February 11, 2003

Dave Smith
US EPA Region 9
75 Hawthorne Street
San Francisco, CA, 94105

Subject: Comments on Malibu Creek Draft TMDL (Nutrients)

Dear Mr. Smith,

Pursuant to your notice of January 10, 2003, we are pleased to provide the following comments on the draft Total Maximum Daily Loads for Nutrients for the Malibu Creek Watershed.

General Comments

The nutrient issue in the Malibu Creek watershed has a long and controversial history, and studies to try to define its impacts have followed a pattern of ever-increasing detail and sophistication. However, some important findings are common to virtually all of these studies, and we appreciate their recognition by EPA as central to the TMDL.

First and foremost of these findings is that algae problems in the watershed are a strongly seasonal phenomenon. Of the many salient findings in the TMDL report, we view as essential EPA's finding that algae-related problems in the watershed warrant different approaches for summer and winter conditions.

EPA Response: *We agree that there is a strong seasonal component to algal cover and that a seasonal approach is warranted*.

Another key finding is that the linkage between nutrient concentration and excess algae has not been conclusively demonstrated in the watershed. The EPA notes that on-going studies may shed additional light on this issue, but the TMDL correctly emphasizes the uncertainty of the algae-nutrient linkage. In addition to ongoing studies by the Regional Board, we are extremely pleased that the watershed monitoring and modeling subcommittee, led by the City of Calabasas, has obtained over a million dollars in Prop. 13 funds to perform further monitoring that will shed new light on algal-nutrient linkages and other water quality issues in the watershed. Given that this TMDL proposes to eliminate algal impairments by nutrient reductions, it is imperative that the linkage between algal impairments and the TMDL's specific numeric nutrient targets is based on firm and conclusive scientific evidence.

EPA Response: *We agree that there should be good coordination between monitoring work done by the City of Calabasas and the targets defined in this TMDL. Monitoring of the watershed should include nutrient concentrations, algal cover and biomass, and other factors which may be related to algae (See page 47 of TMDL). This work could be used to document water quality as a result of actions taken by the stakeholders and document progress toward meeting the TMDL targets. It could also be used to better define the relationship between the nutrient targets and the instream measures such as algal coverage and DO. This being said, EPA found that nutrient levels are significantly higher than levels that have been found to contribute biostimulation in comparable watersheds. Therefore EPA concluded that it is*

necessary to establish nutrient TMDLs, particularly to address the more pervasive summer algae problems.

In the absence of such evidence, the TMDL uses the reference site approach to set numeric nutrient targets. This is inappropriate for a number of reasons. First, data show that the reference sites used in the TMDL are impaired for algal growth, which demonstrates that these numeric targets, if implemented, will not eliminate algal impairments.

EPA Response: *The targets identified in the TMDL are based on EPA and NOAA guidance, studies from the scientific literature and concentrations from reference streams and lakes in the area. We believe that reductions in nutrient concentrations will result in improvements in water quality and reduce the extent and magnitude of algal cover*.

Second, alternative sites within the watershed with even lower nutrient levels are located in the extreme upper reaches of the watershed, and do not fairly represent conditions relevant to algal growth downstream where the TMDL's proposed nutrient reductions would be implemented.

EPA Response: *Our review of data provided by Heal the Bay indicates that concentrations in the upper reaches are not substantially lower in terms of total nitrogen than those used in this TMDL (See Response to Heal the Bay Comments). We believe that the use of R9 as a reference site is appropriate and justifiable*.

Third, research by EPA, among others, shows that the algal species responsible for algal mats in the watershed can thrive at nutrient levels lower than those found anywhere in the watershed (CH2Mhill, 2000).

EPA Response: *While it is true that algae can thrive at lower concentrations, we have also seen evidence in the watershed which suggests 0% cover at these low concentrations. The targets set in this TMDL are well supported by the scientific literature*.

Another problem is the TMDL's use of criteria developed by Biggs (2000) for New Zealand streams for assessing algal impairment. To our knowledge, this is the first use of these criteria as standards for assessing algal impairments in streams in RWQCB Region 4. Their use as a numeric "translator" for the Region 4 Biostimulatory Substances narrative standard not been adopted by the RWQCB in any formal proceeding, nor have they been assessed for their applicability or validity in Region 4 waterbodies. Their relationship to the algal impairments identified in the 303(d) list – the trigger for the TMDL – has not been established, and the TMDL presents no evidence that compliance with these criteria – via nutrient reductions or any other means – will address the type of algal impairments identified in the 303(d) list. A better alternative would be to use the same measure of algal impairment as was used to originally list the creek for the 303(d) list. In fact, this is probably the only way the TMDL can ensure that nutrient reductions achieve reductions in algal growth sufficient to de-list the creek.

EPA Response: *The Regional Board has not established the 30% cover from Biggs (2000) as part of their water quality standards. Rather they have used 30-% cover in greater than 10% of the samples as an assessment threshold in their 2002 303(d) listing process. We believe that it is appropriate to use information from the scientific literature to inform there assessment process as part of best professional judgment. We agree that further work*

should be done to determine whether and how it is appropriate to apply the impairment guidelines suggested by Biggs (See Response to Regional Board 4 Comments).

Given the uncertain efficacy of nutrient reductions to control algal growth in this watershed, we strongly endorse EPA's recommended implementation approach, consisting of a phased implementation of modest nutrient reductions in concert with ongoing studies and continued monitoring of algal response. This is the same approach used by the RWQCB in our neighboring Calleguas Creek watershed to address essentially identical uncertainties about the nature of algae-related impairments there, although in that watershed the RWQCB chose to defer phosphorus limits pending additional information. Like Malibu Creek, Calleguas Creek receives tertiary treated effluent and terminates in a small coastal lagoon. Like Malibu Lagoon, dry season algal blooms and algal mats occur there with some regularity. And, as in Malibu Creek and Malibu Lagoon, the role that excess nitrogen and phosphorus plays in these occurrences is unclear. Thus the EPA's recommended approach is consistent with the RWQCB's approach in comparable circumstances. This approach strikes the best balance between the Regional Board's mandate to reduce algal impairments versus the extremely high cost of nutrient reductions and the uncertainty of their success. In fact, the Malibu Creek nutrient TMDL is quite conservative in this regard, in view of the fact that neighboring watersheds have no phosphorus targets and receive direct discharges of tertiary-treated effluent year-round.

One aspect of implementation we disagree with, however, is how the TMDL proposes to allocate the targeted reductions among the various potential sources, specifically those for the Tapia discharge, recycling and biosolids land application farming. The TMDL proposes a zero-load allocation for nutrients from irrigation with recycled water and suggests this be achieved by limiting effluent irrigation to the nutrient uptake capacity of the irrigated plants. These recommendations, if adopted, will severely hinder water-recycling efforts throughout the watershed and the state. We need regulations with certainty and have invested $20 million dollars for tertiary treatment at Tapia to produce recycled water, and $50 million dollars for the pipes to convey it to over 500 recycled water customers. These customers collectively represent 20 percent of total water demand in the watershed. The district has been a leader in recycling, and has followed state Best Management Practices (BMPs) for water conservation that call for recycling. The standard under these BMPs is to provide irrigation sufficient to maintain healthy vegetation without runoff. The TMDL does not provide sufficient information for a critical assessment of the basis for the recycled water allocations, and the model used to identify recycled water as a nutrient source in need of regulation is vague on details that are important for to its validation by independent parties. Furthermore, independent data do not support the model's assumptions regarding recycled water impacts, as detailed in our specific comments below.

EPA Response: *The most important feature of the TMDL is the determination of the allowable load which was derived on the numeric target and the critical flow. The model was used to estimate nutrient loads and was not used to calculate the allowable load. Our estimates for the loads associated with recycling and biosolids application were based on information described in the Tetra Tech document as provided to us by the Regional Board. If we have overestimated the loadings from different sources, then the percent reduction necessary from those sources will be less. We disagree with the contention that the TMDL will hinder water-recycling effort. It is not our intent to limit or impede water recycling in any way*.

Regarding biosolids land application farming, it is important to allow continuance of this critical backup operation when needed. It is not reasonable or fair for this potential nutrient source to receive zero allocation when its impacts remain unclear and its loss puts the district at risk of non-compliance for other environmental regulations. Specific studies to further evaluate impacts to groundwater have been submitted to the Regional Water Quality Control Board (RWQCB) for approval.

The district does not object to the TMDL's proposed seasonal nutrient limits if supported by firm scientific evidence, but they should be based on mass limits with an appropriate averaging period of one month or more to allow for occasional discharges of short duration to maintain fish in good condition, for plant upsets and for rain events. Reduction of summer loads to zero is not achievable because of the need for these occasional discharges.

EPA Response: *The nutrient targets are concentration-based. The load allocations for the summer are mass based. Winter load allocations were derived for the allowable nutrient concentrations in the winter and are purely concentration based*.

