No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
1	Beutel	Pg 1, General	I found the Report somewhat difficult to follow and this made the review of the document a challenge. As described below, I had problems understanding some fundamental details of the TMDL development including how the load allocation was developed. In particular, there needs to be a clearer and more transparent presentation linking nutrient loading estimated under reference conditions with allowable nutrient loading to the lakes, which in turn drive load allocation.	The draft TMDL relied on estimates of natural background concentrations of total nitrogen (TN) and total phosphorus (TP) to estimate the amount of allowable nutrient loading in both lakes in the absence of any anthropogenic discharges. These values, in turn, were used to estimate the probable concentrations of chlorophyll-a, dissolved oxygen (DO) and total ammonia prior to significant human development in the watershed. The TMDL proposes three independent approaches by which to achieve compliance with the applicable narrative water quality standard: (1) demonstrate that the existing nutrient loads are no greater than the pre-anthropogenic target values, or (2) demonstrate that the existing nutrient concentrations are no greater than the pre-anthropogenic target values, or (3) demonstrate that the lakes are meeting the pre-anthropogenic target values for three key response variables (chlorophyll-*a* , DO and total ammonia). These response targets are expressed as a range of values and the associated exceedance probability under pre-development conditions in order to reflect the dynamic natural hydrology of the region.
2	Beutel	Pg 1, Sections ES, 1 & 2	1. I would like to highlight and support the TMDL's provision for adding highly treated recycled water from Elsinore Valley Municipal Water District to Lake Elsinore. This approach is both creative and sound practice. This water is an acknowledged source of nutrient and salt loading to the lake. But without this water we can conclusively say that Lake Elsinore would have dried out during the recent drought. A dry lake, obviously, has no potential to provide beneficial uses. I consider this a real success story in Southern California water resources management.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
3	Beutel	Pg 1, Sections ES, 1 & 2	2. I would like to highlight and support the TMDL's encouragement of implementing in-lake management strategies (e.g., alum treatment in Canyon Lake), in addition to traditional source control measures, as noted on page ES-5. This approach is both creative and sound practice. There is a growing body of evidence that in-lake measures to limit internal nutrient loading can be cost-competitive when compared to watershed best management practices.	Placeholder for Regional Board
4	Beutel	Pg 1, Section 2	3. The Technical Report presents an impressive water quality dataset from 2001-2016, which is a solid foundation and provides sound scientific knowledge on which to develop a revised TMDL. The fact that this data set is incorporated in the California Environmental Data Exchange Network is indicative of a good quality data set. I do have some minor comments on pages 2-33 to 2-36 (see comments 4, 5 and 6 below).	Comment noted.
5	Beutel	Pg 2, Section 2	Note water clarity is not measured in 1-m intervals (bottom of page 2-33).	The peer reviewer is correct. Correction noted in errata.
6	Beutel	Pg 2, Section 2	Regarding the reliance on the single station LEE2, and how representative it is of the lake, at the top of page 2-34 the Report should more explicitly show that LEE2 is representative of water quality in the lake as a whole (e.g., R^2 of liner regression of concentration collected at same time at LEE2 vs LEE1 and LEE2 vs LEE3).	A thorough review of past monitoring data indicates that there generally appears to be a strong correlation for individual water quality measures between all three TMDL monitoring stations in Lake Elsinore, although there are a few occasional departures . We have included examples for TN and TP for data collected at each location between 2006 and 2011 (see addendum, Figures 6-1 through 6-4) and DO using the last 5 years of monitoring data, (see addendum, Figures 6-5 and 6-6). Correlations between stations for TN, TP and DO all demonstrate statistically significant relationships ($p < 0.0001$). The Regional Board will consider this comment when the monitoring program and Quality Assurance Project Plan (QAPP) are revised after the TMDL becomes effective.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
7	Beutel	Pg 2, Section 2	Near the bottom of page 2-35 and/or on the top of page 2-36, the Report should clarify that TP in many cases is measuring phytoplankton biomass. Some forget when we measure TP in the water column of a eutrophic lake, much of what we are measuring is P in algal biomass. Highlight the connection between organic matter and total N in the organic N discussion too on page 2-37. - Not sure what is meant by “two” in “trends between the two are tightly coupled” – TP and organic form? Maybe here you mean TP and organic matter (i.e., algal biomass)?	Comment noted, thank you. Errata includes two items: (a) noted that TP measurements include algal biomass; and (b) revised text to clarify what was meant by the word "two" in the noted sentence.
8	Beutel	Pg 2, Section 2	4. On page 2-38, the current Report oversells the usefulness of average water column TN:TP ratios in informing specific control measures. The cited USEPA 1999 document notes that this approach is a “first cut” and “a qualitative assessment.” More study would be needed (e.g., seasonal nutrient limitation assays) if a recommendation was to be made to focus specifically on P or N control. That said, in the context of Lake Elsinore and Canyon Lake, the focus on controlling both P and N is based upon sound scientific knowledge. Qualitatively, Lake Elsinore exhibits a wide range of TN:TP ratios, and water column TP is a poor predictor of Chl A in the lake (page 2-42), undermining the conventional paradigm of P limitation in freshwaters. Experts in cyanobacterial ecology advocate for dual management of P and N (e.g., Paerl et al. 2016, It takes two to tango: When and where dual nutrient (N & P) reductions are needed to protect lakes and downstream ecosystems, Environmental Science & Technology 50; Paerl et al. 2011, Controlling harmful cyanobacterial blooms in a hyper-eutrophic lake: the need for a dual nutrient (N & P) management strategy, Water Research 45). And co-limitation in lakes by both P	Reference to the TN:TP ratio does highlight the variable nature and thus need to evaluate both N and P. We are aware of Paerl's paper on dual nutrient control and this led to the decision to require compliance demonstrations with single nutrient control to also show response target compliance after five years (see Pages 9-6, 9-7, and 9-9). It was noted that another Peer Reviewer stated that a single nutrient control strategy to shift lakes to P limitation is technically supportable (see Lewis Comment #94); Also see findings from Schindler et al. 2016 (Schindler, D.W., S.R. Carpenter, S.C. Chapra, R.E. Hecky and D.M. Orihel. 2016. Reducing Phosphorus to Curb Lake Eutrophication is a Success. Environmental Science & Technology 50: 8923-8929) that favors P only control and shows

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
			and N is more common that many recognize (e.g., Wurtsbaugh et al. 2019, Nutrients, eutrophication and harmful algal blooms along the freshwater to marine continuum. Wiley Interdisciplinary Reviews: Water 6). Management of both P and N is the right path forward for Lake Elsinore and Canyon Lake. To confirm the benefits of reducing P and N in the context of Lake Elsinore and Canyon Lake, future scientific studies should include nutrient limitation assays, both conventional nutrient addition assays and biodilution assays that assess algal response to lower P and/or N (see Paerl and Bowles 1987, Dilution bioassays: Their application to assessments of nutrient limitation. Hydrobiologia, 146).	how N control can favor competition toward nitrogen fixing cyanobacteria. The requirement to meet response targets will necessitate dual nutrient control in an adaptive implementation approach if a single nutrient control strategy is not sufficient.
9	Beutel	Pg 2, Section 2	5. In the first sentence on page 2-39, note that ammonification occurs under both anoxic AND oxic conditions. But ammonia does tend to accumulate under anoxic conditions, since a lack of oxygen inhibits nitrification, which in turn can stimulate denitrification and loss of N from aquatic ecosystems. This issue arises again in the last bullet on page 3-3 which incorrectly links ammonification to only anaerobic decomposition. And again at the bottom of 4-30 where the report states that anoxic conditions increase rates of diagenesis. Anoxia stimulates ammonia accumulation and release, but not necessarily diagenesis.	Thank your for the comment. The errata provides appropriate text revisions on pages 2-39, 3-3 and 4-30.
10	Beutel	Pg 2, Section 2	6. I would like to highlight and support the Technical Report's discussion of biomanipulation as an important in-lake management strategy to improve water quality in Lake Elsinore. This approach is recognized as a sound and relatively low-cost management practice, especially in the recovery of shallow lakes. Continued focus on this issue is particularly important with the Report on page 2-46 that >95% of fish assessed in April 2015 were small (< 3.5 cm). These small fish likely exert intense predation pressure on large-bodied cladocerans (e.g. daphnia), thereby alleviating predation pressure on phytoplankton. Discussion at bottom of page 2-70 is good.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
11	Beutel	Pg 3, Section 2	7. On the bullet at the end of page 2-48, the toxin microcystin and the algal species Microcystis appear to be conflated. Text alludes to a "dominant cyanobacteria" while figure 2-29 shows toxin concentration.	Thank your for the comment. The errata provides edited text on page 2-48.
12	Beutel	Pg 3, Section 2	8. On third paragraph on page 2-56 the Report states, "As in Lake Elsinore, a majority of the phosphorus in the water column in Canyon Lake exists in soluble reactive form (Ortho-P)." The Lake Elsinore section states that in Lake Elsinore TP is mostly in the organic form.	The Peer Reviewer is correct. Most of the phosphorus in Canyon Lake is in the soluble reactive form, however Lake Elsinore exhibits the opposite pattern. For example, during the last year of monitoring the data show that Ortho-P comprised approximately 25-50% of the TP concentrations in Lake Elsinore (see addendum, Figure 12-1). Results for TP and Ortho-P in Canyon Lake are described further in response to Comment #87. The reason for the different TP/Ortho-P responses observed in the two lakes is likely attributed to the generally much greater concentrations of algae in Lake Elsinore as compared to Canyon Lake (also see responses to Comments #6 and #7). The errata provides the necessary revisions to the text on page 2-56.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
13	Beutel	Pg 3, Section 2	9. My most significant critique of this section is the use of depth-integrated nutrient data in evaluating and presenting water quality in Canyon Lake. While this may be required for the TMDL framework, it seems like an awkward fit to me, and not the soundest of approaches. Clearly, the main basin of Canyon Lake thermally stratifies and exhibits hypolimnetic anoxia, which in turn promotes sediment release of ammonia, phosphate, iron and manganese. Indeed, manganese accumulation in bottom waters affects the ability of Canyon Lake Water Treatment Plant to treat raw water (page 2-53). I am not convinced, without a clearer presentation of the data, of the validity of the following comment on page 2-65: "A review of historic data indicates that stratification of nutrients is generally limited overall in Canyon Lake, though trends are apparent occasionally." Based on my experience, summertime bottom water samples near the dam likely accumulate significant amounts of ammonia and manganese, and potentially iron and sulfide. These water also historically likely accumulated phosphate – that is why alum treatment was implemented. See model results in Fig. 5-28 and 5-29. Some presentation of the seasonal and spatial patterns of nutrients is merited. Even if this is not required in the context of the TMDL, this information is needed to inform in-lake management strategies aimed at controlling internal nutrient loading in Canyon Lake.	Thank you for the comment. Discrete samples were collected above and below the thermocline in Canyon Lake between June 2006 and June 2008 (see addendum, Figures 13-1 - 13-2 and Table 13-1). Regarding the need for additional presentation of nutrient data, early in the implementation of the revised TMDLs stakeholders will need to revise existing watershed implementation plans that include consideration of in-lake management strategies (see Section 7 of the TMDL Technical Report). To that end, any additional data collection or analysis needed to support those revisions may be considered at that time.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
14	Beutel	Pg 3, Section 2	10. I disagree with the comment at the bottom of page 2-59 that limiting N availability in situ is more difficult compared to limiting P availability. Bottom water oxygenation, using pure oxygen rather than air, has the potential to limit ammonia accumulation in bottom water with modest infrastructure (e.g., Beutel, 2006. *Inhibition of ammonia release from anoxic profundal sediments in lakes using hypolimnetic oxygenation* . Ecological Engineering 28). Oxygenation is also extremely effective at inhibiting manganese accumulation in bottom waters and would be a good fit with Canyon Lake, synergizing with current *in situ* P control efforts via alum addition. In my opinion, oxygenation should be a priority for implementation in Canyon Lake, since it will have the multiple benefits of reducing internal loading of N, P and manganese, while improving pelagic habitat for fish and zooplankton.	Comment noted. The TMDL implementation plan requires the stakeholders responsible for compliance with the TMDL to identify supplemental projects, where needed, to meet the wasteload allocations (WLAs) and load allocations (LAs). Oxygenation in Canyon Lake was included in Table 7-10 as a potential supplemental project for consideration during the Phase 2 Program of Implementation.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
15	Beutel		11. The statement on page 2-63, "This stratification of DO is a natural condition for most lakes" is not correct. This is typically a HUMAN INDUCED condition in EUTROPHIC lakes.	We agree that DO loss in the hypolimnion is often associated with anthropogenic eutrophication; however, it may occur under non-eutrophic conditions as well. Oxygen can enter a lake via three different routes: atmospheric diffusion (oxygen in the air is absorbed by surface water due to a difference in oxygen concentrations), photosynthesis by aquatic plants/algae, and rivers/streams bringing oxygenated water into the lake. In stratified lakes, the hypolimnion receives minimal oxygen from atmospheric diffusion or photosynthesis. Locally, riverine input is limited due to the intermittent nature of the San Jacinto River. Thus, the hypolimnion typically receives minimal DO during summer thermal stratification; the only DO is that acquired during lake overturn. This finite oxygen supply is gradually used by bacteria to decompose the dead organic matter that comes down into the hypolimnion from the epilimnion. Ultimately, the DO in the hypolimnion is gradually exhausted. The greater the organic matter supply in the epilimnion and the smaller the hypolimnion, the more rapidly the oxygen is depleted. While the majority of oligotrophic lakes may exhibit less hypoxia in the hypolimnion than eutrophic lakes, oligotrophic lakes can experience low DO in the hypolimnion (< 4.0 mg/L) during stratification. Regionally, due to very warm conditions and duration of stratification, anoxic conditions can develop in lakes with low productivity. For example, nearby Lake Mathews, an oligo-mesotrophic lake with TP concentration of 0.01 mg/L and chlorophyll-a concentrations of 0.3-0.9 µg/L, develops an anoxic hypolimnion by mid-late summer (Beutel, M.W, A.J. Horne, W.D. Taylor, R.F. Losee and R.D. Whitney. 2008. *Effects of oxygen and nitrate on nutrient release from profundal sediments of a large, oligo-mesotrophic reservoir, Lake Mathews, California.* Lake Reservoir Management. 24:18-29).

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
16	Beutel	Pg 3, Section 2	12. The conceptual model for Canyon Lake presented on page 2-36, in which nutrients released from anoxic sediment build up in bottom waters until they are finally mixed into surface waters at fall overturn, seems off the mark to me for this relatively small and not especially deep reservoir. In much of the reservoir, modest depths will result in both anoxia induced sediment release of nutrients and mixing of these nutrients in to surface waters during wind-induced partial mixing events. This in part may explain the Report comment discussed in comment 9. The Osgood index (mean depth in meters divided by square root of area in km^2) is a measure of a lake's tendency to mix during the summer. Values below 6 indicate weak thermal stratification while values above 8 indicate strong thermal stratification. The value for Canyon Lake is ~4 (5.34 m/sqrt 2.02 km). Thus the lake, while it thermally stratifies, is also susceptible to partial mixing and internal nutrient loading. This is an additional argument to continue alum treatment and implement hypolimnetic oxygenation in Canyon Lake.	We agree that the shallower East Bay and embayment north of the causeway can more readily mix, thus allowing nutrients released from bottom sediments to be introduced into the upper water column, but monitoring demonstrates that accumulation of phosphate, ammonia, sulfide and other reduced substances in the hypolimnion is important for the main body of Canyon Lake. As noted in the response to Comment #14 the stakeholders responsible for compliance with the TMDL will need to evaluate the need for supplemental projects to meet the WLAs and LAs. Oxygenation in Canyon Lake is already noted as a potential supplemental project (see Table 7-10) and the need for continued alum treatments (timing, frequency and extent) will also be considered (see Tables 7-10 and 7-12).
17	Beutel	Pg 4, Section 2	13. While drought may indeed be irritated by fluctuating water delivery to Lake Elsinore, I think you mean exacerbate rather than exasperate in second to last paragraph in page 2-71.	Comment noted. The errata provides the revised text.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
18	Beutel	Pg 4, Section 2	14. I want to make a final comment in support of the ammonia analysis in the Technical Report. My initial concern with the unionized ammonia (UIA) assessment was the fact that in the highly productive waters of Canyon Lake, and particularly Lake Elsinore, there are diel swings in pH, with pH likely peaking in early afternoon with the onset of peak photosynthetic activity. While the Report acknowledges that temporal patterns of pH can drive ammonia toxicity, this issue was not explicitly addressed in the calculation of UIA concentrations, which do not systematically include all "worst case" conditions of afternoon high pH conditions. But the findings that UIA concentrations based on integrated water concentrations from the existing data are relatively low, and the observation that fish kills have not generally been associated with ammonia toxicity (page 2-70), support the general conclusion that ammonia toxicity is not a significant concern at Canyon Lake or Lake Elsinore. In this context, the current approach of using integrated water concentrations from the existing data set is practical and sound.	Placeholder for Regional Board
19	Beutel	Pg 4, Section 3	General per Section - The general approach used in this section to develop and use cumulative distribution frequencies developed on modeled watershed reference conditions, including concentration-based CDFs [Cumulative Distribution Function] for chlorophyll a and ammonia, and spatial-based CDFs for dissolved oxygen, as a "numerical target" is creative, appropriate and scientifically sound. The use of reference CDFs are a scientifically sound tool to assess future lake water quality conditions and attainment of the revised TMDL. But I do have some concerns related to the development of the presented CDFs as described below.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
20	Beutel	Pg 4, Section 3	1. I do not understand the rationale for using chlorophyll a concentrations in the upper 1 meter of the water column as noted on page 3-4. The Report seems to argue that since light does not penetrate much deeper than 1 meter into hypereutrophic waters, that algae must be in the upper 1 meter. Vertical mixing and algal buoyance, not light penetration, control algal distribution in the water column. In addition, I doubt the modeling effort, while one-dimensional in nature, accurately models algal content in the upper 1 meter, which in reality will be dynamic in space and time. For example, algae may be distributed throughout the water column during windy afternoon conditions but be concentrated in upper waters during calm morning conditions. The 1-meter focus seems like a mismatch with both sampling and modeling efforts. A more appropriate approach for the chlorophyll a CDF is to use a water column average.	The TMDL Technical Report states: "The TMDL numeric target for algae is for the average chlorophyll-*a* concentration within the top 1-m of the water column. Below 1-m, light penetration is often inhibited by algal and inorganic turbidity." Under the current monitoring program chlorophyll-*a* concentration is measured as a depth-integrated composite of the entire water column for compliance, and a top 2-m "surface" composite for comparison to the satellite derived estimated concentration. The proposed 1-m sample under the revised TMDL was to obtain better correspondence with satellite imagery. Review of historical data for Lake Elsinore from the past 3 seasons of sampling (when both sample types were collected) shows mixed results with both surface (i.e., top 2-m) and depth-integrated samples exhibiting higher chlorophyll-*a* concentrations, and no seasonal pattern. There does however appear to be a slight divergence of surface and depth-integrated chlorophyll-*a* concentrations in Canyon Lake (Main Lake) that may be tied to the lake's stratification cycle, with winter months typically exhibiting higher chlorophyll-*a* concentrations in surface waters, and at-depth waters exhibiting higher chlorophyll-*a* concentrations during late spring and summer months (see addendum, Figure 20-1).
21	Beutel	Pg 4, Section 3	2. In section 3.1.3, do high manganese concentrations associated with hypolimnetic anoxia in Canyon Lake also impair the MUN beneficial use designation?	The MUN beneficial use is not impaired in Canyon Lake because of elevated Mn concentrations. However, the accumulation of Mn^{2+}, Fe^{2+} and HS^{-} in bottom waters of the main lake does alter Elsinore Valley Municipal Water District's (EVMWD) withdrawals from Canyon Lake. The intake is typically located above the thermocline to minimize these constituents; however, the treatment plant is taken off-line when Mn concentrations exceed 0.45 mg/L.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
22	Beutel	Pg 4, Section 3	3. Regarding the reference conditions, I agree that the full area of Lake Elsinore should be used, but I do not necessarily agree that the existence of Canyon Lake should also be included. How can one assess the ecological quality of the original Lake Elsinore ecosystem when including Canyon Lake upstream? Canyon Lake is a significant sink for nutrients and water that significantly alters nutrient loading to Lake Elsinore. While I understand that "reference" is a relative term, I do not really understand the relevance of proposed reference conditions (original Lake Elsinore but with upstream Canyon Lake) used to develop the CDFs.	Canyon Lake is a man-made reservoir that does, in fact, alter the nutrient loading to Lake Elsinore. However, it is also a permanent feature of the watershed that must be considered in order to determine the Highest Attainable Condition for water quality in both lakes. Artificially deleting Railroad Canyon Dam from the simulation model would produce unrealistically high estimates of nutrient loads to Lake Elsinore that would seriously bias the resulting water quality analysis. Moreover, now that the dam exists, Canyon Lake has been designated as a Water of the U.S. in the Basin Plan. As such, its beneficial uses are entitled to the same protection as those found in Lake Elsinore. The only way to establish appropriate water quality response targets for Canyon Lake, under natural reference conditions, is to run the simulation model based on the assumption that Railroad Canyon Dam was present prior to human colonization of the watershed.
23	Beutel	Pg 5, Section 3	4. The water quality data set summarized on page 3-17 needs to be more comprehensively presented, as is done for stormwater monitoring in Table 4-6. While median concentrations are presented for TP and TN, no reference to the USFS report is provided.	The calculation of the median values is based on the nutrient dataset stored in the State's California Environmental Data Exchange Network (CEDEN). The errata includes a note as to the location of the data source.
24	Beutel	Pg 5, Section 3	5. I am particularly confused as to how internal nutrient loading was incorporated into the development of the CDFs. Following sections include discussion about the importance of internal nutrient loading, yet it is not explicitly explained in this section if and how "reference" internal nutrient loading was addressed. If it was not included as a nutrient input in the context of the modeling effort, CDFs are likely underestimating the frequency of impaired water quality.	Internal loads estimated for a reference watershed condition are part of the model development and described in more detail in the Linkage Analysis chapter. A scenario was developed to create TMDL numeric targets based on daily model results from the lake water quality model with inputs and parameters for all sources (both external inflows and indirectly related internal loads) representative of conditions estimated for a reference watershed condition.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
25	Beutel	Pg 5, Section 4	General per Section - The source assessment presented in the Technical Report was comprehensive and was generally scientifically justifiable. The assessment of internal nutrient loading in both Lake Elsinore and Canyon Lake was also well done. The presented measured versus modeled mass balances for annual average flow (Fig. 4-13) and average annual nutrient loading (Fig. 4-19) reinforce the adequacy of the source assessment. That said, I highlight some concerns below.	Placeholder for Regional Board
26	Beutel	Pg 5, Section 4	The reader would benefit from more interpretation of Fig. 4-22, which currently is hard to understand. The scenarios labeled “reference,” “current, no controls”, and “current, with controls” need to be defined in the text. I presume the “current, no controls” is modeling release from the original lake bed? What is meant by “rough approximation” with regards to the reference. Presumably this reference level of internal nutrient loading needs to be included in the reference water quality model (see comment 5 above for Section 3). If it is part of the development of CDFs key to the assessment of future water quality conditions, it needs to be more than a rough approximation. As you read further, this issue is discussed on page 4-36. I guess the bottom line here is current internal loading rates were discounted by half in both Lake Elsinore and Canyon Lake, though internal load values presented in Table 4-12 did not seem to reflect this 50% decrease for TN, perhaps because of averaging of mass loading over a long-term series. The presentation of internal loading in this section, while encapsulating sound science, was hard to follow.	"Reference" refers to the reference watershed condition; current refers to current conditions with and without controls, i.e. with or without in-lake BMPs (Text states: "The difference between the 'current, no controls' and 'current, with controls' results provides an approximation of the load reduction achieved with implementation of in-lake BMPs, e.g., LEAMS, supplemental water addition). Reviewer is also referred to Table 7-8 and supporting text that further describes the three scenarios. The nutrient load for the reference scenario did involve a 50 percent reduction in flux rates as mass per m^2 of wetted bottom area. Since, the reference condition involved different bathymetry (pre-LEMP), there was a greater wetted surface and thereby total flux to the water column was not proportional to the per flux rates per m^2. Also at play in this long-term annual average loading from sediment nutrient flux is the different water levels when comparing the scenarios without recycled water additions (reference and current, no controls) to the one with recycled water addition (current, with controls). The errata includes revised language regarding concerns with the term "rough approximation. Sentence revised to: "The nutrient flux for the reference watershed condition is an approximation that was developed based on the multiple lines of evidence presented below."

