Comment Summary and Responses
Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL

Public Review
1. City of Redondo Beach
2. State of California, Department of Transportation,
3. Heal the Bay
4. City of Los Angeles, Department of Water and Power,
5. City of Los Angeles, Department of Public Works, Bureau of Sanitation
6. County of Los Angeles, Department of Public Works
7. City of Torrance, Department of Public Works
8. City of Lomita
9. City of Carson
10. United States Environmental Protection Agency, Region IX
Peer Review
11. Dr. Paul M. McGinley, University of Wisconsin – Stevens Point, Stevens Point WI
12. Dr. Rakesh K. Gelda, Upstate Freshwater Institute, Syracuse, NY

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Public Review				
1	**3/18/08**	**Mike Shay, Principal Civil Engineer - City of Redondo Beach**		
1.1			The City of Redondo Beach is respectfully requesting to withdraw and be exempted from the subject TMDL for the Machado Lake Receiving Water in the Dominguez Channel/LA Harbor Drainage Watershed as proposed by the Los Angeles Regional Water	The City of Redondo Beach is within the Machado Lake sub-watershed and is subject to the TMDL; the City did not provide documentation to demonstrate otherwise. Therefore, Regional Board staff is not able to consider this request at this time. The City may

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			Quality Control Board. The subject TMDL draft document lists the City of Redondo Beach as one of the responsible agencies in this watershed.	provide additional information and documentation such as maps, GIS layers, and may schedule a site visit with staff in order for this request to be considered.
1.2			Machado Lake is a receiving body of urban and storm water runoff from storm drain systems covering an approximately 20-square mile watershed. The Wilmington Drain collects runoff from the surrounding cities of Lomita, Torrance, Carson, and Los Angeles, and then discharges over 50 percent of the watershed into Machado Lake at the northeast corner. The rest of the water enters the lake through other storm drains including the Project No. 77 channel, the Harbor City Relief Drain located at the west end of the lake, City of Los Angeles drains for runoff from streets, and the Harbor Park Municipal Golf Course. The Wilmington Drain, Project 77, and the Harbor City Relief Drain collect storm water from the communities of Harbor City, Lomita, Carson, Torrance, and Wilmington, and from the Walteria lake drainage area. In addition, two Project 643 outlets discharge to the wetland area. During dry season, Machado Lake is replenished via a City of Los Angeles Department of Water And Power (LADWP) potable water pipeline and dry weather runoff.	Comment noted, a similar description of drainages is included in the staff report.
1.3			As noted above, City of Redondo Beach has no direct discharges into the lake, and has zero (0) point source area miles, and as such the load allocation must be calculated to be zero. The City should not be responsible for any loadings.	Our records show that 2.2 acres are within the Machado Lake sub-watershed; while this area is small it is subject to the TMDL. Also, there is the potential for nonpoint source runoff to Machado Lake.

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1.4			The south-easterly portion of the City-owned boundary, shown in the subject TMDL document as the potential contributory drainage area, consists of no catch basins that drain into Machado Lake.	No documentation, such as a stormdrain map, was provided to support this comment. Also, the lack of catch basin does not exclude the potential for stormwater and nonpoint source runoff contributions to Machado Lake.
1.5			Therefore, the City strongly suggests it be exempted from the obligations associated with this TMDL for the following reasons: 1. The City's drainage area is listed to be 0 (zero) square miles.	Our records show that 2.2 acres are within the Machado Lake sub-watershed; while this area is small it is subject to the TMDL
1.6			2. The existing boundaries show most of the City draining into the Santa Monica Bay. Only a very small portion (very south-easterly side) of the City is included in the Machado Lake Watershed. This area is approximately 0.01 square miles, based on the City of Los Angeles GIS map.	See response 1.3
1.7			3. Even if there is a small fraction of land area included in the watershed drainage boundary map, this area is so small as to be negligible. The cost-benefit of the spent resources to be involved in the subject TMDL cannot be justified.	See response 1.3 The City of Redondo Beach did not provide any technical documentation to support the claim that potential impacts to water quality from the city are negligible. In the absence of technical information demonstrating no impacts to water quality, the City of Redondo Beachis included as a responsible jurisdiction in this TMDL.
1.8			4. The City of Redondo Beach is a proactive member of the Santa Monica Bay Beaches Bacteria (SMBBB) TMDL, and as such the City	Regional Board staff appreciates the participation of the City of Redondo Beach on the Santa Monica Bay Beaches Bacteria TMDL. Staff looks forward to

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			has developed an integrated Implementation Plan with a goal of potentially reducing multiple pollutants of concern. The City has been and will be intimately involved with implementing the tasks listed in the Plan to ensure that pollutants such as trash have been fully addressed.	working with the City on the implementation of the Machado Lake Nutrients TMDL. The flexible implementation plan for this TMDL allows the City several compliance options.
1.9			5. It would be more reasonable for the City to focus its resources to implement the SMBBB TMDL and other upcoming SMBBB TMDLs only. The majority of the City land area discharges into the Santa Monica Bay, which would make it more feasible and cost effective to pull all the resources set aside for these types of projects together in order to develop one monitoring and one implementation plan. The small area draining into Machado Lake would be subject to the same control measures of the implementation plan developed for the SMBBB TMDL. As the result, this area would benefit from the appropriate BMPs designed for the entire City.	See response 1.8
1.10			The City of Redondo Beach is concerned that any aspects of the Machado Lake TMDL involving the City would jeopardize potential resources, which could be better spent on TMDLs mainly focused in the Santa Monica Bay.	See response 1.8
1.11			We at the City appreciate all the efforts of your team regarding the TMDLs. We rely on your mutual understanding of working within limited budgets to	Comment noted

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			implement these costly but necessary programs.	
2	**3/21/08**	**Joyce E. Brenner, Acting Chief, Stormwater Implementation - Department of Transportation, State of California**		
2.1			The California Department of Transportation (Department) appreciates the opportunity to comment on the Total Maximum Daily Load (TMDL) Technical Documentation for nutrients in Machado Lake. The Department strongly supports efforts to protect human health and achieve the best water quality possible.	Comment noted
2.2			However, the Department would like to express the following concerns with the technical documentation. The morphology and ecological processes of Machado Lake are more characteristic of a shallow wetlands system than a lake. First, the water body has an average depth of one meter, a surface area of 40 acres, and stores approximately 120 acre-feet of water. The TMDL must consider the unique physical properties of Machado Lake to develop a successful approach to nutrient management. The Department is concerned that sediment removal or phosphorous immobilization techniques may be the only viable options for controlling internal nutrient cycling in the lake. These are expensive options and can be difficult and problematic to implement. A more viable option might be to reclassify the waterbody as wetlands. The Department requests that the Regional Board allow for a better understanding and more appropriate characterization of the lake before the TMDL and the implementation plan are finalized and adopted.	Machado lake is a fully aquatic ecosystem. Machado lake is permanently flooded and the principal medium in which aquatic organisms, such as fish, live is water. Machado Lake has existing beneficial uses related to fully aquatic systems, such as warm freshwater habitat. Machado Lake is not a transitional area between terrestrial and aquatic systems, which would be descriptive of a wetland. The TMDL did consider the physical properties of Machado lake such as, depth, size, mixing, and watershed location, when developing the TMDL. Regional Board staff agrees that sediment removal or phosphorus immobilization may be required to address internal sources of nutrients. Projects such as these are planned by the responsible party for lake as part of the Proposition O Machado Lake Ecosystem Rehabilitation Projects.

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2.3			The impact on the lake from internal sources of nutrients appears to be underestimated in the staff report. The external sources described, urban runoff, adjacent golf course runoff, migratory waterfowl, and atmospheric deposition, are typical of urbanized watersheds; however, internal nutrient loading and the influence of natural disturbances on internal cycles within Machado Lake are likely to be much greater than what is predicted by the model and discussed in the report. The sediment-related nutrient flux is a critical factor to understand the condition of Machado Lake. This is emphasized by the claim made by Lai (2008) that greater than 5,000 acre-feet of stormwater discharges into the lake each year from the surrounding watershed. The total volume of the reservoir is less than 2 percent of the annual discharge of the reservoir. As a result, the lake is relatively frequently refreshed. At the update meeting held on July 16, 2007, staff stated that a study was being performed to evaluate the effects of sediment resuspension. Please state whether this study is ongoing or planned and if any results are available.	The Machado Lake Nutrient Flux Study by the Southern California Coastal Water Research Project (SCCWRP) was conducted to estimate the internal nutrient loading from the lake sediments. The experimental design of this study was such that a maximum nutrient flux rate was estimated. The maximum sediment flux rate was then applied to entire lake area; it is unlikely that this is an under estimation of the internal nutrient flux from the sediments. The TMDL voluntary special studies, to be conducted by stakeholders, include a study to evaluate sediment resuspension. This study has not been initiated and no results are available.
2.4			The staff report discusses the impact of wind on the internal loading to the lake; however, the frequency and importance of wind speeds that exceed 10 miles per hour is understated within the report. This wind speed is defined as occurring under "unique" conditions within the staff report although wind speeds greater than this are common in the region.	Wind speeds of greater than 10 miles per hour do not commonly occur in the Machado Lake area. More than 1 year of hourly wind speed data from a weather station near Machado Lake was reviewed as part of the TMDL development. In addition, nutrient load contributions directly from the wind resuspension of sediments are not quantified in the TMDL. The discussion of wind resuspension was included in the staff report for completeness. A special study would be required to specifically quantify this source of

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				nutrient loading.
2.5			(In addition, the staff report appears to understate the loading as a result of bioturbation from populations of carp and goldfish. The lake is shallow, warm, and nutrient rich; this makes it a well-suited habitat for proliferation of these fish.	The TMDL staff report does not directly quantify the nutrient loading contribution from fish bioturbation activities, due the lack of specific fish population assessments for Machado Lake. If a special study is conducted to quantify this source it will be considered at the TMDL reconsideration.
2.6			More consideration should be given to the complexity of nutrient systems and the populations of macrophyte and phytoplankton within the TMDL and the Implementation plan. For example, due to the size of the watershed and the historic loads to the lake, the lake has acted as a sink for sediments and pollutants since 1971. This has caused carbon, nitrogen, and phosphorous to be present in surplus in the system. Also, the nutrients are incorporated into the rooted Macrophytes and recycled back into the lake during respiration. As a result of this and the constant resuspension of sediment by natural processes, management of the ratios between these nutrients will not effectively improve water quality within the lake. In addition, the concentrations of nitrogen and phosphorous in both soluble and insoluble forms are important independently and in concert with each other. Nitrogen removal can cause phytoplankton assemblages to shift from populations of chlorophyta (green algae) to populations of nitrogen fixing cyanophyta (blue-green algae). In addition, most literature states that a concentration of total phosphorous that exceeds 30 µg/L will promote growth of macrophytes and phytoplankton and lead to eutrophic conditions. Please take these factors into	Figures 14 and 15 in the staff report are presented as a part of the NNE BATHTUB model sensitivity analysis illustrating that in the model the lake chlorophyll concentration is sensitive to phosphorus and nitrogen loads to the lake. Other nutrient processes mentioned in this comment were considered in the TMDL; for example, better management of macrophytes to reduce nutrient loading and wind resuspension of sediment are discussed. The TMDL implementation schedule allows responsible parties adequate time to consider and implement various compliance options.

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			consideration and reevaluate the information presented in Figures 14 and 15 and the nutrient management plan to develop a comprehensive and effective strategy for this TMDL.	
2.7			Some additional information is requested for the Staff Report: a) any Secchi readings taken concurrently with the readings of Table 5 (page 30); b) the nitrogen and phosphorus concentrations mentioned but not listed in Section 4.1.3 (page 39); c) that modeling of the lake, with respect to annual loading of nitrogen and phosphorus, did not include that portion of the total annual runoff loading that would have passed through the lake without a long detention time (i.e., during overflow events).	As requested, the Secchi depth measurements have already been provided to this stakeholder. In addition these data will be included in the administrative record of this TMDL. The nitrogen and phosphorus data requested is from the Los Angeles County Stormwater Monitoring program and is available on online at the following website: http://ladpw.org/wmd/NPDES/report_directory.cfm Also this data, as used in this TMDL, is presented in the TMDL Technical Memo. The entire annual nutrient load estimated in the TMDL was applied to the model analysis. The portion of the nutrient load that exits the lake during an overflow was calculated and used to more accurately estimate the percent load reductions required in the TMDL. This is presented in Table 8 of the TMDL Technical Memo and Table 16 of the staff report.
2.8			It is stated on page 57 of the Staff Report that the modeling assumes a critical drought condition when the 835 kg/yr total annual loading capacity of phosphorus was determining. Please consider if this it a reasonable climatic condition upon which to develop this TMDL. Same comment for nitrogen reported on page 58.	TMDLs are required to consider critical conditions in order to be protective of water quality under all conditions. Drought conditions resulting in reduced lake volume would be a critical condition at Machado Lake under which loading capacity should be evaluated.

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2.9			Please clarify the relationship between certain information presented in the Staff Report. On page 47, Table 14, it is indicated that the total annual phosphorus loading from the 'sediment flux' is 7,161 kg/yr, while on page 57 it is indicated that modeling leads to a total annual phosphorus loading capacity in the lake of 835 kg/yr. If understood correctly, this Staff Report could be read to indicate that the proposed TMDL would not be effective under some implementation options. A similar comment is made for nitrogen, but the ratio of sediment flux to the annual loading capacity is much lower.	The loading capacity of Machado Lake for both phosphorus and nitrogen is less than the current internal loading rate. Thus, implementation options for this TMDL will include actions for internal source reduction.
2.10			Table 7-29.2 Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL Implementation Schedule (and repeated as Table 20 in the Staff Report): the Department is not included under Task 2, related to implementation of load allocations. Please discuss why the Department was omitted from the Task, and what the implications are with respect to partnering with named responsible MS4 permittees (e.g., in a Monitoring and Reporting Plan, Task Number 5).	Caltrans is a point source discharger and is assigned a waste load allocation (WLA). Caltrans may partner with other responsible parties, as outlined in the TDML, to comply with the TMDL if they wish. Task 2 of the TMDL implementation schedule is a mechanism for the implementation of the TMDL load allocations (LAs), which are assigned to non point source discharges. Caltrans is a point source discharger and is not assigned LAs and therefore does not have any responsibilities under Task 2.
2.11			Cost Estimates made under Section 9.8 of the Staff Report should more clearly indicate that right of way costs are ignored. This is especially important since this is a highly urbanized watershed, and almost the only available significant land parcel not having significant development is the surrounding Harbor Regional Park. Related: construction costs shown on Table 26, page	The staff report takes into account a reasonable range of economic factors in estimating potential costs associated with TMDL compliance. The Regional Board cannot prescribe the method of achieving compliance with the TMDL (Water Code § 13360) and is unable to describe the nature of all potential actions to achieve compliance.

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			84 of the Staff Report, for a `treatment filter' should be compared to an EPA Fact sheet, where a construction cost of $18,500/acre treated is cited; that cost is more than 9 times the cost reported on the Table. It should be noted that the EPA Fact Sheet was issued in September 1999, so even that cost could be low. (http://www.epa.gov/npdes/pubs/sandfltr.pdf)	The EPA fact sheet referenced in this comment was used for sand filter cost estimates and is included in the staff report list of references. The $18,500/ acre cost estimate is included in the text of the staff report.
2.12			Thank you for the opportunity to comment. The Department supports the goals of the improving the water quality with respect to nutrients in Machado Lake, and we hope that these comments are helpful.	Comment noted
3	**3/24/08**	**Mitzy Taggart, D. Env., Senior Staff Scientist and Kirsten James, Director of Water Quality - Heal the Bay**		
3.1			On behalf of Heal the Bay, we submit the following comments on the Draft Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL. In general, we support this TMDL, particularly the inclusion of concentration-based load allocations (LAs) and waste load allocations (WLAs) for both total phosphorus and total nitrogen, as well as the 8.5 year timeline for implementation.	Comment noted

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3.2			However, we do have several concerns with the TMDL. For instance, the option for compliance determination on a mass basis (percent load reduction) should be removed from the TMDL. As discussed in our comments below, this option introduces much uncertainty into the TMDL and may not be consistent with the concentration-based WLAs.	Comment noted – see response to comment 3.8
3.3			Additionally, we concur with one of the peer reviewers that the ammonia targets are not protective of aquatic life. Ammonia numeric targets (acute and chronic) should be based on the fifth percentile of the allowable ammonia concentrations calculated using the lake's temperature and pH data. Currently, the acute ammonia target is based on the median temperature and pH data, and the TMDL does not include a chronic ammonia target.	Comment noted – see response 3.12 and 3.13
3.4			**WLAs/LAs for Nitrogen and Phosphorus** We support the inclusion of WLAs and LAs for total nitrogen and total phosphorus. Requiring the reduction of *both* nutrients is necessary to ensure successful abatement of the eutrophic conditions in the lake. It is well established in the scientific literature that the impacts of nitrogen and phosphorus on algal growth are complex, involve numerous factors, and are often waterbody specific. Often, the importance of nitrogen and phosphorus will change with fluctuating conditions in the waterbody, so it is incorrect to make the broad generalization that one nutrient is limiting. Appropriately, TMDLs for two other lakes in California also require reductions of both nutrients.	Comment noted

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3.5			**Implementation Schedule** We support the 8.5 year schedule. The implementation schedule for this TMDL should be shorter relative to other Region IV TMDLs because of two important factors. First, the lake system is fairly simple and contained, with two sources responsible for a large majority of the nutrient loading (sediment influx and the Wilmington drain). Second, the City of LA has already completed a conceptual design of a comprehensive project to restore the lake and has earmarked Proposition O funding to implement the project by mid-2014. Of note, the staff report does not mention this 117 million dollar project that will be the key to meeting the WLAs. We suggest the staff report include a brief discussion of this project and its timing.	Comment noted Regional Board staff recognizes the importance of the Proposition O projects and commends the City of Los Angeles on the planed projects that will work to improve water quality throughout the city. Regional Board staff is supportive of the Prop O Machado Lake Ecosystem Rehabilitation Projects. Regional Board staff did consider the Proposition O planed projects and schedule when developing this TMDL, although a specific discussion of Proposition O is not included in the staff report. The implementation schedule of the TMDL is closely aligned with the schedule of the Prop O Machado Lake Ecosystem Rehabilitation Projects. Likewise, many of the potential implementation actions discussed in the TMDL are planed projects as part of the Machado Lake Ecosystem Rehabilitation Project. In response to the request made by many other stakeholders staff has extended the TMDL implementation schedule by 1 year. Staff finds this extension reasonable to provide responsible jurisdictions ample time to coordinate actions. The schedule in the revised tentative Basin Plan Amendment reflects a 9.5 year schedule
3.6			Importantly, the proposed schedule includes a possible re-opener at the 7.5 year mark, over one year after scheduled lake restoration and BMP construction. This	As requested the potential extension of the implementation schedule by 3.5 years has been removed. .

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			timing is consistent with the City's Proposition O project, as there will be time to collect at least one year of data on the effectiveness of the project prior to the re-opener. Thus, the Regional Board should maintain the 8.5 year schedule and remove the provision in the Basin Plan Amendment that allows for a potential extension of the implementation schedule of 3.5 years. The appropriate time to talk about implementation schedule extensions would be at the reopener. Further, the Regional Board should make the re-opener *mandatory*, as important information will be available at that time that may impact the TMDL.	In response to this request, the staff report and Basin Plan amendment implementation schedules will be revised to state that the TMDL **will** be reconsidered at 7.5 years after the effective date.
3.7			**Implementation – Compliance Determination on a Mass Basis** The load allocations in this TMDL are appropriately defined in terms of water column concentrations in the lake. Yet, the TMDL provides a percent load reduction option for determining compliance: "Alternatively, MS4 Permittees may be deemed in compliance with waste load allocations by demonstrating a 47 percent reduction for total nitrogen and 91 percent reduction for total phosphorous." Determining compliance by percent load reduction may not be consistent with the WLAs, is a method fraught with uncertainty, and should be deleted. At this juncture, prediction of the relationship between percent load reductions and water column concentrations in Lake Machado is very uncertain because of an incomplete dataset and our limited	The discussion of mass-based compliance determination in the staff report and Basin Plan amendment has been refined to address sources of uncertainty with this approach. The results obtained by NNE Model are used to provide the linkage between total loads entering the lake and lake response (water-column concentrations). As long as the model has been calibrated, the model results would be able to provide the lake concentration within a reasonable level of certainty and to achieve the WLAs in the TMDL to meet the numeric target.

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			understanding of the nutrient cycle within the lake. Complex fate and transport mechanisms affect nutrients discharged to Lake Machado. The modeling completed by the RWQCB was useful for providing insights into nutrient behavior in the lake; however, it cannot be used to relate loads to water-column concentrations with an adequate level of certainty to include it in the Basin Plan Amendment. In general, measuring load reductions in stormwater can be difficult and uncertain. This is particularly true for Machado Lake, because in this system, a large portion of each storm event is flushed through the lake. Finally, the MS4 permittees are given the option of determining compliance by measuring concentrations at end-of-pipe. In summary, the percent load reductions of 47% nitrogen and 91% phosphorus could actually lead to water column concentrations significantly different than the concentration-based WLAs in the TMDL. The result would be a determination of compliance without necessarily achieving the WLAs in the TMDL.	
3.8			**Implementation – Compliance Determination through participation in the LWQMP** We strongly support the development of a Lake Water Quality Management Plan (LWQMP) as encouraged by the TMDL. However, the following sentence in the TMDL should be deleted: "Stormwater permittees may be deemed in compliance with waste load allocations by actively participating in a LWQMP to attain the waste load allocations for Machado Lake". As written, this sentence implies that mere participation in the	This sentence has been deleted from the staff report and Basin Plan amendment.

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			LWQMP can result in compliance, even if the WLAs and LAs are not met. Thus, the RWQCB should remove this sentence entirely.	
3.9			**Ammonia Numeric Targets** The numeric targets for ammonia should be revised to include the Basin Plan's chronic ammonia objective. The TMDL states that the total nitrogen target expressed as a monthly average is protective of chronic aquatic life exposure for ammonia. It is true that, since "total nitrogen" includes ammonia, and the total nitrogen limit of 1 mg/l is lower than the chronic ammonia value of 2.2 mg/l, the total nitrogen target would be more protective, *if these values were comparable*. The TMDL seems to imply that the total nitrogen limit covers the chronic ammonia objective of the Basin Plan because they represent similar timeframes. However, total nitrogen will be measured as a monthly average based on bi-weekly sampling, and the chronic ammonia objective is a four-day average concentration. Since all three targets represent different timeframes (the acute ammonia target is based on a 1-hour objective), we recommend adding chronic ammonia to the numeric target table of the TMDL. One of the peer reviewers of the TMDL also commented on this issue: "Although the nitrogen target of 1 mg/l is conservative, the implementation of it on a water-column, monthly average basis in not consistent with that of the ammonia target."	The chronic ammonia water quality objective in the Basin Plan is a 30 day average. The TN target, which includes ammonia, is protective of aquatic life. However, a chronic ammonia objective has been added as a numeric target in the TMDL as requested.
3.10			Importantly, both the acute ammonia target in the	The acute and chronic ammonia targets presented in

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			TMDL and the chronic ammonia target discussed in the staff report are not protective of Machado Lake aquatic species because they were calculated using the median values for temperature and pH. The peer reviewer also discussed this problem: "The Basin Plan objective for ammonia for chronic exposure of 2.2 mg/L is based upon median values of pH and temperature data. This appears not to be protective enough of aquatic life for ammonia toxicity (e.g., Gelda and Effler 2003)." The peer reviewer recommended the RWQCB calculate allowable ammonia concentrations for the lake using the temperature and pH data from the lake, and then comparing these to the measured ammonia concentrations to determine if ammonia is present at toxic levels. We recommend basing the TMDL's acute and chronic ammonia targets on the 5th percentile values of these allowable ammonia concentrations calculated per the Basin Plan. This would ensure that the numeric ammonia targets are protective at all times. As pointed out by the peer reviewer, ammonia is toxic to aquatic life at low concentrations, so it is important that the numeric targets are set protectively.	the staff report and Basin Plan amendment are protective of aquatic life. The chronic ammonia target was calculated based on the median values of pH and temperature. The acute ammonia target was calculated based on the 95th percentile of pH and temperature values. This is the Regional Board's consistent method for calculating ammonia water quality objectives for TMDLs and other regulatory programs. This method of calculating ammonia water quality objectives is protective of aquatic life. On page 35 of the staff report it was not clear that the acute ammonia target was calculated based on the 95th percentile of pH and temperature values. This has been corrected.
3.11			**Numeric Target for Chlorophyll a** The Basin Plan Amendment includes a numeric target for the monthly average chlorophyll-a of 20 ug/L. However in the staff report, Table 1 indicates that eutrophic conditions exist within a range of chlorophyll-a values of 7.3-20 ug/L. Why did RWQCB staff select 20 ug/L, the highest end of this range?	The chlorophyll *a* numeric target of 20 ug/L is related to moderately eutrophic conditions present in Table 1 and allows an acceptable level of algal biomass for Machado Lake that will attain Beneficial Uses, but is not expected to result in negative eutrophic to hyper – eutrophic water quality conditions. The higher end of the range will attain Beneficial Uses.