We can appreciate that the EPA is under a legal obligation is complete this TMDL before March 31, 2003 under the terms of a consent decree with other parties[1]. While we were not a party in that action, the TMDL nonetheless will significantly impact both our water and sanitation service to over 80,000 customers. To its credit, the EPA with the assistance of RWQCB staff has compiled a large volume of information since November 2002 when EPA began its involvement in this TMDL. Still, we are very concerned that this TMDL will be adopted despite substantial unresolved uncertainties in its key premises, and absent an adequate chance to review its details by those most directly affected by it. There are a number of technical corrections necessary for the document to be a valid record, as noted herein.

Sincerely,

James E. Colbaugh
General Manager

Attachment

[1] We have heard that this deadline may be extended to June 2003 and would appreciate any information on this.

EPA Response: *The deadline extension applies only to Santa Monica Bay pathogens, Calleguas nutrients, and Santa Clara River chlorides. It does not apply to Malibu Creek.*

Specific Comments
In our specific comments below, we have made every effort to provide data as necessary in support of our recommendations and comments.

Page 3. We are pleased that EPA recognizes the need to consider seasonality in the TMDL. Sunlight should be added to the list of important seasonally varying factors in the second paragraph. We disagree with the statement in the last paragraph that nutrient load reductions in the TMDL will have any impact on algae –related impairments in upstream tributaries. The TMDL provides no evidence for this statement, and elsewhere the draft TMDL cites evidence to the contrary, specifically that nutrient concentrations and nutrient loads are unrelated to algal levels in the watershed. When the SWRCB reset nitrate limits to 10 mg/l in 1999, they also directed the RWQCB to extend the "summer" season start date to May 1 if creek flows were greater than 10 CFS (the minimum flow to keep the lagoon open – Attachment A).

EPA Response: *Comment noted. The numeric targets were based on information from the scientific literature, EPA guidance and an assessment of reference conditions. We have acknowledged uncertainty in the target, but maintain that the reductions will result in needed reductions in algal levels*.

Page 5. The statement in the 4th paragraph that Malibu Lagoon drains into Santa Monica Bay when the entrance to the lagoon is open is incorrect. Data collected by the district show the lagoon exchanges water with the bay even when closed through the sand berm, in concert with the ocean tidal cycle. This phenomenon was also documented in a study cited by the TMDL (Ambrose et. al., 2000). This water exchange is important, as it replaces a portion of lagoon water with seawater of lower nutrient concentration with each tidal cycle. The TMDL modeling appears to overlook this factor, and thus overstates the nutrient loading to the lagoon in the summer when it is closed. Another way of stating this is that the TMDL understates the margin of safety for the lagoon.

EPA Response: *Seepage fluxes were accounted for in the BATHTUB model, which was used to model the lagoon during the closed periods. The procedure is described briefly on page 8-8 of the Tetra Tech report. Tidal inflows were estimated from the Ambrose study, which showed that during closed periods the lagoon elevations fluctuated by about 0.1 meters due to tidal variations outside the lagoon.*

Page 5. Note the "acres listed" in Table 1 do not coincide with the lake size in the paragraphs following.

EPA Response: *The text has been revised.*

Page 6. Discharge from Westlake Lake of 1 cfs minimum for fish flows is required through September 1 of each year.

EPA Response: *The text has been revised.*

Page 7. Add "acres" after 1097 in para. 1.

EPA Response: *The text has been revised.*

Page 9. In paragraph 1, the list of studies on algal growth in the watershed needs to include a important baseline study of Malibu Creek by researchers from UCLA and UC Riverside, reported in *Malibu Creek Study, 1978-1979,* James M. Montgomery, Consulting Engineers, Las Virgenes MWD Report #1319.5. This volume includes chapters on algae, macroinvertebrates, riparian vegetation, and physicochemical conditions in the creek prior to the advent of recycled water use in the upper watershed. It documents the occurrence of abundant algal growth in the summer even in the absence of recycled water irrigation in the upper watershed.

EPA Response: *This report was not provided and was not available for review by EPA as part of the TMDL.*

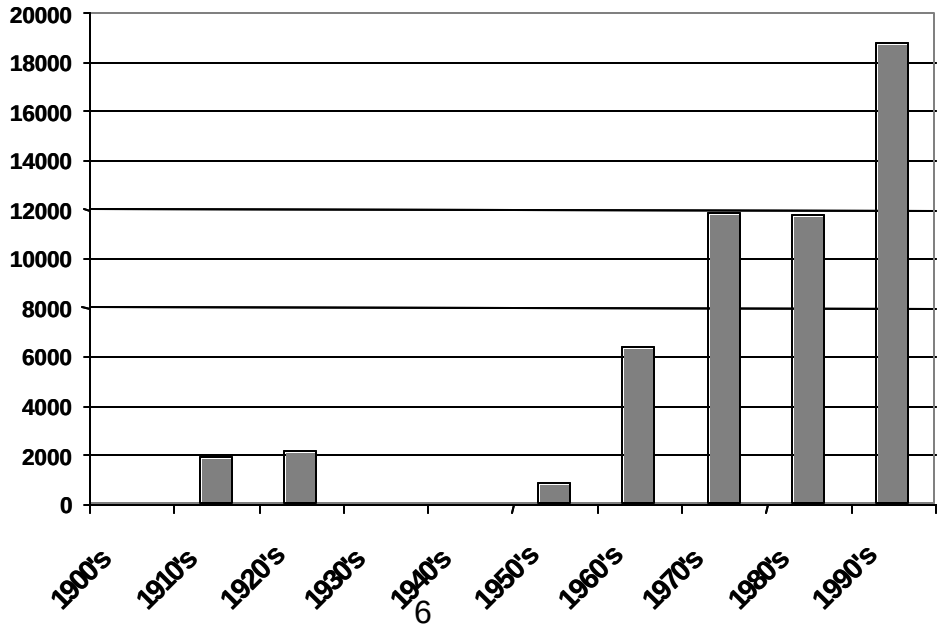
Page 12. TMDL needs to supply more detail regarding the statement at the bottom of the page that 6 of 17 sites had low DO (< 7.0 mg/l) and were "generally sites with more developed land use."

- How were the other 11 sites with higher DO classified?
- What is meant by "generally more developed land use?" Does this mean that some low DO sites were in undeveloped areas, that the "developed" classification was somewhat subjective, or something else?

EPA Response: *The land use classifications were from Briscoe et al., 2002. .*

- The mere proximity of homes or urban development to excess algae does not establish an algae – nutrient linkage. Far from it. Urban development affects algal growth primarily by removal and modification of riparian cover, altering the light regime of the stream. The loss of riparian cover in concert with urban development has been amply documented in the watershed (Figure 1. Data from Lillien, 2002).

Fig. 1. Riparian Habitat Losses in Malibu Creek
(Linear feet along stream)



EPA Response: *Nutrient concentrations at the more developed sites were higher than those at less developed sites (Busse et al., 2002). We acknowledge that urban development may also result in decreased canopy cover and influence algal growth*.

- The linkage between light and excess algae (especially aesthetic nuisance algae) has been clearly demonstrated in the watershed, whereas the linkage with nutrients has been shown to be extremely weak or non-existent (CH2Mhill, 2000).

EPA Response: *We have equally compelling slides from Heal the Bay suggesting that there is little relationship between canopy cover and algae (See Response to Heal the Bay's comments).*

- There is a great deal of uncertainty associated with the classification of monitoring sites as developed or undeveloped, especially as a means of demonstrating nutrient linkages with excess algae. To date we have seen no documentation of the methods used to classify sites, including recent work by UCLA, UCSB, SCCWRP and Heal the Bay. Nor have we seen any evidence that sites used in these studies to search for algal-nutrient linkages were controlled for light or flow, both of which have been shown to be the primary determinants of algal growth in the watershed (Chapman, 1979; CH2Mhill, 2000), and are variables often impacted by development.

EPA Response: *The light and flow regime in the Malibu Creek watershed are part of the existing condition and need to be taken into consideration in the development of the TMDL. The State may modify the TMDL to account for new information, including information on algae, light and flow conditions*.

Note in Table 5, R-6 must have had at least one sample less than 5 mg/l if 4.3 is the minimum.

