permissions.**

Using the term “species of concern” in two apparently different contexts is confusing, one list appears to be species that pose harm such as the listed species of Asian Carp and the other is a list of restricted species but some are allowed either in the aquarium or aquaculture trade. It would be useful to the program and readers of the management plan to better define these two lists and not use the same terminology for both. **Revised mention of species of concern in as “Invasive species of concern”, to imply those which pose harm. Link provided in Appendix A to AZGFD’s site for R12-4-406 Restricted Live Wildlife for further clarification.**

- Overall the plan lays out well the species of concern, agencies that are working with AIS and recommendations to achieve in the plan. It would have been nice to see AIS species listed with risk analysis according to major watersheds in the state and priorities given to the highest risk species. Did stakeholders of affected industries (aquaculture) have a seat at the table and comment on the plan? **Unfortunately, much risk analysis work has yet to be done. As for stakeholders in industries such as aquaculture, in short, yes. AISAC’s working groups and meetings are open to participation from any and all stakeholders, and the development of this plan certainly received input from such individuals and groups.**

3) From: Scott Newsham, U.S. Coast Guard, ANSTF Federal Member

- While the Coast Guard gets barely a passing mention in the plan (which is understandable given the lack of commercial waterborne trade in Arizona), due to my great admiration and respect for Larry Riley, I reviewed the plan. ;-)
- They wisely used the CT, CA and NM plans in their development, so I didn't have to do a point by point comparison with the ANSTF Checklist. Arizona has identified, detailed and prioritized their AIS issues and laid out a reasonable, methodical, yet challenging set of activities to address them. I was particularly impressed by the 3 Directors Orders in Appendix E. They are putting some bite into their bark.

- While I would have liked to see more details as to the cost of AIS to the state economy (both near and long term), that is well beyond the scope or intent of these plans. One has to start from a premise that the issue has been sold politically and this plan will guide the use of funds when those armored cars pull up to the AGFD and start unloading the bags of money.
- Now for the federal government to start acting like a true partner in the process and provide meaningful support to state efforts. I think the most useful thing the ANSTF could do at this stage of their life is to make the case to the Administration for federal support of state management plans. Succeeding in that effort would TRULY be an accomplishment that everyone could put on their evaluation report and feel good about.

4) From Stephanie Carmen, Bureau of Land Management, ANSTF Federal Member

General Comments

- Clarification is needed early in the document about the various acts and plans in Arizona and how they interact. How does the AzAIS fit in with the Arizona Invasive Species Management Plan of 2008? **Seeks to work alongside the 2008 plan. Aquatics plan developed to address the unique intricacies and challenges posed by aquatic environments and their invasive species issues, first mentioned now under Concerns, Challenges, and Overall Goal in Executive Summary.**
- Capitalization of species names needs to be consistent throughout the document. Generally, common names of fish are not capitalized, unless they are proper names to begin with (ex. Gila trout, round goby) and I suggest using this throughout the text (ex. bullfrog, New Zealand mudsnail, purple loosestrife). **Fixed.**
- Scientific names of species should be included the first time the species is mentioned, or comprehensively in a table near the front. Clarify if you are using Quagga and zebra interchangeably early. **Scientific names now included upon every first mention; interchangeable use of quagga/zebra now mentioned under quagga and zebra mussel discussion in “Freshwater Animals” section.**
- Section formatting needs to be consistent. It is difficult to determine when you are moving from a subsection to a new section. **Fixed.**
- Define AzAIS early in the document and use consistently throughout **Included in Acronyms/definitions table, and mentioned early on.**

Specific Comments:

- **Pg. 5 Executive Summary** – define Section 1204 [of what] [*Editor’s Note – See Don MacLean’s comment on how to reference Section 1204*]; how often will plan be revised and adjusted? **Reference and definition included. Revision and adjustment mentioned in a fluid manner; revisions are to be based off of experience, research and new management strategies and tools as they become available.**
- **Pg. 7 Introduction, paragraph 1, last sentence** – impaction of should be impact on **Amended.**