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				Algal biomass growth in lakes, which is measured as chlorophyll *a* is linked to the lake's phosphorus and nitrogen concentration. In order for Machado Lake to achieve a chlorophyll a concentration of 7.3 ug/L the phosphorus and nitrogen concentrations would need to be approximately 0.03 and 0.33 mg/L, respectively based on NNE BATHTUB model predictions. These values are well below the phosphorus and nitrogen targets applicable for Machado Lake. Based on the technical information presented in the staff report and the nature of Machado Lake, Regional Board staff concluded that phosphorus and nitrogen targets of 1 mg/L and 0.1 mg/l, respectively, were appropriate. These nutrient values are linked to the higher end of the chlorophyll a range associated with moderately eutrophic conditions. Therefore, the higher end of the range was chosen as the numeric target.
3.12			**Interim WLAs/LAs** The one-year interim WLAs and LAs in the TMDL should be reviewed and revised to reflect available data. These interim allocations are designed to prevent backsliding of the Machado Lake water quality and are set at the 95th percentile of current lake concentrations. We have been told by City of Los Angeles staff that additional lake water quality data was recently provided to the RWQCB.	The effective date interim WLAs and LAs have been reviewed and revised based on additional data provided by the City of Los Angeles.
3.13			In addition, we request the RWQCB to modify the 5-year interim allocations from the TMDL. This is a highly	Regional Board staff does not support the complete removal of interim WLAs and LAs. Interim allocations

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			unusual request from our organization because we believe interim allocations are key to ensuring progress is steadily made toward water quality attainment. In this case, however, the 5-year interim milestone is not consistent with the schedule of the City of LA's Proposition O project for lake. Interim milestones could be problematic during the course of cleanup at Machado Lake because removal of sediment—a primary source of nutrients to the Lake—is a key part of the project. Reducing nutrient concentrations in the water column prior to sediment removal may be difficult as long as sediment influx continues. However, interim allocations assigned to sources discharging to the lake provides incentive for the City to reduce concentrations and loads from Wilmington Drain (Proposition O project scheduled for completion by 2011) and other drainages. We urge the Board to apply the appropriate interim 50% reduction limits to those sources by year 5.	are a longstanding TMDL policy of the Los Angeles Regional Water Quality Control Board and are included in numerous TMDLs. Interim allocations are necessary to ensure that progress is being made to improve water quality and attain beneficial uses. The 5 year interim waste load and load allocations have been revised to reflect a 30 percent reduction from current in-lake total nitrogen concentrations. Moreover, responsible jurisdiction may be deemed in compliance with the numeric 5 year interim WLAs and LAs through the implementation of internal and/or external source reduction projects. The revised BPA amendment reflects these edits and clearly states the determination of compliance with the 5 year interim allocations.
3.14			**Modeling** Both peer reviewers raised the issue of the applicability of the BATHTUB model to Machado Lake. Specifically, Dr. McGinley suggests that the BATHTUB model "may not be a particularly powerful tool for evaluating Machado Lake where the water quality during critical periods is apparently controlled by internal nutrient release and not equilibrium with watershed loads." Even more concerning is the issue raised by Dr. Gelda that the same 2006-2007 data used to calibrate the model was also used to validate the model. It appears the model has not been	A simple dynamic model can predict short-term variations in lake conditions to reflect variations in flow and load. However, the approach used in the Machado Lake represents a long-term average results and BATHTUB model was determined to be appropriate because it addresses the parameter of concern (phosphorus and nitrogen) and has been used previously for lake or reservoir TMDLs. As shown in the report, the NNE BATHTUB model has successfully predicated annual average conditions in this TMDL. The data for this TMDL are limited and insufficient for a dynamic model simulating day-to-day variability. In

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			adequately validated. As Dr. Gelda questions, is there another data set, such as the 1992-93 data set, which can be used to validate the model? We believe the RWQCB should strive to validate all models used to support TMDLs. Has the RWQCB developed a simple dynamic model as suggested and partially developed by the un-named peer reviewer?	addition, USEPA also recommends the use of BATHTUB for nutrient TMDLs (USEPA, 1999).
3.15			**Monitoring** Although we are supportive of bi-weekly sampling, the use of only two sampling sites in the northern and southern portions of the lake is likely not representative of the conditions in a 40 acre lake. Can the staff provide data that demonstrates that the lake is well-mixed and that two sample sites are adequate?	Two sampling sites for required TMDL monitoring are appropriate and representative of the conditions in Machado Lake. This is based on the field data collected for this TMDL, which demonstrates that the lake is well mixed and there are not notable differences between the sampling locations. These data will be provided in the administrative record of the TMDL.
3.16			Since algal growth and odor are two of the impairments this TMDL addresses, we suggest monitoring for odor and algae (percent coverage). Why aren't these parameters included in the monitoring program?	This TMDL does include the monitoring of algae as chlorophyll *a* concentration. This is the correct monitoring parameter for algal biomass in lakes. The parameter of estimating algae percent cover is used in creek and river systems and is not usually applied to lakes. The general field conditions will be recorded with the field data at the time of sampling. The sampling team will record the presence or absence of foul odors.
3.17			**Sources** The golf course may be a significant source of nutrients to the lake. Thus this potential source should be addressed in the TMDL. Why wasn't groundwater transport of nutrient from the golf course to the lake discussed as a potential source? Is there any available	Direct nutrient loading from the golf course is not quantified in the TMDL since there is not a direct discharge point to the lake. The landscape of the area suggest that drainage from the golf course enters a low lying area on the southeast side of the lake near the wetlands.

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			information on groundwater depth and direction of flow in the area adjacent to the lake? Also, the golf course could be a potential source of nutrients to surface water. We urge the RWQCB include this discussion in the staff report and TMDL.	Machado Lake is located within the Coastal Plain of Los Angeles County Groudwater Basin, West Coast Subbasin. Based on the California Groundwater Bulletin 118 the direction of groundwater flow in this basin is towards the ocean, with southward and westward movement. Groundwater elevation measurements around the park area and golf course show that groundwater is found at just over 60 feet, which supports the assumption that groundwater is flowing southward rather than westward. While groundwater flow may be contributing a small input to the lake, groundwater flow is an output from the lake as well; its contribution is therefore considered minimal. The TMDL provides for special studies; if stakeholders conduct a special study on groundwater inputs to the lake, the results will be considered at the time of the TMDL reconsideration.
3.18			**Special Studies** The Basin Plan Amendment includes three optional special studies. We urge the RWQCB to include an additional special study to determine the appropriate nutrient levels in the lake to prevent eutrophication and impairment. The results of this study will be critical for assessment of WLAs and LAs during the reopener discussions at year 7.5.	Additional special studies have been added to the staff report and Basin Plan amendment. The results of special studies will be considered at the TMDL reconsideration.
4	**3/24/08**	**Katherine Rubin, Manager, Wasterwater Quality and Compliance Group - Department of Water and Power, City of Los Angeles**		

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4.1			The Los Angeles Department of Water and Power (LADWP) appreciates the opportunity to review and submit comments on the proposed Basin Plan Amendment (BPA) and related documents for the nutrient TMDL for the Machado Lake	Comment noted
4.2			The Machado Lake TMDL has been established for both aesthetic reasons and also ammonia concentrations. LADWP considers aesthetics to be an important component of the recreational beneficial use. Therefore, LADWP supports the Regional Boards decision establish a TMDL for Machado Lake in order to protect the aesthetic and aquatic life beneficial uses of the lake. However, LADWP has concerns about the nitrogen and phosphorous allocations, modeling, and implementation schedules, as discussed below.	Comment noted
4.3			**TMDLs for Nitrogen and Phosphorous** LADWP has examined the data used by the RWQCB to evaluate impairment by nitrogen and phosphorous (N&P). It appears that the wasteload allocations (WLAs) for N&P may have been placed in the TMDL for preventative reasons rather than to address any existing impairment (Table 4 of the draft Staff Report dated February 7, 2008). LADWP supports the already-planned implementation of best management practices (BMPs) that would reduce N&P among other pollutants, and believes that the WLAs will not be necessary if the BMPs perform as anticipated. LADWP suggests that the RWQCB collect more data to evaluate the effectiveness of the BMPs before issuing	By the nature of Machado Lake's listing on the 303(d) list and the development of this TMDL the lake is currently impaired and WLAs and LAs have been established to address water quality impairments. TMDLs and allocations are not developed as preventative measures. The nitrogen and phosphorus allocations in this TMDL are necessary to address impairments at Machado Lake such as eutrophication. Table 4 presents the ammonia data collected for the lake as part of this TMDL. This data does not demonstrate an ammonia impairment in the lake. As a result, no WLAs or LAs for ammonia have been established. We will consider all ammonia data in developing the 2008 303(d) list and may delist

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			WLAs for N&P, and therefore suggests that the RWQCB consider removing the WLAs at this time. As described by Table 1 in the draft Staff Report, chlorophyll a appears to be a more appropriate way to measure the eutrophication aspect of the TMDL. **Recommendation:** As BMPs become implemented in the Machado Lake watershed, collect data in order to evaluate the effectiveness. Remove the WLAs for total phosphorous, total nitrogen, and ammonia from the BPA, and focus the TMDL on chlorophyll a instead.	ammonia at that time. Staff agrees that BMP implementation will reduce pollutants such as nitrogen and phosphorus and will be necessary to achieve the TMDL allocations. The TMDL must assign final WLAs and LAs. TMDLs must include all required elements; WLAs and LAs are required elements of a TMDL. It is not possible to exclude WLAs and LAs from the TMDL. Algal biomass (measured as chlorophyll *a*) is a biological indicator of lake water quality. It is not a causative pollutant discharged to the water body; for example, chlorophyll *a* is not discharged to the lake from the surrounding watershed. In the case of this TMDL, nutrients (nitrogen and phosphorus) are the pollutants discharged into the water body causing impairment. The TMDL WLAs and LAs are established for the actual pollutant discharged into the waterbody. The TMDL does include the biological indicators of chlorophyll *a* and dissolved oxygen concentration as numeric targets. These indicators, as targets not allocations, are important to track water quality improvements, better understand the lake response to reduced nutrient loading, and assess attainment of beneficial uses.
4.4			**Waste Load Allocation Verification** LADWP requests that prior to applying WLAs the	The TMDL must assign final WLAs and LAs. TMDLs must include all required elements; WLAs and LAs are

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			stakeholders should be allowed to gather more data in order to verify the wasteload allocations (WLAs) that were derived using the model. LADWP believes more time should be allowed for data collection due to the impact this TMDL could have on other point sources within the watershed, which include low income users of LADWP leased properties, who already implement nutrient management best management practices (BMPs). Such land is used as an important source of income for these lessees, **Recommendation:** Prior to applying WLAs of the TMDL, ensure that the WLAs are correct by allowing time to gather enough data to verify the WLAs.	required elements of a TMDL. It is not possible to exclude WLAs and LAs from the TMDL. This TMDL provides for special studies and monitoring, which allows for additional data collection. The results of special studies and monitoring will be considered at the TMDL reconsideration and may be used to adjust WLAs.
4.5			**Implementation Schedule** LADWP understands that Proposition "O" (Prop 0) projects are being planned with milestones that extend to the year 2015. Prop 0, overwhelmingly approved by Los Angeles city residents in the November 2004 election, authorized the City to issue $500. million in general bonds for watershed protection projects that enhance public health and our environment by: cleaning up and preventing pollution of our waterways and beaches. At this point, the California Environmental Quality Act (CEQA), pre-design, and permitting processes should be under way for many of the Machado Lake TMDL implementation options. The Prop 0 schedule allows time to install the various BMPs such as porous pavement, aeration, trash capture devices, and sediment capture. devices. Thus, LADWP supports the schedule provided in the BPA for	The initial (effective date) interim allocations are required to prevent further degradation of water quality prior to the initiation of implementation actions. These allocations are set as the 95th percentile of current lake conditions and the compliance point for the initial interim allocations for all responsible parties is in the lake. The initial interim allocations reflect current water quality in the lake; it is not expected extensive (if any) implementation actions would be necessary to achieve these interim allocations.

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			achieving final wasteload allocations because it is similar to the Prop 0 schedule. However, LADWP is concerned that the schedule for interim limits will not be flexible enough. This is because the proposed BPA requires interim limits to apply on the effective date of the TMDL rather than waiting for particular BMPs to become implemented and fully functional.	
4.6			LADWP also supports a reconsideration of the TMDL schedule if data from studies or monitoring shows that a modification is necessary.	Comment noted – the TMDL implementation schedule includes a reconsideration to consider the results of monitoring and special studies.
4.7			The BPA also states that the stakeholders must have a memorandum of agreement (MOA) within 6 months. LADWP's past experience with similar processes has demonstrated that six months is not enough time to enter into a MOA, due to the need for stakeholders to consult with their respective management, enter the budget process and raise funds for this effort.	Based on previous TMDLs and TMDLs currently under implementation, staff expects 6 months to be adequate to develop an MOA.
4.8			**Recommendation:** LADWP requests that a schedule to achieve interim limits for nitrogen and phosphorous be removed from the BPA. Instead, LADWP recommends that a mechanism for reporting progress of the various BMP implementations be used. LADWP also recommends that the time for a MOA development be extended to 1 year. Also, if advanced stormwater treatment is needed, which is not included in current Prop 0 plans, the LADWP requests that the implementation	See response 4.5 and 4.7 The implementation schedule will be considered at the TMDL reconsideration 7.5 years from the effective date of the TMDL. If advance stormwater treatment is required a schedule extension will be considered.

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			schedule be extended by 5 years, as recommended by the City of Los Angeles Department of Public Works.	
4.9			LADWP appreciates and supports the need to improve water quality in the Machado Lake in order to prevent future eutrophication and improve the recreational uses of the lake.	Comment noted
5	**03/24/2008**	**Enrique C. Zaldivar, Director or Bureau of Sanitation, City of Los Angeles**		
5.1			The City of Los Angeles (City) appreciates the opportunity to comment on the proposed Basin Plan revisions for the Machado Lake Algae, Ammonia, Eutrophic, and Odors Total Maximum Daily Load (TMDL). The City has recognized the importance of recreational use, aquatic; and related beneficial uses in the lake, and views the restoration and protection of these uses as high priorities. As evidence of this, the City is moving forward with spending $120 million of its Proposition 0 funds to address water quality impairments in Machado Lake and Wilmington Drain.	Comment Noted. Regional Board staff appreciates the City's commitment to water quality improvement through implementation of Proposition O
5.2			Consistent with our commitment, the City requests assurances that the Los Angeles Regional Water Quality Board (RWQCB) is also committed to utilizing the phased TMDL approach consistent with EPA guidance in an iterative approach of improving the allocations, moving forward with the implementation plan, and gaining critical knowledge of the waterbody.	The proposed TMDL is structured for iterative implementation by responsible parties in accordance with EPA guidance. Like many other Los Angeles Region TMDLs previously adopted TMDLs, it contains an implementation schedule, allows for special studies and contains a reconsideration to revise the TMDL based on the results of special studies and monitoring. See also response to Comment No. 5.17.

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5.3			The City is committed to working with you to produce data and analyses, including the effectiveness of the BMPs, which will potentially lead to modifications and improvements of this Basin Plan to achieve our mutual water quality objectives.	Comment Noted
5.4			The City appreciated the opportunity to participate in stakeholder meetings held by the RWQCB to discuss the development of this TMDL. After review of the recently released draft TMDL, we have additional comments and concerns regarding the proposed allocations, implementation schedules and strategies, data gaps, sources, and linkage analysis. These are presented in greater detail below.	Comment Noted
5.5			**Compliance Plan Schedule:** The Implementation Schedule prescribes 8.5 years for the completion of full implementation options. However, considerable time is needed to complete, the necessary lake improvement projects, including the City's proposed Wilmington Drain Multi-Use and Machado Lake Ecosystem Rehabilitation Projects, to address the internal pollutant loads and external BMPs projects to reduce the external pollutant loads. These implementation plan include complex design and construction projects that will require several years to design, bid, and construct, especially if coordinating and cost-sharing with other regulated entities in the watershed. The responsible agencies need additional	Regional Board staff notes that the City's lake improvement projects, the Wilmington Drain Multi-Use project and the Machado Lake Ecosystem Rehabilitation project, are currently in the pre-design phase and should soon be in the design phase. According to the final project concept reports, these projects are scheduled for completion in 2010 and 2015, respectively. The current TMDL schedule is based on a final compliance date of 2017 (based on a 2009 effective date); Nonetheless, staff understands the need to coordinate actions with other jurisdictions and finds that an additional 1.0 years is reasonable. The schedule in the revised tentative Basin Plan Amendment reflects a 9.5 year schedule.

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			time to coordinate the necessary implementation plans, cost-sharing agreements, and construction contracts. Therefore the City requests the extension of the final compliance date an additional 1.5 years to allow the lake to stabilize subsequent to collection of monitoring data from a healthy lake. That would require revising 8.5 years to 10 years. for this ' TMIDL Implementation Schedule.	
5.6			**Compliance Plan Schedule (cont'd)** Similarly, the other State Nutrient TMDLs referenced in this staff report all have an implementation schedule ranging from 10-21 years.	The recommended TMDL Implementation Schedule has been revised to 9.5 years. The lake nutrient TMDLs referenced in Table 3 of the staff report are all significantly larger lakes and watersheds, which require longer implementation schedules.
5.7			**Compliance Plan Schedule (cont'd)** The City also requests some minor adjustments to the other tasks, such as submittal of the monitoring plans, implementation plans, and special study results. For instance the Lake Water Quality Management Plan (LWQMP) may include a sediment depth assessment and will require 2.5 years for completion. Please refer to Attachment A and ' comment 68 for the modified implementation schedule.	Please see response to comment number 5.106
5.8			**Compliance Plan Schedule (cont'd)** *Requested Action:* Please extend the implementation schedule to 10 years and adjust the TMDL re-opener to Year 9 to occur after the final construction' of all lake management and BMP projects.	See response to comment 5.5
5.9			2. **Reconsideration of Targets Established as Initial Interim WLAs and LAs** The targets established as the initial interim WLA are set as 95t^{h} percentile of current lake concentrations (TN 3.36 mg/L and TP= 1.18), by no means represent the nutrient discharge of	Staff recognizes the City's concerns which is why the compliance point for the interim allocations is in the lake. The initial interim WLAs and LAs are set to reflect current lake conditions, not storm drain conditions. The interim allocations, based on current

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			the storm drains into the lake.	lake conditions, are not meant to represent storm drain discharges. The interim allocations are necessary to ensure that there is not further degradation of lake water quality once the TMDL is effective, but prior to implantation activities
5.10			2. **Reconsideration of Targets Established as Initial Interim WLAs and LAs (cont'd)** The City has been monitoring the lake and the storm drains from October 2007 through end _ of February 2008 (Attachment B). For Wilmington Drain, the 95th percentile of nutrients was TN = 8.51 mg/L, TP = 2.05 mg/L and the maximum measured concentrations were TN °.18.42 mg/L, TP = 4.66 mg/L. For Project 77 Drain, the 95th percentile of nutrients was TN 4.46 mg/L, TP = 1.47 mg/L and the maximum measured concentrations were TN = 5.71 mg/L, TP 1.99 mg/L. The two storm drains sampled, during October 2007 to end of February 2008 (Attachment B) show eight exceedances above the initial interim WLAs. The interim WLAs are overly underestimated, and if given as monthly averages are unachievable. The exceedances due to false initial interim limits will place the point sources in' noncompliance from year 1 (TMDL effective date): and subject ` them to third party lawsuits. If the objective of interim limits is to protect the existing condition of the lake, they must be set in a manner where they are attainable in the time frame that is given to achieve them. Therefore, the interim limits must be revised to reflect the existing condition and established as annual averages.	Regional Board staff appreciates the submission of these data. Regional Board staff has reviewed these data and the initial interim WLA and LA are set as 3.5 mg/L for total nitrogen and 1.25 mg/L for total phosphorus as monthly averages to be measured in lake. These concentrations reflect existing in lake conditions. Storm drain sampling is not the basis for compliance, and Regional Board staff finds that applying the initial interim WLA and LA as annual averages will not be protective of current water quality conditions and prevent further impairments.
5.11			2. **Reconsideration of Targets Established as Initial Interim WLAs and LAs (cont'd)** Moreover, the	Regional Board staff does not support the complete removal of interim WLAs and LAs. Interim allocations

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			second interim limits needs to be removed.	are a longstanding TMDL policy of the Los Angeles Regional Water Quality Control Board and are included in numerous TMDLs. Interim allocations are necessary to ensure that progress is being made to improve water quality and attain beneficial uses. The 5 year interim waste load and load allocations have been revised to reflect a 30 percent reduction from current in-lake total nitrogen concentrations. Moreover, responsible jurisdiction may be deemed in compliance with the numeric 5 year interim WLAs and LAs through the implementation of internal and/or external source reduction projects. The revised BPA amendment reflects these edits and clearly states the determination of compliance with the 5 year interim allocations.
5.12			2. **Reconsideration of Targets Established as Initial Interim WLAs and LAs (cont'd)** Additionally, the technical memo, page 6, last paragraph, states: *"It is important to note that the total nitrogen concentration entering the lake under wet weather events is currently meeting the total nitrogen TMDL waste load allocation of 1.0 mg/L"* City's stormwater monitoring data (Attachment B) shows that for wet weather events of November 30, and December 19, 2007 and (one to three days post rain) the total nitrogen concentration are between 2.0 to 3.9 mg/L for all the three storm drains discharging to the lake. The technical memo on page 7, first paragraph, states *"average concentration of total phosphorus in the stormwater discharge is 0.37 mg/l"* The phosphorus concentration for the same wet	The Interim WLAs and LAs are established on in-lake conditions in consideration of the most recent data provided by the City, not storm drain outflow. As far as the technical discussion, Staff finds that estimates of nutrient loading based on flow weighted composite samples collected under the MS4 permit are a more accurate representation of wet weather nutrient loading to the lake. The city's data were collected one to three days after a rain event and were collected as grab samples. This sampling approach does not provide information about the loading of nutrients to the lake over the length of a storm. No changes have been made to the technical memo based on two grab sample sampling events.

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			days varies between 0.48 to 1.99 mg/L, and is five to twenty times higher than LA phosphorus load allocation of 0.1 mg/L. The City understands that the nutrient concentration reported in the technical memo are estimated concentration from LA County monitoring reports. The reports do not characterize the current storm drain nutrient discharge to the lake. Therefore, the City requests the revision of the storm drain output to the lake and information provided in the technical memo be based on City's current monitoring data.	
5.13			2. **Reconsideration of Targets Established as Initial Interim WLAs and LAs (cont'd)** Regarding load allocations, based on additional in-lake samples, the LAs should be modified to reflect the existing condition of the lake. The revised interim LAs, based on current monitoring data will be TP = 1.25 mg/L and TN = 3.50 mg/L. It is imperative that the revised interim LAs are established as annual averages because: a) of limited data of in-lake sampling; and, b) periodic exceedances due to storm drains input. It should be noted that all of the California Lake Nutrient TMDLs have targets and WLAs established as annual averages and not monthly averages.	Regional Board staff appreciates the submission of these data. Regional Board staff has reviewed these data and the initial interim WLA and LA have been revised to reflect the City's data: 3.5 mg/L for total nitrogen and 1.25 mg/L for total to be measured in lake. These concentrations reflect existing in lake conditions based on 1 ½ years of monthly sampling at the lake. The initial interim WLAs and LAs are necessary to prevent further degradation of lake water quality; annual averages will not be protective of current water quality conditions and prevent further degradation.

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5.14			2. **Reconsideration of Targets Established as Initial Interim WLAs and LAs (cont'd)** *Requested Action:* Include the additional events sampled by the City for in-lake samples and establish the TN and TP based on the 95th percentile of the new monitoring data provided in Attachment B for the in-lake samples. The modified WLAs and LAs should be TP= 1.25 mg/L and TN=3.50 mg/L and be assigned as annual averages (Table 17 and 18). Additionally, there should be language in the TMDL to remove the City from noncompliance in the case storm drain monitoring shows exceedances. In lieu of being deemed out of compliance, the regulated entities shall complete an investigative action plan that includes monitoring, identifying sources, and reporting to RWQCB.	See response to comment 5.13 The implementation language has been refined to explain that compliance with the initial interim targets shall be measured in-lake.
5.15			3. **MOA and Clean up and Abatement Order:** Based on the City experience working with multi-agencies in other adopted TMDLs, establishing a Memorandum of Agreement (MOA) with all the responsible jurisdictions and the Regional Board is impossible in 6 months. Instead of an MOA, the City requests that a conditional waiver be used to implement load allocations. Each responsible agency will be required to submit a letter of intent to RWQCB committing to the waiver and to participate in the LWQMP. The most recent example is the Machado Lake Trash TMDL, where the responsible parties were given a conditional waiver. The Machado Lake Nutrient TMDL seems to meet the same requirements for a conditional waiver as the Trash TMDL. *Requested Action:* Consider a conditional waiver to be used in lieu of an MOA to implement load allocations.	Although conditional waivers were utilized to address nonpoint sources of trash in the Machado Lake trash TMDL, staff finds that they are not an appropriate regulatory mechanism to address the load reductions required for the Machado Lake nutrient TMDL. Whereas nonpoint sources of trash stem from improper disposal of trash directly into waterbodies, nonpoint sources of nutrients stem from sediments currently located at the bottom of Machado Lake that were discharged through NPDES permitted stormdrains. The types of load reduction projects for trash and nutrient TMDLs will be different – trash load reductions can be achieved through nonstructural BMPs whereas load reductions for Machdo Lake will be implemented through sediment removal or treatment processes. Consequently, conditional waivers from waste discharge requirements are not

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				appropriate for the Machado Lake TMDL.
5.16			**4. Consider Delisting, Ammonia.** The Problem statement of the Basin Plan amendment mistakenly identifies "Nitrogen (including ammonia) as one of the excessive nutrients." Based on the staff report (Table 4, page 29), and the results of in-lake ammonia samples, *"The ammonia concentration was generally below the method reporting limit of 0.1 mg/L ".* Furthermore, all measured ammonia concentrations not only fall below the Basin Plan standard of 5.95 mg/L, but are below the total nitrogen requirement in this TMDL of 1.0 mg/L and often below the reporting limit. Based on the 1992-1993 data faxed to City by RWQCB staff on March 3, 2008, the average of ammonia is 0.1 mg/L and far below the standard. The monitoring data of in-lake samples (2006-2007) shows that ammonia only accounts for approximately 5% of the total nitrogen (TN). In fact 94% of total nitrogen in the lake is organic nitrogen. As mentioned earlier, the 5% of the concentration of 0.1 mg/L, is clearly below the basin plan standard and	The problem statement is not mistaken. Ammonia is a form of nitrogen and all forms of nitrogen are contributing to the eutrophic effects observed in Machado Lake. Furthermore, staff recognizes that sampling results indicate that ammonia is generally within TMDL targets. Consequently, staff did not develop WLAs and LAs for ammonia in this TMDL. However, numeric targets for ammonia were included to ensure that all water quality standards are attained and that aquatic life is protected. The Regional Board will consider all ammonia data in developing the 2008 303(d) list and may delist ammonia at that time. The staff report appropriately included a summary of the 1992-93 data set and we provided these data to stakeholders upon request.

