Page #	Paragraph #	Comment Type	Comment	Response to Comment	Additional Action Needed	Mod Needed (Y/N)	Mod made (Y/N)	Description of Modification	Version # containing Revision
na	na	comment	General comment: this document remains fairly general, high level and not specifically customized to Utah Lake. We recommend adding more detail and specificity to this document if the purpose of this document is to guide development of site-specific criteria for Utah Lake. For example, it would be great if the document were updated to reflect the scientific input and suggestions identified by the SP in more detail.	Edits for version 7 have added specificity for the context of Utah Lake throughout	None	Y	Y	Edits for version 7 have added specificity for the context of Utah Lake throughout	7.2
1	2	comment	Recommend a brief intro to UT WQS explaining the context of the designated and existing uses; goals of the WQ criteria (assuming the NNC are to be adopted as WQS criteria); and the UT process for adoption and re-evaluation/revision of those NNC. “Attainable” water quality conditions are terms with specific Clean Water Act/ WQS regulatory meanings. If the “attainability” of WQ conditions is considered as part of this analysis, then those considerations need to be justified under one of the 40 C.F.R. 131.10(g) factors. Also, when deriving NNC, it is important to establish the TN or TP criteria at concentrations such that they do not exceed the DO/pH/ etc. criteria. Setting TN and TP criteria at concentrations that reach the established DO/pH criteria may not ensure protection of the use. This “buffer” should be considered in addition to the uncertainty associated with each analysis.	Intro to the WQS added in section 1.0. Removed phrase addressing attainability in reference-based approach section	None	Y	Y	Paragraphs introducing the WQS and NNC development added in paragraphs 4-5 of section 1.0. Removed phrase addressing attainability in reference-based approach section	7.2
1	3	comment	If warnings against using the water for stock watering occurred during recent summer/ fall HABs, isn’t the Ag use impaired also (or at least threatened)? Should this mention concerns for downstream Drinking Water use & intakes?	Added a sentence addressing this comment	None	Y	Y	Sentence added: "HAB conditions may also threaten agricultural uses (Class 4) and downstream uses (Class 1C)."	7.2
1	4	comment	What about documenting here the number of recreational advisories issued for the lake? Over what period of time?	Added as suggested	None	Y	Y	Short paragraph added after impairment paragraph: "HAB issues in Utah Lake have also been documented by recreational advisories. These advisories are determined according to threshold values for cyanobacterial cell counts and/or cyanobacterial toxins. From 2016 to 2019, part or all of the lake was assigned a “caution” or “warning” advisory for 11-18 weeks, and a “danger” advisory was issued for 0-14 weeks (out of a total of 13-25 monitored weeks). A “danger” advisory results in recreational closures. "	7.2
1	4	comment	We encourage Utah to consider public health risks/issues and to incorporate language on those concerns in this document. 1. Strengthens the case for action/ funding. 2. Should be factored into objectives & outcomes – what risk levels are accepted? 3. If Public Health is affected later – much better for UDWQ to be on the record acknowledging issue in writing.	Language about public health risk has been incorporated where appropriate	None	Y	Y	Language about public health risk has been incorporated where appropriate	7.2
1	4	text edit	strike "would". Insert "and could create public health concerns".	Changed as suggested	None	Y	Y	Changed to "which further impacts beneficial uses and could create public health concerns"	7.2
1	4	text edit	Insert "that have been observed in Utah Lake'	Changed as suggested	None	Y	Y	Added "that have been observed in Utah Lake"	7.2
1	4	comment	Recommend condensing this information into a bulleted list showing the attainment status of Utah Lake’s beneficial uses and what pollutants they are impaired for (or those that are fully supporting).	Opted for paragraph form to provide more nuanced perspective, but pollutants are bolded	None	Y	Y	Pollutants were bolded.	7.2
1	6	comment	This paragraph is important and might be worth highlighting at the beginning and end of the document. It would be helpful to describe the process and timeframes for making revisions to this document. If this document is intended to guide how the TN and TP criteria are developed for Utah Lake, it seems prudent to have a process to annually (at a minimum) review and revise this document. Describing who does that review and who needs to approve the document would be helpful to include here.	This topic is highlighted at the end of the document, and we have sought to incorporate specifics on revision as well.	None	Y	Y	Topic highlighted at the end of the document	7.2
2	1	comment	Wondering if this section is necessary or if you could remove this section and simply reference the literature review document for additional background context?	Section retained; wanted to keep context in this document	None	N	N	NA	7.2
2	1	text edit	strike "shifted to" insert "expanded to also"	Changed as suggested	None	Y	Y	strike "shifted to" insert "expanded to also"	7.2
2	4	comment	Improper use of this term as the Highest Attainable Condition is the best achievable WQ condition after conducting a use attainability analysis. If the reference condition approach is used targeting the “most attainable condition” (rather than true reference) than a UAA justifying that downgrade/target should be done in advance. Otherwise, recommend sticking to the least (or un-) impacted condition as the study target.	Removed reference to attainability in this sentence	None	Y	Y	Removed reference to attainability in this sentence	7.2
2	4	text edit	strike "or the most attainable condition"	Removed reference to attainability in this sentence	None	Y	Y	Removed reference to attainability in this sentence	7.2
2	4	text edit	insert "or underprotective"	Changed as suggested	None	Y	Y	Added "or underprotective"	7.2

Page #	Paragraph #	Comment Type	Comment	Response to Comment	Additional Action Needed	Mod Needed (Y/N)	Mod made (Y/N)	Description of Modification	Version # containing Revision
3	1	comment	Again, a diminished targeted condition that should require a UAA beforehand. Is it the intention of this work to downgrade the HAC of UT Lake based on one of the 131.10(g) attainability factors? If not, recommend removing reference to “achievable” conditions.	Removed reference to attainability in this sentence and changed as suggested	None	Y	Y	Sentence now reads "This type of information provides a point of reference that allows managers and researchers to put present environmental stresses into an overall perspective on the status of the resource and can inform criteria development because it may provide information to support discussions based on indicators of past ecosystem response and evolution. "	7.2
3	1	text edit	insert "based on indicators of past ecosystem response and evolution" strike "as to what an achievable condition"	Removed reference to attainability in this sentence and changed as suggested	None	Y	Y	Sentence now reads "This type of information provides a point of reference that allows managers and researchers to put present environmental stresses into an overall perspective on the status of the resource and can inform criteria development because it may provide information to support discussions based on indicators of past ecosystem response and evolution. "	7.2
3	2	text edit	several text edits	Text edits incorporated as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
3	3	text edit	several text edits	Text edits incorporated as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
3	4	text edit	several text edits	Text edits incorporated as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
4	2	text edit	strike "developed" insert "reviewed"	Changed as suggested	None	Y	Y	strike "developed" insert "reviewed"	7.2
5	1	comment	This language is confusing. What are the long-term management goals? Won’t this process benefit from more explicit and detailed discussion of the long-term goals for UT Lk?	Difference between management goals and beneficial uses is clarified, and an added section with management goals table has been added	None	Y	Y	Changed to "management goals that relate to protection of specific beneficial uses" and management goals table added to section 2	7.2
5	2	comment	It’s ok to be vague in a conceptual model, but this seems to be lacking direction. What are the desired level of effects on uses: no loss of recreation days in a summer season? no loss of water right usage for irrigation and stock watering? no loss of aq life during any seasonal bloom event? This process will benefit from an outline of what are the specific goals, or how are those goals going to be established before doing further work. Supporting uses is too vague and doesn’t protect existing WQ.	Section 2 has been expanded with specific management goals, assessment endpoints, and measures.	None	Y	Y	Section 2 has been expanded with specific management goals, assessment endpoints, and measures.	7.2
5	2	text edit	insert "see section X for specific details"	Section 2 has been expanded with specific management goals, assessment endpoints, and measures.	None	Y	Y	Section 2 has been expanded with specific management goals, assessment endpoints, and measures.	7.2
6	2	comment	Many of these topics relate to the proposed approaches outlined in this document. It would be helpful to understand how the work on these topics will connect to the analytical approaches identified in this document.	It is somewhat implied - filling these gaps will provide additional data for modeling; and for understanding the ecology and impacts of nutrients on Utah Lake. To the extent they provide actionable data, addressing these gaps can be used.	None	N	N	NA	
7	2	comment	Given some of the challenges with applying the various approaches described below to a single waterbody, it would be helpful to outline (up front) if all approaches will given the same weight. Discussing the limitations of the various approaches up front will be helpful to guiding final decisions. Using MLE sounds great but for Utah Lake, it seems like the group has already weighted some approaches more than others and it would be helpful to document that now.	Sentence added: "The Steering Committee will ultimately decide how to weight each line of evidence."	None	Y	Y	Sentence added: "The Steering Committee will ultimately decide how to weight each line of evidence."	7.2
8	1	comment	This is a valuable approach to assessing and describing uncertainty. However, pls remember that the general public is not as familiar with the concept of uncertainty as the scientific community. Hence, it’s worthwhile to explain the purpose of evaluating “uncertainty” within the scientific approach to problem solving.	Clarifying words added to this sub-section to help describe the concept of unceratinty for a more general audience	None	Y	Y	Clarifying words added, for instance "Uncertainty is inherent to any scientific study, and it is important to quantify, contextualize, and communicate uncertainty..."	7.2
10	43832	comment	First paragraph transmits a very low confidence in any recommendations v 2nd paragraph. It would be useful to include a general level of confidence for any recommendations in comparison to the degree and frequency of eutrophication issues already occurring in UT Lk. Yes, there’s always scientific uncertainty, but you might compare it to the level of problems addressed by proposed solutions.	2nd paragraph removed	None	Y	Y	2nd paragraph removed	7.2
10	43832	comment	Are these paragraphs needed?	2nd paragraph removed	None	Y	Y	2nd paragraph removed	7.2
10	1	text edit	insert "for TN, TP, and rsponse indicators"	Edits incorporated as suggesteed	None	Y	Y	text now reads: "SP will recommend numeric values for TN, TP, and response indicators for consideration as NNC for Utah Lake"	7.2
10		text edit	strike "scenarios and"	Edited as suggested	None	Y	Y	Removed "scenarios and"	7.2
10	4	comment	When deriving NNC, it is important to establish the TN or TP criteria at concentrations such that they do not exceed the DO/pH/ etc. criteria. Setting TN and TP criteria at concentrations that reach the established DO/pH criteria may not ensure protection of the use. This “buffer” should be considered in addition to the uncertainty associated with each analysis.	The SP will identify concentrations of nutrients linked to specific measures, which will also incorporate a buffer which will ensure the protection of the use. How the incorporation of this buffer will happen is outside the scope of the framework document.	None	N	N	NA	
10	5	comment	What about the need to evaluate downstream impacts to drinking water supplies on the Jordan River? We recommend including Drinking Water/ Domestic Water Supply going to be included? How far downstream is the nearest water supply intake? Are HABs a threat to DW uses? Taste, odor, added pretreatment costs considered?	Downstream use added here and as a subsection	None	Y	Y	Downstream use added as a use in this sentence, and a subsection for downstream use was also added in accordance with management goals table	7.2
10	6	comment	It would be helpful to indicate if UDWQ plans to conduct an aesthetic study… or not.	Yes - edited to add and see management goals table	None	Y	Y	Sentence added: "A recreational survey is also proposed to identify thresholds relevant for recreational use (DWQ 2020)."	7.2