- **Pg. 11, first sentence carried over** – Upon finalization of the plan for the year – what year, what plan? **Amended, was referencing comments and how they are addressed. Not necessarily a year limited issue, year specification removed. Plan was being spoken of as it's tentative/draft status, revised to reflect approved/active state.**
- **Pg. 13, second full paragraph beginning “For decades…”** – this section leaves out a some species (like tamarisk, crayfish) which have had deep impacts on the ecosystems of AZ and focuses instead in great detail on others. If it is an overview of invasions, it should be more comprehensive, yet broad, and extend back further than decades. *[Editor’s Note – I agree .. see Don MacLean’s comments for additional thoughts on this section]* Also, be sure to more explicitly state that nonnative sportfish will continue to be stocked and these are not considered invasive under this plan. **Sportfish stocking addressed and clarified. Section expanded.**
- **Pg. 14, second full paragraph** – include BLM in list of partners – active at Lake Havasu **Added.**
- **Pg. 18, last paragraph** - Sentence beginning One algal species should have a colon instead of a semicolon **Amended.**
- **Pg. 20-12, listing of priority species** – what order are these listed in within each priority (i.e., phylogenetic, alphabetical)? Ensure proper capitalization of all scientific names. **Listed alphabetically by common name and capitalization fixed.**
- **Pg. 21, Priority 2 description** – not sure what the sentence beginning OR their introduction is intending. **Clarified.**
- **Pg. 23, Federal, last sentence** – why are the laws from New Mexico relevant here? **Typo; Removed.**
- **Pg. 24-25, USFWS programs** – I believe this section could be updated and more current *[Editor’s Note – See Don MacLean’s comments for input on this section]* **Updated using D.M.’s input.**
- **Pg. 26, Bureau of Land Management** – suggest the following re-write:
The BLM implements multiple strategies in combating invasive species. These include BLM’s Partners Against Weeds (PAW) Plan, the Department of the Interior’s Invasive Plant Management Plan, and the National Invasive Species Management Plan. Also, as part of its implementation of the National Fire Plan, the BLM acts to reduce invasive weeds that function as fire fuels and works with partners to enhance native plant restoration. In treating infestations, the BLM uses an integrated management approach that employs the method or combination of methods that will have the greatest positive effect with the minimum negative environmental impact. The BLM uses biological, mechanical and chemical control methods. It is BLM policy to use chemical pesticides only after considering alternative methods. Volunteers and partners play a significant role in helping land managers remove invasive species from public lands. Management of animal species, including invasive animals, on BLM lands is completed in cooperation with partnering state and federal agencies. The BLM is actively involved in Quagga mussel research and management at Lake Havasu. **Rewrite included.**
- **Pg. 28, paragraph on AISAC is confusing** – clarify their role and the status of the plan. **Clarified.**

5) From Donald MacLean, U.S, Fish and Wildlife Service, Administrative Staff to the Aquatic Nuisance Species Task Force and State ANS Management Plan Coordinator

Note: The comments below are based on the ANSTF Guidance for State and Interstate Aquatic Nuisance Species Management Plans, which is available on the ANSTF web site (<http://www.anstaskforce.gov/stateplans.php>). In the comments below, the term “Guidance” refers to this document.

General Comments

- The information contained in the Arizona State AIS Management Plan is good solid information that serves as an excellent foundation for an ANSTF approved State ANS Management Plan. I was especially pleased to see the completed implementation table.
- There are formatting issues throughout the document such as:
 - The different spacing between lines in the first and second paragraphs on page 16. This same issue also occurs on pages 28, 38, and other pages as well.
 - There are places where lists use bullets and other places where lists use dashes. One format should be used throughout the document.
 - There are places where there is a one line space between the heading and its text and other places where headings of the same level do not have the one line of space.
 - There are many places where headings are left alone at the bottom of a page instead of being kept with their accompanying text on the proceeding page.
- An acronym list is needed for this document.
- Move the list of acknowledgements to an appendix and add contact information if possible.

Comments on Missing Content by Section

- **Introduction** – The introduction of the plan has a brief description of the AIS problem in general, but it is not specific enough to Arizona [**Editor’s Note: See 4th specific comment from Stephanie Carmen**]. Additional information on the unique aspects of the AIS in Arizona should be included, if possible. Also, the following items, listed in the Guidance, are not included in the preliminary draft:
 - Geographic scope of plan, including a map and discussion of the geographic area showing water bodies, drainage basins, and major structural features.
 - **Note:** The map included on page 9 looks as if it could be quite useful to the reader in a discussion of the geographic scope of the plan. However, its small size makes it difficult to read. Could the main map be taken out of the surrounding diagrams and enlarged to fill the whole page? If appropriate, could any of the other much smaller

