

# BASIN PLAN AMENDMENT FOR THE CONTROL OF NUTRIENTS IN CLEAR LAKE

## LATE REVISIONS

*Italicized text* indicates the text of a document. Additions are noted by underline and deletions by ~~strike-out~~.

### Changes to the Resolution

Modify finding #4 as follows:

*Clear Lake is listed on the federal Clean Water Act section 303(d) list as impaired due to nuisance algae blooms*

Modify finding #14 as follows:

*Central Valley Water Board staff completed an environmental ~~that~~ checklist and the Water Board has concluded that the proposed amendment results in no potential for adverse effect, either individually or cumulatively, on wildlife.*

Delete finding #18:

~~*The Central Valley Water Board finds that the proposed amendment is consistent with the State Water Resources Control Board Resolution No. 68-16, in that the changes to water quality objectives (i) consider maximum benefit to the people of the state, (ii) will not unreasonably affect present and anticipated beneficial use of waters, and (iii) will not result in water quality less than that prescribed in policies, and the proposed amendment is consistent with the federal Antidegradation Policy (40 CFR part 131.12). The proposed amendment requires responsible parties to reduce phosphorus inputs to Clear Lake, which should result in a reduction of nuisance algae blooms. Such actions are of maximum benefit to the people of the state. The proposed amendment will not unreasonably affect present and anticipated beneficial uses nor result in water quality less than described in applicable policies because the amendment is intended to result in compliance with water quality objectives. The actions to be taken are not expected to cause other impacts on water quality.*~~

Re-number finding #19 and #20 to #18 and #19.

### Changes to Attachment 1 of the Resolution

Modify item #2 as follows:

*Studies indicate that the incidence of algal blooms can be significantly reduced if phosphorus loads to the lake are reduced by 40%. This A 40% reduction would equal an annual allowable loading of approximately 87,100 kg. Therefore, for this implementation plan, an average annual (five year rolling average) phosphorus load of 87,100 kg is established as the loading capacity for Clear Lake.*

Modify item # 5(a) as follows:

Describe the actions that the discharger will take to reduce phosphorus discharges and achieve load allocations and implement those actions according to a schedule approved by the Executive Officer.

### **Changes to Attachment 1 of the Resolution**

Modify Item #3 as follows:

3. *Waste load allocations for the NPDES facilities discharging to the lake or tributaries are as follows:*

- a. *Lake County Stormwater Permittees (Lake County, City of Clearlake, City of Lakeport) - 2,000 kg/yr*
- b. *California Department of Transportation (Caltrans) – 100 kg/yr*

Implementation of practices to control phosphorus will be required under the stormwater program.

Modify Item #4 as follows:

The load allocation for nonpoint source dischargers - U.S. Bureau of Land Management (USBLM), U.S. Forest Service (USFS), Lake County (County) and irrigated agriculture - is 85,000 kg/yr (average annual load based on five year rolling average). ~~Waivers of waste discharge requirements and waste discharge requirements will be used to require dischargers to control~~ The U.S. Bureau of Land Management (USBLM), U.S. Forest Service (USFS), Lake County (County) and irrigated agriculture are responsible for controlling phosphorus discharges from those portions of the watershed within their respective authority to comply with the load allocation.

Modify Item #6 as follows:

~~For activities on lands they manage, the~~ The USBLM and USFS shall be responsible for providing provide the following for grazed lands under their jurisdiction:

- d. Description of ~~actions~~ management practices to control erosion from grazing, an evaluation of their ~~the~~ effectiveness of the management practices, and estimates of phosphorus loading from grazing grazed lands.

Modify Item #8 as follows:

Compliance with load and waste load allocations for phosphorus in Clear Lake is required by [ten years after approval by OAL].