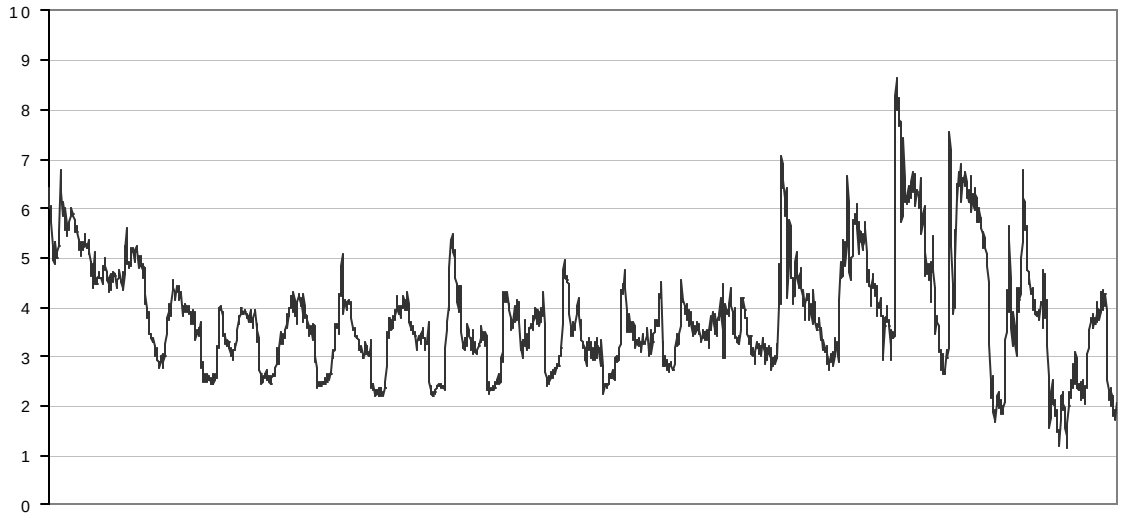
EPA Response: The text has been edited.

Page 13. The finding that low pre-dawn DO is likely a natural phenomenon in the creek is consistent with spot checks conducted by the district of pre-dawn and morning DO in algae-free areas of La Jolla Canyon Creek, which has no development within its watershed (Fig. 2). Early morning DO along this stream was less than 5 mg/l at 10 of 12 sites sampled.

Page 13. We disagree that low lagoon DO meets the basin plan standard for impairment, let alone impairment linked to eutrophication or nutrients. Fig. 3 shows continuously monitored DO in the lagoon over the month of December, when the lagoon was open, chlorophyll levels were low, and algal mats absent. The data show that very low pre-dawn DO is common in the lagoon even when no eutrophic conditions exist, and is likely a natural phenomenon.

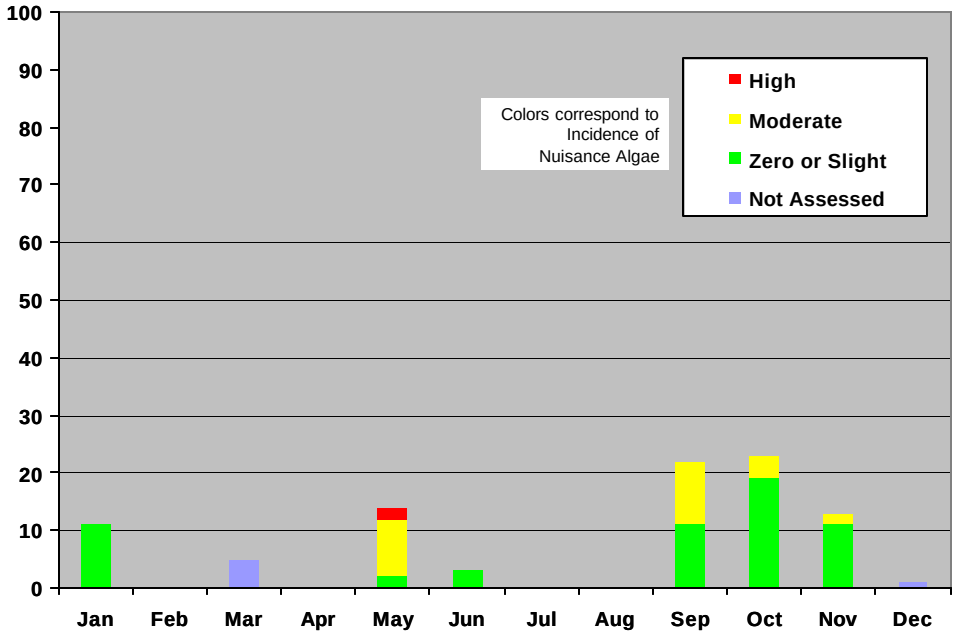
***EPA Response**: We acknowledged in the TMDL that the predawn condition is most likely a diurnal phenomenum. However it is clear that conditions in the lagoon are well below the 5 mg/l throughough much of the year. By definition water quality concentrations below the standards indicate impairment (i.e. non attainment of the standard). The argument being made here is that the standard is inappropriate for the lagoon. If the commenter believes that the low DO in the lagoon is a natural phenomema and that the standards need to be re-written, discussing this with the Regional Board.*

Fig. 3. DO (mg/L) in Malibu Lagoon 11/27/02 to 12/16/02
15 Minute Interval Data



Page 13. The TMDL should note that none of the creeks in the watershed would have been listed as impaired for winter algae in the original 1996 listing if the data had been sorted by season. We recommend that Fig. 4, which clearly makes this point, be included in the final TMDL.

Fig. 4. Seasonal Distribution of Observations Used in 1996 WQA for Nuisance Algae in the Malibu Creek watershed



EPA Response: EPA *did not re-evaluate the sheets used by the Regional Board in 1996. We note that Regional Board maintains that the listing applies year round (See Response to Regional Board 4 Comments)*.

Page 14. There are a couple problems that need to be addressed with the seasonal analysis of algal impairments using the "30% algal cover more than 10% of the time" criterion. First, algal cover in the late fall consists primarily of algal mats that develop in the summer and persist into the late fall only because large rain events have not arrived to scour them. Busse et. al. (2002), which is cited in the TMDL, attribute the October decline in floating algal biomass to macroalgal senescence, "rendering the macroalgae unresponsive to other environmental growth stimuli." Shorter days and lower temperatures limit algal growth in these months regardless of nutrient concentrations (Chapman, 1979; CH2MHill, 2000).

EPA Response: *This argument is consistent with the EPA's seasonal allocation*.

Second, the analysis lumps data from each month into very broad categories ("November through April"), such that a concentration of exceedances in the late fall months yields an apparent - but erroneous – conclusion that impairments occur throughout the winter. Elsewhere the TMDL cites data provided by Heal the Bay that excess algal cover extends into November and December, and this is consistent with rainfall records that show that scour flows occur primarily, though not exclusively, in the January to April timeframe. Again, there is no evidence to suggest that nutrient reductions will reduce algal growth in the winter months.

EPA Response: *The argument here is not that the seasonal approach is not warranted but that the dates should be adjusted to better reflect rainfall patterns*. *EPA believes it is appropriate to retain the "season" definitions used in the TMDL because they coincide with the periods in which Tapia is permitted to discharge.*

Third, the 30% criteria was developed for benthic periphyton, not the floating algal mats responsible for the historical 303(d) algal impairment listings. The report by Busse et al. cited in the TMDL makes this point where it discusses shading of benthic diatom mats by floating macrophytes. The TMDL also needs to note that observations of floating algal mats were the sole basis for the creeks' algal impairment listing on the original 303(d) listing.

EPA Response: *Biggs (2002) used 30% algal cover as a threshold for filamentous algae greater than 2 cm long. He also recommended a threshold of 60% algal cover forl mats greater than 0.3 cm thick. It is not clear what type of algae the Regional Board was assessing in 1996.*

Page 16. The declaration in the first paragraph that nitrogen and phosphorus are responsible for excess algal and periphyton growth in the watershed is presented without supporting evidence. It ignores important caveats in the studies by UCSB that, "streamwater TN and TP concentrations are not effective tools for assessing trophic status in [this} system (Busse, et.al., 2002:12) and that, "the biomass of floating algae was strongly positively correlated with light availability." It is also contrary to the findings of scientific studies by Chapman (1979) and CH2Mhill (2000), and our own experience with the summer flow prohibition, wherein termination of Tapia's discharge for 7 months each year for the past 5 years has failed to yield any detectable reduction in algal cover downstream of the discharge. We do not see how the TMDL can make the flat, unqualified statement that nitrogen and phosphorus are responsible for excess algal and periphyton growth in the watershed when

so many studies have failed to establish a clear nutrient linkage. In fact, reduction of summer nutrient loading has had no impact on algal growth. It seems premature to propose nutrient targets and allocations until there is some assurance that they will work.

EPA Response: *While we acknowledge that there is uncertainty in the relationship between nutrient concentrations and algal biomass, it can not be refuted that algae need N and P to grow. The argument being made here is that there are other factors that may be more easily controlled to limit the amount of algae in the streams. EPA has developed targets for N and P that are attainable, and should result in decreased algal abundance. At levels above these targets, streams usually experience biostimulation effects including excessive algae growth. If based on further studies it is determined that the algae problem can and will be ameliorated via other means, the TMDL can be reconsidered by the State.*

Page 18. As for our comments on page 16, the TMDL needs to address the large body of evidence that algal problems in the watershed are not linked to nutrient levels. This is essential to assure the local communities that must meet the stringent limits proposed in the TMDL that their efforts will solve the problem.