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			generally below the method reporting limit. Additionally, as staff indicated in Page 27 of the report: *"Staff was unable to locate a 1998 Machado Lake fact sheet; but assumes that the data from this monitoring (1992-1993) program was used for the original 303(d), listing in 1998".* Based on the 1992-1993 data, the average of ammonia is 0.1 mg/l and far below the standard. Therefore the various data sources demonstrate that the ammonia is not a problem for the lake and should be de-listed. As part of TMDL development requirements, current pollutant levels and conditions should be assessed in determining if the 303(d) listing is still applicable and warrants a TMDL. *Requested Action:* The City requests that a TMDL not be developed for ammonia; therefore, the numeric target and WLAs for ammonia should be removed. Additionally, the RWQCB should pursue delisting of ammonia during the next 303 (d) listing cycle and include the 92-93 data in the TMDL staff report.	
5.17			**5. To follow EPA Guidance on Phased TMDL Approach** The Machado Lake TMDL should be explicitly developed as a "phased TMDL" consistent with EPA guidance. In the August 2, 2006 memo from headquarters to the regions, EPA recommended the use of phased TMDLs for those in which scheduling reasons require they.*be established despite significant data uncertainty and where the State expects that the loading capacity and allocation scheme will be revised in the future as additional information is collected". This* EPA memo also notes that *"An example of a phased TMDL could be a TMDL for phosphorus in a lake watershed where there are uncertain loadings*	Staff partially agrees and partially disagrees with this comment. As stated in Response 5.2, the TMDL includes an implementation schedule, special studies to address data gaps, and contains a reconsideration to revise WLAs and LAs in response to special studies. In response to the City's request, the implementation schedule will be revised to state that the TMDL **will** be reconsidered. However, Regional Board staff is concerned that the City has misconstrued the elements of a phased TMDL by requesting that the final WLA and LA will be determined at the TMDL reconsideration. The EPA

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			from the major land uses and/or limited knowledge of in-lake processes. In such a case, the loading capacity of the water body may be difficult to establish and the State may decide to include a schedule for establishing a revised TMDL based on follow up monitoring It is clear that a formal Phased TMDL approach is appropriate for Machado Lake for reasons outlined in EPA's 2006 clarification letter on Phased TMDLs (i.e., because of the limited data available, and uncertainties around loading and modeling analyses). The guidance letter suggests that Phased TMDLs include a monitoring plan and scheduled timeframe for revision of the TMDL. In addition, the letter notes that Phased TMDLs are an example of the Iterative Adaptive Implementation approach that would provide for a flexible allocation scheme. Section 9.4 of the Machado Lake TMDL notes that there may be a need to reconsider the TMDL and allocations. Section 9.5 outlines a monitoring plan, Section 9.6 identifies two special studies (nutrient flux and sedimentation/resuspension studies), and Item 21 in the schedule in Section 9.7 makes it clear that the TMDL can be reconsidered based on the results of the special studies. The City appreciates these provisions in the TMDL and recognizes that they are elements of and consistent with the EPA 2006 clarification letter. The City requests, however, that the TMDL also formally state that it is a Phased TMDL with Iterative Adaptive Implementation, consistent with and with a citation to, the 2006 letter. This will make it clear that the TMDL approach aligns with current EPA policy and that evolving EPA policies and methodologies	memorandum cited by the City clearly states, "All phased TMDLs must include all elements of a regular TMDL, including load allocations, wasteload allocations and a margin of safety. As with any TMDL, each phase must be established to attain and maintain the applicable water quality standard." The EPA memo continues, "…phased TMDLs will in all likelihood need to be revised." The City is mistaken in assuming that the EPA guidance allows the Regional Board flexibility for delay determination of WLA and LA at the time of TMDL adoption. However, the Regional Board can include reconsiderations to revise WLAs and LAs. Further, phased TMDLs are limited to TMDLs where there is significant data uncertainty, which is not the case for the proposed TMDL. There is some uncertainty associated with storm drain data and variability in external sources and nutrient cycling within the lake (BPA, pg 5), but this is addressed by the margin of safety, a required element of a TMDL, and is not considered "significant uncertainty". The proposed TMDL is similar to other several other nutrient TMDLs adopted in this Region and in California, which interpret narrative standards using methods established by scientific literature and EPA guidance. The proposed TMDL is not a phased TMDL; it is rather one of many Regional Board TMDLs that allow for special studies and contain a reconsideration to revise targets, allocations or the implementation schedule, if needed.

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			regarding adaptive implementation also will be applicable to this TMDL. Therefore, please modify Table 17 and 18 to reflect final WLA and LA will be determined at the TMDL reopener.	
5.18			**5. To follow EPA Guidance on Phased TMDL Approach (cont'd)** In addition, the TMDL should include a recreational user survey special study and a biological assessment study on the list of optional studies that can be used for TMDL reconsideration.	The TMDL currently includes optional special studies. Stakeholders may conduct special studies not defined in the Basin Plan Amendment for Regional Board staff review.

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5.19			**5. To follow EPA Guidance on Phased TMDL Approach (cont'd)** *Requested Action:* Modify the Staff Report and Basin Plan amendment to state that it is a phased TMDL with iterative adaptive implementation and with a citation to the EPA's 2006 letter on Phased TMDLs. This supports City's request: a) to use interim WLA /LA of 95th percentile; and, b) not to assign final WLA/LA for TP and TN until TMDL reopener. In the TMDL reconsideration (Page 70, 3rd paragraph) modify *"TMDL **may** be reconsidered" to "TMDL **will** be reconsidered",* and adjust Table 17 and 18 accordingly.	Staff has revised the proposed TMDL in accordance with the City's comments. See response to 5.17
5.20			**6. Numeric Target for Nitrogen** There is much discussion in this TMDL about the need for nitrogen control in addition to phosphorus, but there is no substantive or defensible technical information presented to establish the relative importance of nitrogen versus phosphorus.	The staff report clearly identifies nitrogen as a key nutrient for phytoplankton growth and, in addition to phosphorus, responsible for eutrophic effects in surface waters. The 1983 paper by Daniel E. Canfield, Jr. is discussed. This paper presents the importance of both nitrogen and phosphorus in relation to algal biomass growth in lakes.
5.21			**6. Numeric Target for Nitrogen (cont'd)** In fact, the report recognizes that the blue green algae blooms are of concern in the lake, and it is well known that blue green algae are capable of fixing atmospheric nitrogen and thus can thrive even with significant reduction in nitrogen loadings.	The staff report does identify blue green algae blooms as a negative characteristic of eutrophication. However, the staff report does not cite that blue green algae blooms have occurred at the lake. Staff has observed general algal blooms at the lake and chlorophyll samples have demonstrated high concentrations of algal biomass in the lake. However, since phytoplankton analysis data are not currently available for Machado Lake it is not possible to identify the algal species. Phytoplankton communities in lakes

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				are often dynamic and composed of more than one species; therefore reduced nitrogen loading to the lake is necessary for the overall control of algal biomass in the lake not just a single group of algal species. Moreover, not all blue green algae species are capable of nitrogen fixation, for example the nonheterocystous forms such as *Oscillatoria,* and *Microsystis* are not capable of nitrogen fixation (Madigan, Martinko, Parker, 1997). .
5.22			**6. Numeric Target for Nitrogen (cont'd)** The BATHTUB modeling methodology is not able to simulate a particular form of algae such as blue greens, and so does not provide a realistic interpretation of the benefits of nitrogen control. As a steady-state spreadsheet tool, NNE BATHTUB is not an appropriate model to address the dynamic nature of stormwater runoff, sediment release, and sedimentation. Dynamic models such as EPA's AQUATOX or CE-QUAL-W2 model should be applied.	Staff find that there is a sufficient data set to support development of this TMDL a steady-state model such as NNE BATHTUB. However, there are few water quality data obtained on a sustained daily basis to support a dynamic model simulating day-to-day variability. A simple dynamic model can predict short-term variations in lake conditions to reflect variations in flow and load. However, the approach used in the Machado Lake represents a long-term average results and BATHTUB model was determined to be appropriate because it addresses the parameter of concern (phosphorus and nitrogen) and has been used previously for lake or reservoir TMDLs. As shown in the report, the NNE BATHTUB model has successfully predicated annual average conditions in this TMDL. In addition, USEPA also recommends the use of BATHTUB for nutrient TMDLs (USEPA, 1999).

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5.23			**6. Numeric Target for Nitrogen (cont'd)** The use of any N:P ratio in this case could be questionable, because of the overall lack of data and modeling imprecision., The 10:1 ratio is only for a "rule of thumb" application: In fact, the apparent reference to "Thomann and Mueller (1987)" on page 35 of the draft TMDL report seems to be directed at Thomann-Mueller's description of "Controlling Nutrients for Different Waterbodies" and its tabulation and explanation of "general guidelines" for. waterbodies including large and small lakes. Thomann and Mueller (1987) recommends that the N:P ratios are *"a useful' measure for understanding at a firstlevel the relationship between nitrogen, phosphorous, and plant biomass"* and that *"care must be taken in interpretation and use"* of these measures. Thomann and Mueller (1987) does not recommend the application of a 10:1 N:P ratio for deriving numeric targets. Because of these very significant technical uncertainties and the relatively limited data availability for Machado Lake, this TMDL should be explicitly structured to be a phased TMDL *Requested Action:* Further study and analysis of the basis for a TN target for this TMDL is needed due to the lack of an existing technical basis for nitrogen control. This would be accomplished in Phase I of this TMDL that should be explicitly structured to be a phased TMDL (see comment #5).	Staff finds sufficient data and information available to determine WLAs and LAs, but agrees that further study could provide useful information for revising those WLAs and LAs. The total nitrogen to total phosphorus ratio is used to establish a balance between the amount of nitrogen and phosphorus in lake; it is the ratio suitable for healthy phytoplankton growth. The 10:1 ratio is well established as the general balancing point between nitrogen or phosphorus limitation (Thomann and Mueller, 1987 and Horne and Goldman, 1994). This relationship has been applied for water quality objectives in other Regional Board Basin Plans (SDRWQCB, 1994,) and in a previously adopted TMDL for the Los Angeles Region (Malibu Creek Nutrients TMDL, 2003). A balance between nitrogen and phosphorus concentrations in the lake prevents the situation where the lake may experience strong nitrogen or phosphorus limitation. Balancing the nutrient concentrations in the lake is important to establishing an overall healthy lake ecosystem. See response 5.17 See response 5.20
5.24			**7. Sensitivity Analysis and TMDL Margin of Safety:** The "sensitivity analysis" described in the staff report (Page 51, Section 5.1.2) and Lai 20.07 does not	Theoretically speaking, uncertainty and sensitivity analysis are closely related, uncertainty is parameter specific, and sensitivity is algorithm-specific with respect to model "variables.", for example, total

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			address uncertainty and TMDL margin of safety (MOS) as it prefaces itself as intended. The described exercise only helps identify the limiting nutrient and LA/WLA necessary to achieve the goal. A true sensitivity analysis would test the concentrations used for loadings, calibration factors, physical assumptions, and other model parameters to provide a band of confidence around the parameter selection, loading calculations, etc. This would then be used to identify the limits of uncertainty that can then be used to quantify the risks and margin of safety to' successful goal attainment attributed to modeling calculations. The sensitivity calculations illustrated in Lai (2007) show calculations of nutrients and chlorophyll-a that are not in the range of the data. Therefore; the sensitivity analysis indicates that the model is not sensitive enough or hasn't been calibrated sufficiently to simulate observed conditions. *Requested Action:* Perform a true sensitivity analysis and quantify model uncertainty as it relates to margin of safety as required in the TMDL.	phosphorus, total nitrogen. By investigating the "relative sensitivity" of model variables, a user can become knowledgeable of the relative importance of variables in the model. By knowing the "uncertainty" associated with model parameter values and the "sensitivity" of the model to specific variables, a user will be more informed regarding the confidence that can be placed in model results. Uncertainties in the scientific sense are a component of all aspects of the modeling process. In Machado Lake Nutrient modeling, the sensitivity analysis was conducted to investigate how the model variable has a significant effect on modeling outputs. The results of sensitivity analysis demonstrate that the variables of the model are within the range of the data and provide a guideline to select calibration factor of the model.

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5.25			**8. Reconsideration of Numeric Target for Chlorophyll a:** The City supports using the Chlorophyll-a (Chl-a) target to establish the designated uses of the lake, but believes that a Chl-a target of 20 ug/L for the TMDL is unreliable based on the following: Staff report, page 33: *"A numeric target of 20 ug/L Chlorophyll cc is established to protect the beneficial uses of Machado Lake based on EPA guidance (EPA 1999) ".* What is the title of this EPA (1999) document? In the reference section, EPA (1999) refers to "Stormwater Technology Fact Sheet -Sand Filters. EPA 832-F-99-007" Is this correct? The EPA 1999 was reviewed but the Chl-a target of 20 ug/L was not found.	The EPA document Protocol for Developing Nutrient TMDLs, First Edition (1999, EPA 841-B-99-007) was followed in the development of the chlorophyll *a* target for Machado Lake. This document has been added to the list of references in the staff report.
5.26			**8. Reconsideration of Numeric Target for Chlorophyll a (cont'd)** Table 1, page 22 identifies a chlorophyll value of 56 ug/L as consistent with a TP value of about 0.10 mg/L. This calls into question the Machado Lake TMDL target of 20 ug/L of chlorophyll, which was taken from an entirely different EPA document and does not appear to have any direct linkage to the TP target of 0.10 mg/L. In fact there does not appear to be any basis for the 20 ug/L target for this TMDL.	The staff report adequately presents the basis for the chlorophyll a target of 20 ug/L. Table 1 in the staff report presents the Carlson Trophic Status Index (TSI) which relates a range water quality measurements, chlorophyll (µg/L) Secchi depth (m), and total phosphorus (µg/L), to general water quality characteristics, and is recommended by EPA guidance (EPA 841-B-99-007) as a means to establish nutrient targets. The chlorophyll *a* concentration of 56 µg/L referred to in this comment is related to highly negative eutrophic to hyper-eutrophic water quality characteristics such as, blue green algal blooms, algal scum, and low dissolved oxygen. The chlorophyll a numeric target of 20 µg/L is related to moderately eutrophic conditions and allows an acceptable level of algal biomass for Machado Lake that will attain Beneficial Uses, but is not expected to result in negative eutrophic to hyper – eutrophic water quality conditions.

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				While the Carlson TSI and the NNE BATHTUB tools predict that that lower TP concentrations (~ 0.5 – 0.7 mg/L) will likely be needed to attain a chlorophyll a concentration of 20 µg/L, these tools were not directly used to set numeric targets. Instead, in response to stakeholder comments made throughout the TMDL development process regarding the NNE BATHTUB tools and the applicability of the Carlson TSI to southern California, Regional Board staff relied upon the EPA-recommended value of 0.1 mg/l for phosphorous. This target has been applied in a previously adopted TMDL for the Los Angeles Region (Malibu Creek Nutrients TMDL, 2003). Again, the Carlson TSI correlates a *range* of TP values with a *range* of chlorophyll a values. It is therefore possible that due to the dynamic nature of lakes, a TP target of 0.1 mg/L will achieve a chlorophyll a target of 20 µg/L. It should be noted that no waste load or load allocations are assigned for chlorophyll a. The chlorophyll a target of 20 µg/L was preserved to ensure that the TP target and allocations will attain water quality objectives and Beneficial Uses in the Lake. See response 5.25

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5.27			**8. Reconsideration of Numeric Target for Chlorophyll a (cont'd)** Although the peer review paper by Mr. McGinley states that 20 ug/L *"...would likely provide a relatively high degree of user satisfaction",* he cites the publication by Heiskary and Walker (1995). This publication actually concludes that 40 ug/L was determined to be an appropriate nuisance threshold for the reservoir studied. This study also provided a reasonable methodology to establish chlorophyll and nutrient targets for lakes and reservoirs using user surveys. In fact, the City recommends that this is a methodology that should be considered as part of a phased TMDL process for Machado Lake.	Staff finds that the user survey approach, suggested as a method for establishing chlorophyll and nutrient targets for this TMDL, would only apply to Recreation Beneficial Uses. Machado Lake has existing aquatic life Beneficial Uses and the TMDL numeric targets must be protective of these uses. Therefore, Regional Board staff does not consider a user survey alone as an appropriate method for establishing numeric targets.

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5.28			**8. Reconsideration of Numeric Target for Chlorophyll a (cont'd)** Based on Technical Memo dated January 11, 2008 (Page 6), The Model used for linkage analysis predicted Chl -a concentration of 36.1 ug/L. The model output for Chl-a is based on load capacity for nutrients calculated to meet numeric targets of 0.1 mg/L and 1.0 mg/L for total phosphorus and total nitrogen. It is not clear why RWQCB is not accepting the model output for Chl-a selected to meet EPA target of 0.1 mg/l for total phosphorus.	The BATHTUB NNE tools predicted that 0.1 mg/L TP would result in a seasonal average chlorophyll concentration of 36 ug/L. This value was not established as the chlorophyll numeric target because it was considered at this level there is a greater risk that the lake would experience highly negative eutrophic effects and not attain Beneficial Uses especially during the summer season, which is the critical condition for this waterbody. Furthermore, he model shows a linkage between nutrient loading and in-lake algal response rather than a clear relationship between phosphorus and chlorophyll *a*. This is likely due to other lake dynamics such as sediment resuspension. Therefore, the model was not used to directly assign the chlorophyll a target, but was rather used to better understand the relationship between nutrient loading and in-lake water quality See response 5.26
5.29			**8. Reconsideration of Numeric Target for Chlorophyll a (cont'd)** Machado Lake is a small, very shallow, polymictic lake located in a semi-arid, warm climate. This makes it very different than the general lake situations, and their associated empirical relationships, described section 2.1 of the draft TMDL. For example, the trophic status indices related to phosphorus were developed for deeper, dimictic, strongly stratified, northern temperate lakes. This ecoregional difference has very substantive importance in relation to the assessment of lake trophic status and what the appropriate TMDL targets should be and how they should be derived. Using	Although many of the concepts and information available for lake management have been developed through the long history of research on northern temperate lakes, the fundamental concepts such as the correlation between increasing plant biomass and a more productive trophic state (eutrophic to hyper-eutrophic) and the fact that increased nutrient concentrations are the underlying causes of cause of eutrophication are well established concepts and can be applied to Machado Lake. Regional Board staff's reliance on EPA guidance and literature values is thus appropriate for setting numeric targets. These targets are similar to targets previously established by the Los

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			targets from several very generalized EPA guidance documents that also are based on lakes very dissimilar from Machado Lake is not appropriate. Although it is recognized that one or more targets are needed in the initial phase of a phased TMDL, it must also be recognized in the TMDL document that the loading capacity, and hence targets, may also need to be revised in a subsequent phase, for example through site-specific study. Please also refer to Comment #10 below for "Special Study".	Angeles Regional Board (Malibu Creek Nutrient TMDL) and other Regional Boards in California (e.g., Lake Elsinore and Indian Creek Nutrient TMDLs). Staff did consider the specific characteristics (e.g. depth, mixing cycle, size, and climate) of Machado Lake when evaluating water quality data and developing the TMDL. Also, staff conservatively used information that was developed based on lakes in other regions when developing the chlorophyll *a* target for Machado Lake. That is why staff set the chlorophyll a target based on a moderately eutrophic state, rather than a mesotrophic or oligotrophic state, which might apply to northern temperate lakes. At a moderately eutrophic state, productivity is high, which is expected for a shallow, warm lake, located low in the watershed, such as Machado. The TMDL does recognize that there may be a need to revise the numeric targets and allocations based on the results of special studies. A reconsideration to address this is scheduled for 7.5 years after the effective date of the TMDL.

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5.30			**8. Reconsideration of Numeric Target for Chlorophyll a (cont'd)** *Requested Action:* The City recommends selection of a Chl-a numeric target of 56 ug/L, and a DO target (Basin Plan standard). The Chl-a numeric target selected should be interpreted as a nuisance level not to be exceeded more than 25% of the time. This is reasonable as a likely conservative starting point but then subject to the results of further special studies and modeling in Phase 1 of the phased TMDL. For example, the lake user special study recommended by the City will help establish appropriate numeric targets associated with recreation to be used to help define attainment in Phase 2 of the TMDL. Additionally, postpone setting final standards for phosphorus and nitrogen until the reopener using a weight evidence approach including monitoring data, results of special studies, and establishment of the healthy lake.	See response 5.25, 5.26, 5.27, and 5.28 The Clean Water Act and EPA guidance clearly requires that TMDLs must set the final LAs and WLAs. Consequently the staff has structured a TMDL in which special studied, and implementation actions can be evaluated and the Regional Board will review the findings of these reports to revise the TMDL, as necessary. Staff finds that postponing the TMDL until it is reconsidered could not be approved by EPA nor meet the requirements of the Clean Water Act... However, implementation of final load and waste load allocations is postponed until the Regional Board reconsiders these allocations in light of the special studies.
5.31			**9. Linkage Analysis, Model Calibration and Validation:** In the original BATHTUB model by the Army Corps of Engineers, a set of model options (P, N, light, flushing) are available for chlorophyll-a calculation. It is not clear which option is built in the NNE BATHTUB tool. Additionally, it is not clear, if the tool was calibrated to seasonal conditions or average annual conditions. Although a model calibration was performed, no model validation was conducted. A model validation includes the use of an independent data set that was not used in calibration to test the model. The data used in the model was limited and only for approximately one year (2006-2007). There is no indication that this period is representative of long-	NNE BATHTUB model provides a variety of options for simulating nutrient sedimentation, including several first and second order representations. Also available are five candidate sub-models for chlorophyll a, which depend variously on nitrogen, phosphorus, light, and flushing rate limitations, and three candidate models relating Secchi depth (transparency) to chlorophyll a, turbidity, and nutrient concentrations. NNE BATHTUB thus provides a highly flexible tool for developing a semi-empirical, annual average analysis of nutrient concentrations and eutrophication. Although no additional data are available for model validation, NNE model demonstrates that a good

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			term average conditions to make it representative. Furthermore, the spreadsheet tool was constantly adjusted using calibration factors to complete the "calibration." There was no validation of the tool against a separate set of data, with no adjustments to prove that it is valid to use for long-term applications. Will a tool validation be performed for this TMDL analysis? Without a validation, there is little confidence that the tool is appropriate for the TMDL calculation.	agreement between the predicted and measured water quality and provides confidence that the estimated annual nutrient loads to the lake are good estimates of existing loads entering Machado Lake.
5.32			**Linkage Analysis, Model Calibration and Validation: (cont'd)** There is no comparison of the event mean concentrations used in the loading calculations to site-specific-data. If no site-specific data was available for the model calibration, there should be some comparison to similar watersheds and lakes to increase the confidence in the concentrations selected to calculate the loads.	The event mean concentrations used in the loading calculations are based on 1994 – 2005 data of LA County storm water monitoring data mass emission sites annual mean. These data can be considered as a representative of event mean concentrations in the watershed of Southern California.
5.33			**Linkage Analysis, Model Calibration and Validation: (cont'd) There** are no illustrations confirming that calculations approximate temporal or statistical representations of observations. Rather, the documents illustrate "calibration" calculations based on model parameters themselves such as lake volume, nutrient concentrations, chlorophyll-a, etc. Therefore, the documents have not demonstrated that the models are calibrated and applicable to the TMDL analysis.	If temporal or representative data are available, further model calibration will be performed. Model calibration is to calibrate the model parameters so that the model can predict the real system physically and chemically correct. In this study, the field measured data were used to calibrate the model to represent the Machado Lake phenomena. Like any scientific investigation, the calibration is a never ending process. However, the calibrated model is believed by the staff to be scientifically correct and can be applicable to the TMDL analysis. Further improvement can be made as more data become

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				available. If temporal or representative data are available, further model calibration will be performed.
5.34			**Linkage Analysis, Model Calibration and Validation: (cont'd)** *Requested Action:* Use an independent data set for model validation to ensure that the model has reasonably been calibrated to site-specific condition. Compare event mean concentrations used in the TMDL calculations to site-specific data.	Although no additional data set is currently available for model validation, NNE model demonstrates that a good agreement between the predicted and measured water quality and provides confidence that the estimated annual nutrient loads to the lake are good estimates of existing loads entering Machado Lake If additional independent data set is available, further model calibration and model validation will be performed.
5.35			**10 Special Studies:** The City appreciates the provision of the optional studies in the Draft Report and recommends the following: Based on EPA 2000 Nutrient Criteria Guidance for Lakes and Reservoirs, there are site specific considerations that can and should be taken into account to establish more rigorous targets based on cause-effect information and the attainable aquatic life and recreation uses for any specific lake. The City suggests the following optional site-specific	As requested additional optional special studies have been added to the staff report and Basin Plan Amendment.

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			studies: Lake User Survey; ▪ Lake user surveys have been used in Lake Elsinore Canyon Lake in California to help set nutrient and chlorophyll-a criteria. The user survey analysis along with the nutrient monitoring data provide a reasonable objective and empirically based method for deriving nutrient and Chl-a criteria to protect designated uses for the lake ▪ Lake-specific bioassessment (e.g. using field protocol and sampling sheets to document the biological condition of the lake during Chl-a sampling);Field protocol and sampling sheets from specific states may be used to assist lake-specific bioassessment and document the health of lake condition. These can be found in EPA's 1998 Technical Guidance Document for Lake and Reservoir Bioassessment and biocriteria at http://www.epa.6ov/owow/monitoring/tech/lakes.html. ▪ Collection of more information to demonstrate what a reference condition for an urban lakes may be.Based on a 2007 report by Southern California Coastal Water Research Project (SCCWRP), the TP concentration for natural catchments of 12 different rivers and creeks in Southern California can be greater than 0.1 mg/L at times. Therefore, an adaptive approach should be used to define what reference condition is for an urban lake such as Machado Lake. A similar study to SCCWRP 2007 report,	

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			but specifically for urban lakes in Southern California to document reference conditions, will be very useful. Please also refer to above comment #5 on "Phased TMDL Approach with adaptive management". *Requested Action:* Add the proposed special studies as optional studies to the Voluntary Studies (section 9.6, page 27 of the draft TMDL report.	
5.36			The Problem Statement identifies "Nitrogen ***(including ammonia)***" as one of the excessive nutrients. Based on monitoring data, ammonia (NH3) is not found in excessive concentrations in fact, ammonia is rarely detected. According to monitoring data, ammonia only accounts for approximately 5% of the Total Nitrogen (for in-Lake samples). It appears that most of the Nitrogen is Organic-N. Ammonia should not be included in the problem statement. In fact, it appears that ammonia should be delisted from the 303(d) List, and not be included in this TMDL. All measured Ammonia values (for the stormdrains and in-lake samples) fall below the Basin Plan standard (5.95 mg/L) and the Total Nitrogen requirement in this TMDL (1.0 mg/L). The average ammonia concentration is approximately 0.10 mg/L, which is near the detection limit. In addition, the staff report states, "As a result of high nutrient concentrations, algal blooms, odors and eutrophic conditions Machado Lake was placed on the Clean Water Act 303(d) list of impaired waterbodies in 1998, 2002, and 2006." Please reword this sentence to read: "Machado Lake was placed on the Clean	See response to comment 5.16. Comment noted. Sentence in Basin Plan Amendment changed.

