



**COUNTY OF LAKE  
PUBLIC WORKS DEPARTMENT**

255 N. Forbes Street  
Lakeport, California 95453  
Telephone 707-263-2341  
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**G. R. Shaul**  
Public Works Director

**4/3/07 BdMtg Item 4**

Clear Lake

Deadline: 3/19/07 noon

March 15, 2007

Ms. Song Her  
Clerk to the Board  
State Water Resources Control Board  
P. O. Box 100  
Sacramento, CA 95812-0100



**SUBJECT: Proposed Total Maximum Daily Load for Nutrients for Clear Lake**

Dear Ms. Her,

This letter is in response to the proposed amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Nutrients in Clear Lake.

The County appreciates the willingness of Regional Board staff to include and work with the County in the process of developing the TMDL. However, because of pressure from EPA to develop a TMDL, limited budget and strict timelines, we do not feel that the County's major concerns were adequately addressed. The County's major concern is the information utilized to justify the TMDL does not reflect the current conditions in Clear Lake. The clarity of Clear Lake, as measured by secchi depth, has increased significantly since 1990, see Enclosure A.

The last comprehensive analysis of the phytoplankton ecology of Clear Lake was the EPA Clean Lakes Diagnostic/Feasibility Study The Causes and Control of Algal Blooms in Clear Lake, dated July 1994 (Clean Lakes Study). The Clean Lakes Study utilized information collected by the California Department of Water Resources (DWR) between 1969 and 1992. The Clean Lakes Study is comprehensive, but it is the County's and the author's opinion that it does not address current conditions in Clear Lake. In 1991, Clear Lake's limnology underwent a significant change, with clarity more than doubling, a reduction in the frequency and magnitude of blue-green algal blooms, and the proliferation of aquatic macrophytes. Because of the limited data available, the Clean Lakes Study was unable to properly analyze the post-1991 lake conditions. Review of available data collected by the Department of Water Resources (DWR) through 2001 indicated in-lake levels of phosphorus have not decreased from the pre-1990 period, in fact they have increased, but the lake is clearer, see Enclosure A. Without an update of the Clean Lakes Study, as we requested during the initial phases of the development of the TMDL in 2002 (see Enclosure B) it is difficult to determine whether Clear Lake, a naturally eutrophic lake, is water quality limited, whether a Total Maximum Daily Load is required or whether phosphorus limitation will reduce algal growth and increase lake clarity.

Therefore, the County disagrees with the Target Report prepared by TetraTech. The Regional Board staff was able to have TetraTech visit Clear Lake as requested in 2002 and listen to our presentation on Clear Lake and our concerns regarding the appropriateness of the Clean Lakes Report's conclusions. However, TetraTech proceeded to develop a Target Report based on outdated information and determined that reducing phosphorus would reduce nuisance blue-green algal blooms, exactly what the County did not consider appropriate.

- The Target Report also appears to draw erroneous conclusions on when the lake was in "compliance." The Target Report lists the "compliance period" to be between 1985 and 1989 and the non-compliance period to be 1990 and 1992. In reality, there have been significantly fewer nuisance, blue-green algal blooms since 1991. DWR secchi depth data for the Upper Arm of Clear Lake confirm this, with secchi depths averaging 0.9 meters during 1985 through 1990, and averaging 1.7 meters during 1991 through 1992, the "non-compliant" years, see Enclosure C. Since 1991, the Upper Arm secchi depth has averaged 2.1 meters. How is a lake with double the clarity of the "compliant" lake "non-compliant"?
- The Target Report also recommends that chlorophyll-a be utilized in determining whether Clear Lake is in compliance. There is very little historical data on chlorophyll-a levels in Clear Lake, therefore, the models used in preparation of the Target Report are unverifiable and we do not believe the recommended target is appropriate. For instance:
  - The modeled chlorophyll-a levels do not reflect the changes in secchi depth, see Enclosure C.
  - The main assumption behind the TMDL Target Report is that phosphorus levels in the lake cause increased blue-green algal blooms. The data collected by the Department of Water Resources shows an increase in phosphorus concentrations, yet a decrease in blue-green algae numbers, see Enclosure D. The data does not support the Target Report assumption.
  - Based on chlorophyll-a data collected by DWR in 2005-2006 for the Regional Board, measured lake phosphorus levels do not reliably predict the chlorophyll-a levels (26% correlation), see Enclosure E.