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11	4	comment	While some of this information is included in the table at the end of the document, it would be helpful to clearly articulate what specific thresholds will be considered in these sections and to not include values associated with impaired conditions. Also, it would be helpful to have a sense of whether there is sufficient data (given the data summary) to look at the proposed causal and response indicators. Lastly, it would be helpful to articulate what proposed approach would be used for the analysis (assuming S/R)?	Specific targets appear in the management goals table and have been added to the document. Determining data sufficiency is outside the scope of this framework document.	None	Y	Y	Targets for specific measures appear in the management goals table, which has been added.	7.2
11	6	comment	Recommend including the pH criteria as well in this document.	pH criteria added	None	Y	Y	pH criteria added	7.2
11	8	comment	Will this be S/R analysis? Modeling? Both?	Paragraph edited to provide clarity as requested	None	Y	Y	Paragraph now reads "Directed research by the Science Panel could analyze linkages between chlorophyll a and DO via S-R and mechanistic modeling to establish chlorophyll a targets that are protective of the DO criteria. Then, a translator between chlorophyll a and nutrient concentrations could establish the nutrient concentrations necessary to maintain the chlorophyll a target. "	7.2
11	8	text edit	strike "then"	Sentence no longer appears in document	None	Y	Y	Paragraph now reads "Directed research by the Science Panel could analyze linkages between chlorophyll a and DO via S-R and mechanistic modeling to establish chlorophyll a targets that are protective of the DO criteria. Then, a translator between chlorophyll a and nutrient concentrations could establish the nutrient concentrations necessary to maintain the chlorophyll a target. "	7.2
11	8	text edit	insert "will be"	sentence no longer appears in document	None	Y	Y	Paragraph now reads "Directed research by the Science Panel could analyze linkages between chlorophyll a and DO via S-R and mechanistic modeling to establish chlorophyll a targets that are protective of the DO criteria. Then, a translator between chlorophyll a and nutrient concentrations could establish the nutrient concentrations necessary to maintain the chlorophyll a target. "	7.2
11	9	comment	How will macrophytes be considered beyond considering chl-a conditions? What about a macrophyte endpoint specifically?	See Management Goals table for macrophyte endpoint	None	N	N	NA	7.2
12	1	comment	It would be helpful to include those specific concentrations here and provide more detail on their application to Utah Lake if these concentrations will be considered in the analysis.	Concentrations are dependent on slope threshold and desired level of uncertainty, so system-specific chlorophyll concentrations would need to be calculated. Sentence updated to reflect this.	None	Y	Y	Sentence changed to "Such chlorophyll a concentrations, dependent on the system-specific slope threshold and desired level of uncertainty, might also be used as assessment endpoints in Utah Lake."	7.2
12	2	comment	Shouldn't this describe the data available related to irrigation ditches and evaluation of agricultural uses? What about noting that toxin impacts to ag uses have been a concern in the past.	Paragraph has been adjusted according to other comments. Determining data sufficiency is outside the scope of this framework document.	None	Y	Y	Paragraph now reads: "Agricultural uses of Utah Lake, including irrigation of crops and stock watering, are largely affected by nutrient enrichment through its effect on cyanotoxins and taste and odor issues. Information on the collection of these endpoints are given above for Recreational Uses. Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2
12	2	comment	I do not agree with this proposed approach or these suggested thresholds. Was a lit review done on impacts to crops? Did it show there was no research? What about research being done in Utah related to plant uptake? Australia work? If no thresholds exist, it seems like it would be most appropriate to identify this as a research area instead of citing to thresholds related to ingestion, not plant uptake.	Drinking water values were removed, identified as research area	None	Y	Y	Changed to "Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2
12	4	comment	Should evaluate impacts to Drinking water.	Added as suggested	None	Y	Y	Added "Drinking Water Uses EPA has the following drinking water health advisories for microcystin and cylindrospermopsin that could be used (https://www.epa.gov/cyanohabs/epa-drinking-water-health-advisories-cyanotoxins): •Microcystin: 0.3 ug/L (infants and pre-school); 1.6 ug/L (school age and adults) •Cylindrospermopsin: 0.7 ug/L (infants and pre-school); 3.0 ug/L (school age and adults)"	7.2

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12	4	text edit	insert suggested paragraph "Drinking Water Use EPA has the following drinking water health advisories for microcystin and cylindrospermopsin that could be used (https://www.epa.gov/cyanohabs/epa-drinking-water-health-advisories-cyanotoxins): • Microcystin: 0.3 ug/L (infants and pre-school); 1.6 ug/L (school age and adults) • Cylindrospermopsin: 0.7 ug/L (infants and pre-school); 3.0 ug/L (school age and adults) "	Added as suggested	None	Y	Y	Added "Drinking Water Uses EPA has the following drinking water health advisories for microcystin and cylindrospermopsin that could be used (https://www.epa.gov/cyanohabs/epa-drinking-water-health-advisories-cyanotoxins): •Microcystin: 0.3 ug/L (infants and pre-school); 1.6 ug/L (school age and adults) •Cylindrospermopsin: 0.7 ug/L (infants and pre-school); 3.0 ug/L (school age and adults)"	7.2
14	1	comment	Again, is this a management goal; does it protect existing uses; what are the thresholds necessary for protection and are they more/less stringent than those for designate/existing uses?	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
15		comment	What about specifying the estimated date the analysis or results will be available?	Timelines appear in a different document which has been developed (in draft form) and supplied to the SC	None	N	N	NA	
15		comment	Recommend specifying the endpoints included in the model and identifying those endpoints that cannot be covered by the model.	Assessment endpoints are detailed in section 2 in the management goals table, but data availability and sufficiency for the S-R modeling effort are outside the scope of this document	None	N	N	NA	
15		comment	The distribution of values from within the lake doesn't seem like reference conditions to me. f it's of limited utility, perhaps it is better to remove it?	Removed as suggested	None	Y	Y	Row removed from table	7.2
15		comment	highlight "best attainable condition"	Unclear if this comment suggests a change	None	N	N	NA	7.2
16	1	text edit	strike "beneficial" insert "designated and existing"	Changed as suggested	None	Y	Y	strike "beneficial" insert "designated and existing"	7.2
16	1	comment	Is this going to be done? If not, recommend removing and covering in a document describing additional work that could be completed.	Yes, this will be done. Text retained	None	Y	Y	Retained, not modified	7.2
16	1	comment	Is this really stressor response?	Removed as suggested	None	Y	Y	Removed	7.2
16	1	text edit	strike "for example.. ..system"	First portion retained, second portion removed	None	Y	Y	First portion retained, second portion removed	7.2
16	2	comment	So will the model be used, as developed, to derive TN and TP criteria? If not, recommend expanding this section to describe the work that will need to be done to use the model expressly for the purpose of deriving nutrient criteria.	Yes, the model will be used to derive TN and TP criteria, along with the other lines of evidene.	None	N	N	NA	
17	1	comment	Without describing the topics (carp excretion, etc.) in further detail, there isn't much context for this language.	Removed as suggested	None	Y	Y	Sentences removed as suggested	7.2
17	1	text edit	strike "some of the new… atmospheric deposition"	Removed as suggested	None	Y	Y	Sentences removed as suggested	7.2
17	2	comment	See comment above about whether the model, as developed, will identify TN and TP criteria.	Yes, the model will be used to derive TN and TP criteria, along with the other lines of evidene.	None	N	N	NA	
18	1	comment	It would be nice to have a bulleted list of the response variables being considered.	Bulletted list added	None	Y	Y	Bulleted list added	7.2
18	2	comment	It is important to apply thresholds that are known to protect the beneficial use. For example, it does not make sense to use a threshold of 100, 000 cells/mL in the S/R analysis because it is value known to represent impairment of recreational uses. Similarly, using a threshold of 50 ug/L does not make sense because it would not be protective of either recreational or aquatic life uses. We recommend removing this language and only presenting and using thresholds known to protect the designated use of interest (e.g., recreation, aquatic life).	The SP will identify concentrations of nutrients linked to specific measures, which will also incorporate a buffer which will ensure the protection of the use. How the incorporation of this buffer will happen is outside the scope of the framework document.	None	N	N	NA	
18	2	comment	This language is redundant with page 11. Recommend removing. See below for more detailed comments.	Paragraph removed here and information incorporated into the earlier section.	None	Y	Y	Paragraph removed here and complementary information was added to section 2.2	7.2
18	2	comment	Recommend either removing this or revise to say: "As part of the framework for deriving NNC, UDWQ plans to conduct a user perception survey. Once completed, endpoints from the survey could be to model TN and TP.	Edited as suggested	None	Y	Y	Sentences changed to "As part of the framework for deriving NNC, UDWQ plans to conduct a user perception survey. Once completed, endpoints from the survey could be to model TN and TP. "	7.2
18	3	comment	Is this referring to S/R models? If so, provide details. What about the state's interest in testing EPA's national NNC approach to deriving lake criteria? Is that part of the plan? If so, please document.	Yes - clarification added to the Literature section since the National Models are outside the Utah Lake dataset	Determine if EPA's national NNC approach will be used. If so, document.	Y	Y	Added text to Literature line of evidence	7.2
18	3	comment	When deriving NNC, it is important to establish the TN or TP criteria at concentrations such that they do not exceed the DO/pH/ etc. criteria. Setting TN and TP criteria at concentrations that reach the established DO/pH criteria may not ensure protection of the use. This "buffer" should be considered in addition to the uncertainty associated with each analysis.	The SP will identify concentrations of nutrients linked to specific measures, which will also incorporate a buffer which will ensure the protection of the use. How the incorporation of this buffer will happen is outside the scope of the framework document.	None	N	N	NA	
19	1	comment	Can you provide more detail on what endpoints will be used? Or gaps in the endpoints that Utah plans to address? A list of specific endpoints would be helpful.	See Management Goals table for endpoints	None	N	N	NA	7.2
19	2	comment	When will this occur?	Timelines appear in a different document which has been developed (in draft form) and supplied to the SC	None	N	N	NA	

