California Regional Water Quality Control Board
Santa Ana Region

April 21, 2006

Item: **15**

Subject: **Supplemental Staff Report: Proposed Basin Plan Amendment – Incorporation of a Nutrient Total Maximum Daily Load for Dry Hydrological Conditions for Big Bear Lake – Resolution No. R8-2006-0023**

On January 17, 2006, staff made available for public review a staff report that includes a discussion of proposed changes to the draft Big Bear Lake Nutrient total maximum daily loads (TMDLs) that were presented at a public workshop on August 26, 2005. Since the release of the January 17, 2006 staff report, staff has received input from the USEPA and from Risk Sciences, Inc., representing the Big Bear Municipal Water District, San Bernardino County, San Bernardino County Flood Control District, the City of Big Bear Lake, California Department of Transportation (Cal Trans) and Big Bear Mountain Resorts, that warrants additional changes to the proposed TMDLs. Risk Sciences, Inc., does not represent the USFS, and staff anticipates that the USFS will offer additional comments prior to or at this public hearing. The need for further changes will have to be assessed at that time. This supplemental report describes additional changes that have been made to the proposed Basin Plan amendment in response to the additional comments received to date. These changes are shown in the Errata Sheet for the proposed Basin Plan amendment (Attachment to Resolution No. R8-2006-0023).

In summary, the significant proposed additional changes are:

1. Deletion of the proposed numeric target for nitrogen and the TMDL, WLAs and LAs for nitrogen for Big Bear Lake.
2. Addition of text in Section 1 of the Basin Plan Amendment ("Big Bear Lake Nutrient TMDLs") and in Section 1. B.3. ("Seasonal Variation/Critical Conditions") that explains that, since the TMDL for dry hydrological conditions was developed to meet the numeric targets under the critical, worst-case conditions, consistent compliance with these targets is expected to be achieved even in the absence of TMDLs for wet/average hydrological conditions, given the greater lake volume and dilution anticipated under wetter conditions.
3. Addition of a footnote to Table 5-9a-c noting that compliance dates for the TMDL targets for wet and/or average hydrological conditions are subject to change, based on approved TMDLs for these conditions.
4. Addition of a footnote to Task 1.2 that indicates that individual waste discharge requirements or a conditional waiver of waste discharge requirements for the Big Bear Mountain Resorts would not be necessary, provided that adequate regulatory coverage is provided by the San Bernardino County MS4 permit.
5. Revision of Finding No. 10 of Resolution No. R8-2006-0023 to acknowledge that reducing phosphorus is one of the potential methods to ensure compliance with relevant numeric and narrative water quality objectives specified in the Basin Plan. Text has also been added to describe the approach that will be used to address nitrogen, which is a limiting nutrient under certain circumstances. This

language is also included in Section 1. A. "Numeric Targets" of the Basin Plan amendment.

6. Addition of text to Finding No. 14 of Resolution No. R8-2006-0023 specifying that external load dischargers are responsible for reducing their internal nutrient loads.
7. Revision of Finding No. 31 of Resolution No. R8-2006-0023 to acknowledge that the Basin Plan Amendment becomes effective upon approval by OAL.
8. Revision of the macrophyte coverage target from 30-60% to 30-40% of the whole lake area.

Each of these changes is discussed below.

Deletion of the proposed numeric target for nitrogen and the TMDL, WLAs and LAs for nitrogen for Big Bear Lake

Staff of the USEPA indicated via teleconference on February 16, 2006 and via letter dated February 23, 2006 that they would not approve the proposed Basin Plan amendment, as released to the public on January 17, 2006, if the matter of the attainability of the proposed numeric target and TMDL for nitrogen was not addressed. The USEPA letter identified several alternative actions that could be taken.

Regional Board staff initially proposed numeric targets for nitrogen as well as phosphorus because both nutrients have been found to limit algae at different times and because both nutrients are available to floating plants such as coontail. The basis for USEPA's concern is that Board staff had not identified any means whereby the proposed nitrogen target would be achieved (a problem that staff attributes to model limitations). USEPA believes that, absent an identified mechanism whereby compliance with the nitrogen target can be assured, the TMDL would not satisfy all relevant requirements and could not be approved. USEPA suggested that, since phosphorus appears to be the primary nutrient of concern, as indicated in the proposed Basin Plan Amendment, it would be appropriate to reserve action on nitrogen pending further data collection and analyses and a demonstration that the selected target is attainable. In response, Board staff propose the deletion of the proposed numeric target, TMDL, WLAs and LAs for nitrogen. However, the proposed amendment continues to include requirements for the collection of nitrogen data, which will be used to assess the need for and nature of revisions to the TMDL to include nitrogen targets, TMDL, etc., and to assess compliance with the established Total Inorganic Nitrogen objective for Big Bear Lake (see below). The proposed Basin Plan amendment has also been revised to include language describing this nitrogen regulatory approach (see below).

Addition of text regarding compliance with the numeric targets under wet/average hydrologic conditions

Staff of USEPA expressed concern that while the proposed numeric targets are intended to apply under all hydrologic conditions, the proposed TMDLs address only the dry conditions. USEPA questioned whether the TMDLs could be approved absent a demonstration that the targets would be met consistently without reductions in external loads that occur principally during average/wet conditions. In response, language has been added to the discussion of the Big Bear Lake Nutrient TMDL in Section 1 of the Basin Plan Amendment and to the discussion of seasonal variation/critical conditions

(Section 1. B. 3 of the Amendment) to clarify Board staff's expectation that, since the proposed TMDL was developed to address the worst-case, critical conditions of dry periods, the targets are also expected to be met at other times, when there is additional inflow to Big Bear Lake and the volume of the lake and dilution are increased. Anderson and Wakefield-Schmuck (2006) note that "the observed increase in total N and P in Big Bear Lake from 2002-2004 is consistent with the lowered lake level and reduced volume" and that "the reduction of about 1 m in mean lake depth would be expected to yield a 22% increase in TN and TP concentration." Staff believes that control actions necessary to address internal loading of nutrients will address external loads on an immediate basis, without requirements for external load reductions, given that nutrient fluxes appear to result from mineralization/release from surficial material, not deeper sediments. This is not to say that future average/wet condition TMDLs will not require external load reductions. Such reductions will likely be necessary to reduce the magnitude, cost, etc., of control actions necessary to reduce internal loads over the long-term.

Addition of a footnote to Table 5-9a-c noting that compliance dates for the TMDL targets under wet and/or average hydrological conditions are subject to change based on approved TMDLs for these conditions

Risk Sciences, Inc., indicates that a compliance date for the targets under wet and/or average hydrological conditions cannot be approved until a TMDL and implementation plan are available to know what is required to comply. Regional Board staff added a footnote to Table 5-9a-c, wherein compliance dates are specified, to state that the dates shown for the wet/average hydrologic conditions are subject to change based on approved TMDLs for those conditions.

Addition of a footnote to Task 1.2 regarding permit coverage for the Big Bear Mountain Resorts

Task 1.2 requires that individual waste discharge requirements (WDRs), or a conditional waiver of WDRs, be issued for the Big Bear Mountain Resorts to incorporate nutrient allocations, compliance schedules and monitoring and reporting requirements.

Snow Summit Ski Corporation submitted comments to Regional Board staff noting that most of the ski resort acreage is either within USFS lands or within the city limits of Big Bear Lake and that they were already regulated by these entities, as well as San Bernardino County (see Comment #18 of Attachment B –Response to Comments). Staff responded that individual WDRs (or a conditional waiver therefrom) are necessary since neither the City of Big Bear Lake, San Bernardino County nor San Bernardino County Flood Control Distirict could assert comprehensive jurisdiction over discharges from the Resorts pursuant to the MS4 permit, given that portions of Snow Summit and Bear Mountain ski resorts are within Forest Service lands.

During a meeting on February 14, 2006 Snow Summit Ski Corporation raised this issue again, and the County of San Bernardino, the San Bernardino County Flood Control District and the City of Big Bear Lake were not clear about their authority to regulate all the ski resorts discharges from federal and non-federal lands and noted they would have to check with their legal counsel. Staff added a footnote to Task 1.2 to indicate that,

provided that the MS4 permit is found to provide adequate regulatory coverage, then separate WDRs would not be necessary for the Big Bear Mountain Resorts. Staff notes that confirmation of jurisdiction is not likely to be available prior to the April 21, 2006 hearing.

Revision of Finding No. 10 of Resolution No. R8-2006-0023 and Section 1. A "Numeric Targets" to acknowledge that reducing phosphorus is one of the potential methods to ensure compliance with relevant numeric and narrative water quality objectives specified in the Basin Plan and to describe the regulatory approach for nitrogen.

Risk Sciences, Inc., indicates that there are other lake management strategies that can be implemented to achieve compliance with the response targets (e.g., chlorophyll *a*) without necessarily reducing phosphorus concentrations. Board staff have revised Finding No. 10 of Resolution No. R8-2006-0023 to specify that a reduction in phosphorus is one of the potential methods to ensure compliance with relevant numeric and narrative water quality objectives specified in the Basin Plan. In addition, in response to the proposed deletion of the nitrogen targets, TMDLs, WLAs and LAs (see above), staff proposes new language in both Finding No. 10 and in Section 1. A. "Numeric Targets" of the proposed Basin Plan Amendment to acknowledge that nitrogen can be the limiting nutrient under certain circumstances, but that data and analytical limitations preclude the identification of achievable targets, TMDLs, etc., at this time. The revised text explains that nitrogen monitoring is required and that the data collected will be used to support future revision of the TMDL to incorporate nitrogen targets, etc., as necessary and appropriate.

Addition of text to Finding No. 14 of Resolution No. R8-2006-0023 specifying that external load dischargers are responsible for reducing their internal nutrient loads

On behalf of stakeholders, Risk Sciences, Inc., requested that language be added to clarify that dischargers responsible for external loading of nutrients to Big Bear Lake would be responsible for reducing their contributions to the internal nutrient load in the lake. This language has been added to Finding No. 14 of Resolution No. R8-2006-0023.

Revision of Finding No. 31 of Resolution No. R8-2006-0023 to acknowledge that the Basin Plan Amendment becomes effective upon approval by OAL

The Alaska Rule (an amendment to 40 CFR 131.21(c) through (f)) specifies that Basin Plan amendments that entail the revision of water quality standards are not considered in effect unless and until approved by USEPA. The proposed TMDL does not revise water quality standards and, consequently, would become effective after OAL approval. Finding No. 31 of Resolution No. R8-2006-0023 has been corrected to reflect this.

Revision of the macrophyte coverage target from 30-60% to 30-40% of the whole lake area

On behalf of stakeholders, Risk Sciences, Inc., requested that the percent macrophyte coverage target be changed from 30-60% on a whole lake basis to 10-30% of the littoral zone, as recommended in the final report by Leidy (Leidy, 2006). As described in detail

in the response to Risk Sciences' comment (see Comment #3 of Response to Comments received after January 17, 2006), staff is not persuaded of the merits of this recommendation for a number of reasons. Briefly, the area of the littoral zone is difficult to define; use of a percentage of the lake as whole would be easier (Anderson, 2006). In addition, Leidy's recommendation is focused on the protection of fisheries, but does not appear to take into consideration the potential effects of his recommended reduction in coverage on water quality and all the lake's beneficial uses. For example, data collected after the application of herbicides in 2002 and 2003 to reduce nuisance macrophytes (Eurasian milfoil and coontail) demonstrated significant increases in water column nutrient concentrations and chlorophyll *a,* leading to and reflective of the excessive algae blooms that occurred after the herbicide treatment and prior to the alum treatment. Excessive algae can result in adverse impacts to recreational and wildlife beneficial uses.

While staff does not recommend the approach suggested by Leidy or Risk Sciences, Inc., we do believe that it is appropriate to revise the macrophyte coverage to 30-40% on a whole lake basis. This is based on the review and consideration of additional relevant information, including literature cited by Leidy (2006) and others (Anderson, 2006; Petr, 2000; Schneider, 2000). It appears that 30-40 % macrophyte coverage is within the range of values identified as optimal. It should be emphasized that as part of the development of the lake management plan, which is required by the proposed TMDL implementation plan, this and other targets are subject to review and revision.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) REQUIREMENTS

The basin planning process has been certified by the Secretary of Resources as functionally equivalent to the requirement for the preparation of an Environmental Impact Report or Negative Declaration. The Regional Board is required to complete an environmental assessment of any changes the Board proposes to make to the Basin Plan. Staff prepared an Environmental Checklist (Attachment B to the June 2005 TMDL Report) and revised it in the January 17, 2006 Staff Report (Attachment C), determining that there would be no significant adverse environmental impacts from the proposed Basin Plan Amendment. Staff has reviewed the environmental checklist in light of the proposed changes to the Basin Plan amendment/TMDL discussed above. No changes to the environmental checklist are warranted; the staff determination that there would be no adverse environmental impacts from the proposed amendment remains valid, provided mitigation measures are implemented.

Staff Recommendation

Adopt Resolution No. R8-2006-0023, amending Chapter 5 of the Basin Plan to incorporate the Nutrient TMDL for Dry Hydrological Conditions for Big Bear Lake shown in the Attachment to the Resolution, as amended by Errata Sheet No. 1.

References:

Anderson, M.A. 2006. E-Mail correspondence with author, 8, 9 March. Riverside, CA.

Anderson, M. A. and J. Wakefield-Schmuck. 2006. *Internal Recycling in Big Bear Lake: 2005.* Final Report to the Big Bear Municipal Water District. 20 pp.

Leidy, Roy. 2006. *Prehistoric and historic environmental conditions in Bear Valley, San Bernardino County, California.* Final report prepared for Risk Sciences. Sacramento, CA: EIP Associates.

Petr. T. 2000. Interactions between fish and aquatic macrophytes in inland waters. A review. *FAO Fisheries Technical Paper.* No. 396. Rome, FAO. 185p.

Schneider, J.C. 2000. *Evaluation of the effects of the herbicide Sonar on sport fish populations in Michigan lakes.* Fisheries Technical Report No. 2000-2. Ann Arbor, MI: Michigan Department of Natural Resources.

ERRATA SHEET No. 1

CHANGES TO RESOLUTION NO. R8-2006-0023

Language added to the Resolution released publicly on January 17, 2006 is **underlined and bold**, language deleted is shown as ~~strike-through~~

Resolution title

Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate a Nutrient Total Maximum Daily Loads (TMDLs) for Dry Hydrological Conditions for Big Bear Lake

Finding #7 of Resolution No. R8-2006-0023

7. Big Bear Lake's designated beneficial uses adversely impacted by nuisance aquatic plants and low dissolved oxygen levels include COLD, WARM, WILD, REC1, REC2, and RARE.

Finding #8 of Resolution No. R8-2006-0023

8. As a result of the beneficial use impacts to Big Bear Lake, the Regional Board listed Big Bear Lake as water quality limited in accordance with Section 303(d) of the Clean Water Act. Section 303(d) requires the establishment of a Total Maximum Daily Load (TMDL) for the pollutant(s) causing the impairment. Phosphorus ~~and nitrogen~~ isare the principal nutrients causing the impairment. Section 303(d) also requires the allocation of the TMDL among the sources of nutrient inputs. State law requires an implementation plan and schedule to ensure that the TMDL is met and that compliance with water quality standards is achieved.

Finding #9 of Resolution No. R8-2006-0023

9. The Basin Plan amendment shown in the attachment to this Resolution was developed in accordance with Clean Water Act Section 303(d) and Water Code Section 13240 *et seq*. The amendment is proposed for incorporation into Chapter 5 "Implementation", of the Basin Plan. The proposed Basin Plan amendment includes background information concerning the water quality impairment being addressed and the sources of nutrients to Big Bear Lake. The proposed TMDLs isare supported by a detailed report prepared by Regional Board staff and titled "Staff Report on the Nutrient Total Maximum Daily Loads for Big Bear Lake", June 2005 (hereinafter, "TMDL Report").

Finding #10 of Resolution No. R8-2006-0023

10. The Basin Plan amendment specifies a numeric targets for total phosphorus, ~~and total nitrogen~~. Control of ~~nitrogen and~~ phosphorus is one of the potential methods ~~needed~~ to ensure compliance with relevant numeric and narrative water quality objectives specified in the Basin Plan, and to prevent adverse beneficial use impacts resulting from the proliferation of nuisance aquatic plants. There is evidence that nitrogen is the limiting nutrient under certain circumstances and that control of nitrogen inputs may be an additional method to address beneficial use impairment in Big Bear Lake. However, due to data and analytical model limitations, it is infeasible to identify an appropriate and achievable nitrogen TMDL, targets and wasteload and load allocations at this time. The Basin Plan amendment requires

the collection and evaluation of nitrogen data that will support future revision of the TMDL, if and as necessary.

Finding #11 of Resolution No. R8-2006-0023

11. The Basin Plan amendment specifies response numeric targets for chlorophyll *a,* macrophyte coverage and percentage of nuisance aquatic vascular plant species for Big Bear Lake. These response numeric targets provide a method to track improvements in water quality resulting from reductions in the loading of ~~nitrogen and~~ phosphorus.

Finding #13 of Resolution No. R8-2006-0023

13. The Basin Plan amendment specifies a TMDLs, wasteload allocations for point source discharges (WLAs), load allocations for nonpoint source discharges (LAs) for total phosphorus ~~and total nitrogen~~ for Big Bear Lake for Dry Hydrological Conditions only.

Finding #14 of Resolution No. R8-2006-0023

14. The TMDLs for Dry Hydrological Conditions specifies~~y~~ a reduction in ~~nitrogen and~~ phosphorus from internal nutrient sources, which are lake sediment and macrophytes. External load dischargers are responsible for reducing their contributions to the internal nutrient loads.

Finding #15 of Resolution No. R8-2006-0023

15. The TMDLs for Dry Hydrological Conditions does not specify nutrient reductions from external watershed sources, which include resorts, urban discharges and open space/forested lands.

Finding #16 of Resolution No. R8-2006-0023

16. The Basin Plan amendment specifies an implementation plan for nutrient reduction. The implementation plan includes compliance schedules for the numeric targets, TMDLs, wasteload allocations and load allocations, as well as a monitoring program to track progress toward compliance.

Finding #21 of Resolution No. R8-2006-0023

21. Review of the potential environmental impacts of the adoption and implementation of the Big Bear Lake Nutrient TMDLs was conducted. The adoption of the TMDLs would have no direct effect on the environment. The implementation of projects that may be conducted to implement the Nutrient TMDLs is expected to have less than significant impacts or less than significant impacts with application of mitigation measures on the following: air quality, biological resources, hazards and hazardous materials, hydrology and water quality, noise, aesthetics and transportation and traffic. As projects to implement the TMDLs are developed, specific environmental impacts and mitigation measures to address those impacts are subject to thorough and separate evaluation pursuant to the California Environmental Quality Act (CEQA).

Finding #23 of Resolution No. R8-2006-0023

23. The adoption of thisese TMDLs is necessary to reduce loadings of nutrients to Big Bear Lake and to address water quality impairments that arise therefrom.

Finding #27 of Resolution No. R8-2006-0023

27. The Regional Board discussed this matter at a workshop conducted on August 26, 2005 after notice was given to all interested persons in accordance with Section 13244 of the California Water Code. Based on the discussion at those workshops, the Board directed staff to prepare the appropriate Basin Plan amendment and related documentation to incorporate the Big Bear Lake Nutrient TMDLs.

Finding #31 of Resolution No. R8-2006-0023

31. The Basin Plan amendment must be submitted for review and approval by the State Water Resources Control Board (SWRCB), Office of Administrative Law (OAL) and U.S. Environmental Protection Agency (USEPA). Once approved by the SWRCB, the amendment is submitted to OAL and USEPA. The Basin Plan amendment will become effective upon approval by OAL ~~and USEPA.~~ A Notice of Decision will be filed.

Finding #33 of Resolution No. R8-2006-0023

33. For the purposes of specifying compliance schedules in NPDES permits for effluent limitations necessary to implement thisese TMDLs, the schedule(s) specified in thisese TMDLs shall govern, notwithstanding other compliance schedule authorization language in the Basin Plan.

CHANGES TO ATTACHMENT TO RESOLUTION NO. R8-2006-0023

(Language added to the proposed Basin Plan amendment released publicly on January 17, 2006 is **underlined and bold**, language deleted is shown as ~~strike-through~~)

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Initial TMDL development efforts were focused on nutrients, leading to Regional Board adoption of a nutrient TMDLs for dry hydrological conditions for Big Bear Lake in 2006. Nutrient TMDLs for wet and/or average hydrological conditions will be incorporated in the Basin Plan when these TMDLs are developed in the future. As shown in Table 5-9a-f, the development of these TMDLs is a requirement of the adopted TMDL implementation plan for the nutrient TMDLs for dry hydrological conditions.

Past studies, starting in 1968/1969, have shown that Big Bear Lake is moderately eutrophic and that the limiting nutrient is generally phosphorus.

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As stated above, development of nutrient TMDLs to address these problems was initiated in 2000. In this process, it was recognized that insufficient data for wet or average hydrological conditions were available to allow calibration of the lake water quality model used to calculate the TMDLs. Accordingly, a TMDLs ~~was~~were developed to address dry hydrologic conditions only (see Section 1.B., below). This~~e~~ TMDLs was~~ere~~ adopted by the Regional Board in 2006 and became effective on [date]. The implementation plan included with this~~e~~ TMDLs specifies a requirement for the development of nutrient TMDLs for wet and/or average hydrological conditions.

A key step in the development of the nutrient TMDLs was the identification of the numeric targets to be achieved. The numeric targets, identified in Section 1.A., below, do not vary based upon hydrological condition. Like the approved TMDLs for dry hydrological conditions, the TMDLs for wet and/or average hydrological conditions that will be developed are expected to assure also that these numeric targets are achieved. Indeed, since the TMDL for dry hydrological conditions was developed to meet the targets under the critical, worst-case conditions, consistent compliance with these targets is expected to be achieved even in the absence of TMDLs for wet/average hydrological conditions, given the greater lake volume and dilution anticipated under wetter conditions.~~;~~ It is recognized that future ~~unless~~ modifications to the targets may be found necessary.~~are demonstrated to be necessary and appropriate.~~

1.A. Numeric Targets

As shown in Table 5-9a-c, both "causal and response" numeric targets are specified for Big Bear Lake. The c~~C~~ausal targets is~~are~~ ~~those~~ for phosphorus.~~, and nitrogen, the principal nutrients responsible for plant growth~~. Phosphorus is the primary limiting nutrient in Big Bear Lake.[1]~~, and nitrogen can be a limiting nutrient under certain conditions~~. Response targets include macrophyte coverage, percentage of nuisance aquatic vascular plant species and chlorophyll *a* concentrations. These response targets are more direct indicators of

[1] There is evidence that nitrogen is a limiting nutrient under certain conditions. However, given data and analytical limitations, no nitrogen targets are specified. Nitrogen monitoring is required as part of this TMDL. The data will be used to specify nitrogen targets in the future, as warranted.

impairment and are specified to assess and track water quality improvements in Big Bear Lake.

A weight of evidence approach will be used to assess compliance with the TMDLs, which means that data pertaining to all the numeric targets will be evaluated and non-compliance with one target will not automatically imply non-compliance with the TMDLs.

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Table 5-9a-c
Big Bear Lake Nutrient TMDL Numeric Targets[a]

Indicator	Target Value
Total P concentration	Annual average[b] no greater than 35 µg/L; to be attained no later than 2015 (dry hydrological conditions~~season~~), 2020 (all other times)[c]
~~Total N concentration~~	~~Annual average[b] no greater than 1000 µg/L; to be attained no later than 2015 (dry season), 2020 (all other times)~~
Macrophyte Coverage	30-~~4~~60% on a total lake area basis; to be attained by 2015 (dry hydrological conditions~~season~~), 2020 (all other times) [c,d]
Percentage of Nuisance Aquatic Vascular Plant Species	95% eradication on a total area basis of Eurasian Watermilfoil and any other invasive aquatic plant species; to be attained no later than 2015 (dry hydrological conditions~~season~~), 2020 (all other times) [c, d]
Chlorophyll *a* concentration	Growing season[~~d~~e] average no greater than 14 µg/L; to be attained no later than 2015 (dry hydrological conditions~~season~~), 2020 (all other times)[c]

[a] Compliance with the targets to be achieved as soon as possible, but no later than the date specified

[b] Annual average determined by the following methodology: the nutrient data from both the photic composite and discrete bottom samples are averaged by station number and month; a calendar year average is obtained for each sampling location by averaging the average of each month; and finally, the separate annual averages for each location are averaged to determine the lake-wide average. The open-water sampling locations used to determine the annual average are MWDL1, MWDL2, MWDL6, and MWDL9 (see 1.B.4. Implementation, Task 4.2, Table 5-9a-i).

[c] Compliance date for wet and/or average hydrological conditions may change in response to approved TMDLs for wet/average hydrological conditions.~~is subject to confirmation by when TMDLs are developed for these conditions.~~

[d~~e~~] Calculated as a 5-yr running average based on measurements taken at peak macrophyte growth as determined in the Aquatic Plant Management Plan (see 1.B.4. Implementation, Task 6C)

[e~~d~~] Growing season is the period from May 1through October 31 of each year. The open-water sampling locations used to determine the growing season average are MWDL1, MWDL2, MWDL6 and MWDL9 (see 1.B.4. Implementation, Task 4.2, Table 5-9a-i). The chlorophyll *a* data from the photic samples are averaged by station number and month; a growing season average is obtained for each sampling location by averaging the average of each month; and finally, the separate growing season averages for each location are averaged to determine the lake-wide average.

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1.B. Big Bear Lake Nutrient Total Maximum Daily Loads (TMDLs) for Dry Hydrological Conditions

The TMDL technical report [Ref. #1] describes in detail the technical basis for the TMDLs for Dry Hydrological Conditions that follow.

1.B.1. Nutrient TMDLs, WLAs and LAs and Compliance Dates – Dry Hydrological Conditions

A TMDLs, and the WLAs and LAs necessary to achieve it~~them~~, are established for total phosphorus ~~and total nitrogen~~ for dry hydrological conditions only.

The phosphorus ~~and nitrogen~~ TMDLs for Big Bear Lake for dry hydrological conditions is~~are~~ shown in Table 5-9a-d.

Table 5-9a-d

Big Bear Lake Nutrient TMDLs for Dry Hydrological Conditions

	Total Phosphorus (lbs/yr) [b]	~~**Total Nitrogen (lbs/yr)**~~ [b]
TMDL[a]	26,012	~~280,900~~

[a] Compliance to be achieved as soon as possible, but no later than December 31, 2015.

[b] Specified as an annual average for dry hydrological conditions only.

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Table 5-9a-e

Big Bear Lake
~~Nitrogen and~~ Phosphorus Wasteload and Load Allocations for Dry Hydrological Conditions

Big Bear Lake Nutrient TMDL for Dry Hydrological Conditions ~~Nutrient TMDLs~~	**Total Phosphorus Load Allocation (lbs/yr)[a, b]**	**~~Total Nitrogen Load Allocation (lbs/yr)[a, b]~~**
TMDL	**26,012**	**~~280,900~~**
WLA	**475**	**~~3,445~~**
Urban	475	~~3,445~~
LA	**25,537**	**~~277,455~~**
Internal Sediment	8,555	~~152,386~~
Internal macrophyte	15,700	~~102,324~~
Atmospheric Deposition	1,074	~~21,474~~
Forest	175	~~460~~
Resort	33	~~811~~

[a] Allocation compliance to be achieved as soon as possible, but no later than December 31, 2015.

[b] Specified as an annual average for dry hydrological conditions only.

1.B.2. Margin of Safety

The Big Bear Lake Nutrient TMDLs for Dry Hydrological Conditions includes an implicit margin of safety (MOS) as follows:

1.B.3. Seasonal Variations/Critical Conditions

This~~e~~ nutrient TMDL~~s~~ for Big Bear Lake is~~are~~ focused on the critical dry hydrological conditions and, in particular, on the control of the internal sediment loads that dominate during these periods. This~~e~~ is~~are~~ the first phase of TMDLs needed to address

eutrophication in Big Bear Lake. The next phase will include collection of data needed to refine the in-lake and watershed models (see 1.B.4. TMDL Implementation, Task 6A) and to develop TMDLs that address other hydrological conditions (see 1.B.4. TMDL Implementation, Task 9). TMDLs for wet and average hydrological conditions will be developed to address external loading that contributes to the nutrient reservoir in the lake and thus eutrophic conditions, particularly during the critical dry periods. However, it is important to note again that since the TMDL for dry hydrological conditions was developed to meet the numeric targets under the critical, worst-case conditions, consistent compliance with these targets is expected to be achieved even in the absence of TMDLs for wet/average hydrological conditions, given the greater lake volume and dilution anticipated under wetter conditions.

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The TMDLs recognizes that different nutrient inflow and cycling processes dominate the lake during different seasons. These processes were simulated in the in-lake model using data collected during all seasons over a multi-year period. Thus, the model results reflect all seasonal variations. The phosphorus numeric targets ~~is~~are expressed as an annual average, while the chlorophyll *a* target is expressed as a growing season averages. The intent is to set targets that will, when achieved, result in improvement of the trophic status of ~~the~~ Big Bear Lake year-round.

1.B.4. TMDL Implementation

Table 5-9a-f outlines the tasks and schedules to implement the TMDLs for Dry Hydrological Conditions. Each of these tasks is described below.

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Table 5-9a-f

Big Bear Lake Nutrient TMDL Implementation
Plan/Schedule Report Due Dates

Task	Description	Compliance Date-As soon As Possible but No Later Than
TMDL Phase 1		
Task 1	Establish New Waste Discharge Requirements for Nutrient Sources	*(*6 months after BPA approval*)*
Task 2	Establish New Waste Discharge Requirements for Lake Restoration Activities	*(*18 months after BPA approval*)*
Task 3	Revise Existing Waste Discharge Requirements	*(*6 months after BPA approval*)*

Task 4	Nutrient Water Quality Monitoring Program 4.1 Watershed-wide Nutrient Monitoring Plan(s) 4.2 Big Bear Lake Nutrient Monitoring Plan(s)	Plan/schedule due *(*3 months after BPA approval*)* Annual reports due February 15
Task 5	Atmospheric Deposition Determination	Plan/schedule due *(*1 year after BPA approval*)*
Task 6	Big Bear Lake – Lake Management Plan, including: 6A. Big Bear Lake and Watershed Model Updates 6B. Big Bear Lake In-Lake Sediment Nutrient Reduction Plan 6C. Big Bear Lake Aquatic Plant Management Plan	Plan/schedule due *(*1 year after BPA approval*)* Annual reports due February 15
TMDL Phase 2		
Task 7	Review/Revision of Big Bear Lake Water Quality Standards 7.1 Review/Revise Nutrient Water Quality Objectives 7.2 Development of biocriteria 7.3 Development of natural background definition	December 31, 2015
Task 8	Review Big Bear Lake Tributary Data	December 31, 2008
Task 9	Develop TMDLs, WLAs and LAs for wet and/or average hydrological conditions	December 31, 2012
Task 10	Review of TMDLs/WLAs/LAs	Once every 3 years

[Note: BPA => Basin Plan Amendment

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Task 1: Establish New Waste Discharge Requirements for Nutrient Sources

1.1 Waste Discharge Requirements (WDRs) or Conditional Waiver of WDRS to the Big Bear Mountain Resorts to incorporate the nutrient load allocations, compliance schedule and monitoring and reporting requirements.[2]

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[2] The Regional Board may find that for regulatory purposes, including those of this TMDL, the Big Bear Mountain Resorts are under the jurisdiction of San Bernardino County and/or the City of Big Bear Lake and are or can be appropriately addressed by the terms and conditions of the MS4 permit issued for San Bernardino County (see Task 3, 3.1). Where necessary, appropriate changes to the MS4 permit to assure appropriate regulatory coverage can be considered. Under these circumstances, individual waste discharge requirements or a conditional waiver therefrom for the Big Bear Mountain Resorts would not be necessary.

Task 4: Monitoring

4.1 Watershed-wide Nutrient Water Quality Monitoring Program

No later than (**3 months from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake and Big Bear Mountain Resorts shall, as a group, submit to the Regional Board for approval a proposed watershed-wide nutrient monitoring program that will provide data necessary to review and update the Big Bear Lake Nutrient TMDLs, to determine specific sources of nutrients and to develop TMDLs for other hydrological conditions. Data to be collected and analyzed shall address, at a minimum, determination of compliance with the ~~nitrogen and~~ phosphorus dry condition TMDLs, including the WLAs and LAs, and with the existing total inorganic nitrogen (TIN) objective.

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An annual report summarizing the data collected for the year and evaluating compliance with the TMDL/WLAs/LAs shall be submitted by February 15 of each year.

In lieu of this coordinated monitoring plan, one or more of the parties identified above may submit a proposed individual or group monitoring plan for Regional Board approval. Any such individual or group monitoring plan is due no later than (**3 months from effective date of this Basin Plan amendment**) and shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report of data collected pursuant to approved individual/group plan(s) shall be submitted by February 15 of each year. The report shall summarize the data and evaluate compliance with the TMDL/WLAs/LAs.

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4.2 Big Bear Lake: In-Lake Nutrient Monitoring Program

No later than (**3 months from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts shall, as a group, submit to the Regional Board for approval a proposed Big Bear Lake nutrient monitoring program that will provide data necessary to review and update the Big Bear Lake Nutrient TMDLs, and to develop TMDLs for other hydrological conditions. Data to be collected and analyzed shall address, at a minimum: (1) determination of compliance with ~~nitrogen~~, phosphorus and chlorophyll *a* numeric targets; (2) determination of compliance with the existing total inorganic nitrogen (TIN) objective; and (3~~2~~) refinement of the in-lake model for the purposes of TMDL review and development.

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The monitoring plan shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report summarizing the data collected for the year and evaluating compliance with the TMDLs/WLAs/LAs and numeric targets shall be submitted by February 15 of each year.

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In lieu of this coordinated monitoring plan, one or more of the parties identified above may submit a proposed individual or group monitoring plan for Regional Board approval. Any such individual or group monitoring plan is due no later than (*3 *months from effective date of this Basin Plan amendment* *) and shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report of data collected pursuant to approved individual/group plan(s), shall be submitted by February 15 of each year. The report shall summarize the data and evaluate compliance with the TMDL/WLAs/LAs and numeric targets.

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Task 6: Big Bear Lake – Lake Management Plan

The Big Bear Lake – Lake Management Plan shall be implemented upon Regional Board approval at a duly noticed public meeting. Once approved, the plan shall be reviewed and revised as necessary at least once every three years. The review and revision shall take into account assessments of the efficacy of control/management strategies implemented and relevant requirements of new or revised TMDLs for Big Bear Lake and its watershed. An annual report summarizing the data collected for the year and evaluating compliance with the TMDLs/WLAs/LAs and numeric targets shall be submitted by February 15 of each year.

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In lieu of this coordinated plan, one or more of the parties identified above may submit a proposed individual or group Big Bear Lake – Lake Management Plan and schedule for approval by the Regional Board. Any such individual or group plan must conform to the requirements specified above and is due no later than *(* 1 year from effective date of the Basin Plan amendment*).* An individual or group plan shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report summarizing the data collected for the year and evaluating compliance with the TMDLs/WLAs/LAs and numeric targets shall be submitted by February 15 of each year.

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Task 10: Review/Revision of the Big Bear Lake Nutrient TMDL for Dry Hydrological Conditions ~~Nutrient TMDL~~ (TMDL "Re-opener")

The basis for the TMDL for Dry Hydrological Conditions, ~~TMDLs and~~ the implementation plan and schedule will be re-evaluated at least once every three years[3+] to determine the need for modifying the allocations, numeric targets and TMDLs. Regional Board staff will continue to review all data and information generated pursuant to the TMDL requirements on an ongoing basis. Based on results generated through the monitoring programs, special studies and/or modeling analyses, changes to the TMDLs may be warranted. Such changes will be considered through the Basin Plan Amendment process.

[3+] The three-year schedule is tied to the 3 year triennial review schedule.

The Regional Board is committed to the review of this~~ese~~ TMDLs every three years, or more frequently if warranted by these or other studies.

(The following comments were received after the Public Hearing documents were sent out on January 17, 2006. These comments and Board staff's recommended changes to the proposed Basin Plan amendment are also addressed in the April 21, 2006 supplemental staff report.)

TIM MOORE
Risk Sciences
Letter presented on February 14, 2006

Note: Comments were provided on behalf of the Big Bear Lake TMDL Task Force, with the exception of the USFS.

Comment #1
Revise language of staff report to indicate that external load dischargers are responsible for "some" of the internal load. Change text from saying that they are responsible for reducing "the" internal loads to "they are responsible for reducing their internal loads."

Response #1
Staff have revised Finding #14 of Resolution No. R8-2006-0023 to include language reflecting that the external load dischargers are responsible for reducing their contributions to the internal nutrient loads.

Comment #2
Delete the example calculation of natural background loads. Without an agreed definition as to what constitutes "natural background," such calculations are premature. The example significantly underestimates the natural background loads.

Response #2
The example calculation was presented for informational purposes only in the January 17, 2006 Staff Report. This Report is a part of the record of this matter and is not subject to change. As indicated in the January 17, 2006 staff report, the example is **one** method for determining natural background loads and staff noted that much more data would be needed to refine the calculation. This example calculation is by no means the only method for determining natural background loads.

Comment #3
Change target for Percent Aquatic Macrophyte Coverage to range between 10-30% of the littoral zone as recommended in the revised Leidy report.

Response #3
Staff does not agree with this recommendation, but now proposes that the macrophyte coverage target be changed from 30-60% to 30-40% on a whole lake basis. The basis for this recommendation is as follows.

As noted in the Response to Comments released on January 17, 2006, staff used the recommendation for macrophyte coverage initially provided by Leidy to identify the proposed 30-60% coverage target. In the June 2003 document titled "Prehistoric and Historic Environmental Conditions in Bear Valley, San Bernardino County, California", Leidy (2003b, 37) states "More than 60 percent of the reservoir bottom area potentially

supports aquatic macrophytes (over 1,800 acres of the 2,973 acre reservoir area at full pool)." In an email dated July 2, 2003 to Sheila Hamilton and Tim Moore, staff asked (Boyd, 2003) "Would a coverage closer to 60% be more applicable based on this report?" This question was directed to Leidy, who, in a reply dated July 21, 2003 (Leidy, 2003a), stated "The short answer is "yes,", if "applicable" means *what would naturally occur in Big Bear Lake in the absence of development in the watershed and in the absence of human manipulation.*" He then states "To maintain the aquatic fauna of the reservoir in a reasonable balance, I would not recommend reducing the macrophyte coverage to less than 30 percent. A relatively even distribution of macrophytes around the perimeter of the lake is also desirable, if not prevented by topography."

In the final version of Leidy's report, dated February 2006 (Leidy, 2006b), Leidy states that "...aquatic macrophyte coverage about 10 to 30 percent of the lake's littoral area capable of supporting aquatic macrophytes should be adequate to maintain aquatic ecosystem functions and to maintain a viable largemouth bass population", and "adverse impacts to the bass population are potentially possible if the aerial coverage at Big Bear Lake begins to exceed about 30 percent of the littoral area." In response to a query from Board staff concerning the apparent change in his coverage recommendation, Mr. Leidy replied (Leidy, 2006a) that his recommendation had not changed but that the final report simply clarified the draft report by explicitly referring to the littoral zone as the area to be considered in establishing the coverage target. Mr. Leidy concluded that macrophyte coverage from 10 to 30 percent of Big Bear Lake's littoral area (i.e., photic zone) will maintain all aquatic ecosystem functions.

After reviewing the final version of Leidy's report and consideration of additional literature and information (Anderson, 2006; Petr, 2000; Schneider, 2000), staff are not convinced that the range of macrophytes should be lowered to less than 30% or that macrophyte coverage should be based on the littoral area for the following reasons.

1) The littoral zone is difficult to quantify. Whole lake coverage can be normalized to the area of the lake at full pool so that macrophyte coverage can be compared even when lake levels differ. Staff notes that none of the references cited in the Leidy report (Leidy, 2006b) explicitly refers to the littoral zone.

- (Leidy, 2006 b, p.48) – Orville P. Ball and Associates (1987) suggested that a plant coverage of 12 to 22 percent of the lake would likely be suitable if fishing were the principal recreational activity on the lake
- (Leidy, 2006 b, p.51) – In a survey of 30 Texas reservoirs Durocher et al. (1984) found a highly significant, positive relationship between the percent submerged vegetation (up to 20 percent)...
- (Leidy, 2006 b, p.51) – The Florida Game and Fresh Water Fish Commission suggested that 30 percent plant coverage represents a healthy balance for warmwater fish in small water bodies.
- (Leidy, 2006 b, p.51) - In large lakes (i.e., greater than 133 surface acres), young-of-the-year largemouth bass density was positively correlated to percent area coverage (PAC) of aquatic macrophytes and to PVI (percentage of the lake volume infested) (Maceina 1996).
- (Leidy, 2006 b, p.52) - Similar research in Guntersville Reservoir, Alabama, by Wrenn et al. (1996) evaluated the fluctuating surface

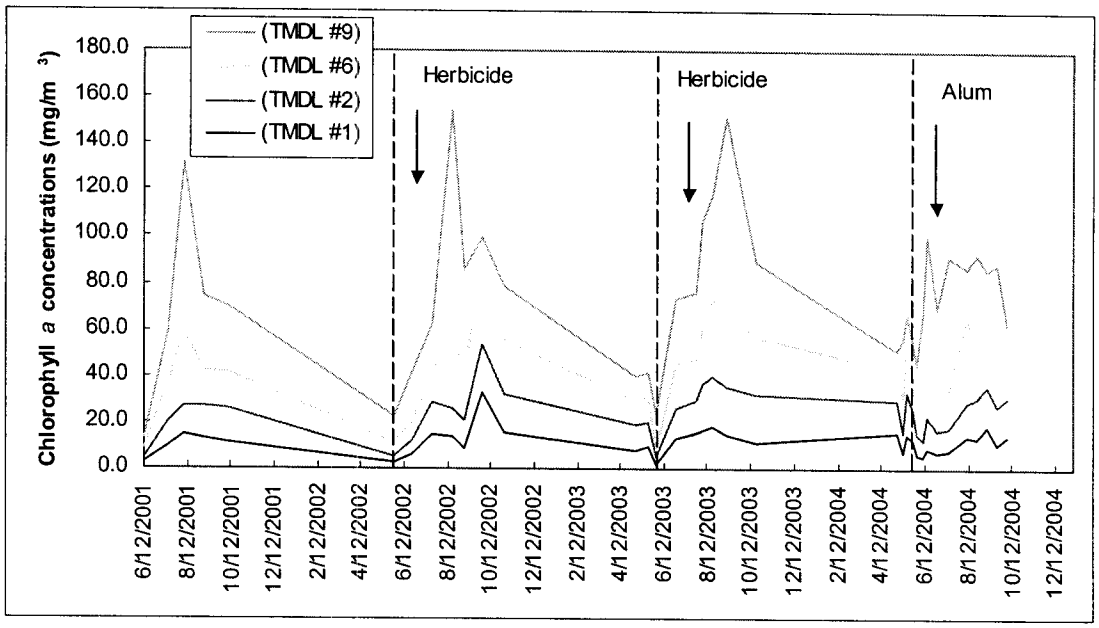
coverage of aquatic macrophytes over a period of years. These researchers concluded that an optimum level of macrophyte coverage could not be identified for largemouth bass, but coverage of greater than 20 percent of the surface area contributed to a decline in growth for fish younger than age-4.

- (Leidy, 2006 b, p.52) – "The "best science" indicates that 10-40% aerial coverage of submersed plants may be ideal for largemouth bass fisheries in larger water bodies" (Maceina 1999).

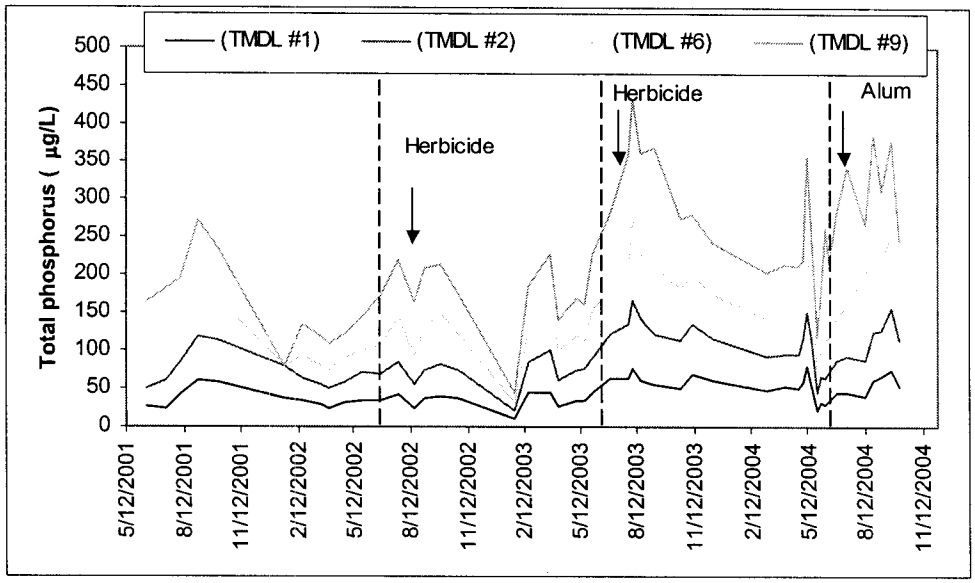
2) Staff are concerned that the literature cited by Leidy (2006b) provides evidence pertaining to macrophyte coverage to support fisheries alone, and that other beneficial uses of the lake are not taken into consideration. Empirical evidence demonstrates that macrophyte coverage reductions on the order proposed by Leidy (and the 60% upper limit of the range initially proposed by Board staff) could have adverse effects on lake water quality and beneficial uses.

The herbicide treatments conducted in 2002 and 2003 eradicated more than 50% of the total area of macrophytes (414 of 781 acres), while changes in lake levels also contributed to an additional decrease in plant coverage over this time. Subsequent to the herbicide treatments and prior to the alum treatment in May 2004, water quality conditions in Big Bear Lake were poor, characterized by high nutrient levels and excessive algae (see Figures 1 and 2 below). Excessive algae growth violates the Basin Plan narrative objective for algae and adversely affects the recreational and wildlife beneficial uses of the lake. In part, the poor water quality conditions and algae growth can be attributed to the reduction of macrophytes that would otherwise have utilized nutrients in the water column and thereby prevented or reduced algae growth. Obviously, a balance must be struck amongst acceptable macrophyte growth, nutrient concentrations and algae growth in order to assure that all of the beneficial uses of the Big Bear Lake are protected.