- maps also be enlarged as well? Links should also be provided to larger versions of the maps, if possible. **Addressed.**
- Discussion of any scientific review and/or public comment on the plan as well as a summary of specific comments and any indication of how those comments and reactions were addressed in the final plan.
 - Note: Since this is a preliminary review of a plan, I don't necessarily expect to see much information on specific comments yet, but the final plan should contain an appendix with highlights on the important comment periods and comments that helped shape the overall plan with a shorter summary in the main report and providing some information on how the comments may have shaped the development of the plan. **Section added.**
 - **Problem Definition and Ranking** – Although the plan does have a specific section that covers this topic, it lacks several of the crucial pieces of information that characterize the problem and its unique aspects particular to Arizona. The following information from the Guidance is missing (See below in the specific comments for some more specific comments on the Prioritization Scheme):
 - “An estimation of the number of species or other taxa in various classes, in the geographic area. **Amended.**
 - The plan should acknowledge that problems and concerns may change over time. If problems and concerns are to be further described in the context of individual objectives, this section can provide a brief overview and summary discussion. **Amended.**
 - Discussion of:
 - Cryptogenic species (i.e., those which have not been determined as clearly native or nonindigenous), including, to the extent possible, probable pathway. **Discussed.**
 - Species that have not yet been identified in Arizona's waters but have the potential of finding their way into the State's waters and the pathways of concern. **Discussed.**
 - Any evaluations of the economic and ecological costs and benefits of proposed actions. The Task Force recommends using ecological risk assessment principles to understand and group ANS problems.” If this does not exist, then briefly discuss more general economic costs and mention that a more detailed analysis is not available at this time. **AGFD's ERAs discussed.**
 - **Goals** – The goal (the Plan says “goals” but it really only reads like 1 goal) of the Arizona plan is a solid goal that reflects the intent of the Non-indigenous Aquatic Nuisance Prevention and Control Act. The goal could be improved by indicating how the goal(s) of the plan contributes to the accomplishment of ANSTF, Fish and Wildlife Service, or other relevant Federal program long-term outcome goals.” **Amended to include agency cooperation and furtherance as a goal of the plan.**
 - **Objectives, Strategies, Action and Cost Estimates** – The Objectives and Strategies section of the Arizona plan outlines the basic objectives and strategies of the plan, however, it fails to provide any detail at the action level. The actions are mentioned in the implementation table, but enough details are not provided in the table or in the corresponding section of the plan itself. As per the Guidance document this section should include:

- **Actions** - Each strategy should include Actions that describe the specific work or task that will be performed to implement a strategy. Short statements detailing the work required and organizations involved and their respective roles should be prepared for each action. The expected result should be described. **Detailed and clarified.**
 - Each action, along with associated strategies, objectives and goals should have a title and be listed in the implementation table. For each action, the names of the implementing and funding organizations and their roles should be specified.
 - If necessary, include information about the problems and concerns being addressed to indicate why a particular strategy or set of actions is appropriate.
 - The plan should also disclose the consensus reached among organizations to apportion activities and work collaboratively on addressing ANS problems.
 - The roles and responsibilities of each participating organization need to be clearly defined and lead organizations need to be identified.
- **Cost Estimates** - The basis for the cost estimates (i.e., salary of two field biologists 1/3 of the year, plus equipment and travel costs) should be presented here if that information is available. The estimated contribution of each organization and the total cost for each action should be shown in the implementation table. **Discussed.**
- **Priorities for Action** – The Arizona Plan seems to refer the reader back to its species prioritization scheme as its list of top priorities upon which it will focus its efforts. Although focusing on specific species is certainly one option for developing priorities, there could certainly be other non-species priorities as well. Perhaps some more attention could be given to this section? As per the Guidance document this section should include:
 - Priorities for action are established based upon the severity of a problem, the programmatic authority and scientific capability to resolve it, and the cost of the proposed solution. **Mentioned.**
 - The plan should discuss the rationale for focusing on certain species, pathways, economic and ecological impacts, or other problems/concerns and not others. **Discussed.**
 - It should be explicit about which problems and concerns are to be addressed in this iteration of the plan and why they were included at this time while others were not. **Mentioned.**
- **Program Monitoring and Evaluation** – The Arizona Plan outlines a method for program monitoring and evaluation, however, it is unclear exactly what the measurable performance metric will be and what the thresholds for success versus failure will be. The Guidance document includes the following information on program monitoring and evaluation, much of which is not covered in the Arizona Plan:
 - Include in this discussion the performance measures that will be used to assess the effectiveness of management actions. For instance, on an annual basis this might include:
 - Whether or not objectives are achieved;
 - Rate of spread along a river reach or coastline;
 - Change in total acreage of habitat occupied by the ANS or the displaced native species;
 - Changes in abundance of an invader and directly or indirectly impacted species;
 - Changes to Federal and State T&E and extinct species lists due to ANS.**Included suggested performance measures as criteria to be assessed.**

- It is recognized that unforeseen factors may impact the progress of remedying a problem, and this would be evident through program monitoring and evaluation. The discussion should address how other physical, chemical and biological stressors are impacting the effectiveness of management actions and the success of objectives. **Examples of stressors which impact effectiveness are mentioned, plus the ability of monitoring and evaluation to keep this plan effective.**
- Describe the process that will be used to accumulate information about results (outcomes and outputs), compare them against planned results, evaluate effectiveness of efforts, and provide feedback. Monitoring and evaluation actions should be included as multiple line items in the Implementation Table.” **IMAP invasives.**