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19	3	comment	This seems like a critical component and this section should lead with this paragraph. It's a limitation that will impact the use of this approach. Also, because the data are already summarized, can't the gradient already be evaluated to see the range of concentrations observed?	Paragraph moved to second paragraph of the S-R section	None	Y	Y	Paragraph moved to second paragraph of the S-R section	7.2
19	4	comment	See comments above about whether this line of evidence is considered sufficiently applicable to Utah Lake to genuinely consider. Or consider removing this paragraph because the NLA analysis is also discussed in the "scientific literature" section.	Paragraph removed, as in previous sections	None	Y	Y	Paragraph removed	7.2
20	1	comment	Is it fair to assume that the new research will not face the previous methodological issues?	Yes. Sentence edited to clarify this point	None	Y	Y	Sentence changed to "To address these limitations, the DWQ ULWQS has funded research approved by the SP to conduct a paleolimnological study that will address previous methodological challenges and help answer the following questions:"	7.2
23	2	comment	Recommend deleting this threshold as an example	Clarification on why this threshold should be deleted is needed. Retained for now.	None	N	N	NA	
23	3	comment	See comment above.	Clarification on why this threshold should be deleted is needed. Retained for now.	None	N	N	NA	
24	1	comment	Shouldn't this be a value?	Table no longer appears in document.	None	Y	Y	Table deleted from document (macrophyte-dominated state no longer addressed)	7.2
24	2	comment	Shouldn't this be a value?	Table no longer appears in document.	None	Y	Y	Table deleted from document (macrophyte-dominated state no longer addressed)	7.2
29		comment	If this table is included, additional detail and specificity would be helpful.	We are happy to add additional detail and specificity but are unsure which components would be helpful here. Additional feedback would be great!	None	N	N	NA	
na	na	comment	1. "This [Framework} document describes the approach that will be used to derive in-lake numeric nutrient criteria (NNC) for nitrogen and phosphorus in Utah Lake." Presumably, this refers to NNC promulgated in Utah's Water Quality Standards. This information may be discussed in documents that I did not review but I note a complete absence of discussions of regulatory requirements for water quality standards. Absent discussion of these requirements, the data collection will be inefficient and may not ultimately provide the necessary information. G211	Discussion of the regulatory requirements for standard setting is outside the scope of this document (a general framework), but we are aware that any proposed nutrient criteria would also need to go through the regulatory process as well. According to the timeline document and discussions with DWQ, these processes will be occurring in parallel and the processes will inform each other. The Water Quality Standards Group is hopefully communicating with the DWQ ULWQS staff to make sure any requirements that may be needed far ahead of regulatory action are made.	None	N	N	NA	
na	na	comment	2. The lake is currently impaired for total phosphorus. Whether a TMDL-like approach is applied or a standard is derived, a phosphorus target concentration is needed and perhaps a nitrogen target concentration . As proposed, NNC will be derived. By definition, NNC are intended to support the uses. The uses are the goals for the water quality and explicitly include management goals. Federal and State regulations identify the specific options available to address if a criterion is not or cannot be met. The Framework considers some of these but does not identify their relevance to the regulatory process. If a numeric criterion cannot be met, load reductions can be implemented under a TMDL until the criterion is met. However, if load reductions are insufficient, the criterion can be changed by establishing the Highest Attainable Use based on at least one of the 40 CFR 131.1-(g) factors . These factors could be applicable to NNC derived by any of the proposed methods. Therefore, the research should be explicitly designed to evaluate the applicability of (g) factors.	This framework document is intended to detail the process of deriving NNC that represent protection of the existing uses. It does not address the feasibility of achieving these goals, or the regulatory alternatives since that would be a consequence pursuant to criteria setting. The document is a criteria framework, not necessarily a 131.10(g) framework, which would be a substantially different effort.	None	N	N	NA	

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na	na	comment	3. The Framework discusses applying a weighted-of-evidence approach with an extensive number of potential lines of evidence. Ultimately, the Steering Committee will be presented with a range of values including estimates of the bias and uncertainty associated with these values. Obtaining consensus on the uncertainties will likely be labor intensive and ultimately rely on expert opinion. There are unlikely to be clear answers because of the fundamental limits of the current state of the science. Extensive uncertainty analyses will not overcome these fundamental limits. Expert opinion will play a key role but absent silver-bullet type answers, decisions can be challenged by opposing experts. The discussion of the considerations for conducting a weight-of-evidence analyses are incomplete. Consider citing or adding specific examples from the USEPA CADDIS guidance such as Summary Tables of Types of Evidence.	This is a valid concern - reconciling what is "protective" given levels of uncertainty is difficult. Criteria setting is, of course, different from causal analysis. The former must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use and if not using 304(a) criteria, must be based on scientifically defensible methods. This proposed approach fully meets the intent of 131.11. The statues is mute on how to combine evidence - only that it be scientifically defensible and the courts have given states and EPA great deference in that regard. It is our intent to lay out lines of evidence much like the summary tables of evidence (with information on the uncertainty, much as CADDIS uses it). However, causal assessment, in contract, attempts to build inference around cause when experimentation is not possible. It is a differnet proposition. Therefore, weighing evidence using Hill's criteria is an option CADDIS has proposed. Many states do not use that approach - and successfully so.	None	N	N	NA	
na	na	comment	4. Clarifications of the management goals are needed to focus the potential assessment endpoints and measures. The management goals presented in Figure 7 are simply the designated uses and more details are necessary (The text currently does not include any explanation of management goals). For instance, potentially taking a reference approach is discussed. Is a management goal restoring the lake to pre-settlement condition? If the paleolimnological studies show a higher frequency of cyanobacteria blooms historically than currently, would allowing a higher frequency be consistent with the management goals? Beyond the regulatory requirements, what are the management goals for the recreational use, aquatic life use, and agricultural uses? What are the management goals for the recreational uses? No exceedances of cyanotoxins ever? No more than historically? No more than economically feasible? Are the management goals for the agriculture use to protect the crops from adverse effects from cyanotoxins or people who eat the crops? How are scums defined in the context of the management goals? These answers guide the selection of assessment endpoints.	See Management Goals Table	None	N	N	NA	
na	na	comment	5. The assessment endpoints require further clarification. Figure 7 in the Framework is a conceptual model that includes assessment endpoints in addition to illustrating linkages. Why would change in DO be an assessment endpoint but not change in pH? Both have numeric criteria that must be met (or the criteria changed). Is the intent to establish N and P criteria that will be protective of the DO criteria? What does no increase in algal toxins mean? An increase in primary production and change in phototroph assemblage structure appears to be a measure and not an assessment endpoint (AKA, measure of effect in the older 1998 Ecological Risk Assessment Guidance). Why is clarity an assessment endpoint and how does it relate to the management goals?	Figure 7 includes change in pH as an assessment endpoint, and theh pH criteria have been added to section 2.2 (formerly section 2.1). Also see the Management Goals table. "no increase in algal toxins" does not appear in the document. Updates and clarifications for assessment endpoints and measures have been made in the Management Goals table.	None	Y	Y	pH criteria added, management goals table added	7.2
na	na	comment	6. Tables 5-8 list assessment endpoints and was adapted from Table 7.1 of USEPA (2000). The reference may not be appropriate because the adaptations are unclear. In addition, USEPA (2000) does not use the term assessment endpoints. What are listed in Tables 5-8 are more accurately termed “measures or measures of effects.” Assessment endpoints are often not directly measureable and hence one or several measures are used to infer the condition of the assessment endpoint. An exception would be if DO criteria are an assessment endpoint, the measure could be directly measurable by water column measurements (the measure).	Section 2.1 now contains definitions of assessment endpoints and measures of effect. See also management goals table.	None	Y	Y	Section 2.1 added with relevant definitions	7.2
na	na	comment	6. Tables 5-8 list assessment endpoints and was adapted from Table 7.1 of USEPA (2000). The reference may not be appropriate because the adaptations are unclear. In addition, USEPA (2000) does not use the term assessment endpoints. What are listed in Tables 5-8 are more accurately termed “measures or measures of effects.” Assessment endpoints are often not directly measureable and hence one or several measures are used to infer the condition of the assessment endpoint. An exception would be if DO criteria are an assessment endpoint, the measure could be directly measurable by water column measurements (the measure).	Same as comment in previous row - see row 80	None	N	N	NA	7.2
na	na	comment	“Assessment endpoints are explicit expressions of the actual environmental value that is to be protected. Measurement endpoints are measurable responses to a stressor that are related to the valued characteristics chosen as the assessment endpoints (Suter, 1990a). “	Unclear what this comment is suggesting. Management goals, assessment endpoints, measures, and targets have been better defined in section 2.1	None	Y	Y	Management goals, assessment endpoints, measures, and targets have been better defined in section 2.1	7.2