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
27	Beutel		2. I am having trouble understanding, based on information previously presented in the Report, the nutrient load values presented in Table 4-14. This key summary table should be easy to interpret and transparent in how the values were developed. Atmospheric deposition and supplemental water are easy enough to assess and for the most part match data earlier presented. But values for watershed runoff and internal loading do not match values presented earlier in Table 4-9 (watershed nutrient loading) and Table 4-12 (internal nutrient loading). On a more fundamental level, this analysis has me confused because I am not seeing here, or in following sections, an explicit comparison between current nutrient loading (Table 4-14) and modeled reference nutrient loading. What am I missing here? How can the implication of a load allocation when the difference between current nutrient loading and modeled reference loading is not clearly defined?	Table 4-9 shows the runoff nutrient load arriving at the inflows of each lake segment, while Table 4-14 shows the runoff nutrient load that is retained within each lake segment. In other words, the Canyon Lake loads are divided between those that are retained in Canyon Lake and those that overflow to Lake Elsinore in Table 4-14. Errata includes revisions to these tables. See response to Comment 29 for basis of updated tables.
28	Beutel	Pg 6, Section 5	In general, I agree that the approach to developing the load allocations presented in Section 6 is scientifically defensible and provides a reasonable and justifiable method for controlling nutrient loading to Lake Elsinore and Canyon Lake. I only wish the Report was clearer in its presentation of how the ultimate load allocations were developed relative to reference conditions.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
29	Beutel	Pg 6, Section 5	1. While reference conditions were modeled as described in Section 5.4.6, I do not see an explicit description of the annual average nutrient loading for the reference conditions comparable to Table 4-14 which summarizes nutrient loads under current conditions. As a result, I am having trouble digesting the waste load allocation section. I guess these values are at the bottom of Table 6-2. Presumably, the load allocations from Table 6-3 plus the required load reductions from Table 6-3 equals the total current nutrient loading to the lakes, taking into account other nutrient sources including supplemental water, internal loading and deposition. The sum of these values roughly match the values for "Watershed Runoff" in Table 4-14. Greater transparency and a clearer discussion of how the numerical values presented in Tables 6-2 and 6-3 were developed would be helpful.	Table 4-12 provides a summary of reference loads for internal sediment flux. Note: Errata corrects the modeled loads for sediment nutrient flux under current conditions without controls in Table 4-14. The revisions were required because values in Table 4-14 were based on post-processing of lake model results that applied zero values to years with a dry lakebed. In contrast, values in Table 4-12 do not include zeros for dry lakebed years in averaging. With the correction, results in Tables 4-12 and 4-14 are now consistent. Regarding tables in Section 6, the reference watershed loads are equal to the allocations in Table 6-2. The Peer Reviewer is correct in finding that the sum of the values in Tables 6-2 and 6-3 is intended to equal the existing watershed load (Note: Errata includes revisions to Table 4-9 and Table 4-14 for watershed runoff. The revisions correct numbers that were obtained from an outdated watershed model run. The changes make existing load for watershed runoff in the source assessment consistent with the values used for estimation of load reductions needed to reduce existing load to the allocations (Tables 6-2 and 6-3) and used to run lake models for creation of numeric target CDFs. The revised table numbers do not affect the allocations, load reductions or number target CDFs provided in the TMDL Technical Report.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
30	Beutel	Pg 6, Section 5	2. Because of the unclear presentation of nutrient loading for reference watershed conditions, I do not understand how nutrient loading from supplemental water addition, internal loads and deposition fit into the overall reference versus existing conditions for annual mass loading. Presumably, the total of loads presented in Table 6-7 should equal the load for the reference condition. The Report needs to better link values in Table 6-7 back to reference conditions. The Report should present a parallel table to Table 6-7, using the same categories while presenting the loading for the reference conditions. The total nutrient loading in both tables being the same, since nutrient loading in reference conditions should equal allowable nutrient loading.	Values in Table 6-7 for allocation for watershed runoff are equal to the sums at bottom of Table 6-2. In the errata, a footnote has been added to Table 6-7 indicating that the reported loads are reflective of the reference watershed condition. Values in Table 6-7 for sediment nutrient flux are equal to the values reported for the reference modeling scenario in Table 4-12.
31	Beutel	Pg 6, Sections 6, 7 & 8	General per Sections - I agree that the implementation and monitoring requirements in the revised TMDL provide a reasonable, practicable and feasible plan to, over the long term, facilitate and assess the return of Lake Elsinore and Canyon Lake to reference conditions. I find the list of studies, planning efforts and implemented projects quite impressive. Modeling results for chlorophyll a CDFs under reference versus control and non-control scenarios (Fig. 7-7) suggest that efforts to data have improved water quality. The phased implementation plan and associated 15-20 year implementation period outlined in Table 7-11 is well thought out and reasonable, especially when considering the time scale involved with implementing watershed BMPs and the response time of shallow lake ecosystems to decreases in external loading. Some comments related to implementation and monitoring are included below.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
32	Beutel	Pg 6, Section 7	1. Presentation of CDFs in Figure 7-7 and associated Table 7-8 were quite effective, in contrast to some of the earlier sections of the Report. Modeled results are promising and paint a picture of near attainment of the TMDL. But I think these modeling results could use a reality check with actual data. What do CDFs look like based on actual monitoring data. What do recent versus past years look like? Let's not paint an overly optimistic picture of current water quality conditions in Lake Elsinore, unless real-world data is confirming that picture.	Model results in Figure 7-7 represent expected water quality over a 100-year period of implementation of water quality controls at current levels. In contrast, there is only a brief window of time where actual water quality data have been collected since project implementation. Per the comment, limited water quality data was reviewed to get an initial look at water quality conditions at current levels of implementation of water quality controls. CDFs were created to examine potential shifts in trends between long-term and recent monitoring results (see addendum, Figure 32-1). It appears that the depth-integrated chlorophyll-*a* concentrations have decreased in the last two years of monitoring, compared to the historic concentrations. One explanation for this may simply be the above-average precipitation that the region experienced during the 2016-17 and 2018-19 wet weather seasons. On the other hand, DO (as a water-column average) appears to have remained consistent between long-term and recent monitoring results. Both data sets have an average DO value of 6.4 mg/L, while the median value from 2017-2019 monitoring (5.5 mg/L) is slightly lower than 2006-2019 monitoring (6.3 mg/L). Going forward, this type of analysis can be performed on a routine basis as a measure of progress being made towards achieving attainment of the TMDL.
33	Beutel	Pg 6, Section 7	2. Regarding implementation projects and studies, I have the following recommendations: (1) I am surprised that the use of natural treatment systems such as vegetated surface-flow treatment wetlands has not been considered to sustainably remove P and N from EVMWD recycled water before input to Lake Elsinore. As one of the more well-defined and continuous point sources to the lake, treatment of this inflow should be a priority, especially if there are long-term plans to increase recycled water inflow rate.	Comment noted. The TMDL implementation plan requires the stakeholders responsible for compliance with the TMDL to identify supplemental projects, where needed, to meet the WLAs and LAs. Natural treatment systems may be considered during the evaluation of supplemental projects.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
34	Beutel	Pg 7, Section 7	2. Regarding implementation projects and studies, I have the following recommendations: (2) Oxygenation of Canyon Lake should also be a high priority as it would synergize with alum to further lower internal loading of P, while also lowering N internal loading and help meet MUNI beneficial uses by lowering manganese concentrations and lessening fall algal blooms.	Comment noted. The TMDL implementation plan requires the stakeholders responsible for compliance with the TMDL to identify supplemental projects, where needed, to meet the WLAs and LAs. Oxygenation in Canyon Lake was included in Table 7-10 as a potential supplemental project for consideration during the Phase 2 Program of Implementation.
35	Beutel	Pg 7, Section 7	2. Regarding implementation projects and studies, I have the following recommendations: 3) A significant focus should be put into fisheries management. The small paragraph on page 7-42 was not too inspiring. As noted earlier, recent studies have shown that most of the biomass in the lake is small fish that predate on zooplankton. Without some decreases in the number of small fish, zooplankton grazing pressure will be unacceptably low.	Comment noted. The TMDL implementation plan requires the stakeholders responsible for compliance with the TMDL to evaluate the continued implementation of existing projects and identify supplemental projects, where needed, to meet the WLAs and LAs. Fishery management, which has been previously used to support efforts to improve water quality in the lake, will continue to be evaluated as a potential tool to improve lake water quality. Notably, a fishery management study is currently underway to support future fish management decisions.
36	Beutel	Pg 7, Section 7	2. Regarding implementation projects and studies, I have the following recommendations: (4) Coupled with (2) I recommend a nutrient limitation study, as discussed earlier, to better understand what role N and P play in controlling algal productivity. Results will likely confirm that a focus on both P and N for both Lake Elsinore and Canyon Lake is warranted.	As noted in Table 7-12, the stakeholders responsible for implementation of the TMDL will consider implementation of special studies to gather data necessary to support TMDL compliance activities. The Peer Reviewer's study recommendation may be considered for implementation by the responsible entities.
37	Beutel	Pg 7, Section 7	2. Regarding implementation projects and studies, I have the following recommendations: (5) Coupled with (3) I recommend a mesocosm study to assess how removal of small fish from the waters of Lake Elsinore affect zooplankton grazing pressure on algae and subsequent water clarity and chlorophyll a concentration. This could be an important step in showing lakes managers the important connection between high small fish biomass and high algal biomass.	See response to Comment #36.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
38	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (1) The enhancements to stormwater monitoring are good. Additional sites and lower storm mobilization criteria are appropriate. Detailing pollutant inputs from the watershed is fundamental to the TMDL process and should be thought of as a key investment in the long-term management of Lake Elsinore and Canyon Lake.	Placeholder for Regional Board
39	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (2) At both Lake Elsinore and Canyon Lake, I strongly recommend monthly sampling. The cost of monitoring is minor compared to the financial investments, past and future, made to improve water quality. Yet the benefit is substantial in that monitoring data dictate more costly management projects. The more money spent on monitoring, the more informed and strategic will be the expenditures on management.	Monthly monitoring, including twice monthly monitoring in summer months, is currently being conducted at Lake Elsinore through 2021. The Regional Board will consider this comment when the monitoring program and QAPP are revised after the TMDL becomes effective.
40	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (3) In-lake water quality sonde measurements must include pH to assess potential for ammonia toxicity. While this was clear for Canyon Lake, it was not a clear for Lake Elsinore. Confirm pH will be measured in Lake Elsinore as part of sonde deployment, especially considering that diurnal monitoring will be discontinued.	The LESJWA sondes include measurement of pH.
41	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (4) At least once per year in the summer, all three stations at Lake Elsinore should be monitored for water quality to continue to build the data base confirming that LEE2 is representative of the entire lake.	Thank your for the comment. The Regional Board will consider this comment when the monitoring program and QAPP are revised after the TMDL becomes effective.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
42	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (5) The focus on using satellite remote sensing to assess chlorophyll a in surface waters in both lakes is a very good idea, and can yield meaningful data that can inform management at low cost. Coupled with this, every effort should be made by field staff to collect water samples at nearly the exact time that target satellites are overhead. Only by coupling remote sensing data with lake water quality, will you be able to make meaningful use of remote sensing data. Note since water quantity is patchy and changes with time and space, especially in Lake Elsinore, it is not enough to collect samples around the time the satellite is overhead (e.g. same day, or day before). Sampling time relative to satellite Passover is critical.	Placeholder for Regional Board
43	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (6) I am surprised to not see pathogens as part of the monitoring plan. Please confirm this is not a needed part of this monitoring program.	The surveillance and monitoring program established to support TMDL implementation is focused on the constituents associated with the TMDL. Pathogen monitoring in Canyon Lake and Lake Elsinore is addressed by other area monitoring programs.
44	Beutel	Pg 7, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (7) While integrated water column sampling for water quality (e.g., nutrients) is appropriate for Lake Elsinore and the shallower arms of Canyon Lake, it is not for the deeper station in Canyon Lake (CL07). Perhaps integrated samples are needed at this station from the perspective of how the TMDL is developed and assessed. But in addition, discrete water samples should be collected during thermal stratification at this deep-water station. This data is critical to assess trends in internal loading in the lake. At the minimum, I recommend sampling 4 samples down the water column (surface, thermocline, upper hypolimnion, lower hypolimnion) bi-monthly during the spring/summer (May, July, September).	Commented noted, see response to Comment #13.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
45	Beutel	Pg 8, Section 8	3. Regarding monitoring, I have the following comments and recommendations: (8) Regarding climate change, one tricky issue not addressed in the report is that in a warming climate, past environmental conditions do not predict future environmental conditions. In the context of this TMDL, the CDF numeric targets were developed on a model using past flow and water quality data. Yet, moving forward we will be managing Lake Elsinore and Canyon Lake in a warming climate, one that is generally acknowledged to favor cyanobacteria in nutrient rich and shallow lake ecosystems. Are we fated with comparing future environmental conditions to unrealistically stringent past conditions when it comes to managing water quality in shallow eutrophic lakes like Lake Elsinore?	The TMDL Technical Report does address the issue of climate change (e.g., see Section 7.1.4). The simulation model considers a wide-range of hydrologic conditions that have occurred historically, including prolonged droughts punctuated by periods of unusually high rainfall. These wet/dry extremes capture the full range of possible outcomes in the watershed - from a completely dry Lake Elsinore lakebed to Lake Elsinore overflowing into Temescal Canyon. While it is difficult to predict which specific weather pattern will prevail in the future, experts testifying before the State Water Board indicate that climate change are expected to produce longer and more frequent droughts along with greater variability in the frequency and magnitude of extreme wet years. If this turns out to be true, then this would likely make the San Jacinto watershed's hydrology even more asymmetric than it already is. Regardless, a key principle of the TMDL's program of implementation is to implement a wet-lake strategy in Lake Elsinore. That is, when stakeholders are developing projects to support TMDL compliance the focus should be on getting water to Lake Elsinore - regardless of whether expected changes in the climate occur. Finally, It is important to note that the high-resolution modeling approach used in the revised TMDL does a much better job of assessing natural climatological variability than the existing TMDL (2004), which relied on just three archetypical years, and a simplified weighting scale, to represent wet, dry and medium precipitation conditions.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
46	Brookshire	Pg 1, General	This is detailed and comprehensive technical revision to the Lake Elsinore and Canyon Lake TMDL. The team has executed and compiled an impressive array of different field measures and modeling efforts. The unusual hydrologic setting, historic and current surrounding land use practices and layers of historical and current direct management of hydrology and nutrient dynamics make this a highly complex and difficult system to project future states and manage for them. While lake Elsinore represents southern California's largest "natural" lake, Canyon Lake is a constructed reservoir. The authors make abundantly clear that Lake Elsinore was subject to wildly fluctuating water levels and was naturally prone to eutrophication prior to extensive watershed modification. This observation is key to their subsequent findings and management recommendations. It is clear that the historical management scenarios and the current TMDL revisions are designed to achieve and sustain water quality, hydro-ecological and biogeochemical features that are totally artificial, engineered and without natural analog for the watershed. Given that Lake Elsinore has no natural outflows and nutrient exports, the revised TMDL are obviously motivated by recreation, agricultural water, esthetics and local quality of life rather than downstream ecosystem consequences. This makes it somewhat challenging to assess the new approach of using reference watershed conditions given the near complete artificiality of the ecosystem and its introduced non-native fish fauna. My sense is that this team has put together an overall very solid and well-researched report. The report does however raise some fundamental general and specific issues that will be detailed below in response to the Conclusions.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
47	Brookshire	Pg 1, General	The choice of reference watershed values and their implementation in CDFs (rather than a single value) is somewhat confusing and seems inconsistent. Further the nutrient concentrations values from the Cranston guard station are outstandingly high for naturally vegetated ecosystems I am familiar with and compared to those form other natural watersheds in Southern California (references below).	Expressing response targets for the natural reference condition as dynamic values based on a CDF is more complex and difficult to implement than specifying only a single not-to-exceed value. However, the latter approach is not well-suited due to the highly variable hydrology and resulting asymmetric nutrient loading associated with the San Jacinto watershed. Moreover, a single high value would not adequately protect water quality in the lakes and using a single value from the middle of the range would impose compliance burdens that could not be consistently attained even under natural reference conditions when there were no anthropogenic discharges to the lake. The Highest Attainable Condition is not one number but, rather, a range of values that varies with the natural hydrology of the watershed. The goal of the TMDL is to maintain the best water quality that is achievable given this natural variability. Regarding the natural background nutrient levels, the Cranston Guard Station values are supported by findings from other sampling efforts downstream of undeveloped canyons in the San Jacinto River watershed. Even with this support, the TMDL includes a requirement for the stakeholders responsible for TMDL implementation to complete a study to further evaluate nutrient loads from reference watersheds (see Table 7-12; Section 7.4.2.5)