Specific Comments (content and typographical)

- The front page has a page number 47 on it. **Amended.**
- **Page 3** – Table of Contents - Page numbers should be added here. **Done.**
- **Page 5 - Exec summary**
 - **4th sentence** – There is no legal reference for “Section 1204.” Consider adding the following: “Section 1204 of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA, as amended by the National Invasive Species Act (NISA) of 1996).” **Reference included.**
 - **Concerns, Challenges, and Goals** - Inland waters - are they using that term to refer to waters that are internal versus border waters? **Amended to more broad meaning, “state waters”**
 - The AzAIS acronym needs to be referenced in the beginning. **Mention and introduction of AzAIS acronym now included in executive summary as part of the second sentence.**
- **Page 6** - First sentence under "plan" needs to be finished with page numbers. **Done.**
- **Page 7** - "Impaction" should be changed to “impacts”. **Changed.**
- **Page 8** - First sentence - missing comma after the word tanks. **Inserted.**
- **Page 10**
 - **3rd paragraph** – It is very nice to see the acknowledgement of other plans, but I would also like to see more detail on exactly how Arizona intends to try and work with the existing State ANS management plans. **Comments on AzAIS’s aim to establish inter-state and inter-agency cooperative agreements and collaborative efforts for shared waters and shared data and research findings.**
 - **3rd paragraph** - The last sentence, which starts "While the current ..." is extremely confusing and needs to be rewritten. **Sentence rewritten.**
- **Page 12**
 - A reference is needed for the \$5 billion figure. **Cited.**

- The map on page 12 would be much more useful if there was a paragraph describing each of the watersheds. **Addressed, links to watershed data etc.**
- **Page 13 -**
 - **2nd paragraph** - the word "section" needs an "s." **Amended.**
 - **3rd Paragraph, last sentence** - an explanation, for the laypersons, on how the reservoirs alter habitat in ways that favor AIS would make things clearer.
 - **4th paragraph** - More detail is needed on the eradication of purple loosestrife in Arizona
 - **5th paragraph**
 - “Freshwaters” should be changed to “freshwater habitats” or perhaps “fresh waters.” **Changed to “fresh waters”.**
 - The 6th sentence which starts with "It has since invaded ..." is missing a word. **Sentence fixed.**
 - “Clearage” is not a word. **Amended to “Clearing of occluded drains”**
 - The sentence "An amount of control has been attributed to these efforts ..." is confusing and needs to be rewritten. **Sentence rewritten.**
 - **Last paragraph** – The sentence "Additional areas may be added to their distribution, ..." sounds as if we may be spreading it around on purpose. Perhaps change this statement to read something like: “The mudsnail may occur in other waters as well, but at present...” **Changed for clarity.**
- **Page 15 -** It would be nice to see examples of each impact specific to Arizona.
- Also suggest changing "Deterioration of human health" to “Impacts to human health” and moving it down near the bottom of the list. **Done.**
- **Page 16 –**
 - **3rd paragraph, Last Sentence** – This sentence needs clarification. Are you trying to make the point that even if the mussels don't clog the pipe completely, it still causes problems by reducing the amount of flow within the pipe? **Yes. Clarification added.**
 - List names of crayfish earlier in the paragraph. **Done.**
- **Page 17 –**
 - The word “mudsnail” is spelled with a lower case m. **Fixed.**
 - **Page 17 - 2nd paragraph, 7th line** - change "competing" to "compete." **Amended**
- **Page 18 -** It was stated earlier in the document that purple loosestrife had been eradicated from Arizona. This paragraph does not mention this fact at all and makes it sound as if purple loosestrife has never occurred in Arizona. **Amended to mention history of invasion and eradication.**
- **Page 20-21, Prioritization Scheme** – The differences between the three different priorities in your prioritization scheme need to be explained much more clearly.
 - It is not clear what the difference is between Priority 1 and 2 species. Are priority 1 species those that already exist within the state and priority two species those that are not yet present within the state? To this reviewer, Priority 1 and 2 species seem to be the same except for them not having “as great a potential for wide-spread harm.”