Page #	Paragraph #	Comment Type	Comment	Response to Comment	Additional Action Needed	Mod Needed (Y/N)	Mod made (Y/N)	Description of Modification	Version # containing Revision
na	na	comment	o The discussion focuses on assessment (management response objectives), linkages back to associated nutrient concentrations for purposes of setting NNC is not discussed. Is this intentional? If significant relationship between any of these responses and ambient nutrient concentrations can be established this, by itself, would be a pretty solid rationale for setting Utah Lake NNC. ▯ Is this not addressed to avoid the discussion of combined criteria? o Perhaps as a result of the first comment, this discussion also does not address the importance of setting NNC to be protective of the most sensitive use. o The discussion on "best attainable conditions" touches on the most challenging aspect of this investigation. There are many studies that discuss the difficulties of reversing to previous stable states in shallow lakes. I do not know of any way that we can demonstrate that Utah Lake is a potential exception. As a result, this is where those skeptical of any recommended NNC are likely to ultimately focus. ▯ We might be able to demonstrate that improvements—reductions in intensity or magnitude of HABs—are possible. ▯ Are conditions likely to get even worse under the status quo? ▯ How might the concept of adaptive management work into the NNC plans? ▯ It is important to note that all of the above involves trends in responses as opposed to reductions in N or P.	Intentional? Not sure, but we assume that the strength of the S-R models will help solidify the rationale for NNC, although that is not necessary since nutrients have a well proven scientific basis for causing impairment of uses. We've added language on sensitive uses. We've removed the BAC language; however, I don't think the goal is to reverse the stable state from open water back to macrophyte dominated, but rather to ensure that designated uses are protected.	None	Y	Y	Amended language per response	7.2
na	na	comment	• Section 2.2: Lines of Evidence o Again, this is fantastic. The additional language on how each line of evidence could specifically inform the NNC is very helpful. o It is still not clear to me how a public perception survey would be conducted for a single water body. I'm not saying this is impossible; I'm just having a hard time visualizing how this would be done. o There is a formatting typo at the end of the first paragraph on p. 18.	Comment 2 will be kept in mind as the recreation survey is designed and implemented. Formatting typo is no longer present.	None	Y	Y	Typo fixed	7.2
na	na	comment	• Section 2.3: Combining Lines of Evidence o This was the highlight of the framework document for me. I'm glad that the framework now acknowledges the elephant in the room. o Linking the duration and frequency to NNC components to uncertainty and risk is a particularly useful way to highlight how these concepts could influence the SP recommendations. The hypothetical tables are also useful. o I suspect that stakeholders will differ significantly with respect to their tolerance for risk. ▯ Water quality standards have traditionally had a pretty low tolerance for risk, but I'm not aware of concrete guidelines in such MLE scenarios. Is there anything specific that we can point to? o Does it make any sense to explicitly consider risk from the opposite perspective as well? What is the risk that we will spend this money and not see any improvements in the lake? What is the risk of things getting worse if we do not? ▯ If this is where the steering committee is ultimately headed, perhaps it should be addressed by the SP directly?	All very valid points. For multiple endpoints based on uncertain analysis (very much unlike the scenario with tox testing), it is always difficult to reconcile what is the defensibly protective value; transparency and discussion of uncertainty and logic is the best one can do and, to date, has proven to meet the requirements of 40 CFR 131.11, that the criteria be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use and if not using 304(a) criteria, must be based on scientifically defensible methods. We believe that even with disagreement on which value is most certainly protective, the values will identify the scientifically sound range space. As was done with the headwaters effort. We agree that stakeholders will likely disagree and are unclear whether there is any solution for that other than transparency and dialogue. I do not know of guidance on MLE for setting criteria - it is different than causal analysis. The best I can think of is the 131.11 language and the examples set by EPA in its Florida Rule and new national lakes effort - which seem fairly consistent with what is being	None	N	N	NA	
na		comment	I have reviewed ULWQS Numeric Nutrient Criteria Technical Framework document and have no comments. Nicely done.	Thank you for the feedback.	None	N	N	NA	
na		comment	The current draft does a good job of outlining the various lines of evidence that we will consider in developing NNC for Utah Lake. It also provides some good examples of potential endpoints. However, to finalize the document, I believe we need a robust discussion of management goals, specific to each of the beneficial uses for Utah Lake (2A, 3B, 3D, and 4) and downstream Jordan River (1C), that can be used to determine specific metrics against which we can compare the costs and benefits of various nutrient regimes. I think the Steering Committee is the appropriate body to develop these qualitative management goal statements and associated metrics. I do not think we need to identify specific thresholds for all metrics at this time, although some are already prescribed by existing rule (e.g. DO, pH, and ammonia criteria). Rather, once we agree on a set of management goals for the lake and measures that can be used to evaluate those goals, the Science Panel can develop scenarios of nutrient reduction that are paired with the management goal metrics and statements of uncertainty. Ultimately, the metrics we develop for management goals at Utah Lake need to be integrated into the Strategic Research Plan as a strong link to the Framework document. Additional study may be needed to derive some of these thresholds (e.g. recreation user survey).	Management goals, assessment endpoints, measures, and targets have been added to the management goals table	None	N	N	NA	

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1	4	comment	Toxins should be the primary stressor. There is no cell count to toxin ratio. Past experiences has shown algae/blue-green algae grows in Utah Lake. Using cell counts will be the lowest trigger and not indicative of the toxicity of Utah Lake. Cell counts should be globally deleted.	Per discussion of management goals table with SC, cell counts were retained in this document as in the management goals table. Further analysis of cell count and toxin relationships will quantify the ability to connect abundance and toxicity.	None	N	N	NA	
1	4	text edit	The recent EPA Guidance does not have values for total cyanobacterial cell density related to inflammatory health endpoints. [https://www.epa.gov/sites/production/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf].	The EPA document describes a significant relationship between cell density and inflammatory health endpoints, but variability was too high to assign a recommended value. Cell density may have additional impacts beyond direct inflammatory health endpoints, including connections to other sources of impairment (e.g., pH, DO, toxins)	None	N	N	NA	
1	4	comment	Has Utah Lake seen low dissolved oxygen levels?	Yes, see Management Goals Table current conditions	None	N	N	NA	
1	4	comment	Is Provo Bay being studied too?	Yes, Provo Bay is a separate Assessment Unit	None	N	N	NA	
3	1	comment	The 1975 conditions should be identified as per the Clean Water Act legally required end point.	existing use protection (see UAC R317-1-1) based on the uses supported in 1975 is required in addition to protecting the designated uses.	None	N	N	NA	
3	3	comment	Delete and focus on toxin levels.	Per discussion of management goals table with SC, cell counts were retained in this document as in the management goals table. Further analysis of cell count and toxin relationships will quantify the ability to connect abundance and toxicity.	None	N	N	NA	
10	7	comment	The recent EPA Guidance does not have values for total cyanobacterial cell density related to inflammatory health endpoints. [https://www.epa.gov/sites/production/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf].	The EPA document describes a significant relationship between cell density and inflammatory health endpoints, but variability was too high to assign a recommended value. Cell density may have additional impacts beyond direct inflammatory health endpoints, including connections to other sources of impairment (e.g., pH, DO, toxins)	None	N	N	NA	
11	2	comment	The recent EPA Guidance does not have values for total cyanobacterial cell density related to inflammatory health endpoints. [https://www.epa.gov/sites/production/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf].	The EPA document describes a significant relationship between cell density and inflammatory health endpoints, but variability was too high to assign a recommended value. Cell density may have additional impacts beyond direct inflammatory health endpoints, including connections to other sources of impairment (e.g., pH, DO, toxins)	None	N	N	NA	
11	3	comment	The recent EPA Guidance does not have values for total cyanobacterial cell density related to inflammatory health endpoints. [https://www.epa.gov/sites/production/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf].	The EPA document describes a significant relationship between cell density and inflammatory health endpoints, but variability was too high to assign a recommended value. Cell density may have additional impacts beyond direct inflammatory health endpoints, including connections to other sources of impairment (e.g., pH, DO, toxins)	None	N	N	NA	
11	4	comment	Remove as noted above.	Per discussion of management goals table with SC, cell counts were retained in this document as in the management goals table. Further analysis of cell count and toxin relationships will quantify the ability to connect abundance and toxicity.	None	N	N	NA	
11	8	comment	Should we include protection for midges too?	Midges are invertebrates, which are included in the paragraph: "The highlighted text means of course that the invertebrates and plant communities necessary to fishes are to be protected. "	None	N	N	None	