The algae blooms following the herbicide treatments were reflected by high chlorophyll *a* values, shown in the graph below. These chlorophyll *a* values generally exceed the proposed chlorophyll *a* target (14 µg/L as a growing season average), which is intended to assure that the growth of algae does not become excessive.



Data plotted only for growing season (May 1 –October 31) for each year (2001-2004). Site numbers increase from west to east: Site #1 =west end, Site #9 =east end.



Data plotted for 2001-2004 for all months in which there were data available
Site numbers increase from west to east: Site #1 =west end, Site #9= east end

Staff calculated the approximate areas of macrophytes that would be expected based on the different recommended targets.

Percent coverage	Whole lake area (acres)	Littoral area (acres)
10-30	274-822	187-560
30-40	822-1096	560-747
30-60	822-1644	560-1120

Assumptions:
1)Lake is at full pool at 2740 acres (Tetra Tech, Inc. 2004)
2)Littoral area is from 0-18 feet below the lake surface (plants are found in Big Bear Lake to about 18 feet below the water surface but the distribution of plants depends on factors besides depth, such as slope, substrate, clarity, etc.)
3)Littoral area is equal to 1867 acres (Tetra Tech, Inc. 2004) (as pointed out above, littoral area is approximate and is difficult to quantify –for the purposes of these calculations only, staff is simplifying by using depth only as the determining factor in littoral area).
4) Remetrix (2001) stated that in 2000 approximately 800 acres of the lake was comprised of macrophytes. This acreage translates to approximately 29% and 43% coverage on a whole lake and littoral area basis, respectively.

Example Calculations:
Whole lake area:
30% = 0.3*2740 acres = 822 acres
Littoral area:
30% = 0.3*1867 acres = 560 acres

Staff continues to recommend that the macrophyte coverage target be based on whole lake area but now proposes a 30-40% target range. Although the lake bottom can support up to 60% coverage of plants, coverage to that extent would probably result in the significant adverse impacts to the beneficial uses of the lake. This recommendation appears to be consistent with other recommendations in the literature regarding optimal macrophyte coverage (Anderson, 2006; Petr, 2000; Schneider, 2000). Staff recognizes that the coverage of macrophytes now proposed is essentially the same as the coverage that existed when the lake was placed on the 303(d) list in 1994. However, in 1994, the macrophyte population consisted of nuisance species, not a diverse community and the location and density of these plants resulted in adverse impacts to the lake's beneficial uses. As discussed in the Technical Report for the Nutrient TMDL, the intent of the macrophyte coverage target is to assure the presence of a diverse community of plants that can provide aquatic habitat (and that can reduce water column nutrient concentrations and excessive algae growth). Macrophytes can be managed so that plant density within the lake is a function of the type of beneficial use. This type of management would allow the macrophyte coverage on a whole lake basis to remain essentially unchanged, but would allow for variations in plant density dependent on type of beneficial use expected for that location. It should be emphasized that the proposed Basin Plan amendment requires the development of a lake management plan that takes into account vegetation metrics. Assessments of the relationships between fisheries, water quality, macroinvertebrates and coverage of macrophytes will be an important part

of the development of this plan and will likely lead to recommendations regarding optimal macrophyte coverage. The targets/TMDL can be modified if and as necessary to address these recommendations.

Comment #4
Delete the compliance date for wet or average conditions. A compliance date cannot be approved until a TMDL and Implementation Plan are available to know what is required to comply.

Response #4
Staff have added a footnote to Table 5-9a-c in the Attachment to Resolution No. R8-2006-0023 specifying that the proposed compliance dates for wet and/or average hydrological conditions are subject to change based on approved TMDLs for those hydrological conditions.

Comment #5
WARM and COLD are "designated" uses not "existing" uses. Existing uses are those that have been attained since November of 1975. The definition of attainment is that water quality standards have been consistently met. Water quality objectives cannot be revised to be less stringent if these are "existing" uses.

Response #5
Staff has revised Finding 7 in Resolution No. R8-2006-0023 to refer to the "designated" beneficial uses of Big Bear Lake. The proposed TMDL is intended to protect these uses, whether or not they are considered "existing".

As a factual matter, it is appropriate to point out that, as Risk Sciences, Inc. recognizes, there is diversity of opinion among regulatory agencies and other stakeholders concerning the definition of attainment. The USEPA and the State Board (in precedential decisions) have defined "existing uses" as those that actually occurred as of November 28, 1975 **or** where the water quality was suitable to support such uses.

Further, we believe that Risk Sciences, Inc. incorrectly assumes that "existing use" determinations prohibit refinement of beneficial use classifications and the adoption of appropriate water quality objectives. USEPA encourages states to refine beneficial uses and to adopt water quality objectives tailored to assure protection of those uses. Even if there is no refinement of beneficial uses and a COLD (for example) beneficial use is determined to be "existing", less restrictive objectives could be developed provided that it is demonstrated that (1) the COLD use will be fully protected, and (2) that antidegradation requirements are satisfied. This flexibility is reflected in Task 7 of the proposed Basin Plan amendment. This task specifies the review/revision of Big Bear Lake Water Quality Standards, which includes tasks to review/revise nutrient water quality objectives, develop biocriteria and develop a definition of natural background.

Comment #6
Modify statement that reducing nitrogen and phosphorous is "necessary" to meet narrative water quality standards for algae, weeds and dissolved oxygen. There are lake management strategies to improve some or all of the response targets without necessarily reducing nitrogen and/or phosphorous concentrations. Regional Board cannot specify the method of achieving compliance.

Response #6
Staff have revised the language in the proposed Resolution (Finding # 10) to specify that control of phosphorus is one of the potential methods to ensure compliance with relevant numeric and narrative water quality objectives specified in the Basin Plan, and to prevent adverse beneficial use impacts resulting from the proliferation of nuisance aquatic plants.

Comment #7
Margin of safety for nutrient targets is unnecessary given the degree to which the response targets are being attained by other control measures.

Response #7
A margin of safety is a required component of a TMDL, as specified in [CFR Title 33, Chapter 26 Section 1313(d) (1) (C). As explained in the June 2005 staff report, staff used an implicit margin of safety that accounts for uncertainty in the TMDL.

Comment #8
Chlorophyll-a target is expressed as an annual growing season average. Using 14 ppm will result in non-compliance in half the years despite the fact that algae are not impairing beneficial uses in those years.

Response #8
Staff assumes that this comment is directed at the median or 50th percentile value used to set the proposed numeric target of 14 µg/L. The assertion that use of this target will result in significant noncompliance apparently relies on the premise that observed water quality conditions in the lake will continue and that no nutrient control or other TMDL implementation activities to improve those conditions will be implemented. It is simply inappropriate to rely on data now available to conclude that the target cannot be achieved consistently. As described in the Technical Report for the Nutrient TMDL, model simulations demonstrated that the proposed chlorophyll *a* target can be achieved if other actions to achieve the TMDL (phosphorus reduction, reductions in macrophyte coverage) are implemented.

Comment #9
Targets should be adjusted for falling lake levels. Evaporation increases nutrient concentrations by up to 100% during a drought cycle.

Response #9
The WASP lake model did account for changes in lake levels and corresponding changes in water quality concentrations (based on empirical data from 2001-2003), therefore, the load reductions that are needed to meet the proposed numeric targets already take these factors into consideration.

Comment #10
There is a strong possibility that EPA will line item veto the "Weight-of-Evidence" approach based on their long-standing commitment to the "Independent Applicability" approach. If they do so, the entire basin plan must be brought back to the Regional Board for reconsideration.

Response#10
Staff of USEPA have not raised objections to the proposed language (included in the proposed Basin Plan amendment in Section 1. A. Numeric Targets) regarding the use of the weight of evidence to determine whether or not compliance with the TMDL is being achieved. We believe that Risk Sciences' suggestion that the "entire basin plan" would have to be brought back to the Regional Board for reconsideration in the event of USEPA's disapproval of this language is a misstatement; clearly, the basin plan as a whole would not be affected by this limited amendment to incorporate a TMDL.

Comment #11
Dry condition compliance depends on control over external loading during wet weather.

Response#11
As explained in the staff report, internal nutrient loads dominate during both dry and average hydrological conditions while external loads dominate during wet hydrological conditions. Since the hydraulic residence time of Big Bear Lake is approximately 11 years, any external loads deposited during wet hydrological conditions will likely be buried and/or recycled. Since the WASP lake model did not model lake water quality concentrations during wet hydrological conditions, the link between external and internal nutrient loads is only speculative. Only with further modeling and monitoring can this link be elucidated. This information is a required component of the implementation plan. Moreover, many researchers state that internal nutrient loads must first be controlled if these dominate because focusing only on external nutrient loads will not reduce internal nutrient loads. We have taken a similar approach with this TMDL.

Matt Yeager
San Bernardino County Flood Control District
(Comments presented orally on February 14, 2006)

Comment #1
Please be consistent with the use of eutrophic and moderately eutrophic in the Basin Plan amendment.

Response#1
Staff have changed eutrophic to moderately eutrophic in the Basin Plan amendment (page 2 of 21). The definitions of these are related to the trophic state index (explained in the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 2005)) and are defined by the concentrations of total phosphorus, total nitrogen and chlorophyll *a,* as well as secchi depth.

Richard Kun
Snow Summit Ski Corporation
(Comments presented orally on February 14, 2006)

Comment #1
Both Bear Mountain and Snow Summit ski resorts apply calcium nitrate to the snow and not ammonium nitrate as reported in the Staff Report.

Response #1
Comment noted.

Comment #2
Snow Summit Ski Corporation is already regulated by the USFS, the City of Big Bear Lake and the County of San Bernardino. Why are we the only private corporation in Big Bear Lake that has been singled out?

Response #2
Snow Summit Ski Corporation has not been singled out but has been identified as one of the parties responsible for inputs of nutrients to Big Bear Lake. Similarly, the other parties identified by the commenter are responsible for nutrient inputs and are thus required by the proposed TMDL to assume specific implementation responsibilities. This is part of the requisite TMDL process of identifying significant sources of pollutants resulting in water quality standards impairment, and identifying appropriate actions to control those inputs.

Dave Smith
U.S. EPA
(Comments presented via teleconference on February 16, 2006 and via a letter dated February 23, 2006)

Comment #1
The TMDLs and associated allocations presented in the staff report may not result in attainment of the selected total nitrogen target. This issue must be addressed to ensure that the TMDLs are approvable under the Clean Water Act.

Response #1
As described in the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 2005), staff attributes the inability to demonstrate the attainability of the nitrogen target to model limitations. However, to address the concern identified by USEPA, the proposed nitrogen numeric target, TMDL, WLAs and LAs have been deleted from the proposed Basin Plan amendment. The proposed amendment continues to include requirements for the collection of nitrogen data, which will be used to assess the need for and nature of revisions to the TMDL to include nitrogen targets, TMDL, etc., and to assess compliance with the established Total Inorganic Nitrogen objective for Big Bear. A description of this strategy has been added to the proposed amendment at Section 1. A. Numeric Targets.

Comment #2
Although we concur with the TMDL's focus on dry hydrological conditions and effects as the highest priority time period in terms of nutrient effects in the Lake, we are concerned that the staff report does not demonstrate that setting TMDLs and associated allocations that apply only during dry hydrological conditions will ensure WQSs are attained during all hydrological/climatic conditions. Based on the source assessment, it appears that substantial external nutrient loadings occur during wet conditions. A significant portion of wet condition nutrient loads are likely to remain in the Lake for an extended period of time, thus contributing to in-lake nutrient loading during dry conditions. To be approvable, the TMDLs must be set at levels that result in attainment of water quality standards during all hydrological/climatic conditions.

Response #2
Based on (1) the comparison of data collected in 2005 (a wet hydrological period) and data collected in 2001-2004 (a dry period) (shown below), (2) the linkage between decreases in total nitrogen and total phosphorus concentrations and increases in lake levels that would be expected in average/wet conditions (Anderson and Wakefield-Schmuck, 2006), and (3) evidence that nutrient fluxes occur from mineralization or release from surficial material, not from deeper sediments, staff believes that implementation of the proposed TMDL will assure compliance with the numeric targets and, thereby, water quality standards without external load reductions. This should not be construed to mean that external load reductions will not be required in future TMDLs developed to address average/wet hydrologic conditions, or that such reductions would be ineffective. The focus of the proposed TMDL is on reductions in the internal loading of sediments (including those that were deposited during wet conditions), since internal loading dominates during the critical dry conditions. Control actions to address internal

loads will need to be implemented. To the extent that internal sediment sources are reduced over the long-term by reducing external loads, then the burden of internal load reduction would be reduced. These findings are subject to confirmation as TMDLs for wet and/or average hydrological conditions are developed, as required by the proposed implementation plan. Language has been added to the discussion of the Big Bear Lake Nutrient TMDL in Section 1 of the Basin Plan Amendment and to the discussion of seasonal variation/critical conditions (Section 1. B. 3 of the Amendment) to clarify Board staff's expectation that since the proposed TMDL was developed to address the worst-case, critical conditions of dry periods, the targets are also expected to be met at other times, when there is additional inflow to Big Bear Lake and the volume of the lake and dilution are increased.

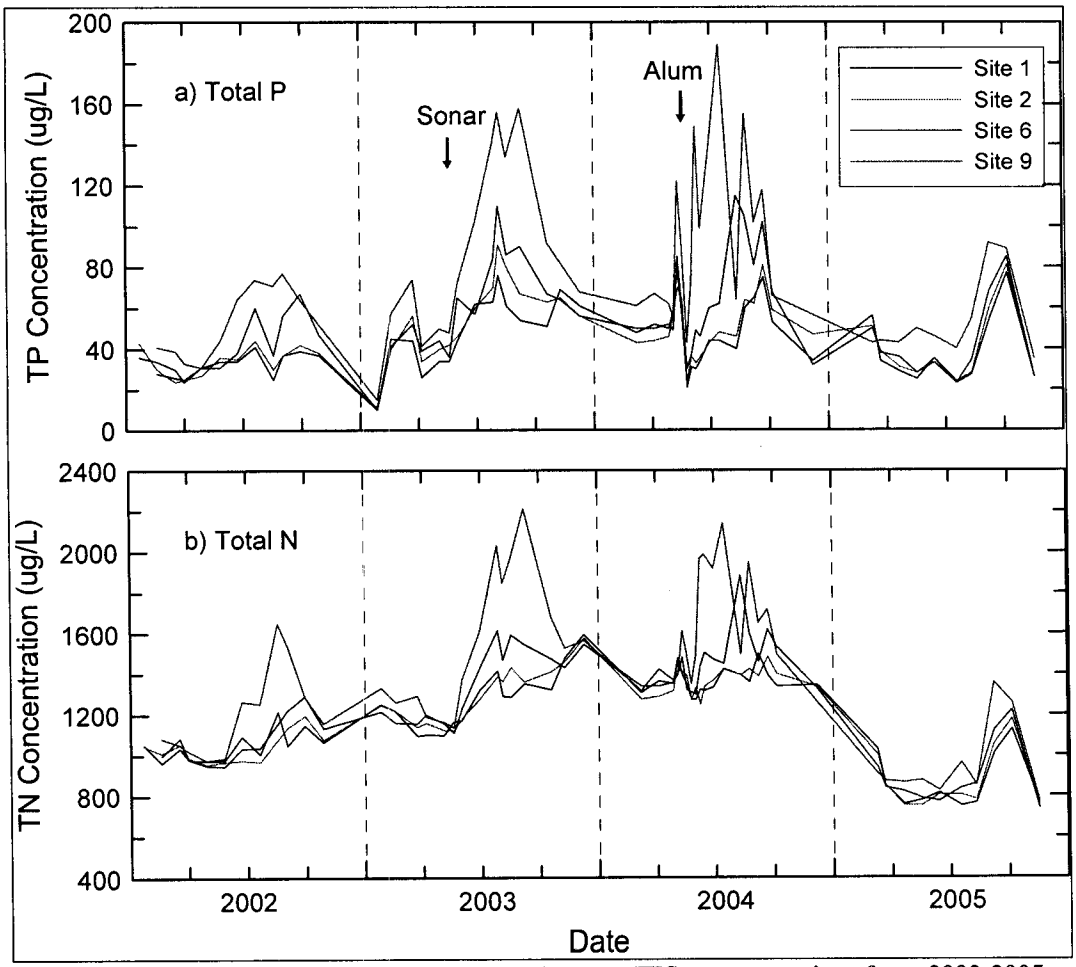


Figure 3. Total phosphorus (TP) and Total nitrogen (TN) concentrations from 2002-2005
Source: (Anderson and Wakefield-Schmuck, 2006)
Sites progress from west to east of the lake (Site 1 =west end; Site 9 = east end)

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Recd 2/14/06

RISK SCIENCES

Recommended Revisions to Proposed Nutrient TMDL for Big Bear Lake

1) Revise language of staff report to indicate that external load dischargers are responsible for "some" of the internal load. Change text from saying that they are responsible for reducing "the" internal loads to "they are responsible for reducing their internal loads."

2) Delete the example calculation of natural background loads. Without an agreed definition as to what constitutes "natural background," such calculations are premature. The example significantly underestimates the natural background loads.

3) Change target for Percent Aquatic Macrophyte Coverage to range between 10-30% of the littoral zone as recommended in the revised Leidy report.

4) Delete the compliance date for wet or average conditions. A compliance date cannot be approved until a TMDL and Implementation Plan are available to know what is required to comply.

5) WARM and COLD are "designated" uses not "existing" uses. Existing uses are those that have been attained since November of 1975. The definition of attainment is that water quality standards have been consistently met. Water quality objectives cannot be revised to be less stringent if these are "existing" uses.

6) Modify statement that reducing nitrogen and phosphorous is "necessary" to meet narrative water quality standards for algae, weeds and dissolved oxygen. There are lake management strategies to improve some or all of the response targets without necessarily reducing nitrogen and/or phosphorous concentrations. Regional Board cannot specify the method of achieving compliance.

7) Margin of safety for nutrient targets is unnecessary given the degree to which the response targets are being attained by other control measures.

8) Chlorophyll-a target is expressed as an annual growing season average. Using 14 ppm will result in non-compliance in half the years despite the fact that algae is not impairing beneficial uses in those years.

9) Targets should be adjusted for falling lake levels. Evaporation increases nutrient concentrations by up to 100% during a drought cycle.

10) There is a strong possibility that EPA will line item veto the "Weight-of-Evidence" approach based on their long-standing commitment to the "Independent Applicability" approach. If they do so, the entire basin plan must be brought back to the Regional Board for reconsideration.

11) Dry condition compliance depends on control over external loading during wet weather.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San F

OPTIONAL FORM 99 (7-90)
FAX TRANSMITTAL # of pages ▶ 2
To Joanne Schneider From Dave Smi
Dept./Agency or Hope Smythe Phone #
Fax # Fax #
NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTR

February 23, 2006

Joanne Schneider
Environmental Program Manager
California Regional Water Quality Control Board, Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501

Dear Joanne,

Thank you for the opportunity to provide additional comments on the Big Bear Lake nutrient TMDLs. As we discussed during our February 16, 2006 call, two aspects of the TMDLs need to be addressed in order to ensure the TMDLs are approvable under the Clean Water Act. This letter discusses those concerns and outlines potential options for addressing them.

The staff report suggests the TMDLs and associated allocations may not result in attainment of the selected total nitrogen target. As the numeric target is the State's interpretation of the applicable water quality standards (WQS) and all TMDLs must be set at levels sufficient to meet WQSs, the TMDLs must be set at levels that are expected to result in attainment of selected numeric targets. To address this concern, several options are available: (a) provide a supplemental technical rationale to support a finding that the TMDL will meet the TN target; (b) withdraw the total nitrogen (TN) target, particularly if it is not vital to WQS interpretation for Big Bear Lake; (c) revise the TMDLs and/or allocations to demonstrate that TN target can be met; and/or (d) provide a larger explicit margin of safety (MOS) (i.e. lower allocated loadings) to account for this significant uncertainty.

Although we concur with the TMDL's focus on dry hydrological conditions and effects as the highest priority time period in terms of nutrient effects in the Lake, we are concerned that the staff report does not demonstrate that setting TMDLs and associated allocations that apply only during dry hydrological conditions will ensure WQSs are attained during all hydrological/climatic conditions. TMDLs must be set at levels that result in attainment of water quality standards during all hydrological/climatic conditions. Based on your source assessment, it appears substantial external nutrient loadings occur during wet conditions. A significant portion of wet condition nutrient loads are likely to remain in the Lake for an extended period of time, thus contributing to in-lake nutrient loading during dry conditions. We recommend the following options to address this

concern: (a) provide a supplemental technical rationale to support a finding that the proposed TMDLs are likely to result in WQS attainment under all hydrological and climatic conditions without requiring pollutant input reductions during non-dry hydrological conditions; (b) provide some level of wet hydrological condition nutrient input reductions; and/or (c) provide a larger explicit MOS to account for this uncertainty.

We hope this clarifies the concerns we have with the current Basin Plan Amendment and supporting analysis. If you have any questions, please call Cindy Lin at (213) 244-1803 or me at (415) 972-3416.

Sincerely yours,

David Smith

David Smith

cc: Ken Harris, SWRCB

California Regional Water Quality Control Board
Santa Ana Region

March 3, 2006

Item: 12

Subject: **Public Hearing: Consideration of Adoption of Proposed Basin Plan Amendment – Incorporation of Dry Season Total Maximum Daily Loads for Nutrients for Big Bear Lake – Resolution No. R8-2006-0023**

DISCUSSION

On June 21, 2005, staff of the California Regional Water Quality Control Board, Santa Ana Region (Regional Board) issued a staff report entitled "Nutrient TMDLs for Big Bear Lake". The report recommended that the Regional Board consider amendment of the Implementation Plan of the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) to incorporate the proposed TMDLs, which focus on dry hydrologic conditions. TMDLs that address average and wet hydrologic conditions are to be developed in the future.

On August 26, 2005, the Regional Board held a public workshop to receive evidence and testimony on the proposed Big Bear Lake Total Maximum Daily Loads (TMDLs). Staff revised the proposed TMDLs based on both written and oral comments received from the public, and responded to comments received prior to, during and after the August 26, 2005 public workshop. The revised proposed Basin Plan Amendment is shown in Attachment A (Attachment to Tentative Resolution No. R8-2006-0023). The staff responses to comments received during and after the August 26, 2005 public workshop are included in Attachment B. Attachment C contains the CEQA checklist. Copies of the written comments are included in Attachment D.

Attachment B includes comments received from Dr. Kenneth Reckhow, who provided the requisite scientific peer review. It should be noted that Dr. Reckhow found no significant flaws in the technical approach used to develop the proposed TMDLs (see Comments 201-208).

In summary, the proposed TMDLs include:

- Final numeric targets;
- Wasteload Allocations (WLAs) for point source discharges and Load Allocations (LAs) for nonpoint source discharges;
- An Implementation plan and schedules for compliance with the TMDLs, numeric targets, WLAs and LAs; and,
- A monitoring plan and schedule to assess the effectiveness of the TMDLs.

Based on the comments received on the proposed nutrient TMDLs (as presented on August 26, 2005), staff proposes the following major changes to the TMDLs/Basin Plan Amendment.

1. **Replacement of the final numeric target for total phosphorus with the interim target and appropriate modification of the final phosphorus TMDLs, WLAs, and LAs**
In the June 2005 TMDL Report, staff originally proposed a total phosphorus final numeric target based on the Trophic State Index. An interim target for phosphorus was also recommended. Based on comments received regarding the inappropriateness of the Trophic State Index for Big Bear Lake (see Attachment B, Comments #34, 39, 67, 74, and 202), staff proposes to replace the final total phosphorus target with the interim total phosphorus target. The final total phosphorus target proposed for Big Bear Lake would become 35 µg/L (the final target proposed originally was 20 µg/L). The revised target is shown in Table 5-9a-c in Attachment A.

   To be consistent with the recommended change to the final numeric target, the interim TMDLs, WLAs and LAs that had been proposed would become the final TMDLs, WLAs and LAs. The revised TMDLs for nutrients are shown in Table 5-9a-d in Attachment A.

   In addition, staff proposes that the numeric targets be established to address all hydrologic conditions, not just dry hydrologic conditions (see Attachment A, Section 1.A.). Again, the TMDLs now proposed are intended to achieve the numeric targets during dry hydrologic conditions. TMDLs to meet the targets under average and wet hydrologic conditions will need to be developed and implemented in the future.

2. **Revision to the interim target for chlorophyll *a* and replacement of the final numeric target for chlorophyll *a* with the revised interim target**
In the June 2005 TMDL Report, staff originally proposed a chlorophyll *a* interim target of 10 ug/L. This interim target was based on the 25th percentile of growing season chlorophyll *a* data from the 4 lake stations and was intended to ensure that algae growth did not become excessive as a result of nutrient concentrations. Comments were received (Attachment B, Comments #33, 34, and 36) suggesting that since algae growth has not been excessive in Big Bear Lake under prevailing lake conditions, it would be more appropriate to set the chlorophyll *a* target at the ambient lake-wide concentration. Staff agrees and proposes to replace the chlorophyll *a* target of 10 ug/L with a revised chlorophyll *a* target of 14 ug/L. This concentration is the median of results from samples collected at the four lake stations from June 2001-October 2001. This time period includes the growing season and was prior to any herbicide application.

   In the June 2005 TMDL Report, staff also proposed a final chlorophyll *a* numeric target of 5.0 ug/L based on the Trophic State Index. Based on comments received regarding the inappropriateness of the Trophic State Index for Big Bear Lake (see Attachment B, Comments #34, 39, 67, 74, and 202), staff proposes to replace the final chlorophyll *a* target with the revised interim chlorophyll *a* target. The final chlorophyll *a* target proposed for Big Bear Lake is 14 µg/L. The revised target is shown in Table 5-9a-c in Attachment A

3. **Revisions to compliance dates for the numeric targets**
Based on comments received (Attachment B, Comments #39, 67, 94 and 140), staff proposes to modify the compliance dates for the proposed numeric targets. In the June 2005 TMDL Report, staff originally proposed 2010 and 2015 as the dates for compliance with the interim and final numeric targets, respectively. Staff now proposes that under dry hydrologic conditions, compliance with the final numeric targets, and with the proposed dry hydrological condition TMDLs, WLAs and LAs, be achieved as soon as possible but no later

than December 31, 2015. The proposed compliance date for the numeric targets under average and wet hydrologic conditions is December 31, 2020. The revised compliance dates for the revised targets are shown in Table 5-9a-c in Attachment A.

4. **Addition of a Lake Management Plan – Task 6**
Staff recommends that a number of tasks that had been identified separately in the implementation plan proposed initially be integrated in a new requirement for the development of a comprehensive lake management plan. Specifically, staff recommends deleting separate implementation tasks for model updates, in-lake sediment nutrient reductions and management of aquatic plants (proposed in Section E (now Section 1.B.4) TMDL Implementation, Tasks 6, 7, and 8) and instead incorporating these tasks in a new Task 6 - Development of a Lake Management Plan. The new task is shown in Table 5-9a-f and described in the accompanying text in Attachment A.

5. **Addition of biocriteria**
Comments were received concerning the need to develop biocriteria for Big Bear Lake (Attachment B, Comments 39 and 64). It was suggested that the development of biocriteria for Big Bear Lake should be included in the TMDL implementation plan. It was also suggested that biocriteria should be developed by the Regional Board (Attachment B, Comment #116). Staff agrees and recommends a revision to former Task 10 (now Task 7) to include the development of biocriteria. Staff also recommends that language be added to the new Task 6 (Development of Lake Management Plan) that would require the stakeholders to include a proposed plan and schedule for the participation of the stakeholders in the Regional Board's effort to develop biocriteria for Big Bear Lake. The revised task is shown in Table 5-9a-f and described in the accompanying text in Attachment A.

6. **Monitoring Program Requirements – Flexibility Language Added**
Comments were received from the City of Big Bear Lake on the monitoring program requirements proposed in Task 4.1 of the implementation plan. The City believes that more specific information on the proposed location of monitoring stations and the proposed frequency of monitoring should be provided (Attachment B, Comments #21, 24 and 25). In response to those comments, staff proposes that language be added to the monitoring program requirements in Task 4 that acknowledges that changes to the proposed monitoring stations, frequencies, or constituents monitored will be considered at any time based on a request from the stakeholders, accompanied by a report that describes the rationale for the proposed changes and identifies recommended alternatives.

7. **Monitoring Program Requirements –Constituents Added**
Based on comments (Attachment B, Comments #6, 7, 20, 31, 41, 68, 79, 86, 87, 100 and 128) that the particulate nutrient loads from sediment should be addressed more thoroughly as well as sediments in general, staff proposes to add the following constituents to be monitored: total nitrogen in sediment, total phosphorus in sediment, bedload concentration, grain size. Staff recommends replacing total suspended solids with suspended sediment concentration. The revised constituent list is shown in Task 4.1 in Attachment A.

8. **Revision to the Compliance Date for Task 7**
Since additional tasks were added to Task 7 (formerly Task 10), staff believes that the compliance date of December 31, 2010 originally proposed is not adequate to allow the completion of the additional tasks. The compliance date now proposed is December 31, 2015.

9. **Development of TMDLs for Wet and/or Average Hydrological Conditions – language added**
The San Bernardino National Forest (Attachment B, Comment # 117) suggested that completion of the development of nutrient TMDLs for wet and/or average hydrological conditions by 2012 might be problematic if these conditions do not occur and appropriate data cannot be collected (proposed in Section B. TMDL Implementation). Staff agrees and recommends adding language reflecting the fact that development of TMDLs for wet and/or average hydrological conditions is contingent upon obtaining the needed data (new Task 9 (formerly Task 12) of the proposed implementation plan).

8. **Addition of a Definition for Natural Background or Minimally-Impacted Areas**
Numerous comments (Attachment B, Comments # 6, 20, 31, 36, 40, 61, 64, 68, 75, 86, 87, 93, 100, 121, 122, 128, 131, 149, 151, 152, 154, 160, 166, 170 and 182) suggested that the Big Bear Lake watershed is natural and that the Regional Board should take into consideration the natural loads from the watershed and the natural loads from the lake bottom sediments. Staff believes that consideration of nutrient loads that arise from natural conditions should be evaluated in the Big Bear Lake watershed; however, staff also believes that how natural is defined is an important consideration. For these reasons, staff proposes to add the Development of Natural Background Definition as part of the Review/Revisions of Big Bear Lake Water Quality Standards (Task 7.3 to the new Task 7 (formerly Task 10)). Staff believes that the effort to review/revise beneficial uses, numeric nutrient water quality objectives or to develop biocriteria should be closely coordinated with the development of a natural background definition, as shown in Task 7 of Attachment A.

In an effort to evaluate natural background or minimally-impacted areas, staff evaluated data and land use information for the watershed.

The Southern California Coastal Water Research Project (SCCWRP) is currently undertaking studies to evaluate water quality levels from natural watersheds. To define 'natural watersheds' for the study, one of SCCWRP's criteria was that the watershed had to be at least 95% undeveloped and in as close to pristine condition as possible. Using this criterion, staff re-evaluated the landuse in the watershed based on the 83 subbasins as defined in the HSPF water quality simulation model used to develop the proposed TMDL. The goal of this evaluation was to determine how much of each subbasin, and the Big Bear Lake watershed as a whole, could be classified as minimally-impacted.

Of the 83 subbasins defined in the HSPF watershed model, 22 had at least 95% forest land use (Table 1). Those subbasins included: 3, 6, 11, 12, 14, 15, 31, 33, 38, 40, 51, 56, 64, 66, 67, 68, 70, 72, 74, 76, 79, and 82. Total forest land use in the Big Bear Lake watershed equals 14,463 acres (note: this area does not exactly equal that reported in the staff reports due to slight differences in the Geographical Information System (GIS) layers used for this analysis). Of that total, the forest land use comprising the subbasins identified above equals 7,699 acres. Fifty-three percent of the total forest land use is therefore comprised of

subbasins with 95% or greater forest land use. Using GIS technology, staff overlaid a road layer on the subbasin layer to determine if the subbasins were affected by anthropogenic impacts such as roads. A qualitative analysis was performed such that if roads were found throughout the individual subbasin that subbasin was excluded from being classified as "minimally-impacted", and the forest area of that subbasin was not included in the total area for the "minimally-impacted" area definition. Subbasins 11, 38, 56, 66, 67, 74 had roads throughout the area and were not included for further analysis. If roads were found in the lower portion of each subbasin (i.e., downstream closer to Big Bear Lake), the area above the roads was considered minimally-impacted and staff digitized a polygon of the area. If roads were in the upper portion of the subbasin, everything below the roads was considered to be impacted.

A map of the digitized areas of each subbasin is shown in Figure 1. A tabular summary of the results is shown in Table 2. From this analysis, staff determined that 2,551 acres out of the initial 7,699 acres of forest land use identified as having 95% or greater forest land use was minimally-impacted. Therefore, according to the analysis performed by staff, 18% of the total forest area (i.e., 14,463 acres) is minimally-impacted, and conversely 82% of the forest land in Big Bear Lake watershed has anthropogenic impacts.

Staff would like to emphasize that this analysis is preliminary and certainly needs to be refined with additional information on other anthropogenic activities that may be occurring on forest lands, as well as information concerning the exact nature of anthropogenic activities that may be creating nutrient loads. It is also important to point out that this analysis does not affect the proposed nutrient TMDLs, which are for dry season conditions only. **No reductions from forest lands are proposed as part of this dry season TMDL**. We believe that this type of analysis, as well as development of a natural background definition, is most pertinent to the future development of wet and/or average hydrological conditions TMDLs.

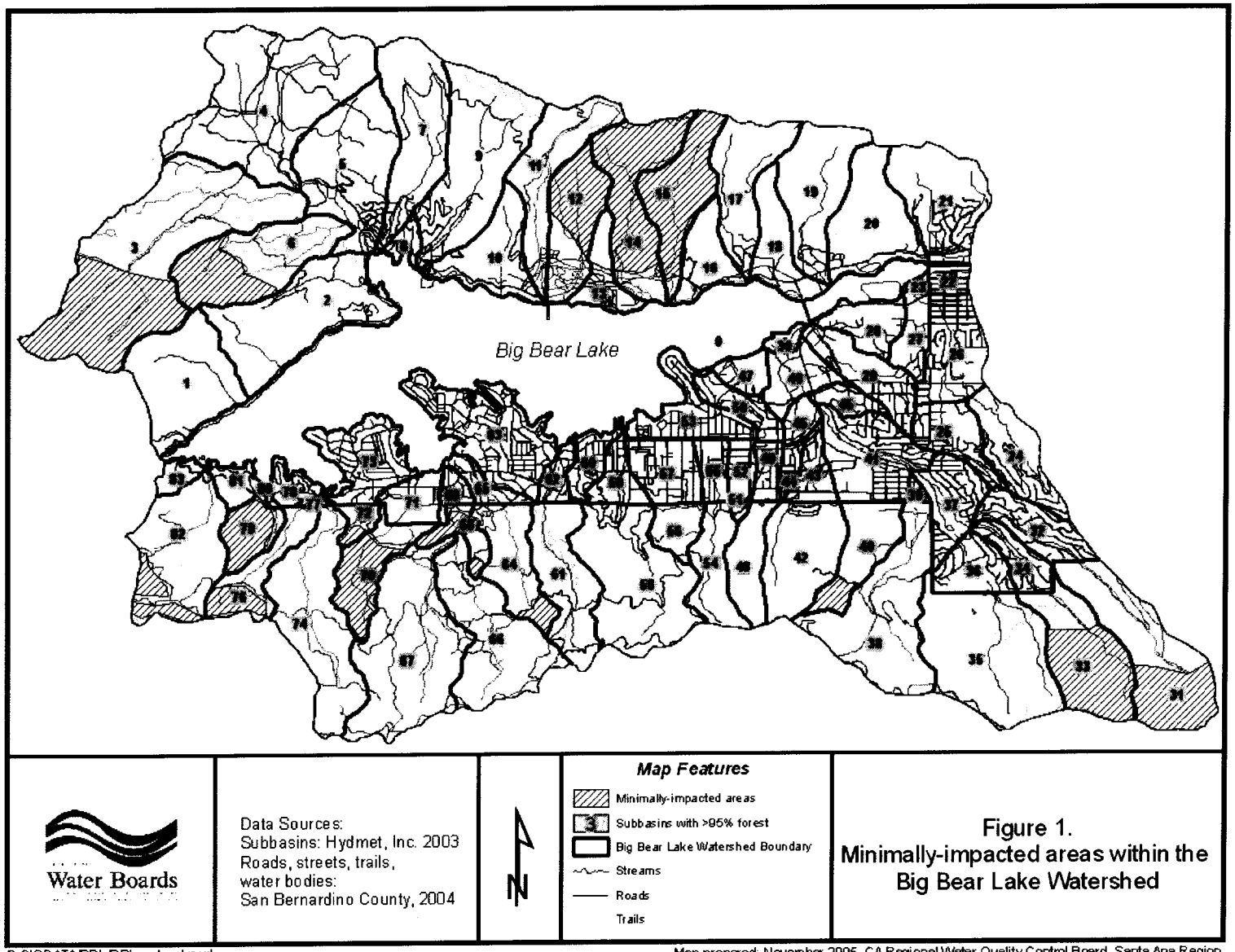
Big Bear Lake
Water Boards
Data Sources:
Subbasins: Hydmet, Inc. 2003
Roads, streets, trails,
water bodies:
San Bernardino County, 2004
N
Map Features
Minimally-impacted areas
Subbasins with >95% forest
Big Bear Lake Watershed Boundary
Streams
Roads
Trails
Figure 1.
Minimally-impacted areas within the
Big Bear Lake Watershed
D:\GISDATA\BBL\BBL_natural.mxd
Map prepared: November 2005, CA Regional Water Quality Control Board, Santa Ana Region

Table 1. Acres of land use for each subbasin

	Acres of land use				% of total		
Subbasin No.	Forest	Resort	Urban	Total	Forest	Resort	Urban
1	389.9	0	54.9	444.8	87.7%	0.0%	12.3%
2	475.7	0	79	554.7	85.8%	0.0%	14.2%
3	1086.3	0	0	1086.3	100.0%	0.0%	0.0%
4	812	0	55.7	867.7	93.6%	0.0%	6.4%
5	452.8	0	63.2	516	87.8%	0.0%	12.2%
6	432.6	0	0	432.6	100.0%	0.0%	0.0%
7	386.7	48		434.7	89.0%	11.0%	0.0%
8	0	0	43.8	43.8	0.0%	0.0%	100.0%
9	405.4	0	107.1	512.5	79.1%	0.0%	20.9%
10	206.4	0	49.7	256.1	80.6%	0.0%	19.4%
11	325.9	0	7.3	333.2	97.8%	0.0%	2.2%
12	280.9	0	11.1	292	96.2%	0.0%	3.8%
13	98.5	0	22.2	120.7	81.6%	0.0%	18.4%
14	400.2	0	5.4	405.6	98.7%	0.0%	1.3%
15	310.3	0	0.8	311.1	99.7%	0.0%	0.3%
16	140.1	0	19.4	159.5	87.8%	0.0%	12.2%
17	278.1	0	30.9	309	90.0%	0.0%	10.0%
18	161.2	0	34.9	196.1	82.2%	0.0%	17.8%
19	315.8	0	48.2	364	86.8%	0.0%	13.2%
20	274.6	0	77.5	352.1	78.0%	0.0%	22.0%
21	227.7	0	150.4	378.1	60.2%	0.0%	39.8%
22	0	0	53.2	53.2	0.0%	0.0%	100.0%
23	0	0	12.4	12.4	0.0%	0.0%	100.0%
24	133.2	0	110	243.2	54.8%	0.0%	45.2%
25	59	0	111.7	170.7	34.6%	0.0%	65.4%
26	87.4	0	170.5	257.9	33.9%	0.0%	66.1%
27	0	0	108.1	108.1	0.0%	0.0%	100.0%
28	0	0	138	138	0.0%	0.0%	100.0%
29	0	0	207.9	207.9	0.0%	0.0%	100.0%
30	0	0	25.7	25.7	0.0%	0.0%	100.0%
31	502.4	0	6.5	508.9	98.7%	0.0%	1.3%
32	0	0	191.4	191.4	0.0%	0.0%	100.0%
33	383.6	0.6	6.3	390.5	98.2%	0.2%	1.6%
34	0	17.2	98.1	115.3	0.0%	14.9%	85.1%
35	545.4	97.9	3	646.3	84.4%	15.1%	0.5%
36	7.9	66.8	78.4	153.1	5.2%	43.6%	51.2%
37	0	63.6	136.1	199.7	0.0%	31.8%	68.2%
38	540.8	9.8	3.6	554.2	97.6%	1.8%	0.6%
39	0.7	1.8	15.5	18	3.9%	10.0%	86.1%
40	220.7	0	0	220.7	100.0%	0.0%	0.0%
41	1	54.9	275	330.9	0.3%	16.6%	83.1%

	Acres of land use				% of total		
Subbasin No.	Forest	Resort	Urban	Total	Forest	Resort	Urban
42	233.3	111.7	0	345	67.6%	32.4%	0.0%
43	1	0	97.6	98.6	1.0%	0.0%	99.0%
44	0	0	41.6	41.6	0.0%	0.0%	100.0%
45	0	0	124.7	124.7	0.0%	0.0%	100.0%
46	0	0	149.2	149.2	0.0%	0.0%	100.0%
47	0	0	67.3	67.3	0.0%	0.0%	100.0%
48	65.3	105.4	0	170.7	38.3%	61.7%	0.0%
49	0	0.3	67.9	68.2	0.0%	0.4%	99.6%
50	0	0	110.1	110.1	0.0%	0.0%	100.0%
51	13.9	0	0	13.9	100.0%	0.0%	0.0%
52	0	0	74	74	0.0%	0.0%	100.0%
53	0	0	202.8	202.8	0.0%	0.0%	100.0%
54	137.6	56.2	0	193.8	71.0%	29.0%	0.0%
55	0	0	79.8	79.8	0.0%	0.0%	100.0%
56	102.9	0	0	102.9	100.0%	0.0%	0.0%
57	0	0	182.7	182.7	0.0%	0.0%	100.0%
58	453.2	74.4	41.9	569.5	79.6%	13.1%	7.4%
59	0	0.7	99.4	100.1	0.0%	0.7%	99.3%
60	0	0.7	91.6	92.3	0.0%	0.8%	99.2%
61	317.9	18.3	0	336.2	94.6%	5.4%	0.0%
62	0.2	18.8	43.6	62.6	0.3%	30.0%	69.6%
63	0	0	382	382	0.0%	0.0%	100.0%
64	248.1	0	0	248.1	100.0%	0.0%	0.0%
65	0.5	0	71.4	71.9	0.7%	0.0%	99.3%
66	478.5	0	0	478.5	100.0%	0.0%	0.0%
67	681.2	0	0	681.2	100.0%	0.0%	0.0%
68	92	0	0	92	100.0%	0.0%	0.0%
69	0.2	0	47.9	48.1	0.4%	0.0%	99.6%
70	221.5	0	0	221.5	100.0%	0.0%	0.0%
71	0.5	0	110.3	110.8	0.5%	0.0%	99.5%
72	52.5	0	0	52.5	100.0%	0.0%	0.0%
73	0.3	0	238.3	238.6	0.1%	0.0%	99.9%
74	526.6	0	0	526.6	100.0%	0.0%	0.0%
75	0	0	3.3	3.3	0.0%	0.0%	100.0%
76	197.2	0	0	197.2	100.0%	0.0%	0.0%
77	0	0	8.2	8.2	0.0%	0.0%	100.0%
78	0	0	68.8	68.8	0.0%	0.0%	100.0%
79	133.7	0	2.4	136.1	98.2%	0.0%	1.8%
80	0.3	0	5.1	5.4	5.6%	0.0%	94.4%
81	37.6	0	33.8	71.4	52.7%	0.0%	47.3%
82	466.7	0	4.9	471.6	99.0%	0.0%	1.0%
83	56.9	0	43.1	100	56.9%	0.0%	43.1%
Total	**14462.8**	**747.1**	**5106.6**	**20316.5**			

Table 2. Minimally-impacted areas and percentages by subbasin

Subbasin	at 95% forest	digitized polygon area (ft^2)	digitized polygon area (acres) = ft^2 *2.2957E-5	Total forest area (acres) - digitized polygon area (acres)	% of total forest area that is minimally-impacted =digitized polygon area (acres)/total forest area (acres)
1	none				
2	none				
3	see map for polygon	20698047	475	611	44%
4	none				
5	none				
6	see map for polygon	8463937	194	238	45%
7	none				
8	NA				
9	none				
10	none				
11	roads throughout polygon				
12	see map for polygon	7610539	175	106	62%
13	none				
14	see map for polygon	15406627	354	47	88%
15	see map for polygon	12570232	289	22	93%
16	none				
17	none				
18	none				
19	none				
20	none				
21	none				
22	NA				
23	NA				
24	none				
25	none				
26	none				
27	NA				
28	NA				
29	NA				
30	NA				
31	see map for polygon	9542656	219	283	44%
32	NA				
33	see map for polygon	12691305	291	92	76%
34	NA				
35	none				
36	none				
37	NA				
38	roads throughout polygon				
39	none				

Subbasin	at 95% forest	digitized polygon area (ft^2)	digitized polygon area (acres) = ft^2 *2.2957E-5	Total forest area (acres) - digitized polygon area (acres)	% of total forest area that is minimally-impacted =digitized polygon area (acres)/total forest area (acres)
40	see map for polygon	2216112	51	170	23%
41	none				
42	none				
43	none				
44	NA				
45	NA				
46	NA				
47	NA				
48	none				
49	NA				
50	NA				
51	none	298084	7	7	49%
52	NA				
53	NA				
54	none				
55	NA				
56	roads throughout polygon				
57	NA				
58	none				
59	NA				
60	NA				
61	none				
62	none				
63	NA				
64	see map for polygon	1594463	37	211	15%
65	none				
66	roads throughout polygon				
67	roads throughout polygon				
68	see map for polygon	2261110	52	40	56%
69	none				
70	see map for polygon	6596376	151	70	68%
71	none				
72	see map for polygon	661055	15	37	29%
73	none				
74	roads throughout polygon				
75	NA				
76	see map for polygon	2560437	59	138	30%
77	NA				
78	NA				
79	see map for polygon	4758898	109	24	82%
80	none				

Subbasin	at 95% forest	digitized polygon area (ft^2)	digitized polygon area (acres) = ft^2 *2.2957E-5	Total forest area (acres) - digitized polygon area (acres)	% of total forest area that is minimally-impacted =digitized polygon area (acres)/total forest area (acres)
81	none				
82	see map for polygon	3193150	73	393	16%
83	none				

Total forest area minimally-impacted areas (acres)	2,551	
Total forest area (acres)	14,463	
% of minimally-impacted areas to entire forest area after taking roads into consideration		18
NA = no forest land use; land use was comprised of either urban or resort or both		

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) REQUIREMENTS

The basin planning process has been certified by the Secretary of Resources as functionally equivalent to the requirement for the preparation of an Environmental Impact Report or Negative Declaration. The Regional Board is required to complete an environmental assessment of any changes the Board proposes to make to the Basin Plan. Staff prepared an Environmental Checklist (Attachment B to the June 2005 TMDL Report), determining that there would be no significant adverse environmental impacts from the proposed Basin Plan Amendment.