- Priority 2 species seem to be based on one of two criteria that are completely opposite in scope, which makes it seem as if they should be two different categories.
 - Priority 3 species also seem to be based on one of two criteria that are completely opposite in scope.
 - The last sentence in the Priority 1 description is not a full sentence and there are species under 1 and 2 which are not italicized.
 - For both Priority 1 and 2 species, it is not clear what you mean when you say “for either anthropocentric or intrinsic value.”
- **Page 22 – Goals** – The 7th goal needs some editing. **Moved bullets and edited.**
 - **Page 23** –
 - The Aquatic Nuisance Species Task Force is referenced in two different ways on this page. The correct acronym for the Aquatic Nuisance Species Task Force is ANSTF. **Fixed.**
 - The last sentence of this section refers to “federal laws relevant New Mexico.” Is this a remnant from text that was borrowed from the New Mexico Plan? **It was. Portion was removed.**
 - **Page 23 – Federal** – Consider adding this text to the section on Federal laws: *The Sikes Act (16 USC 670a-670o, 74 Stat. 1052), as amended, Public Law 86-797, approved September 15, 1960 - The Sikes Act provides for cooperation by the Departments of the Interior and Defense with State agencies in planning, development and maintenance of fish and wildlife resources on military installations throughout the United States. Military installations with significant natural resources are required to prepare in cooperation with the Department of the Interior and State agencies integrated natural resources management plans (INRMPs) [including invasive species management]. The Sikes Act also requires that the Secretary of the Interior, in consultation with state fish and wildlife agencies, to submit a report annually to respective Congressional committees with oversight responsibilities on the amounts expended by Interior and state fish and wildlife agencies on activities conducted [including invasive species management] pursuant to INRMP's. In 2009 the Sikes Act was amended to clarify the authority of the Department of Defense to enter into interagency agreements with other federal agencies to implement natural resource programs [including invasive species management] on military installations. In 2010 the Sikes Act was amended again to include state-owned lands supporting National Guard facilities to the requirements of the Sikes Act.* **Added.**
 - **Page 24, NISA entry, 3rd sentence** – Delete the “As well,” and say “NISA also established ...” **Done.**
 - **Page 24, U.S. Fish and Wildlife Service entry** – Please replace the USFWS write-up with the following text:
The U.S. Fish and Wildlife Service’s Aquatic Invasive Species Program is housed within the Fisheries and Habitat Conservation Program’s Division of Fisheries and Aquatic Resource Conservation. The Branch of Aquatic Invasive Species essentially houses three functions:

- **The FWS Aquatic Invasive Species Program** – *The AIS Program seeks to prevent the introduction and spread of AIS, rapidly respond to new invasions, monitor the distribution of and control established invaders, and foster responsible conservation behaviors through its national public awareness campaigns (Stop Aquatic Hitchhikers and Habitattitude).*
- **Administration of Aquatic Nuisance Species Task Force** – *The Branch of AIS builds capacity, coordinates, and implements AIS prevention and control activities authorized under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA, as amended by the National Invasive Species Act (NISA) of 1996), including: co-chairing and administering the ANSTF, supporting Regional Panels, providing grants for State/Interstate ANS Management Plans, and implementing a National AIS program.*
- **Injurious Wildlife Evaluations and Listings** – *The AIS Program supports the Injurious Wildlife Provisions of the Lacey Act through an ongoing process of evaluating species and possibly listing them as injurious through the rulemaking process.*

The AIS Program has worked to prevent populations of invasive species like Asian carp and zebra quagga mussels from entering or spreading into the United States. Priority containment (boat inspection and decontamination), early detection and rapid response (snakehead eradication and Chicago Sanitary Shipping Canal), interjurisdictional coordination and planning (Quagga/Zebra Mussel Action Plan and 100th Meridian), and regulatory (injurious wildlife listing of black and silver Asian carp) and non-regulatory actions (Stop Aquatic Hitchhikers!) have occurred across many jurisdictions. Through the actions of the AIS program, a national AIS network has been built – including 39 states, 6 Regional panels, over 1,000 participants in two national public awareness campaigns and many other partners – that has planned, directed and accomplished significant regional and landscape level invasive species prevention and management resource outcomes. The AIS Program serves as the nation’s front line for prevention of new aquatic invasive species by regulating imports of injurious wildlife, facilitating behavioral change and managing pathways to limit the introduction and spread of invasives (awareness campaigns and ballast water), and developing monitoring programs for invasion hotspots to facilitate early detection and rapid response. Replaced.

- **Page 25, Description of the U.S. Forest Service** – Please replace the existing paragraph with the following information provided by Mike Ielmini from the U.S. Forest Service: *“The U.S. Forest Service uses multiple authorities to manage aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens), derived from laws enacted by Congress that authorize the Secretary of Agriculture to administer the agency (particularly the 193 million-acre National Forest System) and other resources and to issue necessary regulations. Many of these authorities have subsequently been delegated from the Secretary to the Chief of the U.S. Forest Service. Forest Service invasive species activities are guided by the agency’s National Strategy and Implementation Plan for Invasive Species Management (2004) and other associated policies and program plans. The U.S. Forest Service uses its authorities and broad base of expertise to conduct activities to prevent, detect, control, mitigate, and research aquatic and terrestrial invasive species across a wide variety of landscapes and agency programs, including Forest Service Research and Development, State and Private Forestry, International Programs, and the National Forest*

System. The U.S. Forest Service emphasizes an integrated pest management approach against aquatic and terrestrial invasive species, utilizing a science-based structured decision-making process to prioritize activities across landscapes, and incorporates invasive species management considerations into Forest Land and Resource Management Planning efforts (Forest Plans) nationwide. The U.S. Forest Service provides technical and financial support to States and local organizations to address complex invasive species problems and establishment of cooperative partnerships against aquatic and terrestrial invasive species. The U.S. Forest Service participates on local, regional, and national invasive species coalitions and committees; including the Aquatic Nuisance Species Task Force and various ANS Regional Panels.” Done.