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11	9	comment	It is reasonable to study the inhibition of light penetration due to other factors as well such as sediment suspension	Yes, it is reasonable to study multiple sources of reduced water clarity. Those sources tied to nutrients are those that are relevant to the task of developing nutrient criteria, though the sources outside of that designation provide useful context.	None	N	N	None	
11	2	comment	I have read Jay's comments and agree that this section should be re-worked.	See responses and edits to Jay's feedback	None	N	N	See responses and edits to Jay's feedback	
14	1	comment	Where is this example below? Section 2.2 Lines of Evidence?	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
18	4	comment	Again, toxins are the primary type of stressor not cell counts. EPA 822-R-49-001 May 2019, Page 94.	Per discussion of management goals table with SC, cell counts were retained in this document as in the management goals table. Further analysis of cell count and toxin relationships will quantify the ability to connect abundance and toxicity.	None	N	N	NA	
na	na	comment	"Listed Utah Lake designated beneficial uses as: • 2A: Frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. • 3B: Warm-water species of game fish, including the necessary aquatic organisms in their food chain. • 3D: Other aquatic wildlife. • 4: Agricultural uses including irrigation of crops and stock watering. The aquatic life and recreational uses are currently impaired due to factors associated with nutrient enrichment." Suggest listing all impairments. Utah Lake is listed for TDS impacting class 4: agricultural designated beneficial use. The interaction between TDS, PH and P & N should be included in the modeling and study. "One of the most significant environmental impacts of PH is the effect it has on the solubility and thus the bioavailability of other substances." Without incorporating TDS into the model and studies we will not have a full understanding of Utah Lake's water chemistry. 2016 Integrated Report DWQ http://www.state.ky.us/nrepc/water/ramp/rmph.htm	List of impairments was updated to include TDS and specifically identified which beneficial uses were impaired by TP and TDS. Specific details relating specific variables of interest were added to the modeling sections. To the extent TDS relates to nutrient-related conditions, it will be included in modeling efforts. However, if TDS is not connected to nutrient-related conditions, it would be considered outside the scope of this study.	None	Y	Y	Added impaired listing for agricultural uses: "Agricultural uses were listed as impaired due to elevated total dissolved solids in 2006."	7.2
na	na	comment	Mechanistic Modeling: combine the two Mechanistic models together and put the water quality portion as a sub-category. In the "Mechanistic water quality modeling to evaluate nutrient responses under reference conditions:" it states, "To simulate reference conditions, the anthropogenic nutrient loads are set to minimal levels so that modeled responses based on background nutrient inputs can be evaluated. Other drivers (e.g., hydrology, macrophyte extent and density) can also be manipulated. This type of reference scenario may set a lower bound for what is necessary to ensure protection of beneficial uses. In addition, this information can be combined with paleolimnological evidence to assess how results of the mechanistic model run under natural conditions compare to those associated with pre-settlement inputs." What is the difference between anthropogenic nutrient minimal levels, background, natural, and pre-settlement conditions?	"natural" and "background" conditions are the same. Changed to be "natural background" in both cases to avoid confusion. Pre-settlement conditions may or may not be consistent with natural background levels, which can be tested with the model. Mechanistic model sub-sections were retained within reference and stressor-response sections, as those efforts represent two different approaches taken with the same toool.	None	Y	Y	"natural" and "background" changed to "natural background" for consistency.	7.2
na	na	comment	Recreational Uses There are several different cyanobacteria and cyanotoxins numbers listed from multiple sources. Why not use Utah's current recreational use assessments numbers or the new assessment numbers which have been out for public comment and waiting for the Water Quality Board approval? Agricultural Uses This section does not accurately represent the agriculture industry or the impact that cyanotoxins have on agriculture. Using drinking water standards for agricultural uses is over protective. Suggest either revising or deleting this section. Here is some suggested language for your consideration: Agricultural uses of Utah Lake include irrigation and stock watering. Utah Lake is listed for TDS impacting class 4: agricultural designated beneficial use. Nutrient enriched water is a benefit to irrigators, because it reduces the amount of fertilizer needed, which reduces input costs. However, cyanobacteria may pose a problem to livestock if they are producing high levels of cyanotoxins. The Utah Department of Agriculture and Food (UDAF) suggests livestock producers provide a clean stock water source to their livestock, and if cyanotixons are present to restrict livestock access to contaminated water. Currently there is very limited understanding of cyanotoxins impact to crops and plant uptake. The irrigation method may create a concern to farm labors if water comes in direct contact with the plants. This increases the possibility of direct contact with cyanotixons. Good hygiene and proper handling of produce reduces the potential health risks. UDAF's lab does offer cyanotixon testing to agriculture producers. Although the specific values to protect crops and stock watering are not as well developed, the concentrations for recreation cyanotixons could be used as indicator values. Alternatively, additional research could be conducted to identify appropriate values for irrigation and stock water.	Agricultural uses section re-worked to remove drinking water standards.	DWQ staff should check and make sure the correct values are in the text and MG table. We used the available values at the time, which have changed or are changing. DWQ is best positioned to make sure the currently correct values are used. This has been left as a bubble in the text.	Y	Y	Agricultural uses section changed to "Agricultural uses of Utah Lake, including irrigation of crops and stock watering, are largely affected by nutrient enrichment through its effect on cyanotoxins and taste and odor issues. Information on the collection of these endpoints are given above for Recreational Uses. Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2

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na	na	comment	2.2 Lines of Evidence As mentioned in 1.0 there is no mention of TDS and the role it plays in Utah Lake water chemistry. UDAF suggests adding a statement on TDS to this section. Mechanistic model: "The selected hydrodynamic model is the Environmental Fluid Dynamics Code (EFDC) and the selected water-quality model is Water Quality Simulation Program (WASP)." In the last Science Panel (SP) meeting (3/19-20/2020) the SP indicated that there are issues with the EFDC, and WASP models functioning correctly for PH and alkalinity. Either this issue needs to be resolved or new models should be selected. Empirical analysis: as mentioned in 1.2, there are several different cyanobacteria and cyanotoxins numbers listed from multiple sources. Why not use Utah's current recreational use assessments numbers or the new assessment numbers which have been out for public comment and waiting for the Water Quality Board approval? Paleolimnological reconstruction of past conditions: there have been 5 different paleolimnological coring's in Utah Lake from 1974-2012. What has changed in this paleolimnological data gathering that did not happen before, are we just doing research? It indicates Utah Lake will use an approach similar to the one used by Minnesota Pollution Control Agency for its Spring Lake Site-Specific Eutrophication Standard Justification. There appears to be an obvious problem with the Spring Lake site-specific eutrophication standard. When the background (pre-settlement) TP is higher than the current background or TMDL standard, can this type of standard ever be archived?	TDS was not identified in the management goals table as a nutrient-relevant assessment endpoint, although stressor-response analysis may include TDS as a mitigating factor. The EFDC/WASP modeling plan moving forward includes addressing the pH and alkalinity issue. Cell count and toxin values are based on DWQ values, but WHO values are provided for context and illustration of consistency between the two values. DWQ values are indicated in the Management Goals table. Paleolimnological research is currently underway, and reporting by the research team will discuss novel findings. Reference-based analysis will indicate whether the pre-settlement TP level is higher than the current background standard, and if this is the case there is a mechanism for the criteria to go through a highest attainable use process. However, this framework addresses how to arrive at values that will protect the designated uses and is not intended to address feasibility.	None	Y	Y	Management goals table added, which uses DWQ values for cell count and toxin	7.2
1	1	comment	I agree with Jay that the TDS impairment should be mentioned since TDS has a positive correlation with conductivity, which can affect pH and thus bioavailability of N and P. If this has been proven otherwise for Utah Lake, then it should be discussed here.	List of impairments was updated to include TDS and specifically identified which beneficial uses were impaired by TP and TDS. Specific details relating specific variables of interest were added to the modeling sections. To the extent TDS relates to nutrient-related conditions, it will be included in modeling efforts. However, if TDS is not connected to nutrient-related conditions, it would be considered outside the scope of this study.	None	Y	y	Added impaired listing for agricultural uses: "Agricultural uses were listed as impaired due to elevated total dissolved solids in 2006."	7.2
5	1	comment	Here you separate beneficial uses as a part of management goals, yet below you seem to use them interchangeably, which becomes confusing (see comment in section 2.1). Language describing the NNC as protective of beneficial uses needs to be included here. The relationship between beneficial uses and management goals needs to be clearly defined here as well.	Uses of "beneficial/designated use" and "management goals" are clarified throughout the document, consistent with the management goals table	None	Y	Y	Uses of "beneficial/designated use" and "management goals" are clarified throughout the document	7.2
5	1	comment	As in lake water levels, lake WQ, recreation, wildlife, and agric., or just beneficial uses or ?	We clarified the point that the conceptual model addresses designated uses, not management goals. Wording was changed and conceptual model linked here to emphasize that point. This should clarify the confusion inherent in this comment.	None	Y	Y	Sentence changed to ". For the purposes of this framework, the conceptual models reinforce the basis for linkages between nutrient pollution, assessment endpoints and designated uses for Utah Lake. "	7.2
5	2	text edit	replace "defensibly" with "defensible"	Corrected as suggested	None	Y	Y	replaced "defensibly" with "defensible"	7.2
6		comment	I assume that the microbial inputs are implicit but I think contributions from the microbial community should at least be mentioned in the caption or text. Describing what the arrows mean / how one interprets them would be helpful to the general public and could easily also describe general microbial processes important to nutrient pathways. Otherwise, it's a little too simplified and leaves an un-trackable thread when the microbial community is discussed later in the ULWQS process or other figures.	This figure was retained as-is, but the other conceptual figure (box and arrow diagrams) has been moved up and does include microbes. Microbes are implicitly included in the detrital pool and in the respiration and recycling pathways in the figure, but we chose to retain the figure as-is given that the management goals, assessment endpoints, etc. do not have a microbial component.	None	N	N	NA	
10	4	comment	This doesn't make sense. Different methodologies will be selected to determine various and specific endpoints. Therefore, a methodology is inherently connected to endpoint determination that results. What does immunity have to do with anything?	Sentence removed for clarity	None	Y	Y	Sentence removed for clarity	7.2