Comments on the CEQA analysis were received indicating that specific projects to implement the proposed TMDLs (e.g., alum treatment or dredging) could have environmental impacts and that those impacts should be identified in the CEQA analysis for the TMDLs. Staff has reviewed the environmental checklist in light of these comments and the proposed changes to the Basin Plan amendment/TMDLs discussed above. The checklist has been modified to recognize that there may be certain adverse environmental impacts resulting from the implementation of TMDL projects. These impacts are identified as less than significant or less than significant with the implementation of appropriate mitigation measures. The determination has been revised to indicate that the proposed project (implementation of the TMDLs) may have a significant effect on the environment but that there are mitigation measures available that will substantially lessen any adverse impact. Each of these TMDL implementation projects will be subject to separate, detailed CEQA review. The adoption of the TMDLs per se will not have a direct impact on the environment.

RECOMMENDATION:

Adopt Resolution No. R8-2006-0023, amending Chapter 5 of the Basin Plan to incorporate the Dry Season Nutrient TMDLs for Big Bear Lake shown in the Attachment to the Resolution.

ATTACHMENTS

Attachment A – Tentative Resolution No. R8-2006-0023, with attached proposed (revised) Basin Plan amendment

Attachment B – Responses to comments received from the scientific peer reviewer and from the public

Attachment C – Environmental Checklist

Attachment D – Comment Letters

California Regional Water Quality Control Board
Santa Ana Region

RESOLUTION NO. R8-2006-0023

Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Big Bear Lake

WHEREAS, the California Regional Water Quality Control Board, Santa Ana Region (hereinafter, Regional Board), finds that:

1. An updated Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) was adopted by the Regional Board on March 11, 1994, approved by the State Water Resources Control Board (SWRCB) on July 21, 1994, and approved by the Office of Administrative Law (OAL) on January 24, 1995.

2. The Basin Plan specifies the following beneficial uses for Big Bear Lake: cold freshwater habitat (COLD), warm freshwater habitat (WARM), water contact recreation (REC1), non- contact water recreation (REC2), wildlife habitat (WILD), municipal and domestic supply (MUN), agricultural supply (AGR), rare, threatened or endangered species (RARE) and groundwater recharge (GWR).

3. For COLD designated inland surface waters, the Basin Plan specifies the narrative objective that dissolved oxygen levels shall not be depressed below 6 mg/L. For WARM designated inland surface waters, the Basin Plan specifies the narrative objective that dissolved oxygen levels shall not be depressed below 5 mg/L.

4. The narrative objectives pertaining to dissolved oxygen are not being met consistently in Big Bear Lake, as demonstrated by relevant monitoring.

5. The Basin Plan specifies numeric total phosphorus and total inorganic nitrogen water quality objectives for Big Bear Lake. These water quality objectives were based on ambient concentrations of total phosphorus and total inorganic nitrogen as determined in the 1970s. Evidence now indicates that these objectives are not sufficiently stringent to protect beneficial uses and should be revised. Relevant monitoring demonstrates that these objectives are not consistently met in Big Bear Lake.

6. Proliferation of nuisance aquatic plants has been recorded in Big Bear Lake since the 1970s. Nutrient discharges have promoted the growth of aquatic plants. These nuisance aquatic plants serve as both a sink and a source of nutrients.

7. Big Bear Lake's beneficial uses adversely impacted by nuisance aquatic plants and low dissolved oxygen levels include COLD, WARM, WILD, REC1, REC2 and RARE.

8. As a result of the beneficial use impacts to Big Bear Lake, the Regional Board listed Big Bear Lake as water quality limited in accordance with Section 303(d) of the Clean Water Act. Section 303(d) requires the establishment of a Total Maximum Daily Load (TMDL) for the pollutant(s) causing the impairment. Phosphorus and nitrogen are the nutrients causing the impairment. Section 303(d) also requires the allocation of the TMDL among the sources of nutrient inputs. State law requires an implementation plan and schedule to ensure that the TMDL is met and that compliance with water quality standards is achieved.

9. The Basin Plan amendment shown in the attachment to this Resolution was developed in accordance with Clean Water Act Section 303(d) and Water Code Section 13240 *et seq*. The amendment is proposed for incorporation into Chapter 5 "Implementation", of the Basin Plan. The proposed Basin Plan amendment includes background information concerning the water quality impairment being addressed and the sources of nutrients to Big Bear Lake. The proposed TMDLs are supported by a detailed report prepared by Regional Board staff and titled "Staff Report on the Nutrient Total Maximum Daily Loads for Big Bear Lake", June 2005 (hereinafter, "TMDL Report").

10. The Basin Plan amendment specifies numeric targets for total phosphorus and total nitrogen. Control of nitrogen and phosphorus is needed to ensure compliance with relevant numeric and narrative water quality objectives specified in the Basin Plan, and to prevent adverse beneficial use impacts resulting from the proliferation of nuisance aquatic plants.

11. The Basin Plan amendment specifies response numeric targets for chlorophyll *a,* macrophyte coverage and percentage of nuisance aquatic vascular plant species for Big Bear Lake. These response numeric targets provide a method to track improvements in water quality resulting from reductions in the loading of nitrogen and phosphorus.

12. The numeric targets apply to all hydrological conditions.

13. The Basin Plan amendment specifies TMDLs, wasteload allocations for point source discharges (WLAs), load allocations for nonpoint source discharges (LAs) for total phosphorus and total nitrogen for Big Bear Lake for Dry Hydrological Conditions only.

14. The TMDLs for Dry Hydrological Conditions specify a reduction in nitrogen and phosphorus from internal nutrient sources, which are lake sediment and macrophytes.

15. The TMDLs for Dry Hydrological Conditions do not specify nutrient reductions from external watershed sources, which include resorts, urban discharges and open space/forested lands.

16. The Basin Plan amendment specifies an implementation plan for nutrient reduction. The implementation plan includes compliance schedules for the numeric targets, TMDLs, wasteload allocations and load allocations, as well as a monitoring program to track progress toward compliance.

17. The Implementation Plan specifies a requirement for the development of TMDLs, WLAs, and LAs for wet and/or average hydrological conditions once sufficient data are obtained.

18. Given the complex nature of Big Bear Lake, the Implementation Plan specifies the development of a Lake Management Plan that will address competing uses, nutrient reduction strategies and other plans to control nutrient discharges and aquatic plants as appropriate.

19. The Basin Plan amendment will assure the reasonable protection of the beneficial uses of surface waters within the Region and is consistent with the state's antidegradation policy (SWRCB Resolution No. 68-16).

20. The Regional Board has considered the costs associated with implementation of this amendment, as well as costs resulting from failure to implement nutrient control measures necessary to prevent adverse effects on beneficial uses. The implementation plan in the Basin Plan, which includes extended compliance schedules and employs a phased TMDL approach to provide for refinement

based on additional studies and analyses, will ensure that implementation expenditures are reasonable and fairly apportioned among dischargers.

21. Review of the potential environmental impacts of the adoption and implementation of the Big Bear Lake Nutrient TMDLs was conducted. The adoption of the TMDLs would have no direct effect on the environment. The implementation of projects that may be conducted to implement the Nutrient TMDLs is expected to have less than significant impacts or less than significant impacts with application of mitigation measures on the following: air quality, biological resources, hazards and hazardous materials, hydrology and water quality, noise, aesthetics and transportation and traffic. As projects to implement the TMDLs are developed, specific environmental impacts and mitigation measures to address those impacts are subject to thorough and separate evaluation pursuant to the California Environmental Quality Act (CEQA).

22. Provided that appropriate mitigation is implemented, projects designed and conducted to achieve the TMDLs are expected to have less than significant impact, either individually or cumulatively, on fish and/or wildlife species.

23. The adoption of these TMDLs is necessary to reduce loadings of nutrients to Big Bear Lake and to address water quality impairments that arise therefrom.

24. The proposed amendment meets the "Necessity" standard of the Administrative Procedure Act, Government Code, Section 11352, subdivision (b).

25. The Regional Board submitted the relevant technical documents that serve as the basis for the proposed amendment to an external scientific review panel and has considered the comments and recommendations of that panel in drafting the amendment.

26. The proposed amendment will result in revisions to the Basin Plan Chapter 5 "Implementation".

27. The Regional Board discussed this matter at a workshop conducted on August 26, 2005 after notice was given to all interested persons in accordance with Section 13244 of the California Water Code. Based on the discussion at those workshops, the Board directed staff to prepare the appropriate Basin Plan amendment and related documentation to incorporate the Big Bear Lake Nutrient TMDLs.

28. The Regional Board prepared and distributed written reports (staff reports) regarding adoption of the Basin Plan amendment in accordance with applicable state and federal environmental regulations (California Code of Regulations, Section 3775, Title 23, and 40 CFR Parts 25 and 131).

29. The process of basin planning has been certified by the Secretary for Resources as exempt from the requirement of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) to prepare an Environmental Impact Report or Negative Declaration. The Basin Plan amendment package includes staff reports, an Environmental Checklist, an assessment of the potential environmental impacts of the Basin Plan amendment, and a discussion of alternatives. The Basin Plan amendment, Environmental Checklist, staff reports, and supporting documentation are functionally equivalent to an Environmental Impact Report or Negative Declaration.

30. On March 3, 2006, the Regional Board held a Public Hearing to consider the Basin Plan amendment. Notice of the Public Hearing was given to all interested persons and published in accordance with Water Code Section 13244.

31. The Basin Plan amendment must be submitted for review and approval by the State Water Resources Control Board (SWRCB), Office of Administrative Law (OAL) and U.S. Environmental Protection Agency (USEPA). Once approved by the SWRCB, the amendment is submitted to OAL and USEPA. The Basin Plan amendment will become effective upon approval by OAL and USEPA. A Notice of Decision will be filed.

32. The Notice of Filing, the TMDL Report, environmental checklist, and the draft amendment were prepared and distributed to interested individuals and public agencies for review and comment, in accordance with state and federal regulations (23 CCR §3775, 40 CFR 25 and 40 CFR 131).

33. For the purposes of specifying compliance schedules in NPDES permits for effluent limitations necessary to implement these TMDLs, the schedule(s) specified in these TMDLs shall govern, notwithstanding other compliance schedule authorization language in the Basin Plan.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Regional Board adopts the amendment to the Water Quality Control Plan for the Santa Ana River Basin (Region 8), as set forth in the attachment.

2. The Executive Officer is directed to forward copies of the Basin Plan amendment to the SWRCB in accordance with the requirements of Section §13245 of the California Water Code.

3. The Regional Board requests that the SWRCB approve the Basin Plan amendment, in accordance with Sections §13245 and §13246 of the California Water Code, and forward it to the OAL and U.S. EPA for approval.

4. If, during its approval process, Regional Board staff, SWRCB or OAL determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Board of any such changes.

5. The Executive Officer is authorized to sign a Certificate of Fee Exemption in lieu of payment of the California Department of Fish and Game filing fee.

I, Gerard J. Thibeault, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Santa Ana Region, on March 3, 2006.

_____

Gerard J. Thibeault
Executive Officer

ATTACHMENT TO RESOLUTION NO. R8-2006-0023 ~~2005-0002~~

(Proposed changes to the Basin Plan amendment presented on August 26, 2005 are shown in strikeout for deletions and underline for additions)

Draft

(NOTE: The following language is proposed to be inserted into Chapter 5 of the Basin Plan. If the amendments are approved, corresponding changes will be made to the Table of Contents, the List of Tables, page numbers, and page headers in the plan. Due to the two-column page layout of the Basin Plan, the location of tables in relation to text may change during final formatting of the amendments. For formatting purposes, the maps may be redrawn for inclusion in the Basin Plan, and the final layout may differ from that of the draft.)

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Big Bear Lake

Big Bear Lake, located in the San Bernardino Mountains, was created by the construction of the Bear Valley Dam in 1884. The Lake has a surface area of approximately 3,000 acres, a storage capacity of 73,320 acre-ft and an average depth of 24 feet. The lake reaches its deepest point of 72 feet at the dam. The Big Bear Lake drainage basin encompasses 37 square miles and includes more than 10 streams. Local stream runoff and precipitation on the Lake are the sole source of water supply to the Lake. The spillway altitude is 6743.2 feet. The major inflows to the lake are creeks, including Rathbone (Rathbun) Creek, Summit Creek, and Grout Creek. Outflow from the Lake is to Bear Creek, which is tributary to the Santa Ana River at about the 4000-foot elevation level. Twelve percent of Big Bear Lake's drainage basin consists of the Lake itself. The US Forest Service is the largest landowner in the Big Bear area. Two ski resorts, Bear Mountain and Snow Summit, lease land from the Forest Service.

The beneficial uses of Big Bear Lake include cold freshwater habitat (COLD), warm freshwater habitat (WARM), water contact recreation (REC1), non contact water recreation (REC2), municipal and domestic supply (MUN), agriculture supply (AGR), groundwater recharge (GWR), wildlife habitat (WILD) and rare, threatened or endangered species (RARE).

Big Bear Lake is moderately eutrophic. During the summer months, d~~D~~eeper water ~~during the summer months~~ may exhibit severe oxygen deficits. Nutrient enrichment has resulted in the growth of aquatic plants, which has impaired the fishing, boating, and swimming uses of the lake. To control this vegetation, mechanical harvesters are used to remove aquatic plants, including roots.

Toxics may be entering the Big Bear Lake watershed and accumulating in aquatic organisms and bottom sediments at concentrations that are of concern, not only for the protection of aquatic organisms, but for the protection of human health as well. Past Toxic Substances Monitoring Program data have indicated the presence of copper, lindane, mercury, zinc, and PCBs in fish tissue.

During 1992-93, the Regional Board conducted a Phase I Clean Lakes study (Section 314 of the Clean Water Act) to evaluate the current water quality condition of the lake and its major tributaries [Ref. 20]. The focus of the study was to identify the tributaries responsible for inputs of toxics and nutrients. As a result of data collected in the Clean Lakes Study, Big Bear Lake and specific tributaries were placed on the 1994 Clean Water Act Section 303(d) List of Water Quality Limited Segments for the reasons indicated in Table 5-9a-b.

Table 5-9a-b

Big Bear Lake Watershed Waterbodies on the
1994 303(d) List of Impaired Waters

WATERBODY	STRESSOR
Big Bear Lake	nutrients
	noxious aquatic plants
	sedimentation/siltation
	metals
	copper
	mercury
Rathbone (Rathbun) Creek	nutrients
	sedimentation/siltation
Grout Creek	metals
	nutrients
Summit Creek	nutrients
Knickerbocker Creek	metals
	pathogens

In 2000, the Regional Board convened a TMDL workgroup to assist in the ~~initiated~~ development of Total Maximum Daily Loads for the Big Bear Lake watershed. The Big Bear Municipal Water District, a key contributor to the workgroup, created the Big Bear Lake TMDL Task Force, including representatives of the District, Regional Board staff, the San Bernardino County Flood Control District, the City of Big Bear Lake, the Big Bear Area Regional Wastewater Authority, the State of California, Department of Transportation (Caltrans), the USFS and the Big Bear Mountain Resorts. Initial TMDL development efforts were focused on nutrients, leading to Regional Board adoption of nutrient TMDLs for dry hydrological conditions for Big Bear Lake in 2006. Nutrient TMDLs for wet and/or average hydrological conditions will be incorporated in the Basin Plan when these TMDLs are developed in the future. As shown in Table 5-9a-f, the development of these TMDLs is a requirement of the adopted TMDL implementation plan for nutrient TMDLs for dry hydrological conditions.

1. Big Bear Lake Nutrient Total Maximum Daily Loads (TMDLs)

Past studies, starting in 1968/1969, have shown that Big Bear Lake is eutrophic and that the limiting nutrient is generally phosphorus. In Big Bear Lake, nutrients (nitrogen and phosphorus) are available in the water column and sediment and are taken up by aquatic macrophytes and algae. Nutrients are also bound in living and dead organic material, primarily macrophytes and algae. Decomposition of this organic material, as well as macrophyte and algal respiration, consumes dissolved oxygen, resulting in the depletion of dissolved oxygen from the water column. Oxygen depletion in the hypolimnion results in anoxic conditions, leading to periodic fish kills in Big Bear Lake. Oxygen depletion also results in the release of nutrients from the sediment into the water column, promoting more algae and aquatic macrophyte production. Nutrients released by plant decomposition are cycled back into a bioavailable form.

Although aquatic macrophytes provide protection from shoreline erosion, habitat for fish and other aquatic biota and waterfowl habitat, excessive growth of noxious and nuisance species, particularly Eurasian

watermilfoil (*Myriophyllum spicatum*) impairs recreational uses of the Lake and reduces plant and animal species and habitat diversity.

As stated above, development of nutrient TMDLs to address these problems was initiated in 2000. In this process, it was recognized that insufficient data for wet or average hydrological conditions were available to allow calibration of the lake water quality model used to calculate the TMDLs. Accordingly, TMDLs were developed to address dry hydrologic conditions only (see Section 1.B., below). These TMDLs were adopted by the Regional Board in 2006 and became effective on [date]. The implementation plan included with these TMDLs specifies a requirement for the development of nutrient TMDLs for wet and/or average hydrological conditions.

A key step in the development of the nutrient TMDLs was the identification of the numeric targets to be achieved. The numeric targets, identified in Section 1.A., below, do not vary based upon hydrological condition. Like the approved TMDLs for dry hydrological conditions, the TMDLs for wet and/or average hydrological conditions that will be developed are expected to assure that these numeric targets are achieved, unless modifications to the targets are demonstrated to be necessary and appropriate.

~~A TMDL technical report prepared by Regional Board staff describes the nutrient related problems in Big Bear Lake in greater detail and discusses the technical basis for the TMDLs that follow [Ref. # 1].~~

1.A. Numeric Targets

As shown in Table 5-9a-c, both "causal and response" ~~interim and final~~ numeric targets are specified for Big Bear Lake. Causal targets are those for phosphorus and nitrogen, the principal nutrients responsible for plant growth. Phosphorus is the primary limiting nutrient in Big Bear Lake, and nitrogen can be a limiting nutrient under certain conditions. Response targets include macrophyte coverage, percentage of nuisance aquatic vascular plant species and chlorophyll *a* concentrations. These response targets are more direct indicators of impairment and are specified to assess and track water quality improvements in Big Bear Lake.

A weight of evidence approach will be used to assess compliance with the TMDLs, which means that data pertaining to all the numeric targets will be evaluated and non-compliance with one target will not automatically imply non-compliance with the TMDLs.

Table 5-9a-c

Big Bear Lake Nutrient TMDL Numeric Targets[a]

Indicator	Target Value
Total P concentration ~~(interim)~~	Annual average[b] no greater than 35 µg/L; to be attained no later than 2015 (dry season), 2020 (all other times) ~~2010~~
~~Total P concentration (final)~~	~~Annual average[b] no greater than 20 µg/L; to be attained no later than 2015~~
Total N concentration ~~(final)~~	Annual average[b] no greater than 1000 µg/L; to be attained no later than 2015 (dry season), 2020 (all other times) ~~2015~~
Macrophyte Coverage	30-60% on a total area basis; to be attained by 2015 (dry season), 2020 (all other times) ~~2015~~[c]
Percentage of Nuisance Aquatic Vascular Plant Species ~~(final)~~	95% eradication on a total area basis of Eurasian Watermilfoil and any other invasive aquatic plant species; to be attained no later than 2015 (dry season), 2020 (all other times) ~~2015~~[c]
Chlorophyll *a* concentration ~~(interim)~~	Growing season[d] average no greater than 14~~10~~ µg/L; to be attained no later than 2015 (dry season), 2020 (all other times)~~2010~~
~~Chlorophyll *a* concentration (final)~~	~~Growing season[d] average no greater than 5.0 µg/L; to be attained no later than 2015~~

[a] Compliance with the targets to be achieved as soon as possible, but no later than the date specified

[b] Annual average determined by the following methodology: the nutrient data from both the photic composite and discrete bottom samples are averaged by station number and month~~time~~; a calendar year average is obtained for each sampling location by averaging the average of each month; and finally, the separate annual averages for each location are averaged to determine the lake-wide average. The open-water sampling locations used to determine the annual average are MWDL1, MWDL2, MWDL6, and MWDL9 (see 1.B.4~~E~~. Implementation, Task 4.2, Table 5-9a-i).

[c] Calculated as a 5-yr running average based on measurements taken at peak macrophyte growth as determined in the Aquatic Plant Management Plan (see 1.B.4. ~~E~~. Implementation, Task 6C~~8~~)

[d] Growing season is the period from May 1through October 31 of each year. The open-water sampling locations used to determine the growing season average are MWDL1, MWDL2, MWDL6 and MWDL9 (see 1.B.4. Implementation, Task 4.2, Table 5-9a-i). The chlorophyll *a* data from the photic samples are averaged by station number and month; a growing season average is obtained for each sampling location by averaging the average of each month; and finally, the separate growing season averages for each location are averaged to determine the lake-wide average.

1.B. Big Bear Lake Nutrient Total Maximum Daily Loads (TMDLs) for Dry Hydrological Conditions

The TMDL technical report [Ref. #1] describes in detail the technical basis for the TMDLs for Dry Hydrological Conditions that follow.

1.-B.1. Nutrient TMDLs, WLAs and LAs and Compliance Dates – Dry Hydrological Conditions

TMDLs, and the WLAs and LAs necessary to achieve them, are established for total phosphorus and total nitrogen for dry hydrological conditions only. As stated above, phosphorus and nitrogen are the nutrients that cause beneficial use impairment in Big Bear Lake. Dry hydrological conditions are defined by the conditions observed from 1999-2003; that is, average tributary inflow to Big Bear Lake ranging from 0 to –3,049 AF, average lake levels ranging from 6671 to 6735 feet and annual precipitation ranging from 0 to 23 inches. TMDLs, WLAs and LAs for wet and/or average hydrological conditions will be established as part of the TMDL Phase 2 activities once additional data have been collected (see 1.~~E~~B.4. TMDL Implementation, Task 9 ~~12, below~~).

The phosphorus and nitrogen TMDLs for Big Bear Lake for dry hydrological conditions are shown in Table 5-9a-d. Wasteload allocations for point source discharges and load allocations for nonpoint source discharges are shown in Table 5-9a-e.

Table 5-9a-d

Big Bear Lake Nutrient TMDLs for Dry Hydrological Conditions

	Total Phosphorus (lbs/yr) [be]	**Total Nitrogen (lbs/yr)[be]**
~~Interim~~ TMDL[a]	26,012	280,900~~N/A~~
~~Final TMDL[b]~~	~~21,735~~	~~280,900~~

[a] ~~Interim~~ Ceompliance to be achieved as soon as possible, but no later than December 31, 2015~~2010~~.

~~[b] Final compliance to be achieved as soon as possible, but no later than December 31, 2015.~~

[be] Specified as an annual average for dry hydrological conditions only.

Table 5-9a-e

Big Bear Lake
Nitrogen and Phosphorus Wasteload and Load Allocations for Dry Hydrological Conditions

Big Bear Lake Dry Conditions Nutrient TMDLs	**~~Interim~~ Total Phosphorus Load Allocation (lbs~~kg~~/yr)[a, be]**	**~~Final Total Phosphorus Load Allocation (kg/yr)~~[b, e]**	**~~Final~~ Total Nitrogen Load Allocation (lbs~~kg~~/yr)[a, b, e]**
TMDL	**26,012**	**~~21,735~~**	**280,900**
WLA	**475**	**~~475~~**	**3,445**
Urban	475	~~475~~	3,445
LA	**25,537**	**~~21,260~~**	**277,455**
Internal Sediment	8,555	~~4,278~~	152,386
Internal macrophyte	15,700	~~15,700~~	102,324
Atmospheric Deposition	1,074	~~1,074~~	21,474
Forest	175	~~175~~	460
Resort	33	~~33~~	811

[a] ~~Interim~~ Aallocation compliance to be achieved as soon as possible, but no later than December 31, 2015~~2010~~.

[b] ~~Final allocation compliance to be achieved as soon as possible, but no later than December 31, 2015~~.

[be] Specified as an annual average for dry hydrological conditions only.

1.B.2.~~C~~. Margin of Safety

The Big Bear Lake Nutrient TMDLs for Dry Hydrological Conditions include an implicit margin of safety (MOS) as follows:

1. The derivation of numeric targets based on the 25th percentile of nutrient data;
2. The use of conservative assumptions in modeling the response of Big Bear Lake to nutrient loads.

1.B.3.~~D~~. Seasonal Variations/Critical Conditions

The critical condition for attainment of aquatic life and recreational uses in Big Bear Lake occurs during the summer and during dry years, when nutrient releases from the sediment are greatest and water column concentrations increase. Macrophyte biomass peaks in the summer/early fall. Recreational uses of the lake are also highest during the summer. These nutrient TMDLs for Big Bear Lake are focused on the critical dry hydrological conditions and, in particular, on the control of the internal sediment loads that dominate during these periods. These are the first phase of TMDLs needed to address eutrophication in Big Bear Lake. The next phase will include collection of data needed to refine the in-lake and watershed models (see 1.B.4. TMDL Implementation, Task 6A) and

to develop TMDLs that address other hydrological conditions (see 1.B.4.~~E~~. TMDL Implementation, Task 9).

The TMDLs recognize that different nutrient inflow and cycling processes dominate the lake during different seasons. These processes were simulated in the in-lake model using data collected during all seasons over a multi-year period. Thus, the model results reflect all seasonal variations. The numeric targets are expressed as annual averages. The intent is to set targets that will, when achieved, result in improvement of the trophic status of the Big Bear Lake year-round.

Compliance with numeric targets will ensure water quality improvements that prevent excessive algae blooms and fish kills, particularly during the critical summer period when these problems are most likely to occur.

1.B.4.~~E~~. TMDL Implementation

Table 5-9a-f outlines the tasks and schedules to implement the TMDLs for Dry Hydrological Conditions. Each of these tasks is described below.

Table 5-9a-f

Big Bear Lake Nutrient TMDL Implementation
Plan/Schedule Report Due Dates

Task	Description	Compliance Date-As soon As Possible but No Later Than
TMDL Phase 1		
Task 1	Establish New Waste Discharge Requirements for -Nutrient Sources	*(*6 months after BPA approval*)*
Task 2	Establish New Waste Discharge Requirements for Lake Restoration Activities	*(*18 months after BPA approval*)*
Task 3	Revise Existing Waste Discharge Requirements	*(*6 months after BPA approval*)*
Task 4	Nutrient Water Quality Monitoring Program 4.1 -Watershed-wide Nutrient Monitoring Plan(s) 4.2 Big Bear Lake Nutrient Monitoring Plan(s)	Plan/schedule due *(*3 months after BPA approval*)* Annual reports due February 15
Task 5	Atmospheric Deposition Determination	Plan/schedule due *(*1 year after BPA approval*)*
Task 6	Big Bear Lake – Lake Management Plan, including: 6A. Big Bear Lake and Watershed Model Updates 6B. Big Bear Lake In-Lake Sediment Nutrient Reduction Plan 6C. Big Bear Lake Aquatic Plant Management Plan	Plan/schedule due *(*1 year after BPA approval*)* Annual reports due February 15
~~Task 6~~	~~Big Bear Lake and Watershed Model Updates~~	~~Plan/schedule due *(*6 months after BPA approval*)*~~
~~Task 7~~	~~Big Bear Lake In-Lake Sediment Nutrient Reduction Plan~~	~~Plan/schedule due *(*1 year after BPA approval*)*~~
~~Task 8~~	~~Big Bear Lake Aquatic Plant Management Plan~~	~~Plan/schedule due *(*1 year after BPA approval)**~~ ~~5 year report due (*5 years after Regional Board approval of plan/schedule); thereafter, annual reports due February 15~~
~~Task 99~~	~~Big Bear Lake Multimetric Index Development Plan~~	~~Plan/schedule due *(*1 year after BPA approval*)*~~
TMDL Phase 2		

Task ~~7~~10	Review/Revision ~~and Revise~~ of Big Bear Lake Water Quality Standards~~Nutrient Water Quality Objectives~~ 7.1 Review/Revise Nutrient Water Quality Objectives 7.2 Development of biocriteria 7.3 Development of natural background definition	December 31, 2015~~2010~~
Task ~~8~~11	Review Big Bear Lake Tributary Data	December 31, 2008
Task ~~9~~12	Develop TMDLs, WLAs and LAs for wet and/or average hydrological conditions	December 31, 2012
Task 10~~13~~	Review of TMDLs/WLAs/LAs	Once every 3 years

[Note: BPA => Basin Plan Amendment]

Task 1: Establish New Waste Discharge Requirements for Nutrient Sources

On or before (**6 months from the effective date of this BPA*), the Regional Board shall issue the following new waste discharge requirements

1.1 Waste Discharge Requirements (WDRs) or Conditional Waiver of WDRs to the US Forest Service to incorporate the nutrient load allocations, compliance schedule and monitoring and reporting requirements for Forested Areas.

1.2 Waste Discharge Requirements (WDRs) or Conditional Waiver of WDRS to the Big Bear Mountain Resorts to incorporate the nutrient load allocations, compliance schedule and monitoring and reporting requirements.

Other nutrient discharges will be addressed and permitted as appropriate.

Task 2: Establish New Waste Discharge Requirements for Lake Restoration Activities

On or before (**18 months from the effective date of this BPA*), the Regional Board shall issue the following new waste discharge requirements

NPDES Permit to the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts for Lake restoration activities, including, but not limited to alum treatment and/or herbicide treatment. Requirements specified in these Waste Discharge Requirements, shall be developed using the Aquatic Plant Management Plan and Schedule submitted pursuant to Task 6C~~8~~.

Task 3: Review and/or Revise Existing Waste Discharge Requirements

Waste Discharge Requirements (WDRs) have been issued by the Regional Board regulating discharge of various types of wastes in the Big Bear Lake watershed. On or before (**6 months from the effective date of this Basin Plan amendment**), these WDRs shall be reviewed and revised as necessary to incorporate the nutrient wasteload allocations, compliance schedule and TMDL monitoring and reporting requirements.

3.1 Waste Discharge Requirements for the San Bernardino County Flood Control and Transportation District, the County of San Bernardino and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618036 (Regional Board Order No. R8-2002-0012). The current Order has provisions to address TMDL issues. In light of these provisions, revision of the Order may not be necessary to address TMDL requirements.

3.2 State of California, Department of Transportation (Caltrans) Stormwater Permit
Provision E.1 of Order No. 99-06-DWQ requires Caltrans to maintain and implement a Storm Water Management Plan (SWMP). Annual updates of the SWMP needed to maintain an effective program are required to be submitted to the State Water Resources Control Board.

Provision E.2 of Order No. 99-06-DWQ requires Caltrans to submit a Regional Workplan by April 1 of each year for the Executive Officer's approval. As part of the annual update of the SWMP and Regional Workplan, Caltrans shall submit plans and schedules for conducting the monitoring and reporting requirements specified in Task 4 and the special studies required in Tasks ~~6, 7, 8 and 9~~.

Task 4: Monitoring

4.1 Watershed-wide Nutrient Water Quality Monitoring Program

No later than (**3 months from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake and Big Bear Mountain Resorts shall, as a group, submit to the Regional Board for approval a proposed watershed-wide nutrient monitoring program that will provide data necessary to review and update the Big Bear Lake Nutrient TMDLs, to determine specific sources of nutrients and to develop TMDLs for other hydrological conditions. Data to be collected and analyzed shall address, at a minimum, determination of compliance with the nitrogen and phosphorus dry condition TMDLs, including the WLAs and LAs.

At a minimum, the proposed plan shall include the collection of samples at the stations specified in Table 5-9a-g and shown in Figure 5-7, at the frequency specified in Table 5-9a-h. Modifications to the required sampling stations, sampling frequencies and constituents to be monitored (see below) will be considered upon request by the stakeholders, accompanied by a report that describes the rationale for the proposed changes and identifies recommended alternatives. ~~If one or more of these monitoring stations are not included, rationale shall be provided and proposed alternative monitoring locations shall be identified in the proposed monitoring plan.~~ In addition to water quality samples, every two weeks on a year-round basis, visual monitoring (including documenting flow type and stage) determinations shall be made at all stations shown in Table 5-9a-h. Flow measurements will be required each time water quality samples are obtained.

At a minimum, samples shall be analyzed for the following constituents:

- T~~t~~otal nitrogen
- N~~n~~itrate + nitrite nitrogen
- T~~t~~otal phosphorus
- T~~t~~otal dissolved phosphorus
- Suspended sediment concentration~~total suspended solids (TSS)~~
- C~~e~~hlorophyll *a*
- D~~d~~issolved oxygen
- A~~a~~lkalinity
- Bedload concentration
- A~~a~~mmonia nitrogen
- T~~t~~otal dissolved nitrogen
- O~~o~~rtho-phosphate (SRP)
- T~~t~~emperature
- T~~t~~urbidity
- pH
- C~~e~~onductivity
- H~~h~~ardness
- Grain size
- Total nitrogen in sediment
- Total phosphorus in sediment

Note: Chlorophyll *a* to be ~~will only be~~ collected and analyzed only from May 1- October 31 of each year at the frequencies described in Table 5-9a-h; ~~Bear Creek outlet will not be sampled for~~ chlorophyll *a* sampling not required at Bear Creek outlet.

In addition, the proposed plan shall include a proposed plan and schedule for development of a Big Bear Lake Sedimentation Processes Plan for the determination of nutrient loads associated with sediment. At a minimum, the proposed plan shall include the placement of sediment traps at the mouths of Rathbun, Knickerbocker, Grout and Boulder Creeks to determine the rate of influx of sediment and particulate nutrients to Big Bear Lake, as specified in Table 5-9a-g and shown in Figure 5-7, at the specified frequency indicated in Table 5-9a-h. Modifications to the required sampling stations, sampling frequencies and constituents to be

monitored will be considered upon request by the stakeholders, accompanied by a report that describes the rationale for the proposed changes and identifies recommended alternatives. The proposed monitoring plan shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report summarizing the data collected for the year and evaluating compliance with the WLAs/LAs shall be submitted by February 15 of each year.

In lieu of this coordinated monitoring plan, one or more of the parties identified above may submit a proposed individual or group monitoring plan for Regional Board approval. Any such individual or group monitoring plan is due no later than (*3 *months from effective date of this Basin Plan amendment**) and shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report of data collected pursuant to approved individual/group plan(s) shall be submitted by February 15 of each year. The report shall summarize the data and evaluate compliance with the WLAs/LAs.

Table 5-9a-g

Big Bear Lake Watershed
Minimum Required Sampling Station Locations

Station Number	Station Description
MWDC2	Bear Creek Outlet
MWDC3	Grout Creek at Hwy 38
MWDC4	Rathbun Creek at Sandalwood Ave.
MWDC5	Summit Creek at Swan Dr.
MWDC6	Rathbun Creek below the Zoo
MWDC8	Knickerbocker Creek at Hwy 18
MWDC13	Boulder Creek at Hwy 18

Note: Bear Creek outlet to be sampled monthly from March -November

At a minimum, samples shall be analyzed at the frequencies specified in Table 5-9a-h:

Table 5-9a-h

Big Bear Lake Watershed
Sampling Frequency

Flow type	Months monitoring is required	Frequency
Baseflow	January 1 – December 31	Once/month when baseflow is present;
Snowmelt~~-melt~~	January 1 – May 31[1]	Varied -See note 2 below
Storm events	January 1 – December 31	3 storms per year[3]

[1] Sampling to begin after the first substantial snowfall resulting in an accumulation of 1.0 inch or more of snow

[2] Samples to be collected daily for the first three days of the snowmelt~~-melt~~ period. If ambient air temperatures remain above freezing after three days have passed, snowmelt~~-melt~~ sampling will then be performed once a week for the following three weeks or until the snowmelt~~-melt~~ period ceases. Snowmelt~~-melt~~ cessation will be determined by one of the following: a) ambient air temperatures drop below freezing during most of the day; or b) a storm/rain precipitation event occurs after the snowmelt~~-melt~~ event was initiated. Beginning March 15th of each year, snowmelt ~~melt~~ flows will most likely be continuous since ambient air temperatures will usually remain above freezing. From March 15th through May 31 of each year, snowmelt~~-melt~~ sampling events will be conducted daily for the first two days of a snowmelt~~-melt~~ event and then once a week thereafter until the spring runoff period has ended or the tributary station location shows no signs of daily flows for one week. Flow status will be evaluated in the afternoon, when ambient air temperatures are highest and flow potential is greatest.

[3] Two storm events to be sampled during October – March; 1 storm event to be sampled during April – September. For each storm event, eight samples across the hydrograph are to be collected.

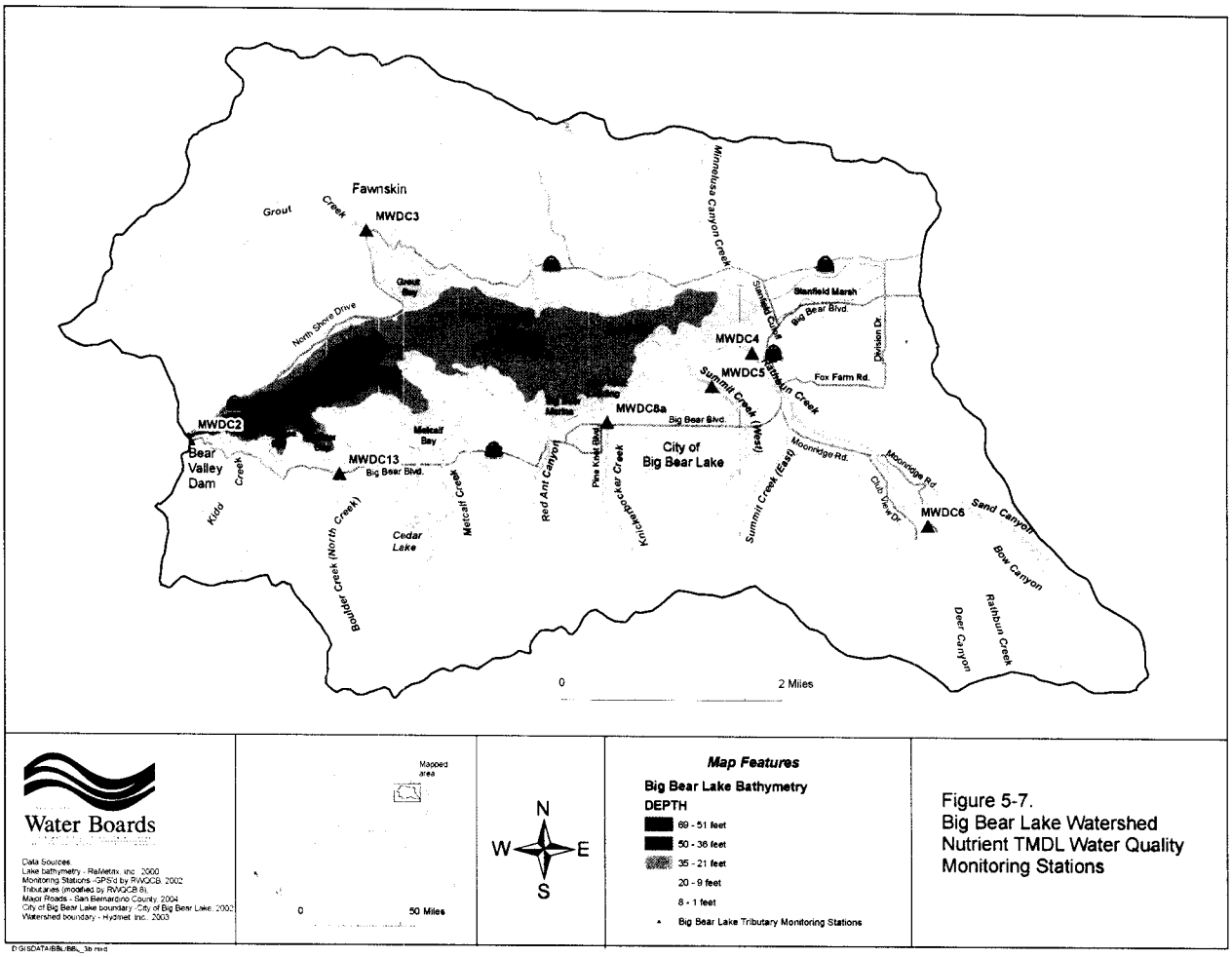

Figure 5-7 – Big Bear Lake Watershed Nutrient TMDL Water Quality Stations

4.2 Big Bear Lake: In-Lake Nutrient Monitoring Program

No later than (**3 months from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts shall, as a group, submit to the Regional Board for approval a proposed Big Bear Lake nutrient monitoring program that will provide data necessary to review and update the Big Bear Lake Nutrient TMDLs, and to develop TMDLs for other hydrological conditions. -Data to be collected and analyzed shall address, at a minimum: (1) determination of compliance with ~~interim and final~~ nitrogen, phosphorus and chlorophyll *a*, numeric targets; and (2) refinement of the in-lake model for the purposes of TMDL review and development.

At a minimum, the proposed plan shall include the collection of samples at the stations specified in Table 5-9a-i and shown in Figure 5-8, at the specified frequency indicated in Table 5-9a-i. Modifications to the required sampling stations, sampling frequencies and constituents to be monitored (see below) will be considered upon request by the stakeholders, accompanied by a report that describes the rationale for the proposed changes and identifies recommended alternatives. With the exception of hardness, alkalinity, total

organic carbon (TOC), dissolved organic carbon (DOC), and chlorophyll *a,* each sample to be analyzed shall be collected as a photic zone composite (from the surface to 2 times the secchi depth) and as a bottom discrete (0.5 meters off the surface bottom) sample. Hardness, alkalinity, TOC, DOC, and chlorophyll *a* -shall be collected as photic zone composites. Dissolved oxygen, water temperature, turbidity, specific conductance, and pH shall be measured at 1-meter intervals from the surface to 0.5 meters from the bottom using a multi-parameter water quality meter. Water clarity shall be measured with a secchi disk.

At a minimum, in-lake samples must be analyzed for the following constituents:

- Sspecific conductance
- Wwater temperature
- Cehlorophyll *a*
- Ttotal nitrogen
- Nnitrate +nitrite nitrogen
- Ttotal phosphorus
- Ttotal hardness
- Ttotal dissolved phosphorus
- Ddissolved organic carbon (DOC)
- Ttotal dissolved nitrogen
- Ddissolved oxygen
- Wwater clarity (secchi depth)
- Aammonia nitrogen
- Aalkalinity
- Tturbidity
- Oortho-phosphate (SRP)
- Ttotal suspended solids (TSS)
- pH
- Ttotal dissolved solids (TDS)
- Ttotal organic carbon (TOC)

The monitoring plan shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report summarizing the data collected for the year and evaluating compliance with the TMDLs/WLAs/LAs~~TMDL~~ shall be submitted by February 15 of each year.

Table 5-9a-i

Big Bear Lake Minimum Required Sampling Station Locations

Station Number	Station Description
MWDL1	Big Bear Lake – Dam
MWDL2	Big Bear Lake – Gilner Point
MWDL6	Big Bear Lake – Mid Lake Middle
MWDL9	Big Bear Lake – Stanfield Middle

Frequency of sampling at all stations: for all constituents except TOC and DOC, monthly from March – November; bi-weekly (i.e., every other week) from June 1 through October 31. TOC and DOC to be monitored four times per year (quarterly) from January through December.

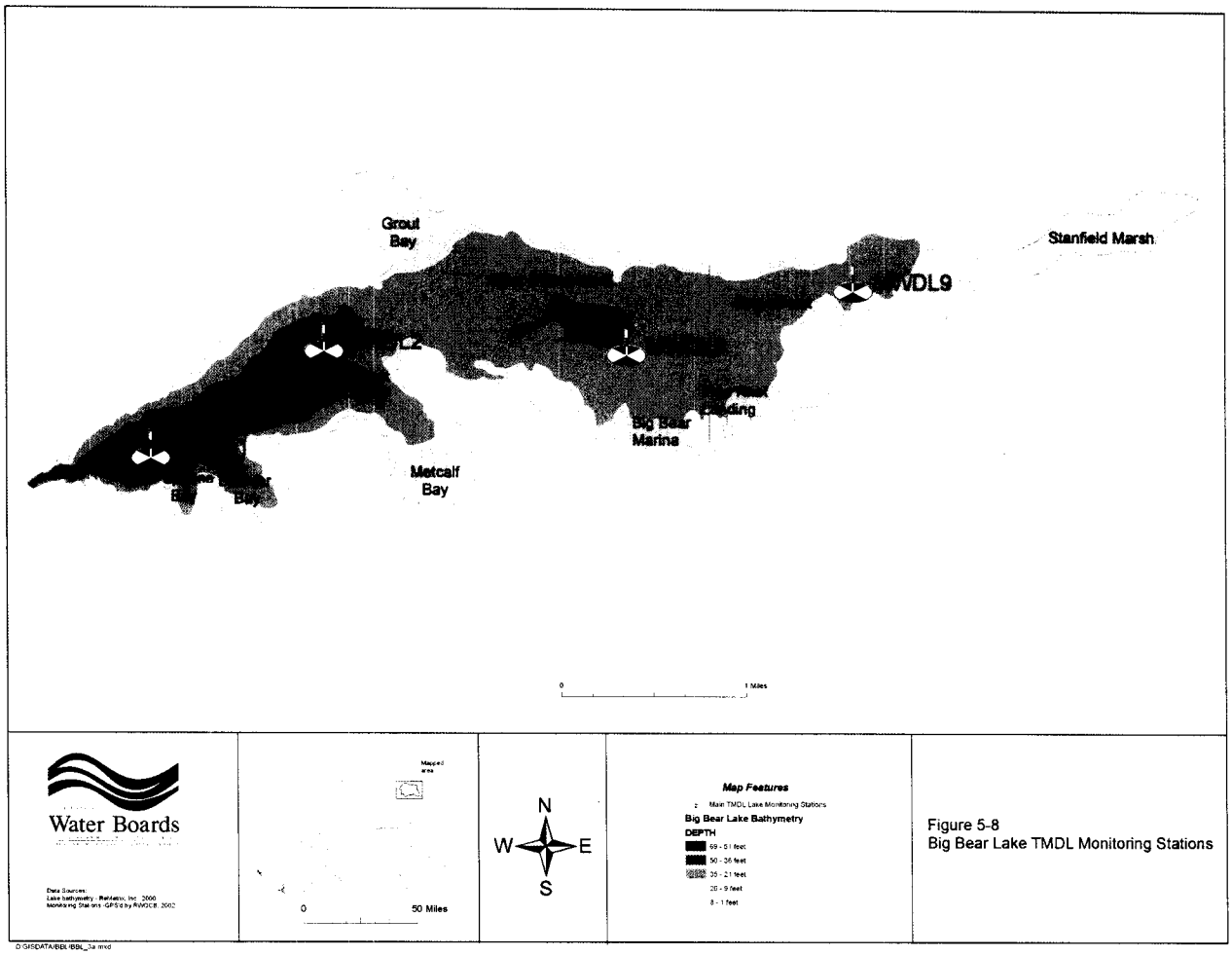

Figure 5-8 Big Bear Lake TMDL Monitoring Stations

In lieu of this coordinated monitoring plan, one or more of the parties identified above may submit a proposed individual or group monitoring plan for Regional Board approval. Any such individual or group monitoring plan is due no later than (*3 *months from effective date of this Basin Plan amendment* *) and shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report of data collected pursuant to approved individual/group plan(s), shall be submitted by February 15 of each year. The report shall summarize the data and evaluate compliance with the numeric targets.