### **Changes to Alternative Attachment 1 of the Resolution**

Modify item #1 as follows:

*Modeling studies predict that a 40% reduction in average phosphorus loading will significantly reduce the incidence of algae blooms. ~~This~~ A 40% reduction would equal an annual allowable loading of approximately 87,100 kg. Therefore, for this program of implementation, an average annual (five year rolling average) phosphorus load of 87,100 kg is established as the loading capacity for Clear Lake.*

Modify Item #5 as follows:

*Compliance with load and waste load allocations for phosphorus in Clear Lake is required by [ten years after approval by OAL]. However, by [five years and three months after approval by OAL], the Regional Board will consider information developed and determine whether the phosphorus load and waste load allocations should continue to be required or if some other control strategy or approach is more appropriate. To the extent that other controllable water quality factors, besides phosphorus, cause or contribute to nuisance algae blooms, those factors will be addressed in revisions to this program of implementation. Implementation of phosphorus control practices to achieve load and waste load allocations will occur under waste discharge requirements or waivers of waste discharge requirements.*

Modify Item #6 as follows:

*If Clear Lake is attaining its beneficial uses and the Regional Water Board determines that phosphorus loads above allocated amounts are not causing or contributing to nuisance algae problems, ~~these load and waste load allocations will no longer apply~~ the Regional Water Board will amend the Basin Plan to revise this nutrient control program for Clear Lake.*

### **Changes to Attachment 1 and Alternative Attachment 1 of the Resolution**

Change the Basin Plan Amendment language for Surveillance and Monitoring as follows:

*The responsible parties – Lake County, City of Clearlake, City of Lakeport, Caltrans, USBLM, USFS and irrigated agriculture – ~~who conduct water quality monitoring shall measure their contribution to phosphorus loading to the lake and shall assess the effectiveness of their implementation activities. Monitoring shall also occur within Clear Lake to assess the occurrence of nuisance algae blooms in the lake. To assess algae growth, Secchi disk depth or chlorophyll-a shall be monitored.~~ will work with Regional Water Board staff to estimate nutrient loadings from activities in the watershed. Loading estimates can be conducted using either water quality monitoring or computer modeling or a combination of the two.*

## **Additions to the Response to Comments**

Page 1, first paragraph, last line:

Replace ~~24 May 2006~~ with *8 June 2006*

Page 1, second paragraph:

Replace ~~22/23 June 2006~~ with *5 May 2006*

Add to first page after commenter B:

*Written comments received by 8 June 2006*

*C. Michael Flake, California Department of Transportation. Comments 15-21*

*D. Thomas A. Contreras, U.S. Forest Service Mendocino National Forest.*

*Comments 22-25*

*E. Robert Lossius, County of Lake, Public Works Department. Comments 26-28*

*F. Maria Rea, U.S. Environmental Protection Agency. Comment 29*

Add to page 7

*15. Comment: Recent Improvements in Water Clarity: According to data gathered over the past 15 years, water clarity in the lake has significantly improved. Therefore this TMDL may not be necessary.*

Response: See response to Comment #5 above.

*16. Comment: Monitoring responsibility and funding: The Total Maximum Daily Load (TMDL), as currently written, does not clearly specify who will conduct the monitoring or how it will be funded.*

Response:

In response to this comment we have modified the proposed changes to the monitoring and surveillance chapter of the Basin Plan. It has been modified to clarify the type of monitoring that would be conducted. It now states that the Regional Board will work with the responsible parties to estimate nutrient loadings from activities in the watershed. Loading estimates can be conducted using water quality monitoring, computer modeling or a combination of the two methods. Funding for monitoring or modeling would be the responsibility of the responsible party. However, Regional Board staff will work with the responsible parties to identify funding for these activities.

The Department of Water Resources currently conducts water quality monitoring about ten times a year in the lake. It is expected that this monitoring will continue. The data produced by this monitoring effort can be used to assess conditions within the lake. Also the Regional Board has funding for Tetra Tech to conduct a baseline modeling exercise to estimate phosphorus loads from each responsible party.

17. *Comment: Appropriateness of the Chlorophyll-a target: Chlorophyll-a may not be the appropriate indicator of the lake's health. Monitoring conducted by the Department of Water Resources shows that, in recent years, chlorophyll-a levels remain high, even though the lake clarity significantly improved. Our perspective is that the main source of water quality contamination in Clear Lake is invasive non-native plants and not the algae blooms considered in the TMDL.*

Response:

It is our understanding that DWR does not measure chlorophyll-a levels in the lake. As part of the development of the technical report Regional Board staff and Tetra Tech worked closely with the County to obtain all existing data from DWR and other sources. Staff is unaware of any long term chlorophyll-a records from Clear Lake.