EPA Response: *See response above. We also encourage the stakeholders to discuss options for a phased implementation plan with the Regional Board*.

Page 18. We note with astonishment EPA's statement in paragraph 1 that the numeric target values for Malibu Creek set no precedent with respect to other watersheds in California. If nutrients indeed are the cause of algae impairments in Malibu Creek, then the numeric targets cannot be that different for other southern California streams with algal impairments. The algal species identified by Chapman (1979) and Busse et.al. (2002) in Malibu Creek are hardly unique or rare (e.g. *Cladophora, Enteromorpha, Rhizoclonium etc.),* nor are the landuses and sources identified as important nutrient sources in the TMDL (e.g. golf courses, treatment plants, recycled water irrigation, urban development, etc.).

EPA Response: *While it is true that the algae are not unique to Malibu Creek, we do not think it is appropriate to apply the numbers generated as part of this TMDL to other streams at this time without further analysis. Conditions in rivers like the LA River or San Gabriel River are much different than those in Malibu Creek. We and the Regional Board will evaluate the appropriateness of these numbers on a case by case basis.*

Page 18. EPA dismisses several guidelines for numeric nutrient targets because they have little predictive power in explaining the patterns of algal biomass in the watershed. Yet this flaw is also true of the numeric targets proposed in their stead (CH2Mhill, 2000 and this review, below). In hunting for a predictive factor that works, the TMDL apparently ignores several factors that are known to work quite well, specifically light intensity, water temperature and water velocity, highlighted as qualitatively important factors in work by Chapman (1979) and quantified in work by CH2Mhill (2000). The assumption of the TMDL seems to be that nutrients must lie at the root of algae-related impairments, and therefore limits itself to nutrient-based solutions and targets.

EPA Response: *Again it can not be refuted that algae need N and P to grow. The argument being made here is that there are other factors that may be more easily controlled to limit the amount of algae in the streams. If based on further studies it is determined that*

the algae problem can and be ameliorated via other means, the TMDL can be reconsidered by the State in the future.

Page 21. In view of the uncertainties between algal biomass and nutrient inputs in this watershed, if the EPA decides to set numeric nutrient targets, they should be the alternative targets suggested by EPA (2.5 mg/l TN and 0.4 mg/l TP). Adopting the more stringent targets of 1 mg/l TN and 0.1 mg/l TP will serve no purpose other than opening the state and other public agencies to third-party lawsuits for non-compliance. This is unreasonable when the alternative targets will serve just as well to test the TMDL's assumption that algae will respond to lower nutrient levels.

EPA Response: *We believe the values of 1 mg/l for total nitrogen and 0.1 mg/l for total phosphorous are appropriate. They are consistent with EPA and NOAA guidance, they are consistent with numbers from the scientific literature, they are consistent with background concentrations in the watershed and they are attainable. No commenters presented persuasive arguments in support of alternate targets.*

Page 21. The basis for EPA's winter nitrogen numeric target of 8 mg/l TN is severely flawed. The justification that a target is required due to "some evidence of algae problems in the winter months" is very weak, because the winter months at issue are November and December and the algae problems associated with these months are due to summer algal mats that grow in the summer and persist until rain events. The presence of algal mats during these months has nothing to do with nutrient enrichment during these months, and nutrient reductions during this period is unlikely to have any effect in eliminating them. Algal growth rates in the winter months are slower due to lower water temperatures, shorter days, and lower sun angles. These conditions limit algal growth regardless of nutrient levels (Chapman, 1979; CH2Mhill, 2000). Aside from these issues, the basis for the actual value (8 mg/l) is also flawed, as it is based on the Basin Plan's 10 mg/l MUNI standard with a "20% margin of safety." The MUNI standard is a drinking water standard that has no relationship to algal growth. Furthermore, there is already a substantial margin of safety in the existing 10 mg/l limit in the winter due to dilution by native creek water. There are few, if any, drinking water wells downstream of Tapia, and any that do exist are either upstream or above gradient of any Tapia discharges, as the receiving water below Tapia is undeveloped until the Malibu Civic Center, which is served entirely by imported water.

EPA Response: *The basin plan indicates that 10 mg/l applies to surface waters. This TMDL simply implements that standard. We do not think it is appropriate at this time to impose summer time targets to the winter time because there are uncertainties associated with 1) the extent of impairment in the winter, 2) the relationship between nutrient concentrations and algae in the winter and 3) the relationship between nutrient loads in the winter and nutrient accumulation in the sediments. EPA has opted to apply the existing concentration-based standard to the winter time conditions along with a margin of safety which will result in a substantial reduction in the annual nitrogen loadings to the system. We believe this approach is appropriate given the uncertainties noted above. The record does indicate that algae is present at many locations throughout the winter, and EPA has concluded that a margin of safety to help address winter algae growth is warranted in light of that evidence.*

P. 23. Discharge 002 is never intentionally used and only serves as an emergency spillway from Reservoir 2 dam to prevent overflow structural damage.

Please remove references to Discharge 004 here and elsewhere in the TMDL as it no longer exists.

Need to remove or substantially revise the last paragraph. The 004 discharge was eliminated in 1999. No discharge is currently routed to the percolation ponds. The district may convert the site to constructed wetland if all necessary permits can be obtained, but this would not include reestablishment of the 004 discharge or any surface connection to the creek regardless. The WDR for this project issued by the RWQCB in 2002 specifies that the project shall not impact creek nutrient levels, and requires monitoring to verify it.

EPA Response: *We appreciate the extra clarification on the use of the discharge points and have incorporated these comments. The 004 discharge was included in the model, which simulated the period 1992-1995. A note has been added to the TMDL to this effect. Loads and flows were included in the model for the 002 and 004 discharges for the model period as reported in the Tapia monitoring reports.*

P. 24. Strong exception is taken to the TMDL's assumption that irrigation practices using recycled water are the primary source of nutrient loading. This is an important issue for the district's stewardship of water resources, and therefore warrants substantial comment.

Apparently, the TMDL's conclusions regarding recycled water as a major nutrient source rest on the model created by Tetra Tech and the assumptions therein. The first issue is that neither the TMDL nor the Tetra Tech report offered as a supporting document provides much detail of any use in evaluating the validity of the model.

EPA Response: *The Regional Board provided Tapia and other stakeholders with an initial draft of the Tetra Tech model report which included the source assessment and the assumptions being made. EPA has considered each of the comments received concerning the source analysis but has concluded that changes in the source analysis are not warranted based on these comments*.

At a minimum, stakeholders deserve to see a list of input parameters *and the values for these parameters used for the actual model runs*. For a TMDL of this magnitude – calling for 90-100 percent reductions in nutrient sources – stakeholders deserve the right to fully examine the model and how it works. A 30-day review is inadequate for this purpose, even if all interested stakeholders had a working copy of the model and complete documentation for it.

EPA Response: *EPA provided a 30-day comment period consistent with federal requirements in order to meet the March 22, 2003 consent decree deadline for establishing the TMDL. Model input files can be from EPA or the Regional Board upon request.*

The documentation provided finds fundamental problems with the model assumptions and calibration:

- Reference to the Tetra Tech report finds substantial disparities between the model predictions and actual field measurements above the Tapia treatment plant. The report states that, "The model predictions compare reasonably well with the monitoring data at most of the stations." On the contrary, inspection of

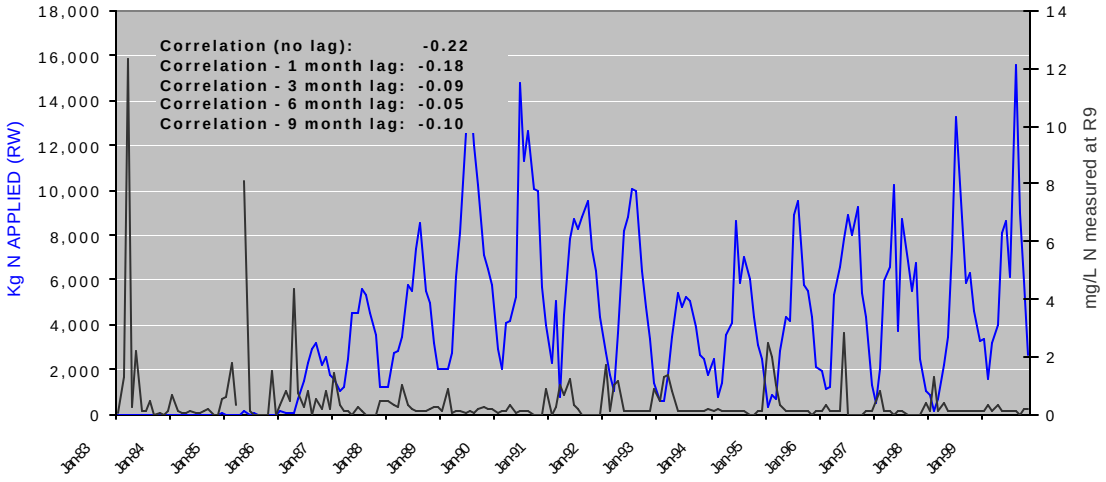
Figures 8-2 through 8-6 in the report show that the only stations that agree "reasonably well" with the model all are below Tapia, which is expected as Tapia discharges directly to the creek. Figure 8-2 is the relevant calibration check for irrigation impacts. Agreement between the model and field measurements in this figure are quite poor.