- **Page 30, ADEQ entry** – The first responsibility of ADEQ (“Ensuring that Arizona’s public water ...”) is not formatted properly within the list and needs to be fixed. **Fixed.**
- **Page 30, Arizona State Land Department** – A little more detail here would be useful to readers. What is a CWMA? What are the names and geographic coverage of the two CWMAs in Arizona? Do their activities include aquatic weeds?
- **Page 30, first sentence** – This is the first time the acronym AzAIS is used in this document. This should have occurred much earlier in the very beginning of the document. **Fixed.**
- **Page 33, first full sentence** – The sentence starting with “AGFD activities to date ...” is not grammatically correct and needs some editing. **Edited.**
- **Page 33, gaps in State Management and Authorities** – More details are needed in each of the sections, on what the State does and does not have the authority to do regarding AIS.
- **Pages 33-46, Recommended Strategies and Actions** – In each of these sections, the actions (1A1 – 1A8) should be indented one more level to make it more clear that they are a subset of the Strategy (1A).
- **Page 41, Strategy 4B** – The first word should be capitalized. **Fixed.**
- **Page 42, Current Activities, Arizona Department of Agriculture** – Is the first sentence really supposed to be bolded? **No. Amended.**
- **Page 46, Priorities for Action** – In addition to my comments above on Priorities for Action:
 - The first sentence is confusing and needs to be rewritten **Sentence rewritten.**
 - The last sentence says to “See ... the following priority listings for reference ...” However, there is no list of priority listings after the paragraph. Is this referring to the earlier lists under the prioritization scheme?
- **Implementation Table** –
 - The page numbering on second page of the implementation table resets itself to 1.
 - In places where the table has references to other rows (mostly for lead agency, I think), please repeat the information instead of saying “See 1A1.”

- **Page 65, Program Monitoring and Evaluation** –
 - The list of results of the evaluation should be formatted as the earlier lists have been unless the numbers are important for some reason. **Formatting fixed, #4 margin fixed.**
 - Number 4 has an issue with its left margin.
 - **Page 67, Appendix A** – A page break needs to be inserted before the title for Appendix A to separate it from the glossary. **Inserted page break.**
 - **Pages 67 and 70, Lists of Freshwater Animal Species of concern and list of Non-indigenous Freshwater Plants** – These lists need further explanation. Are they lists of species already in the State? Are they not yet within the State? Are they just a list of species the State is worried without regard to presence or absence within the State? Are they a list of species that is prohibited to own or transport? **Added clarification and link to where list was derived in earlier referencing section in AzAIS plan.**
 - **Page 77** – Delete extra line within the references. **Extra line deleted.**
-

6) From Kim Holzer, U.S. Fish and Wildlife Service, Branch of Aquatic Invasive Species

Table of Contents

- Pg. 3: Include page numbers please. **Done.**
- Pg. 3: Objective 4 is cut off... **Formatted.**
- Pg. 3: Reserve the word significant for discussions of statistically significant results. In this context, please replace with important, major, considerable or large, etc. **Amended, mentioned where correct.**

Executive Summary

- Beware of misuse of “that” versus “which” throughout. **Yes.**
- Pg. 5: Paraphrase section 1204 or simply say, “In accordance with Section 1204 or NANPCA, this plan focuses on...” **Fixed.**
- Pg. 5: Authors talk about AIS priority species, list examples here. **Done.**
- Pg. 5: “natively driven environments” does not make sense. **Fixed.**
- Pg. 5: Authors talk about “implementation of strategic actions” without any specifics of such actions or summary of the implementation table. **Done in respective sections.**
- Please include existing authorities and programs in place for AIS prevention or management. **Done.**

In general, the executive summary is quite generic and would benefit from added details, making it more specific to the State of Arizona. **Made more Arizona specific.**

Introduction

- Capitalize “State” **Corrected.**
- Pg. 7: Phrase, “natively driven environments,” is confusing. **Fixed.**
- Pg. 10: Dual canal system gives strong justification to include whole State; it would be useful if your map identified these features. **Amended.**
- Pg. 10: Why delay the engagement of neighboring States or other potential entities with overlapping jurisdictions or shared waterways? **We don’t.**

In general, the introduction captures the genetic problem associated with AIS spread, with some specifics to the State regarding the Central Arizona Project and the Salt River Project. To highlight the local AIS problem, I would like to see some literature cited here with an exemplary case study on the ecological and economic costs of AIS accidentally introduced to your region, including specific concerns for Arizonian native species, recreation sites and industry.