Staff agrees that water clarity or some other estimate of algae growth may turn out to be a better estimate of lake health than chlorophyll-a. Under both the original and alternative Basin Plan Amendment language the Regional Board would review the results of the studies conducted and determine if the target and load allocations are appropriate for Clear Lake. Also the alternative Basin Plan Amendment language states that the responsible parties will work together to define appropriate indicators of lake health. During these evaluations the chlorophyll-a target could be reviewed and modified if necessary.

Staff is interested in working with the responsible parties to evaluate the beneficial use impacts associated with the recent increases in the abundance of attached aquatic plants. Control programs for phosphorus and other nutrients, and erosion control programs may help limit growth of the attached aquatic plants.

18. *Comment: Internal vs. External Loading: The clarity of the lake largely depends on existing phosphorus in the lake bottom and washout over time. The relative importance of internal vs. external loading should be studied further. Residence time of phosphorus in the lake should be evaluated to better estimate how to using external load reduction could potentially reduce the amount of algal blooms in the lake. Furthermore, the implementation plan should clearly specify how allocation requirements would change as the clarity of the lake improves.*

Response: The water quality model that was used to model the processes occurring within the lake (EFDC<sup>1</sup>) considers both the internal loading and the

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<sup>1</sup> Environmental Fluid Dynamics Computer Code. More information about EFDC can be found on the internet at: <http://www.epa.gov/athens/research/modeling/efdc.html>

residence time of phosphorus. The allocations were derived based on the results of this model.

It is expected that the clarity of the lake will improve as loading allocations are met. The load allocations specified in the Basin Plan Amendment would not change unless information gathered from continued studies shows that the existing allocations are inappropriate.

19. *Comment: Limiting Nutrients: The roles of nitrogen and iron in the occurrence of blue-green algal blooms in the lake are unclear at this time, but should be considered as part of the management practice implementation.*

Response: Staff agrees that the role of nitrogen and iron need to be investigated as part of the continued studies being called for in the proposed Basin Plan Amendment.

20. *Comment: Sediment vs. Nutrient Focus: The TMDL implementation focuses on reducing sediment loads to the lake. Although most sediment-controlling BMPs will decrease nutrient loading, it may be helpful to clarify the extent of nutrient reduction that can be expected.*

Response: The ultimate goal of the implementation plan is to reduce phosphorus inputs to the lake. The focus of the plan is on reducing erosion because most sources of phosphorus to the lake are sediment driven. Other non-sediment sources of phosphorus (such as sewer and septic system overflows) may be important and will be evaluated during implementation.

The overall goal is to reduce inputs of phosphorus to 87,100 kg/year. However, the alternative Basin Plan Amendment language contains a provision that states that the phosphorus loading allocations would not apply if Clear Lake is attaining its beneficial uses and excess phosphorus is determined not to be the cause of impairment.

21. *Comment: Caltrans Load Allocation: Allocations to point source dischargers are loosely based on relative land area rather than potential sediment contribution to the lake and current efforts to control sediments. Estimates of the potential phosphorus loading from Department roadway varies from 289 kg to 1038 kg per year. These estimates assume that all runoff enters the lake directly and are overly conservative. As such, limiting the Department's waste load allocation (WLA) to 100 kg/yr could require reducing phosphorus loads by 65% to 95%. Such reduction requirements are technically and economically infeasible and would have a significant impact on roadway operations and maintenance. Regional efforts to control sediments and phosphorus loading may be more beneficial than implementing individual BMPs. With the increased development in the region, opportunities for coordination will increase. The TMDL should provide a formal process by*

*which point source and non-point source dischargers may trade pollutant credits for BMP implementation. For example, allowing the Department to fund a wetland outside of its right-of-way could be more economically feasible than site-specific BMPs, and more effective in reducing phosphorus loading to the lake.*

Response: The original and alternative Basin Plan Amendments both state that the Regional Board will review the load allocations five years after adoption of the Amendment. Staff will consider data submitted by Caltrans regarding estimated loading during this review. It is staff's understanding that Caltrans implements enhanced management practices in watersheds that affect impaired waterbodies (i.e. 303(d) listed). Staff does not intend to require additional practices beyond the enhanced practices that are already required. During the five year review, load allocations can be adjusted to be consistent with loads that would be expected with implementation of the enhanced management practices.