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			Water Act 303(d) list of impaired waterbodies in 1998, 2002, and 2006 for ammonia, algae, odors and eutrophic." As stated on page 27, the Regional Board staff were unable to locate a 1998 Machado Lake fact sheet and had to make assumptions based on what data were used to support the 303(d) listing; as such, the sentence should just state the fact of the current listings.	
5.37			Deletion is misspelled. Should be "depletion". (Page 3, Linkage Analysis)	Comment Noted. The typo has been corrected.
5.38			A review of available data shows that including the attached data collected by City staff with the Regional Board's dataset increases the 95 th percentiles to 1.25 mg/l, for Total Phosphorus and 3.50 mg/L for Total Nitrogen. The interim limits should be changed to reflect these values based on available data (see Attachment B).	See response to comment 5.13

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5.39			The TMDL states that samples will be collected as a "surface integrated sample". SWAMP sampling protocols describe a "sub-surface grab sample", a "depth-integrated sample", or a "surface grab sample". Please replace language with the term "sub-surface grab sample", or clearly define what is meant by "surface integrated sample". The requirement to sample the epilimnion and hypolimnion if the lake stratifies should be removed, or it should be limited to parameters measured in the field with the YSI water quality probe (Temp, DO, pH, EC). It would be difficult to determine if stratification is occurring while taking real-time measurements. Samples for N, P, and the other conventional constituents should be collected in a consistent manner (and depth), regardless of the temperature profile of the lake. Please explain the rationale for collecting TDS, TSS, and Turbidity samples.	The Basin Plan Amendment states the TMDL monitoring plan shall consider lake stratification for the collection of water samples. If future lake management projects result in the lake becoming deeper and potentially thermally stratified during the summer season, then collecting water samples in both the epilimnion and hypolimnion will be important to fully understand the nutrient cycling of Machado Lake. These issues can be resolved in the Monitoring Plan to be submitted by the City and subject to Executive Officer approval. Staff does not consider sampling in both the epilimnion and hypolimnion and an inconsistency in sample collection. Samples collected in the epilimnion should continue to be collected as a depth integrated samples. Samples collected in the hypolimnion should be collected as a discrete depth sample. This type of sampling design provides for consistent collection of depth integrated samples and more specific sampling when the lake stratification conditions call for it. A determination if the lake is stratified can be made while in the field based on the temperature and dissolved oxygen data collected. TDS, TSS and Turbidity are commonly collected as part of lake water quality monitoring programs. They can provide useful information when analyzing sediment resuspension that may be due to wind or a large storm event, and/or bioturbation. They are useful and inexpensive parameters for comprehensively evaluating lake conditions.

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5.40			Please delete the word "Nutrient " from the title page for this is not a Nutrient TMDL but a Eutrophic, Algae, Ammonia and Odors TMDL. Similarly, please correct this TMDL title throughout the document.	Staff agrees that this TMDL has been developed to address Eutrophic, Algae, Ammonia, and Odors listing. However, these listing are the result of nutrients that are and have been loaded to Machado Lake. Because TMDLs in general focus on determining the maximum loads of pollutants that cause impairments, and in this case those pollutants are nutrients, the TMDL is entitled a “Nutrient” TMDL. This TMDL includes both numeric targets and allocations for nutrients; therefore the word nutrient is correctly included in the title of the TMDL.

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5.41			The name "Vermont Street" should be changed to Vermont Avenue. Also, more historical information should be included about the lake. (This can be found from various articles; including NewsPilot 1/30/84.) For example, before the lake was constructed, the area was known as Bixby Slough, and was formed as an oxbow from a bend in the LA River. The area is also the only remaining natural wetland in the South Bay area.	Vermont Street has been changed in the staff report to Vermont Avenue. The staff report contains an adequate description of the Machado Lake subwatershed and the environmental setting.
5.42			Harbor City is a community in the City of Los Angeles and should not be identified separately from the City of LA; therefore, please delete your reference to Harbor City. Please add Rancho Palos Verdes, Redondo Beach, and unincorporated County areas to the community list. In addition, it would be beneficial if a breakdown of areas owned by each responsible agency/jurisdiction were included both in a table and on a map. A map has been attached (see Attachment D) for your reference and GIS support information is available upon request.	Harbor City is no longer listed as separate community in the staff report. Rancho Palos Verdes, Redondo Beach, and Los Angeles County have been identified as communities in the Machado Lake subwatershed in the Environmental Setting section of the staff report.

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5.43			Three discharge points into Machado Lake are identified, Wilmington Drain, Project No. 77, and Harbor City Relief Drain. After consulting with LA County staff, it seems that Project No. 510 should be listed instead of the Harbor City Relief Drain that discharges to the downstream wetlands. In addition, there are two storm drains (36" and 78") that discharge into the riparian woodland on either side of Wilmington Drain that is missing. Please include these discharge points and cite your reference for your drainage information.	TMDL Wasteload Allocations apply to all stormdrains discharging to Machado Lake. The staff report has been updated to correctly identify the Project No. 510 stormdrain. The correct name of this stormdrain was verified in the Los Angeles County Department of Public Works Drains and Facilities map. The 36" and 78" stomdrains referred to in this comment are not identified on maps, provided by the City of Los Angeles, showing stormdrains discharging into Machado Lake. These stormdrains were not pointed out to Regional Board staff in the numerous occasions when we were at the lake with City of Los Angeles staff. Please provide documentation of these stormdrains and they will be added to staff report figures. The Machado Lake Watershed Management Plan provided by the City of Los Angeles Recreation and Parks Department was used to identify stormdrains discharging to Machado Lake. This document does not identify the 36" or 78" stormdrains referred to in this comment.

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5.44			The area shown for Ken Malloy Harbor Regional Park (KMHRP) is incorrect. Please exclude all areas that are not owned by the City of LA and not part of the park, such as, Harbor Junior College owned and operated by the State of California, a 10-acre parcel bordering Anaheim that is owned by Tosco Refinery, and a 1-acre parcel in the SW corner owned by California Water Service, to name a few. Please correct this Figure to show just the KMHRP land area.	This figure in the staff report has been update to show the park boundary.
5.45			Since this TMDL is for the lake portion only, the area shown for the Machado Lake Sub-watershed should not include areas that drain directly to the wetland south of the lake. Also, the area for the Dominguez Channel Watershed includes areas that do not drain to Dominguez Channel but that drain directly to the Los Angeles and Long Beach Harbors. A map has been attached (see Attachment E) for your reference that shows the correct watershed details. Please recalculate any land use data and redraw Figure 2. The supporting GIS info is available upon request. Since this TMDL is only applicable to Machado Lake, a new figure should be added that shows just the Machado Lake Sub-watershed area and identifies all the cities that discharge to this sub-watershed (see comment #7).	The watershed boundaries for both the Dominguez Channel watershed and the Machado Lake sub-watershed have been correctly drawn by GIS technical staff based on the California Interagency Watershed Maps (CalWater). These maps are the State of California's working definition of watershed boundaries. Regional Board GIS technical staff correctly refined the watershed and sub-watershed boundaries based on regional hydrology and stormdrain drainage areas. Only the sub-drainage areas that directly discharge to the lake were used to estimate pollutant loading from the Machado Lake sub-watershed. For example, the sub-drainage area of the Figueroa drain, which discharges to the wetlands was not included in the watershed pollutant loading calculations.

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5.46			From comment #8, please properly identify the Project 510 and the Harbor City Relief Drain and include the additional storm drains that discharge into the riparian area (36" and 78"). Also, the red sub-watershed boundary line does match the actual drainage area. Please correct Figure 3 to identify the correct storm drain discharge and sub-watershed boundary.	See response to comment 5.45 and 5.47
5.47			Please define the term "critical habitat" as it is used in the second sentence.	The term “critical habitat is used to generally refer to the important plant and wildlife habitat resources surrounding the lake area such as, southern willow riparian forest. These habitat areas are identified as part of the Ken Malloy Harbor Regional Park Improvement Program Habitat Restoration and Lake Water Quality Improvement Design Development Report, which was provided by the City of Los Angeles Department of Recreation and Parks.
5.48			This paragraph makes several statements about the state of the lake, such as, lake depth, algal blooms, lake color, and fish population. Please include the sources/documentation that support the statements in this paragraph of the TMDL. Also, please include bluegill in the statement about fish population.	The Machado Lake Watershed Management Plan was reviewed by staff as a basis for the description of the lake. This documentation has been provided in the staff report. This description of Machado Lake was verified based on numerous staff observations at the lake and the collection of field notes in conjunction with field sampling conducted for this TMDL. Also, the bluegill has been added to the list of fish in Machado Lake.

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5.49			Several of the studies discussed in this section were conducted in the early 1970s and regarding lakes with wastewater treatment plant discharge. Please use more recent studies as references and lakes similar to Machado Lake, without any treatment plant discharges.	These studies are discussed to provide background information on the relationship of nitrogen and phosphorus to eutrophication. These studies provide information on a fundamental concept of this TMDL; reduced nutrient loading is necessary for a lake to recover from negative eutrophic conditions. These studies provide appropriate background information on eutrophication for this TMDL.
5.50			Please provide a reference for the statement recognizing phosphorus and nitrogen as key nutrients in phytoplankton growth in lakes and as responsible for the eutrophication of surface waters. Also, please note that this conclusion varies depending on the specific conditions at a lake. In addition, the last sentence of the paragraph states that the studies described in the paragraph are more relevant to lakes that are phosphorus-limiting, yet Machado Lake is nitrogen-limiting. Please provide references to studies of nitrogen-limited lakes as these are more applicable to conditions at Machado Lake.	Phosphorus and nitrogen are macronutrients required for growth and biological processes in phytoplankton and all plants (Solomon, Berg, Martin, Villee, 1996). The EPA Nutrient Criteria Technical Guidance Manual for Lakes and Reservoirs, referenced several times in the TMDL, clearly states that nitrogen and phosphorus are primary factors in determining algal biomass growth. The EPA document also discusses nitrogen as a limiting nutrient. The 1983 paper by Daniel E. Canfield Jr, presents the importance of both nitrogen and phosphorus in relation to algal biomass growth in lakes. See response 5.20 and 5.51

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5.51			Are the lakes presented as examples nitrogen-limiting or phosphorus-limiting? These lakes were only given phosphorus targets. Furthermore, the statement: "it is clear that phosphorus and nitrogen are intrinsically linked to the key symptom of eutrophication," is not made clear from the examples of Lake Erie and Lake Washington that nitrogen is intrinsically linked because the discussion about these lakes is only about phosphorus loading. And, if these lakes are phosphorus-limiting (which is not stated and should be), then the examples given are not at all relevant to conditions at Machado Lake and do not provide a basis for choosing nitrogen and phosphorus as nutrient standards for Machado Lake.	The TMDL staff report summarizes staff's technical rationale underlying its recommended TMDL. It relies on technical literature, specific data for Machado Lake, generally accepted principles of water quality, regulatory guidance from other regulatory and resource agencies, and other TMDLs that have been adopted for similar water quality impairment by states and Regional Boards. Staff recognized that there may be data gaps and addresses those issues by providing interim limits, a time schedule to conduct studies and monitoring to fill data gaps, providing interim waste load and load allocations based on current conditions in Machado Lake, and suspending the implementation of final waste load and load allocations until the Regional Board reconsiders these allocations in light of the special studies. The staff report provides references to the technical literature on which it formed its best professional judgment. See response 5.51
5.52			The document alternates between the use of "r" and "r -squared . " Please be consistent with the statistical analysis. These two variables provide completely different information. The "r" value tells if how positively/negatively and by what magnitude the data are correlated with the x- and y-parameters. The "r -squared" value tells how well the data fits the regression line.	"r" and "r –squared" are used correctly. The various uses of "r" and "r-squared" depend upon the technical information presented. Different authors of the technical literature presented in the TMDL applied different statistical analysis; thus both "r" and "r-squared" appear in the staff report. Regional Board staff has correctly and accurately presented the work of other technical scientists.
5.53			Please clarify that the boxes at the bottom of the graphic refer to impairments of uses.	The figure caption states that the figure is a conceptual model leading to impaired Beneficial Uses.

No.	Date	Author	Comment	Response
5.54			The entire page contains statements that form conclusions about eutrophic processes that are later used to determine limits for Machado Lake. It is very important to provide references and adequate reasoning for forming these conclusions.	The text on the this page of the staff report is a description of Figure 6, which is identified as adapted from Tetra Tech 2004.
5.55			This section indicates that the most distinct water quality problem affecting Machado Lake is eutrophication. It also mentions that nutrient enrichment results in high algal productivity and nuisance macrophyte growth. Eutrophication and other scientific. and regulatory terms used throughout the document (such as trophic state and various water quality parameters) should be listed and defined in a Glossary. With regards to the eutrophic condition of Machado Lake, it should be indicated that the lake is a macrophyte-dominated lake as opposed to an algae-dominated lake. The presence of algae historically has not been a major lake management issue. Algae were present in the lake in 2007 for a short period of time but were attributed to the mechanical harvesting of the emergent and floating vegetation. The third sentence states: "algal blooms have be en observed in the lake during. summer months"; please provide more specific information and evidence of these observations such as the dates and number of observations, photo documentation, etc. The last sentence of the paragraph states: "As a result' It of high nutrient concentrations, algal blooms, odors and eutrophic conditions Machado Lake was placed on the Clean Water Act 303(d) list of impaired waterbodies in 1998, 2002, and 2006." Please reword this sentence to read:	Algal biomass data collected for Machado Lake and presented in the staff report shows multiple occasions where considerable amounts of algal biomass were present in the lake. Terms such as eutrophication, are defined in the text of the staff report as necessary. See response 5.38

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			"Machado Lake was placed on the Clean Water Act 303(d) list of impaired waterbodies in 1998, 2002, and 2006 for ammonia, algae, odors and eutrophic." As stated on page 27, the Regional Board staff were unable to locate a 1998 Machado Lake fact sheet and had to make assumptions based on what data were used to support the 303(d) listing; as such, the sentence should just state the fact of the current listings.	
5.56			The document states, "no single determinations [of DO] shall be less than 5.0 mg/L except when natural conditions cause lesser concentrations." What would define a natural condition for Machado Lake and when would this occur? Please be specific.	An example of a natural low dissolved oxygen condition would include a naturally productive lake that does not have anthropogenic nutrient sources. Natural growth and decay process in the lake may result in low dissolved oxygen conditions. It is not expected that the natural conditions exemption to the dissolved oxygen water quality objective would apply to Machado Lake due to the highly developed (un-natural) nature of the surrounding watershed. The watershed has undergone significant land use and hydromodification changes and has anthropogenic sources of nutrients, as compared to natural watershed conditions. Moreover, Machado lake is a receiving waterbody for several point source waste discharges, which directly contribute additional organic material in the lake or provide nutrients required for additional organic growth in the lake. The decay of the additional organic material can lead to the depression of the dissolved oxygen concentration below the Basin Plan water quality objective.

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5.57			This paragraph discusses the numeric objective of 10 mg/L for nitrogen as not being sufficient for controlling excessive algal growth based on available data and scientific literature. However, no data or reference to any literature is provided to support these statements. Please provide the specific documents and references that were used to draw these conclusions. Additionally, what was the scientific basis for the 10 mg/L numeric objective for nitrogen set forth in the Basin Plan?	This statement in the staff report is based on evidence in the technical literature that lakes with nitrogen concentration less than 10 mg/L are found to be impaired by eutrophication. The EPA Guidance documents relied upon for this TMDL provide examples of nitrogen concentrations of less than 10 mg/L related to eutrophic conditions in lakes.
5.58			To provide an adequate comparison, please include in this table a column identifying the 303(d) listings for each lake. Three of the four lakes are specifically listed for nutrients with the fourth listed for phosphorus; in contrast, Machado Lake is not listed for nutrients or phosphorus, but is listed for eutrophic conditions. In addition, the targets are based on annual averages versus monthly averages being proposed in this TMDL. It is noteworthy to point out that two of the four Nutrient TMDLs you listed for comparison did not provide a nitrogen target for the lakes based on the fact that the lakes were phosphorus-limiting. (See Attachment C) Machado Lake is proven nitrogen-limiting and there is not enough available data on Machado Lake to support phosphorus as critical to excessive algal growth in the lake.	While Machado Lake is not listed for nutrients, the chemical pollutants that stimulate eutrophication are nitrogen and phosphorus, thus the numeric targets were set for these chemicals. The tables are included to show how other Regional Boards interpreted narrative objectives as numeric targets that were more stringent than existing numeric nutrient water quality objectives in the their Basin Plans. The staff report cites sufficient case studies in the technical literature to support phosphorus as one of the critical nutrients for excessive algal growth in the lake and the necessity of including targets for both nitrogen and phosphorus. The TMDL provides for special studies and reconsiderations to address the results of special studies.

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5.59			This TMDL *"is identified on the 1998 and 2002 Clean Water Act 303(d) list of impaired water bodies as impaired due to eutrophic conditions, algae, ammonia, and odors".* It is not clear why this TMDL is setting numeric targets for Phosphorus, Nitrogen, and DO. Especially, when TMDL is using limited data (15 events) and a steady state model which is not an appropriate model to address dynamic nature of stormwater runoff, sediment release, and sedimentation.	The chemical pollutants that stimulate excessive aquatic vegetative growth and stimulate eutrophication are nitrogen and phosphorus, thus the numeric targets were set for these chemicals. Dissolved oxygen is considered a secondary lake response indicator for eutrophic conditions and is established as a numeric target to track water quality improvements and the lake response. A simple dynamic model can predict short-term variations in lake conditions to reflect variations in flow and load. However, the approach used in the Machado Lake represents a long-term average results and BATHTUB model was determined to be appropriate because it addresses the parameter of concern (phosphorus and nitrogen) and has been used previously for lake or reservoir TMDLs. As shown in the report, the NNE BATHTUB model has successfully predicated annual average conditions in this TMDL. The TMDL provides for special studies and reconsiderations to address the results of special studies

No.	Date	Author	Comment	Response
5.60			As a result of the Regional Board staff unable to locate the 1998 fact sheet for the Machado Lake 303(d) listing, the Regional Board has made assumptions that 1992-93 Evaluation of Water Quality for Selected Lakes in the Los Angeles Hydrologic Basin data was used to support the listing. Please include in this TMDL staff report the raw data from these 15 samples taken in 1992-93. The Regional Board states that nutrient concentrations are getting higher in the Lake. It's difficult to evaluate any trends without the data. In addition, please discuss the ammonia data from the 1992-1993 data set, which resulted in ammonia being listed in 1998. Ammonia data from 2006-2007 show the lake to be not only in compliance with ammonia targets proposed, but also under the limit (often below the reporting limit). Based on this recent ammonia data, the Regional Board should consider de-listing ammonia from the 303(d) list for Machado Lake. As part of TMDL development requirements, current pollutant levels and conditions should be assessed in determining if the 303(d) listing is still applicable and warrants a TMDL.	See response 5.16

No.	Date	Author	Comment	Response
5.61			What were the rainfall records for the monitoring periods in 1992-1993 and 2006-2007, and how do they compare to recent and long-term records? The TMDL is dependent on non-point sources, which is of course dependent on rainfall. It is unclear how the data collected during these monitoring periods compare to long-term records. Without knowing this crucial statistic, the data analysis and modeling effort are circumspect, and the TMDL calculation may be over- or under-calculated to meet the desired goals.	It is not clear from this comment how comparing rainfall records from the monitoring periods to long-term records would change the data assessment. Because TMDL allocations are concentration-based, their calculation would not be affected by changes in rainfall. The major nonpoint source of nutrients to Machado Lake, and the only nonpoint source assigned a load allocation is nutrient flux from sediments, which is not dependent on rainfall. Other nonpoint sources were not quantified, but special studies may be conducted to further evaluate these sources.
5.62			The document states that there was a reported operational aeration system. This is not accurate. There was no adequate aeration system.	The Machado Lake Watershed Management Plan identifies an aeration that operated in the lake from approximately 1980-2001. Moreover, personal communication between Regional Board staff and the staff of City of Los Angeles Department of Recreation and Parks has confirmed the previous existence and operation of a lake aeration system in Machado Lake.
5.63			There is no information on the number of sampling locations from which these data have been collected. We are aware that there were two sampling locations: ML-l and ML-2. However, there is no map illustrating the sampling locations. There is no information on their proximity to sources and other relevant information that better characterize the data and its applicability to the analysis. Where are the sampling locations for Site 1 and Site 2? What are the depths of sampling locations at the time of sampling and the overall water depth? Also, it states that 26 dissolved oxygen profiles were	The staff report provides an adequate summary of water quality data collected at the lake. Detailed information from each sampling event collected on the field data sheet such as, the time of sampling and water depth has been and/or will be provided to stakeholders on request. Likewise all sampling events at Machado Lake were conducted in conjunction with staff from the City of Los Angeles Department of Recreation and Parks. Regional Board staff and City of Los Angeles staff were collecting data at the same time at the same

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			measured at the lake from summer 2006 to summer 2007 and that these sampling events were taken at approximately 9 a.m. in the morning. The entire water column during six of these sampling events had less than 5 mg/L D.O. The oxygen levels in a lake are generally lowest after sunrise and increase to a peak around mid-day. Taking oxygen level readings only at 9 a.m. will not give a good representative oxygen profile of Machado Lake. Therefore, this data should not be used to characterize the water quality conditions of Machado Lake nor for establishing the numeric targets for the nutrient TMDL.	sampling locations. City of Los Angeles has all of the detailed information from the field data sheets as collected by their own staff members. The DO profiles presented in the staff report were not used to set the DO numeric target. The DO numeric target is established based on the Basin Plan water quality objective. The DO profiles in the staff report are part of the water quality summary for Machado Lake. Staff agrees that additional DO data collected at different times of day would provide additional information about the oxygen conditions in Machado Lake. The required TMDL monitoring will provide the additional data.
5.64			Regarding Chlorophyll-a, the staff report. States "As expected, summer concentrations are high and concentrations reduce in the winter...." The attached data (see Attachment B) collected by City staff shows a value of 129 ug/L was measured on 12/26/07, which would contradict this statement that Chlorophyll-a follows a seasonal pattern. More data needs to be collected to reach this conclusion, especially since the Regional Board does not have any Chlorophyll-a samples from November through February. Chlorophyll-a values seem to be quite variable throughout the year, regardless of season.	Staff agrees that additional chlorophyll *a* data would be useful to analyze long term algal biomass trends in the lake. The TMDL provides for special studies and reconsiderations to address the results of special studies. However, staff finds that The current data demonstrate excessive algal biomass levels in the lake and supports the development of a TMDL to address the water quality impairment and restore the lake's beneficial uses.

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5.65			This statement should be removed or modified in the report. No information is given to substantiate the statement. Can an illustration be provided to show the change of lake level over time and how it has affected water quality? What is the basis of this statement? There is no information in the report stating that a bathymetry survey was performed of the lake to determine depths during either the 1992-1993 or 2006-2007 data collection periods. There is no indication that total depth was measured at the time of sampling. If only two stations were monitored during the 2006-2007 period, it is not appropriate to extrapolate two measurements across the entire waterbody, especially when the sampling locations are not provided. Finally, is this statement referring to lake "level" or lake depth?	Reduced lake levels result in reduced loading capacity. As the volume of the lake decreases, there is less water to dilute nutrient concentrations. This concept is adequately presented in the staff report.
5.66			As discussed in the previous comment, the Regional Board staff should consider de-listing ammonia from the 303(d) list for Machado Lake based on available data presented in the staff report supporting a de-listing and showing that ammonia are not only far below numeric targets, but often far below reportable limits. A TMDL numeric target should not be set for pollutants that are already meeting the water quality objectives, as stated on page 32 in the last sentence of the paragraph, "An ammonia target will also be set to ensure the lake continues to meet the ammonia objective in the Basin Plan and not contribute to excessive levels of nitrogen."	See response 5.16

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5.67			Please provide documentation supporting your statement that " the numeric objective of 10 mg/L for nitrogen is not sufficiently protective for controlling excessive algal/macrophyte growth and the symptoms of eutrophication in the lake." This is the same comment as comment #22.	This is a repetitive comment. See response 5.59
5.68			Why didn't the Regional Board staff consider other alternatives, such as setting limits based on available data or modeling? Also, why did the Regional Board come to the conclusion that literature values are not appropriate and what were the references used to determine this conclusion?	Regional Board staff considered other alternatives for setting numeric targets. Interim WLAs and LAs were set on available data, including data provided by the City. The comment misconstrues the Regional Board staff's conclusions: The staff report states that numeric targets were not *solely* based on literature values. Instead, literature values were used as inputs for the NNE model, which in turn was used to verify the decision to use values from the EPA guidance document.
5.69			The EPA (1999) reference in lit cited is actually on sand filters; there is no mention of chl-a in document. Should this reference be the EPA 2000 report?	See response 5.25
5.70			In the second sentence, it states: "it is well established in the scientific literature" yet the specific literature has not been referenced. Please cite the specific documentation supporting this statement, especially as this pertains to conditions at Machado Lake.	This statement refers the scientific literature that is presented in section 2 of the TMDL.