Task 5: Atmospheric Deposition Determination

No later than (**1 year from effective date of this Basin Plan amendment* *), the Regional Board, in coordination with local stakeholders, the South Coast Air Quality Management District and the California Air Resources Board, shall develop a plan and schedule for quantifying atmospheric deposition of nutrients in the Big Bear Lake watershed.

Task 6: Big Bear Lake – Lake Management Plan

No later than (**1 year from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts, shall, as a group, submit to the Regional Board for approval a proposed Lake Management Plan for Big Bear Lake. The purpose of the plan is to identify a coordinated and comprehensive strategy for management of the lake and surrounding watershed to address restoration and protection of the lake's beneficial uses.
The plan shall include the following:

A) A proposed plan and schedule for updating the existing Big Bear Lake watershed nutrient model and the Big Bear Lake in-lake nutrient model. The plan and schedule must take into consideration additional data and information that are or will be generated from the required TMDL monitoring programs (Tasks 4.1 and 4.2, above).

B) A proposed plan and schedule for in-lake sediment nutrient reduction for Big Bear Lake. The proposed plan shall include an evaluation of the applicability of various in-lake treatment technologies to support development of a long-term strategy for control of nutrients from the sediment. The submittal shall also contain a proposed sediment nutrient monitoring program to evaluate the effectiveness of any strategies implemented.

C) The proposed plan shall include an evaluation of the applicability of various in-lake treatment technologies to control noxious and nuisance aquatic plants. The plan shall also include a description of the monitoring conducted and proposed to track aquatic plant diversity, coverage, and biomass. Data to be collected and analyzed shall address, at a minimum, determination of compliance with the numeric targets for macrophyte coverage and percentage of nuisance aquatic vascular plant species (see 1.A., above).

In addition, at a minimum, the proposed plan shall also address the following:

- The plan shall be based on identified and acceptable goals for lake capacity, biological resources and recreational opportunities. Acceptable goals shall be identified in coordination with the Regional Board and other responsible agencies, including the California Department of Fish and Game and the U.S. Fish and Wildlife Service.
- The plan shall include a proposed plan and schedule for the development of biocriteria for Big Bear Lake. (This is intended to complement Regional Board efforts to develop biocriteria and to signal the parties' commitment to participate substantively.)
- The plan must identify a scientifically defensible methodology for measuring changes in the capacity of the lake.
- The proposed plan shall identify recommended short and long-term strategies for control and management of sediment and dissolved and particulate nutrient inputs to the lake.
- The plan shall also integrate the beneficial use survey information required to be developed pursuant to the Regional Board's March 3, 2005, Clean Water Act Section 401 Water Quality Standards Certification for Big Bear Lake Nutrient/Sediment Remediation Project, City of Big Bear Lake, County of San Bernardino, California. The purpose of the beneficial use survey is to correlate beneficial uses of the lake with lake bottom contours. The survey is required to be conducted throughout the lake. The survey will determine the location and the quality of beneficial uses of the lake and the contours of the lake bottom where these uses occur. The survey is expected to be used in regulating future lake dredge projects to maximize the restoration and protection of the lake's beneficial uses.

The Big Bear Lake – Lake Management Plan shall be implemented upon Regional Board approval at a duly noticed public meeting. Once approved, the plan shall be reviewed and revised as necessary at least once

every three years. The review and revision shall take into account assessments of the efficacy of control/management strategies implemented and relevant requirements of new or revised TMDLs for Big Bear Lake and its watershed. An annual report summarizing the data collected for the year and evaluating compliance with the TMDLs/WLAs/LAs shall be submitted by February 15 of each year.

In lieu of this coordinated plan, one or more of the parties identified above may submit a proposed individual or group Big Bear Lake – Lake Management Plan and schedule for approval by the Regional Board. Any such individual or group plan must conform to the requirements specified above and is due no later than *(* 1 year from effective date of the Basin Plan amendment*).* An individual or group plan shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report summarizing the data collected for the year and evaluating compliance with the TMDLs/WLAs/LAs shall be submitted by February 15 of each year.

~~**Task 6: Update of Watershed and In-Lake Nutrient Models**~~

~~No later than (**6 months from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts, shall, as a group, submit to the Regional Board for approval a proposed plan and schedule for updating the existing Big Bear Lake Watershed Nutrient Model and the Big Bear Lake in-lake nutrient model. The plan and schedule must take into consideration additional data and information that are or will be generated from the respective TMDL monitoring programs (Tasks 4. 1 and 4.2, above).~~

~~The plan for updating the Watershed and In-lake Models shall be implemented upon Regional Board approval at a duly noticed public meeting.~~

~~In lieu of this coordinated plan, one or more of the parties identified above may submit a proposed individual or group Watershed and In-lake Nutrient Model Update Plan for approval by the Regional Board. Any such individual or group Plan is due no later than (**6 months from effective date of this Basin Plan amendment**) and shall be implemented upon Regional Board approval at a duly noticed public meeting.~~

~~**Task 7: Big Bear Lake Sediment Nutrient Reduction Plan**~~

~~No later than (**1 year from effective date of this Basin Plan amendment* *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts, shall, as a group, submit to the Regional Board for approval a proposed plan and schedule for in-lake sediment nutrient reduction for Big Bear Lake. The proposed plan shall include an evaluation of the applicability of various in-lake treatment technologies to support development of a long-term strategy for control of nutrients from the sediment. The submittal shall also contain a proposed sediment nutrient monitoring program to evaluate the effectiveness of any strategies implemented.~~

~~The Big Bear Lake In-lake Sediment Nutrient Reduction Plan shall be implemented upon Regional Board approval at a duly noticed public meeting.~~

~~In lieu of this coordinated plan, one or more of the parties identified above may submit a proposed individual or group In-lake Sediment Nutrient Reduction Plan for approval by the Regional Board. Any such individual~~

~~or group Plan is due no later than (*1 year from effective date of this Basin Plan amendment*) and shall be implemented upon Regional Board approval at a duly noticed public meeting.~~

~~Task 8: Big Bear Lake Aquatic Plant Management Plan~~

~~No later than (*1 year from effective date of this Basin Plan amendment *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts, shall, as a group, submit to the Regional Board for approval a proposed plan and schedule for management of in-lake aquatic plants (macrophytes). The proposed plan shall include an evaluation of the applicability of various in-lake treatment technologies to control the presence of noxious and nuisance aquatic plants. The plan shall also include monitoring and tracking aquatic plants. Data to be collected and analyzed shall address, at a minimum, determination of compliance with the final numeric targets for macrophyte coverage and percentage of nuisance aquatic vascular plant species (see 1.B, above).~~

~~The Big Bear Lake Aquatic Plant Management Plan shall be implemented upon Regional Board approval at a duly noticed public meeting. A report summarizing the data collected each year during the initial 5-year period and evaluating compliance with the numeric targets shall be submitted by February 15 after the first 5-year period. Thereafter, the report shall be submitted annually by February 15 of each year.~~

~~In lieu of this coordinated plan, one or more of the parties identified above may submit a proposed individual or group Aquatic Plant Management Plan for approval by the Regional Board. Any such individual or group Plan is due no later than (*1 year from effective date of this Basin Plan amendment*) and shall be implemented upon Regional Board approval at a duly noticed public meeting. A report summarizing the data collected each year during the initial 5-year period and evaluating compliance with the numeric targets shall be submitted by February 15 after the first 5-year period. Thereafter, the report shall be submitted annually by February 15 of each year.~~

~~Task 9: Big Bear Lake Multimetric Index Development Plan~~

~~No later than (*1 year from effective date of this Basin Plan amendment *), the US Forest Service, the State of California, Department of Transportation (Caltrans), the County of San Bernardino, San Bernardino County Flood Control District, the City of Big Bear Lake, and Big Bear Mountain Resorts, shall, as a group, submit to the Regional Board for approval a proposed plan and schedule for development of a multimetric index for Big Bear Lake. At a minimum, the plan shall include procedures for incorporating biological, chemical and physical parameters to be used for evaluating Big Bear Lake. The plan shall also include sampling recommendations to calculate trophic state, aquatic macrophyte biomass and species, fish assemblages, shore-zone habitat, phytoplankton, and zooplankton for effective assessment. These monitoring recommendations should be integrated with ongoing in-lake and watershed monitoring (Tasks 4.1 and 4.2).~~

~~The Big Bear Lake Multimetric Management Plan shall be implemented upon Regional Board approval at a duly noticed public meeting.~~

~~In lieu of this coordinated plan, one or more of the parties identified above may submit a proposed individual or group Multimetric Index Development Plan and schedule for approval by the Regional Board. Any such individual or group Plan is due no later than (*1 year from effective date of this Basin Plan amendment*) and shall be implemented upon Regional Board approval at a duly noticed public meeting.~~

Task ~~7~~10: Review and Revision of Big Bear Lake Water Quality Standards~~Water Quality Objectives~~

By December 31, 2015~~2010~~, the Regional Board shall:

7.1 R~~-e~~view/revise ~~and revise~~ as necessary the total inorganic nitrogen and total phosphorus numeric water quality objectives for Big Bear Lake. The Regional Board shall also consider the development of narrative or numeric objectives for other indicators of impairment (e.g., chlorophyll *a*, macrophyte coverage and species composition), in lieu of or in addition to review/revision of the numeric objectives for phosphorus and nitrogen.

7.2 Develop biocriteria for Big Bear Lake.

7.3 Develop a definition for natural background sources of nutrients (and other constituents) to Big Bear Lake and its tributaries.

Given budgetary constraints, completion of these~~is~~ tasks are~~is~~ likely to require substantive contributions from interested parties.

Task 8~~11~~: Review of Big Bear Lake Tributary Data

No later than December 2008, the Regional Board shall review data collected on Rathbun Creek, Summit Creek and Grout Creek to determine whether beneficial uses of these tributaries are impaired by nutrients. If the Creeks are found to be impaired by nutrients, the Regional Board shall develop a TMDL development project plan and schedule.

If these tributaries are found not to be impaired by nutrients, Regional Board shall schedule the delisting of the tributaries from the 303(d) list of impaired waters at the earliest opportunity.

Task 9~~12~~: Development of TMDLs for Wet and/or Average ~~and/or Wet~~ Hydrological Conditions

No later than December 31, 2012, the Regional Board shall utilize additional water quality data and information collected pursuant to monitoring program requirements (Tasks 4 and 5) and model updates (Task 6A) to develop proposed nutrient TMDLs for Big Bear Lake for wet~~average~~ and/or average~~wet~~ hydrological conditions. Completion of this task is contingent on the collection of requisite data for wet and/or average hydrological conditions.

Task 10~~13~~: Review/Revision of the Big Bear Lake Dry Hydrological Conditions Nutrient TMDL (TMDL "Re-opener")

The basis for the Dry Hydrological Conditions TMDLs and implementation plan and schedule will be re-evaluated at least once every three years[1] to determine the need for modifying the allocations, numeric targets and TMDLs. Regional Board staff will continue to review all data and information generated pursuant to the TMDL requirements on an ongoing basis. Based on results generated through the monitoring programs, special studies and/or modeling analyses, changes to the TMDLs may be warranted. Such changes will be considered through the Basin Plan Amendment process.

The Regional Board is committed to the review of these TMDLs every three years, or more frequently if warranted by these or other studies.

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[1] The three-year schedule is tied to the 3 year triennial review schedule.

References

1. California Regional Water Quality Control Board, Santa Ana Region. Staff Report on the Nutrient Total Maximum Daily Loads for Big Bear Lake, June~~May~~, 2005.

ATTACHMENT B
RESPONSE TO COMMENTS

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NOTE: Data and information submitted recently by the Big Bear Municipal Water District indicate that Big Bear Lake is not impaired by sedimentation/siltation. In addition, staff believes there is no evidence to demonstrate that the beneficial uses of Rathbun Creek are not supported due to sedimentation/siltation. Therefore, staff no longer proposes to proceed with the Big Bear Lake and Rathbun Creek Sediment TMDLs (see Agenda Item 12 from August 26, 2005 Board meeting). Instead, staff will recommend that both Big Bear Lake and Rathbun Creek be delisted from the 303(d) List of Impaired Waters due to sedimentation/siltation.

Many parties submitted comments that address both the Sediment TMDLs proposed originally and the proposed Nutrient TMDLs. In light of the de-listing recommendation for sedimentation/siltation, these Responses to Comments focus largely on the issues related to the Big Bear Lake Nutrient TMDLs.

PART 1—COMMENTS SUBMITTED IN WRITING

TIM MOORE
Risk Sciences
Letter dated January 29, 2004
(Comments submitted at the January 20, 2004 CEQA Scoping meeting. Comments relate to both the Big Bear Lake Nutrient TMDLs and the Big Bear Lake/Rathbun Creek Sediment TMDLs discussed during the CEQA Scoping Meeting). Comments were submitted on behalf of the Big Bear Lake TMDL Task Force.

Comment #1:
What metrics and threshold values must be met in order to remove Big Bear Lake from the 303(d) list of impaired waterbodies?

Response:
BBMWD submitted information to Board staff one week prior to the August 26, 2005 workshop explaining that the lake capacity reported for 30 years was incorrect. Essentially there was no change in lake capacity since the creation of the 1912 dam because localized dredging activities had kept pace with the influx of sediment. Because of this information, Board staff did not present the Big Bear Lake/Rathbun Creek Sediment TMDLs at the August 26, 2005 workshop. On September 12, 2005, Board staff requested that the BBMWD submit information on their documentation on the correct number for lake capacity. The BBMWD responded on September 13, 2005 with a one-page letter from their engineer on the lake volume calculations in 1912 as well as a report on Big Bear Lake bathymetry prepared in March 1995. Board staff responded on September 29, 2005 requesting that the BBMWD submit more information on the lake capacity issue. To date, Board staff has not received all the requested information to fully evaluate the lake capacity issue.

The two peer reviewers for the sediment TMDLs also noted that there were discrepancies in the reported lake capacities and questioned whether localized dredging had kept pace with the sediment deposition. They asked that this issue be investigated further. One peer reviewer did not find that the staff report provided any evidence that Rathbun Creek was impaired by sediment.

According to the 2004 Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (hereinafter 303(d) Listing Policy), waterbodies can be removed from the 303(d) List if water quality standards are met. Water quality standards include beneficial uses, water quality objectives and the antidegradation policy. The proposed nutrient TMDLs specify numeric targets for both causal (total nitrogen and total phosphorus) and response indicators (macrophyte coverage, percentage of nuisance aquatic vascular plants and chlorophyll *a*) (see Section 3.0 of the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 1, 2005)). If these targets are achieved, then it is believed that water quality standards will also be achieved and a de-listing recommendation would be supported.

The recommended inclusion of both causal and response indicators in the nutrient TMDLs reflects Board staff's recognition of the considerable complexity of nutrient dynamics in Big Bear Lake. Board staff recognizes that the targets will need to be reviewed and likely refined in the future, based on the investigations required in the proposed implementation plan. Staff also recognizes that one or more of the targets may be found to be more indicative of the attainment of standards than others. For these reasons, staff proposes (1) that compliance with the numeric targets under dry conditions and compliance with the TMDLs for dry hydrological conditions is to be achieved by 2015; compliance with the numeric targets for other conditions is set for 2020, and (2) that language be added to the proposed TMDLs that clarifies the expectation that evidence concerning all the targets will be considered and weighed in making a determination of TMDL compliance and attainment of water quality standards (See Section 1.A. Numeric Targets of the proposed Basin Plan amendment). This approach conforms to the requirement of the 303(d) Listing Policy for a Weight of Evidence evaluation, recognizing that one type of data (e.g., water quality data) may not be dispositive and that those data must be considered in the context of other relevant evidence (e.g., data and information regarding the status of beneficial uses). The Regional Board must weigh all relevant lines of evidence to determine the attainment of standards based on available data.

Comment #2:
By what standard will we know when beneficial uses (particularly COLD and REC1) are fully attained?

Response:
If the proposed numeric targets are met, it is assumed that beneficial uses would be attained. This assumption however is subject to confirmation as additional data are collected in the watershed and lake and the watershed and lake water quality models are updated.

See also Response to Comment #1.

Comment #3:
How will the anti-degradation threshold be determined?

Response:
Compliance with the proposed numeric targets and TMDLs is expected to result in the improvement of water quality, as well as the restoration and enhancement of beneficial uses. As such, no lowering of water quality is anticipated and antidegradation requirements would be satisfied. Thus, there is not expected to be a need to identify antidegradation thresholds.

If a lowering of water quality with respect to one or more constituents is projected as the result of implementation measures designed to achieve the TMDLs (e.g., the need to add chemicals

such as alum or herbicides), then relevant historic and ambient water quality data, as well as any pertinent water quality objectives, would be considered in identifying the baseline quality for the purposes of antidegradation review. In such cases, it is expected that the requisite antidegradation demonstrations (that best practicable treatment or control has been implemented, that beneficial uses would be protected and that the lowering of water quality is consistent with maximum benefit to the people of the state) could be readily made, since the lowering of water quality would be occasioned by measures intended to improve the quality and beneficial uses of Big Bear as a whole. Indeed, the Regional Board has already made such antidegradation findings in adopting waste discharge requirements for the application of alum and the herbicide Sonar to the lake to reduce macrophyte growth (Order No. R8-2004-0007, NPDES No. CA8000396, Findings 19 and 20).

Comment #4:
How will the baseline (pre-anthropogenic) condition be defined for a man-made waterbody?

Response:
It's not clear to staff that defining the baseline condition for a man-made waterbody such as Big Bear Lake would be either productive or required for TMDL development. Big Bear Lake is a water of the U.S. with identified water quality standards specified in the Basin Plan. The nutrient TMDLs must assure that those standards are achieved.

However, recognizing the nature of the lake, the proposed TMDL implementation plan takes a realistic and practical approach to long-term management of the water quality and beneficial uses of the lake. The proposed implementation plan requires the development of a lake management plan that will identify a coordinated and comprehensive strategy for management of the lake and surrounding watershed to address restoration and protection of the lake's beneficial uses (see Attachment to Resolution No. R8-2006-0023, I.B.4, TMDL Implementation, Task 6). This plan is to be based on identified and acceptable goals for lake capacity, biological resources and recreational opportunities that are identified in coordination with the Regional Board and other responsible agencies. The plan is to include a proposed plan and schedule for the development of biocriteria. Revisions to water quality standards may be considered through the Basin Planning process to address the findings and recommendations of the management plan.

Comment #5:
How will the Regional Board evaluate "economic considerations," as specified in Section 13241 of the California Water Code if the means of compliance are not yet known?

Response:
Section 13241 applies to establishing water quality objectives. It does not apply to designating uses, or to establishing programs of implementation, which are governed by section 13242. Nor does Section 13241 apply to establishing TMDLs. Federal law mandates that TMDLs be set at a level that will ensure attainment of the existing water quality standards (including objectives). The economic feasibility to the dischargers of achieving the standards is therefore neither relevant nor authorized when setting the TMDL.

Nonetheless, as explained in the TMDL report (Section 11 of the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 1, 2005)), the costs of the methods of compliance must be considered by the Regional Board as part of the CEQA process for the proposed Basin Plan amendment. Cost estimates provided in the TMDL report are based on literature surveys,

existing and ongoing Big Bear Lake projects (such as the dredging project) and stakeholder provided information.

See also the response to Comment # 56.

Comment #6:
How will natural nutrient and sediment loads be distinguished from the net increase in such loads caused by human activity?

Response:
Staff agrees that wherever possible, natural and anthropogenic nonpoint source loads should be distinguished for TMDL purposes (40 CFR 130.2 (g)). In developing the Big Bear Lake Nutrient TMDLs, wasteload allocations and load allocations, watershed land uses were broken down into general categories of forest, resort and urban. Nutrient contributions from the latter uses are not considered natural. Sources from the forest land use were not broken down into natural versus anthropogenic sources due to data limitations. In the future, as such data are collected, the TMDLs can be revised to include a natural load allocation, if warranted. Staff believes that the distinctions between natural nutrient (and sediment) loads and those from anthropogenic inputs can be made only with a more in-depth data collection effort; this effort is part of the proposed implementation plan.

Staff is confident that the commenter is aware of the inherent difficulty in distinguishing natural and anthropogenic pollutant inputs to Big Bear Lake, given the highly modified nature of the watershed, beginning with the installation of the dam and creation of the lake in 1884. Others have wrestled with this issue. For example, the Idaho Department of Environmental Quality produced a paper in April 2003 defining natural background (IDEQ 2003) as part of Idaho's water quality standards. For Idaho, natural background conditions are defined as "no measurable change in the physical, chemical, biological, or radiological conditions existing in a water body without human sources of pollution within the watershed". IDEQ further states that natural background should primarily be assessed on a watershed scale. If this definition were to be employed here, staff questions whether the Big Bear Lake watershed or any portions thereof could be identified as natural since there are human sources of pollution within this watershed. The watershed has ceased to exist as completely natural since the creation of the dam in 1884 and with later development of unpaved and paved roads, camping facilities, trails, off-road vehicle trails, and ski resorts.

That said, however, staff has done some preliminary analysis of natural versus anthropogenic inputs to Big Bear Lake based on work conducted by the Southern California Coastal Water Research Project (SCCWRP). SCCWRP is undertaking studies to evaluate water quality levels from natural watersheds. To define 'natural watersheds' for the study, one of SCCWRP's criteria was that the watershed had to be at least 95% undeveloped and in as close to pristine condition as possible. Using this criterion, staff re-evaluated the land use in the watershed based on the 83 subbasins as defined in the HSPF water quality simulation model used to develop the proposed TMDL. The goal of this evaluation was to determine how much of each subbasin and the Big Bear Lake watershed as a whole, could be classified as minimally-impacted. According to the analysis performed by staff (as shown in the revised Staff Report), 18% of the total forest area (i.e., 14,463 acres) is minimally-impacted, and conversely 82% of the forest land in Big Bear Lake watershed has anthropogenic impacts.

Staff believes that the preferred approach to address nutrient loads from natural background versus man-induced activities would be to first incorporate a definition of natural background into the Basin Plan. Ideally, the definition would apply to all waterbodies and watersheds within the region. The next step would be to determine whether and to what extent the Big Bear Lake watershed is consistent with that definition. Given the time likely required to conduct this effort for the entire region, staff believes that it is appropriate to begin this type of evaluation for the Big Bear Lake watershed and now proposes that language regarding the establishment of a natural background definition be added to Task 7, as shown in the revised Attachment to Resolution No. R8-2006-0023.

Although the proposed nutrient TMDL is for dry hydrological conditions only and no reductions are required for external nutrient loads at this time, the external nutrient load dischargers are required to reduce internal nutrient loads. Because external nutrient loads during wet hydrological periods are significant, it is necessary to address the nutrient runoff from the various sources that result in increased nutrients deposited to the in-lake sediments, which provide a source of internal nutrient loads. If these internal nutrient loads were not reduced, meeting the Big Bear Lake proposed numeric targets would be infeasible and water quality standards will not be attained and maintained. If new data and studies show that natural sources will not allow the present water quality standards to be attained and maintained, a Use Attainability Analysis (UAA) and/or development of new water quality objectives can be initiated. However, the proposed nutrient TMDLs address the existing water quality standards, and those standards are not being attained and maintained. Staff believes that the extended compliance schedule for the proposed Big Bear Lake Nutrient TMDLs is more than adequate to carry out studies and monitoring to better evaluate natural versus man-made or man-induced sources, as well as to define natural background. As shown in the revised Attachment to Resolution No. R8-2006-0023, compliance with the numeric targets under dry conditions, and compliance with the TMDLs for dry hydrological conditions is to be achieved by 2015; compliance with the numeric targets for other conditions is set for 2020. (Also as shown in the Attachment, staff have deleted the proposed final total phosphorus target and replaced it with the interim target and have revised the chlorophyll *a* interim target. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile (see Response to Comments #34, #39, #202)).

Comment #7:
How will legacy loads, such as nutrients stored in sediment washed in Bear Valley from the surrounding mountains long before the dam was built, be accounted for?

Response:
See Response to Comment #4. The lake management plan required by the proposed implementation plan is expected to identify the mechanisms by which nutrient loads in Big Bear Lake will be managed.

Comment #8:
What is the legal distinction between water quality "goals" or "targets" differ [*sic*] from water quality "criteria" or "objectives"?

Response:
TMDLs require a quantitative numeric value or target necessary to implement existing water quality standards, which include narrative and numeric water quality objectives and beneficial uses. The numeric targets are interpretations of existing water quality standards, not water

quality standards themselves. In a memo dated June 12, 2002, State Board legal counsel states

> "... A water quality standard defines the water quality goals of a water body by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses (40 C.F.R. § 131.2.). TMDLs, in contrast, establish numeric targets for pollutants—targets that are designed to achieve water quality standards in impaired waterbodies. TMDLs implement the existing objectives that are designed to protect designated beneficial uses and, therefore, serve as a water quality-based treatment control or strategy that necessarily rests on the established goals and balanced policy considerations embodied by water quality standards."

Comment #9:
What process would be required to change a water quality "goal" or "target?" Is EPA approval required to change a goal or target?

Response:
Changing a "goal" or "target" in a TMDL established in the Basin Plan would require an amendment of the TMDL through the Basin Plan amendment process. Regional Board, State Board, OAL and USEPA approvals would be necessary.

Comment #10:
How will the Regional Board determine what level of water quality can "reasonably be achieved through the coordinated control of all factors which affect water quality in the area" as described in Section 13241 of the California Water Code? In particular, how will "reasonability" be assessed when evaluating various control alternatives?

Response:
The proposed TMDLs are intended to achieve established water quality objectives, not to establish new objectives. Therefore, as discussed in the Response to Comment #5, Water Code Section 13241 does not apply.

That said, staff did evaluate the feasibility and "reasonability" of the proposed TMDLs, WLAs and LAs, taking into account technical, environmental and economic factors. The Big Bear Lake Nutrient TMDLs apply to dry conditions only because data were not available to support TMDLs for wet or average hydrological conditions. In dry conditions, the majority of the nutrient loads are from internal sources. Accordingly, the proposed implementation plan requires studies and monitoring to reduce these sources of nutrients instead of focusing on watershed sources. The wasteload and load allocations were based on literature and empirical research that demonstrate that the load reductions specified are feasible with the incorporation of certain lake restoration activities. No reductions are proposed for external sources because the observed data collected to date did not support reductions in watershed nutrient loads. Staff believes that the proposed TMDLs, wasteload and load allocations and numeric targets represent the conditions that can reasonably be achieved. The Basin Plan triennial review process provides the mechanism for reviewing and revising the proposed TMDLs, wasteload and load allocations and numeric targets, and the water quality standards themselves, in the event that new data and model updates demonstrate that those water quality conditions cannot reasonably be achieved (see Task 10 in the Attachment to Resolution No. R8-2006-0023).

Comment #11:
How will the Regional Board apportion the load allocation between various non-point sources (proportionate to loading or based on ability to control the loads)?

Response:
The loads were allocated amongst the various sources based on existing loads from the identified sources as well as the ability to control the loads (See Section 6.0 of the Staff Report on the Nutrient TMDLs for Big Bear Lake [June 1, 2005]).

Comment #12:
How will the Regional Board implement the load allocations for non-point sources if there is no NPDES permit or Waste Discharge Requirements (WDRs) in place?

Response:
As shown in the Attachment to Resolution No. R8-2006-0023, I.B.4,TMDL Implementation, Task 1, staff proposes to establish Waste Discharge Requirements or Conditional Waivers as appropriate to address the nonpoint source dischargers of nutrients and sediment. In addition, the USFS has a MAA (Management Agency Agreement) with the SWRCB to implement BMPs on their lands to control non-point sources. The Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (2004) stipulates that "the RWQCBs may not delegate their NPS authorities and responsibilities to another agency, and may not indefinitely defer taking necessary action if another agency is not properly addressing a NPS problem." In addition, ."...another agency's actions can serve, for example, as the basis, in part or in whole, for a RWQCB waiver of WDRs for the activities covered in these agreements."

Comment #13:
Does the Regional Board staff intend to recommend a "safety factor" for each TMDL? If so, how will the safety factor be determined?

Response:
As discussed in the Big Bear Lake Nutrient TMDLs Staff Report, Section 8.0 (June 1, 2005), staff proposes that the TMDL include an implicit margin of safety to account for unknowns in the TMDLs. Use of the 25th percentile for the numeric targets, as well as the use of conservative assumptions made during the modeling process, comprise the implicit margin of safety.

Comment #14:
If the scientific research studied demonstrates that in-lake sediments are contributing significant nutrients loads to the water column, will the Regional Board staff recommend dredging such sediments if necessary to meet water quality targets?

Response:
In-lake sediments are a significant source of nutrients to Big Bear Lake during dry and average hydrological conditions (see the Staff Report on the Nutrient TMDLs for Big Bear Lake, Section 4.3 and 4.5 (June 1, 2005)). Further, during wet hydrological periods, most of the nutrient loading ends up on the lake bottom and the nutrients deposited can become bioavailable. The control of nutrient discharges from in-lake sediments will be necessary to achieve the TMDLs. The proposed implementation plan requires that the stakeholders propose projects whereby the TMDLs will be achieved (see Response to Comment # 56). Staff believes that these projects are likely to include dredging, at least in selected locations. However, the proposed TMDLs do not limit the options that can be considered for in-lake sediment nutrient control. As discussed

in Section 10.3 of the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 1, 2005), staff proposes that all options be evaluated and considered for implementation. Further, it is clear to staff that effective control of watershed sources (in the long run) and in-lake nutrient sources, as well as macrophyte control are critical for assuring that Big Bear Lake water quality standards are achieved. It is for that reason that staff proposes to include a specific task in the Nutrient TMDLs Implementation Plan that would require dischargers, in coordination with the Big Bear Municipal Water District, to develop a Big Bear Lake Management Plan (see Response to Comment # 4). Further, as shown in the revised Attachment to Resolution No. R8-2006-0023, staff believes that the TMDL tasks identified in the initial implementation plan to develop the In-Lake Sediment Reduction Plan (formerly Task 7) and the Aquatic Plant Management Plan (formerly Task 8) are appropriately incorporated in the development of the Big Bear Lake Management Plan Task (Task 6).

Comment #15:
If dredging the sediment would cause more environmental damage than to leave it in place, will the Regional Board staff recommend revising the beneficial use classification pursuant to 40 CFR 131.10(G)(3)?

Response:
The comment/question appears to presume that dredging is or may be the only option available to achieve the TMDLs. Staff does not believe that this is the case (see Response to Comment #14). The beneficial uses of Big Bear Lake established in the Basin Plan are **existing uses** and therefore, cannot be removed. If evaluation of in-lake sediment treatment and/or sediment removal options does prove to be too environmentally damaging, and there are no other options for meeting the proposed TMDLs, Big Bear Lake's beneficial uses may be refined such that less stringent water quality criteria would apply, provided that certain criteria in relevant federal regulations are met. Mr. Moore has cited one of these -- Use Attainability criteria.

GENE ZIMMERMAN
Forest Supervisor
San Bernardino National Forest
Letter dated June 15, 2005

Comment #16
It would be appropriate to pre-release the draft Big Bear Lake nutrient TMDLs to the affected stakeholders prior to the public release in order to address and resolve any concerns as well as facilitate buy-in from the concerned public.

Response:
The Staff Report on the Nutrient TMDLs for Big Bear Lake was released to the public on June 21, 2005 (the Staff Report on the Sediment TMDLs for Big Bear Lake and Rathbun Creek was released to the public on July 15, 2005). While we understand the San Bernardino National Forest's (USFS) concern about the opportunity to review the proposed TMDLs, we believe that all stakeholders should have the same opportunity. Further, ample time was provided for review of the proposed TMDLs prior to the first public workshop on August 26, 2005. Board staff will continue to work with all stakeholders to address their concerns and make appropriate refinements to the proposed TMDLs, including the implementation plan.

RICHARD C. KUN
President
Snow Summit Ski Corporation
Letter dated September 1, 2005

Comment #17
Snow Summit Ski Corporation, owner and operator of Bear Mountain and Snow Summit ski resorts, objects to being named as a "responsible party". We fall within the jurisdiction of other designated "Responsible Parties" and we also are heavily engaged in significantly reducing our impacts upon the lake. We respectfully request to be removed from the designation "Responsible Party".

Response:
Snow Summit Ski Corporation is a discharger of nutrients to Big Bear Lake. Pursuant to federal regulations, wasteload and load allocations must be established for all significant sources of pollutants to impaired waters like Big Bear Lake, irrespective of the jurisdiction of other agencies or parties. The TMDLs specify allocations for urban runoff, including that from San Bernardino County lands and the City of Bear Lake, and for USFS lands, as well as resorts. The County, City and the USFS are the agencies identified by the commenter as holding jurisdiction over ski resort acreage (see Comment #18).

Activities that cause or have the potential to cause nonpoint sources of pollution from the ski areas under Snow Summit Ski Corporation's jurisdiction are subject to regulation by the Regional Board and must be addressed in the TMDLs. While the erosion control measures are used to control sediment, Board staff understands that the ski resorts apply chemicals containing nutrients to the ski slopes to promote snow making operations or to enhance ski/snow board runs. In fact, data collected from 2001 to the present indicate higher concentrations of nutrients immediately below the ski resorts compared to other sites within the watershed. We do not believe that the BMPs implemented thus far are effective in reducing nutrient discharges from the ski areas.

Comment #18
Most of the ski resort acreage is either under Special Use Permit from the Forest Service or within the city limits of Big Bear Lake and falls within the jurisdiction of those agencies, as well as that of San Bernardino County, and should not be singled out.

Response:
See Response to Comment #17. Nutrient discharges by the parties identified in the comment are also addressed in the proposed TMDLs; neither Snow Summit nor the resorts as a whole are being singled out.

The San Bernardino National Forest (USFS), City of Big Bear Lake and San Bernardino County do not regulate the discharge of waste. The City of Big Bear Lake and San Bernardino County are themselves regulated under an NPDES permit for storm water discharges from municipal separate storm water systems (MS4). They lack legal jurisdiction over storm water discharges into their systems from the USFS area, in which a large majority of Snow Summit Ski Corporation's area falls. Discharges from the ski resorts on USFS land enter the MS4 system downstream of the ski areas and the City of Big Bear Lake, San Bernardino County and the San Bernardino County Flood Control District are not to be held responsible for Snow Summit

Corporation's facilities and discharges from these facilities into the MS4 systems. Therefore, it is appropriate that the discharge of waste, including storm- and non-stormwater runoff from the ski areas be addressed by the proposed TMDLs.

Staff would also like to emphasize that the proposed TMDLs are for dry conditions only and that no reductions in the urban discharges or ski resort discharges are required to meet the proposed TMDLs for dry conditions. However, if the results of studies conducted pursuant to Task 4 - Nutrient Water Quality Monitoring Program, demonstrate that the discharges from the ski resorts that enter the urban MS4 are responsible, to a significant degree, for exceedances of the urban WLAs, the Regional Board will take the appropriate regulatory steps to ensure the ski resorts address and meet their LA.

Comment #19
Several years prior to the development of the TMDL, Snow Summit Ski Corporation has implemented comprehensive erosion/flood control/water quality measures to fully mitigate impacts upon the lake caused by our activities.

The TMDL assumes that recreational areas such as ours have taken no such measures.

As part of our contract with the BBMWD for lake water for snowmaking, we are obligated to work with that agency to control runoff and silting and have worked off site in the Rathbun drainage to that end.

Response:
Staff did receive a summary sheet noting the measures that Snow Summit Ski Corporation has taken to implement erosion control measures, and that information was used in the development of the sediment TMDLs (Klouzer 2004). However, to our knowledge, there has been no comprehensive assessment of those BMPs (i.e., erosion/flood control/water quality measures) regarding their effectiveness in controlling sediment and, more to the point, nutrient inputs to the lake. BMPs need to be monitored and evaluated as to their effectiveness in controlling the types of pollutants that are specific to each BMP. Snow Summit Ski Corporation did not submit any data or information to substantiate the statement that the implemented BMPs have fully mitigated the impacts upon the lake. For example, we note that Snow Summit Ski Corporation has several sediment catchment basins, but there is no record indicating how often these basins are cleaned out or the capacity of these basins. Also, there was no information provided on the sizing of these basins that would allow an evaluation of the size of the storm events that are addressed by these basins in trapping sediment and the nutrients associated with them.

While the erosion control measures are used to control sediment, Board staff understands that the ski resorts apply chemicals containing nutrients to the ski slopes to promote snow making operations or to enhance ski/snow board runs. In fact, data collected from 2001 to the present indicate higher concentrations of nutrients immediately below the ski resorts compared to other sites within the watershed. We do not believe that the BMPs implemented thus far are effective in reducing nutrient discharges from the ski areas.

Task 4 in the Attachment to Resolution No. R8-2006-0023 prescribes the continuation of the watershed and lake monitoring so that issues raised by the dischargers, including Snow Summit Ski Corporation, can be addressed. In addition, the Proposition 13 grant awarded to the BBMWD includes studies to locate areas of erosion within the watershed and recommend

BMPs for these areas. Staff believes that this information will be critical to allow refinement of the TMDLs and resort load allocations in the future.

DAVID J. MARTINEZ

Deputy City Manager, Development Services
City of Big Bear Lake
Letter dated September 2, 2005
(note: comments taken verbatim from letter)

See also comments presented orally by Michael Perry, Big Bear Lake City Manager, at the August 26, 2005 workshop (page 98).

Comment #20
How will natural sediment and nutrients from uncontrollable contributors such as the atmosphere, ash/erosion from fires, and wildlife animal waste be distinguished from the net increase caused by human activities and domestic pets?

Response:
As discussed in the Response to Comment #6, inadequate data are available to distinguish between natural and anthropogenic inputs of nutrients (and sediment). Such distinctions can be made only with a more in-depth data collection effort; this effort is part of the proposed implementation plan. As also described in this response, staff now recommends that the implementation plan include a task (included in the new Task 7) to define natural conditions for the Big Bear Lake watershed, not an easy task given the highly modified nature of the lake and the watershed. Revisions to the proposed TMDLs may be made in the future based on the data collected.

Task 5 in the revised Attachment to Resolution No. R8-2006-0023 requires the development of a plan and schedule for quantifying atmospheric deposition of nutrients in the watershed. Staff proposes to coordinate with the South Coast Air Quality Management District and the California Air Resources Board as well as the local stakeholders in developing this plan. One of the uncertainties in the proposed nutrient TMDLs is the quantification of both wet and dry deposition of nutrients; the results of Task 5 would reduce those uncertainties to enable a better understanding of the significance of atmospheric deposition of nutrients within the Big Bear Lake watershed. Once the nutrient loads from this source are quantified, then we can begin to work with the local and state agencies responsible for air quality to determine what plans can be implemented to reduce this source.

There are no data on the contributions of ash/erosion from fires and wildlife animal waste sources relative to the total nutrient and sediment loads. The data collection effort pursuant to the proposed TMDL implementation plan may provide additional relevant information, though additional targeted investigations may be necessary. Staff believes that nutrient loads from ash/erosion from fires should not necessarily be considered as natural, particularly when some fires are caused by man-induced changes in land use or exacerbated by man's activities (e.g., fire suppression). These sorts of issues will need to be addressed as consideration is given to defining natural background conditions.

Comment # 21
Current water quality stations do not appear to be positioned to distinguish proportional contributory loads from S.B. Co. Flood Control District, the USFS, or the City of Big Bear. How will individual accountability be established?

Response:
Task # 4 in the revised Attachment to Resolution No. R8-2006-0023 requires the development and implementation of a watershed and lake monitoring program. Stakeholders can work together to implement the requirements of this program or are free to develop their own monitoring program. The monitoring program can be designed to incorporate the areas and associated loads that fall within each agency's jurisdiction. The stations that were proposed in the monitoring program were based on previous monitoring data collection efforts. However, the proposed TMDL implementation plan is flexible in that stations can be proposed as long as the information needed to assess compliance with the TMDLs, LAs, and WLAs, and proposed numeric targets can be achieved. Staff would also welcome any suggested revisions to the proposed list of monitoring locations to incorporate into the TMDL implementation plan.

Comment # 22
If current BMPs are properly installed and monitored but still do not achieve TMDL targets, will the Stakeholder(s) be penalized? Who is responsible for developing new BMPs when current BMPs do not achieve the desired targets?

Response:
The proposed nutrient TMDLs are for dry conditions only and there are no reductions required for existing external nutrient loads (See Section 6.0 of the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 1, 2005)). Therefore, discussion of BMPs to control watershed discharges of nutrients is not relevant at this time. However, control of external sources of nutrients via BMPs is expected to be necessary once TMDLs for wet and average hydrologic conditions are developed. As discussed in the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 1, 2005) and in the Response to Comment # 14, nutrients deposited on the lake bottom during these conditions can become available for algae and macrophyte growth. Staff expects that an iterative process comparable to that employed in the MS4 permit would be used here: If monitoring demonstrates that the TMDLs, WLAs, LAs and/or numeric targets are not being achieved, then the dischargers would be required to implement improved BMPs. The specific parties responsible for these improvements would also be determined based on the monitoring results and evidence of those contributing to the noncompliance.

Comment # 23
During winter the City of Big Bear and other agencies in the Big Bear Valley area place sand on icy roads for safety. How has this been factored into the proposed TMDL's?

Response:
Loading rates from different land uses (i.e., forest, resort and urban) were based on empirical data collected in the watershed as well as literature values obtained from similar-type watersheds (e.g., Lake Tahoe). Staff did not have specific information on the amount of sand placed on roads and the amount that ends up in the lake or the local tributaries. Roads and other impervious areas have surface pollutant loading rates related to land use. Transport of impervious area pollutants is a function of rainfall intensity and maximum build-up rates. Loading rates obtained from stormwater sampling conducted by San Bernardino County Flood Control District from 1994-2000, as well as a compilation of other nonpoint source loading rates were used to provide initial estimates of loading rates for urban areas. It is not clear whether any of these loading rates included runoff of sand on icy roads. Tasks 4 and 6 in the revised Attachment to Resolution No. R8-2006-0023 require watershed and lake monitoring programs and updates to the lake and watershed models, respectively. We anticipate that the City of Big

Bear Lake will be an active participant in developing plans to revise the monitoring and modeling in order to address questions and issues raised.

Comment #24
We desire more specific information to define "storm event". The City of Big Bear is subject to localized short bursts of heavy rains primarily from monsoonal weather patterns. For example it is possible that a microburst occurs over the Rathbun Creek tributary area but not over the Knickerbocker Creek tributary area. Does this constitute a "storm event" and trigger sampling as defined in Table 5-9a-o at all sampling locations or just the tributary impacted by the storm?

Response:
Table 5-9a-o contains the proposed Sediment TMDL monitoring frequency, and Table 5-9a-h contains the proposed Nutrient TMDL monitoring. This response addresses the proposed Nutrient TMDL monitoring only, since staff no longer recommends proceeding with the sediment TMDL. The storm events specified apply to each of the proposed creek sampling stations specified in Table 5-9a-g for the Nutrient TMDLs. For example, MWDC4 –Rathbun Creek at Sandalwood Ave. requires sampling of three storm events for nutrients. So, if a storm event occurred over Rathbun Creek only, then only that creek can be sampled. Since the purpose of the sampling is to obtain nutrient loads over a range of conditions for use in updating the watershed model, it would be advisable to sample those storm events that result in flow within the majority of the sampling stations. For the most part, these proposed stations are the same as those that are currently monitored as part of the Proposition 13 grants. Staff realizes that sampling locations might need to be revised depending on logistics and the results of other studies that are currently ongoing within this watershed, and as stated in the revised Attachment to Resolution No. R8-2006-0023, station locations can be changed as long as rationale for changes in the proposed locations is given and proposed alternative monitoring locations are identified in the proposed monitoring plan. Further, given that the sampling protocols may also need to be adjusted, staff also proposes the addition of language allowing stakeholders flexibility in proposing alternative monitoring protocols (revised Attachment to Resolution No. R8-2006-0023, Task 4). The respective parties can also agree upon the definition of what constitutes a storm event.

Comment #25
We desire more specific information regarding interruptions during "snowmelt periods" and temperature measurements. What sampling are we required to do if we have multiple snowmelt periods separated by periods with below freezing temperatures? Do we restart the sampling process after each freezing period, which could last a few days or a few weeks? Will a single temperature station be identified for the Big Bear Lake TMDL to trigger sampling or will sampling be triggered by an individual temperature reading at each sampling location?

Response:
The original sampling strategy was developed in conjunction with the Big Bear Municipal Water District as part of the tributary sampling plan for the Proposition 13 grant work. The purpose of the sampling was to identify those periods in which the majority of nutrients and sediments were contained within the snowmelt. These data would then be used for updating the watershed model. While staff understands the complexities involved in obtaining snowmelt samples, we do not have a more workable alternative method of specifying the monitoring requirements at this time. Board staff would welcome any suggestions from the City on the proposed sampling frequency.