The proposed alternative Basin Plan Amendment directs the responsible parties to work together to conduct studies and implement a nutrient control program for the lake. Part of this effort will be to identify the locations where BMP implementation will be most effective. This process is not a formal pollutant trading program but it would achieve similar results.

*22. Comment: Our first concern is related to the size of the proposed phosphorus reductions for the Middle/Scotts watershed. We believe that some reductions in erosion- related phosphorus export from the Mendocino National Forest (MNF) can probably be achieved. We will not know precisely how much until we complete some of the required TMDL tasks. However, for two key reasons, we question whether a 20% reduction in total phosphorus (and therefore total erosion) could be achieved on MNF. First, TMDL's for other watersheds on the MNF (e.g., Upper Main Eel River Sediment TMDL) concluded that the forest was already below the sediment standards, which were set at 25% over natural background levels. This part of the forest resembles the Upper Main Eel watershed, so it is likely that current loading on the MNF lands in the Middle Creek watershed is less than 25% over background. Since MNF is not responsible for addressing natural erosion (State Water Board Resolution 2005-0050<sup>2</sup>) and complete control of human-caused erosion is rarely feasible, a 20% reduction in overall loading from lands managed by the MNF is unlikely. Secondly, water chemistry data indicates phosphorus concentrations are naturally high and extremely variable and that recovery after soil disturbing events occurs relatively quickly<sup>3</sup>. An important consideration for the Regional Board is that if a 20%*

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<sup>2</sup> Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options.

<sup>3</sup> Water chemistry information collected by Lake County after the 1996 Fork Fire showed phosphorus levels spiking after the first early rains in January, but recovering shortly thereafter. Specifically, on January 1, 1997, total P was 1.48 parts per million (ppm). These levels dropped

*reduction is not possible on MNF, to meet the TMDL, larger reductions from other sources in the Middle/Scotts watershed would be necessary. This may or may not be feasible.*

Response: The percent reductions discussed in this comment are based on the watershed-specific load allocations that were developed in the original Tetra Tech report. The proposed Basin Plan amendment does not include these watershed allocations. Instead, all of the non-point sources throughout the greater Clear Lake watershed were given an allocation of 85,000 kg P/yr. Staff decided on this approach because it would allow for greater flexibility to implement an adaptive management strategy. As the adaptive management strategy is implemented, one of the areas that we would want to focus on is making sure that there are programs in place to assure that design, construction and maintenance activities for paved and unpaved roads are implemented in a manner that keeps erosion to an absolute minimum. Staff would work with the responsible parties to identify where the main non-natural and controllable sources of phosphorus and sediment are. These areas would be prioritized for phosphorus and sediment control. In this way reasonable and achievable sediment control goals for the MNF would be developed, if necessary.

*23. Comment: Our second concern is related to prescribed fire and other fuel reduction activities. We understand that these activities can cause some relatively small increases in phosphorus export for short periods of time. However, when evaluating potential load reductions from MNF lands, we believe the long term benefits of these activities needs to be considered. Besides reducing wildfire risk to life and property, fuels reduction activities reduce the risk of large wildfire-induced increases in sediment and phosphorus export.*

Response: Staff agrees that the long term benefits to prescribed fire should be considered. These considerations would be part of the adaptive management process. As part of the implementation plan we might want to investigate modifying operational practices to reduce the impact of these activities on phosphorus loading to the lake while maximizing their value to reduce fuel loadings.

*24. A third issue relates to monitoring. The MNF believes it is reasonable for land managers to evaluate the effectiveness of restoration activities through on-site, hillslope erosion control monitoring such as that conducted through the Forest Service Best Management Practice Evaluation Program. The MNF is also not opposed to conducting some limited trend monitoring of instream phosphorus levels, as specified by the TMDL, on or immediately downstream*

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to 0.25 ppm by January 22nd and 0.91 ppm on January 25th. In 1998, total P levels ranged from 0.16 to 0.91 ppm.