Regional Board staff has listened to the County's arguments and has worked with us in revising the proposed Basin Plan language to provide the flexibility in implementing the TMDL. Staff has recognized that phosphorus levels are not the only issue and there are limitations to the lake model utilized by TetraTech. In response to the County's concerns expressed during the Regional Board hearing process, the Basin Plan Amendment language was revised. We offer the following:

- 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.

- 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. We are currently working with Regional Board staff and local stakeholders to establish the Clear Lake TMDL Stakeholder Committee to address implementation of the adopted Mercury TMDL for Clear Lake and the proposed Nutrient TMDL for Clear Lake. The County recognizes that this is an expensive process and the required additional studies and monitoring are not funded.

The County is concerned about the ability of a small rural county to fund the mandates of the proposed Basin Plan amendment. These unfunded mandates are in addition to the numerous state directed unfunded mandates such as the Mercury TMDL, Stormwater NPDES program, and the arbitrary escalation of state fees in the past 3 - 4 years. Some specific concerns include:

- The monitoring costs to demonstrate the phosphorus loading are significant. Regional Board staff has estimated the current cost at \$74,000 per year for operating stream gages and water quality monitoring. Funding for monitoring of chlorophyll-a is not provided either. The estimate also assumes that DWR will continue the regular monitoring of Clear Lake conditions. In 2001, these costs were approximately \$35,000 per year. These costs will increase over time and are significant for the County. While the cost of estimating phosphorus loading through modeling is less, models are unverifiable without real data.
- The implementation of BMP's is estimated at \$4 to \$18 million. These costs are substantial. While grants, such as 319h grants, may assist in funding, grants are not a reliable source of funding and do not fund ongoing maintenance costs. The County and its residents will be forced to bear a large percentage of these costs.
- The costs for updating the Clean Lakes Study are significant, and have been underestimated by Regional Board staff. The Clean Lakes Study was prepared by UC-Davis researchers under a \$160,000 contract (\$100,000 from Section 318 and \$60,000 from the County). This was supplemented with additional County funding for water quality monitoring of the tributaries, equipment and staffing. Funding was not adequate for UC-Davis researchers to conduct many experiments that would have been helpful in understanding Clear Lake's limnology. With inflation, a similar study is likely to cost in excess of \$400,000.

The County does not support issuance of the Nutrient TMDL for Clear Lake with numeric waste load allocations, however, with the flexibility inserted in the Basin Plan language to allow further studies, the County does not object to the proposed Basin Plan language.

Ms. Song Her, Clerk to the Board, SWRCB  
TMDL for Nutrients for Clear Lake  
March 15, 2007  
Page 4

If you have any questions, please call me at (707)263-2341.

Sincerely,

Pamela Francis  
Deputy Director – Water Resources

PMF:TRS:trs

Enclosures

cc: Lake County Board of Supervisors  
Clear Lake TMDL Stakeholder Committee



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**G. R. Shaul**  
Public Works Director

Enclosure B

October 29, 2002

Ms. Lori Webber  
Central Valley Regional Water Quality Control Board  
3443 Routier Road, Suite A  
Sacramento, CA 95827-3003

**SUBJECT: Clear Lake Nutrient TMDL**

Dear Lori,

We appreciate your request for information and efforts to coordinate the development of the nutrient TMDL for Clear Lake with the local government. As you know, the County has taken an active role in managing Clear Lake and improving the water quality for several decades. We look forward to working with the Regional Board staff, EPA staff and Tetrattech in developing this important document. Attached is the spreadsheet showing the requested information availability.

Prior to finalizing the scope of work and starting development of the nutrient TMDL, we request that staff who will be working on the project spend at least two days in Lake County to familiarize themselves with Clear Lake, the watershed and the local issues.