See also Response to Comment #24.

Comment # 26
The City of Big Bear Lake has limited funding and staffing. How will the RWQCB define and apply "economic considerations" for the City of Big Bear Lake relative to the pursuit of the proposed TMDL targets and tasks outlined in Table 5-9a-m?

Response:
Table 5-9a-m refers to the proposed implementation tasks for the Sediment TMDLs. Table 5-9a-f refers to the proposed implementation tasks for the Nutrients TMDLs. This response is addressed to the proposed Nutrient TMDLs implementation plan.

As discussed in the Response to Comment # 56, the proposed implementation plan provides that the stakeholders will identify specific proposed projects and methodologies and schedules that will be used to achieve the goals of the TMDL. Those proposals may be accompanied by economic information. As stipulated in the proposed implementation plan, the proposals must be approved by the Regional Board and the Board will be able to consider funding and other relevant information in that process.

Each discharger has the ability to either work in a group with the other dischargers or work alone in implementing the proposed tasks. It is likely to be more economically feasible if all dischargers work together. Staff would like to point out that as a result of the influx of federal and state funds in addition to stakeholder funding, more than four million dollars have been spent in this watershed. Further, some of these federal and state funds will also be used to implement a number of the TMDL required tasks. It is certainly Board staff's intent to continue to assist stakeholders in the procurement of grant funds to address TMDL implementation.

At the same time, it must be recognized that there are economic costs associated with non-compliance with the TMDLs, including continued macrophyte harvesting and potential impacts to the lake's fishery and recreational opportunities. Staff believes that the proposed nutrient TMDLs take all the economic impacts into account and provide a flexible structure and compliance schedule for continuing studies on lake and watershed water quality and for the implementation of various water quality improvement projects.

See also the Response to Comment #5.

Comment #27
Who will decide and how long will it take to judge whether the Watershed-wide Sediment Monitoring Plan is a "reasonable plan".

Response:
While this comment is directed to the Sediment TMDL that had been proposed, it is also related to the proposed Nutrient TMDL. As indicated in Task 4 of the revised Attachment to Resolution No. R8-2006-0023, the monitoring plans are subject to Regional Board approval at duly noticed public meetings. Staff believe that it is in the best interests of the dischargers to work together with Board staff and other stakeholders to develop the draft monitoring plans.

Comment #28
Will the proposed targets become <u>law</u> after adoption by the RWQCB or after adoption by the EPA?

Response:
The required approvals for Basin Plan Amendments (BPA) to incorporate TMDLs are Regional Board approval, State Board approval, OAL (Office of Administrative Law) approval and USEPA approval. The USEPA has final approval authority on TMDL amendments to water quality control plans (i.e., Basin Plan).

Comment #29
How will mediation be handled if two or more agencies disagree on issues such as the Watershed-wide Sediment Monitoring Plan or methodology in identifying pollution sources or BMP's to achieve TMDL proposed targets?

Response:
This comment is also related to the proposed Nutrient TMDL. Tasks 4 and 6 of the revised Attachment to Resolution No. R8-2006-0023 allow the named dischargers to collaborate on the development and implementation of these TMDL requirements, or, in lieu of the coordinated effort, one or more of the identified dischargers (including the City of Big Bear Lake) may submit proposed individual or group plans/proposals for Regional Board approval. Therefore, if the City does not feel their concerns are being addressed in these coordinated plans, the City is free to develop its own plans/proposals. Staff notes that TMDL implementation grant proposals that have a representative and coordinated stakeholder focus are usually awarded funding over proposals by a single entity.

TIM MOORE
Risk Sciences
Letter dated September 2, 2005

See also comments presented orally at the August 26, 2005 workshop (page 79). Comments were provided on behalf of the Big Bear Lake TMDL Task Force.

General comments

Comment #30
We strongly support the theme of the proposed Implementation Plan –to develop and apply a strategy of adaptive management based on the best available scientific information.

Response:
Comment noted.

Comment #31
We fully understand and accept our obligation to mitigate any excess nutrient concentration which may flow to the lake as a result of development activities by humans residing on or visiting Bear Valley. We believe the goal should be to reduce nutrient loads throughout the entire watershed back to the natural ambient background concentrations that occur in the nearby undeveloped forest.

Response:
Please see the Responses to Comments # 4, 6 and 20.

Note: The following comments pertain to the Staff Report on the Nutrient TMDLs for Big Bear Lake (TMDL Report). Staff does not expect to revise the TMDL Report presented at the Regional Board workshop on August 26, 2005. A separate staff report that describes the proposed changes to the Basin Plan Amendment based on consideration of comments received will be prepared. Nevertheless, the following responses to comments on the TMDL Report are provided. (Comments #32- 66)

Citations refer to the numbered comments contained within the original comment letter.

Comments related to the problem statement

Comment #32
(1.1) The problem statement should be updated to accurately represent current conditions in the lake. Eurasian watermilfoil and coontail were virtually eradicated as a result of a large-scale herbicide application program initiated in 2002. Subsequent follow-up surveys each spring demonstrate that these invasive plant species have been eliminated and Big Bear Lake is no longer impaired by aquatic weeds.

If future monitoring efforts prove the continuing success of that effort (permanent, long-term spot re-treatment program to ensure that Eurasian milfoil and coontail do not recolonize the lake), we recommend that Big Bear Lake be de-listed for noxious aquatic plants in the next biennial update of California's 303(d) list.

Response:
Staff recognizes the proactive approach BBMWD has taken in reducing nuisance aquatic plant growth. We would also like to point out that through a Clean Water Act Section 319(h) grant, a portion of the herbicide treatment in 2003 was funded with federal dollars. The purpose of the problem statement is to provide a general overview of the data and information supporting the listing of the waterbodies on the 303(d) List; in this case, the presence of noxious aquatic plants and elevated nutrient levels. Excessive plant growth has been a documented problem in Big Bear Lake for over 30 years. Staff believes that there is the possibility that these nuisance aquatic plants could continue to be a problem if nutrient concentrations are not reduced in the water column and sediment. Further, staff recognizes that it is also important to maintain areas in the lake that are too deep for plant growth (at least at the normal operating level of the lake), as well as to continually monitor the lake for nuisance plant species and implement appropriate actions to control nuisance species. It is important to keep in mind that any plant species can become a nuisance if it forms a monoculture. Note that the Staff Report on the Nutrient TMDLs for Big Bear Lake (June 1, 2005) contains a discussion of the application of Sonar and the large reduction in plant biovolume and noxious aquatic plants reported in 2004 (Section 2).

Staff believes that it may be appropriate to de-list Big Bear Lake for nuisance aquatic plants in future 303(d) listing activities if it is demonstrated that as a result of controlling nutrient levels, nuisance aquatic plants have been reduced. Staff does not believe that it would be appropriate to delist if the reduction of plants is due solely to herbicide treatment without addressing the underlying sources that supply nutrients for plant growth.

Comment #33
(1.2) Big Bear Lake is not impaired by algae. The draft problem statement does not provide any evidence that excess algae growth is occurring in Big Bear Lake. The draft report states that "For the most part, Big Bear Lake has experienced few problems with excessive algae."

Algae blooms occasionally appear near the end of each summer. These blooms usually encompass a very small area and last only a few weeks.

Historical analysis indicates that small algae blooms have been occurring since the dam was first constructed in 1884. There is no evidence to suggest that the frequency, duration or magnitude of algae growth is worsening. Consequently, there is no reason to believe that the narrative objective of the Basin Plan, prohibiting waste discharges from contributing to excessive algal growth, has been or is likely to be exceeded at Big Bear Lake.

Response:
The Staff Report on Nutrient TMDLs for Big Bear Lake (June 1, 2005) does not indicate that Big Bear Lake is impaired due to algae. In fact, the Staff Report acknowledges that the lake is <u>not</u> on the 303(d) list due to excessive algae growth. However, algae growth is affected by nutrients and it is appropriate to evaluate algae as an indicator of the health of the lake (and to ensure that algae growth does not impair the lake in the future). Board staff has emphasized that it is important to record information such as algal blooms and fish kills as part of the ongoing sampling efforts (meeting with BBMWD, March 6, 2002). As stated in the Staff Report (June 1, 2005), algal blooms have become more prolific in 2002 and 2003, apparently as the result of the herbicide treatments and removal of macrophytes.

We are troubled by the statement that there is "no evidence to suggest that the frequency, duration or magnitude of algae growth is worsening" for two reasons. First, chlorophyll *a* (an

indicator of algal biomass) and phytoplankton densities and species were not routinely measured and quantified until the start of the monitoring program in 2001. Thus, there are no chlorophyll *a* data available upon which to evaluate long-term trends. We do note that the only other reports that detail the species and density of phytoplankton were the reports prepared by the DFG in the late 1970s. Since that time, a review of data collected by BBMWD shows no measurement of chlorophyll *a* or any phytoplankton species or density. Secondly, as stated above and as discussed in the TMDL Staff Report (June 1, 2005), chlorophyll *a* levels have increased from 2002 to 2003. Again, for these reasons, we believe that it is appropriate that the TMDLs address algae growth as well as macrophytes.

Comment #34
(1.3) Significantly reducing algae concentrations in Big Bear Lake may reduce overall productivity of the fishery. If the amount of algae declines the zooplankton population will as well. This, in turn, will likely reduce the number and size of fish living in the lake.

The Virginia Department of Environmental Quality concluded that "gains in habitat from oxygenated hypolimnia and reduced macrophytes will likely be outweighed by loss of biological productivity" in reservoirs where significant nutrient reductions are sought.

The graph illustrating a general relationship between algae and fish abundance is included in the comments because we believe it is necessary to know define [*sic*] the relationship with greater certainty before concluding that the present algae concentrations may be impairing the beneficial use or assuming that lower algae concentrations will be "better" for the aquatic ecosystem in the lake.

Response:
Staff readily acknowledges the significant complexity of nutrient dynamics in Big Bear Lake and their effects on the biota. To address this situation, the proposed TMDLs implement an adaptive management strategy, as acknowledged by the commenter (see Comment #30). This strategy includes an extended TMDL compliance schedule, implementation plan requirements for monitoring and investigations, the commitment to review the TMDLs and revise them as appropriate and, perhaps most important and relevant here, a requirement for the development of a lake management plan. The expectation is that this management plan will provide a comprehensive and coordinated strategy for managing algae, zooplankton, macrophytes, nutrients etc. in the lake to assure that beneficial uses will be protected. It is also acknowledged that changes to the water quality standards of the lake may themselves need to be modified. (see Response to Comment # 4)

With this underlying perspective in mind, we agree that reducing algae concentrations in Big Bear Lake may reduce the overall productivity of the fishery. It is for this reason that staff is not proposing to utilize USEPA's recommended criteria for chlorophyll *a*. Instead, staff based the proposed interim target of chlorophyll *a* on empirical data from 2001. Because there is little evidence to suggest that the algae narrative Basin Plan objective has been violated, staff now recommends using the median or 50th percentile of chlorophyll *a* data from the four lake stations in place of the initially proposed 25th percentile. The proposed target for chlorophyll *a* is 14 μg/L rather than 10 μg/L as shown in the Attachment to Resolution No. R8-2006-0023. The purpose of including the proposed numeric target for chlorophyll *a* is to ensure that excessive algae blooms do not occur. The proposed chlorophyll *a* numeric target does not preclude the presence of a healthy population of phytoplankton in Big Bear Lake.

Further, based on comments received from the peer reviewer and others, staff now believes that it would not be appropriate to specify the final numeric targets for chlorophyll *a* (and total phosphorus) that were proposed based on a trophic state index (Comments # 39, 67, 74 and 202). Instead, staff now proposes to use the total phosphorus interim target as the final target, and the chlorophyll *a* revised target (discussed above) as shown in the revised Attachment to Resolution No. R8-2006-0023. This results in a proposed target for chlorophyll *a* of 14 µg/L (and total phosphorus numeric target of 35 ug/L).

It is not clear to staff how the quote by the Virginia Department of Environmental Quality pertains to chlorophyll *a* concentrations since it specifically references macrophytes and oxygenation in the hypolimnion. Staff does agree that loss of macrophytes could also have profound effects on the health and overall biological productivity of the lake and has taken this into account in the proposed macrophyte numeric targets. Since zooplankton are selective grazers, staff does not know whether decreasing some forms of algae will have an effect on all zooplankton or just some species of zooplankton. In addition, having a lower number of fish that feed on zooplankton such as Daphnia, will likely aid in the proliferation of zooplankton, especially Daphnia. Decreasing plant coverage could result in higher predation, lower numbers of zooplankton and macroinvertebrates available for fish to consume and decreased hiding places for younger fish. However, reduction in chlorophyll *a* concentrations does not lead to reduced macrophyte populations; in fact, the reverse is likely. As clarity increases, macrophytes will likely increase. These statements speak to the need for the lake management plan discussed above.

As indicated in Response to Comment #33, staff has not stated that algae are impairing the beneficial uses of Big Bear Lake. Further, staff has not "assumed" that lower algae concentrations will be better for the lake. Since the algae objective is narrative, it is necessary to translate this narrative objective into a numeric value. Chlorophyll *a* is an indicator of algal biomass and yet, while algal blooms have occurred and continue to do so with the level of chlorophyll *a* observed in the lake, staff does not believe that these algal blooms constitute excessive algae as defined in the Basin Plan objective. As discussed above, for these reasons, staff believes that the median or 50th percentile of observed values during the growing season in 2001 should be used in place of the 25th percentile to derive the chlorophyll *a* numeric target. Staff believes that as lake management programs are implemented, it will be important to track and monitor algae along with other parameters to ensure that the lake's ecosystem is not impacted by algae growth and to ensure compliance with the Basin Plan narrative objective for algae.

Again, staff well recognize the interconnectedness of these biota (fish, zooplankton, phytoplankton, etc.) and in the Staff Report on Nutrient TMDLs for Big Bear Lake (June 1, 2005), staff proposed the development of a multimetric index for Big Bear Lake (formerly Task # 9). As shown in the revised Attachment to Resolution No. R8-2006-0023, staff now recommends that the development of a multimetric index be deleted from the proposed TMDL, but that the Regional Board, with the assistance of stakeholders, develops biocriteria for Big Bear Lake. Biocriteria would enable biological conditions such as zooplankton, phytoplankton, algae and fish assemblages to be taken into account.

In addition, as indicated above, there is a re-opener clause in the proposed TMDLs that allows evaluation of the proposed numeric targets and TMDLs, WLAs and LAs as new data are obtained and model updates are completed.

See also Response to Comment #39.

Comment #35
(1.4) The low dissolved oxygen concentrations measured in the deepest portion of the lake are caused by naturally-occurring anaerobic conditions. There is no specific evidence presented to determine the degree to which nutrient levels are exacerbating the problem. There is no evidence that the richness or abundance of fish is materially harmed by the ambient DO levels. Recent fish kills are relatively small and most likely due to extreme low lake levels and high water temperatures in the summer.

There is no evidence to demonstrate that the DO objective will be met if the TMDL targets are achieved.

We recommend that the draft TMDL be revised to determine if the alum application in 2004 had any measurable impact on DO levels.

The draft TMDL should also recognize the presence of and analyze the effectiveness of a large-scale aeration project at the west end of the lake. Recent data submitted to the Regional Board indicate the active remediation strategy is effectively mitigating the potential for DO impairment near the dam.

Response:
As with algae, Big Bear Lake is not currently on the 303(d) List due to low dissolved oxygen (DO) (see below). However, dissolved oxygen is known to be related to eutrophication. Further, since the Basin Plan specifies a narrative dissolved oxygen water quality objective, it is appropriate to address dissolved oxygen as part of the proposed Big Bear Lake Nutrient TMDLs. As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake (June 1, 2005), the dissolved oxygen objective is not being met at all times and at all locations in Big Bear Lake. Staff believes that exceedance of the dissolved oxygen narrative objective suggests that the COLD beneficial use is not being attained and that it may be appropriate to include Big Bear Lake on the 303(d) List as impaired due to low dissolved oxygen levels.

Plant and animal respiration, bacterial decomposition of organic matter, and chemical oxidation of dissolved organic matter are processes that can lower dissolved oxygen concentrations. Because Big Bear Lake is eutrophic and therefore productive, organic matter accumulates on the lake bottom and decomposes. This process depletes the oxygen in the bottom waters. How much of this decomposition is caused by bacterial decomposition compared to chemical oxidation is a question that has not been answered. Decreases in organic matter are likely to result in improved dissolved oxygen concentrations, as is noticed in less productive lakes. The dissolved oxygen concentration narrative objective is directly related to the COLD beneficial use. The collection of lake monitoring data as specified in Task 4 of the proposed Basin Plan amendment/TMDLs (Attachment to Resolution No. R8-2006-0023), will enable an evaluation of whether or not the existing dissolved oxygen objective will be met consistently with the reduction of nutrients and corresponding decrease in organic matter.

Mr. Moore comments on recent fish kills but no written record of the occurrence of fish kills has been provided by either Mr. Moore or BBMWD. This information is needed to confirm whether, as Risk Sciences postulates, the only time fish kills occur are during extreme low lake levels and high water temperatures in the summer. In addition to low dissolved oxygen levels, fish kills may also be related to ammonia toxicity. As discussed in the Nutrient TMDLs Staff Report for

Big Bear Lake (June 1, 2005), the ammonia objective has been exceeded periodically. Staff believes that this should be evaluated further in the future.

As noted above, staff does not intend to revise the staff report, nor do we believe that it is necessary or appropriate to do so to include an evaluation of whether the alum application in 2004 had any measurable impact on dissolved oxygen levels. Rather, we believe that this analysis should be included in any report prepared that examines the efficacy of various in-lake treatment strategies to reduce nutrients as required by Task 6B of the proposed Basin Plan amendment/TMDLs. The proposed TMDLs are for nitrogen and phosphorus; dissolved oxygen has not been proposed as a target. Performing the requested analysis would not result in staff recommendations for changes to the nitrogen and phosphorus TMDLs.

Similarly, analysis of the large scale aeration project should also be included in any report prepared that looks at the efficacy of using various in-lake treatment strategies to reduce nutrients (Task 6B as specified in the proposed TMDLs (Attachment to Resolution No. R8-2006-0023)). Furthermore, it is not clear to which data Mr. Moore refers when discussing the active remediation strategy. We have not received any sampling plan that shows how any improvements will be quantified by this large-scale aeration project, or where the sampling stations are located. We also have not seen any data evaluating the efficacy of the other aerators that were installed near the dam in the 1980s.

Comments related to the numeric targets (see caveat preceding Comment # 32)

Comment #36
(2.1) If numeric targets will differ substantially from current water quality objectives for nitrogen and phosphorus in the Basin Plan, then those objectives should be revised in accordance with Section 13241 of the California Water Code. This is particularly true if the numeric targets are to be used as the basis for developing mandatory limits in NPDES stormwater permits.

Even if the nitrogen and phosphorus targets are intended to translate the narrative algae objective, the resulting chlorophyll a values should not be less than the current average ambient levels.

Unlike the current numeric objectives for nitrogen and phosphorus, there is no indication that the current DO objectives in the Basin Plan are somehow inadequate. There is no need to use translated targets to implement those numeric DO objectives.

We are particularly concerned that the proposed targets should be evaluated with respect to whether they are realistically attainable given the natural background concentration of nitrogen and phosphorus of soils in and around Big Bear Lake.

Response:
As discussed in the Response to Comment # 8, numeric targets are interpretations of existing water quality standards, not water quality standards themselves. Section 13241 does not apply to establishing TMDLs or to the numeric targets specified therein. The proposed TMDL implementation plan recognizes that changes to water quality standards, including narrative or numeric objectives, may be necessary in the future (see Responses to Comments #4 and 34); indeed, the proposed implementation plan includes a Task (now identified as Task 7 in the revised Attachment to Resolution No. R8-2006-0023) explicitly designed to address possible

changes to water quality standards. The Section 13241 factors will be considered, as is appropriate, when and if new or revised water quality objectives are considered. That said, however, staff believes that a principal underlying concern motivating this comment is that economic considerations (one of the Section 13241 factors) will not be properly considered when permit limitations or other requirements are established to meet the TMDLs, including the numeric targets. As described in other responses (see, for example, the Responses to Comments # 5 and 56), economics must be considered as part of CEQA compliance for the Basin Plan amendment and accordingly, staff has included relevant, available information in the Staff Report on the Nutrient TMDLs for Big Bear Lake. As indicated in the Response to Comment #56, the Regional Board will be able to consider additional and presumably more definitive economic information when considering the stakeholders' proposals for complying with the requirements of the TMDLs.

As stated previously (Response to Comment # 35), the proposed numeric targets are not explicitly directed to compliance with the dissolved oxygen objectives. Violations of these objectives are observed in some locations for limited periods. Implementation of the TMDLs and compliance with the numeric targets will, hopefully assure consistent compliance with the dissolved oxygen objectives.

Please see the Response to Comment # 6 for a discussion related to the natural background concentration comment. Staff would also note that Leidy's report reveals that there was a natural, semi-perennial lake, known as Lower Bear Creek, in the area now called Big Bear Lake (Leidy 2003). However, that lake was not the size of the present day lake and therefore any type of correlation between natural loads from the watershed (as it existed prior to the creation of the dam in 1884) and the effect of these nutrient loads on the present day lake does not make sense. The type of water body that existed prior to the creation of the lake was a "moderately-sized, shallow lake and swampland"; Bear Creek also "meandered down the middle of the lush valley" (Leidy 2003).

Finally, as noted in the Staff Report, the phosphorus associated with the sediment may or may not become bioavailable after it enters the lake. Because of the algae and plants, there will always be sufficient organic matter to drive the internal nutrient loading within the lake unless the internal nutrient loads are reduced.

Comment #37

(2.2) The proposed numeric targets do not properly translate some of the relevant water quality objectives. The proposed targets for phosphorus and nitrogen are not limited to waste discharges, but apply to all loads regardless of whether loads are a waste discharge or naturally occurring. The same is true for total inorganic nitrogen. Therefore, the proposed numeric targets are an imprecise translation of the narrative objectives and should be considered new or revised water quality objectives (and subject to review under Section 13241).

Response:

See Response to Comments #4, 5, 6, 8, 10, 20, 33 and 36.

Comment #38

(2.3) There is considerable scientific uncertainty regarding the preferred percent coverage range for aquatic macrophytes. The draft TMDL recommends a target of 30-60% coverage based on general literature values. Experts (Leidy, Smart, ReMetrix) who have performed site-specific studies of Big Bear Lake recommend target values between 10-30%. We suggest the target be

revised to include the entire range (10-60%) until the discrepancy can be resolved or we suggest that the target be restated as "approximately 30%".

Response:
Staff agrees that there is considerable uncertainty regarding the preferred percent coverage range for aquatic macrophytes. It is because of this uncertainty that staff proposes using a range of values and not an absolute value. Leidy (2003) is the reference from which we obtained the 30-60% coverage. As stated earlier, Leidy stated that up to 60% of the surface bottom of the lake could support macrophyte growth and the only reason to reduce this level would be to avoid nuisance effects. He then states that the macrophyte coverage should be reduced to no less than 30% because macrophytes are beneficial. Hence, the proposed macrophyte coverage of 30-60%.

To better define what would be an appropriate macrophyte coverage, staff also proposes the development of an aquatic plant management plan as part of the development of the Lake Management Plan (Task 6) as shown in the revised Attachment to Resolution No. R8-2006-0023. We have not received any information by Risk Sciences or BBMWD about the recommended macrophyte coverage as proposed by the researchers named by the commenter and so we have no way to evaluate the recommendation in light of work performed (for the BBMWD) by Leidy.

As the commenter is aware, a beneficial uses map is required as part of the 401 Certification for the East End dredge project. This map will outline areas of the lake that are to be used for certain beneficial uses (e.g., recreation, fishing, etc.). Bottom depth contours for the entire lake are required as well. From this, as well as the assessment conducted for the Proposition 13 project, information can be obtained on the proposed macrophyte coverage. However, only with future assessments of species abundance and richness (i.e., zooplankton, macroinvertebrates, fish, etc.) will we know whether the proposed macrophyte coverage allows <u>all</u> the existing beneficial uses to be met. Without other available documentation, we appropriately rely upon Leidy's reported information on macrophyte coverage for Big Bear Lake.

There have been ample opportunities for this concern to be identified (TMDL Workgroup meetings and/or meetings with the BBMWD on 6/4/2003, 7/8/2003, 7/1/2004, 9/15/2004, and 3/8/2005, at which the derivation of the proposed nutrient targets was discussed). Staff must express some frustration that this issue is being raised now. In any event, we believe that the proposed implementation plan provides for refinement of the macrophyte coverage target as part of the required Lake Management Plan.

Comment #39
(2.4) It would be more effective and efficient to regulate water quality by developing biocriteria for Big Bear Lake.

The proposed numeric targets while intended to protect the aquatic ecosystem, are not closely correlated with any specific change in richness or abundance. More important, there may be other implementation strategies that can improve the density and diversity of aquatic species without attempting to manipulate water chemistry.

Chlorophyll a, secchi depth, percent macrophyte coverage, nutrient concentrations and the trophic state index are all indirect indicators of ecosystem health and integrity. Using more direct measurements of the true biological endpoints we are concerned with will avoid

misapplying generic values from the scientific literature to the unique aquatic ecosystem of Big Bear Lake.

Response:
Staff agrees that developing biocriteria for the entire Santa Ana Region, not just for Big Bear Lake, would enable us to more effectively measure the ecological integrity of our water bodies. EPA defines ecological integrity as a combination of chemical integrity, physical integrity and biological integrity. EPA defines biocriteria as numeric values or narrative descriptions that are established to protect the biological condition of the aquatic life inhabiting waters that have been given a certain designated aquatic life use. According to EPA, bioassessments are the evaluation of the biological condition of a water body using biological surveys and other direct measurements of the resident living organisms. Therefore, all stressors to the biological community are measured; biocriteria would not be stressor-specific unless a credible relationship has been established between stressors and impairment. Moreover, as EPA states, physical and chemical criteria are designed to prevent harmful effects on aquatic life before they occur. EPA also states that biocriteria are derived from biological assessments involving integrated measures or indices of the composition, diversity, and functional organization of a reference aquatic community.

Staff agrees that it is appropriate to revise the language in the proposed Basin Plan amendment to include an additional task of developing biocriteria, noting that to develop these criteria would likely require substantive contributions from interested parties. As shown in the revised Attachment to Resolution No. R8-2006-0023, staff now proposes to add biocriteria development to the Basin Plan amendment (Task 7). See also Response to Comment #34.

We would also like to point out that the derivation of all the proposed numeric targets is not solely based upon literature values. In fact, the interim targets of total phosphorus and chlorophyll *a* initially proposed, as well as the final total nitrogen target, are based on data collected in Big Bear Lake during 2001 and 2002. Based on comments received (Comments #6, 34, 202), staff is proposing to delete the proposed final numeric targets for chlorophyll *a* and total phosphorus that were based on the trophic state index and instead specify the total phosphorus and chlorophyll *a* targets based on the 25th and 50th percentile of observed values, respectively. Staff also proposes to extend the compliance date to meet these final numeric targets to 2020. These proposed modifications to the TMDLs are shown in the revised Attachment to Resolution No. R8-2006-0023.

The proposed macrophyte coverage target was derived based on Leidy's report specific to Big Bear Lake, while the % eradication targets were derived based on staff's best professional judgment of what is feasible.

Comment # 40
(2.5) Target levels should not be set to values less than that which can be achieved under undisturbed natural background conditions.

The SWRCB draft Impaired Waters Guidance is consistent with the Santa Ana Regional Board's previous approach to addressing nonpoint source pollution (San Bernardino County's MS4 permit was given as an example).

We recommend that Regional Board calculate the natural background load that would occur by rerunning the WASP model after converting all existing land uses back to an undisturbed forest

conditions for the simulation. In addition, it will be necessary to estimate the internal loads that were likely to be present in the valley soils when it was inundated after the dam was built.

We recognize that tolerating natural background loads may mean that the lake will not meet some of the proposed numeric targets. We view this as a natural limitation on the true potential beneficial uses that can be achieved rather than as an impairment of the existing beneficial use. In the end, it may be desirable to reduce nutrient loads below natural background levels.

Response:
See Responses to Comments #4, 6, 7, 15 and 37.

To evaluate nutrient loads under "undisturbed natural background conditions", the existing HSPF watershed model would need to be rerun to include this scenario. Considering that there is not an agreed upon definition of "natural background" conditions and other data still are limited (e.g., limited meteorological, flow, stream water quality, and identified source data), staff believes that, at this time, it would be a waste of money and time to rerun the model. We would also point out that this suggestion is contrary to the approach the BBMWD and Board staff have taken. The BBMWD agreed with staff's suggestion to remove a task in the Proposition 13 grant that included rerunning and updating the existing models. This was because of the limited timeframe of the grant, which would largely preclude collecting additional data needed for updating both the watershed (HSPF) and lake (WASP) models. The task was revised to include an assessment of models, data gaps that exist, and other information that is needed before any updates to the models are made. Because updating the HSPF watershed model depends on data collected as part of the Proposition 13 grant and those studies will not be complete until the end of 2006, there would be little time to incorporate new data to rerun the model. Staff and BBMWD agreed that the money could be more wisely spent. In fact, the money not used to rerun the models was redirected to a new task – development of the Emergent and Aquatic Plant Management Plan. Staff believes that the models should be updated and rerun only when additional data are collected.

As discussed in detail in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 4 and Section 5, there are uncertainties associated with the lake WASP model that can only be addressed with additional data. Moreover, since the WASP model uses the HSPF loads, any changes to the original HSPF files will necessitate a recalibration of the WASP model. Again, without additional data, it would not be prudent to expend the time and funds necessary to rerun and calibrate the WASP model

Comments related to the source assessment

Comment #41
(3.1) The source assessment does not distinguish between naturally-occurring and anthropogenic pollutant loads.

Response:
See Response to Comment #6

Comment #42
(3.2) The source assessment assumes that the existing Best Management Practices and other mitigation/remediation strategies have zero effectiveness.

Response:
This comment refers to the sediment TMDL and the HSPF watershed model setup, which included both nutrient and sediment loads from the watershed. The specific issue is that the HSPF modeler used a default value of 1 for the Supporting Management Practice Factor (SMPF) that is used to simulate the reduction in erosion achieved by erosion control practices. Use of the default values was necessary because at the time of model development in 2003 there was no information as to the effectiveness of BMPs that have been implemented in the watershed, or for that matter, the location of such BMPs. Board staff did receive information from some stakeholders on the BMPs that they had implemented; however, no information on the effectiveness of these BMPs (for either sediment control or nutrient control) as determined through a structured monitoring program, was provided.

Thousands of tons of nitrogen and phosphorus might well have been removed from Big Bear Lake due to aquatic harvesting programs. However, there has been no written documentation of the benefits of harvesting except in a California Department of Fish and Game (DFG) report prepared in the 1970s. The BBMWD or other stakeholders have not yet presented a report of nutrient loads removed by harvesting activities, nutrient loads removed by the sediment basins or sediment loads removed by the sediment basins (staff notes that BBMWD did provide information pertaining to their sediment basins and clean out schedule as shown in Table 4-1 of the Staff Report on Sediment TMDLs for Big Bear Lake/Rathbun Creek Sediment (July 11, 2005)). The approximate basin capacities and clean out method and frequency for some of the sediment basins was not provided. As stated earlier, the proposed TMDLs are based on the data that has been provided to us or that staff has collected. We believe that there will be ample opportunity to collect and evaluate this type of information as part of the ongoing implementation of the TMDLs.

Comment #43
(3.3) The source assessment should be updated to include the critical information gained during the recent very wet winter of 2004-05. It is essential to understand whether the dominant external sources are "controllable" or not as that term is used in Section 13241 of the California Water Code and in the Basin Plan itself.

Response:
See Responses to Comments #5, 10, 40 and 158. Staff would also note that Task 6, as shown in the Attachment to Resolution No. R8-2006-0023, specifies that models will be updated as new data are collected.

Comment #44
(3.4) The draft technical report indicates that there was insufficient information to calculate a TMDL for wet hydrologic conditions. If so, then this calls in to question the accuracy and reliability of the entire source assessment analysis.

In all likelihood, the existing information is not good enough to meet the requirements imposed by CEQA and NEPA for obtaining 401 certification or 404 permits necessary to implement mitigation or remediation projects.

Response:
The Staff Report on Nutrient TMDLs for Big Bear Lake indicates that the available data were not adequate to allow the WASP model to be calibrated to conditions other than dry hydrologic

conditions. External source loads were modeled using the watershed model (HSPF); however most importantly, there were no data from wet hydrologic conditions to calibrate the lake WASP model. Staff could have applied the WASP model to wet hydrologic conditions; however, staff believes that this would have been a misuse of the model. Instead, staff focused on the most critical conditions -- during the summertime and during dry hydrologic conditions. The source assessment to support the proposed TMDLs for dry hydrological conditions is based on the best available information at the time and again, there are current studies planned in the Proposition 13 grant awarded to BBMWD to gather additional data on sources for updating the models in the future (see Response to Comment #40) specified in Task 6A of the revised Attachment to Resolution No. R8-2006-0023.

We are unclear about the comment on meeting CEQA or NEPA requirements. There is an existing dredging project ongoing, which obviously complied with CEQA requirements. Since we have not seen CEQA or NEPA documentation on the mitigation or remediation projects that Risk Sciences' obviously has in mind, we cannot comment on their adequacy. The permitting and environmental review process for individual projects is a separate process from the development and approval of the proposed TMDL.

Comment #45
(3.5) Some of the nutrient loads attributed to "Urban point sources" originated in the surrounding [*sic*] and are merely passing through the city's storm water infrastructure. Since the source assessment is likely to be used to establish regulatory responsibility, it is important to characterize the full fate and transport path more precisely. The storm water agencies are only responsible to the extent that their facilities increase the overall load ("waste discharge") beyond what would have otherwise occurred under natural conditions.

Response:
As explained in the Staff Report on Nutrient TMDLs for Big Bear Lake (p. 21), the subbasins for the HSPF model were delineated based on topographic features, stream reaches, and the storm water system geographical information system (GIS) files supplied by the City of Big Bear Lake. Therefore, the model does take into consideration the storm water system. Moreover, the TMDL relies upon the data that was available for the development of both the HSPF watershed model and the WASP lake model. As stated previously, the proposed TMDL schedule allows for the re-evaluation of this information through the watershed-wide monitoring (Task 4 of the revised Attachment to Resolution No. R8-2006-0023) and for updates of the models (Task 6A) so that the TMDLs, including allocations based on source assessments, can be refined in the future.

See also Responses to Comments #4, 6, 20, 36 and 40.

Comments related to the linkage analysis

Comment #46
(4.1) The proposed targets are not limited to dry hydrologic conditions only. The targets also apply to wet and average hydrologic conditions.

It is inappropriate to assume that the uses will be protected under dry conditions unless we know that the targets will be met under average and wet conditions. To assume that internal loads can be controlled under dry conditions without first characterizing the transport

mechanisms that deliver the source material under wet conditions is scientifically unsound. To the extent that internal nutrient loads are the result of legacy pollutants contributed to the lake during wet years, those loads should be addressed in the wet weather TMDL rather than being included as part of the TMDL for dry conditions.

Response:
The proposed TMDLs were developed for critical conditions. As explained in the Staff Report, critical conditions are observed during summer and during dry hydrologic conditions. Critical conditions address the period in which the worst water quality would be expected; at other times, water quality is generally improved and the proposed numeric targets are expected to be met. This is demonstrated by water quality conditions in 2005, which likely represents wet hydrologic conditions: concentrations of constituents were lower than those observed in recent dry years. As shown in the Staff Report on Nutrient TMDLs for Big Bear Lake, as lake levels decrease, nitrogen concentrations increase and vice versa. The relationship between lake levels and phosphorus is not as clear.

There is a re-opener clause as shown in Task 10 of the proposed Basin Plan amendment/TMDLs to review and possibly revise the TMDLs, allocations and numeric targets in response to new information and updated models that indicate that the proposed TMDLs, allocations and numeric targets cannot be met even with the implementation of nutrient removal and control programs. Moreover, the proposed Basin Plan amendment/TMDLs specifies that TMDLs will be developed for wet and/or average hydrological conditions (Task 9).

Many researchers have noted that if internal loads dominate, then reductions in external loads will likely not result in improvement in lake water quality unless internal loads are reduced. As shown in the Staff Report, external loads dominate during wet hydrologic conditions and internal loads dominate during dry and average hydrological conditions. Currently, there are not enough data to model the lake and its response to nutrient loads observed during wet and/or average hydrological conditions and therefore, the proposed Nutrient TMDLs are limited to dry hydrological conditions only. Monitoring and updates to models are specified in Task 4 and 6A of the proposed Nutrient TMDL implementation plan in order to develop the long-term data record needed to simulate all types of hydrological conditions and the corresponding effects on lake water quality.

Comment #47
(4.2) The linkage analysis should include a sensitivity analysis to assess the degree to which any of the assumptions may be driving the calculations.

Response:
Model development was conducted under contract to the BBMWD; however, the scope of work proposed by the BBMWD and approved by Board staff did not include conducting a sensitivity analysis. In the future, staff believes that it may be appropriate to conduct a formal sensitivity analysis as part of any model updates. Considering that the sensitivity analysis has to be conducted during model development, it is not possible to perform a sensitivity analysis on the current models without re-running both of the models several times using different parameter values. This would result in unnecessary delay to the adoption of the TMDLs, without significant benefit. Many uncertainties in the models themselves are discussed in detail in the Staff Report, and this uncertainty was taken into account implicitly as part of the margin of safety. Updates to the models are also part of the recommended implementation plan.

See also Response to Comment #203

Comments related to the TMDL allocations

Comment #48
(5.1) The draft technical report indicates that the "Responsible Parties" will be responsible for meeting the entire TMDL, including the internal load reductions. The internal loads are assigned to the load allocation and not the wasteload allocation. It is unclear who is legally responsible for achieving the internal load reduction.

Response:
The TMDLs are allocated to internal and external loads. External loads comprise both wasteload allocations and load allocations. As specified in the revised Attachment to Resolution No. R8-2006-0023, the internal loads are the responsibility of all parties, whether governed by wasteload or load allocations, because their inputs have contributed to the internal loads. This approach is consistent with the approach of the approved Lake Elsinore and Canyon Lake Nutrient TMDLs in allocating the internal loads to the external load dischargers.

Comment #49
(5.2) The proposed TMDL does not take into account the load reductions that have occurred as a cumulative result of all dredging activities over the last 30 years. In addition, BBMWD harvested and removed more than 20,000 tons of weeds between 1991 and 2001. The alum application in 2004 sequestered many additional tons of nitrogen and phosphorus thereby preventing it from entering the water column. All of these activities must be shown in the TMDL allocation particularly as they relate to determining responsibility for the net internal load contribution.

Response:
See Response to Comment #42. Board staff recognizes and appreciates the efforts of the BBMWD to address beneficial impacts in the lake via macrophyte harvesting and chemical applications, and we recognize that sediment removal has likely also resulted in substantial reductions in nutrient internal loads. However, in both cases, there has been no evaluation of the magnitude of such reductions. As indicated in the Response to Comment #42, we believe that the proposed implementation plan provides ample opportunity for the development of this information and application, if and as appropriate, in revised TMDLs.

It should be noted that to the extent that the dredging has resulted in internal nutrient load reductions, these reductions would have been reflected in the nutrient flux studies that were conducted in 2002 and 2003 as well as in the ambient water quality data obtained in 2001 and 2002, prior to the herbicide or alum treatments. Estimates can be made as to the nutrients removed by harvesting, and the WASP model did take into account empirical data from the macrophyte studies performed in 2002 and 2003. Tetra Tech did the best job they could with the best available data to simulate the growth rate of macrophytes and the macrophyte nutrient recycling processes. Staff does recognize that the models should be updated with new data as it is generated in the watershed (see the Attachment to Resolution No. R8-2006-0023, Task 6A).

Comment #50
(5.3) The proposed TMDL does not yet account for the nutrient loads that were present in the soil when the valley was initially flooded to form the lake. Core samples collected at the east

end of Big Bear Lake in May 2005 demonstrate that there is no clear trend in phosphorus concentrations with increasing sediment depth. Therefore, it is inappropriate to assign responsibility for internal loads to present day storm water permittees. Even if those agencies were to remove 100% of the sediment that was deposited since the dam was constructed, it would likely only remove more of the same lying beneath. The data presented in Figure 2 is meant to illustrate the danger of assuming that phosphorus concentrations decrease as the depth increases.

Response:
See Responses to Comments # 4, 6, 7, 14, 15, 20, 31, 36, 37 and 40.

An underlying premise of this comment is that the nutrients in the soils present before the reservoir was formed remain bioavailable, despite nutrient transformations and losses that have likely taken place over time and, more importantly, the likely burying of these native sediments by sediment inputs from the watershed. This premise contradicts the approach being taken with the East End dredge project, wherein dredged materials from the project footprint are being used to re-fill a 60-foot deep dredge pit. The assumption of this dredge and fill approach is that dredged materials that will be used to re-fill the 60-foot main dredge pit will be buried and the nutrients contained therein will therefore not become bioavailable. Staff believes that the sediment nutrients contributing to the eutrophication of the lake are not due to legacy conditions, but are recent inputs of nutrients via erosion, sedimentation and in-lake resuspension and sedimentation. It is entirely appropriate to address this nutrient source as part of the TMDL. (Contract No. 04-204-558-0, Quarterly Report No. 1, September, 2005).

The sampling plan approved by staff for the East End dredging project included the collection of four cores within the dredging footprint to determine nutrient concentrations at depth. These cores were taken prior to any dredging activities. However, staff have not seen the data from the cores, and so cannot evaluate the data. There was no information provided by Risk Sciences on the core results presented in the comment letter; specifically the location of this core within the dredging footprint and whether it was obtained prior to or during dredging activities. Staff did recognize that dredging might just uncover more nutrients and discussed this issue with the BBMWD and other stakeholders at a meeting on September 23, 2003 and required the collection of relevant data (these data have not yet been submitted to staff). Task 6B, as shown in the revised Attachment to Resolution No. R8-2006-0023, specifies that a Big Bear Lake Sediment Nutrient Reduction Plan be developed as part of the development of the Lake Management Plan to determine the best approaches in controlling nutrients from sediment. This plan specifies "evaluation of the applicability of in-lake treatment technologies", it does not specifically mention any treatment technology. Nor is there any assumption that dredging will be the sole, nor necessarily the most effective, mechanism to address the internal loading problem. The information collected as part of the East End project as well as from the Army Corps of Engineers large-scale sediment sampling project will need to be evaluated as to the efficacy of controlling nutrients via the removal of sediment.

Comments related to seasonal variations and critical conditions

Comment #51
(6.1) We support the Regional Board's approach to distinguish between various hydrologic conditions. The lake is incapable of achieving the same level of water quality under low pool

conditions as it is under full pool conditions. We recommend that different targets should be established for each of the major hydrologic conditions.

Response:
See Response to Comment # 46.

The proposed numeric targets were developed to assure that Big Bear Lake water quality standards (water quality objectives and beneficial uses) will be achieved during the critical, dry weather conditions. However, as discussed in the Staff Report on the Nutrient TMDLs for Big Bear Lake, and as reflected in the proposed Basin Plan amendment, staff believes that compliance with these targets should also assure that standards are achieved under different hydrologic conditions. Moreover, as indicated in the Response to Comment # 46, empirical evidence indicates that compliance with the numeric targets should be feasible under these different hydrologic conditions. As TMDLs for average and wet hydrologic conditions are developed in the future, the numeric targets can be revisited and revised if appropriate.

Arguably, staff could recommend more stringent numeric targets for wet conditions because past and recent (2005) data indicate that the water quality is better than that observed during dry hydrologic conditions. However, staff believes that more stringent numeric targets for wet conditions are not needed since the proposed numeric targets would ensure protection of Big Bear Lake's beneficial uses.

Comment #52
(6.2) The critical water quality condition occurs near the end of prolonged drought when lake levels, and available dilution, are at their lowest. The critical loading condition occurs during extreme wet years. We recommend against attempting to adopt a TMDL for dry conditions and deferring development of the other TMDLs to a later (unspecified) time. Such a phased approach may waste considerable resources as agencies attempt to implement the dry weather TMDL only to discover, later, that the overall targets were never attainable due to uncontrollable factors intrinsic to average and wet weather conditions. Our recommendation is consistent with previous guidance prepared by the SWRCB's General Counsel (Can a TMDL be adopted by the Regional Board and incorporated into the Basin Plan with an understanding than an implementation plan would be adopted at some later specified or unspecified date?).

The proposed implementation plan does not assure continuous compliance with the proposed targets which do not distinguish between wet and dry hydrologic cycles. To demonstrate good faith, we are prepared to go forward with the most substantial elements of the Implementation Plan (monitoring, modeling, plan preparation) voluntarily while the Board staff continues to develop the TMDLs for average and wet conditions. BBMWD is preparing a formal work plan to update and upgrade their Lake Management Plan to facilitate the proposed TMDL Implementation Plan.

Response:
Discussions with BBWMD and Mr. Moore and changes in the proposed TMDLs subsequent to the submittal of this comment may have resolved the concerns identified, or at least addressed them to present satisfaction. In any case, the following response is provided.

Staff acknowledges and appreciates the BBMWD's efforts to address eutrophication and beneficial use impacts in Big Bear Lake and welcomes the commitment to move forward with implementation tasks. We share the District's evident view that it is essential to move forward in

a timely manner, recognizing that uncertainties remain and can only be addressed through further investigations such as those identified in the proposed implementation plan. All the proposed tasks shown in the revised Attachment to Resolution No. R8-2006-0023 will be invaluable in collecting data to determine TMDLs, WLAs and LAs for wet and/or average hydrologic conditions, as well as implementation of the proposed dry hydrologic condition ("critical condition") TMDLs. It would be imprudent to postpone the adoption of the dry hydrologic TMDLs since adoption of these TMDLs will require all stakeholders to become involved in the requisite studies and monitoring needed to develop TMDLs for wet and/or average hydrologic conditions. Neither is it necessary to postpone in light of the extended compliance schedule that is proposed and the commitment to review the TMDLs and revise them if necessary. Moreover, as a practical matter, failure to move forward on these TMDLs on the basis of inadequate information is not an acceptable option, and EPA would likely take action to promulgate TMDLs independently.