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10	5	comment	Are these really “goals” or is it really water quality goals relative to each beneficial use? If they are manamgment goals, we need to know the defining characteristics of them and how they differ from beneficial uses.	Section re-worked to better define designated beneficial uses, management goals, assessment endpoints, measures, and targets	None	Y	Y	New section (2.1) added: Relevant Definitions. First paragraph of this section reads: "The Utah Lake Management Goals, Assessment Endpoints, Measures, and Targets document (DWQ 2020) was developed by the SC and outlines the relationships between beneficial designated uses of Utah Lake and the conditions and variables that relate to these uses in the context of NNC development. The designated beneficial uses for the lake are Recreational Use, Aquatic Life and Wildlife Use, Agricultural Use, and Downstream Use (Figure 7, DWQ 2020). Each use is associated with multiple management goals, and each management goal is associated with one or more assessment endpoints, measurements, and targets. "	7.2
10	5	comment	There should be much more discussion about Figure 7. These two paragraphs should set up how Figure 7 evolved, what it encapsulates, and why it’s relevant to the entire process. I’m left to interpret it alone and figure out how it relates to the following sections.	Figure 7 is described in section 1.2, and an explicit connection to this section was added. The definition for assessment endpoints was also added and references the figure with an explanation of how assessment endpoints connect management goals with processes in the causal pathway.	None	Y	Y	Reference to figure 7 (now renumbered) was added to section 1.2 where it is described first. An explanation of management goals, assessment endpoints, and processes in the causal pathway was added	7.2
10	6	text edit	add text: "a chemical with a very low odor detection threshold"	Added as suggested	None	Y	Y	Added text "a chemical with a very low odor detection threshold"	7.2
10	6	comment	The main focus of the ULWQS is to determine the connection between nutrient loading and HABs. These are secondary endpoints that may or may not be supportive of HAB linkages to nutrient enrichment so it would make more sense to place this paragraph at the end of the section.	Paragraph moved to end of section as suggested	None	Y	Y	Paragraph moved to end of section	7.2
11	3	comment	There should be a crosswalk discussion on the shift to monitoring concentrations for recreational use assessments (ug/L) from cell count criteria below (#cells/mL). Are cell count criteria still currently used by DWQ? Are these criteria to be linked with concentration values in some way or is DWQ transitioning away from cell counts? It would be helpful background, particularly when cell counts are not as informative as cyanotoxin concentrations.	Material from later in the document (section 2.2, see comment 143) has been moved up to this section to help connect the dots and make this section more complete.	None	Y	Y	Material from later in the document has been moved up to this section to help connect the dots and make this section more complete.	7.2
11	6	comment	excessive respiration values?	Term was clarified	None	Y	Y	Changed to "Aquatic life in Utah Lake are directly affected by eutrophication through impacts on dissolved oxygen (DO) and pH caused by additions in organic matter loading that lead to increased respiration that result in decreased DO and pH. "	7.2
11	6	comment	This sentence is a bit cumbersome and could be better written. Perhaps separate the concepts by using independent sentences?	Sentence split into two sentences as suggested	None	Y	Y	Sentence changed to ". Aquatic life may also be indirectly affected by nutrient enrichment through the alteration in food resources, resulting from a shift to more nutrient tolerant and less palatable algal species. These shifts reduce the efficiency with which carbon is made available to the food web. "	7.2
11	6	comment	It isn’t just palatability, it’s also sometimes physically impossible for some zooplankton to graze on algae that are too large to ingest.	Fair point, although the shift would likely be to cyanobacteria which tend to be smaller cells. Language left as-is for simplicity's sake but could be changed if feelings are strong.	None	N	N	NA	7.2
11	6	text edit	add: "ntrient" prior to "enrichment"	Added as suggested	None	Y	Y	Added "nutrient" prior to "enrichment"	7.2
11	9	comment	Is this a sentence?! It would be better to suggest directed research by the SP to explore these relationships. As suggested here, it sounds far more simple than reality.	Edited for clarity as suggested	None	Y	Y	Added text to indicate directed research by SP, and split idea into two sentences	7.2
11	10	comment	If “a” is italicized here, it should be consistently throughout the document.	Corrected here and throughout	None	Y	Y	"a" in chlorophyll a was italicized throughout the document	7.2
11	10	comment	replace "for growth" with "for macrophyte growth"	Added as suggested	None	Y	Y	Added "macrophyte" before "growth"	7.2
12	1	comment	This statement is oversimplified. Some macrophytes (Stuckenia filiformis, S. pectinata, and other vascular and macroalgal species) were tolerant of very low light conditions, while water chemical parameters were more limiting for them in freshwater wetlands of Great Salt Lake. (Studies funded by DWQ and WFWQC). Instead, suggest that light level targets in conjunction with other nutrient-specific WQ targets could be explored for protection of aquatic life. You could also add that macrophytes are known to purify and clarify water bodies. Plenty of references out there.	Incorporated changes as suggested	None	Y	Y	Added "in conjunction with other nutrient-related targets" to the sentence	7.2
12	2	comment	Then what? This sentence needs work. suggested edit: "Food resources impacts from nutrient enrichment are more difficult to quantify and identification determination of nutrient levels at whichthat effect food web impacts interactions/relationships occur could take years to decades of study to fully understandwould need to be studied. However, researchers have identified chlorophyll concentrations associated with shifts in zooplankton:phytoplankton ratios that reflect points at which inefficiencies in trophic transfer occur that affect food webs and these may be used to develop criteria (Yuan and Pollard 2018). Such chlorophyll concentrations might also be used as assessment endpoints in Utah Lake."	Edits incorporated for clarity	None	Y	Y	New paragraph edit: "Food resource impacts are more difficult to quantify, and identification of nutrient levels at which food web impacts occur would require complex and time-intensive studies."	7.2

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12	2	comment	Are these from comparable systems? Are the species compositions of zooplankton and phytoplankton comparable to those in Utah Lake? What are the criteria used by the authors and are they applicable to Utah Lake given that it is a highly calcareous system? “Such chlorophyll concentrations ..” - What chlorophyll concentrations? Are you suggesting that the same concentration targets would be applicable for Utah Lake? Perhaps suggest that SP directed research would be appropriate to explore similar inflection points between oligotrophic to eutrophic shifts where top-down control becomes an equal (or greater) influence to bottom-up control and therefore an important driver of WQ relative to nutrient enrichment.	The cited study analyzed continental-scale data across a range of oligotrophic to eutrophic conditions. The zooplankton:phytoplankton ratio was proportional under oligotrophic conditions but varied (steady zooplankton with increasing phytoplankton) under eutrophic conditions. The NLA is a statistically representative compilation of lakes across the nation and may serve as a comparator to the condition in Utah Lake. Of course interpretations for the situation in Utah Lake would need to be a part of that assessment, but the comparison to the NLA data would be a useful starting point.	None	Y	Y	"(from the National Lakes Assessment)" was added to emphasize the continental-scale nature of the dataset.	7.2
12	3	comment	These are for humans, not agricultural uses.	Agricultural uses section re-worked to remove drinking water standards.	None	Y	Y	Agricultural uses section changed to "Agricultural uses of Utah Lake, including irrigation of crops and stock watering, are largely affected by nutrient enrichment through its effect on cyanotoxins and taste and odor issues. Information on the collection of these endpoints are given above for Recreational Uses. Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2
14	1	comment	"management goals" Same comment as above. Please clarify.	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	1	comment	Why would management goals change if a perceived improvement of the system would be beneficial to aquatic life and potentially reduce the risk of HAB outbreaks? I’m not following your logic here.	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	1	comment	This paragraph could be greatly abbreviated, pointing out the need for further information from paleo studies and discussions between the SP and SC regarding the feasibility of a change in state.	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	2	text edit	edit: "as well as scientific literature" to "as well as using supporting supportive scientific literature"	Edited as suggested	None	Y	Y	Added "using" to sentence	7.2
15		comment	beneficial uses?	Changed to "designated uses"	None	Y	Y	Changed "management goals" to "designated uses"	7.2
15		comment	and cyantoxin concetrations?	Added as suggested	None	Y	Y	Added "cyanotixin concentrations"	7.2
15		comment	and TDS?	Although TDS is an impairment for Utah Lake, it is not identified in the Management Goals table as a nutrient-related measure.	None	N	N	NA	
15		text edit	"other lines" to "other lines of evidence" and "simlilar literature" to "similar systems found in the literature"	Edited as suggested	None	Y	Y	other lines to "other lines of evidence" and "simlilar literature" to "similar systems found in the literature"	7.2
15	1	comment	The order of lines of evidence in this section should be parallel to the order that is initially presented. If you want “Stressor-Response” first, then stressor-response should be presented before reference based above in section 1.1.	Reference-based moved before stressor response in this section.	None	Y	Y	Reference-based moved before stressor response in this section.	7.2
15	1	comment	This is the language that is lacking throughout the previous part of the document (section 1). The chronic use of “management goals” without defining what they are in relation to beneficial use support (except the modest implication at the end of this section) needs to be addressed.	Language has been updated in the document throughout, with specific regard to definitions in section 2.1 and the Management Goals table	None	Y	Y	Language has been updated in the document throughout, with specific regard to definitions in section 2.1 and the Management Goals table	7.2
15	2	comment	Shouldn’t it be explained how the current primary indicator support (cell count) and Chl a will be translated into concentrations?	There is some misunderstanding about what the specific comment refers to. But the mechanistic models can be run to those loading conditions that meet in-lake response conditions are met. Those loads are modeled as concentrations in the lake. So, both are generated.	None	N	N	NA	
15	3	comment	If TDS has been shown to be unimportant in relation to bioavailability of N and P in Utah Lake, please reference it early in the document. Otherwise, should it be an included WQ endpoint here?	Although TDS is an impairment for Utah Lake, it is not identified in the Management Goals table as a nutrient-related measure.	None	N	N	NA	
17	1	text edit	edit "use" to "beneficial use"	Edited as suggested	None	Y	Y	Added "beneficial" before "use"	7.2
17	3	comment	management goals?	management goals removed from sentence (just beneficial designated uses included)	None	Y	Y	management goals removed from sentence (just beneficial designated uses included)	7.2
17	3	comment	Phosphate-phosphorus?	Clarified in figure caption	None	Y	Y	Clarified this term in the figure caption	7.2
18	1	comment	This information is sorely needed much earlier in the document as indicated by my earlier comments!	This information was moved up into section 2.2 under recreational uses	None	Y	Y	This information was moved up into section 2.2 under recreational uses	7.2
18	2	comment	All the rest of this text through “…could also be explored to identify levels that protect these assessment endpoints.” below the WHO thresholds table should move up earlier in the introductory info of document. Much of it is better written than what is presented above.	These paragraphs specifically relate to empirical stressor-response analysis so they have been retained here. Improvements to the writing of previous sections have been made, so hopefully this comment has been addressed.	None	N	N	NA	