It is our opinion that reliance on past reports, without updating, to determine a nutrient TMDL for Clear Lake will lead to erroneous conclusions and TMDL requirements that may not lead to improved water quality in Clear Lake. The last comprehensive analysis of the phytoplankton ecology of Clear Lake was the EPA Clean Lakes Diagnostic/Feasibility Study The Causes and Control of Algal Blooms in Clear Lake, dated July 1994 (Study). The Study utilized information collected by the California Department of Water Resources (DWR) between 1969 and 1992. The Study is comprehensive, but it is our opinion that it does not address current conditions in Clear Lake. In 1991, Clear Lake's ecology underwent a significant change, with clarity increasing significantly, a reduction in the intensity and magnitude of blue-green algal blooms, and the proliferation of aquatic macrophytes. Since insufficient data was available after this change occurred, the Study could not adequately address the new condition. One theory proposed was this was due to the extended drought from 1987 through 1992. However, this "new" condition has persisted through the present period, although the watershed experienced several very wet years in 1995, 1997 and 1998. Property owners concerns have changed from managing nuisance blue-green algal blooms to maintaining access to deep water through the aquatic macrophytes in the last decade.

This past summer, we performed some cursory reviews of the DWR data through late 2001-early 2002. We had hoped this data would provide a “smoking gun” explaining the change, however, our analysis only raised more questions. Due to changes in the phytoplankton data format, we were unable to analyze the entire phytoplankton data record for changes. We noted the following:

- Measured secchi depths in all three arms of the lake increased significantly in 1991, essentially representing a doubling of the clarity.
- The nitrogen in the water column has become primarily ammonia and organic nitrogen (>90%) since 1987. During the early 1970’s, there were times when essentially all the nitrogen in the water column was as nitrite and nitrate.
- Orthophosphate concentrations began a significant increase in 1989, resulting in significantly more orthophosphate in the water column than during the late 1970’s and 1980’s.
- The orthophosphorus percentage of phosphorus in the water column has essentially doubled since the 1980’s, however, it is in the same range that occurred in the early 1970’s (a period of frequent nuisance blue-green algal blooms)
- The current average annual nitrogen-phosphorus ratios do not appear to be significantly different than existed in the 1980’s.
- There appears to be an increase in green algae and a decrease in blue-green algae starting in 1987 and continuing through 1993. (Note that this is an incomplete analysis that does not include all algal species and stops due to inconsistencies in data sets).
- We have not analyzed Lake County Vector Control’s database, which includes basic water quality data from 1954 through the present, temperature and dissolved oxygen profiles from 1960, plankton, insect larval and algal concentrations since 1988, and beach seine/fish counts since 1987. Much of this data was placed in computer format this past summer and has not received a comprehensive analysis.

In conclusion, the County requests that:

- Staff working on the nutrient TMDL spend at least two days at Clear Lake familiarizing themselves with Clear Lake, the watershed and the local issues.
- The ecology of Clear Lake needs to be thoroughly evaluated to determine if reducing the nutrient load to Clear Lake would improve water quality prior to establishing a nutrient TMDL.

We look forward to working with the Regional Board staff, EPA staff and Tetrattech in developing the nutrient TMDL for Clear Lake.

Ms. Lori Webber, CVRWQCB  
Clear Lake Nutrient TMDL  
October 29, 2002  
Page 3

If you have any questions, please call me at (707)263-2341.

Sincerely,

A handwritten signature in cursive script that reads "Thomas R. Smythe".