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5.71			The Basin Plan does not specify a required depth to measure for Dissolved Oxygen. What is the basis for requiring the DO to be measured at 0.3m depths? Measuring DO at 0.3 meters above the sediments will not give an accurate picture of overall conditions of the Lake. This depth is too close to the sediments where natural decaying processes may bias results. To avoid bias from elevated surface concentrations as well as the depressed concentrations associated with sediments, The City recommends taking the measurements at mid-depth (i.e., determine the depth of the water and divide by 2).	Based on the sampling experience of Regional Board staff, DO measurements made 0.3 meters above the sediments will not be biased by sediment decay processes, especially in a shallow polymictic lake. Because DO values are typically lower at greater depths, DO measurements collected at the mid-depth of lake may allow 50% of the water body to exceed the dissolved oxygen water quality objective. This is of particular concern in a water body the size and depth of Machado Lake; there would be very limited areas of refuge (particularly for fish) from low dissolved oxygen conditions.
5.72			Table 1, page 22 identifies a chlorophyll value of 56 ug/L as consistent with a TP value of about 0.10 mg/L. This calls into question the Machado Lake TMDL target of 20 ug/L of chlorophyll, which was taken from an entirely different EPA document and does not appear to have any direct linkage to the TP target of 0.10 mg/L. In fact there does not appear to be any basis for the 20 ug/L target for this TMDL. Therefore, the City recommends the Regional Board use a Chl a target of 56 ug/L. Also, all of the CA Lake Nutrient TMDLs has targets and WLAs established as annual averages and not monthly averages, thus the City requests that the numeric targets for TP, TN, and Chl a be established as annual averages also. Finally, the numeric target for ammonia should be removed from this table and TMDL based on previous comments (Comment #1, 25, 31)	See response 5.25, 5.26, 5.27 Because there are consistently high air temperatures from April to November, and due to the shallow depth of the Lake, which allows increased light penetration and higher lake temperatures, the growing season is longer at Machado Lake. Annual averages would not be protective over the lengthy growing season. See response 5.16

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5.73			To avoid confusion, the County of Los Angeles should be listed among the co-permittees for the MS4 Stormwater Municipal Permit. In addition, a table should be added that shows the land area for each responsible discharger, including Caltrans..	The County of Los Angeles is clearly identified in the text of the staff report as the principal permittee of the Los Angeles County MS4 permit.
5.74			Please provide the numeric values used for your runoff calculations (area, ratio of imperviousness, 5-year annual average rainfall). Also, a review of the technical memo and the Parsons report shows a discrepancy between the average rainfall values used by Regional Board staff (10.63 in.) with the average rainfall value used by the Parsons report (13.5 in.). The City obtained the meteorological records from LA County for the rain stations in the proximity of Machado Lake. Three stations are located in the Lake watershed (stations 1253, 1158, and 1252) and the average rainfall of these stations equals 13.78 inches. Please adjust the TMDL calculations based on an average rainfall value of 13.78 inches.	Table 2 of the Technical Memo clearly presents the numeric values used for runoff calculations including area, average annual rainfall, and imperviousness ratio. The average annual rainfall value is based on 5 years of precipitation data collected from a California Irrigation Management Information System (CIMIS) weather station. This weather station is in close proximity to Machado Lake (~13 miles) and is an acceptable source of rainfall data.
5.75			Regional Board staff should state that loadings and percent reductions are estimates based on many assumptions and that quantifiers have been added. The accuracy of the values provided in the table based on these assumptions and quantifiers should also be addressed and noted.	All assumptions have been clearly stated in the staff report.

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5.76			Please provide a reference for footnotes a,b,c,d. Also, why the Regional Board staff use the mean of annual means for the EMC data instead of using EMC data specific to the Dominguez Watershed? EMC data for the Dominguez Watershed, available through LA County, is a better indicator of loading at Machado Lake because it is more specific to the site conditions. Also, please include loads from the Project No. 510 storm drain.	The footnotes a, b, c, and d on Table 10 were a typo and have been deleted. Based on stakeholder comments that estimating nutrient loading to Machado Lake from a single mass emission site in Dominguez Channel Watershed was not preferable, data was used from all mass emission sites. The method for estimating external nutrient loading to Machado Lake and the application of data from all Los Angeles County stormwater mass emission sites was presented and discussed with stakeholders several times. Loads from the Project No. 510 stormdrain have been included as shown on Table 5 of the Technical Memo.
5.77			A sediment nutrient flux study was used to identify internal loads. The report seems to reference the " Machado Lake Nutrient Flux Study" presented to the Southern California Coastal Water Research Project (SCCWRP) that was prepared by Aquatic Bioassay & Consulting Laboratories and BRG Marine Laboratories, dated August 2007 (SCCWRP, 2007). However, this study provided questionable approximations of extreme flux calculations for summer and winter conditions. It is not clear how this was applied to the spreadsheet tool as described in the TMDL report. The first paragraph in this section references " *a sediment core flux study was conducted by Southern California Coastal Water Research Project" .* There is no reference for the study or the information provided	The sediment nutrient flux study discussed in section 4.2.1 of the staff report describes the Machado Lake Nutrient Flux Study by the Southern California Coastal Water Research Project (SCCWRP). This study was used to establish that sediment nutrient flux is an important source of nutrients to Machado Lake. This study also provided initial estimates of the lake's internal nutrient load, which was included as part of the annual nutrient load for the lake. Staff recognize that the flux rate estimations would likely vary depending on the experimental design of the core flux study. In fact the TMDL specifically calls for a special study to better estimate the flux of nutrients from the sediments and a lake sediment characterization study to refine this portion of the source assessment in the TMDL. The TMDL will be

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			on the study. Does the report mean to reference the " Machado Lake Nutrient Flux Study" presented to the SCCWRP that was prepared by Aquatic Bioassay & Consulting Laboratories and BRG Marine Laboratories, dated August 2007 (SCCWRP, 2007)? If so, it should be referenced as such. Assuming that the internal nutrient loading discussion in Section 4.2.1 is referencing SCCWRP (2007), there are a number of issues that should be addressed regarding that work and its use in the TMDL analysis, as follows: The first paragraph of Section 4.2:1 states that a sediment core flux study was conducted by the SCCWRP to estimate the flux rate of ammonia, nitrate, and phosphate from the sediments. The study is further described as being an "initial *range finding experiment to assess potential maximum flux rates and to determine if in fact the sediments of Machado Lake are a nutrient of concern".* However, the study was documented as being " *an initial range finding test to determine if sediment flux was a potential nutrient source of concern. Depending on the outcome of the study it may be determined that a: more detailed equilibrium study could be warranted",* as stated in its Executive Summary of SCCWRP (2007). It appears the study was not intended to be used as a definitive characterization of sediment flux but rather a "simplistic range finding experiment," as described in its section 3 that actually recommended that further study be performed if its results were interpreted as indicating that sediment flux was a significant source. This is all the more important since the TMDL report	reconsidered to consider adjustments to WLAs and LAs based on the results of special studies. See response 5.123 Sediment cores were not collected in relation to a wet weather event; the core study does not include an analysis of wet weather events and the rate of nutrient flux from the sediments.

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			implies that sediment flux is a major source of nutrients when comparing the loading rates in Tables 10 and 12. The calculated flux rates were "extrapolated to the entire lake area" to estimate seasonal and annual rates, although it also assumed that the internal nutrient release rate is constant. This is substantiated by referencing sediment analysis reports from the Machado Lake Management Plan that indicated that most of the lake exhibits similar geomorphic characteristics. However, the data collected from multiple locations throughout the lake in 2001 indicated that Total Organic Carbon (TOC) ranged from 2,000 to 10,400 mg/KG across the lake in sediment samples with the highest concentrations observed in sediments collected from the northern end of the lake and the lowest concentrations observed in the southern end of the lake (page 4-31 of the Ken Malloy Harbor Regional Park Development Program, DRAFT, Volume II, Machado Lake Watershed Management Plan, prepared for City of Los Angeles Department of Recreation and Parks and Palos Verdes/Southbay Audubon Society by Parsons). Therefore, these data indicate that TOC, a nutrient measurement itself, increased 500% from south to north in the lake. This does not indicate that there is uniform sediment characteristics and it is appropriate to apply the results of a "simplistic range finding experiment" using sediments collected from the center of the lake to the entire lake in the TMDL calculation. Nutrient sources are only atmospheric and point/non-point. A wet weather event will most likely result in	

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			increased nutrient concentrations in the water column and would deposit nutrient-rich solids in the sediments. It was not clear when the sample collection was performed in relation to a preceding wet weather event. It is not apparent that the study team considered what if any influence a recent wet weather event would have had on the results. Temperature, dissolved oxygen, conductivity, pH and chlorophyll-a measurements were made using a YSI probe at the time of sampling on April 16, 2007. However the measurement results were never documented in the SCCWRP 2007 report and described how they were used in the flux analysis, if at all. Furthermore, the results were not compared to other measurements made in the lake to determine if the conditions were representative. Water quality samples were collected in the lake on April 17, 2007.	
5.78			The Staff Report states: "This spatial homogeneity of the sediments supports the general assumption of uniform nutrient release rates." One can discuss averages, but cannot make a general assumption of uniform nutrient release rate, especially given the variability of factors contributing to nutrient release.	The TMDL provides for special studies and reconsiderations to address the results of special studies. The TMDL specifically identifies a voluntary special study to better estimate the nutrient flux from the sediments of Machado Lake.
5.79			Please switch location of data for 3.7m/s and 2.8m/s so that the table and reporting of info goes from low to high in terms of speed.	Comment noted.

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5.80			The Palos Verdes/South Bay Audubon Society has counts of birds at Machado Lake. Why wasn't this information used to estimate bird loads? Please update Table 14 to include these loads.	The TMDL staff report summarizes staff's technical rationale underlying its recommended TMDL. It relies on technical literature, specific data for Machado Lake, generally accepted principles of water quality, regulatory guidance from other regulatory and resource agencies, and other TMDLs that have been adopted for similar water quality impairment by states and Regional Boards. Staff recognized that there may be data gaps and addresses those issues by providing interim limits, a time schedule to conduct studies and monitoring to fill data gaps, providing interim waste load and load allocations based on current conditions in Machado Lake, and suspending the implementation of final waste load and load allocations until the Regional Board reconsiders these allocations in light of the special studies. The staff report provides references to the technical literature on which it formed its best professional judgment. If a special study to estimate the nutrient loading from birds at Machado Lake is conducted by stakeholders the Regional Board will consider it at the TMDL reconsideration
5.81			The Regional Board staff failed to mention the Harbor Junior College and other areas as identified in comment #4 as a contributor to non-point source pollution in Machado Lake. The City of Los Angeles has no jurisdiction over areas owned and operated by other entities such as the State of California via the College, yet these other areas may contribute local nutrient sources to the lake.	Direct nutrient loading from Harbor Junior College is not quantified in the TMDL since there is not a direct discharge point to the lake. The College is separated from the Lake and no overland flow from the college directly discharges to the lake.

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5.82			The study cited may not be an accurate comparison for the City's golf courses. Fertilization practices may vary from agency to agency. The City utilizes slow-release fertilizer on its golf courses.	Direct nutrient loading from the golf course is not quantified in the TMDL since there is not a direct discharge point to the lake. The landscape of the area suggest that drainage from the golf course enters a low lying area on the southeast side of the lake near the wetlands. Detailed information on the fertilizer applications at the golf course would be considered when the TMDL is reconsidered.
5.83			Figures 12 and 13 present model calibration results as "relationship between TP and TN" and "relationship between TP and chlorophyll a". The figures should be generated for "model predicted concentration" against "measured concentration" for all the parameters (e.g., Chl-a, TP, TN).	The model application has been revised as one paragraph in loading capacity and load reduction. The model has been calibrated by adjusting calibration factor as explained in the report. The loads entering into the lake has been confirmed by comparing the predicted results of water quality in the lake with the observed data. As such, the estimated annual nutrient loads to the lake are good estimates of existing loads entering Machado Lake. Likewise, the percent reduction for TN and TP are based on the same calibrated model and should be considered as good estimates of percent reduction for the total annual loads into the lake.
5.84			This paragraph is confusing in its description of the model application to actual conditions. The text references predictions of growing season conditions tabulated in Table 15. However, there is no indication in Lai (2007) that a growing season calibration was performed. Rather, that memo indicates that only an annual average "calibration" was performed. What was calibrated?	The model predicts growing season water quality conditions based on annual nutrient loading. Therefore a summery of growing season water quality conditions is present in Table 15 of the staff report. The model was calibrated based on annual nutrient loads.

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5.85			The loads identified in this table are estimates based on average EMC data from several regional watersheds and model results with limited data; therefore the column in the table showing percent reduction required for TN and TP needs to be identified as an estimate only. More data is necessary to determine the accuracy of loading information from both the lake and urban runoff and resulting percent reduction.	The "percent reduction required" column of this table has been edited to be the "estimated percent reduction required" column. The TMDL provides for special studies and reconsiderations to address the results of special studies.
5.86			Please indicate what the assumed volume of the lake was for this calculation. Also, please define what is being used as a "single large storm event."	The volume of the lake is presented in Table 1 of the TMDL Technical Memo. A single large storm event is defined as a storm event that generates a volume of runoff from the Machado Lake sub-watershed that is greater than the lake volume.
5.87			The Year 5 interim limit deadline should be deleted considering that (1) the first interim limits given as of the effective date of the TMDL will ensure the existing condition of the lake, (2) the lack of scientific data and model uncertainties does not support this interim reduction; additional data and studies are required prior to determining the necessary final WLA and LA, (3) the BMP projects necessary will require multi-agency coordination and complex implementation schedules. Finally, all Proposition 0 projects are scheduled to be completed 8 years after the effective date; however, an additional year is necessary for the lake to reach equilibrium and to assess BMP performances and overall health of lake. Therefore, it is recommended that the reopener be moved to 9 years after the effective date and the final compliance deadline to 10 years after the effective date. It	See response 5.5, 5.6, 5.13, 5.17 Regional Board staff does not support the complete removal of interim WLAs and LAs. Interim allocations are a longstanding TMDL policy of the Los Angeles Regional Water Quality Control Board and are included in numerous TMDLs. Interim allocations are necessary to ensure that progress is being made to improve water quality and attain beneficial uses. The 5 year interim waste load and load allocations have been revised to reflect a 30 percent reduction from current in-lake total nitrogen concentrations. Moreover, responsible jurisdiction may be deemed in compliance with the numeric 5 year interim WLAs and LAs through the implementation of internal and/or external source reduction projects. The revised BPA

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			noteworthy to point out that other state nutrient-related TMDLs were given implementation timelines ranging from 10-21 years. Also, please adjust the interim WLA and LA to be 1.25 mg/L for Total Phosphorus and 3.50 mg/L for Total Nitrogen and replace the final WLA and LA with "To Be Determined at TMDL re -opener." This would be consistent with a "phased TMDL" approach as discussed in corn went #5 of the cover letter.	amendment reflects these edits and clearly states the determination of compliance with the 5 year interim allocations.
5.88			Based on data collected by City staff, the average TP stormwater concentration is 0.57 mg/L, the average TN stormwater concentration is 2.73 mg/L, the average TP lake concentration is 0.84, and the average TN lake concentration is 2.14 mg/L. Therefore, the percent reductions should be 82% for TP stormwater, 63 % for TN stormwater, 88% for TP lake, and 53% for TN lake. Please correct the estimated values in Table 19.	Regional Board staff has completed a thorough source assessment for this TMDL and has accurately estimated percent reductions in Table 19. The TMDL includes a source assessment that has identified sources of pollutant loading to Machado Lake. The assessment of point source discharges included all NPDES permits in the Machado Lake subwatershed including the Los Angeles County municipal separate storm sewer system (MS4) permit, the Caltrans stormwater permit, and general industrial stormwater permits. There are no major individual, minor individual, or general NPDES permits (including dewatering from groundwater) adopted by the Regional Board for the Machado Lake sub-watershed. The nonpoint source assessment included internal nutrient loading, wind resuspension, bioturbation, birds, atmospheric deposition, and nonpoint source

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				runoff. The current in-lake conditions are based on approximately 1 1/2 years of lake water quality monitoring conducted as part of the TMDL development. See response to comment 5.12
5.89			The treatment options identified to reduce nutrient loads from storm drains, specifically sand or media filters or alum injection systems, may be adequate for low flows but will not be able to handle storm event runoff. Please add language to this section that the removal efficiency only applies to dry weather runoff, which may cause problems in meeting the required 47% and 91% reductions in nitrogen and phosphorus, respectively.	The TMDL merely discusses sand and media filters and alum injection systems as potential implementation measures; it does not require sand and media filters and alum injection systems. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options.
5.90			The removal efficiencies stated for removal of nitrogen and phosphorus by alum injection (30-90% no reference, 20-80% CASQA) are widely variable and therefore, not reliable. If the alum injection is in fact only 20% effective, the responsible agencies will not be able to meet the required 47% and 91% reductions in nitrogen and phosphorus, respectively.	The TMDL merely discusses alum injection systems as a potential implementation measure; it does not require alum injection systems. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options.

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5.91			Alum treatment will result in a pH change. Allum/alluminate will need to be added. In addition, a space-intensive facility to hold water back for phosphorus removal will be required. There is not enough lake volume to do alum treatment. Resuspension will be a problem.	The TMDL merely discusses alum treatment as a potential implementation measure; it does not require alum treatment. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options.
5.92			Please add a line suggesting how to deal with toxic sludge.	Section 9.8.1.1 of the staff report provides a statement that special treatment or disposal may be required of dredged sludge from Machado Lake due to the potential that it may contain toxic organic substances.
5.93			Please identify the source of the field data used to determine the evaporation rate of 0.5 meters during the summer months.	Data was collected by Regional Board staff as part of TMDL development. See response 5.65
5.94			Not practical to increase lake level. It is more practical to deepen the Lake with dredging. If recycled water were to be reused, it must be nutrient-limited. Management problems will arise if such water exceeds the standards for N and P in water. Using recycled water will end up being more expensive than indicated due to the need to remove nutrients prior to use.	The TMDL discusses increased lake level as a potential implementation measure; it does not require the lake level to be increased. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options. Staff recognizes that recycled water may need to be treated for nutrient removal prior to use. Section 9.8.1.1 of the staff report includes a statement that the cost of recycled water may increase if additional treatment for nutrient removal is required.

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5.95			If there are no studies showing that this works (piscivore stocking), it would be better to remove this suggestion.	The TMDL merely discusses fisheries management as a potential implementation measure; it does not require fisheries management. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options.
5.96			Establishment of rooted submergent vascular plants depend on water clarity. Maintenance of such plants will be resource-intensive.	Machado Lake already has a root macrophyte community. The macrophytes are harvested and/or sprayed with herbicides by the City of Los Angeles Department of Recreation and Parks. However, the harvested and/or dying plant material is often not removed from the lake; thus the nutrients in these plants are released back into the lake. Under a nutrient conscious macrophyte management and harvesting plan, the plant material should be removed

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				from the lake. Thus the nutrients in these plants are permanently removed from the ecosystem instead of being recycled. This is information is provided in the staff report.
5.97			The City would prefer that a conditional waiver be used versus a Memorandum of Agreement (MOA). The responsible parties in the Machado Lake Trash TMDL were given a conditional waiver. Why wasn't a conditional waiver given for the Machado Lake Nutrient TMDL? A waiver will accomplish the same objectives without the lengthy process of MOA execution between agencies. The Nutrient TMDL seems to meet the same requirements for a conditional waiver as the Trash TMDL.	See response 5.15
5.98			The City recommends that the Regional Board be consistent with all previously approved TMDLs in this region and use the terminology "Monitoring Plan" versus "Monitoring and Reporting Program Plan and Quality Assurance Project Plan." The Monitoring Plans submitted to the Regional Board for approval include appendices that detail both the sampling and analysis controls to ensure data quality. Additionally, the laboratories that conduct the analysis are always certified. Combining the two plans into one "Monitoring Plan" not only maintains consistency and familiarity for easier coordination between agencies, but also reduces the submittal to only one monitoring document to the Regional Board.	The Monitoring and Reporting Program Plan and the Quality Assurance Project Plan may be submitted to the Regional Board together as two individual sections of one document if stakeholders prefer. The State Water Resources Control Board state wide Surface Water Ambient Monitoring Program (SWAMP), which all state monitoring programs are required to be compatible with, calls for individual Water Qualty Monitoring Plans and Quality Assurance Project Plans. Monitoring and Reporting Program Plan and the Quality Assurance Project Plan documents have the same basic requirements as Monitoring Plans

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				submitted for other TMDLs.
5.99			The first sentence includes: "the responsible parties entering into the MOA shall submit a letter of intent, Lake Water Quality Management Plan, Monitoring and Reporting Program Plan and Quality Assurance Project Plan..." What is the letter of intent? Please clarify.	The letter of intent is intended to be a cover letter accompanying the submission of the Lake Water Quality Management Plan, Monitoring and Reporting Program Plan and Quality Assurance Project Plan.
5.100			This section needs to provide more details and clarity for how the point sources (stormwater permittees) and non-point sources (lake) will be deemed compliant with the TMDL. The last two sentences of the 3rd paragraph states that the compliance point for the WLA and LA is in Machado Lake; however, the next two paragraphs discuss the two options for the stormwater permittees (WLA) to be deemed in compliance. Option 1 is participation in the Lake Water Quality Management Plan and Option 2 is demonstrating compliance at the permittees storm drain discharge point versus the lake. Option 2 is	The staff report and Basin Plan amendment have been revised to clarify the implementation language.

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			clearly does not have the compliance point in the lake, thus causing confusion. With regards to those stormwater permittees choosing Option 1, there is no mention of a requirement to enter into the MOA or Waiver discussed on page 68; a mechanism for the participation and coordination of all the parties participating in the Lake Water Quality Management Plan needs to be clearly explained. For Option 2, there is concern that using percent reductions that are based on model results and limited regional data may not translate into compliance with the concentration based numeric targets, thus causing noncompliance for those agencies downstream. The actual load reductions necessary to comply should be based on actual site data and be required as part of the special study for this compliance option. Additionally, since these permittees will not be a part of the Lake Management Implementation Plan, please add in sentence 4 on page 70 that the permittees shall develop an Implementation Plan. For Option 2, each permittee may have several drainage areas and several outfalls that discharge into larger drains to Machado Lake and some permittees drain runoff by topography (surface runoff only). How will compliance be measured in these cases? Please clearly identify the two options for stormwater permittees compliance by adding "Option " headings to the respective paragraphs.	

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5.101			As noted in the cover letter, this paragraph should be revised to reflect a "healthy lake" based on a phased TMDL with' iterative adaptive implementation. This approach will use monitoring data in combination with a lake user survey to determine the healthy lake. This information should be used at the TMDL re-opener to set final WLA and LA for' nutrients and/or Chl a and D.O. Additionally, please modify "TMDL maybe reconsidered" to "TMDL will be reconsidered."	This paragraph in the staff report provides suitable flexibility to adjust the numeric targets and allocations based on the chemical and biological conditions of the lake. See response 5.17
5.102			The second sentence states that samples will be collected bi-weekly; please correct this to monthly sampling as agreed upon during the Regional Board staff meetings with the stakeholders. Bi-weekly monitoring was determined during these meetings to be excessive and an unnecessary additional cost based on the pollutants and beneficial uses. The last sentence states "Water samples will be collected from the stormdrains directly discharging to the lake, as necessary." Please clarify that this requirement is for those MS4 permittees choosing Option 2 as the compliance method.	Our review of the notes from meetings with stakeholder indicates that Regional Board staff maintained a proposed bi-weekly sampling schedule. Regional Board staff continues to find that bi-weekly sampling is the appropriate and necessary sampling frequency for this TMDL to characterize chemical and biological properties of Machado Lake. The sentence "Water samples will be collected from the stormdrains directly discharging to the lake, as necessary." has been deleted from the staff report. The Basin Plan Amendment clearly outlines the monitoring requirements for responsible jurisdictions under all TMDL WLA compliance options.
5.103			The City requests the removal of the second interim date of 5 years, based on the following: 1) the BMPs required to obtain the proposed nutrient loads to the lake are complex design and construction projects and the responsible agencies need additional time to coordinate implementation plans, cost-sharing agreements, and construction contracts, and 2) none of the reference State Nutrient TMDLs have an interim	See response 5.5, 5.6, 5.11, 5.15 The implementation schedule allows responsible parties adequate time to consider and implement various compliance options. Moreover, many of the compliance options are part of the Proposition O projects for the Machado Lake area. Thus, it is not expected that additional implementation time will be

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			compliance date shorter than 8 years from the TMDL effective date. Additionally, with regards to the Prop 0 projects, 8 years are necessary to complete the Wilmington Drain projects and the Machado Lake projects. Similarly, the City requests the extension of the reopener, Task 21, to Year 9 and final compliance (Task 22) to Year 10. This adjustment in the timeline allows for completion of the Prop 0 projects, which includes dredging, followed by a one-year monitoring period to assess the BMP performances, prior to the TMDL reopener. Please delete Tasks 2, 3 and 4, MOA and Clean up and Abatement Order within six months; the City requests that a waiver be used to implement load allocations similar to the Machado Lake Trash TMDL (see comment # 62). Please divide Task 6 into two Tasks - one for submittal of the Monitoring Plan within one year and one for submittal of the Lake Water Quality Management Plan with 2.5 years from effective date of TMDL. More time is necessary to develop the implementation plan and coordinate with other agencies in the watershed, similar to that of Task 11. Regardless of the how agencies choose to comply with this TMDL, all implementation plans should be due to the RWQCB at the same time in order to coordinate the non-point and point source BMPs. Based on experiences with implementation of other Los Angeles region TMDLs, additional time is necessary to implement the monitoring plan due to approval of multi-agency coordination and cost-sharing agreements; therefore, please change Task 9 due date from 60 days to 6 months from date of Monitoring Plan	needed since planning and design of these projects is currently underway. However in response to stakeholder concerns, 1 additional year for TMDL implementation has been added to the schedule. The schedule in the revised tentative Basin Plan Amendment reflects a 9.5 year schedule Regional Board staff feels that the MRP plan and Lake Water Quality Management Plan should be developed and submitted together to ensure a cooperative and comprehensive approach to both monitoring and lake management strategies. One year is adequate time for the development of these documents. Responsible jurisdictions whose compliance is determined as concentration based WLAs measured at end of pipe are also required to submit a MRP plan one year from the effective date. Task 11 relates to the submission of implementation plans and BMPs, not MRP Plans. The TMDL implementation schedule provides 1 year for responsible jurisdictions to develop a MRP Plan. It is expected that all necessary multi-agency coordination would be addressed during the 1 year development period. Once the Regional Board Executive Officer has approved the final MRP Plan, 60 days is enough time to initiate the required monitoring. The Regional Board does have the authority to specify a timeline for compliance. Task 10 and 12 are part of

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			approval. Please delete Tasks 10 and 12 because the details of how and when implementation occurs is the responsibility of the regulated entities and not a requirement of TMDLs. The TMDL identifies the compliance milestones and the entities develop an implementation plan to meet the deadlines. Additionally, implementation will only begin when all cost-sharing agreements have been completed. Task 13 should be rewritten to only address the submittal of monitoring reports and not include any discussion of MOAs and regulatory orders. An implementation schedule is not the correct place for this issue. Also, please only include "annually" in the date section and delete "from date of Lake Water Quality Management approval" to allow the regulated entities the flexibility to choose to submit the annual report per calendar or fiscal year, depending on the final approval date of the cost-sharing agreement. Similarly, please change the date for Task 14 and 18 to read just "annually." Per justifications above, please adjust Task 17 due date from 60 days to 6 months. Please extend the due date for Task 19, completion of special studies, to 8 years. This will allow time to conduct flux studies under various scenarios and the study results will not be needed until the reopener in year 9. The City has provided a revised Table 20 (see Attachment A) that reflects the above comments for your use.	the larger TMDL implementation schedule timeline. The language in Task 13 is necessary to ensure that the Regional Board maintains oversight of attainment of TMDL load allocations. The language "annually–from date of Lake Water Quality Management Plan approval" is necessary to provide a start date for report submittal. The results of special studies need to be reviewed and considered prior to the TMDL reconsideration at 7.5 years after the effective date. Thus due date for results of special studies has not been adjusted to 8 years after the effective date. The TMDL reconsideration has not been moved to 9 years after the effective date.
5.104			Singularize "addresses" .	Comment noted – the typo has been corrected
5.105			Please clarify "sewage treatment" line item.	This typo has been deleted from the staff report

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5.106			Suggest locally-relevant ecologically sustainable alternatives that work with the ecosystem rather than taking a fully treatment-oriented approach. Please provide suggested phased plan or case studies of successful plans from other recreational lake settings that have ecologically-sound treatment approaches.	The TMDL merely discusses potential implementation measures; it does not require specific implementation measures. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options. Regional Board staff disagrees with the characterization that the staff report only discusses "treatment-orientated" implementation approaches. Potential implementation measures, discussed as part of the Lake Water Quality Management, include several options that address water quality improvements as part of a comprehensive ecosystem approach.
5.107			There will be additional costs related to disposal of biomass.	The TMDL merely discusses floating islands as a potential implementation measure; it does not require floating islands. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options.
5.108			The existing predation due to fishing and wildlife are not considered.	The implementation schedule allows responsible parties adequate time to consider and implement various compliance options, including their potential constraints and benefits.