EPA Response: *Modeling is not an exact science. Assumptions are required in any modeling exercise and model results are at best only an approximation of reality. This being said. We believe that the model results provide a reasonable fit to the data. The field measurements presented on Figure 8-2 (Lower Las Virgenes Creek) are quite limited in number (a maximum of eight data values over the four year model period) while Figures 8-3 through 8-6 present much more data, because of the presence of Tapia monitoring stations in these watersheds. Limited conclusions can be drawn regarding the comparison presented in Figure 8-2 because of the limited amount of observed data. Additionally, observed data outliers (such as the ammonia-N value of 1.4 mg/l) indicate a possible data collection or measurement error. We find the model predictions quite reasonable given the caveats discussed above.*

- If the model is correct in assuming that upstream nutrient inputs are dominated by recycled water irrigation, then variations in upstream nutrient levels should track reasonably well with variations in recycled water use. They do not. Nutrient levels above Tapia but downstream of recycled water sites are not even remotely correlated with recycled water use, despite conversion of ¼ of all irrigation demand to recycled water since the early 1980's (Fig. 5).

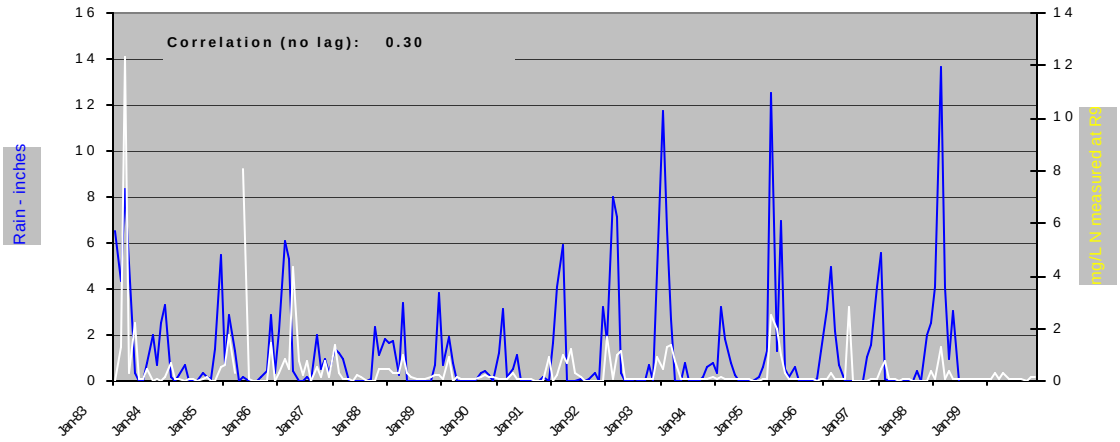
EPA Response: *Irrigation occurs primarily in the summer, and nutrients deposited on the soils act as a long term source. Therefore, there is a delay as the nutrients build up in soils during the dry-season and are then washed into the creeks during rain events. The Tetra Tech model reflects the water budget fairly well (both in terms of flow and volume). The relationship between nitrogen inputs and instream concentration is a function of inputs to the system, dilution and a number of transformation processes. Figure 5 tries to relate load to instream concentration but does not take into account dilution or transformation processes*.

Fig. 5. No relationship between between Irrigation-Applied N vs Measured N in creek (R9).



What creek nutrients levels do correlate with very well with is rainfall (Fig. 6). And this correlation pre-dates the majority of urban development in the watershed, both in timing and magnitude. If irrigation and urban runoff are the main sources of nutrient inputs, according to the TMDL, why then have creek nutrients not changed during a time when urban population approximately doubled in the watershed?

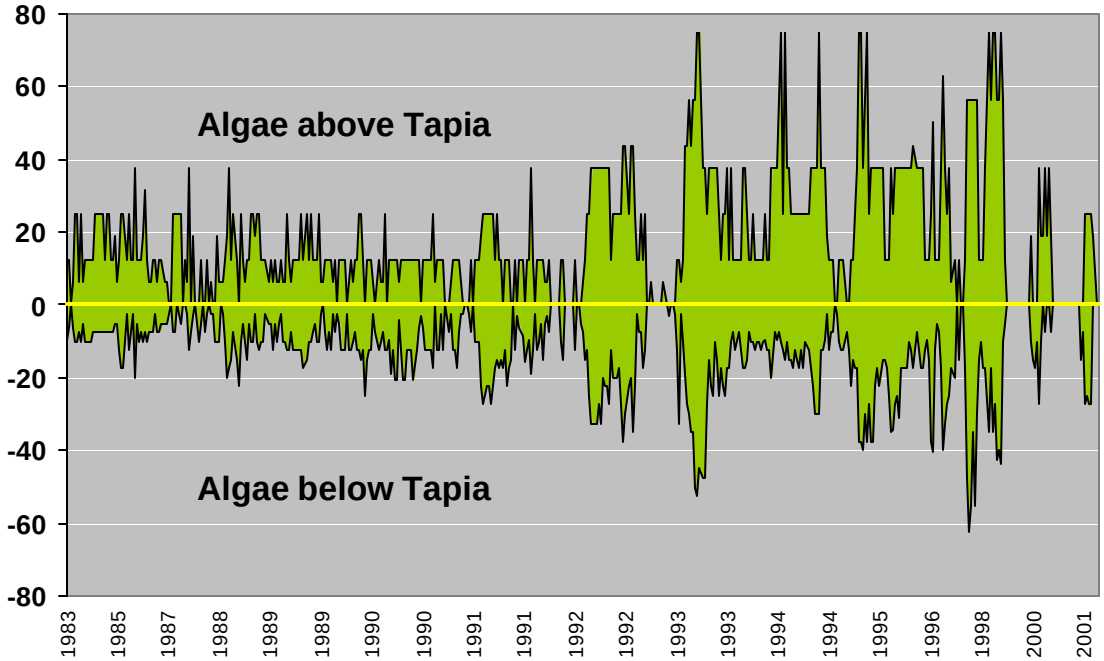
Fig. 6. Good relationship between between Rain vs Measured N in creek (R9). Monthly or annual values.



EPA Response: *We are not surprised to see a relationship between rainfall and concentration. Our source assessment indicates that large amounts of N and P runoff of land during storms. Loadings from undeveloped land and developed land are comparable. Therefore we are not surprised that the basic pattern has not changed with increasing development. We also note that this discussion is moot since we believe that most of the algae problem is associated with the dry-weather period when N and P are above the proposed thresholds of 1 and 0.1 mg/l.*

- The Tetra Tech report (p. 8-9) tries to address this issue by assuming that nutrients entering the creek from recycled water use do not track creek nutrient levels due to uptake by algae above the monitoring stations. If so, then increasing nutrients above the level seen at station R9 should yield increased algal growth. But it does not; nutrients are added directly below this station by the Tapia treatment plant, yet algae levels there are no different there than they are at station R9 (Fig. 7).