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
48	Brookshire	Pg 2, General	Regarding mass balance, it is difficult to ascertain the degree to which adoption of reference based TMDL and reduction in nutrient inputs will actually affect lake nutrient availability and algal production given that, as the authors conclude, the vast majority of nutrient flows are from internal lake-water recycling. If this is the case, at first glance this would seem to obviate much of the entire motivation of reducing watershed inputs. While reducing N and P loads into the lakes should certainly decrease further accumulation of sediment-bound nutrients, it is entirely unclear what the turnover times for the existing sediment pools are and how much new loading contributes to them, especially since there are no outflows from Elsinore. Though sediment half times are listed for organic P and TN in section 2.4.3. it is unclear how these were calculated under nonsteady state conditions and what the turnover times for all N and P species are given that there are virtually no losses, especially from Elsinore. Thus it seems that alum application is the transient remedy for P, but without removal, and with no gaseous loss, the pool should increase over time. Without excavation, this would seem to be an intractable and permanent problem. Similarly, there is only one mention of biological N fixation and not a single mention that I could find of gaseous N losses in the entire report. N fixation is fundamental to redressing N limitation in many lakes and this lake has reportedly been N limited given the N:P ratios.	Half-lives of organic-P and total N concentration in sediments were estimated from measurements made from sediment cores as described in Anderson (Anderson, M.A. 2011. *Task 1 – Estimate Rate at Which Phosphorus is Rendered No Longer Bioavailable in Sediments.* Task 1 Technical Memorandum. Prepared for SAWPA on behalf of the LECL Task Force). Concentrations of organic-P and total N decreased with depth into the sediments that were fitted to a 1st-order rate law. First–order loss rate coefficients were estimated following correction for sedimentation rates following DiToro (DiToro, D.M. 2001. *Sediment Flux Modeling* . John Wiley & Sons, New York, NY. 624 pp.). As the Peer Reviewer noted, it was necessary to assume uniform sedimentation and reaction rates in this analysis. These results thus represent average values over the period of time captured within the cores (approximately 15 and 32 yrs for Canyon Lake and Lake Elsinore, respectively). While export is one loss process for Canyon Lake, burial by newly delivered sediment, sorption or precipitation of labile P as recalcitrant solid phases, and mineralization-nitrification-denitrification provide the mechanisms for the natural long-term removal of legacy nutrient loads to the lakes. Alum application irreversibly binds phosphate, thus hastens removal and burial of P by formation of recalcitrant aluminum-phosphate solids phases.
49	Brookshire	Pg 2, General	The choice of reference watershed values and their implementation in CDFs (rather than a single value) is somewhat confusing and seems inconsistent. Further the nutrient concentrations values from the Cranston guard station are outstandingly high for naturally vegetated ecosystems I am familiar with and compared to those form other natural watersheds in Southern California (references below).	See response to Comment #47.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
50	Brookshire	Pg 2, General	While the simulation models seem to visually match the recent historical data reasonably well this is insufficient as there are no statistics on goodness of fit nor sensitivity analysis of parameters. It is also unclear exactly how the CDFs are incorporated into the model. In some places it is stated that a median is used but in others that the target is for the reference CDF to be well below the contemporary CDF. Finally, the calibration exercise is good but I expected to see future simulations and the sensitivity to various watershed management scenarios. This would be a more robust way to analyze Margin of Safety rather than simply applying a range of values above and below the median to calculate a percent deviation.	Relative error values were provided in Tables 5-2 and 5-5. Model parameter sensitivity analyses were not conducted for this study given the extensive number of published applications of the model. Simulations compared predicted reference and current conditions with water quality predicted for current conditions *with* control strategies. The CDFs were a product of the simulations and an integral part of the approach adopted here since they capture the natural extreme variability present in Lake Elsinore (see further discussion of CDFs in response to Comment #47).
51	Brookshire	Pg 3, General	Related to above, there are only a couple mentions of climate change in the report. Given the projections for the area it would seem unreasonable to assume stationarity in the CDFs, the underlying climate drivers and the underlying interactions in the model.	See response to Comment #45 regarding climate change considerations. In addition, the TMDL requires that a TMDL compliance evaluation be prepared every five years to determine the need for revisions to the TMDL and its implementation program (e.g., see Section 9 regarding demonstrating compliance). This periodic review provides the opportunity to evaluate the established CDFs.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
52	Brookshire	Pg 3, Section 1	Regarding Conclusion 1, "The revised Problem Statement provides a scientifically defensible description of the water quality problems in the Lakes related to excessive algae caused by waste discharges" - The team provides an excellent description of the natural history of Lake Elsinore and Canyon Lake. Through their monitoring efforts they provide data that demonstrates that total N, P and chlorophyll concentrations consistently exceeded the existing TMDLs over the 2002-2016 period. Thus, they adequately motivate the need for revised TMDL. However, given that their measurements and modeling point to internal recycling coupled with climate-driven hydrologic variation as the main culprit, it is unclear whether they actually specifically did “provide a scientifically defensible description of water quality problems…caused by waste discharges”. It would seem that many of the findings imply that internal sediment pools are sufficiently stable and long lasting that current waste discharges are relatively minor contributors. Of course they ultimately have to contribute just due to mass balance but these long-term dynamics have not been sufficiently disentangled in this report. Clearly, freshwater inputs, aeration and alum treatments have been critical but subsequent depth-integrated simulations of current TMDL and proposed reference condition lake nutrient distributions look almost indistinguishable.	The large volume of site-specific monitoring data and analysis assembled over the last 25 years consistently demonstrates that nutrient loads from current external waste discharges are "relatively minor contributors" to water quality impairment in the lakes compared to the internal sediment pools. It is true that some of this internal sediment load is attributable to past anthropogenic discharges. However, there is no practical way to identify the specific prior origin for these current sediment-based loads with the degree of scientific certainty needed to establish legal responsibility. It should be noted that the existing TMDL (2004) also made no attempt to trace existing sediment loads back to their original source in the watershed. As before, the revised TMDL does not attempt to "disentangle the long-term dynamics" and, instead, reaffirms the existing incentives to achieve compliance with key response targets by reducing both internal and external loads. The efficacy of this approach is validated by the Peer Reviewer's comment that recycled water inputs, aeration/mixing systems and alum treatments have caused current water quality to "look almost indistinguishable" from the natural reference condition. Efforts to improve water quality to comply with the TMDL, e.g., through the Comprehensive Nutrient Reduction Plan (CNRP) and Agricultural Nutrient Management Plan (AgNMP) implemented to comply with the TMDL, are working.
53	Brookshire	Pg 3, Section 2	Table 2-15: The TKN/P ratios would appear to be miscalculated here. How does one calculate an NP ratio when the mean TKN in the same table is “NA”? The maximum should be ~8.1 rather than the listed 15.7 correct?	Table 2-15 summarizes data used by the Regional Board in 2001 to support the development of the existing TMDL (2004) - see Santa Ana Water Board 2001, Table 2. The TKN/P ratio was computed from each sample in the record and is unrelated to summary statistics on N and P provided in this table (e.g., the maximum values reported for TKN and P in this table are not from the same samples). The mean of estimated TKN/P ratios from all records is reported; it excludes sample dates with non-detect TKN.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
54	Brookshire	Pg 4, Section 3	Regarding Conclusion 2, "The establishment of a revised Watershed Reference Condition based on the asymmetric 99-year hydrologic record and no anthropogenic discharges of nutrient wastes, provides a scientifically sound basis for establishing the following Numeric Targets for the Lakes and establishing a scientifically justifiable method for establishing the TMDLs, WLAs, and LAs, as well as the reductions in the waste discharges of TN & TP from the watershed runoff to the Lakes." - The proposed revised TMDL Numeric targets have been modified to focus on CDFs of chlorophyll, lake water volume and ammonia and have now eliminated numeric targets for TN and TP. The justification for this appears to be that numerous process can affect critical N:P ratios and absolute availability of these nutrients which trigger algal blooms. However, this raises a few concerns with regard to the adoption and implementation of the Watershed Reference Condition standards.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
55	Brookshire	Page 4, Section 3	Regarding Conclusion 2 (see Comment #54) - While the claim that "No watersheds comparable to Canyon Lake or Lake Elsinore exist in southern California or other areas with similar climatic regimes. As such it is not possible to establish allowable pollutant loads using another watershed/downstream waterbody combination as a means to describe an expected reference condition." may be strictly true, the choice of the single location (the Guard station) seems problematic. It is unclear exactly how the concentration and load data will be used given that virtually all direct manipulation to manage nutrient loads are within-lake (water level, oxygen, alum) and that the reference N and P concertation appear not to differ substantially between intensively managed and reference conditions shown in figures 4-17 and 4-18 (although impossible to determine without statistical tests).	The Cranston Guard station was not the only source of nutrient data used to validate the water quality assumptions used to model the natural pre-development reference condition. Paleogeological analysis of ancient core samples extracted from deep below Lake Elsinore was used to corroborate these values. Concentration and load data were used to estimate the Highest Attainable Condition for the response targets (chlorophyll-*a* , DO & ammonia) under natural, pre-development reference conditions. Under both the existing and revised TMDL, stakeholders have the option to demonstrate compliance based on loads (i.e., WLA), concentrations (i.e., in-lake causal targets for TN and TP), or attainment of response targets. In addition, the implementation program requires stakeholders to conduct a study to further evaluate the natural reference condition for nutrients (see Table 7-12; Section 7.4.2.5). The simulation models may be revised as new and better information becomes available. It is not surprising that the current concentrations of TN and TP, under the intensively managed lake conditions, do not differ substantially from the reference condition. That was the intended outcome of the numerous water quality improvement projects that have been implemented over the last 15-20 years. The effect of those improvements is best illustrated not by comparing the existing condition to the reference condition but by comparing the two lines on each graph showing water quality conditions with and without the BMPs and mitigation projects that have been implemented to comply with the 2004 TMDL.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
56	Brookshire	Pg 4, Section 3	Regarding Conclusion 2 (see Comment #54) - A quick literature search indicates that the reference condition nutrient concentrations appear to be remarkably high compared to similar watersheds in southern California, raising the question about how representative the sites are. For example, Klose et al. (Freshwater Science 2012) found stream Dissolved Inorganic Nitrogen (DIN) to be on average < 100 µg/L and SRP to < 10 µg/L in the upper Ventura River. Yoon and Stein (J. of Env. Engineering 2008) conducted a cross basin measures of stream nutrients in southern California and found nitrate-N to average < 400 µg/L, TKN < 1.2 mg/L and TP ~30 µg/L. Similarly, Gabet et al. (JGR 2005) estimated sediment nutrient fluxes from hillslopes to be ~1.5 kg N ha-1 yr-1 and ~0.8 kg P ha-1 yr-1.	The simulation model used to develop the revised TMDL relied on natural background estimates of TN in the San Jacinto River watershed. DIN concentrations in the upper Ventura River watershed provide no relevant point of comparison. The 0.92 mg/L TN concentration used in the revised TMDL is in the same range specified by the existing TMDL (2004) (i.e., interim TN target of 1.0 mg/L and final TN target of 0.75 mg/L). It is true that the natural background concentrations of TP seem to be higher in the San Jacinto watershed than in other areas of Southern California, but this fact has also been corroborated by sediment core samples collected beneath Lake Elsinore and data from other undeveloped watersheds in the area (see Section 7.4.2.5). In addition, it is likely that variations in TP concentrations of native soils, relative lack of significant vegetative cover contributing to high erosivity, and flashy stream flows explain some of the difference between this area and other watersheds in Southern California. It is also important to note that whereas the Ventura River ultimately flows into the Pacific Ocean, the San Jacinto River drains a very large watershed into Canyon Lake (< 500 acres) and then into Lake Elsinore (which is a closed basin with virtually no flow-thru). Dr. Alex Horne, of U.C. Berkeley as described the result as "world class sedimentation." Therefore, comparisons to other watersheds provides little insight into what one should expect to see in these two lakes. Finally, given the importance of understanding reference nutrient concentrations in the watershed, the implementation program includes additional studies on background nutrient concentrations.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
57	Brookshire	Pg 5, Section 3	Fig 3-6: The time series would appear to be considerably shorter than 100 years.	Correct, the errata includes an updated figure to show the full period.
58	Brookshire	Pg 5, Section 3	Regarding Conclusion 3a, "The revised TMDLs set revised Numeric Targets are based on a scientifically justifiable assumption that excessive algae growth in the lakes is that which would occur under a watershed reference condition without the inputs of any nutrient waste discharges by humans, and that nutrient waste discharges to the Lakes will be controlled to be no more than the reference watershed nutrient runoff." - At the heart of this conclusion is the assumption that the reference conditions used here are actually valid. As stated above, the concentrations seem too high for watersheds under natural vegetation and little anthropogenic loading. Again, without the detailed mass balance and life cycle analysis of the time scale of external of nutrient loading, incorporation into sediments and subsequent turnover, it is difficult to determine whether with the new TMDL excessive algae growth would be that which would occur under the refence condition. Figure 4-14 and 4-15 help think about this visually but still beg the question as whether the source reductions are sufficient.	It is true that the revised TMDL rests on the assumption that the assumptions used to model the reference conditions are valid. The rationale supporting this conclusion is provided in the TMDL Technical Report. This comment does not dispute the evidence or rebut the reasoning set forth in the document. The simulation model used to develop the revised TMDL does incorporate a detailed mass balance analysis and life cycle analysis of TN & TP (using a daily time-step) over a very long time scale (many decades). It does, in fact, track new external nutrient loads, incorporation into sediments and subsequent turnover as the Peer Reviewer recommends. The new dynamic simulation models represent a substantial improvement over the simple static bathtub model that was used to justify the existing TMDL (2004). In addition, the program of implementation in the revised TMDL requires the stakeholders to periodically evaluate progress being made towards compliance with the TMDL. This will required the stakeholders to update and revalidate the lake simulation models as new and better data become available.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
59	Brookshire	Pg 5, Section 3	Regarding Conclusion 3a (see Comment #58) - In section 3.2.2.3 it is stated that the median nutrient concentrations at Cranston guard station were 0.32 mg TP/L and 0.92 mg TN/L. These concentrations are huge and appear to be very similar to that draining urban and agricultural lands. Thus, assuming equivalent water runoff, the "reference" conditions are essentially what is loading into the lake system now. It is also stated that the basis for choosing these median values is "conservative" but why isn't the same CDF approach used for this analysis? The range of values from other undeveloped lands reported here (TP: 1.0 – 13.0 mg/L; TN: 3.5 – 16.9 mg/L TN) are enormous.	The median TN concentration at the natural reference location (i.e. Cranston Guard station) are not "huge." The 0.92 mg/L value at this station falls within the same causal target range for the current (2004) TMDL: 0.75 - 1.0 mg/L. It is true that the TP concentrations are higher than the causal target of the current TMDL (0.32 mg/L and 0.1 mg/L, respectively). However, the TMDL Technical Report offers several additional lines of evidence to corroborate the validity of this value (see also response to Comment #56). While the Peer Reviewer appears to be surprised by the data (e.g. "the range of values from undeveloped lands is enormous"), no rationale is provided for disqualifying the information. Moreover, as noted in Section 7, the TMDL program of implementation includes requirements to continue to evaluate reference nutrient concentrations in the watershed. The CDF approach was not used to simulate the full range of TP concentrations observed in natural runoff because there was insufficient information to parameterize the factors responsible for the variability. Since the primary concern was water quality in the downstream lakes (which is where the TMDLs apply), and these lakes see the long-term cumulative sum of all upstream flows, it is reasonable and appropriate to apply a conservative median value in this instance. Higher temporal resolution of TP and TN concentrations in upstream flows would not materially alter projections of water quality as these flows cumulate and combine in the downstream lake.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
60	Brookshire	Section 3, Page 6	Regarding Conclusion 3a (see Comment #58) - Comparison of TP and TN loads to Canyon Lake shown in Fig. 4-14 with the total watershed TP and TN load reduction necessary under “reference” conditions reveals the assumptions of using the reference values as I understand them. Fig. 4-14 shows loads into Canyon lake of TP: 5000- 35,000kg/yr, and TN 10,000-130,00 kg/yr fig 4-14). By comparison, total watershed reductions required are 767 kg TP/yr and 4,516 kg TN/yr which represent a small fraction of total loading. While the new approach is estimated to yield lower TN and TP loading than the previous TMDL it is uncertain whether it will be sufficient to significantly modulate algae blooms given the proposed reference criteria.	The Peer Reviewer compares nutrient loads from the managed lake condition to the loads associated with the reference condition and concludes that load reductions represent a "small fraction" of total nutrient loading. That is only true because the numerous BMPs and offset programs already being implemented have significantly reduced existing loads compared to what they were prior to adoption of the existing TMDL (2004). As a result, the incremental additional load reduction required to retain the reference condition is relatively small. That proves the prior implementation strategy is working and should be affirmed and expanded under the revised TMDL. The goal of the revised TMDL is to ensure the frequency, duration and magnitude of future algae blooms in both lakes is no greater than that which was expected to occur under natural pre-development reference conditions when there were no anthropogenic discharges. This is consistent with the narrative water quality objective set forth in the Basin Plan.
61	Brookshire	Pg 6, Section 3	Regarding Conclusion 3b, "The use of Cumulative Distribution Frequencies (CDFs) for the Numeric Targets for the Lakes will provide for the return of the Lakes to the modeled WRC [Watershed Reference Condition]." - The use of CDF does seem to be a superior approach than simply applying a static number. However, the description of how they will be implemented is hard to follow. As I understand it, the CDFs will only be strictly applied to within lake measures of chlorophyll, water and NH3. What is less clear is how the model input (the watershed loads of TN and TP) actually feed into the model simulations for lake dynamics and the lake CDFs ultimately evaluated. Part of the difficulty is that the reader cannot peer under the hood of the model.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
62	Brookshire	Pg 6, Section 3	Regarding Conclusion 3c, "The model used provides a scientifically defensible method for approximating the response of the Lakes to watershed discharges of nutrient wastes and the internal flux of nutrients from the sediment in the Lakes." - I spent some time going through CAEYDM-v2. Though unfamiliar with it previously, The model seems sound and powerful with increasing application. My concern is not with the model itself but with how the model calibration was evaluated and compared against reference conditions. First, no alternative models were compared to evaluate model fit and parameter space. No parameter sensitivity analysis was performed, or at least presented. And statistical goodness of fit tests were not performed. While the model seems to perform reasonably well by visual inspection in comparison to the calibration data period, the reference modeled conditions for TN and TP and chlorophyll seem virtually identical for lake Elsinore (fig 5-15) and canyon lake (fig 5-24, 5-28, 5-29) suggesting low sensitivity to adopting the new reference condition approach.	CAEDYM was chosen as the model for the analysis given its extensive worldwide use for simulating water quality in lakes and reservoirs. Given its extensive use, model parameter sensitivity analyses were not deemed necessary for this study. As noted in the response to Comment #50, relative error values were presented in Tables 5-2 and 5-5.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
63	Brookshire	Pg 7, Section 3	Regarding Conclusion 3c (see Comment #62) - Further, the team should incorporate projected climate change into the model runs and not just how the lake model will change to these changes but the entire watershed. In this case the reference systems may behave differently than the lake. This would seem critical to establishing robust margin of safety bounds.	The TMDL Technical Report discusses climate change in Section 7.1.4). The simulation model considered a wide-range of hydrologic conditions that have occurred historically, including prolonged droughts and periods of unusually high rainfall. Importantly, the resulting high-resolution model used in the revised TMDL does a much better job of assessing natural climatological variability than the existing TMDL (2004) which relied on just three archetypical years to represent wet, dry and medium precipitation conditions. Given the climatic variability that already occurs (with or without climate change), the TMDL's program of implementation includes a requirement to assess progress towards achieving compliance with the TMDL on a frequent basis - every five years. This requirement establishes an adaptive management approach to implementation. During each assessment the stakeholders will need to update and revalidate the lake simulation models using the new and better data that will be collected through the TMDL's rigorous monitoring program.
64	Brookshire	Pg 7, Section 4	Regarding Conclusion 4a, "The revised TMDLs includes a revised nutrient discharge source assessment, based on a scientifically justifiable assumption in the Tech Report that excessive nutrients which are discharged to the Lakes will be controlled to be no more than the reference watershed nutrient runoff, that is based on a 99-year hydrologic record and nutrient wash off rates from the watershed under the natural WRC without any anthropogenic inputs of nutrients by nutrient waste discharges." - The team has done a good job at mapping out source contributions within the watershed. As detailed above, however, this conclusion seems almost a certainty given the assumptions of the reference watershed conditions and how they are fed into the model simulations.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
65	Brookshire	Pg 8, Section 4	Regarding Conclusion 4b, "The revised TMDLs include a revised nutrient discharge source assessment, based on a scientifically justifiable analysis in the Tech Report, that estimates the waste discharge of nutrients from the land use categories in the analysis. The source assessment provides a justifiable means to model and calculate the TMDL, SWA, LAs and required nutrient reductions in Section G of Attachment A for each acre of land in each land use category, supported by the source assessment." - As above, the total reductions seem to be a very low proportion of annual nutrient loads received by the lakes. Given the range and magnitude of nutrients retained annually and the release time of these nutrients in the water column it would seem that the source reductions would be inadequate to control excessive algae growth given the hydrologic and management context.	Natural nutrient loads to both lakes are quite large. The incremental nutrient loads attributable to anthropogenic waste discharges are relatively small compared to those natural loads. As such, it is not surprising that the nutrient reductions needed to eliminate or offset these anthropogenic loads are also relatively small. Such reductions may not be sufficient to prevent all algae blooms but they are sufficient to prevent excessive algae caused by waste discharges. That is what must be done in order to comply with the narrative water quality objective in the Basin Plan. The TMDL does not require stakeholders to achieve a level of water quality that is better than that which would occur prior to human colonization in the watershed.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
66	Brookshire	Pg 8, Section 5	Regarding Conclusion 5, "The revised TMDLs for nutrients in the lakes, using the Numeric Targets, Source Analysis, and Linkage Analysis, provide scientifically defensible revised TMDLs for nutrients in Lake Elsinore and Canyon Lake." - Given the concerns raised above, there is considerable uncertainty as to whether this conclusion is sound. This opinion is based on uncertainty in the reference condition assumptions and modeling and the elimination of in-lake TN and TP criteria as stated: “In-lake nutrient concentrations for TN or total TP were not included as causal numeric targets in the revised TMDLs. There are multiple combinations of these two nutrients that would effectively limit algal productivity to cause a return to reference levels for beneficial use impairment indicators (algae, DO, ammonia) higher in the hierarchy. Thus, in-lake nutrients will be evaluated in the implementation section. For example, one implementation alternative could involve reduction of TP below reference levels to ensure it is the growth limiting nutrient and to achieve reference conditions for chlorophyll-a with or without returning TN to reference levels.” What exactly are these “multiple combinations” True, there are. But it would seem that the reliance on the current reference watershed conditions essentially punts the problem to within-lake management without requiring significant source reductions from the watershed.	Some level of uncertainty is intrinsic to all water quality simulation models. However, there is no question that the more sophisticated dynamic models used to support the revised TMDL significantly reduce such uncertainties compared to the literature-based assumptions and static-bathtub models used to justify the existing TMDL (2004). The statement that the proposed TMDL "essentially punts the problem to within-lake management without requiring significant source reductions from the watershed" has been empirically disproven. The stakeholders have implemented numerous source control BMPs throughout the watershed and have been required to document the effectiveness of these efforts in their annual reports over the last 15 years. In addition, the existing TMDL requires them to summarize these efforts and quantify the external load reductions in a special progress report submitted to the Regional Board every 3 years. The stakeholders also proposed, and the Regional Board approved, the in-lake offset programs because the technical analysis clearly demonstrated that these projects would do more to improve water quality much faster than any other mitigation measure available. That analysis also showed that these in-lake offset projects would result in better water quality than if the stakeholders achieved immediate and instantaneous compliance with the original WLA. The offset projects are intended to mitigate the adverse effects on water quality, by addressing the far larger and more consequential nutrient loads contributed by lake-bottom sediments while the stakeholders simultaneously work to reduce new external nutrient loads from being transported to the lakes in watershed runoff. Long-term water quality monitoring data indicates that this approach is working well. The revised TMDL requires stakeholders to continue reducing external nutrient loads to the maximum extent practicable as a prerequisite condition for authorizing the use of offset projects as an interim compliance tool.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
67	Brookshire	Pg 9, Sections 7, 8	Regarding Conclusion 6. "Implementation Plan and TMDL Compliance Monitoring Plan" - Values in 6-9p and 6-9q3 would seem to be in conflict: 2620 of P and 7533 of N versus 3050 of P and 8753 of N.	These values were properly aligned in the April 23 revision to the tables that were included in the attachment to resolution.
68	Brookshire	Pg 9, Section 12	Regarding Conclusion 9, "The references for the revised TMDLs support the analysis and conclusions of the Tech Report and the proposed revised TMDLs." - References provided are generally adequate expect for reference conditions cited above.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
			Regarding Big Picture, "Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?" - In general the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices. However, as addressed above, it is my finding that the fundamental basis for the proposed rule change—the reference	The Peer Reviewer does not explain either how employing a reference watershed condition is "not justified," or offer any guidance as to what more must be done in order to provide an adequate justification. The reference condition does not assume an exceptionally high value for TN. And the site specific TP value used to represent natural background conditions in the San Jacinto watershed was corroborated by several other lines of evidence which the Peer Reviewer did not address in his comments (e.g., see responses to Comments #47 and #56). Section 9 discusses use of the CDFs to assess compliance. The same simulation model used to develop the CDFs will be re-run using actual lake levels and precipitation to estimate the chlorophyll-*a* , DO and ammonia concentrations expected to occur under pre-development land use condition (i.e., the reference condition). Then the actual measured values will be compared to these response targets to determine whether current water quality is better or worse than the extended model of the reference condition. That is how the CDF curves will be used to implement the revised TMDL. Stakeholders also have the option to demonstrate compliance by showing that the cumulative TN & TP loads discharged from their jurisdiction are less than or equal to the nutrient loads washing off the same land area under natural, pre-development conditions.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
69	Brookshire	Pg 10, General	watershed condition—is not adequately justified nor is how it will be implemented adequately explained. In particular, how the cumulative distribution functions will actually be used is unclear. The reference conditions described assume exceptionally high background nutrient loading. Therefore, because the entire proposed rule change is predicated on these nutrient levels, this would seem to obviate substantial intervention in controlling watershed nutrient loading to the lake system. In effect this just shifts the burden onto within-lake intervention almost entirely.	Similarly, stakeholders also have the option to show that volume-weighted average nutrient concentrations in the runoff discharged from their jurisdiction are less than or equal to the TP and TN target values deemed to represent natural water quality in the pre-development era. The latter two approaches do not rely on the CDF curves in order to demonstrate compliance with the revised TMDL. The Peer Reviewer expresses a strong preference for improving water quality by reducing nutrient loads from the watershed rather than relying "almost entirely" on in-lake interventions and offset projects. The Board agrees that source control is the preferred approach for protecting water quality. However, the most effective way to reduce nutrient loads in stormwater runoff is to install volume reduction structural BMPs. While this would assure technical compliance with the TMDL, it would also greatly reduce the total amount of water flowing into both lakes. The net result would greatly reduce the elevation of both lakes and do more to imperil than to protect beneficial uses. It is because of that concern that a "wet-lake strategy" was incorporated into the TMDL program of implementation (e.g., see Section 7.4). A strategy that maximizes water in Lake Elsinore not only benefits nutrients but other constituents as well, e.g., salinity and DO. Since most of the nutrient loading arises from the lake-bottom sediments, it is reasonable to encourage mitigation measures designed to focus on this non-point source. However, the Regional Board has no intention of allowing upstream dischargers to abdicate their source control obligations by "shifting" to implementing only in-lake offset projects instead.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
70	Heinse	Pg 4, General	Pertaining to Conclusion 1, "The revised Problem Statement provides a scientifically defensible description of the water quality problems in the Lakes related to excessive algae caused by waste discharges." - The revised problem statement is scientifically defensible. Because of differences primarily in depth and inflows, nutrient cycles vary between Lake Elsinore and Canyon Lake and also within Canyon Lake. Lake Elsinore is decoupled from most of the watershed because of Railroad Canyon Dam and the reservoir function of Canyon Lake delivering ow to Lake Elsinore only periodically in wet years. Lake Elsinore further functions as a terminal lake except for extreme wet years in which some water may ow through the lake. Nutrient sources in Lake Elsinore are predominantly internal while Canyon Lake receives considerable nutrient inputs form throughout the watershed.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
71	Heinse	Pg 4, General	Pertaining to Conclusion 2 and 3, "The establishment of a revised Watershed Reference Condition based on the asymmetric 99-year hydrologic record and no anthropogenic discharges of nutrient wastes, provides a scientifically sound basis for establishing the following Numeric Targets for the Lakes and establishing a scientifically justifiable method for establishing the TMDLs, WLAs, and LAs, as well as the reductions in the waste discharges of Total Nitrogen and Phosphorous from the watershed runoff to the Lakes." - The proposed TMDLs revision pursues the estimation of allowable nutrient inputs to assure beneficial uses via a reference watershed approach. Allowable loads are calculated based on estimates of watershed nutrient inputs pre-development, and model estimates of resulting water quality metrics based on these inputs. While the previous TMDLs were based on water quality data and distributed TMDL to the watershed, this approach uses the projected \natural" water quality to distribute TMDLs. The reference watershed approach in particular when coupled with CDF representation of loads explicitly recognizes spatial and temporal variability in watershed hydrologic conditions, lake hydrology and ecology as well as implicitly recognizing spatial and temporal variability in nutrient inputs coupled with wet years and extreme events. This approach is commendable.	Placeholder for Regional Board
72	Heinse	Pg 4, General	Pertaining to Conclusion 2 and 3 (see above) - An argument could be made that changes in the watershed (lake surface reduction, reservoir construction, etc.) negate a reference watershed approach, but I recognize that given the lack of comparable lake systems and large variability in lake responses to climatic trends, a watershed approach is a defensible conservative method.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
73	Heinse	Pg 4, General	Pertaining to Conclusions 2 and 3 (see above) - A convincing argument is made that (1) the runoff flow volume to Lake Elsinore (pg 306, TMDL) was overstate in the 2004 TMDL, and (2) the use of CDF's rather than static targets reduce the allowable nutrient loads in the revision. At the same time, water quality targets in the lakes are less stringent at times (dry years) recognizing that the reference condition would also result in impaired uses under these conditions.	Placeholder for Regional Board
74	Heinse	Pg 4, General	Pertaining to Conclusion 2 and 3 (see above) - Overall, numeric targets for nitrogen and phosphorous are scientifically justified and appear to be protective of beneficial uses in the lakes. WLAs and LAs are reasonable, have a sound scientific basis, and target the actual algal bloom/eutrophication issue.	Placeholder for Regional Board
75	Heinse	Pg 5, General	Big Picture Question 1 , "In reading the staff technical reports and proposed implementation language, are there any additional scientific issues that are part of the scientific basis of the proposed rule not described above?" - Both lakes have benefitted from a range of actions and practices put in place in part because of the 2004 TMDL and are expected to be continued or expanded. The compliance monitoring requirements are reasonable and practical.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
76	Heinse	Pg 5, General	As part of the 2004 TMDL, Lake Elsinore receives treated wastewater discharge to dilute salts, compensate for evaporative water losses and maintain a relatively stable water level which aids in lowering the water temperature and thereby increases dissolved oxygen in the water column and in particular at the lake sediment surface compared to the reference state. The supplemental water to Lake Elsinore supplies nutrients in the same order of magnitude than the external loading to Canyon Lake. The report argues that benefits of partially compensating evaporation outweigh the substantial additional nutrient inputs. Because Lake Elsinore is practically a terminal lake this additional loading will increase nutrients and TDS in the lake system over time. Given that internal loading is the main contributor to algal blooms, and that a reduction of internal loading is targeted with the amended TMDLs it would be beneficial to include possible actions and estimates for nutrient reduction to address this particular additional source. One possible approach not discussed in the document could be to develop a special procedure for lake flushing in Lake Elsinore for wet years with excess available water.	Model simulations for the managed watershed and lake condition show marked improvement relative to a condition with no controls, including no supplemental water addition. The linkage analysis provides dynamic simulation of the net benefit of increased volume in the lake even with the increased nutrient loading that comes with it. The scenario with recycled water addition does result in more flushing when reviewing the model results. The stakeholders are required to evaluate the need for supplemental projects to facilitate TMDL compliance as part of the program of implementation. Recommendations such as the one provided (special lake flushing procedures during wet years) could be considered in the future as part of the overall planning process.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
77	Heinse	Pg 5, General	Aluminum sulfate applications to Canyon Lake over several years are aimed at flocculating orthophosphate and prevent diagenesis of phosphorous. I am less confident to provide this comment as this is not my area of expertise. However, I think the benefits of aluminum sulfate applications are somewhat overstated in the report. Aluminum sulfate will form aluminum hydroxide when applied to water and act primarily as a cap for available phosphorous in the lake sediment preventing it from being bioavailable in the water column. While aluminum hydroxide has a high affinity for orthophosphate, it is not the only ion or particulate being attracted. There are several studies that have demonstrated that the cap effect is definite and that aluminum sulfate application are a temporary solution at best.	When aluminum sulfate is applied to water, it releases aluminum hydroxide which binds with phosphorus to form aluminum phosphate. Aluminum phosphate is an inert and insoluble complex which does not break down under normal environmental conditions (i.e., pH>5). While it is true that alum may also bind with other substances, it is highly preferential to orthophosphate. Jar tests conducted by Dr. James Noblet support an assumption that the ratio of aluminum applied to phosphorus removed is approximately 15:1 and accounts for any potentially inefficient binding with other substances. The previous alum applications were not intended or expected to provide a permanent solution for Canyon Lake. Rather, they were designed to neutralize and sequester phosphorus releases from the lake bottom sediments while stakeholders continued to implement load reduction BMPs in the watershed. The Peer Reviewer refers to this as a "cap effect." Long-term water quality monitoring data in Canyon Lake shows that the routine alum application program is working as intended. As a result, future alum applications may be smaller and less frequent and may only be necessary to mitigate unusually large nutrient loads associated with extremely wet (El Niño) winters.
78	Heinse	Pg 5, General	Taken as a whole, the scientific report is expertly prepared and clearly reflects a lot of hard work by a large number of people. The proposed amendments to the TMDLs explicitly recognize variability in space and time, shifting mechanisms between wet and dry years for sources and lake responses including differences in P and N limitations between sites and climatic regimes, and it recognizes that the watershed has changed considerably. The estimated WLAs and LAs are sound and estimated based on current methods and practices.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
79	Lewis	Pg 1, Section 3	Revised TMDL numeric targets - The TMDL finding that the water quality of Lake Elsinore and Canyon Lake would be undesirable for recreation even under natural, undisturbed conditions of the watershed is correct. The watershed in its natural state, without anthropogenic augmentation of nutrient flux, both lakes would have water quality that would be undesirable for designated uses (aquatic life, recreation, water supply).	Placeholder for Regional Board
80	Lewis	Pg 1, Section 3	Use of cumulative frequency distributions - Use of cumulative frequency distributions as a tool for judging the status of the lakes either as modeled or as observed is a valid method for determining the status of the lakes in response to remediation measures. The water quality model, although generally similar to water quality modeling as conducted elsewhere, is not a reliable tool for projecting future water quality conditions of primary interest in Lake Elsinore or Canyon Lake. The model apparently relates algal abundance to P concentration without recognition of a P threshold above which algae are not sensitive to changes in P concentration. The causes of interannual and intra-annual variation of algal abundance under current conditions and probable future conditions are explained by factors other than nutrient availability. No such factors are presented in connection with the model.	The CAEDYM model has been successfully used in numerous lake restoration simulations and accounts for a wide range of factors regulating algal production in lakes, including light, temperature, salinity, and Michaelis-Menten representations for nutrient limitation.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
81	Lewis	Pg 2, Section 3	Internal loading of phosphorus for the two lakes has been quantified experimentally in a competent way, but is interpreted and incorporated in modeling incorrectly in that it is assumed that bioavailable phosphorus released from sediments is entirely retained by the overlying water column. Phosphorus released from sediments through conversion of ferric to ferrous iron leads to precipitation as the water reaches oxidized portions of the water column. In essence, the release process is to some extent reversed by a corresponding precipitation process for an unknown portion of the release, as shown by observations and experiments elsewhere. Phosphorus release from sediments probably does contribute significantly to the supply of soluble reactive phosphorus (SRP) in the upper water column, but the linkage between the sediment release and the actual enrichment of surface waters is not known and therefore cannot be modeled.	The experiments that quantified nutrient release from bottom sediments included assessment of temperature and DO concentrations, so formation of ferric oxyhydroxides that might inhibit release of Ortho-P to the overlying water column was explicitly evaluated. This was also accounted for in the model simulations through the DO half-saturation constant (Hipsey et al. 2014). Moreover, visual characterization of surface sediment color with the Munsell Color chart (used for soils and wetland delineations) on 28 samples collected across Lake Elsinore in May 2010 consistently yielded Gleyl 3/10y (greenish-black) colors and did not identify presence of oxic surface sediment (Anderson, M.A. 2010. *Bathymetric, Sedimentological, and Retrospective Water Quality Analysis to Evaluate Effectiveness of the Lake Elsinore Recycled Water Pipeline Project.* Final Report to LESJWA, September 15, 2010). Only upon extended aeration in the lab did an oxidized (10YR6/6) surface layer develop. Reduced surface redox conditions were also evident adjacent to diffuser lines, reflecting the extremely high concentrations of free sulfide and iron-sulfide phases present that exert a very high sediment oxygen demand during most of the year (Anderson 2010).