*of its lands. However, we wish to illuminate the fact that it is highly unlikely that this monitoring will detect statistically significant trends in phosphorus loads. This is largely due to the fact that even if a 20% reduction were achievable, this amount is relatively small when compared to the high natural variability in phosphorus loading. Binkley (2001), for example, concluded that given high natural variations in streamwater chemistry between streams and within the same stream over time, very intensive sampling designs are needed to detect any changes that are less than about two-fold.<sup>4</sup>*

Response: Staff recognizes the difficulties inherent in monitoring natural systems. As an alternative, the US Forest Service can estimate their load reductions using computer modeling (or a combination of computer modeling and water quality monitoring). Staff is also interested in making sure that erosion and phosphorus loading from paved and unpaved roads is kept at a minimum.

*25. Comment: Our largest concern regarding monitoring is related to the proposed lake monitoring program. The MNF understands the benefits of the proposed program. However, the Forest Service would not be able to implement or fund this work because the agency is typically only allowed to allocate National Forest System (NFS) funding towards activities on national forests. In some limited circumstances, monies can be expended on private lands (e.g., Widen Amendment, 16 U.S.C. § 1011(a) and P.L. 105-227 § 323). However, this can only occur when the projects benefit NFS lands or resources. The proposed lake monitoring does not meet these criteria because, due to the lake's significant distance from the forest boundary (11 miles), monitoring results would not provide any additional information regarding the effectiveness of its land management practices, nor total phosphorus loading from its lands.*

Response: As mentioned in Response #16 above the Department of Water Resources currently conducts water quality monitoring about ten times a year in the lake. This program provides useful information and it is expected to continue. Under the alternative Basin Plan Amendment the responsible parties would work together to determine the appropriate monitoring strategy for the lake and implement that strategy. The monitoring costs would be the responsibility of the responsible parties, but the Regional Board would work with them to identify funding opportunities. The US Forest Service may be able to participate by providing in-kind services, technical assistance or other support.

*26. Comment: The County disagrees with the Target Report prepared by Tetrattech. The Target Report recommends that chlorophyll-a be utilized in*

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<sup>4</sup> Binkley, D. 2001. Patterns and processes of variation in nitrogen and phosphorus concentrations in forested streams. National for Air and Stream Improvement, Technical Bulletin No. 836.

*determining whether Clear Lake is in compliance. There is very little historical data on chlorophyll-a levels in Clear Lake, therefore, the model is unverifiable. The modeled chlorophyll-a levels do not reflect the changes in secchi depth as noted at the May Board workshop, see Attachment 1. The main assumption behind the TMDL is that phosphorus levels in the lake cause increased blue-green algal blooms. Data collected by the Department of Water Resources does not support this assumption, see Attachment 2. Measured lake phosphorus levels do not reliably predict the chlorophyll-a levels (26% correlation), based on data collected by DWR in 2005-2006 for the Regional Board, see Attachment 3.*

Response: The appropriateness of the chlorophyll-a data is addressed in response #9. The chlorophyll-a and secchi depth comparisons are addressed in response #8. The discrepancy between phosphorus concentrations and algae growth is discussed in response #6.

*27. Comment: The County recognizes that control of phosphorus and sediment is likely to have beneficial impacts on water quality and will continue to work to reduce the phosphorus loading to Clear Lake, however, we would like to be on record as objecting to the numerical loadings proposed.*

Response: This TMDL would be implemented through an adaptive management process. The numerical load allocations are our best current estimate of the load limits that are needed to protect beneficial uses. Both the original and the alternative Basin Plan Amendments require a review by the Regional Board five years after adoption. At that time the load allocations may be revised.

*28. Comment: We appreciate the revised language that establishes a working group to reevaluate the conditions on Clear Lake to refine the TMDL by conducting additional studies, reevaluation of the monitoring plan and development of impairment criteria. The County recognizes that this is an expensive process and the required additional studies and monitoring are not funded.*

Response: Regional Board staff would work with the County and other responsible parties to identify funding for the required studies and other implementation actions.

*29. Comment: We have reviewed the draft Total Maximum Daily Load (TMDL) to address nutrient impairment for Clear Lake. Based on our review we have concluded that the TMDL adequately addresses the pollutant of concern, and the current implementation plan will result in attainment of water quality standards.*

Response: Staff appreciates this comment.