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5.109			Please provide the references and sources used to develop the cost estimates. The cost estimates in the staff report for the various BMPs seem to be much lower than cost estimates in the City's Prop 0 Concept Report for Machado Lake. Most of the costs do not identify design and overhead costs that are a significant cost for all projects. For example, this report estimated the cost of hydraulic dredging to be $5 million using $20/cy for 250,000cy, whereas the City has estimated $16,350,000 at $50/cy for 327,000cy. Also, DDT in lake is from declared Montrose Superfund site. Dredging will address Superfund site impacts as well as nutrient issues. The report mentions the need for special sludge disposal but does not account for this cost in the estimate. Similarly, the lake aeration system capital costs seem low and only include one system for the lake; however, the lake may require up to three aeration devices. Several of the cost estimates discuss cost ranges in the text but use either a low or average value for the summary tables. Please include the cost ranges for the summary tables to provide a more thorough estimate and update the cost estimates to represent more all-inclusive costs (such as, design and overhead). For storm water treatment, please add a statement that most of the BMPs are only capable of treating low flow thus requiring high flow bypasses for most storm flow. Also, in Table 30, please include a column with the vegetated swales and filter strips costs and include a total cost row similar to Table 29. The Regional Board staff did not consider the current Prop 0 water quality improvement plans for Machado Lake by the City of	The staff report takes into account a reasonable range of economic factors in estimating potential costs associated with TMDL compliance. The Regional Board cannot prescribe the method of achieving compliance with the TMDL (Water Code § 13360) and is unable to describe the nature of all potential actions to achieve compliance. References for cost estimates are provided in the staff report. Regional Board staff does recognize the City of Los Angeles' Prop O projects for Machado Lake. We commend the City of Los Angles for independently working towards the improvement of water quality. Regional Board staff disagrees with the characterization that this TMDL did not consider Prop O projects for Machado Lake. This TMDL specifically considered the Prop O projects for Machado Lake in terms of implementation actions and schedule.

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			Los Angeles. The City is spending approximately $120 million on Machado Lake alone to improve the quality of lake water.	
5.110			In calculating the annual runoff in Table 2, the imperviousness ratio values are being considered as runoff coefficient which is not quite accurate. In addition, considering the same average imperviousness for each subdrainage (0.62) poses a substantial inaccuracy in calculation. We have adjusted runoff volumes and pollutant loadings using runoff coefficient and comprising land uses imperviousness to obtain more accurate results. (See Attachment F)	This imperviousness ratio of 0.62 is adopted for Dominguez Channel Watershed by LACDPW (Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report, 2000) as cited in the City of Los Angeles Department of Recreation and Parks, Machado Lake Watershed Management Plan prepared by Parsons,2002
5.111			Please verify the EMC values for general land uses. We did not have access to LA county storm water monitoring data mass emission sites 1994-2005 Report to verify the values. The recalculation is based on the EMC Values in Table 3 of this Tech memo.	The Los Angeles County Storm water Monitoring data is available on the County's website. http://ladpw.org/wmd/NPDES/report_directory.cfm The Technical Memo prepared for this TMDL presents how the data was used to estimate nutrient loading from the watershed. The Technical Memo has been

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				updated to more clearly explain the use of the MS4 mass emission site data.
5.112			The EMC's for vacant land use are the highest in comparison to other land uses. This could be interpreted as such that the major pollutant loading comes from the natural sources and not from anthropogenic activities. Please verify.	Major pollutant loading does not come from vacant land use. Vacant land use is one of the smallest land use areas in the Machado Lake sub-watershed. The watershed is a highly developed with large urbanized areas and anthropogenic activities as the major source of pollutant loading.
5.113			"Event mean concentration for each land use". The event mean concentrations (EMCs) of nutrient in stormwater runoff was estimated from Los Angeles County stormwater monitoring data collected at the mass emission sites, which may not be accurate for estimating nutrient loading to Machado Lake given the variability of precipitation pattern across Los Angeles metropolitan area. Please use the EMC data for the Dominguez Watershed.	Based on stakeholder comments that estimating nutrient loading to Machado Lake from a single mass emission site in Dominguez Channel Watershed was not preferable, data was used from all mass emission sites. The method for estimating external nutrient loading to Machado Lake and the application of data from all Los Angeles County stormwater mass emission sites was presented and discussed with stakeholders several times.
5.114			The All Others (AO) land use distribution is significant (up to 34.42% for project 77/510). We have further delineated the AO land use to reflect comprising land uses and to gain on accuracy.	Comment noted
5.115			The rainfall depth should be adjusted to 13.78 inches based on the LA County precipitation data.	See response 5.63 and 5.77

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5.116			"Under this loading capacity the predicted Chlorophyll a concentration is 36.1 ,ug/L". Why is a numeric target of 20 ,ug/L Chlorophyll a is given in the draft TMDL report (on page 33)?	See response 5.26 and 5.28
5.117			When lake volume is 0.114 * 10"6 m3, the corresponding Chl-a value in the lake (74 µg/L as shown in Table 1 on page 2) does not appear in Figure 5. In other words, Chl-a data in Figure 5 is less than 74 µg/L.	The chlorophyll a value of 74 ug/L presented in Table 1 of the Technical Memo is based on field data and is the median chlorophyll concentration collected for the lake. Chlorophyll values in Figure 5 are model predicted values based on changes in the lake volume.
5.118			The existing TN load is 24,107 kg. Should the range of x-axis in Figure 17 extend to cover this value?	This figure presents the sensitivity of chlorophyll *a* in relation to nitrogen loading in the model. It is not meant to demonstrate the relationship between the existing nitrogen loading and chlorophyll. Figures in the technical memo are correctly displayed to present the relevant information.
5.119			Control blanks for overlying water do not appear to have been collected or used in the analysis. Control blanks may have helped explain the changes in concentrations, if any, independent of the sediment cores. Stirring of overlying water in the cores assures complete mixing. No stirring of the overlying water was apparently performed to assure uniform concentration measurements in the overlying water. The study measurements at the different times did not include dissolved oxygen, pH, chlorophyll-a, etc. These measurements should have been made to more fully characterize what was occurring in the cores. The very high initial concentrations at TO indicate that mixing occurred with significant disturbance to the	The Machado Lake Nutrient Flux Study by Southern California Coast Water Research Project (SCCWRP) was presented to stakeholders at a public stakeholder meeting on July 16, 2007. The draft report was distributed and stakeholder comments were solicited. The stakeholder comments collected at this meeting were included in the Regional Board comment letter on the draft report to SCCWRP. SCCWRP addressed these comments in the final report and all assumptions of this study are clearly stated. This studied relied upon the technical expertise at SCCWRP who has provided numerous technical TMDL support documents for TMDL development in

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			sediments that may have disassociated the solids and artificially increasing the overlying water concentrations. It brings the subsequent incubation monitoring and results into question. The cores were maintained at 15C to simulate winter and 25C to simulate summer conditions. There was no documented analysis in the report to demonstrate that these experiment temperatures are representative of summer and winter temperatures in the lake. Since the experiments weren't run at 20C, we don't know what the normal rate constants would be that can be adjusted for summer and winter conditions. They should have been run at 20C as well. Comparisons to other waterbodies should be made to similar waterbodies. However, the referenced locations were Malibu Lagoon and Upper Newport Bay. A quick search for information on Malibu Lagoon indicates that it is a 13-acre shallow water embayment occurring at the terminus of the Malibu Creek Watershed with tidal flow. Upper Newport Bay is an estuary. These are not freshwater waterbodies and aren't applicable as reference locations for comparison purposes. Although the conclusion is that the study provided an estimated range of nutrient flux from the sediments, this could be argued. The sample collection, lab procedures, and incubation approach had a number of flaws that compromise the results and their use. Nitrogen and phosphorous flux rates show very high variability, which indicates a low confidence level and	the Region. See response 5.80

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			low reproducibility in the results. The conclusions point out a number of issues that should be addressed by additional work before these results are applied to a TMDL analysis. The study was performed to estimate potential maximum flux so therefore it is not applicable to a steady-state analysis or for use in with a mathematical model that simulates average conditions (the NNE BATHTUB tool). Using the range of rates without validating their representativeness to the locale and the summer/winter conditions to which they were applied in the TMDL calculation is not appropriate, skews a component analysis of sources/impacts, and is not accurate for a load allocation at this time.	
6	**3/24/08**	**Mark Pestrella, Assistant Deputy Director, Watershed Management Division - County of Los Angeles, Department of Public Works**		
6.1			Public Works appreciates the opportunity to comment on the proposed amendment to the Water Quality Control Plan to incorporate the Total Maximum Daily Load (TMDL) for eutrophic, algae, ammonia, and odors (nutrient) in Machado Lake. We submit these comments on behalf of the County of Los Angeles and the Los Angeles County Flood Control District.	Comment noted

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6.2			As one of the agencies leading the efforts of improving water quality throughout the County of Los Angeles, we support the Water Board's effort to protect the environment and improve surface water quality. It is clear that much thought and effort has been put forth on the side of the Water Board to develop this TMDL. We appreciate the Water Board's attention to some of the details in developing this TMDL. However, we have several concerns and request clarifications on certain issues, which are detailed in the enclosed comment letter.	Comment noted
6.3			**Ammonia Impairment** 1. The Regional Board conducted water quality monitoring of Machado Lake twice over the last 15 years: once in 1992-93 and again in 2006-07. There are no data available for ammonia during the 1992-93 sampling. However, the results of ammonia monitoring conducted during the 2006-07 year indicate that ammonia concentration was generally below the reporting limit of 0.1 mg/L, with the exception of three samples that had measurable values of 0.14, 0.25, and 0.56 mg/L (see Table 4 of the staff report). These observed ammonia levels are all well below the water quality standard for ammonia toxicity specified in the Basin Plan (see Figure 11 of the staff report). Since no evidence of ammonia impairment is presented in the staff report, it is not clear why Machado Lake is listed for ammonia impairment in the first place. The lake is already in compliance with ammonia levels, and the inclusion of	Regional Board staff recognized that based on data collected, a specific TMDL for ammonia is not required; there are no WLAs or LA for ammonia. It is recognized however that ammonia is a form of nitrogen and all forms of nitrogen are contributing to the eutrophic effects observed in Machado Lake. Numeric targets for ammonia were included to ensure that all water quality standards are attained and that aquatic life is protected. We will consider all ammonia data in developing the 2008 303(d) list and may delist ammonia at that time.

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			ammonia in this Total Maximum Daily Load (TMDL), therefore, appears inappropriate. We suggest that the word ammonia in the title of this TMDL and the associated numeric target should be removed from this TMDL.	
6.4			**Numeric Targets** 2. At the present time, there are no numeric nutrient criteria for water bodies in California. However, the Basin Plan developed by the Los Angeles Regional Water Quality Control Board specifies numeric objectives for ammonia, nitrogen, and dissolved oxygen. The Basin Plan sets the numeric target for total nitrogen at 10 mg/L. By comparison, the proposed nutrient TMDL for Machado Lake proposes a much more stringent target of 1 mg/L for total nitrogen. The staff report asserts that the numeric objective of 10 mg/L for nitrogen in the Basin Plan is not sufficiently protective of the biostimulatory substance narrative water quality objective. We do not agree with this extremely conservative numeric target for several reasons. Firstly, recent nutrient TMDLs developed for water bodies in the County of Los Angeles (including the Los Angeles River and Malibu Creek nutrient TMDLs) have adopted a much higher nitrogen, 8 mg/L.	The waterbodies of the Los Angeles River and Malibu Creek are different than Machado Lake and therefore a different technical approach to the TMDL numeric targets is warranted. The staff report provides references to other California lake TMDLs with TN numeric targets similar to Machado Lake. The TMDL staff report summarizes staff's technical rationale underlying its recommended TMDL. It relies on technical literature, specific data for Machado Lake, generally accepted principles of water quality, regulatory guidance from other regulatory and resource agencies, and other TMDLs that have been adopted for similar water quality impairment by states and Regional Boards. The staff report provides references to the technical literature on which it formed its best professional judgment.

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			Secondly, there is no concrete scientific evidence that suggests that a certain level of nitrogen meets the biostimulatory substance narrative objective. Thus, the 1 mg/L target for nitrogen appears to have been arbitrarily set in this TMDL. Thirdly, we do not believe that narrative objectives lacking a quantitative measure should supersede numeric objectives in the Basin Plan in determining the targets.	The statement that a TN numeric target of 10 mg/L is not protective of the biostimulaotry substances water quality objective is based on the staff report's review of technical literature and EPA guidance documents. There is clear evidence in the technical literature and EPA documents that lakes with concentrations much below 10 mg/L of TN are impaired by excessive algal biomass growth and eutrophic conditions. Moreover, other lake TMDLs in the state of California, such as the Lake Elisnore and Canyon Lake Nutrient TMDLs have drawn the same conclusion. The final TN target of this TMDL is referenced in the staff report The nitrogen water quality objective in the Basin Plan is protective of the municipal and domestic supply beneficial uses and is linked to the drinking water standard for nitrate. The biostimulatory substances water quality objective in the Basin Plan is protective of recreation and aquatic life beneficial uses. Machado Lake has designated recreation and aquatic life beneficial uses; therefore the water quality objective and TMDL numeric targets must be protective of these uses. It is both appropriate and necessary to set the TN numeric to attain the biostimulatory substances water quality objective and protect the beneficial uses of Machado Lake. Regional Board staff does not agree with the characterization that the TN numeric target in this TMDL is extremely conservative.

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6.5			3. The proposed TMDL sets the target for chlorophyll-a at 20 ug/L to protect the beneficial uses of the lake. The staff report (page 33) indicates that this value is adopted based on U.S. Environmental Protection Agency guidance. Our literature review, however, indicates that there is no established U.S. Environmental Protection Agency guidance for this variable. Research is not available as to what target levels of chlorophyll-a are appropriate for attainment of different beneficial uses of water bodies. Also, no chlorophyll-a objective is suggested in the Basin Plan. In the absence of clear consensus, we recommend the use of established computational tools that relate nitrogen, phosphorus, and chlorophyll-a concentrations to derive the value for the chlorophyll-a target. For example, using the equation developed by Jones and Beckmann (see staff report, page 16), for a total phosphorus target of 0.1 mg/L, one can obtain a chlorophyll-a value of 68 ¡.g/L, which is more than three times the proposed TMDL target of 20 ¡.g/L. Similarly, using the BATHTUB model, for a total nitrogen target of 1 mg/L and total phosphorus target of 0.1 mg/L, the predicted chlorophyll-a concentration would be 36 ¡.g/L (see the technical memo by Lai, page 6). Although the proposed TMDL uses the BATHTUB model to simulate the relationship between chlorophyll-a and nutrient concentrations, the value of chlorophyll-a is not chosen based on the model result.	The EPA guidance document (EPA 841-B-99-007) recommends the use of an existing classification system as a means to establish numeric targets. The Carlosn Trophic Status Index (TSI) (recommended by EPA 841-B-99-007), which relates a range water quality measurements, chlorophyll (ug/L) Secchi depth (m), and total phosphorus (ug/L), to general water quality characteristics is the basis for the chlorophyll *a* target of 20 ug/L. The chlorophyll *a* numeric target of 20 ug/L is related to moderately eutrophic conditions and allows an acceptable level of algal biomass for Machado Lake that will attain beneficial uses, but is not expected to result in negative eutrophic to hyper – eutrophic water quality conditions. The BATHTUB NNE tools predicted that 0.1 mg/L TP would result in a seasonal average chlorophyll concentration of 36 ug/L. This value was not established as the chlorophyll numeric target because it was considered at this level there is a greater risk that the lake would experience highly negative eutrophic effects and not attain beneficial uses especially during the summer season, which is the critical condition for this waterbody. Furthermore, the model shows a linkage between nutrient loading and in-lake algal response rather than a clear relationship between phosphorus and chlorophyll *a*. This is likely due to other lake dynamics such as sediment resuspension. Therefore, the model was not used to directly assign the chlorophyll a target, but was rather used to better understand the relationship between nutrient loading and in-lake water quality

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				Since currently there is not a clear relationship between chlorophyll *a* and total phosphorus in Machado lake, although this relationship may become clear as additional data is collected, Regional Board staff feels it is more conservative to rely upon an established lake classification system that relates chlorophyll concentrations to desired lake water quality characteristics then to rely upon an equation only evaluating chlorophyll based on total phosphorus. Based on the Carlson TSI a chlorophyll *a* concentration of 68 ug/L is related to highly negative eutrophic conditions such as blue green algal scum; this level would not support beneficial uses
6.6			4. The available data for Machado Lake suggests that there is clear evidence of algal problems in the lake during summer months and little evidence of such problems during winter months. Despite such difference between the summer and winter impairments for the lake, the proposed TMDL applies the same numeric targets for all seasons throughout the year. We suggest setting numeric targets for winter months that are less stringent than the currently proposed targets, because the target should mimic the seasonality of the impairment. We note that this approach has specifically been adopted for the Malibu Creek nutrient TMDL.	There is evidence of reduced algal biomass in the lake during the winter months; however this evidence is composed of only 1 data point showing lower chlorophyll concentrations in the winter. The establishment of seasonal targets may be a reasonable approach; however more data clearly documenting the seasonal biological and chemical dynamics of the lake is needed. Targets are currently established to be protective of water quality and attain beneficial uses in all seasons. The TMDL provides for monitoring and special studies to gather additional information. The TMDL will be reconsidered to potentially adjust targets and allocations based on the results of monitoring and special studies.

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6.7			**Source Assessment** 5. The Regional Board conducted a sediment core flux study for Machado Lake to estimate the internal nutrient loading (that is, the flux of nutrients from the underlying sediment in the lake). Even though we believe that the quantification of the internal nutrient loading is necessary and important, we disagree with the approach used for this purpose. The laboratory experiment used has several limitations: (i) it uses nutrient-limited laboratory water instead of ambient lake water, (ii) it does not take into account the seasonal and spatial variability of the flux, (iii) it does not take into account the impact of storm conditions on the lake dynamics, and (iv) it does not provide steady State flux rate information. Further, it estimates the maximum possible flux rate from the sediment, which is obviously higher than the ambient condition. Thus, the sediment flux rate as currently presented in the TMDL is too high and, at the same time, not representative of the real condition. Given these limitations, additional appropriate laboratory or in-situ experiments should be conducted by staff, and the results of the work published, before the Regional Board adopts this TMDL.	The sediment core flux study was conducted by the Southern California Coastal Water Research Project. This studied relied upon the technical expertise at SCCWRP who has provided numerous technical TMDL support documents for TMDL development in the Region. Stakeholders were given the opportunity to comment on the proposed study design, All of the assumptions of this study are clearly stated in the study final report. The TMDL recognizes that if the experimental design of the core flux study were modified the flux rate estimations would likely improve. In fact, the TMDL specifically calls for a special study to better estimate the flux of nutrients from the sediments and a lake sediment characterization study to refine this portion of the source assessment in the TMDL. The TMDL will be reconsidered to consider adjustments to WLAs and LAs based on the results of special studies.

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6.8			6. Atmospheric deposition was identified as one of the potential sources of nutrients to Machado Lake. The annual nitrogen deposition was quantified based on the deposition measured for the Dominguez Channel watershed. A similar assessment was not conducted for phosphorus deposition, as noted in one of the peer review letters.	The TMDL staff report summarizes staff's technical rationale underlying its recommended TMDL. It relies on technical literature, specific data for Machado Lake, generally accepted principles of water quality, regulatory guidance from other regulatory and resource agencies, and other TMDLs that have been adopted for similar water quality impairment by states and Regional Boards. Staff recognized that there may be data gaps and addresses those issues by providing interim limits, a time schedule to conduct studies and monitoring to fill data gaps, providing interim waste load and load allocations based on current conditions in Machado Lake, and suspending the implementation of final waste load and load allocations until the Regional Board reconsiders these allocations in light of the special studies. The staff report provides references to the technical literature on which it formed its best professional judgment. The atmospheric contributions of phosphorus were considered to be minimal relative to other sources of phosphorus and therefore not included in the TMDL source assessment. This assumption was supported by the independent peer reviewer Dr. Paul McGinley.
6.9			7. Several studies recognize that groundwater is a potential source of nutrients into lakes. This is especially true during low lake-level conditions that trigger hydraulic gradient between the lake level and groundwater level resulting in the net flow of water into the lake. For example, a study of nutrient loading into Lake Tahoe reflected a significant groundwater	Machado Lake is located within the Coastal Plain of Los Angeles County Groudwater Basin, West Coast Subbasin. Based on the California Groundwater Bulletin 118 the direction of groundwater flow in this basin is towards the ocean, with southward and westward movement. Groundwater elevation measurements around the park area and golf course

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			contribution amounting to 49 percent of total nitrogen and 44 percent of total phosphorus loads. If groundwater is a major source of nutrients into Machado Lake, given the long travel time for groundwater (which can be in the order of decades), the impairment would most likely continue despite the remedial efforts proposed in the TMDL. Thus, we believe that it is important that the Regional Board conduct an assessment of groundwater source contribution to the nutrient loading into the lake.	show that groundwater is found at just over 60 feet, whichsupports the assumption that groundwater is flowing southward rather than westward. While groundwater flow may be contributing a small input to the lake, groundwater flow is an output from the lake as well; its contribution is therefore considered minimal. The TMDL provides for special studies; if stakeholders conduct a special study on groundwater inputs to the lake, the results will be considered at the time of the TMDL reconsideration.
6.10			8. To quantify nutrient load into the lake from storm drains, Regional Board staff used the County of Los Angeles' data. We support the use of our data for the development of this TMDL, but note that there seems to have been some misunderstanding of the datasets. The following excerpt is taken from page 3 of the technical memo by Lai (2008), and has been referenced on page 39 of the staff report: The concentration of nutrients in stormwater runoff was estimated from Los Angeles County stormwater monitoring data collected at the mass emission sites. Nutrient concentrations in stormwater vary by land use (Table 3) and the stormwater monitoring data is collected based on various land use types. Therefore, to estimate the nutrient concentrations in runoff from each of the Machado Lake sub-drainage areas the percentage of land use distribution was multiplied by the corresponding annual event mean nutrient	The TMDL Technical Memo has been revised to state, "Nutrient concentrations in stormwater vary by land use (Table 3) ~~and the stormwater monitoring data is collected based on various land use types~~. Therefore, to estimate the nutrient concentrations in runoff from each of the Machado Lake sub-drainage areas the percentage of land use distribution was multiplied by the corresponding annual event mean nutrient concentration ~~for each land use type~~." No corrections to the calculations of the estimated nutrient concentrations are required.

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			concentration for each land use type. Our mass emission sites do not report water quality data for specific land uses; rather, they are located near the outfall of the major watersheds to monitor pollutant loading from the entire watershed, which is a composite of all the different land uses in the watershed. The County has land use-based data collected during the second permit cycle (1994-2000), but those are different from mass emission sites. We suggest that staff verify these discrepancies and, if required, make any necessary corrections in the TMDL.	
6.11			**Wasteload and Load Allocations** 9. The model used to simulate the nutrient loading and the lake response to the loading (that is, the BATHTUB model) has an annual time scale. Though the model is calibrated against the observed annual load, it does not capture the seasonality observed in the monitoring data. A dynamic model that captures the temporal variability should have been implemented to characterize the nutrient dynamics in the lake in a realistic way. It is also not clear whether the model took the internal loading into account or not. Hydrodynamics in the lake is not considered at all. Therefore, instead of using an empirically-based BATHTUB model, we suggest using a simple mass balance (and yet dynamic) model as given below, which is also noted in one of the peer review letters, to compute the nutrient dynamics in the lake.	Although a simple dynamic model can predict short-term variations in lake conditions to reflect variations in flow and load, the approach used in the Machado Lake TMDL represents a long-term average results and the BATHTUB model is appropriate because it addresses the parameters of concern (phosphorus and nitrogen) and has been used previously for lake or reservoir TMDLs. As shown in the staff report, the NNE BATHTUB model has successfully predicated annual average conditions although the data are limited for this TMDL development and insufficient for simulating day-to-day variability. In addition, USEPA also recommends the use of BATHTUB for phosphorus TMDLs (USEPA, 1999).