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
82	Lewis	Pg 2, Section 3	Bioavailable phosphorus (SRP) is the primary cause of high algal abundance and high biochemical oxygen demand passing from the surface to the bottom of the lake. Even so, bioavailable P does not presently control temporal variation in biomass because SRP is present in great excess of algal needs, i.e., there is no scarcity of bioavailable P for algae presently or under the influence of any proposed mitigation. Algal populations in both lakes presently respond to factors other than phosphorus that are not well documented and therefore not easily predicted. These likely include episodes of mixing or upwelling that cause suppression of chlorophyll at the surface through biomass dilution or shading of algal biomass associated with changes in depth of circulation for water of low transparency.	The CAEDYM model was coupled to DYRESM or ELCOM and thus expressly incorporated physical processes, including stratification, mixing and effects of these processes on availability of light with depth, self-shading and related light limitations to photosynthesis.
83	Lewis	Pg 2, Section 3	Chlorophyll is the most important and least reliable prediction for the model. Modeling chlorophyll correctly is a common problem for eutrophic lakes. Inadequacy of the model to predict future chlorophyll is evidence of inadequate information for modeling and inadequacy of models in general to predict chlorophyll in lakes. At present, phosphorus is always present in excess of algal needs, and therefore cannot be the basis for prediction of temporal variation in algal abundance.	As noted in responses to Comments #80 and #82, the model incorporates a wide range of factors and processes governing algal growth beyond simply availability of phosphorus.
84	Lewis	Pg 3, Section 3	Control of anthropogenic P sources - Emphasis of the TMDL is on control of anthropogenic watershed sources of TP. Valid conclusions can be drawn, however, only by emphasis on bioavailable phosphorus, which corresponds to SRP rather than TP. Interception of particulate P adsorbed on silt and clay from disturbed soil or streets in urban areas will not reduce phosphorus concentrations in the surface waters of the lakes, where algae grow. Control must be based on SRP, not TP. Sources of SRP do not correlate uniformly with sources of TP.	Controlling sources of particulate P in the watershed aims to reduce enrichment of the lake bottom, where these sources of P can become bioavailable and released to the water column