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21		text edit	edit figure caption to: "Figure 11. Comparison of TP and chlorophyll-a concentrations between Utah Lake (orange circles) vs. TP values from the 2012 EPA National Lakes Assessment (NLA). Source: Utah Lake Data Explorer). The Utah Lake data was were collected from 1990-2016, and covers the entire lake, and all months. "	Edited as suggested	None	Y	Y	Figure caption edited: "The Utah Lake data were collected from 1990-2016, encompassing the entire lake in all months."	7.2
26		comment	I would argue that establishment of macrophyte beds would support recreation beneficial uses due to improved water clarity and purity, and by supporting fishing by providing additional nursery grounds for juvenile fish.	Tables 8 and 9 have been removed from the document	None	Y	Y	Tables 8 and 9 have been removed from the document	7.2
30		comment	Cyanotoxin concentration rather than cell densities?	Table has been updated with relevant stressor-response relationships	None	y	Y	Table has been updated with relevant stressor-response relationships	7.2
5	1	comment	In the discussion in Section 2.1 below, you focus exclusively on beneficial uses AS management goals. None other are mentioned. I suggest taking a short paragraph here (or somewhere) where you lay out the various management goals of the lake, and how beneficial uses support all (?) of those goals, and also describe how the designated beneficial uses ARE the goals of the ULWQS. Once you've made that link, you can talk about designated beneficial uses "as" goals (though I think I would still stick with focusing the discussion on the beneficial uses, and not trying to universalize those to the "management goals" for the lake	Beneficial uses and management goals are clarified throughout the document, definitions have been added to section 2.1, and see Management Goals table	None	Y	Y	Language has been updated in the document throughout, with specific regard to definitions in section 2.1 and the Management Goals table	7.2
5	1	comment	In the context of risk assessment, the Beneficial Uses are "assessment endpoints" for the various water management goals of the lake. Another issues that you have further on in Section 2.1 is that you are confusing between assessment endpoints and management endpoints. These terms should be more clearly defined in this text when they are first used.	Language about assessment endpoints, management goals, and designated beneficial uses has been clarified thorughout the document. See also definitions in section 2.1 and Management Goals table	None	Y	Y	Language has been updated in the document throughout, with specific regard to definitions in section 2.1 and the Management Goals table	7.2
5	2	text edit	strike "defensibly" replace w/ "defensible"	Edited as suggested	None	Y	Y	Change "defensibly" to "defensible"	7.2
10	3	comment	It really seems like this section is more focused on identifying the MEASUREMENT endpoints that will be used to evaluate the ASSESSMENT endpoints (which seem to exclusively include- by definition- the designated beneficial uses). It would help if you would more clearly organize this section to reflect this, and also be more clear about your use of terms for the two types of endpoints.	This section was reworked to be more explicit about the definitions of designated uses, management goals, assessment endpoints, measures, and targets. Also see the Management Goals table.	None	Y	Y	This section was reworked to be more explicit about the definitions of designated uses, management goals, assessment endpoints, measures, and targets. Also see the Management Goals table.	7.2
10	4	comment	It becomes clearer in the second paragraphs that what you are really talking about here is beneficial uses under Utah WQ regs. "Management goals" can be many things to many of the different stakeholders- providing water, providing habitat, etc. I recommend using that language instead of "management goals."	This section was reworked to be more explicit about the definitions of designated uses, management goals, assessment endpoints, measures, and targets. Also see the Management Goals table.	None	Y	Y	This section was reworked to be more explicit about the definitions of designated uses, management goals, assessment endpoints, measures, and targets. Also see the Management Goals table.	7.2
10	4	comment	This is hard to understand. What "methodology" are you talking about here? The methodology of developing criteria? If so, how would that methodology be "immune" to the endpoints? I really don't know what that is supposed to mean.	Sentence removed for clarity	None	Y	Y	Sentence removed for clarity	7.2
10	4 and 5	text edit	Several suggested edits to change "management goals" to "designated beneficial uses"	Paragraph now appears as the first paragraph in section 2.1 and has been reworked to reflect suggestions here	None	Y	Y	Paragraph revised to read: "The Utah Lake Management Goals, Assessment Endpoints, Measures, and Targets document (DWQ 2020) was developed by the SC and outlines the relationships between beneficial designated uses of Utah Lake and the conditions and variables that relate to these uses in the context of NNC development. The designated beneficial uses for the lake are Recreational Use, Aquatic Life and Wildlife Use, Agricultural Use, and Downstream Use (Figure 7, DWQ 2020). Each use is associated with multiple management goals, and each management goal is associated with one or more assessment endpoints, measurements, and targets. Relevant definitions from the document are: "	7.2
10	6	comment	It would help for each of these sections if they would start out by clearly identifying the relevant assessment endpoints (e.g., a bullet list right below the heading) and then going into a narrative discussion of them. As is, you highlight the importance of the endpoints above, and then they are very difficult to identify in this narrative. It also seems like the narrative is more focused on measurement endpoints (which are used to measure the assessment endpoints) than the assessment endpoints. Which topic are you trying to address?	Assessment endpoints have been added to each section in the form of the management goals table, and the narrative descriptions now accompany those clearly stated assessment endpoints	None	Y	Y	Management goals table added	7.2
10	6 and 7	text edit	Several suggested edits to change "management goals" to "designated beneficial uses"	This section was reworked to be more explicit about the definitions of designated uses, management goals, assessment endpoints, measures, and targets. Also see the Management Goals table.	None	Y	Y	This section was reworked to be more explicit about the definitions of designated uses, management goals, assessment endpoints, measures, and targets. Also see the Management Goals table.	7.2
11	5	text edit	strike "assessment" add "measurement"	Changed to "targets" (level of measure)	None	Y	Y	Changed to "targets"	7.2
11	6	comment	This is a pretty opaque descriptor. This could be clarified- how does it lead to "excess" respiration? Also, what exactly IS the effect on aquatic life of the excess respiration?	Clarified as suggested	None	Y	Y	Changed to "Aquatic life in Utah Lake are directly affected by eutrophication through impacts on dissolved oxygen (DO) and pH caused by additions in organic matter loading that lead to increased respiration that result in decreased DO and pH. "	7.2
11	6	comment	This is not the only ecological effect. Nutrient enrichment can also have habitat impacts, for example by making the water too murky to be able to see prey through.	Sentence added to this effect	None	Y	Y	Sentence added: "Additional habitat impacts include a decrease in water clarity that hinders visual predators. "	7.2
11	6	text edit	edit "be indirectly affected by enrichment " to "be indirectly affected by nutrient enrichment "	Edited as suggested	None	Y	Y	"nutrient" added before "enrichment"	7.2
11	7	text edit	strike "assessment" add "measurement"	Changed to "targets" (level of measure)	None	Y	Y	Changed to "targets"	7.2