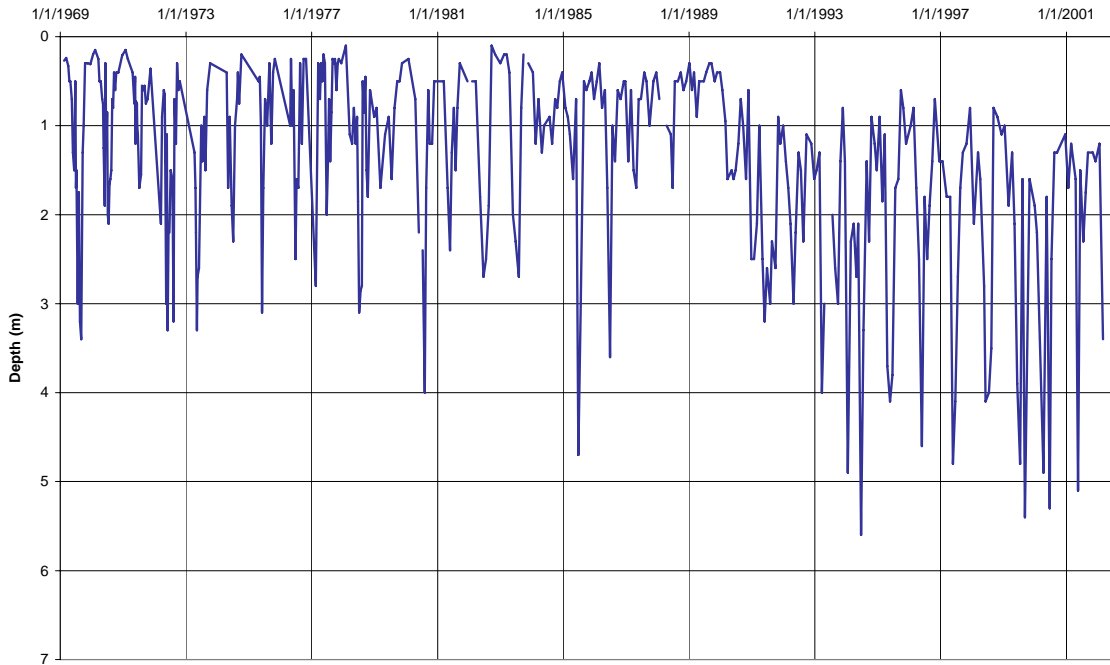
Thomas R. Smythe  
Water Resources Engineer