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			$$V_i \frac{dC}{dt} = L_{ext} + L_{flux} + L_{atms} - L_{out}$$ Where C is concentration in the lake, t is time, Vi is volume of the lake, Lext is external loading into the lake, Lfiux is internal loading from sediment flux, Latms is loading from atmospheric deposition, and Lout is loading due to outflow from the lake.	
6.12			10. The temporal and spatial extent of the monitoring data available for Machado Lake is very limited, and yet allocations are established based on this data. For instance, the interim targets are set based on the 15 data points collected during the 2006-07 year (see Tables 17 and 18 of the staff report). These data do not account for the interannual (year-to-year) variability and may not represent the current lake condition. Thus, use these data for establishing interim targets may be inappropriate.	This TMDL is based on approximately 1.5 years of monthly water quality sampling. The TMDL recognizes the value of additional water quality monitoring and special studies, which can be conducted by stakeholders. The TMDL will be reconsidered to consider adjustments to WLAs and LAs based on the results of special studies.

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6.13			11. Several studies have demonstrated the shortcomings of using nutrient (nitrogen and phosphorus) concentrations to predict algal growth and eutrophication and subsequent impacts on beneficial uses. Nutrients themselves rarely impair beneficial uses; rather, it is the biological response to nutrient loadings that impairs beneficial uses. Thus, biological response indicators (such as dissolved oxygen concentration, chlorophyll-a, water clarity, etc.) provide a more proper way of assessing the impacts of nutrient enrichment on beneficial uses than nutrient concentrations themselves. Consequently, it would be more appropriate to evaluate TMDL compliance in terms of numeric targets set for these biological indicators than for the nutrient concentrations. Therefore, we recommend setting the interim and final waste load and load allocations (see Tables 17 and 18 of the staff report) based on dissolved oxygen and chlorophyll-a levels instead of nutrient concentrations.	Biological indicators are not causative pollutants discharged to the water body; for example chlorophyll *a* is not discharged to the lake from the surrounding watershed. In the case of this TMDL nutrients (nitrogen and phosphorus) are the causative pollutants discharged into the water body. The TMDL WLAs and LAs are established for the actual pollutant discharged into the water body. The TMDL does include the biological indicators of chlorophyll *a* and dissolved oxygen concentration as numeric targets. These indicators, as targets not allocations, are important to track water quality improvements, better understand the lake response to reduced nutrient loading, and assess attainment of beneficial uses.
6.14			**Implementation** 12. According to the staff report compliance point for the stormwater waste load allocations (WLAs) is in the receiving water, the Machado Lake (see page 69 of the staff report). Three compliance alternatives are suggested: (i) compliance by actively participating in lake water quality management plan, (ii) compliance by demonstrating 47 percent reduction for total nitrogen and 91 percent reduction for total phosphorus on annual load bases at the storm drain outfall, and (iii) compliance by demonstrating the concentration based targets on monthly bases at the storm drain outfalL.	The staff report and Basin Plan amendment have been revised to clarify compliance points for the different implementation alternatives.

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			There are some ambiguities between the proposed compliance point and the alternatives. First, it is inappropriate to set compliance point for WLAs in the lake. The compliance point for WLAs should be at the storm drain outfall instead. Second, the required load reduction for compliance under alternative-2 for WLAs is not correct. The 47 percent and 91 percent reductions for total nitrogen and total phosphorus, respectively, are required only if both WLAs and LAs are treated together, in which case compliance is measured in the lake. For WLAs with compliance measured at the storm drain outfalls, the required reduction should be 0 percent for total nitrogen and 73 percent for total phosphorus, which is in agreement with Table 19 of the staff report. We request that these corrections be noted both in the staff report and in the Basin Plan Amendment.	
6.15			13. In addition to nutrients, Machado Lake is impaired for other constituents including Chem-A, Chlordane, DDT, Dieldrin, PCBs, and trash. The only TMDL adopted for Machado Lake to date is for trash. It is to be anticipated that other TMDLs will follow in the near future. When it comes to implementation strategies, especially those carried out in the watershed, dealing with each TMDL separately is not cost effective or environmentally desirable. We believe that a better option would be to utilize an integrated approach, which addresses multiple impairments. However, the implementation timeline proposed for this TMDL does not take these issues into consideration, but focuses strictly on nutrients. From our experience, it is impractical to develop an implementation plan within	Regional Board staff encourages an integrated approach that addresses multiple impairments. The implementation schedules for the Machado Lake Trash TMDL and the Machado Lake Nutrient TMDL are suitably similar to provide integrated planning and implementation. Staff understands the need to coordinate actions with other jurisdictions and finds that an additional 1.0 years is reasonable. The schedule in the revised tentative Basin Plan Amendment reflects a 9.5 year schedule

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			the proposed two years timeframe if an integrated approach is to be pursued. Thus, we highly recommend that staff consider, and propose in the Basin Plan Amendment, another compliance option, one that would reassess the implementation schedule and provide appropriate timeframes for implementation plan and final compliance date based on addressing all impairments of Machado Lake in an integrated approach.	
6.16			14. While the staff report proposes that several Best Management Practice (BMP) options for controlling nutrient loading to Machado Lake, the report does not discuss the technical and engineering feasibility of these proposed BMPs. ' The fact that a technique has been used elsewhere does not mean it necessarily is universally applicable. There are site-specific constraints at Machado Lake that may limit the applicability of some of the proposed alternatives. For example, the option of hydraulic dredging, while potentially effective given that lake sediments are a major source of nutrient loading to the lake water, may not be technically or economically feasible, possible to consider dredging as a potential option. But, is this technically feasible for Machado Lake? A description of the pros and cons of each of the alternatives as applied to Machado Lake need to be provided in the report.	The TMDL merely discusses potential implementation measures; it does not require or advocate specific measures. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options.

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6.17			15. The staff report also proposes alum injection as one of the BMPs that can address both the lake and stormwater runoff. Moreover, the preliminary cost estimate in the staff report suggests that this option is less costly than other options (see Tables 29 and 30 of the staff report), which makes it a potential candidate for implementation. We understand that this technique has been used to treat storm water for nutrients and suspended solids in other States, such as Florida. However, we have a concern that the use of alum injection may have negative environmental consequences in the long-term including changes in pH levels and accumulation of aluminum and other metals in the bottom sediments of the lake and storm drains. If this occurs, it could lead to impairment of the underlying sediments in storm drains and the lake, which subsequently affects aquatic biota living in the sediment. Has staff considered these potential impacts and, if so, determined that they will not occur if used as an implementation method for this TMDL?	The TMDL merely discusses alum injections as potential implementation measures; it does not require alum injection. In fact, the Regional Board is prohibited from specifying the manner of compliance with its regulations (Water Code § 13360). The implementation schedule allows responsible parties adequate time to consider and implement various compliance options. Potential impacts from alum injection and suggested mitigation measures are discussed in the Substitute Environmental Document (SED) prepared for this TMDL

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6.18			16. Table 7-29.2 of the Basin Plan Amendment (BPA) does not agree with the waste load allocations and load allocations sections of the BPA. Table 7-29.2 appears to require achievement of the interim load and waste load allocations at the effective date of the TMDL, while the waste load allocations and load allocations sections of the BPA require achievement one year after the effective date of the TMDL. There is no way that the responsible parties can meet the first interim allocation by the effective date of the TMDL, and the staff report provides no explanation as to how responsible parties are to achieve the first interim allocations prior to monitoring or development of Memorandum of Agreement. We request that staff correct Table 7-29.2 to conform to the other applicable sections of the BPA.	The waste load allocation and load allocation tables in the Basin Pan Amendment (BPA) have been corrected to reflect the achievement of the interim allocations at the effective date of the TMDL. The initial (effective date) interim allocations are required to prevent further degradation of water quality prior to the initiation of implementation actions. These allocations are set as the 95th percentile of current lake conditions and the compliance point for the initial interim allocations for all responsible parties is in the lake.
6.19			17. In addition, we have concerns over the other time frames in the BPA for compliance with the TMDL. In particular, because of the number of individual municipalities involved as responsible parties, plus California Department of Transportation, we believe that it will take longer than the 1 year, 5 year and 8.5 year time frames set forth in the BPA to achieve compliance. This is due to the delays that are inherent in organizing multiple responsible parties to enter into Memorandum of Agreements, agree on implementation strategies, agree on cost-sharing and reach other administrative agreements. While there are clearly advantages in a cooperative approach, our experience has been that delays occur.	Staff understands the need to coordinate actions with other jurisdictions and finds that an additional 1.0 years is reasonable. The schedule in the revised tentative Basin Plan Amendment reflects a 9.5 year schedule

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6.20			**Other Comments** 18. The cost analysis presented in the staff report for the implementation options does not include the cost of acquiring the land for those options that require space outside of the lake and storm drain right-of-way. Given land prices in the County of Los Angeles, these costs could be considerable.	The staff report takes into account a reasonable range of economic factors in estimating potential costs associated with TMDL compliance. The Regional Board cannot prescribe the method of achieving compliance with the TMDL (Water Code § 13360) and is unable to describe the nature of all potential actions to achieve compliance. It is therefore not possible to estimate land requirements or costs of those land requirements.
6.21			19. Citations to some of the literature referenced in the staff report are not provided in the reference section. This has precluded us from proof checking some of the evidence presented in the report. We respectfully request that staff provide such references.	The EPA document Protocol for Developing Nutrient TMDLs, First Edition (1999, EPA 841-B-99-007) was unintentionally left off the staff report reference list; this document has now been added to the list of references in the staff report.
6.22			20. Please provide the units of chlorophyll-a, total phosphorous, and total nitrogen in the empirical equations presented on page 16 of the staff report.	This information has been added to the staff report
6.23			21. Storm drains on the east side of the lake are not correctly labeled in Figure 3 of the staff report. The correct labeling is provided in the figure below.	Figure 3 has been corrected to correctly label the storm drains on the east side of the lake.
7	**3/24/08**	**Robert J. Beste, Public Works Director - City of Torrance, Department of Public Works**		

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7.1			The City of Torrance strongly encourages the California Regional Water Quality Control Board to NOT set numeric water quality targets and waste load allocations for the various agencies for nitrogen, total phosphorus, ammonia, chlorophyll and dissolved oxygen because it is impossible to determine where those sources of pollutants are coming from before a proper Source Identification Study with progressive upstream monitoring is completed. There is no scientifically verifiable way to assign nutrient Waste Load Allocations without first determining the actual sources. This type of pollutant is not like trash or metals that are a wide spread homogenous problem. It was learned from the Total Maximum Daily Loads for Nutrients San Diego Creek and Newport Bay, California report prepared by U.S. Environmental Protection Agency, Region 9 that some inlets to Newport Bay were nearly free of nutrients and that 80% of all the nutrients came from a single inlet, Peters Canyon Wash and that this 80% of nutrient loading came from commercial nurseries. The most effective way to reduce nutrient loads in Machado Lake is through source control of commercial nurseries and BMPs to reduce soil sediments to reduce phosphorous. The TMDL should require the cities and county to adopt regulations requiring commercial nurseries and agriculture enterprises to obtain an NPDES permit and implement waste discharge BMPs that have specific effluent limits.	The TMDL must establish numeric targets and assign final waste load allocations (WLAs) and load allocations (LAs). TMDLs must include all required elements; numeric targets, WLAs, and LAs are required elements of a TMDL. It is not possible to exclude numeric targets, WLAs, and LAs from the TMDL. The TMDL includes a source assessment that has identified sources of pollutant loading to Machado Lake. The assessment of point source discharges included all NPDES permits in the Machado Lake subwatershed including the Los Angeles County municipal separate storm sewer system (MS4) permit, the Caltrans stormwater permit, and general industrial stormwater permits. There are no major individual, minor individual, or general NPDES permits (including dewatering from groundwater) adopted by the Regional Board for the Machado Lake sub-watershed. The nonpoint source assessment included internal nutrient loading, wind resuspension, bioturbation, birds, atmospheric deposition, and nonpoint source runoff. Based on this point and nonpoint source assessment allocations were assigned accordingly. The TMDL calls for special studies and water quality monitoring for additional data collection, as needed. The results of special studies and monitoring may be used to refine and adjust allocations at the TMDL reconsideration. The Regional Board cannot prescribe the method of

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				achieving compliance with the TMDL (Water Code § 13360) and is unable to require cities or counties to adopt regulations requiring commercial nurseries and agriculture enterprises to obtain NPDES permits. Additionally, NPDES are only issued to point source discharges; agriculture operations are nonpoint source dischargers and are not subject to NPDES permitting. Moreover, in 2005 the Regional Board adopted the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order no. R42005-0080), which address water quality pollution from irrigated agriculture operations within the Los Angeles Region. The Conditional Waiver program has established water quality benchmarks and requires Best Management Practice (BMP) implementation to attain water quality benchmarks. All agriculture operations in the Machado Lake sub-watershed are required to enroll and participate in this program.
7.2			The real indicator of the health of Machado Lake is algae blooms, therefore the exceedences should be based on algae growth (macropyhtes) and dissolved oxygen in lake. The TMDL should also account for historic nutrient loading and allow exceedences during dredging operations to remove that historic nutrient loading.	Algal biomass (measured as chlorophyll *a*) and dissolved oxygen are biological indicators of lake water quality. They are not a causative pollutants discharged to the water body; for example, chlorophyll *a* is not discharged to the lake from the surrounding watershed. In the case of this TMDL, nutrients (nitrogen and phosphorus) are the pollutants discharged into the water body causing impairment. The TMDL WLAs and LAs are established for the actual pollutant discharged into the water body.

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				The TMDL does include the biological indicators of chlorophyll *a* and dissolved oxygen concentration as numeric targets. These indicators, as targets not allocations, are important to track water quality improvements, better understand the lake response to reduced nutrient loading, and assess attainment of beneficial uses. The TMDL does account for historic nutrient loading to lake in the form of a load allocation assigned to the lake sediments. Staff does not expect that a specific exceedance allowance will be necessary during dredging operations. Required sampling can be conducted prior to dredging events or within enough time after dredging events to allow for sediment settling and accurate sample collection
7.3			The other source of phosphorous, in addition to commercial nurseries, is from soil sediments from erosion, usually resulting from grading for construction. Again we recommend that the Regional Water Quality Control Board does not set numeric limits for phosphorous, but instead requires tighter BMPs for construction or require the construction of forebays at Machado Lake to prevent sediments from entering the lake. The TMDL should also address low dissolved oxygen levels; not by Waste Load Allocations but by monitoring dissolved oxygen in the lake. There are relatively inexpensive mixing systems that have been proven to increase dissolved oxygen levels in stagnant lakes.	The statewide general NPDES permitees for Discharges of Stormwater Runoff Associated with Construction Activities are assigned waste load allocations in this TMDL. The statewide general Construction permit has stormwater BMP requirements. See response 7.2

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7.4			Groundwater from dewatering is also a source of nitrogen and should be considered as part of TMDL, i.e., the Board should require nutrient monitoring and effluent limits for all well and construction dewatering in the Machado Lake drainage area.	As stated in the staff report, there are no major individual, minor individual, or general NPDES permits (including dewatering from groundwater) adopted by the Regional Board for the Machado Lake sub-watershed.
7.5			Wet Weather season corresponds to a period of no or little algae growth and dry season corresponds to the time of substantial algae growth. The TMDL should exclude wet weather events but should require a system to increase flow through of water in lake and flush out sediments and nutrients.	Nitrogen and phosphorus are loading from the watershed into Machado Lake during wet weather storm events thus; TMDL allocations are required during the wet season. The Regional Board cannot prescribe the method of achieving compliance with the TMDL (Water Code § 13360) and is unable to require the implementation of a system to increase flow through the lake as the commenter suggests.

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7.6			Below is the USEPA's Region 9 Implementation Plan for a phased approach Newport Bay Nutrient TMDL: • Establish rigorous monitoring and evaluation plans which identify parties responsible for implementation activities and timeframes. • Board issuance of waste discharge requirements to currently unregulated nurseries greater than 5 acres and with discharges that contain greater than 1 mg/l of total inorganic nitrogen. • Revision of existing waste discharge requirements for currently regulated nursery operations. • Revision of existing NPDES permits for which discharges of nutrients exceed 1 mg/l of total inorganic nitrogen. • Requiring the development of nutrient management plans for all agricultural, operations not regulated by waste discharge requirements. • Requiring co-permittees of the stormwater permit to submit an analysis of Best Management Practices that will be implemented to achieve the urban runoff targets. Newport Bay Nutrient TMDL is a success story. The City of Torrance recommends that the Los Angeles Region follow the follow the Newport Bay/San Diego Creek TMDL. While assigning Waste Load Allocations may be the easiest way to prepare a Nutrient TMDL, the experience of Region 9 shows that there is a better way. We recommend that you review the experience of your peers and implement a TMDL that is both based on science and proven to restore the health of the ecosystem.	The Newport Bay Nutrient TMDL includes both waste load allocations and load allocations as required by all TMDLs. Los Angeles Regional Board staff appreciates the additional monitoring, implementation plans, and revision of permits called for in the Newport Bay Nutrient TMDL. The Machado Lake Nutrient TMDL also calls for water quality monitoring, special studies and implementation plans. The results of monitoring and special studies will be considered at the TMDL reconsideration.

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8	**3/24/08**	**Wendell E. Johnson, P.E. M.ASCE, Public Works Director/City Engineer - City of Lomita, Department of Public Works**		
8.1			The City of Lomita would like to urge the California Regional Water Quality Control Board to NOT set numeric water quality targets and waste load allocations for nitrogen, total phosphorus, ammonia, chlorophyll and dissolved oxygen.	The TMDL must establish numeric targets and assign final waste load allocations (WLAs) and load allocations (LAs). TMDLs must include all required elements; numeric targets, WLAs, and LAs are required elements of a TMDL. It is not possible to exclude numeric targets, WLAs, and LAs from the TMDL.
8.2			A healthy and safe environment is of paramount concern to our civic leaders and citizens of Lomita. Machado Lake is a resource to our community and we would like effective and obtainable goals in the restore of a health ecosystem for Machado Lake.	Comment noted
8.3			Our main concern with the proposed Machado Lake Nutrient TMDL is that a Source Identification Study has not been done. An effective Source Identification Study with upstream monitoring would identify the sources and types of land use that the contaminants are coming from. There is no scientifically verifiable way to assign nutrient Waste Load Allocations without first determining the actual sources. This type of pollutant is not like trash which is a wide spread homogenous problem.	The TMDL includes a source assessment that has identified sources of pollutant loading to Machado Lake. The assessment of point source discharges included all NPDES permits in the Machado Lake subwatershed including the Los Angeles County municipal separate storm sewer system (MS4) permit, the Caltrans stormwater permit, and general industrial stormwater permits. There are no major individual, minor individual, or general NPDES permits (including dewatering from groundwater) adopted by the Regional Board for the Machado Lake sub-watershed. The nonpoint source assessment included internal nutrient loading, wind resuspension, bioturbation, birds, atmospheric deposition, and nonpoint source runoff. Based on this point and nonpoint source assessment allocations were assigned accordingly.

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				The TMDL calls for special studies and water quality monitoring for additional data collection, as needed. The results of special studies and monitoring may be used to refine and adjust allocations at the TMDL reconsideration.
8.4			It was learned from the Total Maximum Daily Loads for Nutrients San Diego Creek and Newport Bay, California report prepared by U.S. Environmental Protection Agency, Region 9 that some inlets to Newport Bay were nearly free of nutrients and that 80% of all the nutrients came from a single inlet, Peters Canyon Wast and that this 80% of nutrient loading came from commercial nurseries. The most effective way to reduce nutrient loads in Machado Lake is through source control of commercial nurseries and other land uses with BMPs to reduce soil sediments to reduce phosphorous. The TMDL should require the cities and county to adopt regulations requiring commercial nurseries, agriculture enterprises and large users of fertilizers to obtain an NPDES permit and implement waste discharge BMPs that have specific effluent limits.	The Regional Board cannot prescribe the method of achieving compliance with the TMDL (Water Code § 13360) and is unable to require cities or counties to adopt regulations requiring commercial nurseries and agriculture enterprises to obtain NPDES permits. Additionally, NPDES are only issued to point source discharges; agriculture operations are nonpoint source dischargers and are not subject to NPDES permitting. Moreover, in 2005 the Regional Board adopted the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order no. R42005-0080), which address water quality pollution from irrigated agriculture operations within the Los Angeles Region. The Conditional Waiver program has established water quality benchmarks and requires Best Management Practice (BMP) implementation to attain water quality benchmarks. All agriculture operations in the Machado Lake sub-watershed are required to enroll and participate in this program.

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8.6			The Newport Bay Nutrient TMDL is a success story. Lomita recommends that the Los Angeles Region follow the follow the Newport Bay/San Diego Creek TMDL. While assigning Waste Load Allocations may be the easiest way to prepare a Nutrient TMDL, the experience of Region 9 shows that there is a better way. We recommend that you review the experience of your peers and implement a TMDL that is both based on science and proven to restore the health of the ecosystem.	The Newport Bay Nutrient TMDL includes both waste load allocations and load allocations as required by all TMDLs. Los Angeles Regional Board staff appreciates the additional monitoring, implementation plans, and revision of permits called for in the Newport Bay Nutrient TMDL. The Machado Lake Nutrient TMDL also calls for water quality monitoring, special studies and implementation plans. The results of monitoring and special studies will be considered at the TMDL reconsideration.
9	**3/20/08**	**M. Victor Rollinger, Development Services General Manager - City of Carson**		
9.1			The city of Carson appreciates this opportunity to provide comments on the proposed amendment to the Water Quality Control Plan for the Los Angeles Region (Basin Plan) to incorporate a Total Maximum Daily Load (TMDL) for Eutrophic, Algae, Ammonia, and Odors in Machado Lake. We have identified several issues of concern.	Comment noted

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9.2			Our issues of concern range from simple to complex. The simplest concerns include such things as the document title and the problem statement. The document title should not include the word "Nutrient" and it should be deleted from the title and from all other references.	This TMDL includes both numeric targets and allocations for nutrients; therefore the word nutrient is correctly included in the title of the TMDL.
9.3			The problem statement identifies ammonia as. an excessive nutrient; yet, ammonia (NH_3) is not found in excessive concentrations according to monitoring data. Therefore, ammonia should not be included in the problem statement or this TMDL and should not be included on the 303d List for Machado Lake.	Regional Board staff recognized that based on data collected, a specific TMDL for ammonia is not required; there are no WLAs or LA for ammonia. It is recognized however that ammonia is a form of nitrogen and all forms of nitrogen are contributing to the eutrophic effects observed in Machado Lake. Numeric targets for ammonia were included to ensure that all water quality standards are attained and that aquatic life is protected. We will consider all ammonia data in developing the 2008 303(d) list and may delist ammonia at that time.

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9.4			Some of our more complex issues of concern include the current in-lake conditions, implementation schedule and compliance deadlines, conditional waiver vs. MOA, and numeric targets. These issues are more fully described below: <u>Current In-lake Conditions</u> (Section 6.4, Page 60, Tables 17 & 18, Basin Plan Amendment Page 4 and Page 5) • Interim limits should be changed to reflect the values based on all available data. Including data collected by the city of Los Angeles staff with the Regional Board's data set increases the 95th percentiles to 1.27 mg/L for Phosphorus and 3.55 mg/L for Total Nitrogen.	In response to stakeholder comments, the effective date interim WLAs and LAs have been reviewed and revised based on additional data provided by the City of Los Angeles.
9.5			<u>Implementation Schedule/Compliance Deadlines</u> • The removal of Task 1 and the modification of Task 22 to 12 years would provided the additional time needed by the responsible jurisdictions to coordinate implementation plans, cost-sharing agreements, and construction contracts because the BMP's needed to achieve the nutrient loads to the lake are significant design and construction projects. Furthermore, this would provide consistency with other State Nutrient' TMDLs with compliance schedules averaging 14 years from the TMDL effective date.	The initial (effective date) interim allocations (Task 1) are required to prevent further degradation of water quality prior to the initiation of implementation actions. These allocations are set as the 95th percentile of current lake conditions and the compliance point for the initial interim allocations for all responsible parties is in the lake. The initial interim allocations reflect current water quality in the lake; it is not expected extensive (if any) implementation actions would be necessary to achieve these interim allocations. Staff understands the need to coordinate actions with other jurisdictions and finds that an additional 1.0 years is reasonable. The schedule in the revised

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				tentative Basin Plan Amendment reflects a 9.5 year schedule
9.6			• The advanced treatment should be extended from 3.5 years to 5 years. This request is based on the time required to design, bid and construct any advanced treatment device.	The possible schedule extension of 3.5 years for advanced stormwater treatment has been deleted as a result of resolution of other comments. The implementation schedule will be considered at the TMDL reconsideration 7.5 years from the effective date of the TMDL.
9.7			• Task 9 should also be extended from 60 days to 6 months from the date of MRP Plan approval again due to the necessary multi-agency coordination and approval of cost-sharing agreements.	The TMDL implementation schedule provides 1 year for responsible jurisdictions to develop a MRP Plan. It is expected that all necessary multi-agency coordination would be addressed during the 1 year development period. Once the Regional Board Executive Officer has approved the final MRP Plan, 60 days is enough time to initiate the required monitoring.