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
85	Lewis	Pg 3, Section 3	Two potent and potentially reversible sources of soluble reactive P are supplemental water for Lake Elsinore and internal P loading for Elsinore and Canyon Lake. Supplemental water for Elsinore will be allowed, as shown in the revised TMDL document, to reach 320 µg/L TP, of which about 80% is SRP. This source, which accounts for about 27% of the total water entering Lake Elsinore, is unacceptably rich in SRP (~260 µg/L). Further tertiary treatment of this source could reliably reduce its TP content to approximately 25 µg/L, which could reduce its SRP to ~3 µg/L. This reduction would not be an extreme investment in view of the overall budget for mitigation of water quality in Lake Elsinore. At an SRP concentration of ~3 µg/L, supplemental water would dilute SRP from the other P sources. The necessary additional tertiary P treatment need not be the direct responsibility of the treatment plant operator; it could occur through TMDL channels with the funds that are allocated for P interception in general.	Additional treatment to further reduce the concentration of TP in the recycled water discharged to Lake Elsinore is included among the numerous alternative compliance strategies identified in the TMDL Technical Report and is under consideration by the stakeholders. The issue of how the cost of such a program may be shared among stakeholders will be addressed if this approach is proposed as part of the updated CNRP and AgNMP that must be submitted to the Regional Board following approval of the revised TMDL.
86	Lewis	Pg 4, Section 3	A second and equally pressing priority for control of SRP in the lakes is elimination of anoxia in deep water. This goal may or may not be achievable. One technical strategy for offsetting anoxia, which causes release of SRP from sediments, already has been implemented but is inadequate. A different concept is needed. Maintaining nearly uniform vertical density in the water column (destratification) through use of distributed airlift of the water column or mechanical mixing would allow wind driven circulation to take oxygen to the bottom of the lakes, thus potentially eliminating strong release of SRP from sediments. Favorable for inducing mixing of Lake Elsinore is its low mean depth, but unfavorable is the great size of the lake. Destratification of Canyon Lake, which is smaller, could be more feasible.	As part of the TMDL's program of implementation the stakeholders (through updates to the CNRP and AgNMP) will evaluate the need for supplemental projects to further improve water quality in the lakes. Section 7 of the TMDL Technical Report provides examples of the types of projects that may be considered; it is not an exhaustive list.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
87	Lewis	Pg 4, Section 3	Use of alum to control sediment phosphorus release in Canyon Lake is unfortunate but is motivated by use of the lake as a potable water source. Evidence that this practice produces the desired result is very weak. The evidence in the TMDL document is based on water column phosphorus concentrations immediately before and immediately after alum treatment. More relevant is the time course of measurement for SRP in the entire water column and chlorophyll in the upper water column at varying time spans beyond the applications.	In addition to measuring the concentration of TP immediately before and after each alum treatment, it is also measured at least 8 other times throughout the course of each year as part of the long-term water quality monitoring program. Overall, alum has been effective at decreasing phosphorus concentrations, especially in the main basin of Canyon Lake . Since the initiation of alum application treatments in September 2013, TP and chlorophyll-*a* concentrations have declined over time (see addendum Figures 87-1 and 87-2). In addition to lower phosphorus and chlorophyll-*a* , water clarity is much better (see, for example, the Lake Elsinore and Canyon Lake Watersheds Nutrient TMDL Monitoring 2018-19 Annual Report, Nov., 2019; also see response to Comment #133).
88	Lewis	Pg 5, Section 3	Secondary remediation measures as discussed in the TMDL document are not of interest in that they offer no credible sustained effect on water quality variables in either lake.	Because external anthropogenic nutrient loads are relatively small compared to the internal nutrient loads generated by lake bottom sediments, the Peer Review comments that watershed mitigation measures may not have a large or immediate effect on water quality. However, federal and state law require stormwater dischargers to reduce the controllable nutrient loads in their watershed runoff to the maximum extent practicable (MEP) rather than relying solely on in-lake remediation strategies to demonstrate compliance. Since even small external loads tend to build up in the lake bottom sediments over time, these secondary remediation measures are expected to help sustain improved water quality in the long-term. This is particularly true in Canyon Lake where the alum application program has effectively addressed the legacy loads in the sediment.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
89	Lewis	Pg 5, Section 4	The assertion that nutrient sources will be controlled to an extent that will not differ from the background watershed concentrations is clear but would be irrelevant to the mitigation of water quality problems in the two lakes. Large amounts of SRP are presently added to Lake Elsinore with supplemental water, which would undermine reduction of SRP from the watershed. Also, without elimination of anoxia in the lakes, suppression of external watershed SRP sources will not be effective or, in Canyon Lake, would require eternal alum treatments. The focus of remediation must include all major sources of SRP. Furthermore, the SRP content of the watershed runoff in its natural condition could sustain a hypertrophic condition even if other sources were reduced.	The Peer Reviewer's conclusion that the natural background loads of SRP would continue to contribute to hypereutrophic conditions in the lake even if all other sources were reduced is true. The TMDL is designed to ensure that anthropogenic discharges do not cause or contribute to any incremental increase in algae growth over that which would otherwise occur naturally in the absence of any human activity in the watershed. It is also true that discharging highly treated wastewater to Lake Elsinore adds large amounts of SRP. On the other hand, these discharges also help offset natural evaporation and prevent the lake from drying up completely as it does under natural conditions. Simulation modeling and empirical monitoring data demonstrate that the net effect of these discharges does more to preserve and protect existing beneficial uses even with the higher phosphorus loads contributed by the effluent. In addition, as this same Peer Reviewer notes in a later comment, TP concentrations in Lake Elsinore would tend to be super-saturated with or without the recycled water additions. Thus, the additional phosphorus associated with these discharges is not likely to make algae concentrations any worse than would occur naturally. The Peer Review comment states that "without elimination of anoxia in the lakes, suppression of external SRP sources will not be effective…" especially in Canyon Lake. The simulation modeling indicates that some anoxia occurs naturally in Canyon Lake. The TMDL is intended to eliminate anoxia caused by waste discharges; it is not designed to produce water quality better than that which would occur naturally.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
90	Lewis	Pg 5, Section 4	Nutrient source assessment. Proposed reduction of anthropogenic P from the watershed is based on TP rather than SRP. This error, combined with incomplete emphasis on two additional strong sources of phosphorus (internal loading, supplemental water) that must be moderated for Lake Elsinore in particular, handicaps the mitigation plan.	Like the 2004 TMDL previously approved by the Regional Board, State Water Board and USEPA, the LAs and WLAs in the revised TMDL continue to focus on TP rather than SRP. This is intentional and not an "error." Because phosphorus can change forms, depending on ambient water chemistry conditions, it is standard practice throughout the country to perform the source analysis and specify the compliance requirements for nutrient TMDLs using TP. In addition, the water quality simulation model provided reasonable and acceptable calibration using TP and accounted for transformations between forms. The fact that the model might be further improved by using SRP does not invalidate or disqualify the current version. Because the revised TMDL places its primary emphasis on meeting the response targets for chlorophyll-*a* , DO and ammonia, stakeholders are focused on implementing the most effective solution strategies not merely those that produce the largest TP reduction. The Peer Reviewer does not explain how the analysis of phosphorus loading from internal sources or supplemental water is "incomplete." Both sources were carefully considered and accounted for the water quality simulation models. In addition, the updated WLA in the revised TMDL imposes a more stringent effluent limit for TP on EVMWD's future discharges to Lake Elsinore (0.32 mg/L vs. 0.5 mg/L). And, further mitigation measures designed to reduce TP concentrations in the supplemental water below 0.32 mg/L is one of the options that will be evaluated by the stakeholders as they update the CNRP and AgNMP to comply with the new TMDL. It is not clear how the mitigation plan is "handicapped" by focusing on TP and the significant improvements in water quality achieved to date appear to suggest otherwise.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
91	Lewis	Pg 6, General	Regarding Big Picture Question 1, "In reading the staff technical reports and proposed implementation language, are there any additional scientific issues that are part of the scientific basis of the proposed rule not described above? If so, please comment with respect to the statute language given above." - The TMDL document properly recognizes the significance of scientific issues that are described in the statutory language relevant to the TMDL	Placeholder for Regional Board
92	Lewis	Pg 6, General	Regarding Big Picture Question 2, "Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?" - The TMDL document, with its supporting data on water quality and water quality modeling, has some significant weaknesses in application of current knowledge related to causes and control of lake eutrophication, methods, and recommended practices. These are described below.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
93	Lewis	Pg 8, General	Overview of TMDL Strategies - In addressing its two central goals, suppression of algal abundance and elimination of mass fish mortality associated with low DO, the TMDL document is based on strategies and principles that have much in common with control of these two problems at thousands of locations within the United States and internationally. Suppression of nutrient concentrations, aeration or vertical mixing of water near the sediment-water interface, collection of water quality data, and use of predictive models are common goals and procedures for assessment and remediation of water quality problems such as those of Lake Elsinore and Canyon Lake. For any given lake, however, the difficulty of a TMDL or any other remediation process lies in application of commonly accepted practices to a unique set of circumstances in a way that can reasonably lead to improvement of lake water quality. The TMDL process for Lake Elsinore and Canyon Lake is comprehensive, well funded, and professionally designed, but shows some weaknesses in application of accepted practices for controlling algal abundance and fish mortality associated with DO. The following comments are intended to identify and explain these weaknesses and thereby show how some corrections could strengthen the TMDL process. The following comments address first Lake Elsinore and subsequently Canyon Lake.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
94	Lewis	Pg 9, General	A valid method for suppression of algal biomass in lakes is reduction of the supply of bioavailable forms of nutrients that are most likely to control algal abundance. It is widely agreed that the two elements controlling algal biomass in inland waters are phosphorus and nitrogen. It is also generally agreed that, while algal growth in a lake can be limited either by deficiency of phosphorus or deficiency of nitrogen, control of algal populations is most effectively achieved by control of phosphorus, given that phosphorus is more easily regulated than nitrogen, and that failure to control phosphorus may lead to acceleration of phytoplankton dominance by bloom-forming cyanobacteria that can fix nitrogen (create ammonia from nitrogen gas). Lakes that are nitrogen limited initially can be converted to P limitation by suppression of P to a point at which scarcity of P overtakes scarcity of N. Therefore, the TMDL is correctly oriented on control of phosphorus for suppression of algal abundance. The key requirement of algal control by phosphorus limitation in a lake is to reduce the supply of bioavailable phosphorus to an extent that will begin to suppress algal growth through phosphorus limitation. When the suppression threshold is achieved, further reduction of bioavailable phosphorus will reduce mean and peak biomass of algae, measured as chlorophyll.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
95	Lewis	Pg 9, General	Analysis and interpretation of phosphorus in connection with algal growth typically is based on concentrations of three fractions: SRP, dissolved organic phosphorus (DOP), and particulate phosphorus (PP). SRP is directly available to phytoplankton, whereas DOP is only partially available, and PP is not directly available for uptake. Analysis of phosphorus in Lake Elsinore is presented as TP and SRP ("phosphate P"). The difference between the total and SRP consists of PP plus DOP, separation of which would be desirable but probably not necessary as DOP typically is a small fraction of TP and is only partially available to phytoplankton. For Lake Elsinore, it is appropriate to think of PP as unavailable P and SRP as bioavailable P.	Thank you for the comment. We agree that inorganic particulate P is not readily bioavailable, although particulate organic forms can be converted to bioavailable forms through microbial, enzymatic and other reactions. CAEDYM simulates phosphorus in various forms, but results are reported as TP only in the TMDL Technical Report
96	Lewis	Pg 9, General	High algal abundances that correspond to a eutrophic (or hypertrophic, which is an extreme version of eutrophy) condition in lakes reflects a supply of bioavailable phosphorus in excess of ~20 µg/L. Eutrophic conditions sustained by a bioavailable P in supply water that exceeds 20 µg/L by small amounts (e.g., 25 µg/L) may be consistent with satisfactory recreational use of lakes and absence of extreme conditions for aquatic life. Water quality conditions over this lower range of eutrophic fertility include undesirable but discontinuous algal blooms (bursts of abundance), as well as accelerated oxygen loss from water in contact with sediments. Approaching or exceeding 30 µg/L of bioavailable phosphorus in supply water, eutrophication of lakes causes serious impairment of recreation in that it produces persistent green algal color during the growing season, frequent blooms, strong dominance of undesirable types of algae (nuisance algae), surface scums that are not consistent with recreation, and very strong deep water oxygen depletion that impairs aquatic life. This degree of enrichment with bioavailable P also may also produce unacceptable amounts of algal toxins in an unpredictable manner.	Thank you for the comment. We agree that high concentrations of bioavailable P lead to eutrophication.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
97	Lewis	Pg 10, General	Given a threshold of recreational suitability near 20-25 µg/L bioavailable P in supply water for a lake, the requirement for control of phytoplankton in Lake Elsinore can be focused on a target of 20-25 µg/L for bioavailable P supply. The TMDL document reflects this goal (page E4), which presents two problems. First, for Lake Elsinore, upper water column P concentrations are far above 25 µg/L, and water entering from the watershed directly or via Canyon Lake has bioavailable P far above 25 µg/L. Second, the lake shows an internal P supply (internal loading) of phosphorus from lake sediments, which means that the P supply has not only an external but also an internal component. The TMDL program is oriented on these two categories of P sources.	The Peer Reviewer states that bioavailable phosphorus concentrations must be held below 25 µg/L (0.025 mg/L) in order to protect beneficial uses in both lakes. This is 75% lower than the TP response target specified in the existing TMDL (2004) and 92% less than the natural background concentration (0.32 mg/L) in runoff from undeveloped lands in the San Jacinto Watershed. The Basin Plan prohibits water quality impairments caused by waste discharges. The TMDL cannot specify a TP target that the lakes would be unable to achieve under natural conditions even if all anthropogenic discharges were eliminated completely.
98	Lewis	Pg 10, General	SRP (bioavailable P) is present in all inland waters but varies greatly in concentration. If there were no internal sources of SRP, the volume weighted concentrations of the external sources for Lake Elsinore would produce TP in the upper water column nearly equal to the volume weighted average bioavailable P in supply water. Bioavailable P in lake supply water is converted partly in the lake to algal biomass, which is a form of particulate P.	Thank you for the comment. We agree that bioavailable P is converted to algal biomass which is a form of particulate organic P. We note that the CAEDYM model incorporates these transformations.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
99	Lewis	Pg 11, General	SRP in the upper water column of Lake Elsinore is a source of information on phytoplankton nutritional status in the lake. Phytoplankton are adapted for very high efficiency in uptake of SRP; they can reduce SRP concentrations to ~1-3 µg/L (0.001-0.003 mg/L) when SRP is scarce. Therefore, concentrations of SRP in the upper water column above ~5 µg/L indicate that the phytoplankton community is not experiencing suppression of growth by P scarcity, i.e., that algal populations are P saturated. If SRP is below 5 µg/L, the algae are suppressed or are approaching a status of suppression that will occur when they exhaust their internal reserves of P. The TMDL work on Lake Elsinore does not include this type of nutritional assessment of phytoplankton status, even though SRP was analyzed. The data on Elsinore suggest that SRP in the growth zone is always above 20 µg/L, which would mean that phytoplankton are never limited by P under current circumstances. Suppression of P supply has no effect on algae until bioavailable P is nearly absent from the upper water column (≤ 3 µg/L). If SRP can be suppressed, assessment of P in the lake should be based on SRP data with detection limits of ~2 µg/L for vertically integrated samples in the mixed layer (as determined by temperature profile) rather than the entire water column (top to bottom). Mixing the top and bottom water prevents nutritional interpretation of SRP data because the bottom water is enriched in SRP from sediments and is not subject to removal of SRP by phytoplankton.	Thank you for the comment. The nutritional needs of algae and rates of nutrient uptake and loss vary by species as well as with environmental factors such as temperature and light. The model incorporates these effects in predicting chlorophyll-*a* concentrations.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
100	Lewis	Pg 11, General	Particulate P must be evaluated quite differently for flowing waters than it is for lakes. In lakes, particulate P includes a large proportion of P within phytoplankton cells; it is not available for uptake because it has already been assimilated by algae. In contrast, particulate P in streams and rivers typically includes a high proportion of TP that is adsorbed onto the surface of fine particles (silt, clay). The mineral adsorption process for P is strong and renders the adsorbed phosphorus unavailable to phytoplankton. As adsorbed phosphorus on mineral particles enters a lake, it passes to the bottom of the water column and is integrated into sediments. Therefore, it does not contribute directly to the bioavailable phosphorus (SRP) of the water column in the lake. Phosphorus often enters the lower water column of fertile lakes from anoxic sediments during lake stratification, but phosphorus that is liberated in this way primarily comes from the decomposition of organic matter that was deposited in the lake through growth and death of phytoplankton. Therefore, adsorbed (mineral) phosphorus for practical purposes is irrelevant to the concentration of available phosphorus (SRP) in the upper water column, where algae grow.	Thank you for the comment. The CAEDYM model includes sedimentation losses of particulate P and only uses Orthophosphate as the bioavailable form of P.
101	Lewis	Pg 12, General	Because adsorbed (mineral) particulate phosphorus does not stimulate phytoplankton growth, particulate phosphorus should not be included in modeling or prediction of phytoplankton abundance for a lake. Lake Elsinore receives much of its TP from the San Jacinto River through Canyon Lake and from direct watershed drainage, but should not be assumed to respond to the particulate component of phosphorus in the supply water. In using TP for modeling and evaluation, TMDL analysts have combined available and unavailable P, which is incorrect.	As noted in the response to Comment #100, the CAEDYM model only uses Ortho-P for algal uptake (approximated by SRP). The model also includes sedimentation losses as well as potential for resuspension of inorganic particulate P and decomposition-release of SRP from particulate organic forms. The simulations used SRP and particulate forms of P based upon available analytical measurements to reflect the inventory of P forms summarized as TP. Since uptake, transformations and loss influence different forms and proceed at different rates, TP reflects the sum of all these transformations and losses that occur over time.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
102	Lewis	Pg 12, General	An unusual source of phosphorus for Lake Elsinore is supplemental water, which consists of tertiary treated municipal effluent. The TMDL authors show a great deal of respect for this water source, as they should, given that it is the only means by which the volume of the lake, as reconfigured with a reduced area, can be stabilized. There appears to be a strong tendency, however, to view this phosphorus source as not subject to regulation because of its importance as a water source. This attitude, if continued, will undermine the possibility of establishing reduced abundance of bioavailable P in Lake Elsinore. The TMDL target for concentrations of TP in supplemental water has been 0.5 mg/L (more properly, 500 µg/L), but in the future may be lower (~320 µg/L), which reflects recent TP in the supplemental water (Table 5-1).	We agree that tertiary-treated municipal effluent represents an unusual water supply for a natural lake. Balancing water budget and nutrient budget goals is a unique challenge for Lake Elsinore. The revised TMDL imposes a more stringent effluent limit on EVMWD's future discharges to Lake Elsinore by requiring TP concentrations in those discharges to be no greater than that found in the natural stormwater runoff entering the lake (e.g. 0.32 mg/L, i.e., 320 µg/L). In addition, the Lake Elsinore Aeration and Mixing System (LEAMS) was designed to further reduce the concentration of bioavailable phosphorus by increasing DO levels in the lake that encourage SRP to bind with iron. These efforts, along with source control activities in the upper watershed, when taken together, are projected to produce water quality conditions (measured by the response variables: chlorophyll-*a* , DO and ammonia) which are better than would occur under natural, pre-development land use conditions. It is not expected to eliminate all algae blooms in Lake Elsinore but it is expected to prevent excessive algae growth caused by waste discharges. See also the response to Comment #85 regarding further reductions of phosphorus in the treated effluent.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
103	Lewis	Pg 13, General	At 320 µg/L, the supplemental water would still be a potent eutrophication agent for Lake Elsinore. Supplemental water will, according to the TMDL document, accounts for ~27% of the water supply for the lake, and could in the future increase in volume. The SRP portion of TP in the supplemental water has been ~80% (Table 5-1); for 320 µg/L TP, the water would yield 260 µg/L SRP, which is far above any reasonable target concentration for available P in the upper water column (~25 µg/L). Therefore, the 320 µg/L target should be reduced if the goal is to suppress algal abundance. The TMDL proposes reduction (Table 7-1), but without specificity. The supplemental source offers a means of reducing the mean SRP in Lake Elsinore source water. For example, 10-year averages of TP from tertiary wastewater treatment plants at four different locations of the western US in communities that have modest funding for wastewater treatment are as follows: 20, 31, 29, 13 µg/L. Also, very little of the TP from these facilities is SRP (~3 µg/L). The provider of supplemental water for Elsinore may not be able to justify the cost of the necessary additional tertiary treatment, but the Lake Elsinore phosphorus control effort can justify the value of additional treatment for the large supplemental water source as a means of actually diluting SRP in Elsinore; the TMDL should pursue this opportunity if control of bioavailable P supply is intended to control algal growth.	See the response to Comments #85 and #102.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
104	Lewis	Pg 14, General	Lake Elsinore shows complete depletion (anoxia) of deep water oxygen in the warm season, when the bottom waters can be physically separated from the overlying mixed layer because of density differences caused by a vertical thermal gradient. Anoxia is accompanied by suppression of redox potential in the sediments. The severity of redox potential suppression is shown by release of phosphorus (well documented) and apparently the release of sulfide in some instances. Sulfide is not produced in significant amounts during anoxia in most lakes; it is most likely to be released during deep water anoxia in lakes that have a rich sulfate supply that accompanies salinity, as is the case for Lake Elsinore. Sulfide is toxic to nonmicrobial aquatic life, as is anoxia.	It is true that Lake Elsinore does become stratified during the warm season and this, in turn, can lead to oxygen depletion (anoxia) in the deeper areas. This phenomena occurs naturally and cannot be entirely prevented. However, LEAMS was designed to mitigate these effects. Long-term water quality monitoring data confirms that LEAMS is achieving the 35% reduction in TP flux from the lake-bottom sediments that was assumed and required by the 2004 TMDL. Sulfide releases from the lake bottom sediments are believed to be naturally occurring and are not related to waste discharges from stormwater runoff or EVMWD's discharges to Lake Elsinore. Both the existing TMDL (2004) and revised TMDL are focused on controlling nutrient concentrations in the lake. Water quality problems associated with natural sulfide levels are beyond the scope of this TMDL but will be considered as a potential cause of the "Unknown Toxicity" previously identified as a separate water quality impairment in the lake.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
105	Lewis	Pg 14, General	The release of phosphorus from the sediments is correctly diagnosed in the TMDL as caused by conversion of ferric to ferrous iron at redox potentials that are expected in response to prolonged anoxia. This mechanism is common in fertile lakes. In fact it is not confined to eutrophic lakes; it can occur even in lakes that have moderate trophic status. A key factor affecting occurrence and severity of bottom water anoxia is the volume of the hypolimnion, which determines the amount of hypolimnetic oxygen that is available when the water at the sediment surface produces an oxygen demand during stratification, at which time oxygen depletion cannot be offset by vertical mixing extending from top to bottom of a lake. Lake Elsinore has high oxygen depletion rates because the lake has a modest hypolimnetic volume and is hypertrophic, which insures a rich supply of decaying algal biomass and fecal matter from grazers descending to the sediment surface. The sediments of Lake Elsinore have been studied extensively through both experiments and monitoring. The rates of P release have been well quantified.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
106	Lewis	Pg 15, General	Phosphorus leaves the sediment surface when it is released from ferric iron, which holds phosphate, because low redox potential causes the ferric iron to be converted to ferrous iron, which is soluble. Phosphorus attached to ferric iron that becomes ferrous iron thus is released as soluble SRP. Both phosphorus and ferrous iron then enter the water column from the sediment. This is not the end of the story for phosphorus because transport of SRP upward toward oxidized water some distance above the sediments causes reversal of the chemical processes that led to separation of ferric iron and phosphate. Ferrous iron, after contacting oxygen above the sediment, is converted back to ferric iron, which in turn can form a precipitate with SRP. Ferric phosphate formed in this way returns to the sediment as a flocculant material consisting of iron, phosphorus, and hydroxide complexes. Therefore, it is common for much of the phosphorus released from sediments to return to the sediments. This phenomenon varies from one lake to another, but it is certainly erroneous to characterize the release of phosphorus from the sediment as an intact source of bioavailable phosphorus at the surface of the water column. Therefore, contrary to the assumption given in the TMDL document, internal loading of P is a mystery source, given that its magnitude is unknown as related to SRP at the surface of the water column. Internal loading may be a significant source of bioavailable P in the upper water column, but it is being incorrectly characterized as a sediment source that reaches the surface without loss.	As noted in the response to Comment #81, a detailed characterization of sediment properties, including Munsell color of surface sediments, micro-redox profiles, porewater nutrient concentrations and Fe speciation evaluated sedimentological properties. Core-flux measurements of ortho-phosphate under different temperature and DO levels demonstrated release of ortho-phosphate under all water column conditions. The conditions present in Lake Elsinore do not conform to the classical Fe-P paradigm; rather they follow more biogeochemically complex pathways (e.g., as described by Hupfer and Lewandowski. 2008. *Oxygen Controls the Phosphorus Release from Lake Sediments – a Long-Lasting Paradigm in Limnology* . International Review of Hydrobiology 93: 425-432). More generally, simple mass balance considerations underscore that internal recycling from bottom sediments must constitute the primary source of P and N to the water column especially during years of very limited runoff.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
107	Lewis	Pg 15, General	The TMDL document cites past installation of submerged tubes for moving water at the sediment-water interface in a manner intended to achieve reduction of oxygen loss from the sediment surface. I was unable to determine the manner in which the system functions. Evidently, however, extreme loss of oxygen persists in deep water. If transfer of SRP from the sediment to the upper water column is significant, which is likely, fractional reduction of the area of anoxia on the bottom likely will not be consistent with control of SRP sufficient to suppress algal growth.	Section 7.2.3.3 (pg 7-23) provides basic information on operation of the LEAMS and how it functions. Horne (2018, see reference in Section 12) provides additional information: "Since 2009, the N&P added in the makeup water has been offset with artificial aeration of the lake supplied by four large air compressors and long runs of perforated pipe on the lake bed. The technique supplies little oxygen directly since the air bubbles rise rapidly and exit to the atmosphere in less than 30 seconds. Air bubbles acts as tiny lift pumps and entraining surrounding water and lifting it to the surface. There it mixes with surface oxygen generated by algae before sinking back down towards the lake bed. The added oxygen modifies sediment bacterial activity lowering the amounts of N&P released from the mud. Aeration-mixing thus can offset the N&P discharged in the makeup water." The errata includes a revision to the text to add the Horne (2018) reference as a source of additional information on the operation of LEAMS.
108	Lewis	Pg 16, General	Reduction of the severity of oxygen depletion has an additional rationale, aside from control of eutrophication, in that mixing of anoxic water from the bottom with surface waters under conditions that cause the water column to bring anoxic water to the surface in quantity (during fall mixing or intermittent temporary summer mixing of the water column) is of importance because such mixing can cause fish mortality. Fish mortality in lakes that are not extremely shallow almost never eliminates fish populations, but the associated nuisance caused by decomposition of dead fish and the alarming nature of the mortality to the public justifies efforts to eliminate it in Lake Elsinore.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
109	Lewis	Pg 16, General	Control of algal abundance in Lake Elsinore, if successful, would not be a complete solution for deep water anoxia. Much undigested organic matter is present in the sediments and would continue to cause anoxia in the deepest waters indefinitely for the future, even at a lower trophic status for the lake. Therefore, anoxia on the lake bottom must be eliminated by engineering practice. Elimination of anoxia may be impossible in Elsinore because of the immense volume of oxygen that is need to offset the rapid loss of oxygen to the richly organic sediments in this large lake. Table 7-1 proposes aeration in the future. Probably oxygen demand is too great to be offset by aeration alone, given the size of the lake. Destabilization of warm season layering (often accomplished by large scale airlift of bottom water) might be a more effective and efficient in that it enables natural wind driven gas exchange of the full water column. This problem deserves further study, but could prove impractical because the lake is quite large	While it would be desirable to eliminate all deep water anoxia in Lake Elsinore, including that which is naturally-occurring, the focus of this TMDL is on preventing anthropogenic waste discharges from making the natural water quality problem any worse. The complete mixing alternative suggested by the Peer Reviewer has been previously considered but was abandoned based on concerns that destratifying the lake may result in several unintended consequences, including: increased temperature stress on some fish species and turbulence-induced resuspension of nutrient-rich sediments. The plumbing and infrastructure required to achieve such complete mixing would also interfere with normal recreational uses in the lake. LEAMS was designed and constructed to maximize the amount of aeration and mixing while minimizing the potential for adverse side-effects.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
110	Lewis	Pg 17, General	Removal of carp from the lake is justified in the TMDL document in that carp mobilize sediment phosphorus and also impair the sport fishery, presumably by negative effects on other fish. Both of these motivations are questionable in practical terms. It is very unlikely that carp are responsible for a significant amount of bioavailable phosphorus enrichment of surface water in Lake Elsinore. The sediments in shallow water are oxic and contain little SRP beyond what is in the water already. Further disturbance by carp is unlikely to be incrementally significant in releasing SRP. Studies probably are based on TP, which is not relevant in that it likely is dominated by particulate mineral P. Also, removal of carp seems unlikely to have significant effect on the abundance of game fish in this large lake. Thousands of warmwater lakes over the United States have large carp populations, yet show significant populations of game fish. If this component of the TMDL is to be continued, it needs to be much more rigorously justified. Documentation of the value of the carp elimination in the TMDL is not satisfactory at present.	As noted in responses to Comment #106, surficial sediments across most of the lake are in fact anoxic with high porewater concentrations of NH4+ and SRP, with foraging by benthivorous fish shown to resuspend nutrients and help drive eutrophic conditions in shallow lakes (e.g., Moss, B. 1998. *Ecology of Fresh Waters: Man and Medium, Past to Future* . 3rd ed. Blackwell Science, Oxford, UK. 557 pp.). The TMDL Technical Report does not claim that the foraging behavior of carp contributes a significant amount of phosphorus to the water column. On the contrary, the best estimate is that it is less than 6% of the total internal load to the lake. However, the fact that the contribution is relatively small does not mean that it should be ignored. The CNRP and AgNMP are designed to implement a wide range of source reduction strategies which, collectively, are expected to produce significant improvements in water quality. While a 6% reduction in internal TP loads may not sound like much, it is a larger than the load reductions being required of several of upstream cities in order to meet their assigned WLA. For this reason, no controllable source is considered "too small" to include in the overall source reduction strategy.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
111	Lewis	Pg 17, General	As explained in the TMDL document, sample collection was initially quite ambitious and has passed through several stages of moderation. For a few years, sample collection was suspended as a means of saving money. The least justifiable way of saving money in the TMDL process for Lake Elsinore is to stop collecting data. As various practices are evaluated for effectiveness in changing Lake Elsinore, the only reliable index of change is empirical, i.e., the observed condition of the lake. The proposed sampling program for the future, as given in the TMDL document, shows a modified and simplified sample collection program. The new plan is justifiable as to location of stations and reduction of the number of stations. Sampling frequency, however, has been reduced to an unacceptable degree, in my opinion. For documentation of trophic conditions and water quality associated with trophic condition, a lake should be sampled approximately 15 times per year, with emphasis on the growing season, i.e., the season when phytoplankton show highest abundance and strong temporal variation in abundance. Phytoplankton can be sampled less frequently in the period of deep mixing, but some samples should be collected in cool weather for the purpose of providing contrast with stratified conditions. Bimonthly sampling of lakes is not sufficient to support interpretation except when the lake is quite stable, i.e., in the cool season for this warm monomictic lake.	The Regional Board agrees that water quality monitoring is an essential element of successful TMDL implementation. The reduced level of in-lake monitoring that occurred in 2012-13 was temporary. The Board authorized this change so that the funds could be reallocated to accelerate implementation of various water quality improvement projects. At the time, much of California and particularly Riverside County were in the midst of a severe recession. There simply were not enough public resources available to fund both activities simultaneously. Thus, the Board determined that project implementation was the highest and immediate priority. After the projects were completed, and the recession passed, water quality monitoring programs were fully restored and even expanded. The Peer Reviewer states that bi-monthly sampling is not sufficient to support interpretation of water quality conditions in the lake, but there is considerable long-term water quality sampling data to indicate that both lakes are, in fact, quite stable. Higher resolution (monthly) sampling data have been collected in 2010, 2014, 2017 and 2019. These data show that water quality conditions do not vary quickly or dramatically from month to month. Nor has the additional data helped facilitate better decision-making or project implementation.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
112	Lewis	Pg 18, General	Watershed (river) sampling should provide information on both storm flows (as recognized in the TMDL) and base flows. Rivers sampled in association with eutrophication should be sampled approximately 15-18 times per year, and paired with quantitative flow data. In the case of Lake Elsinore, appropriate appreciation of storm conditions is reflected in the TMDL document, but sampling frequency needs to cover all magnitudes of storm flow, the constituents of which should be volume weighted.	Historical sampling data and stream flow analysis indicates that 95% of the nutrient loads transported to both lakes occurs in just a few relatively large storm events each year. These storms are already routinely monitored. The San Jacinto River is intermittent; limited or even no flow may occur outside of rain events. Non-storm baseflows have been previously characterized as negligible in both volume and nutrient load and additional sampling adds considerable cost while providing no meaningful value. The current sampling program does cover all magnitude of storm events and the constituent analytes are volume-weighted as the Peer Reviewer recommends. Nutrient concentrations (based on storm event flow-weighted composites) are quite consistent overall.
113	Lewis	Pg 18, General	The analytical coverage for Lake Elsinore is relatively narrow, but this narrow focus is justifiable on grounds of the very specific purpose for this study, i.e., identification of eutrophication characteristics and water quality conditions associated with oxygen depletion in deep water. Especially for the lake, it is essential that the study include analysis of SRP with detection limits that are appropriate for interpretation of the purpose at hand, i.e., 2-3 µg/L if the observed concentrations fall below the current detection limit of 20 µg/L (they may not). Some autoanalyzers, operated with appropriate care, are capable of this type of resolution. Chemically oriented technicians who understand the importance of water contamination in the lab or field environment are necessary to avoid occurrence of misleading values for SRP at low concentrations. SRP is the main basis for interpreting the role of the watershed in determining trophic status in the lake. If SRP is consistently above 20 µg/L, however, high resolution is not needed.	When the monitoring program/QAPP are updated during implementation of the revised TMDL, this comment will be further considered. Currently, the Method Detection Limit/Reporting Limit (MDL/RL) for SRP for the TMDL monitoring program is MDL = 16 µg/L and RL = 50 µg/L. At these levels, detections are observed in approximately 70-80% of the samples. The monitoring team is already investigating the capability of existing contract laboratories to lower the MDL/RL for this monitoring program.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
114	Lewis	Pg 19, General	Nitrate, which is directly available to phytoplankton, is included in the list of analytes, but is not discussed in the TMDL document. The detection limit for nitrate is too high; it should be ~5 µg/L. TN, in contrast to nitrate and ammonia, is often mostly inert, in that it includes organically bound nitrogen that is not bioavailable; emphasis on TN is not useful. Nitrite, although usually scarce, should be analyzed separately in that it can accumulate in the hypolimnion and thus be a cause of mass mortality of fish (chocolate gill mortality) at times of vertical mixing.	When the monitoring plan/QAPP are updated during implementation of the revised TMDL, this comment will be further considered. The existing TMDL monitoring program uses the following MDL/RL levels for nitrate: MDL = 160 µg/L and RL = 200 µg/L. At these levels, infrequent detections (< 10%) are observed. The monitoring team is currently evaluating the capability of available laboratories to lower their MDL/RL for this monitoring program.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
115	Lewis	Pg 19, General	The ammonia concentrations that appear in all of the waters sampled for this study are surprisingly high. For example, in looking for reference purposes at water draining from a watershed similar to that of the San Joaquin River under conditions where point sources are not dominant, I see a mean ammonia concentrations of ~5 µg/L. For surface waters of the lake receiving this water, I see ammonia concentrations of ~6 µg/L. Persistently low concentrations of ammonia are expected in oxygenated inland waters because of the processes of microbial nitrification and uptake of ammonia by algae. The reason for the high concentrations of ammonia reported in the TMDL needs to be investigated. It is possible that the analytical method, which is referenced and corresponds to an EPA approved automated method, is not giving the correct information or the samples are becoming contaminated in some way. The detection limit is far too high (100 µg/L). High concentrations of ammonia are expected in the deep waters of a lake that has low oxygen concentrations (for the lake mentioned above, median 47 µg/L), but concentrations typically are low in lake surface waters and river waters, except those that are exposed to strong point sources of ammonia, which may or may not apply to the San Jacinto River above Canyon Lake and Lake Elsinore (text is not clear on this point).	The existing TMDL monitoring program uses the following MDL/RL levels for ammonia: MDL = 44 µg/L and RL = 100 µg/L. At these levels, detections are observed in approximately 80-90% of the samples. The monitoring team has identified another laboratory that can achieve lower levels: MDL = 12 µg/L and RL = 100 µg/L; however, with ammonia already being detected on a regular basis at the current MDL/RL, it would be appropriate to do a cost benefit analysis to evaluate the need to have lower MDL/RL levels at this time. This evaluation can be completed during preparation of an updated monitoring program/QAPP to support the revised TMDL.
116	Lewis	Pg 20, General	The toxicity of ammonia should be evaluated by the current USEPA criteria and not by the historical criteria, which were based on unionized ammonia only. Results of these two types of evaluation will be slightly different; the difference could be important in the evaluation of ammonia for toxicity.	Thank you for your comment. The water quality criteria for ammonia that were used to develop the TMDL numeric targets are consistent with the approved ammonia criteria contained in this region's Basin Plan.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
117	Lewis	Pg 20, General	Measurement of chlorophyll is exceedingly important for the TMDL. Sampling near the surface (0-2 m) and over the entire water column is conducted as part of this of the TMDL studies. I would prefer to see a vertical profile on all dates. Algal biomass is not always distributed evenly in the mixed layer because of the tendency of cyanobacterial bloom species to move toward the surface in calm weather in response to vacuoles that form inside the cells. A profile shows this phenomenon, whereas integrated samples do not. Samples taken only near the surface may give data that do not correspond to an average for the entire mixed layer.	The current and proposed water quality monitoring program includes measurement of chlorophyll-a concentrations in both surface samples and depth-integrated samples. The Peer Reviewer recommends analyzing both sample types in every sampling event at every sampling station. The Regional Board will consider this comment when the monitoring program/QAPP are revised after the TMDL becomes effective.
118	Lewis	Pg 20, General	I am not in agreement with the authors of the TMDL that satellite images are a reasonable substitute for field sampling as a basis for estimating chlorophyll. Satellite images are more suitable for ocean waters, which are not contaminated by the multiple optically active substances that are found in lake water. Also, surfacing of buoyant blooms may distort estimates of chlorophyll per unit volume based on imaging. It is possible to use satellite imagery successfully for very clear, oligotrophic lakes that approach ocean conditions, but I would reject data that are based on satellite data for the purposes of this TMDL. I suggest a stronger conventional sampling program for chlorophyll.	The satellite imaging program has been used to characterize Lake Elsinore and Canyon Lake for ten years. It is intended to supplement, not "substitute" for field monitoring in both lakes. In particular, it provides a means for characterizing algae concentrations across the entire surface of the lake rather than relying on just a few field samples to represent more than 3,000 acres. The TMDL Task Force has conducted several studies confirming the accuracy and precision of satellite-based data; there is a consistently high correlation between such data and laboratory results from field samples collected concurrently with the satellite overpass. The Regional Board acknowledges that there are important limitations on data gathered by satellite technology. For this reason, such data is used to measure long-term trends in water quality but is not used as the primary tool for assessing compliance with the TMDL. Notably, while Lake Elsinore and Canyon Lake were among the very first to use remote sensing to support a TMDL, the USEPA has since supported this technology and has integrated it into the National Lakes Assessment Program.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
119	Lewis	Pg 21, General	I saw only one mention of phytoplankton species composition in the TMDL document. It is brief and qualitative. Phytoplankton composition is an important component of evaluation for the TMDL. Cell counts are expensive but they do not need to be done in great quantity. Perhaps one upper water column sample per month at the deep water station for Lake Elsinore would be adequate.	Section 2, pages 2-47 to 2-49, provided a summary of available phytoplankton community data from Lake Elsinore at the time the TMDL Technical Report was developed. Phytoplankton speciation is not necessary for the development of the TMDL. However, to demonstrate the effectiveness of LEAMs as part of a strategy to offset phosphorus diffusion from lake sediments, algal speciation samples are currently being collected monthly through 2021 at Site LE02 (mid-lake). In addition, the TMDL Task Force is currently collecting fish, zooplankton and phytoplankton data to support preparation of an updated fishery management plan for Lake Elsinore. The findings from all of these efforts will facilitate decision-making during implementation of the revised TMDL.
120	Lewis	Pg 21, General	Recording sondes are used for collection of some TMDL data; these are left in the lake continuously. This is a much more difficult way of collecting data than might seem to be the case. Sondes can drift out of calibration or, for some substances, suffer from biofilm impairment. Accurate continuous recording of water quality conditions is more complicated and more subject to error than time specific sampling. Flawed continuous data are a tremendous nuisance to interpret and undermine confidence in the data on water quality.	Real time data sondes are currently and successfully being used as a supportive measure, but not for compliance determination. These data have been exceptionally valuable to assess episodic events such as fish kills or unexpected algal blooms. Based on experience, with routine maintenance during water quality monitoring events the sondes have worked consistently over the past few years.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
121	Lewis	Pg 21, General	Presentation of water quality data for the TMDL is based in most cases on samples taken from the entire water column. The vertical gradient of nutrients and biomass in lakes is strong during stratification; the integration gives a misleading impression of lake water quality; it quantifies neither the mixed layer where phytoplankton grow nor the bottom where bacteria control the environment; it is a mixture of these two distinct environments.	In addition to the Canyon Lake figures developed to support the response to Comment #13 (see addendum, Figures 13-1 and 13-2), Lake Elsinore surface (0.5 m below surface), integrated (full water column depth-integrated) and bottom (0.5 m above sediment) data results are provided in the attached addendum (see Figure 121-1). These data indicate that nutrient concentrations are typically similar between samples collected at varying depths of the water column. Lake Elsinore is a shallow lake with limited stratification, which may explain the comparable concentrations. Differences between the epilimnion and hypolimnion are certainly distinct in Canyon Lake, but this lake regularly stratifies. How data are collected/presented in the future can be considered during development of an updated monitoring program/QAPP to support the revised TMDL.
122	Lewis	Pg 21, General	Lake Elsinore is monomictic; seasonal mixing occurs in winter and the lake is stratified in summer. The lake has low relative depth, and therefore may show upwelling, partial mixing or deep mixing on an irregular basis during the warm season. These events affect phytoplankton distribution and nutrient availability. This dimension of study, which is quite basic for lake trophic analysis, is missing from the TMDL.	Comment noted. The Regional Board may consider this comment when the monitoring program/QAPP are revised to support implementation of the revised TMDL.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
123	Lewis	Pg 22, General	The modeling of Lake Elsinore as applied to the key water quality problems, which are abundance of algae and anoxia in deep waters, is not useful. As mentioned in the report, the model has difficulty even in mimicking the historical record for chlorophyll. Prediction of future conditions with hypothetical changes in specific variables, including phosphorus supply, is not credible. This flaw is not caused by technical inadequacy of the modeler or the model. The critical predictions are beyond the state of the art for a lake such as Elsinore. Rigorous use of empirical data and the known P requirements of algae will produce the most useful understanding of the response of the lake to control practices.	While we acknowledge that predictions of chlorophyll-*a* did not faithfully reproduce the extreme variations in concentration present in Lake Elsinore (< 10 to > 400 µg/L), the model did reasonably reproduce mean values for chlorophyll-*a* and captured general seasonal and interannual trends for chlorophyll-*a* , as well as lake level, temperature, total dissolved solids and TN and TP. Moreover, the model results underscored the extreme variability in hydrology, lake level and salinity present.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
124	Lewis	Pg 22, General	The model includes the concept of a reference condition. The reference condition is a P source that matches the Canyon Lake/Lake Elsinore watershed runoff from undisturbed lands. Emphasis is TP, which is erroneous. Also, bioavailable P in Elsinore is strongly affected by supplemental water and both lakes are affected by internal loading, which may be moderated in Canyon Lake by alum treatments. Threshold conditions for SRP supply should be established as targets, and should include all sources. The key condition for Lake Elsinore is reduction in chlorophyll a that brings the lake into a qualitatively different state than it now shows. Establishment of this state will require SRP reduction in the volume weighted mixture of all sources (including supplemental water) to ~25 µg/L and elimination of anoxia over sediments, probably by airlift destratification. Peak chlorophyll then will be approximately equal to SRP in the lake surface water, if averaged over the mixed layer (as determined by a thermal profile).	The Regional Board agrees that eutrophication is largely a function of bioavailable phosphorus rather than TP. However, this does not mean that using the latter as a reasonable surrogate measure of the former is an "error" as the Reviewer suggests. Because TP tends to be highly correlated with Ortho-P, it was possible to achieve acceptable calibration of the lake simulation model using TP. This is sufficient to compare and contrast the probable effectiveness of various water quality remediation strategies. The important distinction between TP and bioavailable phosphorus was not ignored or forgotten during this analysis. For example, using alum to bind Ortho-P to form aluminum phosphate will not change the overall concentration of TP but it will reduce the fraction that is bioavailable. It is possible to accurately account for this reaction without measuring Ortho-P directly. Nevertheless, the stakeholders have continued to collect and analyze Ortho-P data in the water quality monitoring program for more than 15 years. Those data were available for use to help calibrate the lake simulation models. The Reviewer's suggestion that anoxia must be eliminated and SRP levels reduced to < 0.025 mg/L would require stakeholders to achieve water quality conditions far better than that which could occur under natural, pre-development conditions. That would be beyond the scope of this TMDL which is focused on preventing the adverse effects caused by anthropogenic waste discharges in order to assure compliance with the narrative water quality objective in the Basin Plan.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
125	Lewis	Pg 23, General	The TMDL document contains a list of supplementary control measures that may be under serious consideration. There is no strong argument or persuasive evidence of validity for any of these supplementary control measures. Macrophytes will not grow in Elsinore because of changes in shoreline position. Meaningful competition of macrophytes with phytoplankton is a phenomenon of small, shallow lakes; it will not occur in Lake Elsinore. Zooplankton grazers do not control average or peak algal abundance in eutrophic lakes; their abundance in such lakes is irrelevant to chlorophyll concentrations. Algal harvesting and algal poisoning are ineffective in controlling phytoplankton in large lakes. Phytoplankton have a doubling rate of approximately one day under favorable conditions. Attempting to offset this growth rate by mechanical or chemical means in a large lake is not feasible.	The TMDL Technical Report is not required to select or justify any particular nutrient control measure. The survey of implementation alternatives described in Section 7 is intended only to demonstrate that there are a range of options available to the stakeholders as they are developing their TMDL compliance strategy.
126	Lewis	Pg 23, General	It is important that the TMDL process be focused on the control processes that make the lake undesirable from the viewpoint of human recreation or aesthetic appeal. There should be an elimination process for distracting ideas that cannot be validated even in concept. There is no harm in considering a wide variety of ideas, but the field of discussion and action should be narrowed so that attention and money can be focused on practices that are most likely to have a meaningful effect on the problems at hand. The TMDL maintains a broad focus because the participants in the TMDL process have brought many thoughts to bear on the problem in these thoughts have carried forward through previous stages of TMDL development and implementation to the present time. The TMDL process should become increasingly clear and sharply focused on specific possibilities as it matures through multiple renewals. The plan for lake improvement will be well served by a narrower focus, a skeptical approach to novel proposed solutions, and rigorous testing of ideas rather than acceptance and continuous discussion of ideas that are irrelevant or ineffective.	The Regional Board agrees that the TMDL implementation process should focus on reasonable and practical strategies that are most likely to produce a beneficial effect. The Board also agrees that the control measures implemented to improve water quality should not interfere with recreational activities or the aesthetic appeal of the lakes. The deliberative process used by the Task Force has an excellent track record for focusing on practical solutions based on rigorous testing backed up by empirical data - just at the Reviewer recommends. The wide range of implementation strategies identified in Section 7 is evidence of the stakeholder's thoroughness not an indication that they are being distracted by, or are insufficiently skeptical of, novel ideas. The significant improvements in water quality achieved to-date clearly show otherwise.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
127	Lewis	Pg 24, General	Is P suppression of algae possible in Lake Elsinore? It is not clear from the TMDL document that implementation of the TMDL procedures as defined in the document have any chance whatsoever of changing the water quality status of Lake Elsinore. While modeling as well as some of the analysis and interpretation is based on concentrations of TP rather than concentrations of bioavailable P, there is enough information on SRP to support some tentative conclusions about the overall feasibility of the TMDL goals.	Many of the implementation measures described in the TMDL document have already significantly improved water quality in both lakes, which is why they are anticipated to be included in the implementation strategy under the revised TMDL (see Table 7-12 - Implementation and/or revision of Existing Water Quality Controls). Long-term local residents have publicly testified that water quality in Canyon Lake is the best they've seen in more than 40 years as a result of the alum application program. And, without EVMWD's discharge of recycled water, because of extreme drought Lake Elsinore would have dried up completely in 2015 and remained that way for most of the next 2 years. Simulation models are merely tools to help stakeholders evaluate and select which alternatives show the most promise for improving water quality and therefore deserve additional field testing. This iterative process has achieved remarkable results in a relatively short period of time. The Regional Board supports the stakeholders' efforts to continue using this approach to achieve compliance with the revised TMDL.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
128	Lewis	Pg 24, General	Suppressing phytoplankton abundance in Lake Elsinore requires suppression concentrations of SRP in supply water that reach and then extend below the threshold of scarcity that caps growth in phytoplankton abundance. This goal requires control of three sources of SRP: watershed runoff, supplemental water, and internal supply of phosphorus to surface water from sediments. Table 5-10 in the TMDL document gives composite SRP concentrations for storm flow runoff in the San Jacinto River above the two lakes as 280 µg/L. Given that storm flows are the major source of water for the two reservoirs, the watershed SRP supply to the two lakes would be near 280 µg/L under current conditions. Even if this source were reduced by 50% through watershed mitigation, the SRP entering the two lakes would be far above concentrations that would limit the growth of phytoplankton at an appropriate abundance (chlorophyll ~25 µg/L at approximately 25 µg/L SRP).	The goal of the TMDL is to restore the lake to the level of water quality it was expected to have under natural, pre-development conditions in the absence of any pollutant loads from anthropogenic activities. This is its Highest Attainable Condition. The Regional Board lacks legal authority, and is disinclined, to impose regulations requiring dischargers to reduce phosphorus to levels 90% less than that which would occur naturally in an undeveloped watershed. Further, the Regional Board is concerned that there may not be any reasonable, practicable or feasible means of complying with such an obligation even if the Board were to impose such an obligation.
129	Lewis	Pg 25, General	Supplemental water reaching Lake Elsinore has an SRP concentration of 260 µg/L and a mean TP of 320 µg/L. This source, if left intact, will prevent the strong suppression of SRP in Lake Elsinore that is necessary to bring the lake to the threshold for suppression of algal biomass. The supplemental water is of potential value, however, in that it can be brought to an SRP concentration that is negligible (< 5 µg/L) through a higher degree of tertiary treatment and thereby dilute other sources. Dilution from this source still would not be strong enough, however, to overcome the high concentration of SRP in the watershed supply water.	Further reductions in the concentration of SRP in EVMWD's treated wastewater is among the options and alternatives that the stakeholders intend to consider as they develop their long-term compliance plan to implement the revised TMDL.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
130	Lewis	Pg 25, General	A third major source for SRP in Lake Elsinore is internal loading. Release of SRP from anoxic sediments to the water just above the sediment is known, but the rate of transport to surface waters where phytoplankton grow is unknown. It is reasonable to assume that this is a significant source that could be eliminated or minimized by destratification of the lake, but the practicality of destratification is unknown.	The existing LEAMS project serves to destratify Lake Elsinore and has been shown to be effective. When the stakeholders are evaluating the need to modify existing water quality controls or need for supplemental water quality controls (e.g., through preparation of an updated CNRP and AgNMP), these issues may be further explored.
131	Lewis	Pg 25, General	In their current form, the main sources of phosphorus for Lake Elsinore are very far out of line with the mitigation plan that is based on suppression of algal biomass by reduction of bioavailable phosphorus in the upper water column. If the data at hand are reliable both in terms of analytical results and interpretation, and if mitigation is applied mainly to the watershed source, seems inevitable that Lake Elsinore will be hypertrophic even with a successful TMDL program as identified in the TMDL report. Therefore, the motivation for the TMDL process is not clear. Examination of the empirical data is necessary. Reliance on the model is not advisable because the model evidently is based on a presumed relationship between phosphorus load and chlorophyll. There is no causal relationship of phosphorus and variation in algal biomass at present or in the past because the amount of available bioavailable phosphorus in Lake Elsinore is constantly far in excess of the amount that would allow suppression of phytoplankton biomass. It is necessary that the concept of a threshold for P limitation be the basis for projecting the effects of phosphorus sequestration on the growth of algae in Lake Elsinore. Given the present information and interpretation, the most credible conclusion is that the mitigation program, if completed as proposed, will not produce significant changes in Lake Elsinore.	The models used to develop the revised TMDL are considerably more comprehensive and sophisticated than those used to support the existing TMDL adopted in 2004. If the reviewer is correct that there is, in fact, no causal relationship between phosphorus concentrations and resultant changes to algal biomass, this would not just undermine the proposed TMDL revisions, it would completely invalidate the existing TMDL. The Reviewers criticism appears to be based on the fact that Lake Elsinore is presently over-saturated with phosphorus so it is impossible to discern any change associated with the current in-lake mitigation strategies. This may be partially true, but it does not negate the claim that these efforts are in fact (slowly) reducing phosphorus loads in the lake. Nor does it invalidate the claim that these efforts will cumulate to improve water quality over time. If the Reviewer is correct that the planned mitigation strategies do not restore the lake to its natural condition, then the Regional Board will require the stakeholders to undertake further analyses and implement additional projects.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
132	Lewis	Pg 26, General	Depletion of oxygen leading to anoxia occurs in Canyon Lake. There appears to be no proposal in the TMDL document for remediation of anoxia in the lake. The lake is considerably smaller than Lake Elsinore, and has a more focused deep area and a more expansive shallow area than Lake Elsinore. It is possible that the lake could be destratified in warm weather by methods suggested above for Lake Elsinore. A benefit of destratification would be constant mixing of the entire water column, which could offset the occurrence of anoxia. Under these circumstances, internal phosphorus loading might be minimized. Given the long term expense of alum application, and the accumulative of aluminum in the sediments over decades from this type of treatment, it maybe advisable for the TMDL group to call for a study of feasibility for elimination of deep water anoxia in Canyon Lake.	The TMDL does not require that anoxia be eliminated in Canyon Lake. It requires that DO concentration be restored to levels that are equivalent to that which is expected to occur under natural, pre-development conditions. If the existing mitigation projects fail to achieve that objective, then the Regional Board will require stakeholders to implement additional projects. There are potential projects identified in Section 7 of the TMDL Technical Report that could address the oxygen depletion issue more directly if warranted. The Task Force stakeholders are committed to considering these alternatives as it updates the CNRP and AgNMP.
133	Lewis	Pg 27, General	Concentrations of bioavailable P in Canyon Lake supply water are within the hypertrophic range but can be suppressed by addition of alum to the water column. A fully satisfactory record for the effect of alum is not available in the TMDL document, however. According to the TMDL report, concentrations of phosphorus in the water column are high prior to addition of alum and low afterward. This information is incomplete in that concentrations of bioavailable phosphorus in the lake need to be determined over an entire time course of a year, and not centered around the time of application. Perhaps that information is available, but I did not find it.	The detailed evidence documenting the long-term effectiveness of alum is included by reference in the TMDL Technical Report. It was summarized in the 2016 TMDL Progress Report (see Risk Sciences 2016 referenced in Section 12). More recent documentation is also available in the Lake Elsinore and Canyon Lake Watersheds Nutrient TMDL Monitoring 2018-19 Annual Report, November 2019 (these recent findings are shown in Figures 133-1 through 133-3 in the addendum).