Comments related to the implementation plan

Comment #53
(7.1) The proposed implementation plan is insufficiently complete to assess the real-world requirements associated with meeting the recommended targets. It is necessary to know the exact nature of such permit limits in order to assess all of the potential impacts associated with building the facilities or implementing the programs necessary to assure compliance. Since revised permit limits are a "reasonably foreseeable" result of adopting the TMDL, the Regional Board is obligated to consider the specific effects of doing so. It is improper to separate the impact analysis into distinct sub-phases and defer it to a later time when it is evident at the time the TMDL is adopted that the subsequent phases are likely or inevitable.

Response:
Please see the Response to Comment # 56. Staff believes that the proposed TMDL implementation plan clearly identifies the responsibilities of the stakeholders, to the extent that they can be defined explicitly at this time. As discussed in the Response to Comment #56, the stakeholders would be required to submit plans and schedules for compliance with the requirements of the proposed TMDLs and the Regional Board will be able to consider the adequacy of these proposals as well as their impacts on the stakeholders in considering whether or not to approve them. For the proposed dry condition TMDLs, no external load reductions are expected. The stakeholders would be required to participate in monitoring activities, special studies, etc. in both the watershed and in the lake. These responsibilities are clearly specified in the revised Attachment to Resolution No. R8-2006-0023. Participation in the collection of the best scientific data and relevant technical information will be a benefit both to the stakeholders and the Regional Board as the proposed TMDLs are reviewed and refined in the future, and as TMDLs for average and wet hydrologic conditions are developed.

Comment #54
(7.2) The proposed implementation plan does not provide a thorough environmental analysis of the means most likely to be used to reduce internal nutrient loads. A general list of options is given, but a much more detailed review is necessary to demonstrate reasonable assurance that the targets will be attained and to comply with CEQA.

Response:
See Responses to Comments # 63 and 64. The Staff Report on Nutrient TMDLs for Big Bear Lake identified some reasonably foreseeable methods of compliance, including dredging, alum application, herbicide treatments, aeration and macrophyte harvesting. All these methods of reducing internal nutrient loads have been conducted in Big Bear Lake and have proven effective to some extent. Therefore, there is reasonable assurance that application of one or more of these activities would achieve the proposed targets.

The Regional Board is required to prepare a Basin Plan amendment, an Environmental Checklist that identifies potentially significant adverse environmental impacts of the Basin Plan amendment, a staff report that describes the proposed amendment, reasonable alternatives, and mitigation measures to minimize any significant adverse environmental impacts identified in the CEQA checklist. Staff have provided all the above-mentioned items for review and therefore have complied with CEQA requirements. The environmental effects of any proposed project would be subject to project-specific CEQA analysis and certification.

Comment #55
(7.3) We strongly support the Regional Board's proposal to develop and issue a general NPDES permit for restoration activities in Big Bear Lake. We believe the proposed general permit will be considerably more effective if many of the CEQA demonstrations are integrated into the general permit at the time it is adopted. That is why we believe it is essential that the proposed implementation plan identify the specific compliance strategies envisioned, do the requisite environmental review, and make the findings necessary to support rapid execution of various mitigation and remediation projects.

Response:
See Responses to Comments #54 and 63.

Pursuant to Water Code 13360, the Regional Board cannot specify the method or manner of compliance with the TMDLs. Instead, the revised Attachment to Resolution No. R8-2006-0023 requires the dischargers to develop the proposed plans. We believe that this allows dischargers the flexibility to craft an implementation strategy that works in the watershed.

The environmental checklist that is included in the Staff Report on Nutrient TMDLs for Big Bear Lake identifies potentially significant adverse environmental impacts of the Basin Plan amendment. Again, any potential impacts of the remediation activities that are chosen as a result of implementing the proposed associated tasks specified in the revised Attachment to Resolution No. R8-2006-0023 would be subject to further site-specific CEQA and/or NEPA analysis and certification.

Comments related to economic considerations

Comment #56
(8.1) The analysis of economic impacts is incomplete because the implementation plan is just a vague outline of potential options. The economic costs cannot be evaluated until the specific implementation requirements are identified. Under the California Supreme Court's recent Burbank decision, the Regional Board must do that at the time the TMDL is adopted because economics need not be considered at the time permit limits are enacted.

Response:
The implementation plan provides that the Stakeholders will provide specific proposed projects and methodologies that they may use to achieve the goals of the TMDL. In part, this is in compliance with the requirements of California Water Code Section 13360, which prohibits the Regional Board from dictating manner of compliance. Those proposals may be accompanied by economic cost information. As stipulated in the draft TMDL, the proposals must be approved by the Regional Board and the Board will be able to consider cost information in that process. The Regional Board's action to approve or disapprove the proposals is subject to appeal. To date, the Regional Board has considered available economic information for compliance approaches that appear to be likely. The Board recognizes that the costs of compliance may be significant and the proposed TMDLs include both an extended compliance schedule and a specific commitment to review the TMDLs once every three years. The intent of these provisions is to allow for investigations that are expected to result in refinement of the TMDLs, including wasteload and load allocations to responsible parties. Refinement of the TMDLs will also entail consideration of economics. These investigations should facilitate fair apportionment of the implementation costs among the responsible parties.

Comment #57
(8.2) Much of the economic analysis is presented in unit costs which is not adequate to evaluate the cumulative effect. It is not evident from the unit cost data what the total probable cost will be to attain and maintain compliance with the proposed targets. No costs are shown for alternative methods of increasing the richness and abundance of aquatic organisms.

Response:
See Response to Comment #56. The cost information was based on the costs to implement the current lake monitoring and tributary monitoring program and on cost information submitted by stakeholders. In fact, as shown in Table 11-2 of the Staff Report on Nutrient TMDLs for Big Bear Lake, staff utilized the cost information submitted by the BBMWD as part of a Proposition 13 grant. Therefore we are unclear as to why the BBMWD is indicating that their cost information is now insufficient. Nonetheless, staff welcomes the submittal of any other information on costs from Risk Sciences, the BBMWD or any of other stakeholders.

Comment #58
(8.3) The City of Big Bear Lake and surrounding area has fewer than 15,000 full-time residents. Even if 100% of both the City of Big Bear Lake and BBMWD's budgets were earmarked to meet the TMDL targets, there would not be sufficient resources to reduce internal loads by 80% if dredging were the only legal alternative. The economic analysis must include a more realistic assessment of total cost, the means by which it will be paid, and the socioeconomic impact on this relatively poor rural community.

Response:
See Responses to Comments #5, 26 and 56.

Comment #59
(8.4) The tabular summary of expenditures to improve water quality in Big Bear Lake creates a false impression that state grants are the only significant investment occurring. However, we believe it is very important to document the full scope of investments made by all stakeholders so that it is clear that no one is attempting to avoid their rightful responsibilities to the lake and surrounding watershed. BBMWD will prepare and submit a financial summary of the previous expenditures under separate cover.

Response:
Staff recognizes the stakeholder contributions and certainly did not intend to convey the impression that only state grants have supported work to address the euthrophication problem in Big Bear Lake. Staff have asked stakeholders to submit information describing the BMPs and costs associated with those BMPs in order to provide the complete picture of costs associated with improvement to Big Bear Lake. Absent that information, staff has utilized the cost information provided to us by the stakeholders, as well as that derived from the literature. We continue to welcome any cost information that BBMWD or other stakeholders can provide, in particular, information on the following:

- how much stakeholders have spent on watershed and lake restoration activities prior to the creation of the TMDL task force in 2001,
- how much stakeholders have spent on lake and local tributary sampling activities prior to the TMDL sampling initiated in 2001,
- how much stakeholders and the BBMWD have spent on eradicating weeds,
- how much stakeholders have spent performing special studies in the watershed including sediment sampling, zooplankton and phytoplankton analyses, macroinvertebrate studies, nutrient and sediment load modeling to the lake and tributaries, aerial photography of the surrounding watershed and any other studies that have been conducted to date as part of the grants awarded to the BBMWD.

Staff notes that based on a review of historical data and information, it appears that the majority of these studies were last conducted in the1970s as part of the California Department of Fish and Game (DFG) study effort under contract with the Big Bear Municipal Water District.

Comment #60
(8.5) While some of the initial costs of implementing an in-lake monitoring program and watershed-wide nutrient monitoring program are covered by state grant funds, it is unclear how long these programs will continue. That effort may absorb much of the local budgets that are presently earmarked to do actual lake improvement projects. We beseech the Board to consider carefully the value of each and every monitoring mandate or study requirement. We must be careful that scarce resources are not diverted from worthwhile remediation and mitigation projects toward less productive efforts.

Response:
See Responses to Comments # 5, 26 and 56. The proposed tasks specified in the revised Attachment to Resolution No. R8-2006-0023 are based on careful consideration and staff's best professional judgment of what needs to be done to ensure that water quality standards are attained and maintained and that future proposed revisions to the numeric targets, TMDLs, WLAs and LAs are based on sound science. As has been discussed in the prior responses, the proposed implementation plan provides that the stakeholders themselves are to propose specific plans and schedules for compliance with TMDL requirements. Development of these plans and schedules, and consideration of their approval by the Regional Board, will include careful consideration of the needs, costs and potential environmental impacts.

Comment #61
(8.6) If the targets are set to a level that necessitates reducing nutrient loads below natural background concentrations, then the TMDL is imposing requirements more stringent than necessary to comply with federal regulations.

Response:
See Responses to Comments #4, 6, 7, 20, 36, 37, 40 and 50.

Comment #62
(8.7) Some of the projects that may be required to meet the proposed targets (esp. dredging) may seriously undermine the aesthetic appeal of the lake. It is very important that the implementation plan be more detailed so that the economic costs of compliance can be assessed and the indirect economic consequences of mitigation and remediation can be evaluated.

Response:
See Responses to Comments #5, 26, 56 and 60.

The herbicide applications, the alum project and the current East End dredge project provide excellent case studies in determining the loss of revenue due to these projects, as well as increases in revenue over the long-term due to improvements from these projects. This is exactly the kind of information that will be needed as the dischargers implement Task 6 of the revised Attachment to Resolution No. R8-2006-0023.

Comments related to CEQA

Comment #63
9.1) Although the Basin Planning process has been deemed "functionally equivalent" to the preparation of an Environmental Impact Report, that is true only if each of the relevant CEQA elements is adequately addressed during the workshops and hearings. In this instance, CEQA would likely require a programmatic EIR.

The draft Technical Report incorrectly asserts that full CEQA review can be deferred until specific mitigation projects are proposed at some future date. The California Supreme Court has advised otherwise:

> "...an EIR must include an analysis of the environmental effects of future expansion or other action if: (1) it is a reasonably foreseeable consequence of the initial project and (2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its environmental effects (Laurel Heights Improvement Association v. U. of California, 47 Cal.3d, 376, 396 (1988)).

To comply with CEQA, the TMDL must identify and thoroughly evaluate the potential environmental consequences of all reasonably foreseeable implementation strategies that would likely be used to achieve compliance with the proposed targets. The current Technical Report merely lists the various compliance options while providing no detailed environmental analysis.

Response:
The TMDL does not purport to decide the specific projects that may be appropriate for implementation. The Regional Board is prohibited from directing the manner of compliance by California Water Code Section 13660. Rather, the implementation plan contemplates that the Stakeholders themselves will propose the methods and projects that will be deployed to achieve the TMDL's. Once those specific methods and projects are determined, then it is appropriate to

conduct a complete analysis. (Pub. Res. C. Section 21159.2) Were this not so, the Regional Board would have to engage in idle guesswork as to the possible projects and their impacts. This is not required by the CEQA. "[the regional board] is not required to engage in speculation or conjecture" (Pub Res. C. Section 21159(a)).

The Regional Board is only required to develop a program-level (i.e., macroscopic) analysis, not a "project level analysis." (Pub. Res. C. Section 21159(d).) Once specific projects are identified, it will be up to the appropriate public entity to conduct the requisite, complete environmental analysis.

This is not to argue that the appropriate CEQA analysis will not be performed, but rather to recognize that at this stage, the specific details of appropriate projects have not been identified and there is not the available information upon which to base meaningful impacts analysis.

See also the response to Comment #65.

Comment #64
9.2) The draft Technical Report does not identify or discuss all of the reasonable alternatives to the proposed project (Wildlife Alive v. Chickering, 18 Cal. 3d 190, 197 (1976) reaffirmed in Laurel Heights @ 400). Reasonable alternatives must be considered "even if these alternatives would impede to some degree attainment of the proposed objectives." (CEQA Guidelines §15126(d)(3)). Some of the reasonable alternatives not mentioned in the draft Technical Report include: setting nutrient targets equal to the ambient natural background loads, improving richness and abundance by increased stocking, alternatives to the proposed TSI, subcategorizing the beneficial uses to recognize natural limitations, and/or conducting a Use Attainability Analysis. Reasonable alternatives may also include using biocriteria rather than nitrogen and phosphorous targets to regulate nutrient levels in the lake or using Beneficial Use Maps to zone the lake to protect some uses in one place and other, competing uses, in other places.

Response:
The Regional Board has identified and discussed (1) the no project alternative, (2) using different numeric targets, (3) using a different compliance schedule; and (4) the proposed alternative. During the development of the TMDL, these have been the alternatives most mentioned by the Stakeholders as likely to fulfill the TMDL obligation. The CEQA requires the Regional Board to conduct "an analysis of reasonably foreseeable alternative means of compliance with the rule or regulation." C. Pub Res. Code Section 21159(d). It has done so. It is not, however, required to identify and discuss all conceivable alternatives. The Regional Board has met its obligation to identify and discuss reasonably foreseeable alternatives.

Comment #65
(9.3) The CEQA checklist is inaccurate. The checklist does not appear to have taken into consideration any of the reasonably foreseeable follow-on activities that will become legally-binding obligations once the TMDL is adopted. The draft checklist states that the proposed action would not violate any water quality standards. The implementation plan indicated that additional alum treatments may be necessary to meet the recommended targets. Alum treatments in the future would likely violate the current water quality objective for aluminum. Therefore, the claim of "No impact" does not accurately represent the foreseeable consequences of adopting the proposed Basin Plan amendment. There are several other

places throughout the checklist that should be revised to reflect that potentially significant impacts will occur and that mitigation will be necessary.

Response:
See Response to Comment #63. For clarification, the implementation plan contained within the Staff Report on Nutrient TMDLs for Big Bear Lake and the revised Attachment to Resolution No. R8-2006-0023 does not specify that alum is necessary to meet the recommended targets. Alum may be one of the necessary remediation activities chosen by the dischargers to implement the proposed TMDLs, WLAs and LAs. However, the Regional Board does not specify the means of compliance. That is left up to the dischargers. As stated in the Response to Comment #63, any potential impacts from the implementation of individual projects would be subject to further site-specific CEQA analysis and certification.

Staff, however, has revised the CEQA checklist to incorporate potential impacts from the reasonably foreseeable in-lake remediation activities and has identified general mitigation measures that may be implemented. However, individual projects are subject to further site-specific CEQA analysis and certification.

We welcome clarification of the specific deficiencies of the checklist identified by the commenter.

Comment # 66
(10) The draft technical report repeatedly refers to some stakeholders as "Responsible Parties." We recommend against using this particular phrase.

Response:
Comment noted. The "Responsible Parties" are referred to as parties and/or dischargers in the revised Attachment to Resolution No. R8-2006-0023.

See also Response to Comment #17.

GENE ZIMMERMAN
Forest Supervisor
San Bernardino National Forest
Letter dated August 31, 2005

See also comments presented orally by Robert Taylor, Forest Hydrologist at the August 26, 2005 workshop (page 92).

Note: Comments were received for the Nutrient TMDLs, the Sediment TMDLs and joint comments applicable to both Nutrient and Sediment TMDLs. To the extent possible, only responses to comments on the Nutrient TMDLs and the joint comments are provided.

Note: The following comments pertain in whole or in part to the Staff Report on the Nutrient TMDLs for Big Bear Lake (TMDL Report). Staff does not expect to revise the TMDL Report presented at the Regional Board workshop on August 26, 2005. A separate staff report that describes the proposed changes to the Basin Plan Amendment based on consideration of comments received will be prepared. Nevertheless, the following responses address comments on the TMDL Report (Comments # 67- 146).

Citations refer to the numbered comments contained within the original comment letter.

Comments on Big Bear Nutrient TMDL

Comment #67
(N01) The TMDL does not refute the Leidy (2003) report stating that the reservoir is naturally eutrophic. Therefore, use of the arbitrary TSI value of 47 is not justified.

Response:
Board staff does not concur with or refute the information in the Leidy report. However, relevant to the TMDL process, existing uses and water quality objectives of the lake are not being met and this impairment must be addressed through a TMDL. Because of the uncertainties associated with identifying appropriate final numeric targets for chlorophyll *a* and total phosphorus based on the trophic state index (TSI), as discussed in Responses to Comments #6, 34, 29 and 202, staff now proposes to replace the total phosphorus final target with the interim target and revise the chlorophyll *a* interim target. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile. Compliance with the numeric targets under dry conditions and compliance with the TMDLs for dry hydrological conditions is to be achieved by 2015; compliance with the numeric targets for other conditions is set for 2020.

Comment #68
(N02) Has the amount of phosphorous sorbed to sediment loading considered background been taken into account such that phosphorous sorbed to background sediment is considered background phosphorous and is not included in the amount of phosphorous for possible reduction?

Based on these comparisons (many comparisons to studies that have defined the natural background levels of phosphorus expected from a forested ecosystem) and the fact that changes in land use (from forest to agriculture or urban use) appear necessary to substantially

increase nutrient concentrations in higher order streams (Binkley et al. 2004), the USFS believes that NFS lands in the watershed are functioning relatively naturally with respect to nutrient export. We believe that our scarce resources should be utilized to address demonstrated water quality problems and threats to water quality, such as catastrophic wildfire.

Response:
The watershed (HSPF) model output was provided for total phosphorus, total nitrogen, total sediment, etc. in 2003 and 2004 and was not broken down into particulate and dissolved fractions. As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, the HSPF model was updated in 2004 by Hydmet, Inc. for use by Tetra Tech in the WASP model and by staff for TMDL development. We anticipate that the San Bernardino National Forest (SBNF) will be an active participant in developing plans to revise the modeling in order to address the questions and issues raised.

As described in the Nutrient Budget Study, the HSPF model used values obtained from the literature for the expected nutrient concentrations from forest land. The reason that the values obtained from the HSPF model and those that the SBNF believes are representative are similar is because they both come from literature values of forested areas. There are no empirical data for nutrient export coefficients specific to the Big Bear Lake watershed. The data and information provided by the SBNF includes literature values of nitrogen and phosphorus concentrations from forest streams. No actual data collected in National Forest Service (NFS) lands within the Big Bear Lake watershed is provided to show that nutrient concentrations are comparable to those observed in other forested areas. It is also unclear to Board staff whether the other studies referenced represent forests similar to the Big Bear Lake watershed or forests that are managed differently (for example, differences in fire suppression or where there is little human use).

Watershed monitoring is included as Task 4 as shown in the revised Attachment to Resolution No. R8-2006-0023. The proposed TMDLs anticipate that the SBNF will participate actively in the monitoring program in order to allow the SBNF to assess compliance with the TMDLs, and LAs (see Attachment to Resolution No. R8-2006-0023).

See also Responses to Comments #6, 110 and 111.

Comment #69
(N03) **Section 2.0, Page 30, ¶ 1; Tables 2-1, 2-2, and 2-3**: The statistical analysis performed was incorrect relative to non-detects. Using ½ the detection limit is only applicable for certain distributions of data and then only when the number of non-detects is on the order of 15-25% of the population. If insufficient data is available to draw conclusions, then the tables should not list results or should have results footnoted to show that data issues make conclusions questionable.

Response:
The intent of the tables was to show that the existing water quality objectives have been exceeded as one basis for the 303(d) listing. In addition, using ½ the detection limit is an acceptable practice. Performing additional statistical analyses would have no effect on the proposed TMDLs and would not change the fact that the existing water quality objectives have, at times, exceeded existing water quality objectives.

Comment #70
(N04) In regards to the "personal observation," was the person making the observation trained and/or have the documented expertise to make an accurate observation? Also, the sentence references "accounts" plural, yet the parenthetical notes "personal observation" singular. Please clarify.

Response:
Personal observations were made by Board staff during sampling excursions on the lake with the Big Bear Municipal Water District.

Comment #71
(N05) **Page 41, Table 2-7:** See previous statistical comment (N03) related to percent non-detect and number of samples required to make a statistical conclusion that will meet the assumptions inherent in data analysis.

Response:
See Response to Comment #69.

Comment #72
(N06) **Pages 44-45, Figures 2-4 and 2-5:** Please provide the statistical tests showing a significant difference between these two data sets as discussed in the preceding ¶ ("experiences less pronounced dissolved oxygen stratification").

Response:
This analysis is not warranted. The point made by the presentation of the dissolved oxygen data is that because of mixing and the shallower depths at the east end of the lake, dissolved oxygen does not appear to stratify to the extent that dissolved oxygen stratifies at the deeper end near the dam.

Comment #73
(N07-1) The targets, as presented, appear to apply at all times, not just in dry years. Given that the target of 35 ug/L was determined from an estimate at the 25th percentile of dry year data, setting of this as the long-range target is irresponsible. What if the next five years are not dry? These numeric targets should be proposed as "dry year" targets (and the title of Table 3-1 changed appropriately) with a note that every 3 years, the data will be re-assessed and new targets based on the 25th percentile of the data will be quantified.

Response:
See Responses to Comments #46 and 51.

The proposed Basin Plan amendment/TMDLs (Attachment to Resolution No. R8-2006-0023) specifies a re-opener clause (Task 10) by which the Regional Board is committed to review of the TMDLs every three years, or more frequently if warranted by the results of studies specified in the amendment or results from other studies.

Comment #74
(N07-2) The approach that results in the final target of 20 ug/L ("a trophic index system was used to derive the final numeric targets" [Page 49, ¶2] is not based on the data, but rather an assessment of the Carlson Trophic State Index, which was derived by studying small lakes in Minnesota. The explanation in Appendix C is incomplete in its explanation. The use of the

Carlson Trophic State Index as applicable to a reservoir that is not contained within the dataset used to derive the index is an unproven assumption. The information provided below should be assessed [many examples of other trophic state indices, including China and Colorado were presented] or added to Appendix C and further justification of the use of the Carlson Trophic State Index for this situation should be assessed.

Section 3.1.1, Page 50, Numeric Targets, ¶ 2: The statement is made that a Carlson TSI of 47 is "on the high end of the mesotrophic level." The table below indicates that the mesotrophic TSI range for small Minnesota lakes is 40 to 60. The SBNF would like the report to contain language indicating that the Carlson TSI was derived using data of small Minnesota lakes, which may or may not be applicable to Big Bear Lake. In addition, the comment related to the "high end" should be removed.

Response:
As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Attachment C also looks at another way of assessing trophic state with lakes containing macrophytes. However, the use of this index was found not to be appropriate due to the reasons listed in the Staff Report. The Carlson Trophic State Index has been in existence since 1977 and has been used in many states. In particular, this index was used to set a TP numeric target of 20 ug/L for the Indian Creek Reservoir in California. Therefore, there is precedence in using Carlson's TSI in California in reservoirs and staff believes the SBNF has provided no justification for evaluating other trophic indices. In the future, as TMDLs are developed for wet/and or average hydrological conditions as specified in the revised Attachment to Resolution No. R8-2006-0023 (Task 9) and models are updated (Task 6A), the TMDLs can be reviewed as part of the triennial review process or more frequently, if warranted (Task 10) and changes can be made to the TMDLs, WLAs, LAs, and numeric targets, if appropriate.

Finally, as noted in Responses to Comments #34, 39 and 67, and as shown in the revised Attachment to Resolution No. R8-2006-0023, Table 5-9a-c, Board staff proposes to replace the total phosphorus final target with the interim target and revise the chlorophyll *a* interim target. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile. Compliance with the numeric targets under dry conditions and compliance with the TMDLs for dry hydrological conditions is to be achieved by 2015; compliance with the numeric targets for other conditions is set for 2020.

Comment #75
(N07-8 and 11) **Section 3.1, Page 49, ¶ 2:** The "third approach" sited [*sic*] and the last sentence of the paragraph starting "Specifically" does not fully describe the method as presented in EPA-822-B00-001. The final sentence should more fully describe the method, "There are two approaches: (1) using the morphoedaphic index method (MEI) and (2) extrapolating natural background nutrient loading that would occur under undisturbed conditions followed by estimation of nutrient concentrations and trophic state with a mass balance model."

Section 3.1, Page 49, ¶ 2: Was the "third approach" used by EPA to determine a value of 20 ug/L, as referenced on Page 50, Section 3.1.1, ¶ 2? If so, this should be documented. If not, then the documentation of the method used should add that the final target did not use the third approach as stated.

SBNF Suggestion: Therefore, the SBNF suggests that the current final target for total phosphorous in dry years be set using the lower 25th percentile of the data, listed as 31 ug/L,

instead of 20 ug/L. Please reference comment **N34**, which discusses the statistical analysis that was used to determine the value of 31 ug/L.

Section 3.1, Page 49, ¶ 2: The 25th percentile calculates to 31 ug/L, not 35 ug/L. The report should note the difference here, not just in footnote 27.

Response:
Staff is unclear about the intent of the comment. As explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, the third approach is to use other scientifically defensible methods to develop nutrient criteria protective of beneficial uses. Carlson's Trophic State Index has been around since the 1970s and has been used for lakes other than small Minnesota lakes. The information the SBNF has provided pertains to the establishment of reference conditions. As explained in the Staff Report, staff did not develop reference conditions because there are no appropriate reference conditions for Big Bear Lake. Further, both references provided by the SBNF refer to natural background nutrient loads. As explained earlier (see Responses to Comments #6, 20, 36, 40 and 50) staff does not believe that the Big Bear Lake watershed is representative of a natural or undisturbed watershed. Board staff's intent was not to develop nutrient criteria, but to use a similar process as described in the EPA guidance to determine appropriate nutrient numeric targets. As shown in the revised Attachment to Resolution No. R8-2006-0023, staff proposes that water quality objectives be reviewed and revised as appropriate, and that biocriteria be developed for Big Bear Lake. Board staff will need to utilize USEPA guidance for the review and/or revision of the nutrient related water quality objectives and for development of biocriteria. (see also Responses to Comments #34, 39 and 158).

As noted in the Staff Report on Nutrient TMDLs for Big Bear Lake, Board staff recognizes that the 25th percentile of the TP data is 31 ug/L not 35 ug/L. Staff believed that data uncertainties and ease of measurement justified the less stringent numeric target.

Comment #76
(N07-10) **Section 3.1, Page 48, last sentence before Figure 3-1**: Setting dates to meet final targets is premature given that erosion of sediment and associated nutrient loading will be increasing in the short term to return the forest to a more natural fuel loading condition. In addition, if the next few years continue to be wet, targets based on dry year data are unlikely to be correct or achievable.

Response:
Dates for compliance with the targets/TMDLs are required. Board staff recommends an extended compliance time frame so that additional investigations can be conducted and the TMDLs, targets, etc. can be revised if and as appropriate. Additional investigations need to be conducted to determine the loads from a "more natural fuel loading condition" because statements provided by the SBNF are contradictory. Initially, the SBNF stated (Comment #69) that the phosphorus sorbed to sediment should be considered natural. Numerous other comments have stated that the TMDL should account for the "natural background" load (Response to Comment #6, etc.), yet, now the SBNF states that the sediment and nutrient loads will increase in the short term while they are "returning the forest to a more natural fuel loading condition". This statement implies that the historic and current sediment and nutrient loads from the SBNF are not representative of natural loads and will not be until a few years after the fuel reduction treatments are completed.

See also Responses to Comments #6, 20, 36, 40 and 50.

Comment #77
(N07-12) **Page 50, Table 3-2**: This Table has no use in the report. This method is not used, and the data in the table was derived with no data from Southern California Mountains sub-ecoregion. The Table might make it seem to some that a target of 20 ug/L is reasonable since it is more than twice the value in Table 3-2. Since the data set is not appropriate for Big Bear Lake, the implication raised by the table shouldn't occur. Please remove this table.

Response:
As explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, staff did not use the values presented by USEPA because we felt they were not representative of the conditions expected in Big Bear Lake. However, this table is useful for comparison purposes and to show that USEPA does have recommended nutrient criteria that the states could choose to use.

Comment #78
Section 3.1.1, Page 50, ¶ 2: A statement is made that "EPA considers the dividing point between mesotrophic and eutrophic conditions" is 20 ug/L, yet the reference is a textbook, not an EPA document. Please provide the reference to the appropriate EPA document.

Response:
The cited reference is in Novotny and Olem (1994). The full reference is:
USEPA. 1974. *The relationships of phosphorus and nitrogen to the trophic state of northeast and north-central lakes and reservoirs*, Natural Eutrophication Survey working paper No. 23, U.S.EPA, Washington, D.C.

Comment #79
(N08) **Section 4.0, Page 53, ¶ 2 and Section 6.0, Page 84, ¶ 5**: The effect of channelization and the loss of floodplain deposition should be more fully addressed. Sediment originating from the forest that in the pre-anthropogenic setting would have been deposited on the floodplain, now more likely reaches Big Bear Lake. Is this increase in sediment to the Lake assigned to the agency responsible for altering the stream channel? To state that the urban contribution is entirely encompassed by a waste load allocation (as in Table 6-1 and 6-2) discounts the increased contribution to the lake from the lack of floodplain deposition. This source of increased loading should be quantified or modeled and a portion of the load allocation should be transferred to the responsibility of the urban stakeholders.

Response:
Staff understands the complexity of the issue raised by the SBNF. However, the SBNF proposes no method for staff to re-assign the allocations. Further, staff is not aware of any other TMDL where these effects have been taken into account. Therefore, it is staff's opinion that in the absence of concrete data on the effects of stream channel modifications, the TMDLs and allocations are appropriately assigned. Obviously, this is subject to review and modification based on additional investigations.

Comment #80
(N09) **Section 4.0, Page 53, ¶ 5:** A more thorough analysis of Plunge Creek needs to be added to show that it is adequate as a model for the hydrology of the Big Bear Lake watershed.

Response:
Modeling has been conducted with the data available at the time of the modeling effort. Plunge Creek has been used in other modeling efforts specific to the City of Big Bear Lake's

groundwater assessment. Therefore, there is precedence in using the Plunge Creek watershed to calibrate the Big Bear Lake hydrology. Staff does not believe that any further explanation or justification is needed.

Comment #81
(N10) **Section 4.0, Page 54, ¶ 2**: As stated in comment N03, variable detection limits and non-detects can still be evaluated for useful information. A more thorough statistical analysis should be conducted before stating that "phosphorous detection limits were too high."

Response:
The Big Bear Municipal Water District's data collected from 1994-2000 generally used a detection limit of 50 µg/L that resulted in almost all the collected samples to be measured at non-detect. As explained in the Staff Report, these data were not useful in modeling or other efforts when numeric targets lower than 50 µg/L are proposed. In June 2001, the BBMWD proposed an alternative sampling protocol with lower detection limits to obtain data that could be used for TMDL efforts.

Comment #82
(N11) **Section 4.0, Page 54, ¶ 2**: The ***bold, italic*** ("The proposed TMDLs are based on the average of all loads from the period of record of 1999 to 2003. This period only includes loads from dry hydrological conditions.") statement needs to be reiterated on page 47 in conjunction with Table 3-1. This statement gives further justification for making the targets dry year targets only.

Response:
See Responses to Comments #46, 51 and 73.

Comment #83
(N12) **Section 4.0, Page 54, footnote 30:** Please clarify. Was the inability to use the WASP model for the entire data range due to a problem with the format of the output given to the RWQCB? If so, the stakeholders should not be penalized (forced to meet targets based on inadequate data) because the RWQCB had difficulty with the contractors. Why didn't the RWQCB get the output required from the HSPF model for the WASP model before setting targets?

Response:
As explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, the HSPF load data received by Tetra Tech and that received by the RWQCB were based on the same model runs, the only differences were in the way the model output was presented to Tetra Tech and the RWQCB. The WASP model required HSPF loads from the watershed to be based on the area of the watershed that drains to each of the 10 lake segments in the WASP model; Tetra Tech used data only from 1999-2003 based on annual years. Staff could have used this HSPF output; however these loads were not distributed among the three land uses. Hence, staff asked to have the same output that was provided to Tetra Tech but based on the land uses (resort, forest north, forest south, high density residential and urban) instead of based on the 10 segments for the WASP model. The HSPF modeler presented the data in water years instead of annual years because staff had originally requested that the data be presented in this format during the HSPF modeling effort. However, in terms of compliance, Board staff believes that annual years are easier to use in determining compliance with the TMDLs, WLAs, LAs and numeric targets rather than water years. As specified in the revised Attachment to Resolution

No. R8-2006-0023, future model updates are specified (Task 6A) and a discussion of whether annual years versus water years is appropriate could be part of the model evaluation. Again, as specified in the revised Attachment to Resolution No. R8-2006-0023 (Task 10), revision of the TMDLs, WLAs, LAs and numeric targets may be warranted if further monitoring and modeling studies justify any revisions.

Comment #84
(N13) **Section 4.0, Page 55, ¶ 1**: In making the determination between low and high water holding capacity, who made the determination and how was it made? Was the practitioner a trained soil scientist? What soils dataset was used? As the soil survey gives descriptions of water holding capacity beyond high and low (e.g. DaF is very low), how were the varying groups placed in the two categories?

Response:
This information is detailed in the Nutrient Budget Report (BBMWD, Hydmet, Inc., and AquAeTer, Inc., 2003). A CD containing a copy of this report along with both the HSPF and WASP model input and output, GIS files, and the WASP model report were provided to the SBNF on March 28, 2005.

Comment #85
(N14) Section 4.0, Page 55, ¶ 3 and Section 6.0, Page 85, Tables 6-1 and 6-2: Was an assessment made as to whether the flow data fit a normal distribution, a lognormal distribution, or a nonparametric distribution? The type of distribution has implications on the analysis performed, the amount of data needed to adequately address the distribution, and the setting of averages. There is also the implication that the high flow years will deposit the most nutrients in the lake. If the final targets are "specified as an annual average", then the RWQCB is possibly setting up the stakeholders for failure since high flow years are the hardest to control movement of sediment and nutrients.

Response:
Performing this type of analysis would have no effect on the proposed Dry Condition Nutrient TMDLs, considering that any change in external loads had no effect on changes in lake water quality as shown by the WASP model. **To reiterate, the proposed Nutrient TMDLs are for dry hydrological conditions only and no reductions are required for external load reductions.** Furthermore, the models were developed based on the existing data at the time and staff is not aware of any immediate plan to revise these models. Staff does agree that during wet years nutrient loading would be increased. However, the volume of water would also increase in the lake providing a dilution effect. This has been observed most recently from the increases in lake level from 2004 to 2005 and the corresponding improvement in water quality. Again, as shown in the Staff Report wet years happen less frequently than dry or average years. Therefore, during the majority of time, internal loads and not external loads would dominate.

Also see Responses to Comments #46, 51, 73, and 82.

Comment #86
(N15) **Section 4.0, Page 55, Figures 4-3 and 4-4**: The targets are based on dry years, but these Figures show the high variability associated with nutrient loading. The real variability must be taken into account when setting the targets. In addition, as the phosphorus has been associated with "granitic sand" the final targets must take into account that a large percentage of the phosphorus is associated with background erosion. This natural background phosphorus

should be classified appropriately, and a calculation of the internal load associated with this natural background should be identified in Table 4-2 (Page 60) and Tables 6-1 and 6-2 (Page 85). The SBNF should not be held liable for the phosphorus that would naturally erode with the background sediment.

Response:
See Responses to Comments #46, 51, 73, 82, and 85 for a discussion of numeric targets.

Also see Responses to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, and 76 for a discussion of "background" conditions.

Comment #87
(N16) **Section 4.0, Page 58, ¶ 2; Section 4.0, Page 59, ¶ 1; Section 4.3, Page 62, ¶ 2**: The statements that "runoff from forest areas contributed 10% of the total nitrogen load and 26% of the total phosphorus load" and "the most significant contributions from forest land use" need to be clarified. The percentage of each nutrient associated with natural background erosion needs to be quantified and listed. Loading beyond natural background could then be better established for the various stakeholders.

Response:
See Responses to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, 76, and 86.

Comment #88
(N17) Section 4.3, Page 62, ¶1 & Section 2.0, Page 27, ¶ 1: The statement is made (Section 2.0, page 27) that "lakes naturally take thousands of years to progress from an oligotrophic condition ... to an eutrophic condition." The valley had thousands of years to build up sediment and nutrients prior to the arrival of humans and the building of the dam. Has the RWQCB taken into account that the lake bottom sediments deposited before the Forest Service was created are not the responsibility of the Forest Service? Also, has the RWQCB determined what chance there is that the oligotrophic condition could ever be approached given the hundreds of feet of sediments that are naturally occurring in this watershed?

Response:
First, the Staff Report on Nutrient TMDLs for Big Bear Lake does not indicate that staff proposes that the goal of the TMDLs is to achieve oligotrophic conditions in Big Bear Lake. Second, as explained in the Staff Report and as was made clear at the August 26, 2005 Regional Board workshop, staff recommends nutrient targets that are representative of mesotrophic conditions not oligotrophic conditions. However, these final numeric targets have been replaced by the interim targets. Specifically, Board staff proposes to replace the total phosphorus final target with the interim target and revise the chlorophyll *a* interim target. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile.

Also see Response to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, 76, 86, and 87.

Comment #89
(N18) **Section 4.5, Page 67, ¶ 3**: It is inaccurate to state, "phosphorus loading to Big Bear Lake during a wet year" without adding a reference to 1993. Without the year reference, the implication is that the statement and the associated loading will be accurate for all wet years.

Response:
Comment noted.

Comment #90
(N19) **Pages 69-70, Figures 4-6 and 4-7**: The labels next to the pie charts should encompass the years used in case, in the future, the charts are ever looked at without the accompanying figure text.

Response:
Board staff feels that the underlying caption as presented in the Staff Report is adequate.

Comment #91
(N20) **Section 5.1, Page 72, carryover ¶ and Section 5.1b, Page 76, carryover ¶**: An acknowledgement should be made that the load targets may not be possible to meet. The RWQCB only states that compliance is not achieved because of "model limitation" "incomplete understanding" and "model deficiency." The possibility exists that the targets cannot be met given the natural condition of the lake bottom and watershed (see N17).

Response:
Board staff believes that the explanation in the staff report is sufficient. An extended compliance schedule is proposed so that the uncertainties recognized in the Staff Report can be addressed. If warranted by further investigation, the targets and TMDLs can be revised as appropriate.

Also see Responses to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, 76, 86, 87, and 88.

Comment #92
(N21) **Section 5.1a, Page 72, ¶ 1:** The final sentence of this paragraph defining what dry conditions are should be copied/reiterated near Table 3.1 in conjunction with the statements that the targets were derived for dry years only.

Response:
See Responses to Comments #46, 51, 73, 82 and 85. The proposed numeric targets are derived on an annual basis and apply to all conditions.

Comment #93
(N22) **Section 5.1a, Page 72, ¶ 1:** The second sentence needs to acknowledge that the "external nutrient loads are greatest" post-fire and that fire is a natural background condition for this watershed.

Response:
See Responses to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, 76, 86, 87, 88, and 91.

Comment #94
(N23) **Section 5.1b, Page 76, carryover ¶**: The "extended compliance schedule" of 10 years is likely inadequate. Three to four years will likely be spent collecting sufficient data to calibrate the model. If reductions are required, then it will take, at a minimum, an additional three years to begin to calculate if a downward trend exists. Given the variability of results for different hydrologic years, it is unlikely that 10 years will be adequate to meet a final target.

Response:
As previously indicated (see, for example, Responses to Comments # 6 and 39), Board staff proposes to replace the total phosphorus final target with the interim target and revise the chlorophyll *a* interim target which should facilitate compliance. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile.

No external load reductions are required; the focus is on internal nutrient load reductions. Methodologies have already been applied successfully to reduce this loading and staff believes that the reduction required by the proposed TMDLs can be achieved in accordance with the recommended compliance schedule.

Comment #95
(N24) **Section 5.1d, Page 77, ¶ 2 & 3:** The report should note that the studies performed by Welch and Cook (1995) and Welch and Jacoby (2001) were for shallow lakes and western Washington lakes, respectively. The applicability of these studies to Big Bear Reservoir has not been shown, and this possible lack of applicability should be acknowledged. In addition, the RWQCB should address what the environmental consequences of alum application are relative to any water quality objectives for aluminum.

Response:
SBNF is incorrect. Dr. Welch, Dr. Anderson and Dick Osgood were all involved in calculating the necessary dosages for alum for Big Bear Lake for the 2004 alum application. In addition, Dr. Barry Moore evaluated the literature and the effects of alum on biota and Sweetwater Technology performed the alum application. These researchers are experts in their field and staff and the BBMWD deferred to their expert knowledge on what would be appropriate for Big Bear Lake. In addition, the development of site specific objectives (SSOs) for aluminum can be evaluated by the stakeholders, taking into account the natural background concentrations of aluminum (Task 6B as specified in the revised Attachment to Resolution No. R8-2006-0023).

Comment #96
(N25) **Conclusions, Page 79, ¶ 3:** Has the RWQCB made a determination of how an 80% reduction in phosphate sediment flux is to be achieved given the natural condition of the watershed (e.g. several hundred feet of sediment forming the lake bottom) [see N17]?

Response:
See Responses to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, 76, 86, 87, 88, and 91.

Comment #97
(N26) **Page 80, Table 5-1**: Based on our comments in N07, if the final target is set to 31 ug/L instead of 20 ug/L, then it seems possible that a scenario could be found to simulate a successful target acquisition.

Response:
As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, except for the proposed TN target, all other targets can be met (based on the results of the WASP Model runs). Interestingly enough, TN concentrations were reduced by the alum application and this was not taken into consideration when conducting model runs because at that time (the middle of 2004), the alum application was not complete and all of the results were not in. However, the WASP

model could be re-run taking into account the reduction in nitrogen flux due to the alum application to evaluate whether the TN target could be met.

As has been discussed previously (Responses to Comments # 34, 39, 67 and 94) and as shown in the revised Attachment to Resolution No. R8-2006-0023, Table 5-9a-c, staff proposes to modify the final total phosphorus target.

Comment #98
(N27) **Page 83 & 85, Tables 5-2, 5-3, 6-1 and 6-2**: As each of these tables specifically reference that these nutrient TMDLs are associated with dry conditions, then Table 3-1 (page 47) should also explicitly be for dry conditions (see comment N07, 1).

Response:
See Responses to Comments #46, 73, 82 and 85.

Comment #99
(N28) **Section 6.0, Page 84, ¶ 3**: The final sentence implies that the stakeholders are being required to fulfill the role of the RWQCB, "to calibrate the model and develop TMDLs/allocations that address all hydrological conditions." It appears inappropriate for the stakeholders to regulate themselves. This sentence also does not deal with the idea of whether multiple targets are appropriate for the Big Bear reservoir.

Response:
The referenced text states that the dischargers are required to conduct monitoring necessary to calibrate the model and develop TMDLs/allocations that address all hydrologic conditions. That does not imply that the stakeholders are responsible for the development of TMDLs/allocations. As indicated in Task 9 of the proposed Basin Plan amendment/TMDLs (the revised Attachment to Resolution No. R8-2006-0023), the Regional Board has the responsibility to develop TMDLs for wet and/or average hydrological conditions. However, it must be emphasized that Board staff would anticipate the active participation of all stakeholders from the onset of this effort in order to ensure that any proposed wet/average TMDLs, WLAs and LAs have addressed stakeholder issues, data needs, etc.

The Regional Board cannot and would not delegate its authority to stakeholders to regulate themselves.

Comment #100
(N29) **Section 6.0, Pages 84-85, ¶ 3 & formulae**: a) As noted in N08, the urban stakeholders are partially responsible for the load allocations from the upper watershed because floodplain deposition has been reduced by channelization and loss of floodplain due to making the surface impervious. An acknowledgement is needed here relative to this fact. The formula for $\sum$LA needs to be amended to include a portion associated with urban. b) The TMDL formula should also include an assessment of the nutrient load associated with natural background erosion.

Response:
See Response to Comment #79.
See also Responses to Comments #4, 6, 7, 20, 31, 40, 50, 61, 67, 68, 76, 86, 87, 88, and 91.

Comment #101
(N101) **Section 7.0, Page 87, ¶ 1**: The third sentence should be amended to indicate that the greatest loading of nutrients will occur following a significant wildfire.

Response:
According to the SBNF, the policy has been to prevent forest fires. In the event that a catastrophic fire occurs in the watershed, this would be taken into account when evaluating compliance with the TMDLs, WLAs and LAs.

Comment #102
(N102) **Appendix A, Page A2, Table A-1**: Having 2 and 3 samples is insufficient to provide any statistical confidence in averages. In addition, the median has no meaning with only 2 samples. Also, the method for calculating an average value from 3 values when 1 is a non-detect is not stated. (see N03)

Response:
Appendix A provides a summary of nutrient related data for the 303(d) Listed tributaries (Rathbun Creek, Grout Creek and Summit Creek). As discussed in the Staff Report, staff does not believe that there are adequate data to demonstrate that the beneficial uses of these creeks are impaired due to nutrient levels. As specified in the proposed TMDL implementation plan, staff will review all Big Bear Lake tributary data (formerly Task 11 and now Task 8) to determine whether or not the Regional Board should proceed with the development of TMDLs or recommend the creeks for delisting. At that time, we can review the existing water quality data and make any necessary changes to the data analyses.

See also Response to Comment #69.

Comment #103
(N103) **Appendix A, Page A11, Figures A-3 and A-4**: The title of this figure "percentage of average" does not match the y-axis. Either the title or the y-axis needs to be changed.

Response:
Comment noted. The captions should read " Average total P..." and "Average total N...".

Comment #104
(N104) **Appendix A, Page A12, Table A-8**: The record of data is insufficient to make the claim that 1999-2003 was an "extreme" dry event.

Response:
Comment noted. The terminology used for the lake should be the same as that used for the tributaries. Therefore, the language should read "dry scenario".

Comment #105
(N34) **Appendix B, Pages B5-B6**: Was an assessment made to statistically show that photic and bottom data came from the same population distribution and also to show whether these two data sets could be combined? Please provide the data for the photic and bottom as separate data sets and perform this more complete statistical analysis. This analysis provides the basis for the 31 ug/L value presented in the report.