TRS:trs

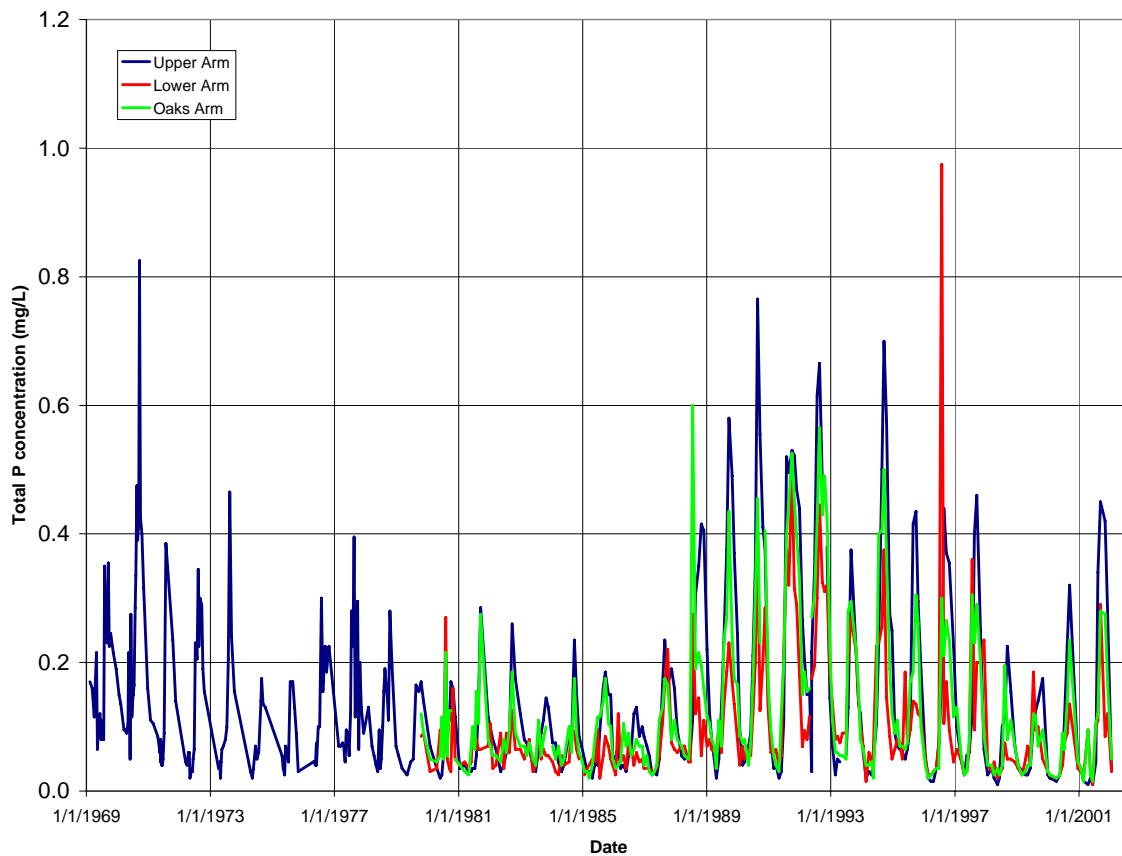
Enclosures

cc: Arthur G. Baggett Jr., Chair, SWRCB  
Robert Schneider, Chair, CVRWQCB  
Jeff Smith, Chair, Board of Supervisors  
Jerry Bruns, CVRWQCB  
Peter Von Loewe, Tetrtech  