Fig. 7. Algal cover above and below Tapia



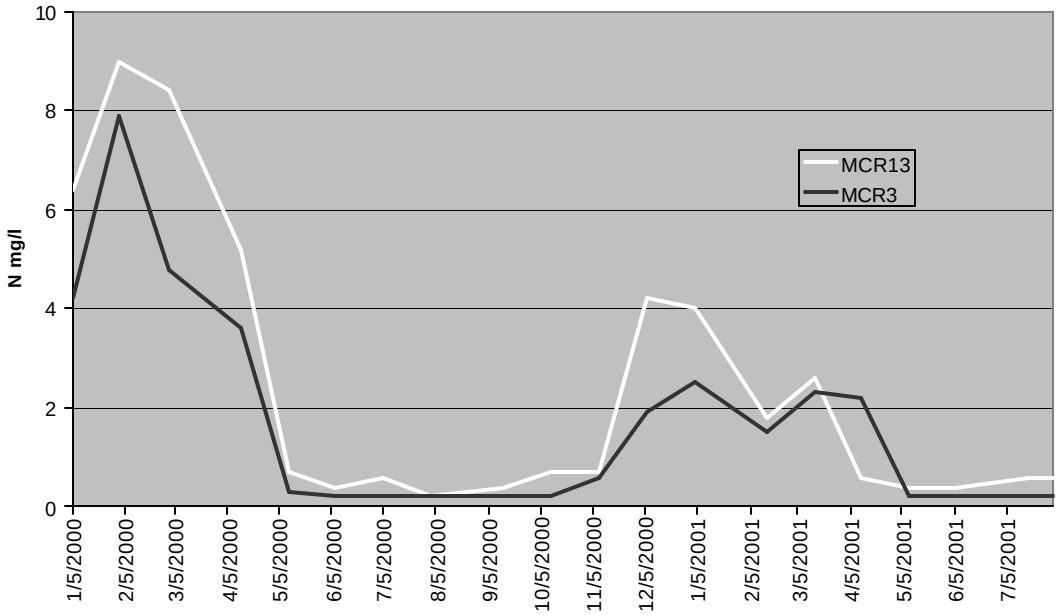
EPA Response: *The basic argument here is that nutrients are not limiting since there is no difference between algae growth above and below Tapia even though nutrient concentrations are much higher below Tapia. However it is entirely possible that algae growth is stimulated by low levels of N and P (perhaps lower than the 1 mg/l and 0.1 mg/l targets) and saturated at higher levels of N and P observed at sites above and below the Tapia discharge.*

- The TMDL's assumption that nutrient reductions along the length of Malibu Creek is due to nutrient uptake by algae has been voiced before by Regional Board staff, particularly to explain why nutrient levels at station R3 are lower than those at station R13, located four miles upstream. The assumption fails, however, because the magnitude of the observed reductions occur throughout the year, regardless of algal biomass (Fig. 8). In fact, the greatest reductions occur in winter. The reason is that flows in Malibu Creek in winter increases between these stations due to runoff from Malibu Canyon. In summer, when flows

decrease between these two stations, nutrient levels between the stations are essentially the same. No doubt some uptake of nutrients occurs in summer, but the amount is far less than what is naturally available (Chapman, 1979; CH2Mhill, 2000).

EPA Response: *The TMDL does not rely on the assumption of nutrient reductions by algae. What Figure 8 indicates to us is that the value of 1 mg/l for total nitrogen is attainable in the summer months and the value of 8 mg/l is generally attainable in the winter months*.

Fig. 8. Nutrient Levels Between Station R13 (upstream) and R3 (Downstream) on Malibu Creek



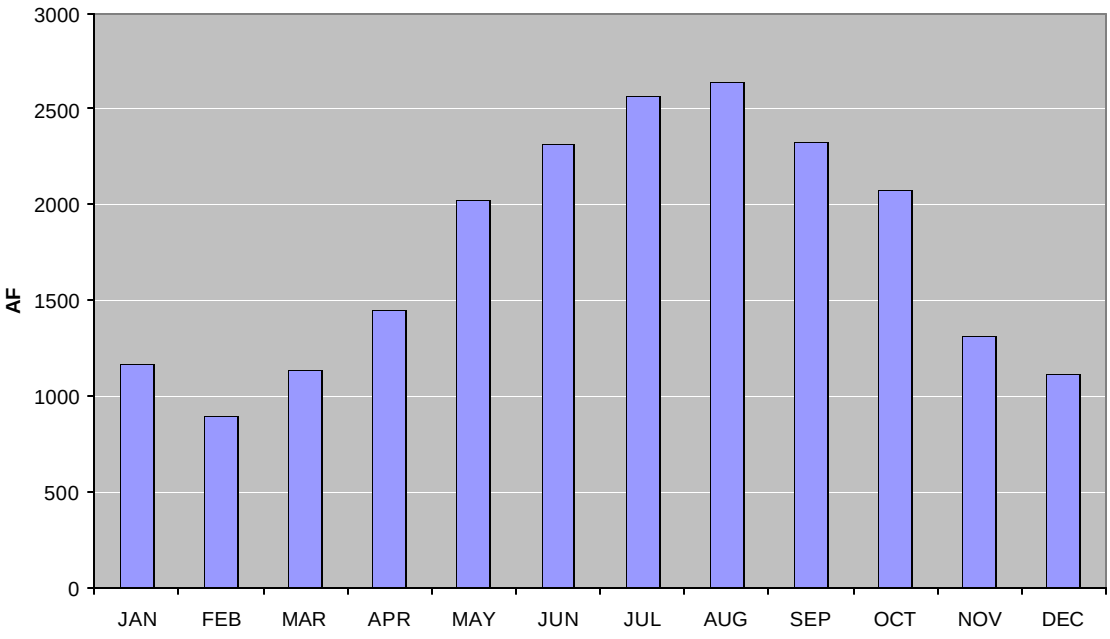
- Another problem with the "algal uptake" explanation for disparities between the model and field measurements is that it is circular. The basic premise of the TMDL nutrient model is that the various sources of anthropogenic nutrients are responsible for excess algal growth. However, when the model results for upstream sources do not match with field data from downstream stations, it assumes that algae are absorbing the nutrients before they reach the downstream stations. This logic is circular, and more importantly, it could as easily support any number of alternative model inputs for the fraction of recycled water nutrients reaching the creek. It also ignores the fact that much larger quantities of nutrients are discharged *directly* to the creek below these stations, yet there is no sudden explosion of algal cover there in comparison to upstream stations located only a hundred yards away (Fig. 7, above).

EPA Response: *Tetra Tech does not state that algal uptake is the explanation for disparities between the model and field measurements. What Tetra Tech we does state on pages 8-9 and 8-10 of their document is that algal uptake can explain why concentrations are lower in the summer and why they are lower downstream*.

- The model's hydrology calibration assumes that imported water flows remain constant throughout the year (p. 8-1 of Tetra Tech Report). This is not true. Fig. 9 shows actual monthly imported water usage for 2002. The seasonal difference shown is typical of every year.

EPA Response: *The watershed model was created with data available at the time which did not include the data cited by the commenter. The commenter does not suggest that EPA misinterpreted the imported water data that were available for the TMDL analysis. More recent data can be included in future model revisions.*

Fig. 9. TMDL assumption of constant imported water flows throughout the year is wrong



- The hydrology calibration figure on Page 8-2 of the model report misrepresents the actual agreement between modeled and actual flows by the use of a log scale on the ordinate. This figure must be redone or, better, provide a table with the data this figure is based on. The documentation is silent on how it accounted for flow losses and gains in summer and winter, respectively, below the gaging station that supplied the field data for the model calibration. This is essential for the model's estimates of both relative and absolute nutrient loads to Malibu Lagoon from various sources, because the creek actually goes dry nearly every

year above the lagoon for a considerable distance. The model calibration shows nearly 8 cfs in the creek in the summer over the entire calibration period, which clearly is not documented by the data – it is zero two months per year on average. This is also true of Malibu Creek above the Tapia discharge in the vicinity of Station R9.

EPA Response: *We believe that the hydrology calibration on Page 8-2 is quite good and well within the range of acceptability for water quality models. The log scale on Figure 8-1 is necessary because the flow varies by orders of magnitude. The predicted flows are as low as 4 cfs in the summer. The plot is based on data series with 1460 data points. The fact that the creek dries up is a situation not easily handled by the model. Even though we account for small flows year round, the corresponding loads will be small during the low flow periods.*

- The model assumes that non-point loads from recycled water, golf courses, sludge injection and manure enter the creek as point sources because, "they enter the waterways primarily as shallow groundwater flows." No matter how "shallow" these flows are, even passage through 1 meter of soil results in substantial nutrient losses due to *in situ* denitrification. This is well documented in the scientific literature, recently reviewed in a doctoral dissertation by G. Amah at the Regional Board and incorporated herein by reference.

EPA Response: *We do account for losses due to flow through groundwater, as noted below. The percentages entering the stream are 25 percent of N and 10 percent of P. The rate of in situ denitrification is certainly a function of nitrogen concentration, flow and temperature. Lacking site-specific information we believe the assumptions made in the Tetra Tech document are reasonable. Should the Regional Board have more site-specific information, we would encourage them to consider it in future TMDL reviews*.

- To account for disparities in actual versus modeled nutrient levels, the model was calibrated by assuming that 25 percent of the N and 10 percent of the P applied as recycled water entered the creek. This is absurd! Even where nutrients were directly subsurface injected at the Rancho Farm, nutrient levels in the creek immediately adjacent to the injection site never exceeds about 5 percent of groundwater levels, even during the driest year on record (2002) when the creek flow is entirely derived by groundwater (Fig. 11 and Table 1, below).

EPA Response: *There are many factors which would determine creek levels of nutrients due to subsurface injection, such as how deep the injection is and which way the groundwater is flowing. The above referenced percentages were those that provided the best fit to observed concentrations in the creek. If the commenter is correct, it should be quite feasible to meet the load allocations for reclaimed water applications.*

- Tables 18 and 19 include "Calabasas" loads that are not even tributary to the Malibu Creek watershed – instead they are in the Los Angeles River watershed.