Problem Definition and Ranking

- Pg. 11: Why do you think damming and water diversion will favor AIS? **Habitat alteration.**
- Pg. 12: Please include reference for \$5 billion estimate of zebra mussel damages. **Inserted.**
- Pg. 13: Please include reference for first observation of NZ mudsnail in Lee’s Ferry and Lake Mead- what State (NV)? **AGFD ERA.**
- Pg. 13: ”Passively move” is a contradiction, perhaps you mean spread naturally or unaided by humans? The same criticism applies to the phrase, “passively dispersed by wind.” **Ok.**
- Pg. 13: Are there any lessons to be learned from Arizona’s successful eradication of purple loosestrife? **Sure.**
- The introduction states, “This plan focuses on eliminating the threat of accidental AIS introductions.” Consider reorganizing this section by different pathways of introduction of AIS to Arizona with an emphasis on the consequences of these accidental releases, and then develop the specifics of your priority species. In general, the organization of this section is hard to follow, especially P11-15. **Worked out.**
- I would like to see more literature cited when describing life history and invasion history of your priority AIS. Also consider standardizing the paragraph outline for the priority species to describe (1) how the AIS was released into Arizona, including influence of water bodies outside the plan boundaries, (2) where the AIS was released and has subsequently spread and (3) how the AIS presently affects or may affect your local economy and ecology.
- Pg. 12: You say, “The following section will cover the history of non-native introductions to the state, and will delineate the most current and primary threats by a prioritization scheme.” Is the prioritization scheme reflected in the order the species appear within each of the three priorities? **By the three prioritization levels.**
- Pg. 18: You describe lumping algae with non-indigenous plants, but give the group its own subheading? **Algae are algae.**
- Pg. 19: Do you have a reference for the observed Didymo bloom in 2009? **AGFD ERA.**
- Pg. 19: I am not sure of the accuracy of the claim that “humans only notice the successful introductions.” **Ok.**
- Pg. 19: Consider describing your rationale for prioritization scores before you talk about the various priority species. **Ok.**

- Pg. 21: I would consider dividing your Priority 3 rating into two subcategories, one for the AIS that are beyond control and one for the AIS that have a low risk of causing impairment to your waterways. **Considered.**
- Where are the scientific knowledge gaps for these priority AIS? **Depends on which one.**
- A discussion of local public awareness of AIS problems and concerns should be addressed. **Ok.**

In general, this section contains some very good information about your priority species, though I would like to see more references to the primary literature or even reference to personal communications. The arguments and structure of this section are hard to follow and there are unnecessary redundancies (e.g., two paragraphs on quagga mussels P14+16).

Goals

- What are the specific management actions and tasks to implement the defined strategies? **Included in strategies and actions.**

Existing Authorities and Programs

- The authors do a very thorough job describing the various authorities and stakeholders with interest in nonnative invasive species management, but there is little attention to how these partnerships can be used to address the problems and concerns identified in their plan. Please append a sentence after each description to outline how this authority or stakeholder group will specifically influence the goals of your State management plan.
- Gaps in authorities and implementing regulations need to be addressed. **Under “Gaps...”**

Objectives, Actions, Strategies and Cost Estimates

- Pg. 31: First appearance of abbreviation “AzAIS” **Ok.**
- Pg. 32: Consider rewording, “impacts from AIS to Arizona may have been somewhat limited to date...” as it delegitimizes your plan. Instead, consider saying that your plan focuses on prevention of accidental introductions and containment. **Ok.**
- Pg. 33: “included” refers to subset so no need to reiterate, “but not limited to”
- Pg. 35: First appearance of priority “class” notation. I prefer the plain language rating of high, medium and low. **Ok.**
- Pg. 36: Idaho has an impressive inspection program for boats and water-based equipment- no need to develop a new one, use them as a model! **Arizona has an unbelievably larger amount of boat traffic, entirely different on many levels.**
- Pg. 41:
 - “Priority Class” now appears in caps.
 - When describing the actions and strategies, please include a description of expected results and outcomes.
 - Gaps and current activities belong in previous section; focus on your plan here and if necessary, address whether additional authority to perform recommended actions is necessary to achieve your goals.
 - Cost estimates are a work in progress I presume? **Amended.**

Program Monitoring and Evaluation

- I would like to see more specific metrics of progress, such as geographic distribution maps and calculations of rate of spread or retreat of your priority species. **IMAP invasives.**
- The analysis of deliverables rests heavily on annual reports. Are there other ways you can monitor and evaluate your progress? **Discussed.**

Implementation Table

- Please paste row information, instead of writing, “See 1A2,” etc. **Table is formatted so things fit, people should be able to follow it.**
- A very thorough representation of the plan’s goals!