David Smith, EPA

Secchi depth, Clear Lake - Upper Arm, 1969-2002



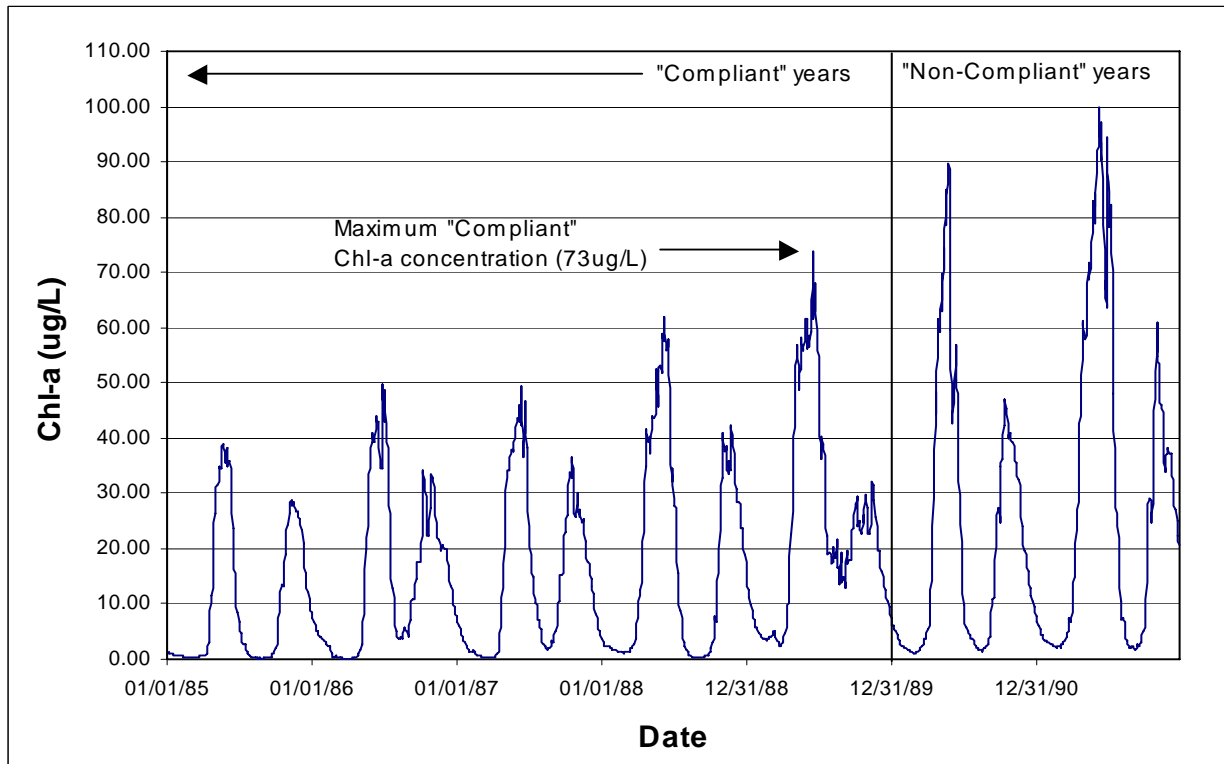
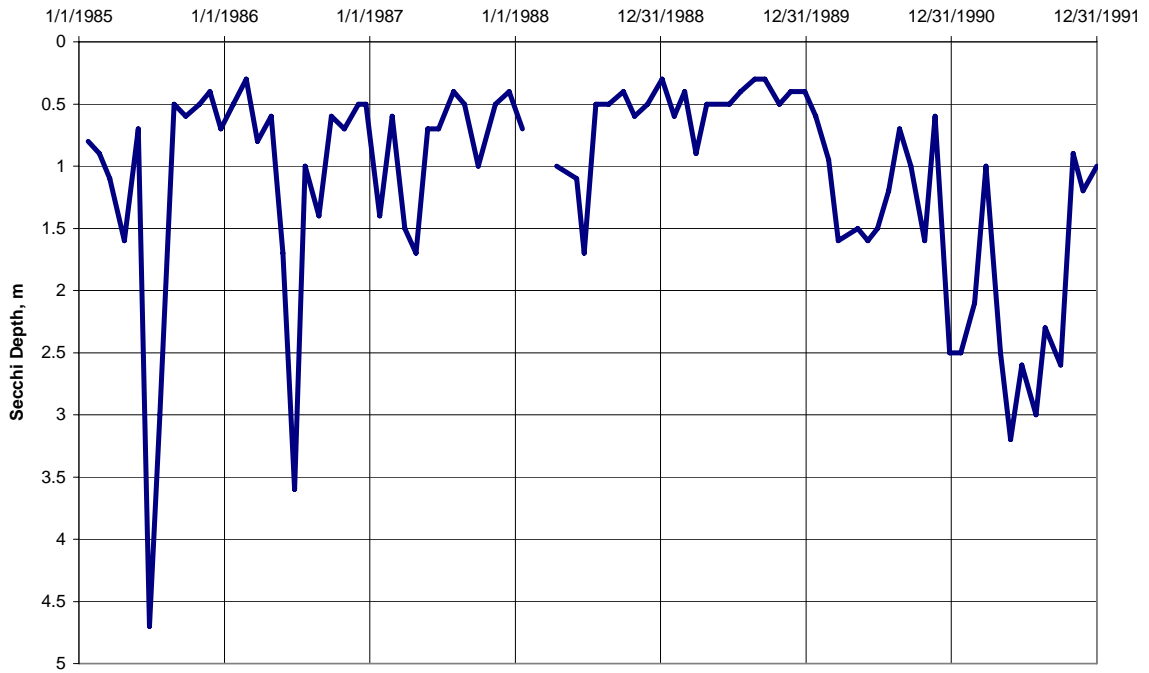
Concentration of total phosphorus in water column, Clear Lake, 1969-2002