EPA Response: The Calabasas landfill is located in the Palo Comado and Las Virgenes watersheds which are part of the greater Malibu Creek watershed.

- Based on the documentation provided, the model used to determine relative contributions of nutrients from recycled water and other sources appears overly

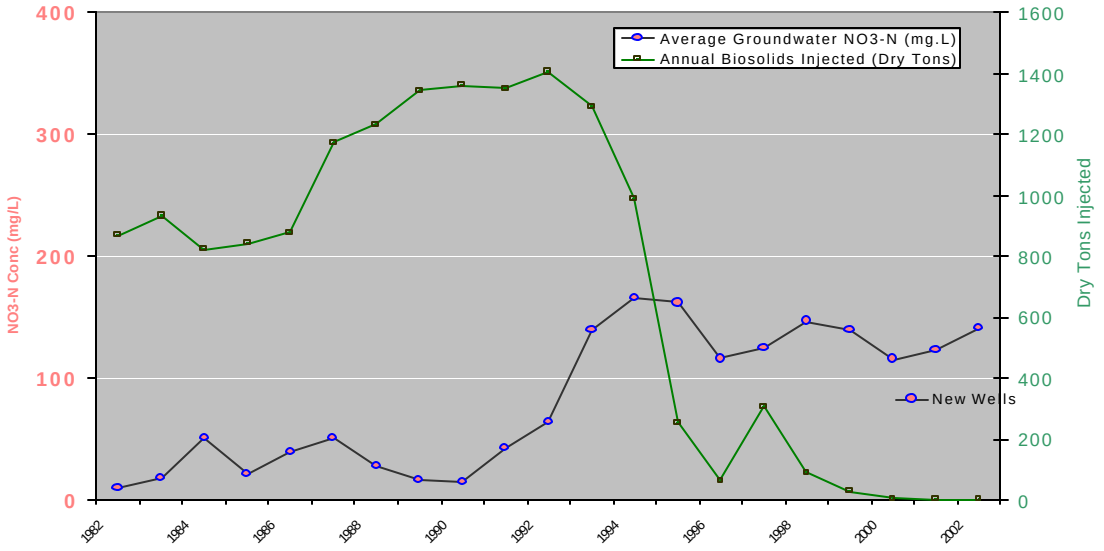
simplistic, misses important features of Malibu Creek's hydrology and nutrient cycling, and uses incorrect assumptions that are not borne out by independent data in every case where such data were available. EPA should more strongly caution that the load allocations in this TMDL not be adopted by the Regional Board until the Tetra Tech model can be examined in detail by affected stakeholders.

EPA Response: *The allowable loads of nitrogen and phosphorus were established independently of the model. The model was used for estimating source loadings and evaluating various source load reduction scenarios. If EPA has overestimated the sources, then the source reductions needed to meet the allowable load would be reduced accordingly. The Regional Board may re-evaluate the load allocations and associated loading reductions in future TMDL revisions*.

P. 32. Groundwater wells adjacent to Rancho Las Virgenes monitor a unique historical situation, since substantially changed, and their data cannot be extrapolated to other areas of the watershed. Land injection of biosolids commenced 1n 1982 and continued until 1994 at a rate of up to 15 dry ton/Ac. The application rates and downstream groundwater data for nitrogen is shown in Figure 10. It took ten years of biosolids application to impact the nitrogen levels in the downstream wells. The loading of biosolids has been significantly reduced and nitrogen up take balance by the current cropping plan shows more crop uptake than application of nitrogen, considering both impacts from recycled water irrigation and biosolids injection. A plan for further monitoring has been submitted to the RWQCB and is waiting their review.

EPA Response: *While it may take 10 years for the biosolids to impact nitrogen levels downstream a concentrations gradient has been established. It is clear that nitrogen concentrations in the groundwater are still high and may continue to be high for a number of years*.

Fig. 10. Nutrient loading and groundwater well Nutrient levels at Rancho Las Virgenes Farm



The attached data (Table 1) showing creek monitoring results along Las Virgenes Creek adjacent to the Rancho Farm indicates an increase in Nitrate concentration from 1 mg/L upstream of the farm, to approximately 8 mg/L adjacent to the farm, then nitrates returning to background of about 1 mg/L downstream of the farm influence.

EPA Response: *Table 1 clearly shows the effect of Rancho Farm on instream water quality. The fact that concentrations are lower at R1 may simply reflect additional dilution from flows in Malibu Creek*.

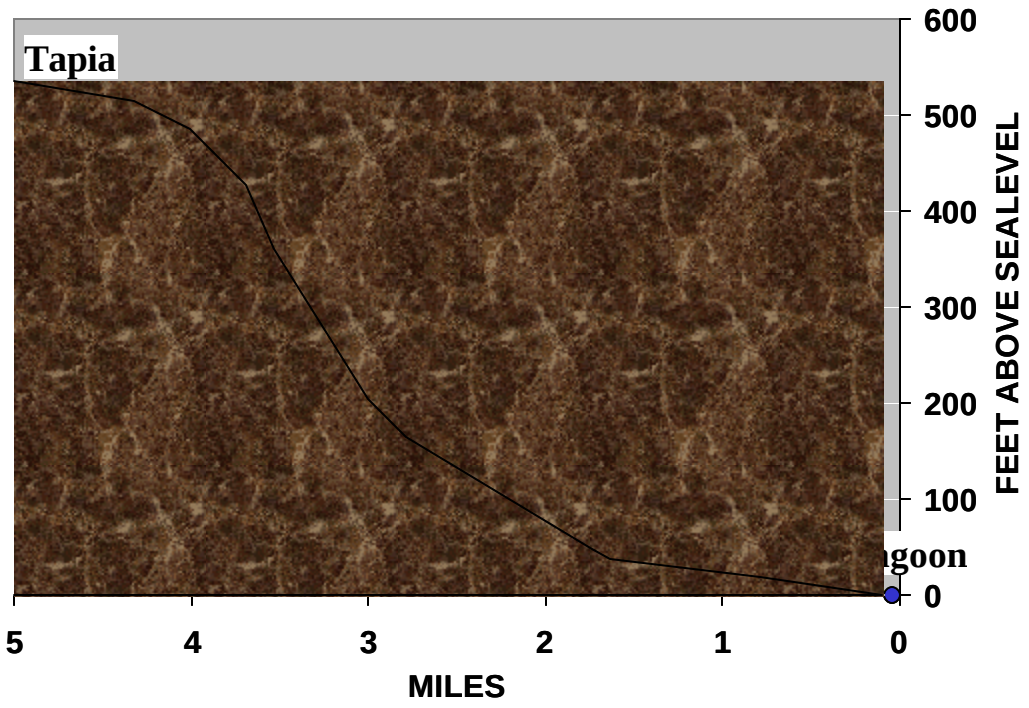
Table 1.

	Nitrate + Nitrite as N (mg/L)			
Sample Date	May-02	Jun-02	Jun-02	Oct-02
Las Virgenes Creek @ Agoura Rd				1.1
Las Virgenes Creek @ A.E.Wright School	2.3	1.2	<1.0	<1.0
Las Virgenes Creek @ Bautista Park Stormdrain	3.3	3.9	4.2	4.3
Las Virgenes Creek across from Las Virgenes Farm Buildings	7.1	6.8	6.6	5.9
Las Virgenes Creek @ White Oak Farm Bridge	8.2	8.8	7.8	7.4
Station R1 immediately upstream of Tapia WRF	1.0	0.9		1.3
Las Virgenes Creek @ Malibu Creek State Park Bridge				5

P. 35. A unique characteristic of Malibu Creek watershed is its extreme hydraulic slope from over 1000' in elevation to sea level in only a few miles (Fig. 11). This steep slope reduces the residence time of nutrients conveyed by pulse flows from rain events in comparison with the longer residence time of nutrients conveyed by mean summer flows. It is therefore appropriate to allocate nutrient loads based on the mean summer flow, rather than instantaneous or daily concentrations. This should be explicitly stated in the TMDL discussion on implementation.

EPA Response: *The TMDL is not based instantaneous or daily concentrations. We agree with the concept of basing the loads on summer flow. However we believe that a median is more reflective of general summer condition than the mean. To reflect the shorter winter season nutrient residence times, the TMDL and allocations are expressed in terms of short-term concentrations.*

Fig. 11. Vertical Profile – Malibu Creek



P. 37. We concur with EPA's seasonal approach for setting TMDL's in the Malibu Creek watershed, however EPA seems to have concerns for the justification. In fact, this approach is very conservative and contains a substantial margin of safety in comparison with recent nutrient TMDL's adopted in adjacent watersheds. In the Calleguas Creek Watershed, for example, the TMDL for nutrients identified limitations on nitrogen at 8 mg/L year round and concluded that this standard would eliminate algae impairments for Mugu Lagoon and its tributary creeks. The TMDL included no phosphorus target at all.