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
134	Lewis	Pg 27, General	Sources of bioavailable phosphorus include the watershed and internal loading. Watershed phosphorus is analyzed in terms of TP coming from the watershed to the lake through the San Jacinto River and from Salt Creek. Watershed sources are broken down by type as they were for the analysis of Lake Elsinore. As indicated for Lake Elsinore, the use of TP as an indicator of phosphorus loading is directly relevant to growth potential for phytoplankton is erroneous. The volume weighted average for SRP is the basis for determining the importance of watershed sources.	Model simulations accounted for inflows of nutrients in bioavailable and particle bound forms. Results are presented as TP to align with allocations and a more robust set of calibration data. Particulate forms are important as they enrich lake bottom sediments thereby increasing internal loading with seasonal patterns. These processes are modeled in the CAEDYM simulations. For example, as noted in response to #100 and #101, the CAEDYM model used in the analyses distinguishes between bioavailable SRP and particulate forms and uses SRP for driving algal growth.
135	Mulla	Pg 1, Section 7	Climate change poses a threat to implementation activities through increased ET of lake, increased water temperature (that affects lake biology and chemistry), and increased likelihood of drought and flood.	Thank you for the comment. Please see responses to Comments #45 and #63 for more information regarding how climate change was considered through development of the revised TMDL.
136	Mulla	Pg 1, Section 7	Table 7-1 of the Technical Report summarizes studies and plans undertaken since the 1990's (Phase I activities) to improve water quality in Canyon Lake and Lake Elsinore. A wide range of implementation activities resulted from these studies, including BMPs for permitted MS4's (street sweeping and catch basin cleaning) and agricultural CAFOs (manure hauling, dairy waste management, nutrient management plans). Reductions in nutrient loading (and runoff from ag fields) resulting from these activities were not accounted for in a simple model used as the basis for revised TMDLs.	The models do, in fact, account for nutrient load reductions that result from implementing watershed BMPs, but it does so collectively based on the change in concentration and mass entering the lakes. More detailed accounting for the BMP load reductions is provided to the Regional Board as part of the annual reports submitted by stakeholders in accordance with their waste discharge permits.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
137	Mulla	Pg 1, Section 7	Watershed monitoring before and after 2011 showed mixed results for TP concentrations, and reductions of from 9-24% for TN concentrations depending on the location of monitoring station. A more definitive analysis should be conducted to estimate changes in TP and TN loads (see Fig. 4-19) or trends (e.g. Kendall Mann tau test). Results suggest an increased emphasis on managing nutrient loss from forested lands, the largest landuse in the watershed.	Use of post-2011 watershed monitoring data in the calibration was done to reflect more recent land use and watershed BMP deployment. There was no statistically significant difference in nutrient concentrations before and after 2011. The presence or lack thereof of a statistical difference would not have influenced the selection of subset for calibration. Regarding increasing emphasis on managing nutrient loss from forested lands, note that the TMDL implementation program includes an activity to revise USFS Nutrient Management Plans (see Table 7-12 and Section 7.4.2.2). The Regional Board will be working with its partners at the State Water Board and USEPA to implement this element.
138	Mulla	Pg 1, Section 7	Additions of alum to Canyon Lake have proven effective at reducing internal loading of phosphorus (Fig. 7-2 and Table 7-7). In Lake Elsinore, past implementation activities included building a levee, addition of supplemental water, aeration and fisheries management. Water quality and recreational benefits occur when the levee combined with supplemental (reclaimed) water maintains Lake Elsinore water levels at above 1,240 ft, primarily by lowering TDS. Aeration and mixing of Lake Elsinore has taken place since 2007, leading to increased DO levels on the lake bottom, decreased release of internal P via reduction of iron in lake bottom sediment, and increased emissions of nitrogen gas (and removal of ammonia) through cycles of oxidation (nitrification) and reduction (denitrification) in lake bottom water. Fisheries management involved removal of carp from 2003-2008. This action reduced carp populations by two-thirds, and resulted in large reductions in release of TP and TN from lake bottom sediments by bioturbation. The exact magnitude of reductions is not clear, because baseline bioturbation rates were not explicitly mentioned. Are lakewide bioturbation rates currently 2 and 5 mg/m^2/day for TP and TN, or are these the baseline rates? Carp populations in Lake Elsinore remain low (< 6/ac).	Bioturbation rates presented in Section 4.3.2 are for a carp population condition of 900 kg/ha that was recorded in 2000-01. More recent survey information was not available at the time of the TMDL revision linkage analysis. The Task Force completed a new fish survey in 2019 and will soon prepare a report to support future fishery management efforts, including additional carp removal, if warranted.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
139	Mulla	Pg 2, Section 7	Modeling of Lake Elsinore water quality involves three scenarios, namely; watershed reference condition baseline (scenario 1), current development without water quality controls (scenario 2), and current development with water quality controls (scenario 3). Fig 7-7 indicates that scenario 3 reduces chlorophyll a concentrations dramatically compared with scenario 2, and reduces chlorophyll a concentrations better than scenario 1 at concentrations exceeding 150 ug/L. Modeling suggests that internal loading of TP and TN will be reduced by 33 and 22%, respectively, for scenario 3 relative to internal loadings for scenario 2.	Placeholder for Regional Board
140	Mulla	Pg 2, Section 7	Potential Phase 2 implementation activities, summarized in Table 7-10, are primarily focused on reducing internal loading of P and N from Lake Elsinore and/or Canyon Lake. While Table 7-10 specifies the general nature of water quality benefits associated with each of the potential Phase 2 implementation activities, a more specific estimate of reductions in TP and TN (e.g. Low, Medium, High) should be added. These estimates would need to be refined during Phase 2 to prioritize each activity (along with considerations for cost and stakeholder preferences).	The detailed load reduction estimates associated with each of the implementation activities were previously provided to the Regional Board in other documents that are included by reference in the TMDL Technical Report. These include the CNRP, AgNMP, Triennial Progress Reports, Annual Water Quality Reports, and the Permittee's Annual Reports.
141	Mulla	Pg 2, Section 7	The potential activities in Table 7-10 are intended to supplement Phase 1 implementation activities that are based upon lake level control at 1,240 ft in Lake Elsinore, and alum additions in Canyon Lake, combined with nutrient management activities in the watershed upstream of Canyon Lake. The first step in Phase 2 will involve selecting which of the supplemental activities to implement and the schedule for implementing them over the next 15-20 years. Phase 2 implementation is contingent on approval of the revised TMDL by local, regional, state and federal entities.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
142	Mulla	Pg 2, Section 7	Upon approval of the revised TMDL, four primary milestones are envisioned (Tables 7-11 of Technical Report and 6-9s of Attachment A). These include engaging and coordinating with stakeholders, revising existing permits, revising watershed based nutrient management plans for municipalities and agriculture, and implementing existing as well as supplemental activities to reduce external and internal nutrient loadings to Lake Elsinore and Canyon Lake. Water quality monitoring will be continued to assess the effectiveness of these activities at controlling nutrient loadings and the extent to which progress is being made on attainment of the revised TMDLs. Additional research studies are anticipated to support implementation activities, including identification of additional reference sites for water quality monitoring, verify assumptions in developing the revised TMDLs (effectiveness of implemented control activities, refinement of lake models), obtain a better understanding of lake nutrient dynamics, or study the impact of wildfires on nutrient export to surface water bodies. Research will also be needed to specifically model the effectiveness of potential supplementary implementation activities listed in Table 7-10. Finally, progress in attaining the revised TMDL will be evaluated annually and cumulatively every 5 years, and adaptive management techniques will be used to modify the implementation plan as needed.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
143	Mulla	Pg 2, Section 7	Section 7.4.2 and Table 7-12 of the Technical Report (and Table 6-9t of Attachment A) are not entirely consistent with information provided in Tables 7-10 and 7-11 of the Technical Report (and Table 6-9s of Attachment A), as neither the text in Section 7.4.2 nor Table 7-12 (or 6-9t) refer in detail to implementation of potential supplementary activities. Implementation activities in Table 7-12 (and Table 6-9t) are essentially ongoing activities from Phase 1, including Canyon Lake alum additions, Lake Elsinore aeration/mixing and fisheries management, and maintenance of Lake Elsinore water levels through addition of reclaimed wastewater.	Thank you for the comment. The noted table/sections are consistent. Per Table 7-12, stakeholders are required to revise existing watershed implementation plans (CNRP and AgNMP) within two years of the revised TMDL effective date. When revising these plans stakeholders will need to evaluate the need for supplemental projects (e.g., as described in Table 7-10 and elsewhere). This requirement is noted in the description of the "Activity" in Table 7-12. As part of the update of CNRP/AgNMP, stakeholders will also be evaluating existing alum application and fishery management strategies to determine if they need revision/modification from how they are currently being implemented. The need to consider supplemental projects is also captured in Section 7.4.2.3. This text describes the information required to be submitted to support inclusion of any supplemental project in the CNRP/AgNMP (e.g., see page 7-41) .
144	Mulla	Pg 3, Section 7	Section 7.4.2.3 of the Technical Report comes closest to describing how potential implementation activities in Table 7-10 could be incorporated into Phase 2 through revision of watershed nutrient management plans. However, there is no recognition that the activities in Table 7-10 are primarily focused on reducing internal lake nutrient loadings and not export of nutrients from the upstream urban, agricultural or forested watersheds. Export of upstream nutrients is best addressed through watershed nutrient management plans, as is perhaps the topic of Mystic Lake drawdown. It would seem more appropriate to discuss implementation of activities in Table 7-10 that relate to internal lake loadings in Section 7.4.2.4, which is heavily focused on control activities in Lake Elsinore or Canyon Lake per se.	As part of the revision of the CNRP/AgNMP Watershed Implementation Plans, the stakeholders responsible for the submittal of these plans will consider all potential nutrient reduction strategies - both watershed and in-lake strategies. Also note that the Regional Board will be working with the USFS to update their Nutrient Management Plans for the areas under their jurisdiction.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
145	Mulla	Pg 3, Section 7	Stakeholder coordination via the Lake Elsinore Canyon Lake Task Force is briefly mentioned in Section 7.4.2.1 and again at the top of Table 7-12 (and Table 6-9t). Their role is largely limited to implementing the research and analysis needed to revise the Lake Elsinore/Canyon Lake TMDLs, and to implement studies and monitoring efforts to make progress in complying with the revised TMDL. It is recommended that a broader stakeholder engagement process be organized to actually decide on the strategy and timeline for selecting and deploying supplementary implementation activities in Table 7-10. This process is briefly mentioned in Section 7.4.2.4, without specific details who the entities responsible for TMDL compliance are, nor how these entities and associated stakeholders will decide on the strategy or timeline for selecting and deploying supplementary implementation activities.	The TMDL Task Force includes a broad range of stakeholders, including the entities responsible for compliance with the TMDL and the Regional Board. All Task Force meetings are open to the public. When Watershed Implementation Plans (CNRP/AgNMP) are revised to comply with the TMDL, these plans will be publicly-noticed by the Regional Board so that there is an opportunity for public comment before the Board takes any action to approve the plans. In addition to the above, stakeholder engagement will also occur through the required environmental review of projects through implementation of California Environmental Quality Act (CEQA) requirements. For example, when supplemental water quality projects are proposed, these projects will require a CEQA review before they can be implemented. This public review process provides additional opportunity to ensure that a broad stakeholder engagement process occurs.
146	Mulla	Pg 3, Section 7	From a technical point of view, revisions to existing NPDES and wastewater permits (Section 7.4.2.2), revision of existing watershed implementation plans (Section 7.4.2.3), and implementation of existing water quality controls (Section 7.4.2.4) are all reasonable.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
147	Mulla	Pg 3, Section 7	Finding and Assumption for TMDL Implementation - According to Attachment 2: "The Implementation and TMDL Compliance Monitoring requirements of the proposed revised TMDLs provide a reasonable, practicable, and feasible plan for ensuring that waste discharges of nutrients will be controlled to return these waste discharges, and return the lakes, to the revised Watershed Reference Condition (WRC), using a combination of the continuation of all existing TMDL compliance control measures and additional nutrient reduction and control measures to meet the revised TMDLs." In large part, this reviewer agrees with the above finding and assumption from Attachment 2. Phase 1 water quality control activities alone have been shown by lake modeling results (based on water quality monitoring data) to meet or exceed nutrient reductions and water quality objectives needed to attain watershed reference conditions. Adding or substituting potential supplementary water control activities associated with Phase 2 to existing activities implemented under Phase 1 should also allow these objectives to be achieved.	Placeholder for Regional Board
148	Mulla	Pg 4, Section 11	Costs of existing Phase 1 projects are estimated based on recent expenditures (Table 11-1). The largest cost of $1.4 million/yr is associated with release of reclaimed wastewater by EVMWD to stabilize Lake Elsinore water levels. It is not clear whether or not this cost includes operation and maintenance costs of associated with the need to maintain and upgrade infrastructure. This cost is shared by the City of Lake Elsinore and EVMWD, and apparently is based partly on fees for water and sewer service levied on residential, commercial and landscape irrigation customers.	The $1.4 million annual cost for recycled water reflects only the yearly O&M expenses of the incremental wastewater treatment required to meet more stringent TN and TP limits in the NPDES permit. It does not include the prior capital costs to upgrade the treatment plant. Nor does it include a reserve fund to replace such equipment at a future date. It does include normal maintenance and repair of existing equipment. Accordingly, the estimate is probably low and, therefore, conservative. These incremental wastewater treatment costs are shared equally between EVMWD and the City of Lake Elsinore.
149	Mulla	Pg 4, Section 11	As a technical note, EVMWD actually did relax discharges to Lake Elsinore during the floods in January of 2017.	Comment noted.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
150	Mulla	Pg 4, Section 11	MS4 stormwater BMP control measures are estimated to cost $0.4 million annually (Table 11-1). These do not include (and are dwarfed by) costs borne by urban developers for stormwater capture and infiltration on new construction projects. Costs to urban developers would have to be paid, regardless of the TMDL requirements. No estimates are provided for the anticipated extent of urban growth expected during the years 2020-2045, but it is likely to be substantial. As a result, costs to urban developers for stormwater capture and infiltration are also likely to be substantial in future years.	Placeholder for Regional Board
151	Mulla	Pg 4, Section 11	Lake Elsinore/Canyon Lake Task Force agreements and grants fund another $1.2 million/yr in costs to implement Phase 1 activities (Table 11-1) such as water quality monitoring, program administration, lake aeration, addition of alum, and carp removal. It is not clear whether or not the costs for lake aeration and mixing take into account the need for replacement and/or upgrade of existing infrastructure. Since carp removal has only been practiced one time, it is not clear how the annual cost for carp removal was estimated.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
152	Mulla	Pg 4, Section 11	Implementation of Agricultural BMPs during Phase 1 are estimated to cost approximately $10 million. Given that there are less than 60,000 ac of agricultural land in the Lake Elsinore/Canyon Lake Basin, this equates to $166/ac in costs, which seems high. Costs associated with nutrient management or conservation tillage practices on the 46,000 ac of rainfed or irrigated cropland in the Basin would typically be $40/ac or less. Costs associated with installation of dairy waste management systems would typically be exponentially higher, but there are only 816 ac of dairy in the Basin. It would be advisable to provide more detail concerning how the costs for implementing BMPs on agricultural land were estimated. Are there mechanisms in place to track cost share dollars paid to agricultural producers by EQIP along with state or local incentive programs? What is the source of funding for the estimated $10 million expended by agricultural producers? What are the estimated annual costs and sources of funding for continued implementation of BMPs on agricultural land during Phase 2 (e.g. 2025-2040)?	Placeholder for Regional Board
153	Mulla	Pg 4, Section 11	Costs of ongoing Phase 1 water control activities and potential supplemental control activities are summarized in Fig. 11-1. This Figure omits cost estimates for urban watershed BMPs that are described in Section 11.1.2.12. No quantitative analysis of the effectiveness at reducing nutrient loadings is undertaken for any of these control activities. However, for each supplemental control activity a qualitative description of potential water quality benefits is provided. It would be useful, in addition, to add another sentence or two for each supplemental control activity indicating a categorical classification (low, medium or high) for effectiveness of the activity at achieving water quality benefits relative to other potential supplemental control activities.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
154	Mulla	Pg 5, Section 11	Mystic Lake drawdown is proposed at a rate of 4,000 acre ft per year (AFY). This drawdown is anticipated to send relatively high quality water downstream to Canyon Lake, resulting in flushing of nutrients and algae, and increased ability to stabilize water levels in Lake Elsinore. In my opinion, the water quality benefits would be greatest if drawdowns were timed to periods long enough after intense runoff events at Mystic Lake to allow time for settling of sediment and nutrients. However, water quality benefits of flushing may be offset if water from the Mystic Lake drawdown has high concentrations of phosphorus or nitrogen. Water quality monitoring is needed to determine N and P concentrations in Mystic Lake. The volume of water sent to Canyon Lake during drawdown of Mystic Lake rivals the volume of reclaimed water added to Lake Elsinore, so costs of sending reclaimed water to Lake Elsinore may be offset to some extent by the Mystic Lake drawdown. Costs of drawing down Mystic Lake, including infrastructure, capital costs and operation and maintenance are relatively low at $1.6 million/yr.	Placeholder for Regional Board
155	Mulla	Pg 5, Section 11	Addition of alum to Canyon Lake inflows is proposed during high runoff periods. This alum would bind bioavailable phosphorus entering Canyon Lake before it can diffuse through the water column. This supplemental practice would reduce the need to apply alum treatments to Canyon Lake to bind phosphorus and reduce internal loading of phosphorus from bottom sediments. Costs for alum additions to Canyon Lake inflows during storm events seem relatively low compared to the potentially large water quality benefits (Table 11-3) of this potential practice.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
156	Mulla	Pg 5, Section 11	Incremental increases in the volume of reclaimed water (by 2 MGD or 3.5 MGD) added to Lake Elsinore are being proposed in drought years as a supplemental activity. The annual incremental costs are relatively small ($1.5-2.1 million), and would only occur periodically. Incremental increases in reclaimed water additions to Lake Elsinore could have adverse impacts on water quality, because the water contains low concentrations of phosphorus and nitrogen. / The primary purpose of adding reclaimed water is to stabilize lake water levels above 1,240 ft, with primary benefits for recreational uses. In addition, stabilization of lake water levels may potentially reduce wave induced suspension of sediments, facilitate the establishment of shoreline aquatic vegetation and reduce concentrations of total dissolved solids. However, no solid assessment of the potential benefits of these impacts on water quality was provided.	Placeholder for Regional Board
157	Mulla	Pg 5, Section 11	Hypolimnetic oxygenation is proposed as a supplemental activity to alum additions in Canyon Lake. This is anticipated to reduce internal loading of phosphorus and increase conversion rates of ammonium to nitrate from sediments in the main body of Canyon Lake. There would be no water quality benefits from hypolimnetic oxygenation in the East Bay of Canyon Lake. Costs to construct, operate and maintain the infrastructure for hypolimnetic oxygenation are estimated at about $ 4 million, which seems reasonable.	Placeholder for Regional Board
158	Mulla	Pg 5, Section 11	Dredging of roughly 200,000 cubic yards of bottom sediment from roughly 50 acres in East Bay of Canyon Lake has been proposed by the Canyon Lake Property Owners Association (POA). Their primary motivation is improved access by boats to homeowner docks. A dredging project organized and paid by the POA between 2002 and 2008 removed 20,000 cubic yards before being halted by a court order that reclassified the project as a public works project requiring payment of prevailing wages and doubling the costs of dredging.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
159	Mulla	Pg 6, Section 11	Costs of dredging bottom sediment from the East Bay of Canyon Lake have been estimated at a high cost of $14 million based on wages that would be paid as a public works project, and based on the worst case scenario for disposal of lake sludge in a landfill. POA has proposed saving money by disposing of dredged sediment on the bottom of the western portion of East Bay, on land east in the floodplain of Salt Creek, or on land owned by POA. It is not clear who would end up paying for the costs of dredging East Bay of Canyon Lake, given the strong role played by POA in proposing this project.	Placeholder for Regional Board
160	Mulla	Pg 6, Section 11	Dredging of East Bay would remove sediment that contributes to internal loading of phosphorus and nitrogen. However, in the long-term, internal loading would resume from sediments remaining on the lake bottom. Water quality benefits of the dredging project appear to be temporary and limited in nature. The project also does not address the primary source of the problem, which is delivery of sediment in runoff to East Bay of Canyon Lake. Primary benefits of dredging would accrue to homeowners through improved access by boats to private docks, and increased capacity to store flood water.	Placeholder for Regional Board
161	Mulla	Pg 6, Section 11	Indirect Potable Use involves pumping advanced treated reclaimed water to the northern end of Canyon Lake. This water would slowly flow through the lake, before being withdrawn at the lower end of Canyon Lake for drinking water treatment. The primary purpose and benefit of the project is to provide a local source of potable drinking water. An alternative method for providing local drinking water is to inject the reclaimed water into aquifers, where it would later be recovered and treated to produce a local source of drinking water.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
162	Mulla	Pg 6, Section 11	No water quality benefits to Canyon Lake would occur with the groundwater recharge, recovery and treatment alternative. Water quality benefits to Canyon Lake would only occur with the reservoir augmentation option. These water quality benefits involve dilution of lake phosphorus and nitrogen concentrations. However, since the magnitude of reservoir augmentation (volume added) was not clearly specified (is Phase 1 volume 3,360 AFY at RWRF?), it is not clear that dilution would be a significant benefit in Canyon Lake. In addition, reservoir augmentation in wet periods would increase delivery of nutrients downstream to Lake Elsinore, worsening water quality there.	Placeholder for Regional Board
163	Mulla	Pg 6, Section 11	Costs associated with water quality benefits of indirect potable use equate to the difference in costs for reservoir augmentation versus costs for groundwater recharge, recovery and treatment (Table 11-7). Baseline capital costs considered as a stand alone cost are very high for either option. However, the incremental benefits of reservoir augmentation relative to groundwater recharge are much lower, at approximately $10 million. Since the primary purpose of indirect potable use is to provide a local source of drinking water, it is not clear who would bear the incremental costs associated with the reservoir augmentation alternative.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
164	Mulla	Pg 6, Section 11	Lakeshore vegetation establishment is proposed on up to 100 acres (about 20-30 miles) of Lake Elsinore shoreline and littoral zone. Submerged aquatic vegetation could be challenging to establish and maintain as a result of limited penetration by sunlight in turbid waters, salinity or fluctuating water levels. Water quality benefits could include reduced wave induced shoreline erosion, uptake of phosphorus and nitrogen, improved oxygenation in the near shore region, and improved habitat for fish and benthic organisms. Benefits depend on the success rate of vegetation establishment, and likely would not be large relative to the revised TMDL goals. Costs of establishing lakeshore vegetation are reasonable at roughly $2.9 million. This assumes replanting is not necessary.	Placeholder for Regional Board
165	Mulla	Pg 7, Section 11	Artificial recirculation of oxygen depleted nutrient rich water from the hypolimnion in deep water of Canyon Lake through a three mile pipeline to shallow water at the inlet of East Bay in Canyon Lake, where it would gradually flow back to the main lake. Removal of low oxygen water from the main lake would reduce internal loading of phosphorus and nitrogen. Recirculating water would be reaerated, and would flush nutrients out of East Bay, reducing the severity of algal blooms. Water quality at the water treatment plant in Canyon Lake would be improved. Costs of artificial recirculation in Canyon Lake are relatively high at $11.1 million, and may not be warranted if water quality benefits are small. Costs are primarily due to infrastructure and capital costs, operations and maintenance are relatively small. It also is not clear what proportion of the costs will be borne by local homeowners whose streets are torn up and rebuilt to install the pipeline.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
166	Mulla	Pg 7, Section 11	Ultrasonic control of cyanobacteria algae is proposed in East Bay of Canyon Lake. The entire East Bay area could be treated using 12 ultrasonic units powered by three floating solar panel arrays at a cost of $0.3 million. Sonication would reduce the cyanobacteria population as well as the health risks of associated toxins. There would be no direct impacts of ultrasonic treatments on nutrient levels, nor would algae levels in the main portion of Canyon Lake be impacted.	Placeholder for Regional Board
167	Mulla	Pg 7, Section 11	Algaecide control of cyanobacteria algae in Canyon Lake and Lake Elsinore is proposed using PAK 27, which releases hydrogen peroxide. Cyanobacteria killed using this technique would settle to the lake bottom, potentially producing elevated toxin levels after repeated use of the algaecide. Since lake nutrient levels are not affected by this control activity, algae blooms could reappear following treatment. Costs of algaecide control were estimated at $7 million based on a single annual application to the entire surface area of Canyon Lake and Lake Elsinore to a depth of four feet. Costs may be underestimated, as It is unclear whether or not a single application would be sufficient for control of cyanobacteria.	Placeholder for Regional Board
168	Mulla	Pg 7, Section 11	Harvesting algae from a barge is proposed in Lake Elsinore, and perhaps the main portion of Canyon Lake. Harvested algae could potentially be sold for biofuel, compost, or nutritional supplements if no toxins are present. Costs do not include potential revenue from sale of harvested algae, nor are the potential costs of disposing toxic algal residue considered. There is an overestimate in cost calculations of $1.2 million, as Lake Elsinore is 20 times smaller than Klamath Lake, not 20% of the area. Water quality benefits of harvesting algae are anticipated to include reductions in chlorophyll-a, removal of N and P taken up in algal biomass, and reduced release of toxins into lake.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
169	Mulla	Pg 7, Section 11	Urban watershed BMPs are proposed to capture and infiltrate runoff from large storms with a return period of 5 years. A strategy is described that involves regional detention and infiltration basins that store 6 ft of water, bioretention structures that store 1.5 ft of water and pervious pavement. The approach to considering urban watershed BMPs seems rather lacking in detail, narrow in scope and short term in vision. Detail is lacking on how much of the 90,000 acres of existing urbanized land could be retrofitted, and how much homeowners would be engaged through education and incentive programs. The cost estimate seems based on treating runoff from only a 500 acre urban drainage area. The section is narrow in scope, as it does not consider conversion of land to xeriscaping, use of rainbarrels, stormwater collection system infiltration systems, controls on application of N and P to lawns, or sweeping of leaf and lawn litter. Proposed activities are focused only on short term and not on policies to guide future urban development that would place a greater emphasis on reducing cumulative impacts of stormwater runoff on Canyon Lake and Lake Elsinore.	Placeholder for Regional Board
170	Mulla	Pg 8, Section 11	Cost estimates for urban watershed BMPs are based on an economic analysis by the Santa Ana Water Board on methods to control bacterial water quality objectives during dry weather. Neither low impact development BMPs nor controls on N and P use or sweeping of lawn and leaf litter are comparable with methods to control bacterial water quality. A statement to the effect that costs for installing permeable pavement are unreasonable leads to a question about whether costs for installing bioretention structures are also unreasonable? The economic analysis for urban watershed BMPs is lacking in detail, is narrow in scope, and short term in vision, and so does not lend confidence to the results presented.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
171	Mulla	Pg 8, Section 11	Section 11.12 has the objective of discussing the potential natural resource and economic benefits of implementing water quality controls in Phase 1 and 2 of the TMDL and revised TMDL. Many of these bullets are written in a generic fashion that does not allow for the extent of natural resource or economic benefits to be assessed (even in a relative sense such as low, medium or high). For example, how much will lakeshore vegetation improve fish populations? How much will use of Lake Elsinore and Canyon Lake for boating, fishing and swimming increase as a result of implementing water quality controls? The downward trend in purchase of fishing licenses is not a benefit. What aspects of aesthetic benefits and ecosystem health will improve? How much is lake clarity and hence property values expected to improve? What cost savings will result from improved water treatability? How will improvements in the health and water quality of Canyon Lake affect the health of species in and around the lake? What are the economic benefits (externalities) associated with all of the above? Are any efforts planned to better link water quality objectives associated with the revised TMDL to any of the above natural resource or economic benefits through modeling or quantitative analysis?	Placeholder for Regional Board
172	Mulla	Pg 8, Section 11	Section 11.13 on potential funding sources for implementation of agricultural water quality control measures contains adequate detail. It would be useful to provide a similar level of detail for all other water quality control measures discussed in Section 11 of the report.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
173	Mulla	Pg 8, Section 11	Finding and Assumption for Economic Analysis. According to Attachment 2: "The supporting documentation and evidence for the revised TMDLs includes an Economic Analysis of the proposed revised TMDLs that evaluates the potential costs of compliance with the proposed revised TMDLs. As well as the potential costs of compliance to agriculture, and identifies potential sources of funding to help the agricultural community subject to the Revised TMDLs to comply. The Economic Analysis provides a sound and supportable evaluation of the potential costs of compliance, as required."	Placeholder for Regional Board
174	Mulla	Pg 8, Section 11	To a moderate degree, this reviewer agrees with the above finding and assumption from Attachment 2. Costs of implementing Phase 1 water control activities are based on historical data associated with their ongoing implementation in Lake Elsinore, Canyon Lake and their upstream watersheds. Costs of implementing potential Phase 2 supplemental water quality control activities are largely based on sound assumptions and economic analysis.	Placeholder for Regional Board
175	Mulla	Pg 8, Section 11	To some extent, this reviewer disagrees with the cost estimates for implementing potential supplemental water control activities in Phase 2. For example, costs of dredging seem overestimated, since the local Property Owner Association (POA) has identified private land for sludge disposal.	Placeholder for Regional Board
176	Mulla	Pg 9, Section 11	Costs of harvesting algae from a barge are also overestimated due to a mistake in accounting for the difference in area of Lake Elsinore relative to Klamath Lake. Costs of implementing urban watershed BMPs seem somewhat questionable based less on the cost analysis per se, and due more to the lack of detail regarding area of implementation, narrowness in scope of selected BMPs, and lack of a long term vision for alternative mechanisms (policies, incentives, etc.) to achieve nutrient reductions from urban watersheds.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
177	Mulla	Pg 9, Section 11	Three other weaknesses of the Economic Analysis also warrant mention. First, there is little discussion about the reasonableness or feasibility of costs for implementing potential supplemental water quality control activities during Phase 2 (with the exception of dredging and installing permeable pavement). Part of this stems from a lack of effort to identify the cost/lb of nutrient reduced, in other words the absence of an assessment on economic effectiveness of achieving nutrient reductions for any individual water quality control activity. Much more emphasis is needed on this assessment of economic effectiveness during Phase 2. Another part stems from a failure to identify potential funding sources for potential supplemental in-lake water control activities.	Placeholder for Regional Board
178	Mulla	Pg 9, Section 11	Second, the Technical Report does not always identify who bears the costs of implementing potential supplemental water quality control activities in comparison to whom benefits the most from their implementation. For example (one among many possible examples), dredging would primarily benefit Canyon Lake homeowners along East Bay by providing them with better boat access to their docks. Water quality benefits of dredging are minor. Would the costs of dredging be borne primarily by these homeowners or more generally by stakeholders in the Canyon Lake watershed?	Placeholder for Regional Board
179	Mulla	Pg 9, Section 11	Third, the economic assessment does not employ full cost accounting techniques to assess costs or benefits associated with externalities such as recreation, fish populations, property values, etc. To a large degree, there is a great need to quantitatively link water quality outcomes provided through lake modeling with outcomes important to stakeholders, such as recreation, fish populations, and property values.	Placeholder for Regional Board