Response:
The SBNF provided no justification for conducting these data analyses and staff disagrees with the suggested approach. Big Bear Lake is a polymictic lake, meaning that the lake continually mixes so both the bottom and photic zone layers are important to the overall lake water quality. Since both the photic zone and the lake bottom comprise the entire Big Bear Lake, it is appropriate to specify numeric targets that are protective of the entire lake. Whether or not the photic and bottom data came from the same population is irrelevant to identifying appropriate lake numeric targets. Board staff believes that it would be confusing to implement and entirely un-workable to have photic zone numeric targets and bottom numeric targets. This approach would likely result in more stringent numeric targets since the photic zone measurements are usually lower concentrations than the bottom.

Comment #106
(N35) **Attachment A, Page 1 of 17, Big Bear Lake, ¶ 1:** Groundwater is another contributor to the lake through base flow. This source of water should be added.

Response:
Groundwater may influence the lake's hydrology. There were no data available at the time of the modeling efforts to determine the contribution of groundwater to the lake's water balance. Literature values were used for concentrations of nutrients in interflow for HSPF (refer to the Nutrient Budget Report (BBMWD, Hydmet, Inc., and AquAeTer, Inc. 2003) for more information). We assume that if the SBNF has any data or information on groundwater contribution, that information would be provided to the Regional Board. Further, if stakeholders believe this is important to consider in the future, then that information should be included as part of the model updates specified in Task 6 of Attachment to Resolution No. R8-2006-0023. Again, we anticipate that the SBNF will be an active participant in developing plans to revise the modeling in order to address questions and issues raised.

Comment #107
(N36) **Attachment A, Page 4 of 17, Table 5-9a-c**: Please make this table coincide with information and comments related to Table 3-1. Footnote c indicates a 5-year running average, but the staff report speaks of annual averages.

Response:
The tables are essentially the same. Annual averages, as shown in footnote d of Table 3-1 and footnote b of Table 5-9c apply to TP and TN. Five-year running averages, as shown in footnote e of Table 3-1 and footnote c of Table 5-9c, apply to macrophyte coverage and percentage of nuisance aquatic vascular plant species. Growing season averages, as shown in footnote f of Table 3-1 and footnote d of Table 5-9c apply to the time period of May 1-October 31.

Board staff did not include a description of how chlorophyll *a* would be calculated in either of these tables; therefore, as shown in Attachment to Resolution No. R8-2006-0023, Table 5-9a-c has been revised to include a description of the stations for determining compliance with the chlorophyll *a* target.

Comment #108
(N37) **Attachment A, Page 6 of 17, 1.C. 1., Editorial:** The third word should be "of" not "f".

Response:
Comment noted.

Comment #109
(N38) **Attachment A, Page 6 of 17, 1.D.:** An acknowledgment is needed that a post-wildfire condition would be the worst critical condition for this watershed relative to loading.

Response:
External loading may be the most significant in post-fire conditions. However, the "critical condition" to be addressed in TMDLs is not the circumstances that would cause the greatest loading, but those in which protection of water quality standards are most problematic. The Staff Report for the Nutrient TMDLs for Big Bear Lake identifies these as dry conditions, when the greatest release of internal sediment nutrients occurs and when there are decreased lake levels, causing increases in nutrient concentrations. Dry conditions typically occur in the summertime, which is when most of the recreational use of the lake occurs and when macrophyte growth and algae can deplete oxygen, placing stresses on aquatic life in the lake.

Nonetheless, staff does recognize the extent to which catastrophic wildfires could impact the lake and affect compliance with the proposed TMDLs. As indicated in Response to Comment #101, fire impacts will be taken into account when evaluating compliance with the TMDLs.

Comment # 110
(Implementation Plan/Monitoring Program – Legal Issues)

The Organic Administration Act authorizes the Secretary of Agriculture to manage National Forest System (NFS) Lands (16 U.S.C. §§ 473-475, 477-482, and 551). Originally, this authority was given to the Secretary of the Interior. In 1905, Congress transferred administrative authority over the management of surface use of forest reserves from the Secretary of the Interior to the Secretary of Agriculture pursuant to the Transfer Act of 1905, 16 U.S.C. § 472. Moreover, funds can only be expended for the purpose for which they have been appropriated (16 U.S.C. §§ 1301). Thus, the Forest Service only has jurisdiction, custody, and control to administer or to conduct activities on NFS lands (16 U.S.C. § 551). The Forest Service is typically only allowed to allocate funding to activities on NFS lands. In some limited circumstances, monies can be expended on private lands, but only when the project benefits NFS lands or resources (e.g., Widen Amendment, 16 U.S.C. § 1011(a) and P.L. 105-227 § 323).

Participation in developing a coordinated monitoring plan, as well as certain of the required elements of that coordinated monitoring plan, may require the Forest Service either to conduct activities off NFS with this task as part of a coordinated group may be problematic [sic]. The Forest Service could participate in a coordinated effort only within the legal constraints described above. The Forest Service could not be compelled either to undertake activities on private lands where it lacks authority to act or to spend funds it is not authorized to spend.

Response:
Board staff have recently learned that the US Forest Service does own land adjacent to Big Bear Lake as well as a portion of the lake bottom. This is identified by the San Bernardino County Tax Assessor as Parcel # (APN): 0306-171-13-0000. Therefore, the SBNF is a responsible agency with jurisdiction not only on the watershed, but also in the lake itself.

That being said, Board staff recognizes that there may be administrative and other issues involved in obtaining the funds to participate in the monitoring program and implementation plan. Each of the parties that will be asked to participate in these activities will face similar

challenges. Additionally, there may be access issues along the way. The Regional Board remains available to assist in resolving these issues. As do the other parties, the USFS has an obligation, more fully discussed in Response to Comment #111, to assure that its land and the activities on those lands, do not contribute to the further impairment of the affected waters.

Comment #111
(Implementation Plan/Monitoring Program – Legal Issues)

Monitoring to demonstrate compliance with TMDLs, including developing and providing data necessary to review and update the TMDLs is a requirement for states, not a person, under the CWA (33 U.S.C. § 1313(d)(1)(C)). As a basis for these additional monitoring requirements, the Regional Board appears to be relying upon Cal. Water Code § 13267, which provides authority for the Regional Board to either investigate, or require the investigation of, the quality of any waters of the state within its region and "any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region...or outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires." Cal. Water Code §13267(b)(1). In requiring the report, the Regional Board shall provide the person with a written explanation with regard to the need for the reports and identify the evidence that supports requiring that person to provide the reports. Cal. Water Code § 13267(b)(1).

Investigation of water quality is the state's responsibility under the CWA. 33 U.S.C. §1313(d)(1)(C)(each state shall establish for [impaired waters]...the total maximum daily load). The requirements in the CWA for a person are directed to the control and abatement of water pollution through control and abatement of point source discharges and nonpoint source releases.

Investigation is not the control and abatement of water pollution. Investigation falls outside the scope of the waiver of sovereign immunity, and the Forest Service could not be compelled to comply with investigation tasks.

In addition, investigation tasks conflict with the CWA and other provisions of federal laws relating to the limitations of Forest Service jurisdiction and ability to expend funds. To the extent that California law is inconsistent, the principles of preemption support the conclusion that the Forest Service could not be compelled to comply with these tasks. If a state statute conflicts with, or frustrates, federal law, the former must give way. See, CSX Transp., Inc. v. Easterwood, 507 U.S. 658, 663 (1993).

Response:
A substantial portion of the lands that constitute the watershed for the affected waters are within the jurisdiction of the USFS, and as noted under Response to Comment #110, the US Forest Service actually owns a portion of the lake bottom. Further, activities on SBNF lands in the watershed do contribute to the condition of the affected waters. The Regional Board is authorized under Water Code Section 13304 to issue a Cleanup and Abatement Order against a discharger or against the owner of land where a discharge is occurring. Further, the Regional Board is authorized to issue an Administrative Civil Liability Complaint for penalties against a person or entity who violates any provision of the Water Code, including Section 13304. Moreover, Water Code Section 13308 allows the issuance of a time schedule order prescribing

a penalty up to $10,000 per day for failure to comply with an appropriate order of the Regional Board. The USFS cannot claim immunity from these enforcement actions.

While the monitoring requirements may create an additional layer of administrative burden for the SBNF in order to obtain funding, there is no doubt that the federal laws do not prevent the federal government from acting on its own to cleanup contamination or pollution which its activities or lands have caused, or from being required by the State to do so. Monitoring is, in part, an effort to determine whether, and to what extent, the USFS' lands or activities are the cause of pollution or contamination. As such, monitoring requirements are an integral component of the federal government's obligations to assure that its lands and activities do not pollute or contaminate state waters.

This is supported by the federal government's obligations under the Clean Water Act as described in Section 313(a):

> Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants, and each officer, agent or employee thereof in the performance of his official duties, shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity including the payment of reasonable service charges.(CWA, 33 U.S.C. 1323 (a))

Comment # 112
(N39) **Attachment A, Page 8 of 17, Table 5-9a-f:** Given the complexities in the watershed as well as the annual budgetary process and limited funding (see comment S07), the SBNF feels that the time frames listed in Attachment A, Table 5-9a-f are overly optimistic and do not take into account the timing of BPA approval nor the time available for Forest Service staff and approval process.

As stated in S20, Task 1 should have a minimum time frame of 1 year.

Response:
Task 1 in Attachment to Resolution No. R8-2006-0023 is a requirement of the Regional Board, not the SBNF. Staff is unclear about which compliance dates identified for the other Tasks referenced in Table 5-9a-f the SBNF believes are inappropriate.

Comment #113
(N39) Attachment A, Page 8 of 17, Table 5-9a-f
Task 4: The plan would require the input of multiple technical specialists as well as review by decision makers, and possibly public input. The RWQCB should take into account that all proposed actions by the Forest Service are required to assess NEPA requirements, which includes public comment, adding time to any planning period. Scheduling and budgeting for these tasks is also dependant on when the BPA is approved. As the Forest Service conducts the planning for the following fiscal year in July and August, the compliance date for this task should be set relative to when the BPA is approved, but not less than 1 year following approval. The economics associated with collected data for five storms per year and eight samples per

storm should be evaluated relative to the watershed budgetary comments made in S07, reiterated here.

Though the SBNF lands comprise ~65% of the watershed, the watershed in question comprises only 2% of SBNF land. Given that our 2005 planning budget for all SBNF watershed management activities was ~$185,000, it may be economically infeasible for the SBNF to contribute the resources required to collect this level of data. As with all projects on Forest Service Land, the Big Bear Lake Nutrient Monitoring Plan will have to take into account the NEPA process.

(N40) Task 4: The Forest Service may develop a monitoring plan within its authorities to fulfill Task 4.1. To the extent feasible, the Forest Service's proposed monitoring plan should address all the elements specified by the Regional Board. However, the Forest Service may be precluded from including all elements because of the legal constraints described above. For example, most of the monitoring stations are located off of Forest Service land, so the Forest Service cannot participate in data collection from these monitoring stations. In addition, the monitoring listed in the tasks goes beyond demonstrations of compliance to monitoring for investigation. As stated previously, the Forest Service cannot be compelled to perform investigation monitoring. With respect to Tasks 4.1 and 4.2, the Forest Service may comply in a fair and reasonable manner, to the extent feasible, within jurisdiction and funding constraints.

Response:
See Responses to Comments #110 and 111.

The frequency of monitoring storm events as proposed in the Big Bear Lake Nutrient TMDL is three storms with eight samples over the hydrograph, not five storms per year as indicated by the SBNF.

Federal regulations require the State to identify measures needed to implement TMDLs in the state water quality management plans (Basin Plan) (40 CFR 130.6). California law requires that Basin Plans have a program of implementation to achieve water quality objectives (Water Code Section 13242). The implementation program must include a description of the actions necessary to achieve the objectives, a time schedule for these actions, and a description of the surveillance and monitoring activities to determine compliance with the objectives. The Regional Board is not bound to require modeling, however, staff believes that model updates and simulations are critical to evaluate and refine the TMDLs and components of the TMDLs (i.e., WLAs, LAs and numeric targets) and to assist in the development of TMDLs for average and wet hydrologic conditions. In addition, many of the stakeholders raise questions about the need to determine "natural" loads; staff is unclear how the SBNF or other stakeholders would propose to determine natural loads without monitoring and/or modeling.

It is important to emphasize that states are only required to use existing data to determine TMDLs. There is no requirement to collect additional data to develop TMDLs. However, absent additional data, the TMDLs cannot be refined in the future. Staff believes that additional watershed data are needed in order to develop effective lake management strategies and to revise the TMDLs as appropriate.

Finally, staff would like to point out that, contrary to the SBNF comment, the proposed monitoring is not investigation monitoring, but pertains to a) assessing compliance with the proposed TMDLs, WLAs, LAs and numeric targets, and b) collecting data for updating the

models so that compliance with the proposed TMDLs, WLAs, LAs and numeric targets can be determined.

Also see Responses to Comments # 5, 10, 37 and 150.

Comment #114
(N39) Attachment A, Page 8 of 17, Table 5-9a-f
Task 6: Reiterating the timing and budgetary restraints on the SBNF, the effective date for this task should be a minimum of 1 year following BPA approval.

(N40) Task 6: The Forest Service may comply in a fair and reasonable manner, to the extent feasible, within jurisdiction and funding constraints. For this task, the Forest Service will be able to provide collected data, within the constraints listed in Task 4 above. However, the Forest Service is of the opinion that funding a modeler is a task required of the Regional Board, and could not be compelled onto the Forest.

Response:
See Responses to Comments # 110, 111 and 113.

Comment #115
(N39) Attachment A, Page 8 of 17, Table 5-9a-f
Task 7: Given the complexity of the project to reduce in-lake sediment, the time frame of 1 year should not start until the Army Corp of Engineers has completed their feasibility study. In addition, if the feasibility study shows that this task is not feasible, then this task should be removed from the implementation requirements.

(N40) Task 7: The focus of this task is on in-lake control of existing sediments, rather than on the CWA's objective of source control and abatement. The state's efforts in this task are more akin to a cleanup alternative for historical and existing sediments in the lakes. The CWA does not provide a remedy for the cleanup of historic pollution. As discussed above, to the extent that the tasks are not requirements related to the control and abatement of water pollution, the federal government has not waived its sovereign immunity, and the Forest Service could not be compelled to comply. However, the Forest Service could make a good faith effort to determine whether it can propose some type of monitoring program within its authorities that could contribute to the state's efforts.

Response:
Please note that the requirement for development of an In-Lake Sediment Nutrient Reduction Plan is included in the revised Attachment to Resolution No. R8-2006-0023 as part of the development of a lake management plan (Task 6). See Responses to Comments # 4, 6, 7, 110, 111, 113, 151 and 153. As discussed in detail in the Staff Report for the Nutrient TMDLs for Big Bear Lake, the control and abatement of internal nutrient pollution, the dominant source of nutrients under dry conditions, is an essential strategy for achieving water quality standards in Big Bear Lake.

It is appropriate to point out that the trial alum project, the herbicide treatments, and the current East End dredge project, along with the Big Bear Municipal Water District's aeration activities can all be used to determine the efficacy of reducing internal nutrient loads from sediment and any monitoring data collected as part of these efforts can be used in this proposed task.

Comment #116
(N39) Attachment A, Page 8 of 17, Table 5-9a-f
Task 9: Given the complexity of the project and the limited staff available at the SBNF to support this task, the effective date for this task should be a minimum of 18 months following BPA approval.

(N40) Task 9: Nothing in this task is a requirement of the CWA. Nor, like Task 8 [see Comment 118], is it even within the scope of the CWA. On its face this Multimetric Index Development Plan does not appear related to state obligations under the CWA. However, to the extent that this task is related to the development either of TMDLs or a development of a methodology for TMDLs, this is the state's responsibility under the CWA. The federal government has not waived its sovereign immunity with respect to this task, and the Forest Service could not be not [*sic*] required to comply with this task.

Response:
As shown in the revised Attachment to Resolution No. R8-2006-0023, staff proposes to delete the Task to develop the Multimetric Index. Instead, a new task to develop biocriteria along with numeric nutrient related water quality objectives is proposed and is the responsibility of the Regional Board (see Attachment to Resolution No. R8-2006-0023, Task 7). Staff would like to emphasize, however, that it is likely that significant monetary contributions from stakeholders will be necessary to complete this task.

Comment #117
(N39) Attachment A, Page 8 of 17, Table 5-9a-f
Task 12 has the implicit assumption that adequate data from average and wet years are collected between now and 2012. Language is required that allows this date to be extended if inadequate data is collected.

Response:
The Task identified in the comment is now included in the proposed Basin Plan amendment as Task 9. Staff agrees with the comment and as shown in Attachment to Resolution No. R8-2006-0023, Task 9, appropriate language has been added.

Comment #118
(N40) Task 8: As discussed above, the investigation of water quality is the state's responsibility. 33 U.S.C. § 1313(d)(1)(C). In addition, there is no provision in the CWA for development of technologies to control the presence of noxious and nuisance aquatic plants. Given that this task does not appear to be a requirement for the control and abatement of water pollution, or related to the subject matter of the CWA, the federal government has not waived its sovereign immunity, and the Forest Service could not be required to comply with this task.

Response:
See Responses to Comments # 110, 111, 113 and 115.

Comment #119
(N41) **Attachment A, Page 9 of 17, Task 2:** The SBNF questions the requirement for the US Forest Service to be issued an NPDES permit. What point source is the SBNF responsible for? Why was this aspect of the task not listed in Section 9.1, Page 91?

Response:
Activities that cause a discharge of pollutants or waste to waters of the U.S. or waters of the state need to be regulated. The Regional Board has adopted a general NPDES permit for application of certain herbicides as well as alum to Big Bear Lake; currently however, the NPDES permit is in the name of BBMWD. Those parties responsible for decreasing the internal nutrient load via the application of herbicides and/or alum or through the implementation of other activities that result in discharges of pollutants to surface waters are appropriately regulated by an NPDES permit. It should be noted that the BBMWD is not a discharger of nutrients but has accepted responsibility for a variety of control actions necessitating permit coverage.

This requirement was listed in the Staff Report on Nutrient TMDLs for Big Bear Lake on pg. 91 – "The Regional Board will work with the responsible parties and the Big Bear Municipal Water District to issue a general NPDES permit for lake restoration activities (e.g., alum or aquatic herbicide) planned for Big Bear Lake. A requisite provision of that permit would be aquatic plant monitoring".

Comment #120
(N42) **Attachment A, Page 11 of 17, Table 5-9a-g**: With the Zoo's current lease ending and the plan to move the zoo to the north side of the lake in 2009, under special use permit with the Forest Service, will MWDC6 continue to have to be monitored in the future? Will an additional monitoring station be required?

Response:
If the SBNF believes it would appropriate to include a monitoring location downstream of the Zoo, then the SBNF is free to submit that recommendation as part of the submittal of the monitoring program.

See also Response to Comment #21.

Joint Comments on Big Bear Lake Nutrient TMDLs and Big Bear Lake and Rathbun Creek Sediment TMDLs

Comment #121
(JO1) Because forest and open space areas naturally export nutrients, the USFS believes that these areas should be considered potential problems only if there is supporting evidence, such as nutrient export rates that exceed the rates expected for these ecosystems under relatively natural conditions. This approach of considering and accommodating natural background loading has been widely applied throughout California by other Regional Boards and the Environmental Protection Agency in addressing water quality impairments associated with other natural constituents (e.g., sediment, temperature).

Response:
See Response to Comment #68.

Comment #122
(JO2) The SBNF would also appreciate if the RWQCB follows SB 469 TMDL Guidance to evaluate the natural background condition and conducts a use attainability analysis. SBNF disagrees that naturally eroding sediment is a pollutant. All references to naturally eroding sediment should list it in the natural background condition category and not as a "waste."

In addition, our information shows that the return interval of fire for this watershed is 30 to 50 years. This return interval for fire should be built into the ecological succession of the model to allow for percentages of the land to be in the barren, grasses, shrubs, forested, etc conditions. This analysis should replace the provided model of fully forest north and fully forested south.

Response:
See Responses to Comments #6, 15 and 68.

We anticipate that the SBNF will be an active participant in developing plans to revise the modeling in order to address questions and issues raised.

Comment #123
(JO3) **Nutrient: Page 5, ¶ 1 and Page 7, #6; Sediment: Page 5, ¶ 1 and Page 6, #6**: The SBNF agrees that critical conditions are an extremely important topic that must be discussed fully and dealt with appropriately. The SBNF does not agree that the most critical condition occurs during summer and during dry years. In our opinion, the most critical time occurs following a wildfire. The reduction in plant cover will cause an increase of sediment loading. "Erosion after wildfire 40 times greater than erosion after prescribed fire with buffers. Erosion after thinning, is 70% of prescribed fire with buffers, or about 1% of wildfire" (Elliot and Robichaud, 2001), which will increase the input of nutrients. The SBNF believes that this critical condition needs to be more thoroughly addressed.

Response:
See Responses to Comments #101 and 109.

Comment #124
(J04) **Nutrient & Sediment: Page 7, #8; Sediment: Page 32, ¶ 2 & Page 77, ¶ 1; Nutrient: Section 4.3, Page 62, ¶1 & Section 9.0, Page 90, ¶ 3**: As the owner of the dam and the lake bottom, the BBMWD should be defined as a local stakeholder, not just a cooperating partner. Ownership of the lake bottom indicates ownership of the sediment included on the lake bottom since the formation of the entity in question, though not of sediment already laid down before the dam was built. In addition, the language should be the same in both reports.

Response:
As noted in the Response to Comment #110, the SBNF is also an owner of the lake bottom and therefore it would appear that the SBNF is suggesting that the TMDL responsibility lie with the BBMWD and the SBNF. However, staff does not believe that this is appropriate. The BBMWD is not a discharger of nutrients. The Regional Board regulates dischargers of waste. WLAs must be assigned to dischargers, not to the owners who receive the discharge. (40 CFR 130.2(h).)

Comment #125
(JO5) **Nutrient: Page 7, #8 and Page 20-21 Land use; Sediment: Page 7, #8 and Page 18-19 Land use**: Since each of the Big Bear Mountain Resorts has some land on SBNF under special use permits, reducing nutrient and sediment loading from the ski areas could be considered a reduction from the forest if the treatments occur on SBNF land. Likewise, BMP implementation and monitoring can be written into the special use permits by the SBNF. Snow Forest has reverted back to the Forest Service and is no longer a resort. Its acreage should be added to the Forest category and the model should be adjusted appropriately.

Response:
Staff believes there is no justification for rerunning the models at this time. Model modifications can be made as part of revision of the models (proposed Task 6a of the revised Basin Plan amendment) if stakeholders agree to this approach. For that reason, we anticipate that the SBNF will be an active participant in developing plans to revise the modeling in order to address questions and issues raised.

Comment #126
(J06) **Nutrient and Sediment: Section 1.1, Page 10, ¶ 3**: Please present the evidence (e.g. literature references) that the groundwater basin is being mined. Mining implies that extraction is exceeding input and that the aquifer in question is trending to a lack of available, usable water.

Response:
The reference is Neste, N.A., J.R. Brudin, and R.V. Stone, Inc. 1973. *Final report draft: Big Bear area regional wastewater management plan.* San Bernardino, CA.

Comment #127
(J07) **Nutrient and Sediment: Editorial**: Figure 1-1 should list what "Field" this watershed is showing.

Response:
The meaning of this comment is unclear.

Comment #128
(J08) **Nutrient and Sediment: Section 1.1, Page 14, Rathbun Creek - State Highway 18 to Big Bear Lake**: Does the "background" modeling deposit sediment on the floodplain? If the city channelization prevents deposition that would naturally occur, then the city has some responsibility as to the increased sediment loading. If such sediment loading comes from a creek not under an NPDES permit, then the city's load needs to be increased in the area of external non-point source loading.

Response:
See Responses to Comments #79 and 101.

Comment #129
(J09) **Nutrient: Page 20, Wastewater; Sediment: Page 18, Wastewater**: Please expand on what the "limited exemptions" are and discuss how the exemptions influence nutrient loading.

Response:
Exemption criteria are contained in Appendix V of the Water Quality Control Plan for the Santa Ana River Basin (1995). Essentially, exemptions can be granted provided that geologic and hydrologic evidence demonstrates that the use of subsurface disposal systems will not, individually or collectively, result in a pollution or nuisance or adversely affect water quality.

Comment #130
(J10) **Nutrient: Page 20, Land Use; Sediment: Page 18, Land Use**: The final sentence starting "This site" implies that the previous two sites are not "contributors of sediment and potentially nutrients." This sentence should be altered to indicate all three areas are potential contributors.

Response:
Comment noted. As noted previously, staff does not intend to revise the Nutrient TMDL Staff Report.

Comment #131
(J11) **Nutrient: Page 31; Sediment: Section 2.1, Page 33**: Please clarify your definition of "controllable water quality factors." The controllability of the issue must be further expanded on, especially given that the majority of runoff and nutrient transport occurs in "wet" years when most sediment controlling structures are not designed to accommodate such flows.

We believe the estimated background erosion rates are too low because they only consider fully forested conditions with no natural wildfire. Under natural conditions, the Big Bear watershed would likely have burned 2-3 times in the last 100 years. As a result of fire suppression, however, there have been no large fires. This reduction in sediment and nutrient loading is important, but not considered in the analysis.

Response:
See Response to Comment # 22. In the context of the Big Bear Lake watershed and the proposed TMDLs, it is presumed that nutrient inputs to the lake are controllable through the implementation, evaluation and refinement of reasonable Best Management Practices. It is recognized that during wet years, reasonable BMPs may not be adequate to address storm-related inputs. TMDLs to be developed to address these hydrologic conditions will need to take this into account.

As discussed in responses to prior comments (see, for example, the Responses to Comments # 6 and 20), staff agrees that it is appropriate to collect additional data necessary to differentiate between natural and anthropogenic loads. Staff now recommends that the implementation plan include a task (included in the new Task 7) to define natural conditions for the Big Bear Lake watershed, not an easy task given the highly modified nature of the lake and the watershed. Revisions to the proposed TMDLs may be made in the future based on the data collected.

Comment #132
(J12) **Nutrient: Section 6.0, Page 84, ¶ 2**: Please clarify why no MOS is used for the nutrient TMDL given the many comments that the model has numerous deficiencies but that an MOS was used in the sediment TMDL when similar conditions exist relative to a complete lack of understanding.

Response:
An implicit margin of safety is included in the nutrient TMDLs, as explained in the Staff Report on the Big Bear Lake Nutrient TMDLs (Section 8.0, pg. 89).

Comment #133
(J14) **Nutrient: Section 9.0, Page 90, ¶ 3; Sediment: Section 9.0, Page 77, ¶ 1**: The identification of stakeholders needs to be updated (see comment **J04**). Ownership of the lake bottom indicates ownership of the sediment included on the lake bottom since the formation of the entity in question, though not of sediment already laid down before the dam was built. As such BBMWD should be an identified stakeholder.

Response:
See Responses to Comments #110, 111 and 124.

Comment #134
(J15) **Nutrient: Section 9.1, Pages 91, 1.b); Sediment: Section 9.1, Page 77, 1.a.**: Does the proposed activity coincide with the current MAA indicating that "issuance of waste discharge requirements for nonpoint source discharges will be waived by the Regional Board" given that the SBNF has been implementing BMPs for all projects on its land?

Response:
See Response to Comment #12.

Staff also points out that despite attempts to obtain information from SBNF, no information regarding BMPs that have been implemented in the watershed have been provided to staff.

Comment #135
(J16) **Nutrient: Section 10.2, Page 93; Sediment: Section 10.2, Page 80**: The RWQCB should acknowledge that installation and maintenance of a "high elevation weather station" on SBNF land will require that NEPA be followed, and the location of the station could cause environmental damage and mitigation requirements.

Response:
Comment noted. We understand that the BBMWD is working with the SBNF to obtain the necessary approvals.

Comment #136
(J17) **Nutrient: Section 10.3, Page 94, bullet 2; Sediment: Section 10.3, Page 80, bullet 3**: Does the RWQCB contemplate that the only option on modeling is to use the model developed by Hydmet, Inc? The USFS already has a model, WEPP, designed to assess the effectiveness of BMPs applied on Forest Service land. Could the SBNF use the WEPP model to fulfill this purpose?

Response:
Board staff does not have a specific recommendation on models that are used to evaluate BMP effectiveness. The HSPF watershed model and WASP lake model were used to determine loads from various land uses and the resulting lake water quality. Future watershed and lake modeling will be necessary to determine compliance with the proposed numeric targets, WLAs, LAs, and TMDLs. A lake and watershed model plan will be produced as part of the Proposition 13 grant. This plan will be used to direct future modeling efforts. It is not clear whether the WEPP model could be used only in assessing BMP effectiveness or whether it could also be used to model nutrient loads from the forest land use. We anticipate that the SBNF will be an active participant in developing plans to revise the modeling in order to address these questions and issues.

Comment #137
(J18) **Nutrient: Section 11.0, Page 97, Table 11-2; Sediment: Section 11.0, Page 82, Table 11-2**: Does the cost range given include costs for sampling the dredged material for constituents beyond those listed in the TMDL (e.g. RCRA constituents, lead, PCBs, etc)? Does the cost range given include transport of the dredged material to a landfill able to accept contaminated

waste? See the Attachment to Resolution No. R8-2005-00002, Chapter 5 – Implementation Plan, Page 5-42, ¶ 4: PCBs in fish tissue have been indicated.

Response:
See Response to Comment #57. Sediment sampling for metals and selected organics, including PCBs, was required as part of the 401 Certification for the East End dredge project. The data presented to date show no sediment contamination from PCBs. In addition, the Army Corps of Engineers has obtained sediment cores throughout the lake and will analyze the cores for PCBs as well as other constituents. The results of these studies will aid in the development of the Sediment Nutrient Reduction Plan (Task 6b) as proposed in the revised Attachment to Resolution No. R8-2006-0023.

Comment #138
(J19) **Nutrient: Section 11.0, Page 98, Table 11-3; Sediment: Section 11.0, Page 84, Tables 11-3 and 11-4**: These tables are incomplete in that they do not show the monetary contributions that the SBNF has made to the Big Bear Lake watershed. The reports state that over $4 million will be spent by the end of 2007. The SBNF has spent over $20 million between 2001 and 2005 in protecting the urban infrastructure from catastrophic wildfire as well as keeping the increased sediment loading from wildfire out of Big Bear Lake.

Response:
Table 11-3 in the Nutrient TMDL Staff Report and Tables 11-3 and 11-4 in the Sediment TMDL Staff Report are based on the available information that staff was able to obtain from other studies and/or the literature and from information provided by engaged watershed stakeholders. Unfortunately, Forest Service involvement in the TMDL development process did not begin until 2004, so that the issues raised by SBNF and relevant information on monetary contributions could not be addressed and identified at the time the staff reports were prepared.

Comment #139
(J20) **Nutrient: Section 12.0, Page 99, ¶ 2; Sediment: Section 12.0, Page 86, ¶ 2**: The SBNF disagrees with the assessment that there "would be no potentially significant impacts on the environment caused by adoption of this Basin Plan amendment." Mitigation measures may be required in numerous areas, as detailed in the CEQA Comments section, below.

Response:
See Responses to Comments #63, 64 and 65.

Staff would point out that the intent of the proposed Basin Plan amendment is to improve the environment. As noted in the CEQA analysis, there may be short-term impacts due to projects that may be implemented to meet TMDL requirements. These projects will be subject to specific CEQA review and consideration. However, staff believes that there will be long-term environmental benefits from implementation of the proposed TMDLs.

Board staff has reviewed and revised the CEQA checklist to identify areas where mitigation will be needed to reduce impacts to less than significant.

Comment #140
(J21) **Nutrient: Section 12.0, Page 99, Alternative 2; Sediment: Section 12.0, Page 86, Alternative 2**: Has the RWQCB taken into account the time requirements placed on the USFS relative to NEPA compliance? NEPA is required on all Forest Service projects. Given that the

budget process has been completed for the FY2006, any projects beyond the Snow Forest restoration will be required to await an additional funding cycle. Given that determination of seasonal effects requires a minimum of 3 years of data and given the variability inherent in the data, a compliance date of 2010 seems unreasonable. What if the BPA is delayed? Will the compliance dates be delayed as well? Please address the reasonableness given the aforementioned issues, especially in regards to the scheduled approval date of the BPA.

Response:
As shown in the revised Attachment to Resolution No. R8-2006-0023, Board staff proposes to replace the total phosphorus final target with the interim target and revise the chlorophyll *a* interim target which should facilitate compliance. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile. This may reduce the number and magnitude of projects needed to assure compliance. In addition, the recommended compliance time for the proposed numeric targets and for the proposed TMDLs, WLAs and LAs for dry hydrological conditions is 2015 while the recommended compliance time for the proposed numeric targets for average and wet hydrologic conditions is now 2020, which staff believes provides adequate time for plans and projects to be implemented. While there may be delays in the BPA approval process, which includes the State Board, Office of Administrative Law (OAL) and the U.S. EPA, staff believes that they will be minimal based on the extensive coordination that has taken place, in particular with the U. S. EPA, and staff's focused effort to assure that OAL requirements are satisfied.

Comment #141
(J22) **Nutrient: Section 13.0, Page 100, ¶ 2; Sediment: Section 13.0, Page 87, ¶ 2**: The SBNF takes exception to the term "just recently" in regards to participation in the TMDL workgroup. As these documents may be referenced in the future, a more precise date should be used or the "and just recently" language should be removed. In addition, as a Management Agency, the SBNF has been an active steward of our lands using BMPs (see comment J19 and S10 for effectiveness studies). The implication of the "just recently" statement is that the SBNF has not been involved in watershed activities that are helpful to the protection of Big Bear Lake. Please clarify this statement and acknowledge the ongoing participation of the SBNF as a Management Agency.

Response:
The TMDL workgroup has been meeting since 2001. The SBNF became an active participant in the TMDL workgroup in late 2004. The phrase "just recently" accurately describes the SBNF participation in the workgroup; there is no statement or intent to imply that the SBNF has not been involved in watershed activities outside the workgroup. By late 2004, monitoring and modeling had been completed and Board staff had initial working drafts of the TMDLs (management review drafts) based on input derived from the stakeholders during the TMDL Workgroup meetings.

CEQA Checklist Comments

Comment #142
(J23) Based on the comments below (J24 through J32), the SBNF recommends that the determination should be at least the second category (i.e. may have significant effect, but alternatives and mitigations available), with the possibility that some of the comments will push the determination into the third category.

Response:
Staff does not believe that the SBNF has provided adequate justification for changing the CEQA findings. As indicated in Responses to Comments #63, 64, 65, and 139, the CEQA analysis does not analyze specific projects that may be implemented to achieve compliance with the TMDLs, since those projects must be identified by the stakeholders and will be subject to specific CEQA review. The inclusion of the TMDLs in the Basin Plan will not itself have any environmental impact, however, implementation of the TMDLs could have environmental impacts. These potential environmental impacts are now identified in the CEQA checklist and potential mitigation measures have been included. Since the TMDLs are for dry hydrological conditions only and there are no requirements to reduce external loads, staff does not believe that the SBNF has provided adequate justification on how the TMDLs will impact the fuels treatment work and the fire suppression work that is currently ongoing. It appears that many of the CEQA comments (see Comments #143-146) referred to the sediment TMDLs. As stated in the response to Comment #1, Board staff is no longer proposing to go forward with the sediment TMDLs, therefore, we do not believe that the SBNF has presented evidence that there could be impacts to their activities based on the implementation of the nutrient TMDLs for dry hydrological conditions.

Comment #143
(J24) **IV. Biological Resources – Would the project: e) Conflict with any local policies or ordinances protecting biological resources:** Both the fuels treatment work and the fire suppression work could be prevented by the implementation of these targets. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

Response:
See Response to Comment # 63. The environmental checklist that is included in the Nutrient TMDL Staff Report identifies potentially significant adverse environmental impacts of the Basin Plan amendment. Again, any potential impacts of the remediation activities that are chosen as a result of implementing the proposed associated tasks specified in the Basin Plan Amendment would be subject to site-specific CEQA/NEPA analysis and certification.

For clarification, the implementation plan contained within the staff report on the Big Bear Lake Nutrient TMDLs and the Basin Plan amendment does not refer to the fuels treatment work and the fire suppression work ongoing in the watershed. Furthermore, no reductions in nutrient external loads are specified in the proposed nutrient TMDLs.

Comment #144
(J25) **V. Cultural Resources, a) through d):** Implementing the TMDL will likely require the installation of engineered works to control and catch sediment. In each case, any project performed by the Forest Service requires that NEPA be followed. Relative to cultural resources, the regulations that the Forest Service must follow are listed in 36 CFS Part 800. In addition, the Forest Service has a Programmatic Agreement (PA) with the California State Historic Preservation Officer regarding the process for compliance with Section 106 of the National Historic Preservation Act. Attachment B of the PA discusses the Standard Resource Protection Measures, which shall be implemented as a part of NEPA to take into account the effect of all undertakings on historic properties. If the proposed project impacts a site eligible for the National Register of Historic Properties, and if the proposed project cannot be sited at another location, then the NEPA procedure will weigh the significance of reducing sediment relative to the TMDL versus the possible destruction of a historic site. To mitigate destruction of a historic

site could require excavation and cataloging of the site in question, which is a highly expensive endeavor. Experience on the Forest indicates that mitigation of a 50 foot by 150 foot area can cost between $50,000 and $100,000. In addition, relative to located possible historic sites in the mountains, many, if not most, sites are located on or near watercourses. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" or the "Potentially significant impact" box be checked for each of these and that an evaluation is made in the discussion section in lieu of this comment.

(J26) **VI. Geology and Soils, a)iv) and b):** If the implementation of the TMDL prevented fuels treatments from being implemented because of the short term increase in sediment, and thus nutrient, loading, then the increased risk of wildfire would lead to an increased risk of landslides and soil erosion associated with wildfire. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

(J27) **VII. Hazards and Hazardous Materials, a) and b):** As stated in comment J20, dredging of sediment will require sampling of the material prior to its transport and deposition at a new site. The possibility exists that the sampling protocol will discover hazardous substances in the sediment (e.g. lead [fishing sinkers], PCBs [though banned in 1977 are very persistent in environment, Nutrient TMDL Basin Plan Amendment states PCBs have been indicated in fish tissue], etc). If such hazardous substances are discovered from dredged materials, then they could pose a human health hazard during the transport, following an accident condition, and would have to be disposed of in a sanctioned landfill, thus raising the costs. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" or the "Potentially significant impact" box be checked for each of these and that an evaluation is made in the discussion section in lieu of this comment.

(J28) **VII. Hazards and Hazardous Materials, g) and h):** Reduction in fuels treatments or decommissioning of roads to reduce erosion would interfere with the local Community Wildfire Protection Plan and could increase the risk of wildland fire. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

(J29) **IX. Land Use and Planning, b):** Reduction in fuels treatments, which will increase sediment loading, and thus nutrient loading, in the short term, would interfere with the local Community Wildfire Protection Plan and could increase the risk of wildland fire. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" or the "Potentially significant impact" box be checked for each of these and that an evaluation is made in the discussion section in lieu of this comment.

(J30) **XV. Transportation/Traffic, e):** Decommissioning of roads to reduce erosion would interfere with emergency access to wildland fires. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

Response:
See Responses to Comments # 63, 142 and 143.

For clarification, the implementation plan contained within the staff report on the Big Bear Lake Nutrient TMDLs and the Basin Plan amendment does not specify that dredging is necessary to

meet the recommended targets. Dredging may be one of the necessary remediation activities identified by the dischargers to implement the proposed TMDL, WLAs and LAs. As stated earlier, any potential impacts from the implementation of individual projects would be subject to site-specific CEQA/NEPA analysis and certification.

Comment #145
(J31) **XVII. Mandatory Findings of Significance, a):** If the sediment TMDL limits the Forest's ability to conduct fuels treatments, which will increase sediment loading, and thus nutrient loading, in the short term, then the risk of wildland fire increases which gives the potential to degrade the quality of the environment in multiple ways. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

Response:
Staff is not proposing to proceed with the sediment TMDL and will be recommending the delisting of Big Bear Lake due to sediment. Staff has, however, reviewed and revised the CEQA checklist and has checked the "Less than significant with mitigation incorporation" because of the potential for impacts due to implementation of the in-lake remediation activities.

It is clear from these comments that SBNF believes their management practices in the watershed will be altered by the proposed Nutrient TMDLs. As discussed in prior responses to comments, the proposed nutrient TMDLs are for the dry season only and do not require reductions from the watershed sources. The only proposed implementation requirements for these TMDLs are to conduct monitoring, modeling and to address the in-lake sediment and macrophyte loads. However, it is likely that future TMDLs that address wet and/or average conditions will require reductions from the watershed and therefore all the issues that SBNF raises may be addressed as appropriate during the development of those TMDLs.

See also Responses to Comments #63, 64, 65, 143 and 144.

Comment #146
(J32) **XVII. Mandatory Findings of Significance, b) and c):** As a part of the required NEPA done for every Forest project, a Cumulative Effects Analysis is conducted relative to erosion within a watershed. Implementation of projects could be hampered given the limited time frame (i.e. 10 years) of the TMDL. If the TMDL lowers the erosion target for a particular watershed such that fuels treatments cannot be done in a timely manner, while the SBNF is receiving Congressionally earmarked funding, then the cumulative effect is higher risk for fire in that watershed and higher risk of potentially significant effects to human health. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

Response:
See Responses to Comments #63, 64, 65, 140, 141, 143, 144 and 145.

MICHAEL FLAKE
Chief, Storm Water Policy
California Department of Transportation
(Letter dated September 2, 2005)

Caltrans comments also presented orally by Paul Lambert at the August 26, 2005 Board workshop

Comment #147
The California Department of Transportation (Department) manages 18 miles (approximately 70 acres) of roadway in the Big Bear Lake watershed. This comprises approximately 0.3% of the entire watershed.

Response:
Comment noted.

Comment #148
The Department should not be required to participate in the development of internal sediment loading control measures and macrophyte reduction/aquatic plant management programs because:

a. There is a zero percent reduction from the Urban Point Source Load of both Total Nitrogen and Total Phosphorus for this TMDL;

b. The results of Dr. Kirby's study verify that internal loading of nutrients is not caused by external sediment loads; and

c. Total Nitrogen and Total Phosphorus loads from the Urban Point Source Load during an average year represent a very small fraction of the total load compared to the loading from internal sources. External inputs that apparently "remain in the lake for an extended period" do not "contribute significantly to internal sediment loading and macrophyte growth" compared to the significant internal sediment loading.

Response:
Dr. Kirby's study did not evaluate nutrient loadings, but only looked at sediment transport to Big Bear Lake. Therefore, it is incorrect to state that Dr. Kirby's study verified that internal loading of nutrients is not caused by external sediment loads. Dr. Kirby's study evaluated sedimentation rates from 1963 through 2003 and concluded that sedimentation to Big Bear Lake does not result from large storm events, but is associated with lake level changes resulting in continuous input of sediment to the lake (and a refocusing of those sediments within the lake). In staff's opinion, these results support the need to control sediment on an ongoing basis. In addition, the sediment cores used in Dr. Kirby's analyses were obtained from the west and east ends and not from the local bays and mouths of tributaries that would receive local input of sediment and nutrients from the watershed.

Staff agree that the nutrient loads from urban sources during an average year represent a small percentage of the overall nutrient load when compared to other sources. However, the internal nutrient loads do originate from the various external land use based watershed sources. Therefore, it is appropriate for the parties responsible for external inputs to address the control and reduction of internal nutrient loads. We believe that a collaborative effort with other stakeholders will be the most effective and efficient way to implement projects necessary to reduce internal nutrient loading.

Comment #149
There is a lack of identification and quantification of the natural background loads. The State Water Resources Control Board (SWRCB) defines, a TMDL as "The sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources and natural background, and a margin of safety" (State Water Resources Control Board, *Revised Draft Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options* (2005)). In the TMDL for Nutrients in Big Bear Lake, the natural background is not included in the load allocations on page 84 of the staff report. The TMDL needs to be amended to include natural background in the load allocations.

Response:
As noted in prior Responses to Comments (see, for example, Comment #6), staff agrees that it would be prudent to take steps to define and identify natural nutrient loading to Big Bear Lake, and the implementation plan now includes an appropriate task (see the revised Attachment to Resolution No. R8-2006-0023, Task 7). Please also see Responses to Comments # 20, 36, 40, 41, 50, 76, 86, 88 and 91.

Comment #150
The Department is concerned that pursuant to State Board Memorandum, Economic Considerations in TMDL Development and Basin Planning (October 27, 1999) and Public Resources Code Section 21159, the Regional Board must take into consideration economic factors including the costs associated with foreseeable methods of compliance.

Response:
Federal law mandates that TMDLs be set at a level that will ensure attainment of the existing water quality standards (including objectives). As indicated in Response to Comment #5, the economic feasibility to the dischargers of achieving the standards is therefore neither relevant nor authorized when setting the TMDLs. However, as part of CEQA compliance, the Regional Board must consider costs of the reasonably foreseeable methods of compliance with the proposed TMDLs. Please see the Response to Comment # 56.

Board Staff has complied with the CEQA requirements. Potential methods of compliance with the proposed Big Bear Lake Nutrient TMDLs and the associated costs were discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 11.

Comment #151
The U.S. Army Corps of Engineers is currently engaged in a study of Big Bear Lake that involves performing 450 sediment cores of the lake bottom. This study will help identify the natural background loads and the primary source of sedimentation in the lake. The Department requests that the RWQCB postpone the finalization of this TMDL until the Corps' study concludes and quantifies the sediment loads associated with background conditions.

Response:
Staff is aware of the efforts of the Army Corps of Engineers (Corps) and believes that it is important to coordinate TMDL implementation activities with the Corps' effort. However, staff does not believe that it is appropriate to delay consideration of the proposed TMDLs pending the results of these studies. First, there are number of critical implementation plan elements, including monitoring, development of a Lake Management Plan and development of biocriteria, which should be implemented as soon as possible. Second, the proposed TMDLs, WLAs and

LAs compliance dates are well into the future, such that there is sufficient time for the Corps studies to proceed and for the TMDLs to be revised if and as appropriate. The proposed TMDLs include an explicit commitment for regular Regional Board review of the TMDLs. Further, staff believes that the proposed implementation plan and schedule can and should be coordinated with the Corps effort. Finally, we would also note that continued Corps funding of the studies in Big Bear Lake is not guaranteed due to the federal budget decision-making process.

See also Response to Comment # 115.