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11	9	comment	Suggest using “chlorophyll-a” here (w/ hypen), or starting out with “chlorophyll a (chl-a).” Also, sometimes you italicize “a” and sometimes you don’t pick a convention and use it consistently.	Consistency with term implemented. Hyphen seems to be a matter of preference.	None	Y	Y	"a" in chlorophyll a was italicized throughout the document	7.2
11	9	comment	Incomplete sentence. What were you trying to say here?	Edited for clarity	None	Y	Y	Added text to indicate directed research by SP, and split idea into two sentences	7.2
12	1	text edit	add text: "macrophyte"	Added as suggested	None	Y	Y	"macrophyte" added before "growth"	7.2
12	2	comment	Which would be measurement endpoints, btw.	Section has been re-worked - see column M	None	Y	Y	Paragraph changed to "Agricultural uses of Utah Lake, including irrigation of crops and stock watering, are largely affected by nutrient enrichment through its effect on cyanotoxins and taste and odor issues. Information on the collection of these endpoints are given above for Recreational Uses. Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2
12	2	comment	Does it necessarily follow that zoo:phyto relationships developed in other systems would be applicable to Utah Lake? This would need to be verified in the studies referred to in the first sentence.	The cited study analyzed continental-scale data across a range of oligotrophic to eutrophic conditions. The zooplankton:phytoplankton ratio was proportional under oligotrophic conditions but varied (steady zooplankton with increasing phytoplankton) under eutrophic conditions. The NLA is a statistically representative compilation of lakes across the nation and may serve as a comparator to the condition in Utah Lake. Of course interpretations for the situation in Utah Lake would need to be a part of that assessment, but the comparison to the NLA data would be a useful starting point.	None	Y	Y	"(from the National Lakes Assessment)" was added to emphasize the continental-scale nature of the dataset.	
12	2	text edit	Add text: "from nutrient enrichment"	Changed as suggested	None	Y	Y	Added "nutrient" prior to "enrichment"	7.2
12	3	comment	Is taste and odor an issue for ag use, either for crops or stock watering? Are there currently any impairments of Ag use on Utah Lake currently? If so, what are they? If there are no ag impairments, would it be worth stating that to close out that line of evaluation (and make the analysis simpler?)	Toxins are the only management goal relevant for the agricultural use, as outlined in this edited section and the added management goals table	None	Y	Y	Management goals table added. Ag uses section now reads: "Agricultural uses of Utah Lake, including irrigation of crops and stock watering, are largely affected by nutrient enrichment through its effect on cyanotoxins and taste and odor issues. Information on the collection of these endpoints are given above for Recreational Uses. Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2
12	3	comment	These are all human use endpoints, not ag.	Section has been re-worked - see column M. Human use endpoints have been removed	None	Y	Y	Paragraph changed to "Agricultural uses of Utah Lake, including irrigation of crops and stock watering, are largely affected by nutrient enrichment through its effect on cyanotoxins and taste and odor issues. Information on the collection of these endpoints are given above for Recreational Uses. Specific values to protect crops and stock watering are not as well developed as for human health, so additional literature review or research could be conducted to identify appropriate values for stock and crop irrigation."	7.2
14	1	comment	Give a short description of what this means—clear water with submerged aquatic vegetation?	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	1	comment	If management goals are beneficial uses, these would not change in the two scenarios (supporting aquatic life uses). However, if “management goals” implies managing the lake for, or under different scenarios, that whole topic should be addressed earlier (and is going to make the discussion of measurement endpoints more difficult).	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	1	comment	Here is where using management goals and beneficial uses interchangeably gets you into trouble. If you are going to use “management goals” in this way you need to have a discussion of what are the possible management goals that the UL NNC’s could support. You could potentially be developing a different set of NNC for different management goals/scenarios.	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	1	comment	What example?	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
14	1	text edit	several suggested text edits	Paragraph no longer appears in document	None	Y	Y	Paragraph deleted from document	7.2
15		comment	Need to make sure your definition and usage of terms is correct here.	Beneficial uses and management goals are clarified throughout the document, definitions have been added to section 2.1, and see Management Goals table	None	Y	Y	Language has been updated in the document throughout, with specific regard to definitions in section 2.1 and the Management Goals table	7.2

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15		text edit	table 3, row 2. strike "management goals" replace w/ "beneficial uses"	Replaced with "designated uses"	None	Y	Y	Replaced "management goals" with "designated uses"	7.2
15		text edit	table 3, row6. several text edits	Changed as suggested	None	Y	Y	Sentence now reads "Scientific literature about similar aquatic systems may be used to support other response endpoints."	7.2
17	1	comment	Just for the sake of editorial consistency, the order of approaches presented here should parallel how they are presented in Section 1 (or section 1 should be reordered).	Reference-based moved before stressor response in this section.	None	Y	Y	Reference-based moved before stressor response in this section.	7.2
17	1	comment	Another example of why you need to pay close attention to definitions of management goals, beneficial uses, assessment endpoints, and measurement endpoints. If this approach is going to follow the ecological risk assessment paradigm, it should use terms consistent with that paradigm. I won't continue changing "assessment" to "measurement" here, but you should get my drift.	Beneficial uses and management goals are clarified throughout the document, definitions have been added to section 2.1, and see Management Goals table	None	Y	Y	Language has been updated in the document throughout, with specific regard to definitions in section 2.1 and the Management Goals table	7.2
17	1	text edit	strike "level" replace w/ "concentrations" and insert "than currently understood"	Edited as suggested	None	Y	Y	level replaced with concentration, final sentence of the paragraph no longer appears in the document	7.2
17	2	text edit	srike "measures" insert variables" and insert "and these can then be" and strike "and"	edited as suggested	None	Y	Y	wording changed as suggested	7.2
18	1	comment	What about near-normal and above-normal temperatures?	To our knowledge, climate change scenarios have not been discussed as potential scenarios for mechanistic modeling. If there is consensus among the SC for such scenarios, that could be communicated to the SP.	None	N	N	NA	
18	1	comment	This sentence is poorly written and hard to track through. Rewrite and clarify	Edited for clarity	None	Y	Y	Changed to ". For example, the frequency with which a value could be exceeded as a result of natural variability or periodicity without a loss of beneficial use could be determined. "	7.2
18	1	text edit	insert "benificial"	Changed as suggested	None	Y	Y	inserted "beneficial"	7.2
18	2	text edit	strike "assessment endpoints and measures" insert "measurement endpoints associated with"	Edited slightly differently than suggested for clarity	None	Y	Y	Changed to "Specific outputs from the mechanistic modeling effort will include nutrient scenarios (loading and concentrations) that support beneficial use and management goals in the lake "	7.2
18	3	comment	This is where "assessment endpoint" may be being used correctly, if an assessment endpoint is something like "support of populations of fish x" where fish x is a species that requires a certain water clarity to grow, survive and reproduce. Again, I think you need to go back to the beginning and clarify your structure and definitions of beneficial uses, management goals, assessment endpoints and measurement endpoitns.	Yes, we are in agreement here. Added definitions in section 2.1 and Management Goals table for additional clarification	None	N	N	NA	
18	3	comment	Again, not clear whether these terms are redundant or mean two different things.	Added definitions in section 2.1 and Management Goals table for additional clarification	None	N	N	NA	
18	3	text edit	strike "assessment endpoint response measures" insert "mesasurement endpoints" . Insert "that refelct ecosystem structure (e.g.,".. Strike "ecosystem structure"	Sentence modified as suggested	None	Y	Y	Changed to ". Empirical methods relate stressors (e.g., N or P) to assessment endpoint measures such as changes in biological composition that reflect ecosystem structure (e.g., cyanobacterial densities or proportion) or biogeochemical measures of ecosystem functions such as DO or pH (see Appendix for example model pairs). "	7.2
19	1	comment	This information could be used earlier in the document, in the section that defines benefical uses, goals, and the two kinds of endpoints. It's more universal- applies to more than just the S-R line of evidence, so it should appear earlier.	This information was moved up into section 2.2 under recreational uses	None	Y	Y	This information was moved up into section 2.2 under recreational uses	7.2
20	3	comment	Bold-italic "a" or plain text "a"? Be consistent	Consistency with term implemented	None	Y	Y	Italicized "a" in "Chlorophyll a" throughout	7.2
20	3	comment	Is it modeling or empirical analysis?	Clarified as suggested	None	Y	Y	removed "empirical analyses"	7.2
20	3	text edit	strike "emperical analysis"	Edited as suggested	None	Y	Y	removed "empirical analyses"	7.2
20	4	text edit	replace "justified" with "justifies". replace "abbreviated" with "attenuated". Replace "along" with "among"	Edited as suggested	None	Y	Y	replace "justified" with "justifies". replace "abbreviated" with "attenuated". Replace "along" with "among"	7.2
21	1	text edit	several text edits	Edits incorporated as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
21	1	comment	Extant, or species that occurred at the time of the core interval?	"extant" removed for clarity	None	Y	Y	"extant" removed for clarity	7.2
21	2	comment	A record of historic lake depth would be very important to pair with the core samples.	Agreed - something to bring up with paleo team as results come in	None	N	N	NA	
22	1	comment	How will this be determined? Through the sediment core samples?	text added: "(as determined from anthropogenic watershed loading estimates)"	None	Y	Y	text added: "(as determined from anthropogenic watershed loading estimates)"	7.2
22	1	text edit	strike "manipulations" insert "and/or". Insert "manipulations"	Edited as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
22		text edit	Figure 11 caption. Strike "was" insert "were". Strike "and"	Edited as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
23	1	text edit	several text edits	Edited as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
23	2	text edit	Insert "has the disadvantage" strike "the weakness"	Edited as suggested	None	Y	Y	Text edits incorporated as suggested	7.2

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23	2	comment	How would they assess this risk?? There would need to be a risk assessment framework developed and accepted for this. This section presents this like this “range of values” will appear by magic. Also, how will these risks be characterized? A risk assessment uses a HQ approach (exposure dose / reference dose) and also sets risk ranges based on no observed effect levels (similar to threshold effect levels) and lowest observed effect levels (similar to probable effect levels). Would the SP produce a risk assessment along these lines to present and interpret their findings? If so, you pretty much need a separate risk assessment workplan that will lay out how that will be done.	"Risk" in this sense applies not to the risk assessment framework but to the chances, or probability, of a given condition along with the margin of error. This is an important distinction to communicate across stakeholder groups that may have different uses of this vocabulary; thanks for alerting us to this.	None	Y	Y	"risk" changed to "probability"	7.2
23	3	text edit	strike "are" insert "is"	Edited as suggested	None	Y	Y	Text edits incorporated as suggested	7.2
23	4	comment	Would the SP also identify the “limiting conditions” that are biologically/chemically important for receptors/management goals? For example, if daily mean oxygen level is the limiting condition for an organism, seasonal and annual means would not be an effective way to protect that organism.	Good point - focusing on timescales relevant to the processes at hand and how they impact each individual S-R relationship will be crucial. Oxygen for instance has daily timescale criteria and longer timescales which will be utilized in analyses.	None	N	N	NA	
23	4	comment	Will the analysis also address climate change, where durations of certain factors (e.g., temperature) may be out of range compared to the existing data set, and statistical analysis would be needed to predict effects under forseen, but yet to be measured conditions.	To our knowledge, climate change scenarios have not been discussed as potential scenarios for mechanistic modeling. If there is consensus among the SC for such scenarios, that could be communicated to the SP.	None	N	N	NA	
24	1	comment	Another example of how these terms need to be better defined and more consistently used.	Removed (designated use) for clarity	None	Y	Y	Removed (designated use) for clarity	7.2