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
180	Yearsley	Pg 2, General	In the precise mathematical definition of CDF, the probability is a function of the random variable and, therefore, plotted as the ordinate rather than the abscissa. The probability of all events occurring is, of course, 1.0 and, generally, displayed as such.	Comment noted.
181	Yearsley	Pg 3, Ex. Summary	Executive Summary-Page Es-4: The term, 'Linkage Analysis' is used here and in several other places before being defined on Page 3-13.	Comment noted. References to "linkage analysis" up to page 3-13 are usually references to it being a key component of TMDL development or in reference to the existing TMDL (2004) (as is the case in Executive Summary). It is not until Section 3 when a discussion of TMDL development methods occurs. This is when it was most appropriate to first define the term..
182	Yearsley	Pg 3, Section 1	Tech Report-Page 1-1: 'The TMDLs specified numeric targets for DO, chlorophyll-a, ammonia, TP —'. The carbon: chlorophyll a ratio, where carbon is a measure of phytoplankton biomass is not a constant (e.g., Yacobi and Zohary, 2010)	Comment noted. The context here is only to list the constituents with numeric targets in the existing TMDL (2004).
183	Yearsley	Pg 3, Section 1	Tech Report-Page 1-2: -Aluminum sulfate ("alum") binds with phosphorus thereby preventing excess algae growth in the lake. As of February 2018, 1,520 metric tons of alum have been applied' The precipitate is a solid waste (e.g., FACT SHEET FOR NPDES PERMIT WA-002447-3 City of Spokane - Riverside Park Water Reclamation Facility (POTW) and Spokane County (Pretreatment Program)). Is there consideration of the impact of this on the lake ecosystem, as in Table 10-1?	Alum (aluminum sulfate) is an USEPA-approved pesticide commonly used to prevent the growth of nuisance algae. It is on the list of Inerts of Minimal Concern) which identifies "other ingredients for which USEPA has sufficient information to reasonably conclude that the current pattern of use in pesticide products will not adversely affect public health or the environment." (54 FR 48314). A full CEQA review was completed prior to commencing alum applications in Canyon Lake. As part of that review, EPA's standard test methods were used to demonstrate that the planned alum doses did not cause chronic or acute toxicity to freshwater fish or invertebrate species. Nor has there been any evidence of any adverse ecological effect on Canyon Lake following the routine alum applications that began seven years ago. All alum applications are authorized under NPDES permits, which require pre- and post-monitoring and are overseen by the Regional Board.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
184	Yearsley	Pg 3, Section 1	Tech Report-Page 1-2: '--estimate nutrient loads to both lakes (LESJWA 2010)'. This reference is not in the archived list of references.	The reference is included in the Technical Report reference list: LESJWA. 2010. San Jacinto Watershed Model Update - Final (2010). Prepared by Tetra Tech. Inc. October 7, 2010. A copy was included in the administrative record.
185	Yearsley	Pg 3, Section 1	Tech Report-Page 1-2: Anderson (2012a) does not include any discussion of model development for Canyon Lake. Rather, it evaluates the effectiveness of certain chemicals for sequestering the macronutrients, nitrogen and phosphorus. It is not clear from the report regarding the way in which they are included in the water quality model. The report by Anderson (2016abcdef) describes the model development for Lake Elsinore, only. More discussion of model development is in Section 5 of the Tech Report. However, it would seem more logical to build the case for model development prior to discussing the results.	Model development was discussed in more detail in Anderson 2012c. The errata provides the updated reference information.
186	Yearsley	Pg 3, Section 2	Tech Report-Page 2-33: "Currently, monitoring and analysis of nutrients and chlorophyll-a occurs monthly during the summer months of July, August, and September, and bi-monthly between September and July" compared to "Beginning in July 2016, the monitoring frequency of Lake Elsinore was increased to bi-weekly during the summer months of July, August, and September:" Clarify which monitoring frequencies are in effect. The latter is best for capturing the frequency and magnitude of plankton blooms.	Thank you for noting the error. Sampling is Monthly June - Sept. When the monitoring program was re-initiated in July 2015, the previous monitoring program bi-monthly sampling schedule for both lakes was continued. Beginning July 2016, monitoring in Lake Elsinore was increased to monthly during the summer months, and remained bi-monthly the remainder of the year. The errata removes the following the sentence: "Beginning in July 2016, the monitoring frequency of Lake Elsinore was increased to bi-weekly during the summer months of July, August, and September."