While the nutrient-algae linkages are no more certain in this watershed than in adjacent watersheds, the conservative approach taken in this TMDL -- the addition of special summer targets with much more stringent limits for both N and P -- provides an extra margin of safety sufficient to allow for variation in weather (e.g. dry years), and occasional extensions of Tapia's discharges into the spring when background creek flows are sufficient to keep the lagoon from closing even absent Tapia's discharge. This latter point is important, as the SWRCB has ordered the Regional Board to consider delaying the April 15th onset of the summer flow prohibition in those years where it will not accomplish lagoon closure. The TMDL needs to recognize the extra margin of safety provided by an open lagoon with respect to nutrient washout (Ambrose et. al., 1995, 2000), the shorter residence time of nutrients in the creek under high flow conditions (see our comments above), and the greater degree of algal scour during these times. This is also true during summer and late fall rain events, when Tapia's permit allows direct creek discharge, and in the late fall when Tapia must occasionally discharge to sustain fish flows in the lower creek. In this latter case, the margin of safety is fall itself, when days are rapidly shortening and algae (like trees) are entering a low-nutrient demand quiescent phase.

EPA Response: *The waste load allocations for Tapia have been modified to account for the possibility of sporadic discharges during the summer season associated with rainfall events or to provide minimum flow for fish. EPA disagrees that changes to the existing summer season discharge prohibition are warranted. EPA believes that the seasonal pattern in algae growth observed in the watershed indicates a need for more stringent nutrient controls during the summer season and some nutrient loading reductions during the winter season.*

P. 38. As noted previously, the Effluent Irrigation/Sludge category in Tables 29 and 30 needs to be split into the unique situation at the Rancho farm and the general category of effluent irrigation. Each situation is different.

EPA Response: *The information needed to differentiate the different categories of effluent irrigation is provided in Tables 18 and 19. There is no need to split the categories again in Tables 29 and 30*.

Page 40. The TMDL is incorrect that 8 mg/l TN is the existing numeric limit in the Tapia NPDES permit. This limit applies only to Tapia's discharge to the L.A. River. The current limit for discharges to Malibu Creek is 10 mg/l nitrate, based on the MUNI drinking water standard. The 8 mg/l limit was applied briefly to Tapia's discharges to Malibu Creek, but this limit was rescinded by the SWRCB in 2000 because there was no evidence in the record to support it.

EPA Response: *We have edited the TMDL accordingly. However, the winter time concentration waste load allocation of 8 mg/l was not changed because EPA remains convinced that a margin of safety is needed to help ensure that winter season algae growth is addressed.*

Because discharges from Tapia are minor and sporadic in the summer, it may be more appropriate to use a monthly maximum mass load rather than monthly average concentration. Rain events in the summer are unusual and unpredictable, and their occurrence hinders the ability to sell recycled water for irrigation, thus requiring occasional

direct discharges from Tapia. These occasional discharges have no appreciable impact on average monthly nutrient loads or concentrations downstream, as they are of short duration and coincide with increased creek flows which dilute concentrations and limit residence time in the creek.

EPA Response: *The waste load allocations for Tapia have been modified to account for the possibility of sporadic discharges during the summer season associated with rainfall events or to provide minimum flow for fish.*

P. 41. As noted previously, land injection of biosolids continues to occur at low loading rates, however, the crop uptake of nitrogen always exceeds the input of nitrogen from biosolids and effluent irrigation, as calculated by EPA 503 regulations.

EPA Reponse: *If indeed there is no excess nitrogen being loaded to the river then no additional reductions would be needed*.

p. 43. In the 2nd paragraph, the TMDL should more clearly explain the rationale for winter limits. Specifically, the less stringent targets are warranted not only because of the uncertainty of the nutrient-algal linkage, but also because there is scant evidence, despite much data, of algal impairments in winter. It is primarily a summer phenomenon. Also, none of the sites with some indication of winter impairment are below Tapia, which should therefore not be required to meet a winter limit, or if it is, then the TMDL should acknowledge this as yet an additional margin of safety.

Also in the 2nd paragraph, the TMDL should also be clearer that it recognizes that the 10 mg/l numeric objective in the Basin Plan derives from the MUNI beneficial use designation. Otherwise, it opens itself to the criticism that the 8 mg/l standard has nothing to do with aquatic life or the narrative biostimulatory substances objective. It is solely to ensure that the MUNI use is met. The paragraph says this in so many words, but respectfully, in our view it can be easily misinterpreted as written.

EPA Response: *The Basin Plan clearly states that 10 mg/l Nitrate-N is the surface water quality standard and suggests it is set in part to help prevent excess aquatic growth. EPA disagrees that there is no evidence of algae growth problems upstream and downstream from the Tapia discharge*.

In the 3rd paragraph, the TMDL should acknowledge that rain events and sporadic scour flows also occur in the summer and late fall. Rain gage data maintained by the district show that such events occur at least once every year. This acknowledgement is important, because otherwise the district's exception for rain events during the prohibition period may be at risk. Also important is the fact that the TMDL's definition of summer's end is very conservative with respect to algal growth. A more reasonable date would be October 15th, because days are getting rapidly shorter and algae are no longer growing at summer rates, and thus are not nutrient limited (CH2Mhill, 2000). If November 15th is retained in the TMDL, then the additional safety margin of this factor should be explicitly acknowledged.

EPA Response: *The waste load allocations for Tapia have been modified to acknowledge that the waste discharge requirements for Tapia allows occasional discharges in the summer season associated with rainfall events or to provide minimum flow for fish. This*

acknowledgement indicates that these sporadic summer season discharges do not result in water quality standard violations.

P. 44. Minor typo in 1st paragraph, top of page: 2nd "and" should be "an."

EPA Response: *The text has been edited*.

P. 45. Regarding Tapia discharges, regulatory finality is needed. In 1984 tertiary filters were installed at a cost over $10 million as a condition of our permit to year-round discharge. Also at this time a commitment to water recycling was made and over $50 million of pumps, pipes and tanks distribute irrigation water throughout our community. This TMDL will require a further investment of $18 million to provide nitrification/denitrification facilities at Tapia to meet winter nitrogen limits of 8 MG/L. However, these investments may be for naught when regulations identify implementation measures that are only tentative and may require "further reductions". Recent Master Plan studies by Montgomery Watson Engineers identify facilities costing $88 million to meet year round nitrogen and phosphorus standards of 2.5 mg/L and 0.4 mg/L. They also identify abandonment of the $18 million nitrification / denitrification plant as the only way to make space to build the $88 million facilities. The district must commit to build facilities to meet reasonable regulations that improve the environment, however we must have reasonable certainty.

EPA Response: *We recognize the issues associated with uncertainty. We note that this request for certainty may be in conflict with the commenter's support for a phased approach. We do not believe it is warranted at this time to require winter time reductions of 1 mg/l for TN and 0.1 mg/l for TP. We do believe it is important for Tapia to meet the existing standard of 10 mg/l. This is in the existing permit. We also believe it is important that the water quality in the winter time be no greater than the 8 mg/l target being established in the TMDL. We recommend the commenter discuss the concept of a phased implementation plan with the Regional Board*.

Note "used" should be "usage" under effluent irrigation.

EPA Response: *The text has been edited*.

p. 46. While we take issue with the load allocations for recycled water irrigation, we appreciate the acknowledgement here that it is impractical to expect 100% crop uptake of nutrients applied via irrigation. However, this statement cannot be reconciled with the load allocations in the TMDL, which call for 90-100% reductions in nutrients from these sources. Clearly this issue needs to be revisited before implementation of any requirements.

EPA Response: *EPA is setting the final load allocation for application of reclaimed water at zero because the existing waste discharge requirement that regulates reclaimed water application requires that "reclaimed water shall be applied at such a rate and volume as not to exceed vegetative and soil moisture conditions". We have edited the text to delete the statement that 100% of crop uptake may be impractical. Based on discussions with the State and reviews of the waste discharge requirements, we believe it is feasible to apply reclaimed water in a manner which ensures that nutrients do not reach surface waters*.

p. 48. A fourth study should be added to better define the actual degree of linkage between effluent irrigation and creek nutrients. This study should include monitoring of shallow

groundwater wells strategically located between irrigation sites and local creeks and lakes and sites without irrigation. The model used to identify effluent irrigation as a major source was based almost entirely on non-site specific values for plant uptake, soil retention, groundwater hydraulics, etc.. Furthermore, what data do exist to independently test the TMDL's assumptions generally shows the loads attributed to this source are grossly overstated, far beyond what can reasonably fit within a "margin of safety" argument. This watershed has no local water resources, and depends on recycled water. Such an important issue should not rest on untested assumptions.

EPA Response: *We encourage the stakeholders to participate in such a study. These could be considered by the Regional Board in future TMDL reviews or revisions*.