Enclosure A: Secchi Depth and Phosphorus Concentrations in Clear Lake, (Source: California Department of Water Resources, Northern District)

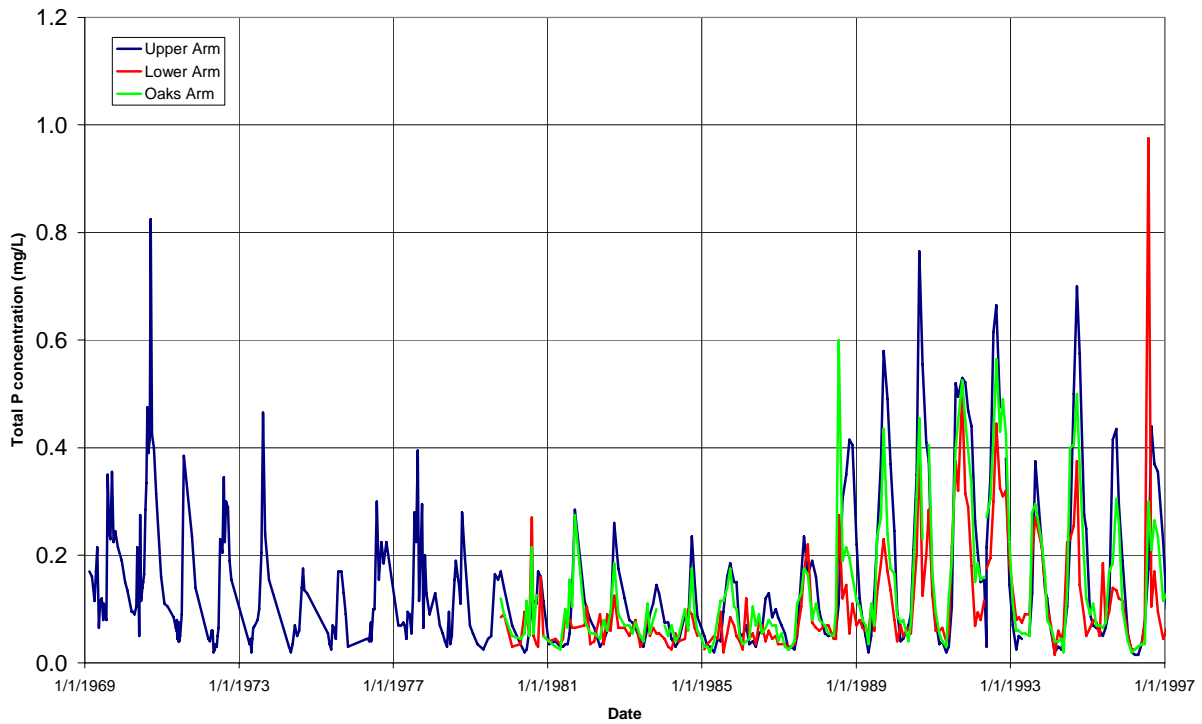


**CLEAR LAKE UPPER ARM SECCHI DEPTH**  
Source: Department of Water Resources

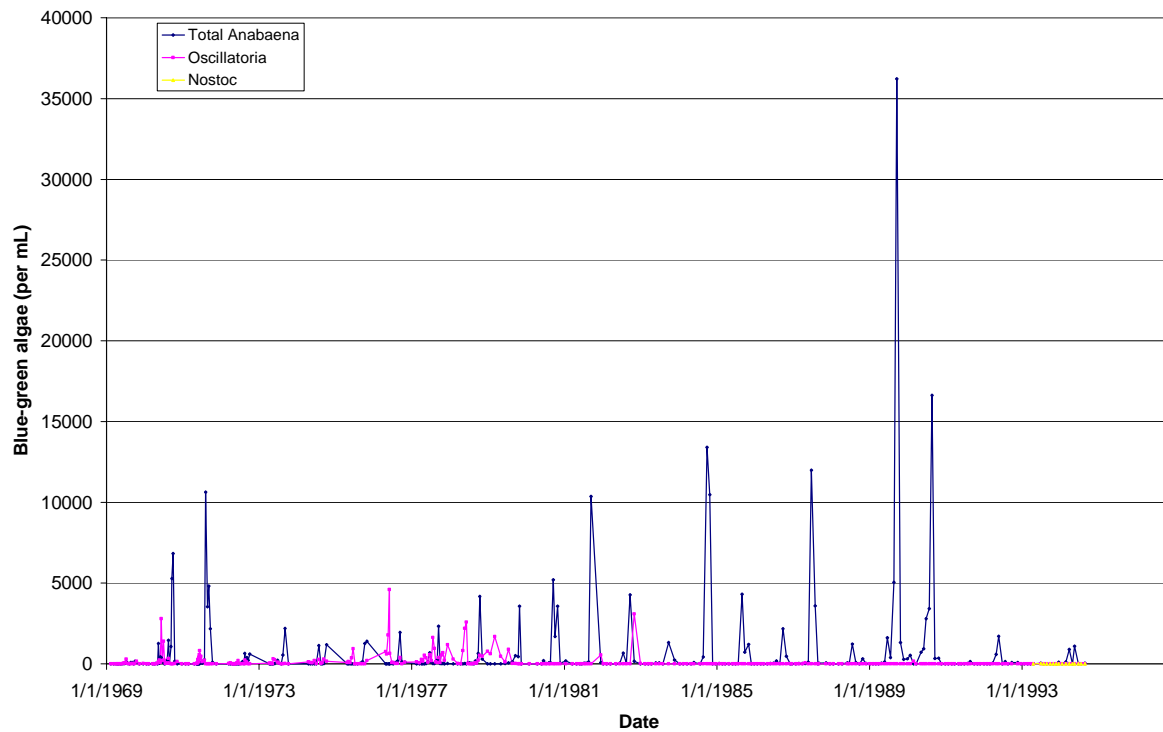


Enclosure C: Comparison of Upper Arm Secchi Depths collected by the California Department of Water Resources with the modeled Chlorophyll-a concentrations calculated by TetraTech