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9.8			Conditional Waiver vs. MOA Section *9.2 , Page 67,* paragraph 2 • The responsible parties in the Machado Lake Trash TMDL *were* given a conditional waiver. For consistency, these same responsible parties could be given a conditional. waiver for the Eutrophic, Algae, Ammonia, and *Odors* TMDL for Machado Lake.	Although conditional waivers were utilized to address nonpoint sources of trash in the Machado Lake trash TMDL, staff finds that they are not an appropriate regulatory mechanism to address the load reductions required for the Machado Lake nutrient TMDL. Whereas nonpoint sources of trash stem from improper disposal of trash directly into waterbodies, nonpoint sources of nutrients stem from sediments currently located at the bottom of Machado Lake that were discharged through NPDES permitted stormdrains. The types of load reduction projects for trash and nutrient TMDLs will be different – trash load reductions can be achieved through nonstructural BMPs whereas load reductions for Machdo Lake will be implemented through sediment removal or treatment processes. Consequently, conditional waivers from waste discharge requirements are not appropriate for the Machado Lake TMDL.
9.9			Numeric Targets Section 3, Page 32, paragraph 1 • Pollutants that are already meeting the water quality objectives should not have numeric targets set. "An ammonia target will also be set..." This is not appropriate since ammonia are not only far below numeric targets, but often far below reportable limits.	See response 9.3

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9.10			The city of Carson looks forward to working with *the* Regional Board and the jurisdictional agencies to make these minor modifications to the TMDL. Working together, we can achieve the water quality objectives of Machado Lake and ultimately restore the lake and wetland to its full and intended use.	Comment noted
10	**3/20/08**	**Peter Kozelka, TMDL coordinator, Water Division - United States Environmental Protection Agency, Region IX**		
10.1			The U.S. Environmental Protection Agency (EPA) appreciates the opportunity to comment on the proposed nutrient TMDLs for Machado Lake. The proposed TlvLDLs meet all federal regulatory requirements and will be approvable when submitted to EPA. We urge the Regional Board to adopt the TMDLs at the May 1, 2008 Board meeting to meet the California's TMDL commitments and to enable EPA to meet its requirements under the consent decree (*Heal the Bay V. Browner, C. 98-48 25 SBA, March 22, 1999).*	Comment noted

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10.2			EPA finds the proposed nutrient TMDLs provide reasonable scientific analysis for addressing eutrophic conditions, algae, ammonia, and odors as impairments included on California's 2006 Section 303(d) List. We concur with the technical approach to attain water quality objectives via pollutant load reductions for total nitrogen and total phosphorus. These TMDLs appropriately include target conditions for dissolved oxygen and chlorophyll. We also recognize these TMDLs contain an associated implementation plan to provide greater clarity of implementation requirement expectations for all concerned stakeholders.	Comment noted
10.3			We commend your hard work on these TMDLs and strongly recommend adoption by the Regional Board.	Comment noted
Peer Review				
11	**1/10/08**	**Dr. Paul M. McGinley, University of Wisconsin – Stevens Point, Stevens Point WI**		
11.1			The export from the watershed was based on watershed area, percent impervious, storm average annual rainfall, and land uses with associated mean runoff concentrations. That seems a reasonable approach, and is similar, if not slightly more conservative than midlevel urban water quality models.	Comment noted.
11.2			Because the lake volume is relatively small compared to the volume generated during many of the storms, much of the storm water passes through the lake. In contrast to many urban lake studies, the most critical aspect of the urban runoff may be the concentration that remains in the lake after the runoff event because that is the starting point for subsequent changes due to	Comment noted.

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			internal load.	
11.3			The atmospheric deposition of nitrogen to the lake was also estimated. The estimating method seems reasonable, although this is a relatively minor nutrient contribution to the lake. The TMDL did not include an atmospheric deposition estimate for phosphorus, although I would anticipate it would likely also be relatively small compared to the internal and watershed loads so its omission is probably not critical.	Comment Noted
11.4			The internal loading to the lake was estimated using measurements from sediment cores. The rate of nutrient release was evaluated as a constant rate during the short term experiments. That is a relatively common approach to estimating sediment contributions. The measured release rate for phosphorus was very high compared to other many other lake sediments. It was not clear if the release was measured under anoxic or oxic conditions, or the extent to which oxygen status was important. The TMDL proposed additional investigation to better understand the release of nutrients from the sediment. Because this nutrient source appears to substantially control the nutrient status of Machado Lake, it appears additional investigation into rates and reduction of nutrient release would be warranted.	Comment Noted The sediment cores were incubated in the laboratory under oxic conditions. This information was added to the Staff Report.
11.5			Another source of nutrients to the lake that is described in the report is sediment resuspension. The	Comment Noted

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			report uses a discussion of wave height to describe conditions where wind mixing would likely reach the lake bottom and lead to a resuspension of sediment. To ultimately incorporate an estimate of resuspension impact on lake nutrient levels, it seems necessary to understand the rate of sediment resuspension (which will reflect sediment characteristics in addition to the wave height evaluation) and the exchange of nutrients between the resuspended sediment and the water column (which would likely require laboratory testing). Alternatively, the resuspension may be part of a net sedimentation rate and be reflected in a reduced sedimentation coefficient. The latter approach appears to be the method actually implemented in the TMDL through calibration coefficient adjustment in the BATHTUB model. That seems reasonable given the difficulty in actually quantifying directly the resuspension influence on nutrient levels.	
11.6			The TMDL uses a chlorophyll a as a numeric target. I believe chlorophyll a is an appropriate target as it is a measure of algal density and has generally correlated with user perceptions of lake water quality (Heiskary and Walker, 1995).	Comment Noted
11.7			The TMDL uses a model simulation of phosphorus and nitrogen concentrations and the relationship between those nutrients and chlorophyll a in the development of the TMDL. Ultimately, nutrient levels are selected for the allocation without linking them directly to the 20 ug/l chlorophyll a concentration. While it is well established that nutrients influence chlorophyll a, the TMDL did suggest there is some uncertainty as to how the nitrogen and phosphorus together or separately	The staff report approaches the TMDL in a holistic manner by requiring reductions of both nitrogen and phosphorus. The staff report discusses the importance of both nitrogen and phosphorus in lake trophic response, but does not focus on individual nutrient dynamics for Machado Lake.

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			influence trophic response.	
11.8			The TMDL presents figures showing simulation results for chlorophyll a with different phosphorus and nitrogen loads (Figures 12 and 13). Although the report concludes the lake is nitrogen limited based on those graphs, it seems that conclusion is really a reflection of Canfield correlation that is used in BATHTUB, not evidence from Machado Lake. Could the data that have been collected to-date be used to demonstrate the relationship between nutrients and chlorophyll a? The additional monitoring that is proposed will provide a better understanding of this relationship. Of course, the assumption in the TMDL that reductions in nutrient load will lead to reductions in algae is reasonable.	The total nitrogen and total phosphors data collected for Machado lake have an average ratio (TN:TP) of 2:7. This suggests nitrogen limitation in the lake. Currently there is not a clear relationship between chlorophyll *a* and total phosphorus in Machado lake, although this relationship may become clear as additional data is collected. This is likely due to other lake dynamics such as sediment resuspension, which can cause noise in the data.
11.9			The TMDL describes a conceptual model for Machado Lake in which the lake receives large quantities of stormwater runoff from the largely urban watershed followed by long periods without water additions. The nutrient loading to the lake can be very large during the periods of heavy storm runoff, as expected because it has a relatively large watershed (~14,500 acres) compared to its size (~40 acres open water area). The result is a system where storms can replace much of the water in the lake. Between rainfall periods, there is little additional water input to the lake. Internal sediment release of nutrients is substantial however, and sediment release rates of phosphorus and nitrogen were observed to be quite large in laboratory studies. Measurements of nitrogen and phosphorus concentrations in the lake show they are highest after prolonged dry periods consistent with sediment release between runoff events. The TMDL provides a	Comment Noted

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			thorough discussion of the link between Machado Lake and the watershed, and the concentration data provided support this conceptual model.	
11.10			The BATHTUB model (as part of a spreadsheet tool) was used to simulate water quality in the lake and the response to nutrient loading. While the BATHTUB model is a useful eutrophication analysis approach in many reservoir systems, it may not be a particularly powerful tool for evaluating Machado Lake where the water quality during critical periods is apparently controlled by internal nutrient release and not equilibrium with watershed loads. The BATHTUB model is commonly used with internal loading implicit in the empirical eutrophication formulas. In the Machado Lake TMDL, it was not clear if the internal load was included explicitly or only through adjustment to the calibration coefficient in the model. The calibration coefficient for phosphorus was reduced to 0.2 to match the average annual phosphorus concentration in the lake. When eventually evaluating the reduction requirements, the external loading was excluded from the calculation on the basis that it is essentially flushed through the lake. Because the BATHTUB model uses an average (across the averaging period) lake response to watershed loading and Machado Lake has a clear annual concentration pattern, the application of a model such as BATHTUB with its simple annual time-step, results in losing much of the information contained in the monitoring data.	In the Machado Lake TMDL, the internal load (sedimentation load) has been simulated explicitly and empirically calibrated by adjusting the calibration coefficient. Effects of internal loading from bottom sediments are inherently reflected in the model parameters or so called calibration factor. The release of sedimentation from bottom was approximately simulated by adjusting the effective sedimentation coefficient (calibration coefficient) in the steady state phosphorus responses. In the Machado Lake TMDL, the calibration coefficient for phosphorus was reduced to 0.2 to match the measured phosphorus concentration in the lake. In other words, the phosphorus concentration predicted in the model using this calibration coefficient represents approximately and reasonably the response of the lake due to external loads and bottom sedimentation loads simultaneously. Mass balance was computed in BATHTUB model at steady state over an appropriate averaging period. Steady-state approximation means that only long term (annual) average loads were simulated, although the loads and conditions may change from year to year. In other words, the model does not represent day-to day changes in flow, loads, or nutrient concentrations, but it has proven effective in practice so that the predicted concentrations represent the characteristics of the lake system.

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11.11			In summary, although the BATHTUB model can provide some insight into the relationship between loading and lake response, I believe that its annual average approach and incorporation of internal nutrient release in the eutrophication algorithms reduce its utility for simulating Machado Lake. I would suggest that the authors might find it useful to use even a simple dynamic model for evaluating the lake.	Although a simple dynamic model can predict short-term variations in lake conditions to reflect variations in flow and load, including wind and weather effects, such effects tend to average out over longer time frames. Meanwhile, the approach used in the Machado Lake TMDL represents a long-term average results and BATHTUB model was determined to be appropriate because it addresses the parameter of concern (phosphorus and nitrogen) and has been used previously for lake or reservoir TMDLs. USEPA also recommends the use of BATHTUB for phosphorus TMDLs (USEPA, 1999). As shown in the report, this steady-state model has successfully predicted annual average conditions using data that are insufficient for simulating day-to-day variability.
11.12			An implicit margin of safety was assumed in the TMDL. This MOS is based on employing conservative assumptions in the evaluation. In the approach that was used to develop the TMDL, the implicit margin of safety seems reasonable.	Comment Noted
11.13			The loading capacity and percent reduction required was estimated by developing a relationship between nutrient loading and average annual lake concentration using the calibrated BATHTUB model. It is my interpretation that the BATHTUB model was used to develop relationships between nutrient load and the nutrient concentration in the lake (Figures 17 and 18), and then the numeric target (1.0 and 0.1 for TN and TP, respectively) were used to identify the acceptable load. This leads to acceptable loads of 825 pounds of	Comment Noted

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			P and 8,800 pounds of N.	
11.14			The calculation of percent reduction required tried to accommodate the flushing of the lake that occurs during storm events. In effect, it seems to be allowing additional loading capacity by neglecting that portion of the load that occurs during the storm events. For example, if the allocation is met, then the TMDL assumes the phosphorus concentration in the lake will be 0.1 mg/l and the flushing of the lake that occurs during stormwater events will flush out 845 pounds of P so that is subtracted from the current estimated total annual load before relating it to the BATHTUB loading capacity of 825 pounds.	When evaluating the load reductions, the mass discharged from the lake as part of the outflow is subtracted from the current mass loading to meet the loading capacity before the percent load reduction is calculated. The loading capacity is the maximum loads that can be allowed in the lake so that the numeric targets are met. Therefore, the remaining loads after subtracting discharged loads from the lake would be the loads to calculate the load reductions when compared with the loading capacity. For example, to meet phosphorus numeric target of 0.1 mg/l, the loading capacity of 825 pounds plus the discharged loads of 845 pounds equal to the loads allowed flowing into the lake and the rest of loads remained in the lake (10,421-(825+845)=8,751) should be considered as reduction loads. Therefore, the portion of the load that occurs during the storm events has been considered in the discharged from the lake as part of the outflow and the calculation of percent reduction does not allow addition loading capacity during the storm events.
11.15			The loading capacity evaluation appears consistent with the conceptual model of Machado Lake that was developed in the TMDL, but I would question what it says about the applicability of the BATHTUB model for computing the acceptable load. The BATHTUB model uses empirical algorithms relating lake response to watershed loads. It is based on reservoirs where watershed loads are related to in-lake response. In the case of Machado Lake, the ultimate loading capacity	The loading capacity of nutrients for Machado Lake depends on numeric targets and mass loadings from both external and internal sources. The NNE BATHTUB model is used to calculate loading capacity for the lake. When, the numeric targets are set, the loading capacity for nutrient can be calculated by NNE model. Therefore, when evaluating the nutrient load reductions needed to meet the loading capacity, the mass of nutrients discharged from the lake, as part of

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			calculation essentially subtracts the watershed load before computing the loading capacity. As also suggested above, this seems like a complicated attempt to force the BATHTUB approach onto this lake system. The TMDL does identify what are likely the critical aspects of attaining the targets for Machado Lake: reducing the runoff concentration and reducing the internal loading. It appears that there will be different combinations of external and internal loading that would allow those targets to be met and those decisions could have implications for identifying restoration alternatives.	the outflow, is subtracted from the current mass loading before the percent load reduction is calculated.
11.16			The TMDL proposed monitoring to measure the progress and special studies to refine aspects of the TMDL. The monitoring program appears sufficient (biweekly samples, nutrients, chlorophyll a, general water quality) to characterize the extent to which nutrient concentrations are being met. The program will also assist better characterizing the relationship between nutrient concentrations and algal density and how that might change with loading reductions. The special studies that are proposed appear appropriate and needed. The internal nutrient loading appears to be an important control over nutrient concentrations during the summer. I would suggest those studies be extended to explore the impact of different remediation strategies on nutrient release as it will be necessary to reduce those release rates substantially if the targets described in the TMDL are to be met.	Comment Noted
11.17			The TMDL presents a group of implantation options that would provide some reduction in nutrient loading and/or concentrations in the lake. The options look	Comment Noted

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			appropriate although they may vary considerably in their effectiveness in this situation.	
11.18			The TMDL established allocations are based on concentrations that are the same as the desired in-lake concentrations. That seems generally reasonable, although it is a simplification and the TMDL could include a more explicit acknowledgment of the dynamic nature of the nutrient loading in Machado Lake and the extent to which the two principal loads act in concert to determine the in-lake concentrations.	Staff agrees that the nutrient loading of Machado lake is dynamic in nature. Likewise, other parameters such as lake size and flushing rate play a role in achieving the final in-lake nutrient concentrations. However, by establishing the TMDL allocations as concentrations equal to the numeric targets there is a direct relationship between nutrient loading and in-lake water quality. This approach will conservatively protect water quality and ensure that beneficial uses are attained even under atypical nutrient loading or hydrologic situations.
11.19			The TMDL does seem to present an appropriate conceptual model for Machado Lake and a concentration-based allocation approach that would move the lake towards the improved water quality. I do believe the modeling approach, while generally capturing the basics of eutrophication in watershed/lake systems, is unnecessarily cumbersome and not particularly powerful with respect to evaluating this lake and suggest it would be easier to evaluate the lake if the different components of the nutrient budget could be evaluated more dynamically.	The model used for Machado Lake is a simple and empirically derived nutrient model that tends to be appropriate for long-term, steady state analysis. The more complex dynamic models are impractical for very long-term simulation and most applicable for time-variable water quality simulations generally of short to intermediate time frames. Due to the much larger demand for input data and labor investment, the dynamic models are generally more suited for a larger and complex reservoir or lake, than for a smaller lake. In addition, a simple steady-state model generally has advantages over a complex dynamic model when an area of insufficient data is studied. To summarize, all major components of the nutrient budget have been considered in the model. The calibration processes performed and parameters used for Machado Lake Nutrients TMDL are appropriate and within the range of available scientific data. The annual

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				averaging period used in this TMDL is considered to be appropriate as well. In addition, the predicted lake concentrations are within a reasonable range when compared with measured data. Therefore, Regional Board staff finds that the calibrated BATHTUB model is an appropriate model for the Machado Lake Nutrient TMDL.
12	**1/7/08**	**Dr. Rakesh K. Gelda, Upstate Freshwater Institute, Syracuse, NY**		
12.1			The Machado Lake TMDL report is reviewed. The report is well-written, and organized according to the elements of a TMDL analysis. The data, modeling analyses, and the pollutant allocation have been presented in a scientifically credible manner.	Comment noted
12.2			The two areas of concern are: (i) model validation, and (ii) lack of ammonia data. The model needs to be tested against a dataset that was not used in the calibration. If no data are available, the model calibration-validation sections (Section 5.1.1 and 5.1.2) of the report should be combined and called as model application. Since the report is about a TMDL analysis for ammonia, ammonia data must be presented even if ammonia levels in the lake are less than the presumed toxicity levels.	See detailed response to comment 12.5, 12.7, 12.8, 12.12, 12.13
12.3			The Regional Board Staff should mention that Machado Lake is a rapidly flushing lake. The hydraulic retention time (τ) on a completely mixed, annual average flow basis can be estimated from τ = V/Q = 0.114 x 106 m3/8.45 x 106 m3/yr = 5 days	The hydraulic retention time of 5 days is accurate on an annual average flow basis. However, due to the wet season dry season dynamic of southern California, the lake may be rapidly flushed during a large storm event and then experience very little (if any) flushing during the dry season. Under these seasonal conditions the lake is not regularly flushing every 5 days as suggested by the comment.
12.4			The report adequately describes the available in-lake	Comment noted

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			total phosphorus (TP), total nitrogen (TN), chlorophyll, dissolved oxygen (DO) and Secchi disk (SD) data to determine the trophic status of the lake.	
12.5			Can a time series of total ammonia levels in the lake be included since TMDL analysis for ammonia is required? Also, DO depth-profiles should be shown to illustrate that the lake is polymictic with periods of stratification and destratification.	Staff agrees these data should be presented. The results of ammonia samples collected at Machado Lake are presented in table 4 of the staff report. Figure 9 and 10 of the staff report are representative dissolved oxygen depth profiles for the lake.
12.6			Selection of chlorophyll *a* is an appropriate target to address the eutrophication issue in Machado Lake. A numeric target of 20 µg/L chlorophyll *a* on a seasonal average basis is consistent with EPA guidance (U.S. EPA 2000) and is attainable according to the modeling analysis presented in the report. Total phosphorus and total nitrogen targets of 100 µg/L and 1000 µg/L, respectively, are generally consistent with the eutrophy observed in other lakes and reservoirs (Bartsch and Gakstatter 1978 as cited in Chapra 1997).	Comment noted
12.7			The TMDL Report states that ammonia was found to be at levels below the toxicity standards. However, no quantitative details were provided regarding the evaluation of ammonia toxicity criteria in the lake. The Regional Board Staff should consider adding a section on ammonia toxicity criteria in the TMDL Report where the following details could be provided: (i) review of available total ammonia (sum of ionized and un-ionized forms of ammonia) data (ii) review of pH and temperature data to compute the allowable concentrations – the criterion continuous concentration (CCC) that is intended to protect aquatic life against chronic toxicity effects (U.S. EPA 1991) (iii) a comparison of the in-lake total ammonia levels with the	Staff agrees these data should be presented. Table 4 of the staff report presents the ammonia data for the lake. Table 6 of the staff report presents a summary of temperature and pH data. Figure 11 provides a comparison of in-lake ammonia concentrations and ammonia water quality objectives.

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			computed CCC values	
12.8			The Basin Plan objective for ammonia for chronic exposure of 2.2 mg/L is based upon *median* values of pH and temperature data. This appears to be not protective enough of aquatic life for ammonia toxicity (e.g., Gelda and Effler 2003). Although, the total nitrogen target of 1 mg/L is conservative, the implementation of it on a water-column, monthly average basis is not consistent with that of the ammonia target. For example, an ammonia exceedance can occur whenever the instantaneous concentration is above the CCC, and an ammonia excursion can occur whenever the average concentration over the specified duration of the averaging period (4 days; U.S. EPA 1985) is above the CCC (U.S. EPA 1991).	Staff agrees. Table 8 of the staff report presents an ammonia hourly average numeric target and ammonia 4-day numeric target, which are set as the Basin Plan ammonia CMC and CCC water quality objective, respectively. These numeric targets are protective of aquatic life.
12.9			The nutrient release rates were determined from sediment cores collected from a single location in the lake. Are there data available (e.g., from sediment surveys) to support the assumption of spatial homogeneity of sediment characteristics?	The Machado Lake Watershed Management Plan sediment analysis reports that most of the lake bottom is covered by similar sediment types of surficial mud underlain by clay. This information was included in the staff report.
12.10			Table 10: Instead of using "Summer" and "Winter", specify actual months considered in the computation (e.g., May-October).	Table 12 of the staff report reflects this suggestion.
12.11			The estimated total annual loads of TP and TN entering Machado Lake are generally consistent with the observed in-lake concentrations.	Comment noted
12.12			Although, empirical water quality models are rarely used to make water quality management decisions, BATHTUB is an adequate tool to perform TMDL analysis for Machado Lake because the lake is shallow, small and rapidly flushing without any	As the comment notes, the NNE BATHTUB is an adequate tool to perform TMDL analysis for Machado Lake.

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			complex morphometric and hydrodynamic features. Further, the temporal and spatial extent of the data available for this lake is extremely limited and does not support the development and testing of a dynamic, fully mechanistic mass balance model.	
12.13			The Regional Board Staff used 2006-07 data to calibrate the model but it was not clear what data were used to validate the model. It appears that the validation was performed by simply using the average values observed in 2006-07. This cannot be called as the model validation because the underlying dataset is the same as used in the calibration. To validate or confirm the calibrated model, it should be tested with a new data set, preferably which reflects entirely different forcing conditions. Can the Staff use 1992-93 data for validation? If no data are available, the model calibration-validation sections (Section 5.1.1 and 5.1.2) of the report should be combined and called as "model application".	Since no additional data are available for model validation, the model calibration-validation sections of the report has been combined and revised as model calibration as recommended
12.14			Can BATHTUB predict typical DO concentrations for the current and future nutrient loading conditions of Machado Lake? Some qualitative description on how the DO target will be achieved should be included in the report.	BATHUB cannot predict typical DO concentrations but oxygen depletion rates in hypolimnion and metallimnion are calculated in the model.
12.15			What will be the typical Secchi disk transparency for the future nutrient loading conditions? How will the increased Secchi disk transparency affect the macrophyte population in the lake? Macrophytes in Machado Lake may result in a more stable and diverse ecosystem but too much of it may have undesirable effects as well. The Staff should consider adding some discussion on this topic as the macrophytes play a role	Based on the summary results from the BATHTUB NNE tools, when the numeric targets are achieved the predicted median Secchi depth is 0.6 meters. A discussion of macrophyte management is included in the staff report

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			in nutrient recycling, reduce wind-induced resuspension of sediment, and alter the aesthetics of the lake.	
12.16			Concentration based allocations are appropriate for this lake for the reasons mentioned in the report.	Comment noted
12.17			The Staff should discuss the implications of interim WLA in the report, particularly of TP. As mentioned in the report, an interim WLA value of TP of 0.41 mg/L (= 0.41 x 8.45 x 10^3 = 3465 kg/yr) will not result in any substantial improvement in the lake with regard to chlorophyll because this level of phosphorus is still in the saturated region of phytoplankton growth curve (Figure 12 of the report). The lake will respond very rapidly once the TP load is reduced to less than 2000 kg/yr (Figure 12 of the report).	The interim TP allocations were removed from the TMDL prior to the public comment period. Interim allocations are a longstanding TMDL policy of the Los Angeles Regional Water Quality Control Board and are included in numerous TMDLs. Interim allocations are necessary to ensure that progress is being made to improve water quality and attain beneficial uses.
12.18			The Staff should discuss that the reduction in deposition of particulate organic matter will take place associated with reduction in the phytoplankton growth in the water column after the implementation of the final WLA. As a result, the internal release rates of phosphorus and nitrogen will also be lower in the future. A sediment model may be needed to predict how long will it take for the sediment to come to a new steady-state and what would be the magnitude of the future release rates.	Sediment nutrient releases have been treated as internal nutrient sources to Machado Lake to assess the expected responses from reduction in external nutrient inputs. The internal load from sediment flux used in Machado Lake presupposed that release rates of nutrients from bottom sediments are constant over one year cycle. As a result, sediment models are rarely incorporated into the lake nutrient prediction models. It is difficult for sediment models to predict the effects of sediment dredging and/or reduction of external loadings on the profiles of nutrient concentrations along the depth of sediments and, consequently, interaction (i.e. release and sedimentation) between bottom sediment and overlying water. Moreover, because, the bottom sediment data are limited in this study, using a sediment model to predict how long the sediment

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				would to come to a new steady state and the magnitude of the future release rates would be impractical. However, the sediment nutrient release rates will be modified through sediment core sampling after the implementation of the final WLA.
12.19			The load capacity was based on dry weather conditions. What was the return frequency of these dry weather conditions? Any records of the water surface elevation in the lake can also be presented, if available. These data will establish a quantitative basis for the selection of critical conditions.	Dry weather conditions normally last approximately six months from May to October. There are data for lake depth that were collected as part of regular sampling. The reduction in lake depth was used to establish the critical condition. There are not records of surface elevation.
12.20			For this system, it is appropriate to consider the margin of safety implicitly by making conservative assumptions about the loads, the targets, and the critical conditions.	Comment noted
12.21			Monitoring of total sulfides (in the absence of oxygen) in the hypolimnion of the lake may be included in the program as it is related to the odor problem in the lake. Also, monitoring of the lake level (i.e., water surface elevation) may be included in the program.	The general field conditions will be recorded with the field data at the time of sampling. The sampling team will record the presence or absence of foul odors. The monitoring of surface elevation has been called for in the TMDL monitoring plan.
12.22			The selection of specific implementation option(s) may depend upon factors such as cost, technical, and engineering feasibility. A critical review of pros and cons of specific alternatives is outside the domain of expertise of this reviewer. But it is worth reiterating that the lake sediment will begin to respond naturally after the final WLA has been implemented. The lake sediment will receive particulate organic matter that is significantly less than the current levels. The	The staff report takes into account a reasonable range of economic factors in estimating potential costs associated with TMDL compliance. The Regional Board cannot prescribe the method of achieving compliance with the TMDL (Water Code § 13360) and is unable to describe the nature of all potential actions to achieve compliance. See response to comment 12.18

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			previously and newly deposited organic matter will continue to undergo aerobic/anaerobic decomposition and will come into a new equilibrium state eventually. A sediment model could help determine the magnitude and the timing of new steady-state release rates of phosphorus and nitrogen, and could decide the requirements of LA.	