Glossary

- Pg. 66: “non-indigenous” used in glossary but appears with and without a hyphen throughout text **Amended.**
- Pg. 67: “non-native appears with hyphen in glossary, but is spelled with and without a hyphen throughout text **Amended.**
- Pg. 67: consider redefining pathway as a transport vector (see Lodge et al. 2006), with explicit natural and human examples. **Addressed.**

From Lesly Swanson.....

1. Page 12 of the landscape formatted document states that “CAP takes water from Lake Pleasant and delivers it to Salt River Project (SRP) canals: this water is then delivered for municipal, agricultural and industrial use in central Arizona and many public and private urban lakes in the Phoenix metropolitan area”. This statement is not entirely true. CAP does deliver water to SRP canals; however, the delivery schedule is intermittent and dependent upon water orders placed by the cities. The majority of the water in the CAP canals is delivered to Tucson. Thus, the “hydrologic connection with infected waters” to SRP canals is not continuous. The main sources of water flowing through SRP canals are the reservoirs on the Salt and Verde River systems and wells in the Phoenix metropolitan area.

Rewritten to clear up any confusion

2. Page 12 of the landscape formatted document states that “Little can be done to stop the downstream spread of quagga from infected waters, but these waters can be isolated and the quagga contained through cooperative partnerships between recreational water users, commercial ventures, water and land management entities and government agencies and organizations”. SRP’s question is how can these waters be isolated and quaggas contained? The only way to isolate waters is to turn the water off. SRP’s water is supplied by a series of a chain of lakes that feed into the canal system. Thus, it is not possible to “isolate and contain” quaggas should they infect one of the lakes in the chain. If the thought is to isolate and contain urban lakes, then perhaps it is possible to do so although it is not clear exactly what will be isolated in the document.

Rewritten.

3. Page 12 of the landscape formatted document refers to the “impact on water users and electrical utilities across the state will be widespread”. Arizona Public Service (“APS”) is a larger “electrical utility” in Arizona than SRP and APS will not be impacted by quagga mussels in the same manner. Thus, we feel that the word ‘electrical’ should be removed from this statement and leave the word ‘utilities’. In leaving the word utilities the document will cover the impact to SRP on both the power and water side, in addition to the water utilities and municipalities.

Edited, to “utilities”

4. Significant formatting issues still need to be resolved. For example:

- Areas of yellow highlighting remain in the document

Removed

- There should be a page break between the Executive Summary and the Introduction

Fixed

· The page layout of the document is not consistent as the document begins in landscape and then after the tables returns to portrait

Fixed.

· Numbering issues remain- a number '47' still appears on the cover sheet and the document jumps from page 68 to page 65 after the tables

Numbering addressed.

· On page 7 under the 'Geographic Scope of Plan' section 'quagga' and 'NZMS' are used and they have not been introduced. Further into the document they listed completely with scientific names. Some people reading the document may not know what NZMS is without it being defined previously.

Amended.

5. Does the term 'Universities' refer only to the University of Arizona? We realize that UofA is taking a lead in producing this document but there are other educational institutions in the State and Southwest that would be valuable assets in the fight against Aquatic Invasive Species. Perhaps it would be beneficial to add them or mention there are other Universities in the document. **Any state university with an interest and expertise would be a valuable asset. Therefore, any university within the Arizona state university system would fall under the category of "Universities".**

Additionally, in the Implementation Table, the terms 'University' and 'Universities' are both listed. What is the difference if there are no other universities named in the document?

Other universities named. University amended to Universities.

6. In the Implementation Table, we feel that the parenthesis around SRP should be removed. They are misleading and seem to imply that SRP is responsible for the amount in parenthesis. In previous discussions with Tom McMahon of AGFD we were told that the parenthesis in the funding section refers to AGFD Full-time equivalent ("FTE").

Removed parenthesis

7. In the Implementation Table, Central Arizona Project ("CAP") is listed under the Federal Funds column. Perhaps the document preparers should check with CAP as to where they wish to be listed, but it is our belief that CAP is a State agency, not federal.

Moved to State.

8. In the Implementation Table on page 67 Task ID # 6C1 "Nursery, pet store and bait dealer flyers", SRP is listed as a Lead Agency; however we have not provided any flyers to any such entities. We would be open to do so in the future where feasible. The information we do have has been handed out to schools and at other outdoor activities but not specifically to nurseries, pet stores and bait dealers.

Future is what we're talking about, good.