Concentration of total phosphorus in water column, Clear Lake, 1969-1997



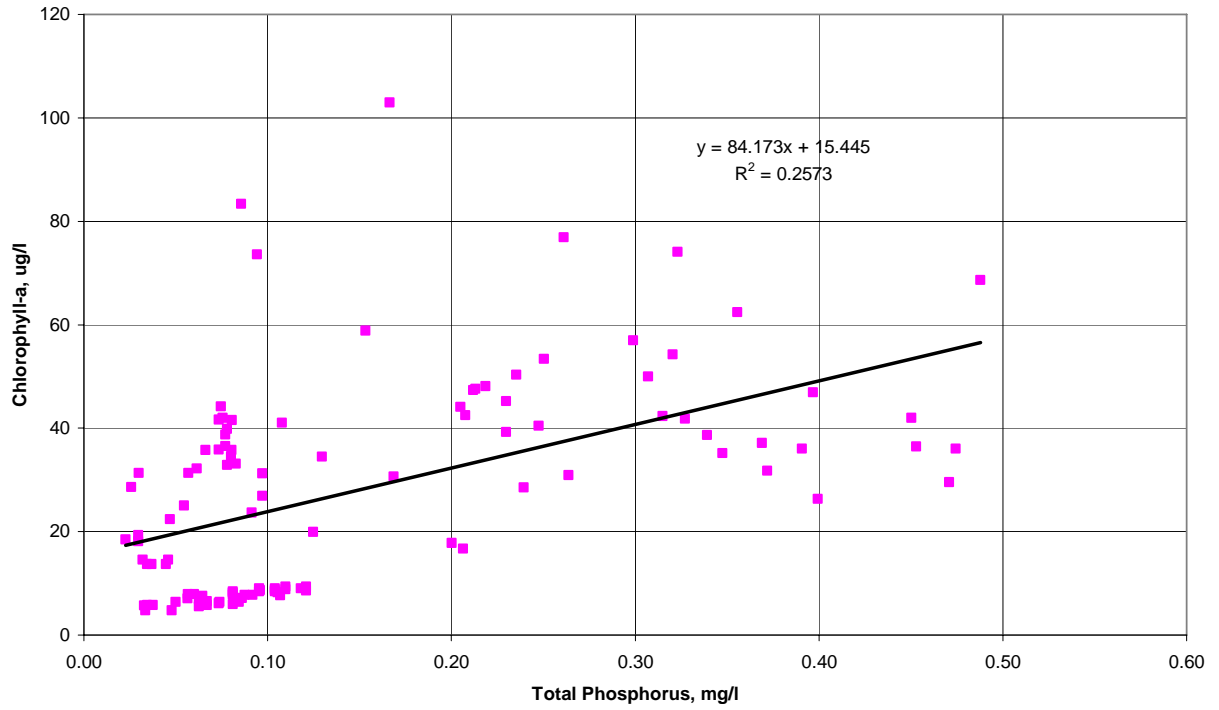
Blue-green algae, Clear Lake - Upper Arm, 1969-1994



Enclosure D: Comparison of phosphorus concentrations and blue-green algae cell counts collected by the California Department of Water Resources

# CLEAR LAKE PHOSPHORUS RELATIONSHIPS

Source: Central Valley Regional Water Quality Control Board



Enclosure E: Relationship of measured total phosphorus and measured chlorophyll-a concentrations in Clear Lake 2005-2006