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
187	Yearsley	Pg 3, Section 2	Tech Report-Page 2-35 & 36: The discussion of TP is confusing. Prior to January 1993, orthophosphate concentrations in Lake Elsinore were below detection limits. The report suggests that the overflow from Canyon Lake in 1993 resulted in increased TP in Lake Elsinore. The observed data for TP are only shown for the period, 2002-2016, however. For these observations, TP is initially near the TMDL limit, but varies greatly from ~0.8 mg/L to < 0.1 mg/L. Was it due to additional influx from Canyon Lake or rather to some internal processes in Lake Elsinore?	The observation that TP was likely due to Canyon Lake overflow is included in the 2000 TMDL Problem Statement prepared by the Regional Board. The 2002-2016 dataset does not cover this earlier time period thus it is not possible to provide a more thorough assessment of this hypothesis.
188	Yearsley	Pg 4, Section 2	Tech Report-Page 2-47: "-- finding that may be expected for a shallow eutrophic lake." Reference?	Reference: Horne, A.J. and C.R. Goldman. 1994. Limnology. Errata includes the full citation.
189	Yearsley	Pg 4, Section 2	Tech Report-Page 2-56: 'As in Lake Elsinore, a majority of the phosphorus in the water column in Canyon Lake exists in soluble reactive form (Ortho-P).' The discussion then changes immediately to a discussion of TP: 'Spikes in TP of greater than 1.0 mg/L were recorded in August 2007, and several dates between October2010 and June 2011.' And does not mention Ortho-P again. Since the report claims that Ortho-P is the major component of TP and is the component available for phytoplankton growth, it should be given more attention and clarification.	The annual monitoring reports and the TMDL progress reports submitted to the Regional Board include a more detailed discussion on Ortho-P.
190	Yearsley	Pg 4, Section 2	Tech Report-Page 2-58: Methods are available for performing statistical analyses on nondetects (Table 2-15)	The problem statement sought to provide a broad characterization of water quality conditions, especially during periods of eutrophication. As such, statistical analysis of non-detects was not conducted/included for this section of the TMDL Technical Report.
191	Yearsley	Pg 4, Section 2	Tech Report-Page 2-75: What is 'mobile-P' and what is its significance?	Mobile-P chart shows the portion of phosphorus in bottom sediments that is either organically bound or iron bound

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192	Yearsley	Pg 4, Section 2	Tech Report-Page 2-77: 'Anderson (2012d) estimated the half-life (t1/2) of nutrients delivered to the lake bottoms of Canyon Lake (t1/2 of 6.7 years for organic-P and 16.7 years for TN) and Lake Elsinore (t1/2 of 60.4 years for organic-P --' What's the significance of this? Is it in the model? Does organic P equal TP for eroded soils?+E208	The half-life of nutrients is critical because, once nitrogen and phosphorus reach the lakes, they tend to cycle in the aquatic ecosystem. The nutrients support algae growth; when that algae dies, the nutrients are released as it decays and the cycle starts over again. It takes many cycles over many years before the nutrients are eventually no longer bioavailable. Since the existing lake bottom sediments are the largest single source of bioavailable nutrients, mitigation projects must prioritize this source in order to have a meaningful impact on water quality just as Dr. Lewis stated in his Peer Review comments. The existing alum and LEAMS projects are intended to address the in-lake nutrient sources in the near-term as stakeholders implement watershed source control BMPs to reduce future nutrient loads to the lakes over the long-term.
193	Yearsley	Pg 4, General	Agreed that the revised Problem Statement provides a scientifically defensible description of the water quality problems in the Lakes related to excessive algae caused by waste discharges after appropriate responses to review comments.	Placeholder for Regional Board
194	Yearsley	Pg 4, Section 3	After addressing the concerns expressed in the peer review, agreed that the establishment of a revised Watershed Reference Condition based on the asymmetric 99-year hydrologic record and no anthropogenic discharges of nutrient wastes, provides a scientifically sound basis for establishing the following Numeric Targets for the Lakes and establishing a scientifically justifiable method for establishing the TMDLs, WLAs, and LAs, as well as the reductions in the waste discharges.	Placeholder for Regional Board
195	Yearsley	Pg 5, Section 3	Tech Report-Page 3-2: 'numeric nutrient endpoint (NNE)' It would be better if this were in the main text rather than in a footnote.	Comment noted.

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196	Yearsley	Pg 5, Section 3	Tech Report-Page 3-4: 'The revised TMDL includes a numeric target for chlorophyll-a, which is a measure of a pigment found within algae, and a commonly used measure of algae concentration in surface waters.' If this is, in fact a commonly used measure of algae concentration (biomass?), there needs to be a reference. See comment above regarding C:Chl.	Errata includes revised text to note that chlorophyll-*a* is an indicator of algal density; citation for Horne and Goldman (1994) also added.
197	Yearsley	Pg 5, Section 3	Tech Report-Page 3-5: 'Chlorophyll-a, a pigment found within algae, is a commonly used measure of algae concentration in surface waters' There should be a reference here, as above.	See response to Comment #196
198	Yearsley	Pg 5, Section 3	Tech Report-Page 3-10: "A CDF is a plot of a statistical distribution for a set of data" See General Comment above	Comment noted. We agree with the mathematical definition provided in Comment #180; however, the TMDL Technical Report provides a description that is intended to help the lay person understand the plots.
199	Yearsley	Pg 5, Section 3	Tech Report-Page 3-10: "However, over time, future water quality data converted to a CDF should align with the CDF of historical water quality, if no significant changes are made in the watershed or to the lakes that impact water quality in the lakes' This is a leap of faith. Furthermore, it may only be true in the (unlikely) event the second clause in the sentence is true. A better rationale would seem to be to invoke other examples such as the one from Chesapeake Bay (EPA 2003) rather than making claims regarding the immutability of the CDF's.	It is true that the watershed will continue to urbanize over time. However, the MS4 permits require all such development to meet rigorous new on-site source control standards. Similar new BMP requirements have also been imposed on agricultural operators and dairies in the watershed. Consequently, water quality in future stormwater runoff is expected to improve over time. The TMDL Technical Report does not claim that the CDF's are "immutable," it merely states that this approach, which recognizes the full dynamic natural range of conditions in both lakes, more scientifically valid and technically defensible than using static target values as was done in the original TMDL (2004).
200	Yearsley	Pg 5, Section 3	Tech Report-Page 3-11: 'logical premise'	In the errata "logical" was removed from the sentence
201	Yearsley	Pg 5, Section 3	Tech Report-Page 3-11: The issue raised in footnote 3 is addressed in Sections 3.2.2.1, 3.2.2.2 and 3.2.2.3. The footnote is not necessary.	The footnote provides clarity as previously requested by stakeholders during development of the TMDL Technical Report.

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202	Yearsley	Pg 5, Section 3	Tech Report-Page 3-14: 'It is not possible to calculate the toxicity of ammonia for all volume elements at a daily time-step, using the lake water quality models developed in the linkage analysis. Moreover, it would be infeasible for future monitoring to assess whether ammonia toxicity is at levels that would naturally occur at a comparable spatial scale' Why is this the case? The model used for the reference condition, CAEDYM (Hipsey et al., 2005) simulates water temperature and pH. Algebraic relationships for unionized ammonia are well known (https://rdrr.io/cran/AmmoniaConcentration/man/ammonia.html). Or use the algorithm in Table 5-9n of Attachment A.	It would be possible to calculate free ammonia based on model results.
203	Yearsley	Pg 5, Section 3	Tech Report-Page 3-18: In terms of readability, it would seem that the discussion of the models used in developing the reference condition (Section 5) would precede the discussion of the way in which they are applied.	The order of presentation of information was discussed at length during development of the TMDL Technical Report. However, it was deemed best to have the order of the report chapters follow USEPA guidance on development of a TMDL. Additional narrative was provided where needed to explain the unique relationships between source assessment, linkage analysis, and allocations in the reference watershed approach.
204	Yearsley	Pg 6, Section 3	Tech Report-Page 3-18: A reference is needed for the model ELCOM. (Hodges, 2000?)	The errata includes the following citation: Hodges, B. and C. Dollimore. 2006. Estuary, Lake and Coastal Ocean Model User Guide.
205	Yearsley	Pg 6, Section 3	Tech Report-Page 3-19:The reference condition for Canyon Lake is based on a computationally intensive application of a 3-D model. Review of this approach is in Section 5, Linkage Analysis, Sections 5.2 and 5.3.	Errata includes added text to address in Section 3.3.2,

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
206	Yearsley	Pg 6, Section 3	Tech Report-Page 3-21,3-22: There is something troubling about these 'CDF's'. In the case of chlorophyll a and Total Ammonia-N, how can there not be a probability that all values of both of these state variables be equal to 1.0? The fact that in the reference condition the lake has no water should not be relevant. If there is no water, there are no phytoplankton. As for DO, it is somewhat surprising that over a 100-year period, the volume of water is either equal to or greater than 5.0 mg/l or 0.0 mg/l. Seems odd and needs an explanation.	The fact that the lake was completely dry during some periods in the reference condition is relevant. The Regional Board's goal is to preserve and protect beneficial uses in Lake Elsinore. In order to achieve that outcome, the lake must first be kept wet. From a fish's point of view, water quality that is less than ideal is still preferable to no water at all. The key regulatory question is: What is the Highest Attainable Condition? This question can only be answered by comparing the natural lake condition to the managed lake condition across multi-decadal time spans. With regards to the CDFs, the numeric targets are intended to classify periods of dry lakebed as extreme cases of naturally occurring beneficial use impairment. Accordingly dry lakebed conditions are built into the CDFs. For DO in Lake Elsinore, the steep vertical segment of the CDF stems from rapid depletion of oxygen under certain time periods when the entire water column quickly drops below 5 mg/L. In other words, anoxic conditions were found to impact the entire profile when they do occur and vice versa.
207	Yearsley	Pg 6, Section 5	Tech Report-Page 5-4: 'Lakes and reservoirs tend to be more complex systems than a 0-D model can represent.' There should be a reference here, or at least at discussion of the time and space scales for which the 0-D is valid compared to 1-D, 2-D or 3-D.	Comment noted. 0-D modeling was not used in this TMDL; thus no need for additional discussion or a reference.

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208	Yearsley	Pg 6, Section 5	Tech Report-Page 5.4: 'Geometric complexity of Canyon Lake, combined with its vertical stratification, requires a 3-D model such as ELCOM to capture key processes of physical transport and vertical nutrient fluxes.' What is ELCOM? A justification for using a complex 3-D model like ELCOM requires considerably more discussion than this. The horizontal aspect ratio of Canyon lake (Width/Length), shown in Figure 2-33, suggests that a 2-D model that accommodates branches (CEQUAL-W2, for example) would be entirely appropriate, Such a model would be much less demanding computationally than the 3-D model chosen here. Furthermore, there is no reference to measurements of currents or water quality constituents that support the conclusion that a 3-D model would provide better results than a 2-D model.	While a 2-D model could have been used to simulate conditions in Canyon Lake, there was an interest on the part of the stakeholders and others to use a common water quality-ecology model (CAEDYM) for both lakes. Since CAEDYM has been packaged with the 1-D DYRESM and 3-D ELCOM hydrodynamic models, the 3-D model was utilized, rather than adopt an alternative model such as CE-QUAL-W2. Moreover, the lateral-averaging of a 2-D model does impose geometric constraints on transport processes especially during large runoff events that are not present in 3-D models.
209	Yearsley	Pg 6, Section 5	Tech Report-Page 5-7: 'CAEDYM includes full eutrophication kinetics and can adequately represent water column water quality dynamics in both lakes. Water quality in Lake Elsinore and Canyon Lake was simulated using CAEDYM v.3.' The reference to CAEDYM (Hipsey et al., 2006(5?)) is to Version 2.2. Assuming Version 2.2 and Version 3.? are essentially the same, there should be considerably more discussion of which of the many compartments (Figure 1.1, Hipsey et al., (2006)) are applicable or are being simulated for the Lake Elsinore/Canyon Lake TMDL.	The biogeochemical processes within the model pertinent to C, N, P and DO were used in the simulations; the aquatic food web for Canyon Lake was defined by nutrients, three classes of phytoplankton (cyanobacteria, chlorophytes and diatoms) and two classes of zooplankton, while fish were included for Lake Elsinore owing to availability of electrofishing and hydroacoustic fish surveys that highlight the potential role of zoo planktivorous threadfin shad on algal abundance.
210	Yearsley	Pg 6, Section 5	Tech Report-Page 5-16: Define 'relative percent error (%RE)'.	The relative percent error values presented are means of relative error computed for pairs of model and measured data or the relative error between predicted and observed values as noted in this section.
211	Yearsley	Pg 6, Section 5	Tech Report-Page 5-16: 5.3.5 Water Quality Model Summary Statistics. Assessing model acceptability should be based on more than simply relative percent error (%RE). See Marias et al., 2007 for a discussion and various metrics.	While incorporating other metrics would provide a more detailed description of model performance for the completed work, it is thought that %RE adequately captures overall model performance for key water quality parameters.

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212	Yearsley	Pg 6, Section 5	Tech Report-Page 5-18: 'intensive computational demand of the ELCOM 3-D hydrodynamic model restricted the simulation to a 5-year time period for calibration.' Using a simpler model here, as described previously would make possible a longer period of record for creating the reference condition.	We agree that a simpler model would have allowed for a longer duration simulation, but as noted in the response to Comment #208, there was interest in using a common water quality model for both Canyon Lake and Lake Elsinore.
213	Yearsley	Pg 7, Section 5	Tech Report-page 5-21: 'For internal water quality processes, default water quality parameters were used in CAEDYM (Hipsey et al. 2006) except for key parameters for bioavailable nutrient (SRP and NH4) fluxes and SOD, as follows' The behavior of the many compartments in Figure 1.1 of Hipsey et al. (2006) is controlled by the parameter estimates. While it is not necessarily the case that the estimates are unique to a specific ecosystem, there should be an in-depth discussion of why these parameters can be used in the models for Lake Elsinore and Canyon Lake. The flow of carbon to phytoplankton, as characterized by its surrogate, chlorophyll a, will be affected by the flow of carbon to the other compartments of zooplankton, fish and macroalgae. These features may not be ones that are part of either of the aquatic ecosystems included in the TMDL. As a result, carbon flow simulated by the model may be quite different than that which occurs in either Lake Elsinore or Canyon Lake. It's difficult to say whether or not aggregating the results at a fairly high level, which is the case for this report, reduces the uncertainty associated with using parameterization that is not representative of the system. However, it does suggest that a much less complex model with fewer compartments might provide as satisfactory a result. Increasing model complexity does not necessarily decrease model uncertainty.	See the response to Comment #209. Default values were used for most model parameters owing to the lack of site-specific data to support alternatives.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
214	Yearsley	Pg 7, Section 5	Tech Report-Page 5-23: 'As with DYRESM, the ELCOM and CAEDYM models require a very large number of parameters; default values were used for almost all thermodynamic and chemical/biological/ecological values'. How is this different from the parameter estimates mentioned above? Similar comments to those above apply.	This redundancy was an editing error.
215	Yearsley	Pg 7, Section 5	Tech Report-Page 5-24: 'Model parameters were varied to improve goodness-of-fit between observed and predicted values.' Which parameters? How does this relate to the previous discussion regarding parameter estimation? This is a highly underdetermined inverse problem for which the actual version of the model being used has thousands of parameters and for which observations are limited.	A limited number of parameters were adjusted to improve goodness-of-fit, including increased DO half-saturation values for SOD and PO4 and NH4 release from bottom sediments to better match empirically measured flux rates.
216	Yearsley	Pg 7, Section 5	Tech Report-Page 5-30: Table 5-5 should include other metrics for evaluating model acceptance as in Marias et al. (2007).	See the response to Comment #211.
217	Yearsley	Pg 7, General	Agreed that the revised TMDLs sets revised Numeric Targets, based on a scientifically justifiable assumption that excessive algae growth in the lakes is that which would occur under a watershed reference condition without the inputs of any nutrient waste discharges by man, and that nutrient waste discharges to the Lakes will be controlled to be no more than the reference watershed nutrient runoff after addressing peer review comments.	Placeholder for Regional Board
218	Yearsley	Pg 7, General	The likelihood that the Numeric Targets for the Lakes will provide for the return of the Lakes to the modeled WRC is increased by the use of Cumulative Distribution Frequencies (CDFs) for the Numeric Targets for the Lakes, but not certain.	The CDF's are intended to provide the best estimate of the exceedance frequencies under the natural, pre-development reference condition. They should not be construed to characterize the level of "certainty" that a given lake management strategy will be successful or not.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
219	Yearsley	Pg 8, General	Tentative agreement that the model used provides a scientifically defensible method for approximating the response of the Lakes to watershed discharges of nutrient wastes and the internal flux of nutrients from the sediment in the Lakes. This would depend on the responses to review comments above and in Section 5, below.	Placeholder for Regional Board
220	Yearsley	Pg 8, General	Agreed that the revised TMDLs for nutrients in the lakes, using the Numeric Targets, Source Analysis, and Linkage Analysis, provide scientifically defensible revised TMDLs for nutrients in Lake Elsinore and Canyon Lake after addressing the peer review comments.	Placeholder for Regional Board
221	Yearsley	Pg 8, General	The references below should be added to the list of references, as should the URL's in the text above and those mentioned in the text, above, where references are missing or incorrect (list provided in letter)	The errata includes the references added per the responses to the comments provided by the Peer Reviewers.
222	Yearsley	Pg 8, General	Tech Report-Page 7-24 and Figure 7-6: 'Some corroboration of these offsets has been found in the DYRESM-CAEDYM model' How can there be corroboration with 1-D model when this is very likely to be, based on Figure 7-6, a 2-D phenomenon.	The 1-D model simulated the suppression of nutrient flux as a result of increased DO in lake bottom as an aerial average
223	Yearsley	Pg 8, General	Tech Report-Figure 7.7: This 'CDF' suffers from the problem discussed above for pages 3-21 and 3-22. That is, the probability that all the values of chlorophyll a can never be 1.0 in the reference condition. As a result, the reference condition and the modeled scenarios cannot be compared.	The reviewer misinterpreted the CDF graph. The graph is not saying that all (100%) of the chlorophyll-*a* values are 1.0 in the reference condition. It is stating that all (100%) of the chlorophyll-*a* values expected to occur in the reference condition are at or below this maximum value. The highest expected value in the CDF has a probability of 1.0 and the median expected value has a probability of 0.5.

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224	Yearsley	Pg 8, General	Tech Report-Figure 7.8: Why doe+E198s the scenario with the controls in place perform more poorly than the one without controls?	The Peer Reviewer has misinterpreted the CDF graph. The green line depicting the current condition with TMDL controls shows significantly few days and a significantly smaller volume of Lake Elsinore that fails to meet the DO target of 5 mg/L than the line red line depicting the current condition without TMDL controls. But both are better than the blue line indicating the reference condition primarily due to the fact that without human intervention to stabilize water levels, Lake Elsinore would periodically dry up completely. For comparison purposes, a dry lake bed is assumed to have 0 mg/L DO.
225	Yearsley	Pg 8, General	Tech Report-Page 7-35: 'Given the longevity of climatic cycles and the potential impacts from climate change' See Blickenstaff et al., (2013).	Thank you for the comment. The errata adds Blickenstaff et al. (2013) as a reference in Section 7.1.4 and in Section 12, TMDL Technical Report references. The findings in Blickenstaff et al. note the potential effects of climate change in the region; these findings are consistent with what is noted in the TMDL Technical Report (Section 7.1.4 - warmer temperatures, increased evaporative losses and more extreme wet weather events). Blickenstaff includes an analysis of potential impacts to Lake Elsinore out to 2100. Findings are consistent with the Technical Report's conclusion that continued supplemental water inputs to the Lake are important for maintaining beneficial uses. These findings also support the wet-lake strategy discussed for Lake Elsinore in Section 7.4.
226	Yearsley	Pg 8, General	Tech Report-Sections 8.2.3 and 8.2.4: Monthly and bi-monthly monitoring may not adequately capture peak values of constituents, particularly those of phytoplankton. Based on the discussion on Page 2-47, (seasonal succession dominated by diatoms in the winter and cyanobacteria during summer months (Appendix A, Figure A-6) bi-monthly monitoring in Lake Elsinore in the winter may not be adequate.	The Regional Board will consider this comment when the monitoring program/QAPP are revised after the TMDL becomes effective.

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
227	Yearsley	Pg 9, General	Tech Report- 9.1 Approach 1 - Numeric Target and 9.2 Approach 2 – Reference Condition Model: Does compliance accommodate uncertainty in model estimates of the reference condition? See EPA (2003) for a detailed analysis of the way it was characterized in the Chesapeake Bay TMDL.	The reference condition model applied to future years for compliance demonstration does account for uncertainty by way of including a significant margin of safety in the development of reference nutrient concentrations based on medians. Future supplemental monitoring from undeveloped canyons (included in the TMDL program of implementation) will provide additional data to validate the reference condition or make a case for revision.
228	Yearsley	Pg 9, General	What is the rationale for using the previous 10-year period for testing compliance? Should the reference condition be updated by replacing older years with more recent ones?	The reference watershed nutrient washoff was estimated based on the median of the monitoring data from Cranston Guard Station, which provided a large margin of safety relative to using an arithmetic mean. Thus, there is some conservatism in the numeric targets. If the dischargers are unable to demonstrate compliance with in-lake approach 1 (comparing data to target CDF) or approach 2 (comparing data to extended reference model for overlapping compliance period), then they have alternative methods involving demonstration of external load reduction. The 10-year period to test compliance was chosen to be consistent with 2004 TMDL; however, it is not a sufficient period of time to capture the multidecadal hydrologic patterns in Lake Elsinore (this led to the development of approach 2).

No.	Reviewer	Letter Pg, Report Section	Comment	Draft Response
229	Yearsley	Pg 9, General	A major scientific issue, addressed only marginally in Sections 7.1.4 and 7.4.1.2, is that of climate change. It seems likely that the reference curves, for which basin hydrology plays an important role, will evolve as the climate changes. Furthermore, water temperatures, which control many processes in lakes and rivers such as saturation levels of DO and CO2 and growth rates of aquatic organisms, are likely to increase. Numerous studies (e.g., Blickenstaff et al., 2013) and databases (e.g., Livneh et al., (2013) and Abatzoglou (2013)) are available to simulate conditions under projected levels of climate change.	See responses to Comments #45, #63 and #225.
230	Yearsley	Pg 9, General	Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices? There are elements of the scientific knowledge, methods and practices upon which the rule is based that can be improved. The most vulnerable element is that of the development and interpretation of the reference condition. Selection and application of the models used to develop the curves are likely to be the subject of considerable scrutiny. As a result, both the methods and applications of the methods should be stated clearly and accurately. Taken as a whole, however, and addressing issues raised in the review process will result in a rule that is based on sound scientific knowledge, methods, and practices.	Placeholder for Regional Board