Comment #152
A SWRCB report (*SB 469 TMDL Guidance: Attachment A: Impaired Waters Regulatory Decision Tree* (11/22/04)), indicates that if natural background levels exceed water quality standards (WQS), revision of WQS is appropriate. The Department requests that the RWQCB postpone finalization of the TMDL until it determines whether the natural background levels exceed the WQS, in which case the WQS will need to be revised, and the TMDL will need to be recalculated.

Response:
See Responses to Comments #6, 20, 36, 40, 41, 50, 76, 86, 88, 91, and 149.

PATRICK J. MEAD, P.E.
Flood Control Engineer
County of San Bernardino Department of Public Works
(Letter dated August 31, 2005)

Comments also presented orally by Matt Yeager at the August 26, 2005 Board workshop

Comment #153
The TMDL should be delayed pending completion of the Army Corps of Engineers' (Corps) study. The Corps study will provide data on sediment nutrient levels and will have significant implications for the effectiveness of possible dredging operations.

Response:
See Response to Comment #151.

Comment #154
The permittees should not be held responsible for nutrients loads from internal lake sediments and macrophytes that originate from natural sources.

Regulation of natural loads conflicts with the intent of the MS4 permit that states that "This Order is intended to regulate the discharge of pollutants in urban storm water runoff from anthropogenic (generated from human activities) sources and is not intended to address background or naturally occurring pollutants or flows (Finding 13, page5)".

Natural sources should not be characterized as "waste discharges". According to the Porter-Cologne Water Quality Control Act (§13050), "'Waste' includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation or of human or animal origin or form any producing, manufacturing or processing operation, including waste placed within containers of whatever nature prior to, and for purposes, of, disposal".

Response:
In the proposed TMDLs, permittees are not to be held responsible for nutrient sources that originate from any other source other than from urban discharges. While the proposed TMDL does specify that all dischargers address the internal nutrient loads, this requirement is based on the fact that all discharges contribute nutrients to the lake in various amounts. As plans to address the internal macrophyte and sediment loads are developed, staff believes that the cost sharing responsibility will need to be worked out by the stakeholders.

As indicated in response to Comment #6, staff was incorrect in describing runoff from forested lands as "natural". We believe that given the extent to which human activities occur in the forested lands in the watershed, that discharges from these areas can indeed be characterized as "wastes".

See also Responses to Comments # 20, 36, 40, 41, 50, 76, 86, 88, 91 and 149.

Comment #155
Because of the natural loads of nutrients that are added to internal sediments, the appropriateness and/or applicability of the Basin Plan objective for algae is questioned.

Response:
See Responses to Comments #6, 31, 149 and 154.

Comment #156
The Permittees should not be characterized as "Responsible Parties" in the TMDL because of the regulatory implications derived from the RCRA program to the term.

Response:
See Response to Comment # 66.

Comment #157
The MS4 permit already requires the Permittees to address pollutant sources and implement BMPs. The Permittees have recently adopted a Water Quality Management Plan for new and re-development projects. Further, BMPs such as street sweeping, commercial, industrial and construction site inspections, drainage facility cleaning, and public education are already being implemented.

Response:
Staff commends the permittees for implementing a number of control measures to reduce pollutants. To the extent that these measures prove effective, they may result in compliance with the proposed urban wasteload allocation. No documentation of the effectiveness of any of these measures in reducing nutrient discharges in the Big Bear Lake watershed has been provided.

We would also emphasize that the proposed Nutrient TMDLs for dry hydrological conditions require no reductions from the permittees. It is likely that when the Nutrient TMDLs for wet and/or average hydrological conditions are developed, documentation of BMPs implemented and the effectiveness of those BMPs will be needed to determine appropriate nutrient allocations. Therefore, we encourage the permittees to begin to collect these data and information.

Comment #158
The Basin Plan objectives for nitrogen and phosphorus are not protective and should be evaluated and revised if necessary. Currently the Basin Plan objectives are being met, in spite of perceived beneficial use impairments. If the Basin Plan objectives are revised, requirements pursuant to Water Code §13241 would be triggered.

Response:
The proposed TMDLs are based on best professional judgment of the water quality conditions necessary to protect beneficial uses and to implement the relevant narrative water quality objectives. We agree that the existing Basin Plan numeric objectives for TP and TIN are not protective of the beneficial uses of the lake. As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 3, these objectives were established in the 1975 Basin Plan based on existing lake data and, in staff's opinion, are not reflective of water quality necessary to ensure protection of the lake's beneficial uses. Task 7 of the proposed Basin Plan amendment/TMDLs (Attachment to Resolution No. R8-2006-0023) requires the Regional Board to review and revise if necessary the nutrient related water quality objectives for Big Bear Lake and to establish biocriteria. If and when new water quality objectives are proposed, staff fully expects to comply with Water Code Section 13241.

The permittees did not provide the data to support the statement that currently the Basin Plan objectives are being met. As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, based on data collected from 2001 through 2003, both TP and TIN exceed their respective objectives. Data collected from 2005 has not been compiled and analyzed and therefore Board staff cannot comment on whether the data support an improvement in water quality. As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, the TMDL must ensure protection of beneficial uses at all times and particularly during the critical period. The critical period that has been identified as occurring when lake levels are low and nutrient levels are more likely to impact the aquatic habitat.

See also Responses to Comments #46, 51, 73, 82 and 85.

Comment #159
The use of modeling and literature values to set numeric targets for nutrients warrants caution due to uncertainties. Particularly as discussed at the August 26, 2005 workshop, reducing nutrients might reduce zooplankton levels and result in a compromised fishery.

Response:
Staff understands the limitations of using modeling and literature values to identify appropriate numeric targets. However, as discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 3, the approach staff used to derive the proposed numeric targets is scientifically valid and appropriate. Refinement and/or revision of the numeric targets can be accomplished within the framework of the proposed TMDLs and we encourage the permittees and other stakeholders to undertake the studies necessary to consider such changes. As noted in the Response to Comment # 39, Board staff proposes to replace the total phosphorus final target with the interim target and revise the chlorophyll *a* interim target which should facilitate compliance. The revised chlorophyll *a* target is based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile.

Comment #160
The periodic occurrence of low lake levels affects the lake's water quality. The hydrological variability must be considered as part of the background state of the lake.

Response:
Staff fully recognizes the extent to which lake levels affect water quality and is proposing to structure the TMDLs to address the various hydrologic conditions. However, as discussed in Response to Comment #158 it is important to keep in mind that TMDLs must be developed and implemented to ensure protection of water quality during all hydrological conditions and varying lake levels.

PART 2 – COMMENTS RECEIVED ORALLY AT THE AUGUST 26, 2005 REGIONAL BOARD WORKSHOP

Note: Many of the oral presenters at the August 26, 2005 Workshop also submitted written comments. The comments and responses presented in this section address only those oral comments presented at the August 26, 2005 Workshop that were not included as part of the written comments.

TIM MOORE
Risk Sciences

Comment #161:
You won't find anybody in this room that is opposed to this TMDL. This is a credit to the task force process and the way that we've worked with your staff.

Response:
Comment noted.

Staff also gratefully acknowledges the proactive approach the Task Force has taken in assisting Regional Board staff with conducting the needed studies to develop the proposed TMDLs.

Comment #162:
For 25 years this community and the Water District have been trying to get the attention of the state and federal government to come up here and help them fix what everybody conceded were pretty big problems, the excessive weeds. Including Big Bear Lake on the Clean Water Act 303(d) list raises EPA's recognition that this is a problem. Because of the 303(d) list status of the lake, it becomes a high priority for grant funding to address water quality problems. Stakeholders and the BBMWD have been managing the lake for several decades, doing a remarkable good job with what technology was available at the time.

Response:
Again, staff recognizes the current and historic efforts of stakeholders in the watershed to address water quality issues that affect Big Bear Lake.

Comment #163:
The monitoring plan that's been proposed by the staff is perfectly acceptable to the Task Force. The Task Force believes that the monitoring plan can be used to demonstrate that stakeholders are doing a good job and that any projects implemented result in long-term improvements to Big Bear Lake.

Response:
Comment noted. Also see Response to Comment # 60.

Comment #164:
Because of the variable hydrological nature of the watershed, somewhere between 80 to 90 percent of the water flow to Big Bear Lake arrives in a single year about once every 12 to 13 years, the El Nino year. There is no such thing as the average condition for this lake; there can be 10 years of evaporation, then the lake fills up in a single year. There are really two or three different kinds of lake: the full lake, the empty lake and one in between. The lake is capable of being different things at different times, but is probably not capable of being ideal, particularly

when, as last year, there's half as much water in the lake as there is today. Under those conditions there is half as much dilution, but the same nutrient sediment load is still sitting there resulting in higher concentrations.

Response:
Staff has recognized the variable nature of the hydrology of the Big Bear Lake watershed, the impact nutrients have on the lake under these varying hydrological conditions and has proposed TMDLs that take this into account. The proposed TMDLs are for dry conditions only; TMDLs that address conditions under wet and/or average conditions will need to be developed in the future.

Also see Responses to Comments #46, 51, 52, 73, 82, 85 and 158.

Comment #165:
In addition to the four million dollars from state and federal grants, the Army Corps of Engineers will contribute another $4 million to the effort in state costs and the BBMWD, along with its partners, the City of Big Bear Lake, the County and CalTrans expect to spend somewhere between five and ten million dollars. These efforts will mean $15 to $20 million in investment to protecting the water quality of this lake and the attainable beneficial uses.

Response:
Comment noted.

Staff believes that it will require the combined efforts of many agencies and the private sector to protect Big Bear Lake's beneficial uses.

Comment #166:
We think about 13,000 tons of sediment a year, on average, flow to the lake. Since 1977, the year the BBMWD was formed, about 400,000 tons of sediment have entered the lake. In that same 30-year period more than 500,000 tons of sediment has been dredged from the lake. Therefore all the sediment that stakeholders are responsible for discharging, plus the natural background loads from the 30-year period since we decided to call this a recreational reservoir, has been removed. All of this has been, of course, supplied in a technical memorandum which we'll produce for you.

Response:
See Response to Comment #49. As noted at the outset of this Response to Comments document, staff no longer proposes to proceed with the Big Bear Lake and Rathbun Creek Sediment TMDLs.

As shown in the Staff Report on Sediment TMDLs for Big Bear Lake and Rathbun Creek, the average simulated sediment load to Big Bear Lake from 1990-2003, a 14-year period, is approximately 13,000 tons. This 14-year period does include one very wet year (i.e., 1993), but the average includes data from wet, dry and average hydrological conditions. Therefore, 13,000 tons is the average load of sediment discharged to Big Bear Lake and it is not based on just one wet year. As a matter of fact, the 1993 simulated sediment load was approximately 65,000 tons.

We note that we have not yet received the technical memorandum referenced in the comment.

Comment #167:
To improve this lake capacity by just five percent would require the removal of up to 350,000 dump truckloads of sediment in about a ten-year space of time. That might improve the phosphorus problem, but it would destroy the recreational use of the lake since nobody will be able to get up the hill for the dump trucks.

Response:
Dredging of Big Bear Lake to remove nutrients is one potential strategy discussed in the Staff Report on Nutrient TMDLs. Board staff has never specifically identified sediment dredging as the preferred and/or only option for the removal of nutrients. As stated in the response to the previous comment, staff no longer proposes to proceed with the Big Bear Lake and Rathbun Creek Sediment TMDLs.

Comment #168:
The most promising alternative for protecting Big Bear Lake is the preparation of the lake aquatic management plan. The Task Force strongly agrees with this approach, have done a lot of background work to make that happen, and are in the process of developing a lake aquatic management plan now, ahead of the required timeframe.

Response:
Staff agrees that development of a Lake Management Plan, including an aquatic plant management plan, is needed for Big Bear Lake and proposes that task be included as part of the TMDL Implementation Plan (See Task 6 in the revised Attachment to Resolution No. R8-2006-0023).

Comment #169:
Reducing the chlorophyll *a* concentration from 15-20 mg/m^3 we have now as ambient down to the proposed final chlorophyll *a* numeric target of 5 mg/m^3 may reduce the fishery by as much as 50 percent. If this numeric target is intended to protect aquatic life, it is important to understand what is meant. Is the intent to have less fish, a greater diversity, a different community structure? Most people assume if you say better habitat you have more fish, not fewer.

Response:
It is true that fish yields increase as the productivity of a lake increases. As the lake progresses in trophic state to eutrophic conditions, the dominant fish species in a lake also changes. The progression is from salmonids to percids to centrarchids to rough fish such as carp (EPA 2000). However, as pointed out by EPA (2000), the changes in fish composition could also be due to other environmental changes and not necessarily due only to nutrients. Thus, there is value in performing bioassessments, but there is also value in tracking physical and chemical parameters as well. It is staff's opinion that development of biocriteria with specific goals for the lake's aquatic resources will take into consideration all the relevant factors that affect the lake's aquatic ecosystem. See also Responses to Comments #34, 39 and 158.

As discussed previously, staff no longer recommends a final chlorophyll *a* target of 5.0 µg/L (see Responses to Comments #34 and 39).

Comment #170:
Rather than force a target which is unrealistic and setting extraordinary precedents for the State of California, and as the TMDL report suggests cannot be met, set a target at background. The WLAs would be based on that target and adjusted based on what can really be done.

The Task Force asks that time for the Army Corps of Engineers to finish its work be allowed. The Army Corps of Engineers study has been ongoing for the past 2 years and is in the last year or so of their study. Data is now starting to flow in. That may create problems with the EPA since we'd indicated this effort would be done in 2005. However, all the work done to date showed us some surprises, some things we didn't expect, and at the same time the State Board is publishing new guidance that says: "We never meant for you to put limits or to do the load allocations for naturally occurring sources. That wasn't our intent."

Response:
It is unclear to staff what components of the proposed TMDLs Risk Sciences believes would be precedential for the State of California. The Indian Creek Reservoir phosphorus TMDL in Alpine County, CA used approaches consistent to the approach staff used in the Big Bear nutrient TMDLs proposed initially: a TP numeric target of 20 µg/L as an annual mean, and a Carlson Trophic State Index set at no greater than 45 units (as reflected in the revised proposed Basin Plan amendment, targets based on the Trophic State Index are no longer recommended). Therefore, staff argues that no precedent would be established but that the approaches are comparable to those employed elsewhere in the State. Also, as explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, based on model simulations, the only proposed numeric target that could not be met was TN; all other proposed numeric targets can be met. As discussed in the Staff Report, the TN target compliance problem is likely a result of model limitations that will be addressed by the proposed implementation plan.

With regard to allowing the Army Corps of Engineers to complete their studies, see Responses to Comments #115, 151 and 153.

With regard to naturally occurring sources, see Responses to Comments #6, 20, 36, 40, 41, 50, 76, 86, 88, 91, 149 and 154.

Comment #171:
Allowing time for the Army Corps of Engineers effort to proceed does not mean there will be any delay in the remediation efforts. Remediation efforts have been going on for decades and they were going on in accelerated style for the four years preceding this meeting. It didn't take a TMDL to make the watershed do the right thing. It took money, interest, partnerships – all of which are in place.

Response:
We agree that the key is the evident interest and commitment of the stakeholders and we again acknowledge the proactive approach being employed. With regard to allowing the Army Corps of Engineers to complete their studies, see Responses to Comments #115, 151 and 153.

BOB LUDECKE
Board Member
Big Bear Municipal Water District

Comment #172:
Five years ago, the BBMWD had to decide whether to embrace TMDLs or to dig in and fight it. The BBMWD Board decided to cooperate since Regional Board staff demonstrated a desire to do what the BBMWD and community has been doing for years – maintaining a safe and healthy lake.

We don't need more police, we need more partners. More money is needed and it is important to not waste the limited resources.

Response:
Comment noted. Staff agrees that it will be necessary for all agencies and stakeholders to coordinate and work together to obtain funding for implementing projects in the Big Bear Lake watershed. To that end, staff is committed to assist stakeholders in obtaining funds.

Comment #173:
We can easily fix or mitigate all of the human cause impacts on the lake. The real problem though comes from what's naturally occurring.

Response:
See Responses to Comments #6, 20, 36, 40, 41, 50, 76, 86, 88, 91, 149 and 154.

Comment #174:
If it's the Board's goal to make Big Bear like Lake Tahoe, we're probably going to have to dig it that deep, and I just can't imagine anybody supporting that kind of a notion.

Response:
See Response to Comment # 88. As Board staff stated in response to this comment at the workshop, there is no intent to make Big Bear Lake like Lake Tahoe.

Comment #175:
We're asking for time to do this right and to let the Army Corps get out there and do their job.

Response:
See Responses to Comments #151, 153, 170 and 171.

Comment #176:
We're also asking for some trust. Our actions should have shown anyone by now that we can be trusted to protect this lake -- within our ability. The BBMWD is an elected Board whose sole mission is to preserve and enhance the lake and the recreational qualities. We're happy to work with you and your staff to achieve these goals, but cooperation is a two-way street. Every stakeholder on the TMDL task force deserves a high level of respect they have earned by taking good care of this lake for all of these decades before EPA finally got around to putting us on the 303 (d) list.

EPA is probably turning up the heat on the Regional Board to complete the TMDL. The Regional Board has a record of standing up to the EPA when it's warranted, and that's what we need you to do here.

Response:
In 1994, the Regional Board evaluated data collected as part of a Clean Water Act – Clean Lakes Study and determined that water quality standards were not being met in Big Bear Lake due to excessive aquatic plants and elevated nutrient levels. Accordingly, the Regional Board added Big Bear Lake to the 303(d) list, a revision approved by the USEPA, as required. These actions were in no way intended to denigrate the exemplary efforts of BBMWD and other stakeholders to implement projects designed to address water quality and beneficial use problems in the lake. Rather, the 303(d) listing reflected recognition that additional control actions were necessary.

Placement on the 303(d) list in turn triggers the need to develop TMDLs for the pollutant(s) causing impairment. Board staff has endeavored to work in cooperative fashion with the stakeholders in developing these TMDLs and intends to continue to do so as approved TMDLs are implemented. It should be pointed out that placement on the 303(d) list heightens the priority assigned to the lake for receipt of state and federal funding, a point made by Tim Moore, a Task Force consultant (see also Comment # 162).

RUTH VILLALOBOS
Chief, Planning Division
U.S. Army Corps of Engineers

Comment #177:
The Big Bear Municipal Water District and the Army Corps of Engineers started almost two years ago on a major feasibility study and an EIR/EIS process that we are cost-sharing on a 50/50 basis. The total cost of the study is about seven-and-a-half to eight million dollars. The purpose of the study is ecosystem restoration. Specifically, we are interested in improving the fish populations and diversity, improving the types of aquatic plant habitat and also improving bird habitat and foraging.

Response:
Comment noted.

Comment #178:
Our process and the timing for completing the study is driven by funding. We're dependent every year on congressional funding. We have an optimum schedule that we would like to follow, although the last couple of years the optimum funding has not been available in order for us to keep the same schedule.

Response:
It is because of these fluctuations in Army Corps of Engineer's funding that staff does not recommend delaying the TMDLs until completion of the Corps' efforts (See Comment # 181).

Comment #179:
The Corps is identifying all of the baseline conditions within the lake and watershed. The analysis of hydrology has been completed. Analysis of the bedload and suspended load for each of the three major tributaries is underway. The Corps is also developing hydraulic models to determine exactly what is happening in each of these three creeks and the contribution of sediment from these three creeks to Big Bear Lake.

Response:
The Army Corps of Engineers' studies are being cost-shared with Proposition 13 grants awarded to the BBMWD. As part of one Proposition 13 grant, the BBMWD has committed to analyzing sediment, flow, and nutrients from at least three tributaries. The BBMWD, staff of the RWQCB and the Army Corps of Engineers had a meeting in January 2005 to discuss how the Army Corps of Engineers' work, such as the hydrologic and hydraulic modeling, could compliment the studies included in the grant. The Army Corps of Engineers also worked with Board staff and the BBMWD and their sub-contractor to determine proper locations for cross-sections within the creeks, so that changes within the creeks could be measured. The cross-section study is also required as part of the Proposition 13 grant. Staff believes that it will be important to continue to coordinate these efforts in the future.

Comment #180:
The Army Corps of Engineers has also developed new aerial photography.

Response:
The aerial photography as well as the associated layers, such as the two-foot and four-foot contours, parcels, stormdrains, etc., were obtained through a Proposition 13 grant awarded to the City of Big Bear Lake and San Bernardino County. The BBMWD worked with the stakeholders in the watershed as well as the Army Corps of Engineers to ensure that everyone could use the collected data. In addition, the USFS has also benefited from this data.

Comment #181:
The Army Corps of Engineers believes that the data is worth waiting for. We should have some of the information for decision-making purposes available after several months.

We would request that you delay the implementation of the TMDL requirements within Big Bear Lake so we can continue to collect the site-specific data and analyze the data, then develop the alternatives, evaluate the cost, the engineering feasibility, the economics and certainly the environmental effects of each of those and participate in open public discussions on the ramifications of those decisions.

Response:
The Proposition 13 grant is scheduled to end in March 2007. The studies conducted as part of this grant will have to be completed prior to this date. Staff believes that the proposed TMDL compliance schedule allows sufficient time for the results of these to be utilized in the future for any lake management decisions.

See also Responses to Comments #151, 153, 170, 175 and 178.

Comment #182:
The Corps is currently doing geotechnical studies and found that there's a peat layer in the lake near the northern, deeper end of the lake closer to the dam indicating where the ancient or old lakebed was at the time that the dam was constructed. Sandy and gravelly type of materials are near the southern shore area. The Corps believes that no matter how deep we dig, there would still be sediments containing nutrients within the bottom of the lake. It would be important to consider the natural background level of all those constituents to formulate what could potentially be cleaned up to improve or restore the quality of the habitat within the lake.

Response:
Board staff was not given the final sampling plan that the Army Corps of Engineers prepared for the geotechnical studies. We have provided comments on the draft sampling plan. Further, staff has not seen any of the results of the study that are mentioned above in the comment. Board staff believes that the data collected by the Army Corps of Engineers will be very useful in determining the most appropriate remediation efforts in reducing internal nutrient loads, as required in the Attachment to Resolution No. R8-2006-0023 (Task 6). Staff notes that the proposed due date for the submittal of the In-Lake Sediment Nutrient Reduction Plan is 1 year after approval of the Nutrient TMDL. In staff's best judgment about the schedule for the approval process, it is likely that final approval from USEPA would occur on or around December 2006. Therefore, the In-Lake Sediment plan would be due on or around the end of 2007. Staff believes that this is sufficient time to incorporate any findings from the Army Corps of Engineers studies. (We note that we provided comments on the Corps' draft sampling plan,

but that we have not been provided with the final sampling plan, or any of the results to date. We will continue to strive for a collaborative approach so that the TMDLs can be implemented and refined based upon the best available data and information.)

Comment #183:
One recommendation from the TMDLs that we extrapolated was – to meet some of the targets – was to extract or dredge about 4.3 million cubic yards of sediment from the lake and thus reduce the sediment and the nutrients within the lake to meet different TMDLs.

Response:
The proposed Basin Plan amendment for nutrients for Big Bear Lake does not stipulate removing sediment to reduce the proposed numeric targets. As stated at the outset of this Response to Comments document, Board staff no longer recommends proceeding with a sediment TMDL for the lake.

Comment #184:
The Army Corps of Engineers is giving the BBMWD cost-sharing credit for the East End dredging project. We are using that as a pilot project to see whether the creation of islands is something that could be done.

Response:
The East End dredge project is a pilot-project to determine whether dredging is an effective nutrient and sediment remediation measure. The results of this study, as well as other studies conducted by the BBMWD, can be used in the development of Lake Management Plan and the In-Lake Nutrient Reduction Plan (Task 6) as proposed in the Attachment to Resolution No. R8-2006-0023.

BOARD MEMBER VAN GUNDY

Comment #185:
I think the management group has really done a great job considering the vagaries of the environment. It is not easy to manage a lake that goes up and down. Having looked at the lake today, I think it is in pretty good shape and I would be careful about trying to reduce the nutrients in the lake any more.

Response:
Recognizing the complexity and uncertainty of nutrient dynamics in the lake, the man-made nature of the lake and the environmental variation that affects the lake's quality, Board staff recommends an implementation plan that includes the development of a lake management plan, development of biocriteria and review of existing water quality objectives. The intent is to foster an adaptive management approach that will assure that appropriate water quality standards are identified and achieved.

Comment #186:
It seems that high zooplankton populations makes a good fishery. If you start knocking down the zooplankton by removing nutrients, the fishery is going to be hurt. There's a balance here and I think we really have to look at the balance of the climatic conditions and what goes on in this lake.

Response:
See Response to Comment #34.

Comment #187:
Four to six weeks of algae in the lake is nothing, I think, in terms of the total year-round effort.

Response:
See Response to Comment #33.

Board staff agrees that algae are only a problem of limited duration, during the growing season, defined as May 1 –October 31. If algae respiration and decay result in lower dissolved oxygen concentrations that affect the fishery and/or contribute to the release of nutrients from the sediment, then this may be a problem, even if of short duration.

Comment #188:
I take exception to Tim's [Tim Moore, Task Force consultant] comments about eradication of the weeds. I don't think it is possible to ever eradicate weeds and it's going to be a continual problem. There is a real balance here and it is necessary to be careful about trying to be too drastic in reducing nutrients.

Response:
Staff believes that the proposed TMDLs, which have been revised in response to comments (replacement of the total phosphorus final target with the interim target and revision of the chlorophyll *a* interim target based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile) takes a reasonable and balanced approach. Staff recognizes that Big Bear Lake will never have low nutrient levels as are seen in Lake Tahoe. On the other hand, staff does believe that given the historic problems with

excessive plant growth and the recent occurrence of algae blooms, some nutrient reduction is warranted. Staff's balanced approach to addressing Big Bear Lake as specified in the proposed Attachment to Resolution No. R8-2006-0023 is to work toward better understanding the lake through monitoring and improved modeling, the development and implementation of a lake management plan, and the development of biocriteria that take biological parameters into account.

See also Responses to Comments #32, 33 and 34.

LAWRENCE BAZEL
Legal counsel
Briscoe, Ivester and Bazel

Comment #189:
The key to resolving the problem is to take another look at the nutrient targets, particularly the chlorophyll target of 5 µg/L. The question that's supposed to answer is what's the right amount of algae in the lake? The 5 µg/L is an academic number from the literature and is not specific to Big Bear Lake. For many things there are national numbers. For nutrients even the EPA says, "Look at the individual lake, see what you can do with that lake, see what is natural and appropriate."

Response:
See Responses to Comments #6, 33, 34, 39 and 40.

Comment #190:
The State of Nevada has set a range of chlorophyll standards for Lake Mead, the nation's largest reservoir, from a low concentration of 5 ug/L to a high of 45 ug/L. The range goes up to 45 ug/L because the managing agency wanted to have a lake that was very productive to promote the fishery. There's no reason to go with the proposed 5 ug/L number if you take another look at what a natural, appropriate number for Big Bear Lake is and take that into consideration.

Response:
See Responses to Comments #6, 33, 34, 36, 37, 39 and 40.

The specific requirements for chlorophyll *a* for Lake Mead, excluding the area covered by NAC 445A.197, are (obtained from the Nevada Administrative Code –Chapter 445A-NAC 445A.118 to 445A.225 –Codification as of February 2003):

(1) Not more than one monthly mean in a calendar year at Station 3 may exceed 45 µg/L.
(2) The mean for chlorophyll *a* in summer (July 1-September 30) must not exceed 40 µg/L at Station 3, and the mean for 4 consecutive summer years must not exceed 30 µg/L. The sample must be collected from the center of the channel and must be representative of the top 5 meters of the channel. "Station 3" means the center of the channel at which the depth is from 16 to 18 meters.
(3) The mean for chlorophyll *a* in the growing season (April 1-September 30) must not exceed 16 µg/L at LM4 and 9 µg/L at LM5. LM4 s located just outside the Las Vegas Bay launch ramp and marina, next to buoy RW "1." LM5 is located next to buoy RW "A" with the southshore landmark of Crescent Island.
(4) The mean for chlorophyll *a* in the growing season (April 1-September 30) must not exceed 5 µg/L in the open water of Boulder Basin, Virgin Basin, Gregg Basin, and Pierce Basin. The single value must not exceed 10 µg/L for more than 5 percent of the samples.
(5) Not less than two samples per month must be collected between the months of March and October. During the months when only one sample is available, that value must be used in place of the monthly mean.

As the commenter has indicated, Lake Mead is a very large waterbody: when full it covers about 247 square miles and has over 500 miles of shoreline. Given the lake's size, the Nevada

approach is understandable. However, it is not evident that a comparable approach should be applied to Big Bear Lake, which is a fraction of the size of Lake Mead.

ROBERT TAYLOR
Forest hydrologist
SAN BERNARDINO NATIONAL FOREST

Comment #191:
The Regional Board's nutrient TMDL does not provide any model simulations for a dry year condition that can meet the proposed targets.

Response:
This is incorrect. As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, the only proposed numeric target that cannot be met (based on model simulations) is the final TN target of 1000 µg/L. As discussed in the Staff Report for the Big Bear Lake Nutrient TMDLs, staff believes that this is due to model limitations, which are expected to be addressed through the proposed implementation plan. The model simulations show that the interim and final numeric targets for total phosphorus (TP) and chlorophyll *a* proposed initially can be met. Nonetheless, as discussed in Responses to Comments #34 and 39, and as shown in the revised Attachment to Resolution No. R8-2006-0023, Board staff proposes replacement of the total phosphorus final target with the interim target and revision of the chlorophyll *a* interim target based on the median or 50th percentile of observed values during the growing season in 2001 rather than the 25th percentile.

CINDY LIN
Environmental Scientist
Southern California Field Office
US Environmental Protection Agency

Comment #192:
Every TMDL is unique, but EPA recognizes that this one is difficult considering the circumstances and the data availability. EPA strongly appreciates the effort that's been done by the Regional Board staff and the Big Bear Municipal Water District. EPA also acknowledges all of the money and time that has been put into TMDL efforts.

Response:
Comment noted.

Comment #193:
There are a number of processes that are in place to address water quality impairment. These processes are TMDLs, beneficial use modifications, and water quality standards changes. The purpose of TMDLs is to look at existing beneficial uses and water quality impairment and develop an approach to address those particular water quality impairments. The purpose of the TMDL is not to set numeric targets that can never change. EPA notes that modifying numeric targets is addressed in the implementation plan as well as by having interim and final numeric targets. EPA recognizes that there is a re-opener clause in the implementation plan to re-evaluate targets based on additional data and information. The TMDL proposed here today may not be used forever throughout time; there are re-openers as part of the TMDL. In addition, there is a delisting process.

Response:
Comment noted.

Comment #194:
EPA is extremely interested in looking at the Army Corps of Engineers monitoring effort. EPA is making a commitment to work with your staff on this TMDL and with the Board and with the Army Corps of Engineers, if that is what is required.

Response:
Comment noted.

Comment #195:
EPA does not think that there is a precedent being set here today for this particular watershed. Clearly, there are different unique challenges to this watershed and this TMDL, but TMDLs are happening all over the country. EPA would remind the Board that when there is a TMDL in place, there is a commitment.

Response:
Comment noted.

Comment #196:
With regard to the TMDL schedule, EPA is open to looking at the time frames. However, I also want to stress the need to proceed with making lake improvements because there is existing impairment that should be addressed.

Response:
Comment noted.

BOARD MEMBER WITHERS

Comment #197:
I'm very compelled hearing of the Corps study that is ongoing and nearing completion. I don't know what the dates and timing are, but it would be appropriate if the stakeholders, perhaps Tim, the local water district, working with our staff, could put together a work plan between now and the adoption of this TMDL of the things that still need to be done, when we expect to have them done, and who are the responsible parties. This way, all will know when the data that we need to make decisions will be available.

Response:
Comment noted. Also see Responses to Comments #151, 153 and 178.

Staff held a meeting with Ms. Sheila Hamilton (BBMWD General Manager) and Tim Moore of Risk Sciences on October 5, 2005 to discuss components of a Lake Management Plan that would integrate all the needed studies. Staff was very encouraged by the effort and commitment of the BBMWD to develop a Lake Management Plan that would evaluate appropriate beneficial use end-points for Big Bear Lake, as well as take TMDL requirements into account. One of outcomes from the meeting was that the BBMWD will be preparing a draft Big Bear Lake Management Plan well ahead of the schedule proposed in the Basin Plan amendment/ TMDLs.

The Army Corps of Engineers also met with Regional Board staff, staff of BBMWD and Tim Moore of Risk Sciences on December 13, 2005 to discuss their work and the proposed completion dates of their baseline studies. Based on this meeting, the Army Corps of Engineers projects that their baseline study will be completed by June 2006 while the final report will be available by September 2008.

BOARD MEMBER RUH

Comment #198:
It would be nice to know the timing of the Army Corps of Engineer's effort, when they will complete the studies and when the information will be available. Once the timing of the study is outlined, a determination can be made as what is still outstanding, and what additional work/studies need to be done, so that an appropriate course of action can proceed.

Response:
See Responses to Comments #151, 153, 178, and 197.

STEVE PONTELL
Managing Partner
Pine Knot Landing

Comment #199:
The Board should consider private sector initiatives as they go forward. Pine Knot Harbor was created by dredging 260,000 tons of material; 130,000 tons of that was exported. There are a lot of potential private sector initiatives in regards to the lake and the Board's support of those projects in the future would be very much appreciated.

Response:
Comment noted. While staff no longer recommends proceeding with the proposed sediment TMDLs for Big Bear Lake and its tributaries, we recognize that spot dredging, such as that referenced by the commenter, will likely be necessary in certain locations. This will be particularly true in marinas where the buildup of sediment would impair recreational uses. It is because of this need to continually manage sediment discharges that staff believes that it is imperative that the stakeholders develop and implement the Lake Management Plan that is proposed as part of the Nutrient TMDLs requirements

See also Response to Comment #166.

MICHAEL PERRY
City Manager
City of Big Bear Lake

Comment #200:
The lake has never looked as good as it did this year. There has never been the elimination of the weeds like this year, or the clarity in the beginning of the year, etc. People ask me "How can the lake be impaired when it's the best it's ever been?" And the answer is, it's not impaired when you look historically, it's impaired when you look at this textbook creation of what we'd like the lake to be. And I have to tell them it's because we are comparing it to something that's never happened before, something we hope will happen, but something that's never happened before.

Response:
See Responses to Comment # 88 and 174. As discussed in the Staff Report for the Big Bear Lake Nutrient TMDL, lake conditions vary considerably depending on climatic and other factors. The application of an herbicide in 2002 and 2003, the lake wide alum project in 2004, the record amounts of rain, and the increase in lake level from historic lows in 2004 to almost a full lake in 2005 obviously had some effect on improving water quality.

PART 3- PEER REVIEWER COMMENTS

K.H. RECKHOW
Duke University
Peer Reviewer
Comments submitted via email 8/16/2005.

Comment #201
Based on data and graphs presented in Boyd (2005), measurements for total phosphorus and total inorganic nitrogen exceeded the water quality objectives for Big Bear Lake and thus resulted in the 303(d) listing. This is clear. However, it appears that there were relatively few exceedances. Perhaps natural variability and the impact of sample location and timing should be taken into consideration to make the case that a small percentage (e.g., 5% or 10%) of exceedances be permitted without listing.

Response:
The DO objectives and the unionized-ammonia objective have all been exceeded in addition to the total phosphorus and total inorganic nitrogen numeric objectives. Moreover, numerous reports spanning over 30 years have documented the macrophyte problems in Big Bear Lake. As a whole, these exceedances of the numeric and narrative water quality objectives along with documented and anecdotal evidence of impacts to beneficial uses support the 303(d) listing for nutrients.

Comment #202
I am troubled by the numeric nutrient criteria – what is the relationship between the 25th percentile for N&P and the designated use? The goal of the TMDL is to achieve compliance with the water quality standard. The standard is essentially expressed in the designated use; the criterion is merely an assessable (measurable) surrogate for designated use. Presumably P&N would relate to phytoplankton density (expressed as chlor a); however, Figure 3.1 (Boyd 2005) shows a miserable bivariate relationship. As a final point with respect to N&P, I do not understand why the Basin Plan (Boyd 2005; page 32) specifies objectives for TOTAL phosphorus, yet for INORGANIC nitrogen – why the inconsistency?

The National Eutrophication Survey trophic state criteria (as well as Carlson's TSI, I believe) were set based on conditions in deep, nutrient-poor north temperate lakes (from Europe, the US, and Canada), and thus should not be given serious consideration for Big Bear Lake.

Response:
As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Board staff used EPA's guidance for developing nutrient criteria to develop the interim numeric targets. The guidance specifies using reference conditions of lakes to set the nutrient criteria. However, when there are no reference conditions available, EPA suggests using the 25th percentile to set the nutrient criteria to ensure that criteria are not set to degraded conditions. Although staff was not proposing to develop nutrient criteria, staff needed to use an established methodology in developing the numeric targets and therefore the EPA guidance was selected as an appropriate method.

Although the relationship between TP and chlorophyll *a* is not linear, historical studies as well as more recent data have shown that TP as well as TN limits algal growth. In addition, as described in the Staff Report, cyanophytes or blue-green algae are the most dominant algal

group in Big Bear Lake. The relationship between TP and chlorophyll *a* might not be as easy to detect due to the presence of macrophytes. Macrophytes are a huge sink and source of nutrients and would tie up bioavailable N and P in their tissues, as would algae, resulting in lower concentrations of these nutrients in the water column. As macrophyte biomass is reduced, the nutrients that were sequestered in the tissues become readily bioavailable. This was seen in Big Bear Lake after the second application of the aquatic herbicide in 2003; water column concentrations of TP, TN and chlorophyll *a* were higher than those observed prior to the herbicide treatment. In addition, the interim numeric targets were based on water quality data collected in 2001 and early 2002 prior to the application of aquatic herbicides or alum and even then, there was excessive macrophyte growth. While there were few exceedances of the existing TP and TIN water quality objectives, the dissolved oxygen as well as the unionized ammonia objectives were not being met. A more protective value than the median or average was used to develop the total phosphorus and total nitrogen numeric targets to ensure that existing water quality standards would be attained and maintained. Because there is little evidence to suggest that the algae objective has been violated, staff now recommends using the median or 50th percentile of chlorophyll a data from the four lake stations in place of the initially proposed 25th percentile.

See also Response to Comment #3 for a discussion on the water quality objectives for TP and TIN as specified in the Basin Plan.

Although Big Bear Lake is not a deep, nutrient-poor north temperate lake, the use of a trophic state index for California is not without precedent; the Indian Creek reservoir specified the use of a trophic state index and set the TP numeric target at a level representative of mesotrophic conditions. That said, staff have received numerous comments on the use of the index and propose to remove the final numeric targets based on the Carlson Trophic State Index. Staff now proposes the interim target (based on 25th percentile of data) as the only (final) numeric target for total phosphorus while the chlorophyll a numeric target would be based on the median or 50th percentile of observed values rather than the 25th percentile.

Comment #203:
Contrary to the Humphrey memo (2003), I do not believe that "EPA recommends HSPF "as the most accurate and appropriate management tool for the continuous simulation of hydrology and water quality in watersheds." To be specific, there have been virtually no uncertainty analyses undertaken using HSPF, so accuracy is essentially unknown.

Response:
Comment noted.

Comment #204:
Despite the fact that the TMDL is focused on nutrient loading, the Humphrey memo provides judgmental estimates of the accuracy of the hydrology, but is mute on the accuracy of the nutrient loads from HSPF!

Apparently, the HSPF model was not calibrated due to insufficient data (Nutrient Budget study 2003, page 4-10). Normally, failure to calibrate would be associated with bad modeling practice. However, HSPF is over-parameterized, which means that even a large data set cannot easily distinguish between many different sets of "optimal" parameters. This condition, termed "equifinality" (Beven, numerous references) could and should be addressed using a procedure such as generalized likelihood uncertainty estimation (GLUE) and would lead to the estimate of

parameter sets (not individual parameters) all of which meet some pre-defined aquatic behavior criterion. GLUE has the added advantage of providing at least some basis for estimation of HSPF prediction error See MOS discussion below).

Response:
Since nutrient loads are based on hydrologic conditions and land use, the calibration of the hydrologic portion of the model is important to determine nutrient loads. As more data are collected, the model can be calibrated and an uncertainty analysis can be run. This proposed task is shown in the Attachment to Resolution No. R8-2006-0023 (Task 6).

Comment #205:
Tetra Tech and Steven Davie have considerable experience with WASP, so I assume that this should be a good modeling effort, given the limitations of the data and of WASP. The graphs in the Tetra Tech report comparing predictions and observations for nutrients and chlorophyll are not confidence-building (particular when considered as a scientific basis for costly TMDL decisions). However, it is refreshing to read the candid appraisals of the lack-of-fit on pages 32 and 33; Tetra Tech is to be commended for these statements, and for recommendations (bottom of page 33) for further study in support of the WASP model. I suggest that a regionalized (generalized) sensitivity analysis (Hornberger and Spear references) be used to assist in prioritizing new data collection.

Response:
Comment noted. As part of a Proposition 13 grant, a model plan will be developed that outlines data gaps, an assessment of models, etc. The type of analysis recommended by Dr. Reckhow could be included as part of the update of the model. The proposed TMDLs allow sufficient time for these types of analyses to be performed prior to the proposed compliance date of 2015.

Comment #206:
While implicit margins of safety are common; they are to some degree a "cop-out." There are better approaches. For example, run an uncertainty analysis, and then use that assessment to guide initial actions in the adaptive process. Further, by doing the uncertainty analysis, you are determining what information is important to the TMDL assessment, yet is relatively poorly known – hence, what needs to be studied in the post-implementation adaptive phase.

Seasonal variations and critical conditions appear to be handled well.

Response:
Staff have noted that a formal uncertainty analysis should be conducted as part of future modeling efforts. Moreover, both the HSPF and WASP model report recommendations, as well as additional studies on macrophyte biomass, sedimentation rates and alum, among others, have aided in the development of the proposed implementation plan.

Comment #207:
The TMDL implementation is proposed to be "phased" (Boyd 2005; Executive Summary). In fact, as stated, this TMDL is not phased; it is adaptive.

As noted under my MOS comments, undertaking an uncertainty analysis as the basis for the MOS would naturally lead to priorities for post-implementation monitoring. This should be adequately described in the TMDL application (but it was not).

Response:
Comment noted. As explained in Response to Comment #206, the recommendations for post-implementation monitoring are based on recommendations from the HSPF and WASP model reports, as well as additional information garnered from other studies conducted in this watershed. Staff believes that the tasks proposed to update the models, conduct water quality monitoring, development of biocriteria, etc. will fill data gaps that were noted as part of the modeling efforts. Any additional data gaps that are identified can also be incorporated into the modeling effort or monitoring programs.

Comment #208:
In brief, this appears to be a fairly typical TMDL that follows a routine procedure for approval rather than a clear linkage to attainment of designated use. Thus, my criticisms are to some degree directed at the overall TMDL process and not to this proposed TMDL alone.

Response:
Staff does not agree that the proposed TMDLs are not linked to protection of beneficial uses. While staff does recognize that Big Bear Lake is a complex waterbody, the proposed TMDLs are aimed at reducing the internal fluxes of nitrogen and phosphorus from both the sediment and from macrophytes to achieve a level of nutrient reduction, macrophyte control that would support identified beneficial uses. It is staff's opinion that the data and information presented in the Staff Report on Nutrient TMDLs for Big Bear Lake supports these needed reductions. Staff also believes that this need to address the internal sediment loads is shared by many of the watershed stakeholders who have sought grants to eliminate macrophytes, dredge nutrient rich sediments and apply alum to sequester nutrients in the bottom sediment. However, it is also clear to staff that additional work needs to be done to specifically identify appropriate biocriteria for the lake that take into account protection of beneficial uses and incorporate all physical and chemical factors that affect Big Bear Lake ecology.

PART 4- U.S. EPA COMMENTS

CINDY LIN – US ENVIRONMENTAL PROTECTION AGENCY

Environmental Scientist
Southern California Field Office
Comments sent 11/7/2005 via email.

See also comments presented orally at the August 26, 2005 workshop (p. 93)

General Comments (Note: The following comments pertain to the Staff Report on the Nutrient TMDLs for Big Bear Lake (TMDL Report). Staff does not expect to revise the TMDL Report presented at the Regional Board workshop on August 26, 2005. A separate staff report that describes the proposed changes to the Basin Plan Amendment based on consideration of comments received will be prepared. Nevertheless, the following responses to comments on the TMDL Report are provided (Comments # 209-244).

Comment #209:
The draft technical TMDL appropriately provides the existing information and conducts the necessary analysis (i.e., source assessment, linkage analysis, waste load and load allocations, etc.). The document can improve by focusing on primary objectives achieved and less on the limitations of the data and analysis, which would be better addressed in one section. For example, the importance of setting numeric targets should be emphasized because these state and federally mandated requirements address serious water quality impairments and stressed beneficial uses.

Response:
Comment noted.

Comment #210:
The discussion on load reductions can improve by providing a more clear justification for the selected percentage reductions. The technical document currently provides an extensive discussion, but perhaps clarity of the selected reductions and numeric targets could be improved by having one explanatory statement for each finding.

Response:
Comment noted.

Comment #211:
The margin of safety discussion outlines all the uncertainties and limitations related to this technical TMDL. But, how do these uncertainties affect the actual load calculations? Do the TMDLs underestimate or overestimate the nutrient loads and/or load reductions? This section can be strengthened by identifying how the uncertainties affect the TMDLs, which consequently would provide more support for the identified numeric targets.

Response:
As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 8.0, staff's proposed use of an implicit margin of safety is intended to account for unknowns associated with the nutrient TMDL development process. These unknowns are summarized in Section 8.0 and discussed in previous sections of the Staff Report. Further, Section 8.0 also discusses the conservative assumptions that make up the margin of safety. With respect to how these

assumptions affect the WLAs and LAs, staff believes that the conservative approach to identifying numeric targets and the conservative approach used in the modeling process results in more restrictive TMDLs, WLAs and LAs than would otherwise be the case.

Comment #212:
Page 31, Footnote 17: Is there currently an update since the review of the UIA objectives since Regional Board's 2002 Triennial Review List?

Response:
Review of the UIA objectives remains on the Regional Board's triennial review list. Because of the limited basin planning funding, it is not likely to be undertaken in the near future.

Comment #213:
Page 38, Figure 2.2: Are 6740.15 feet and 6729.58 feet referring to the elevation of the lake level? Also, do these two lake levels have the appropriate number of significant digits?

Response:
Lake levels were obtained from the Big Bear Municipal Water District, which reports lake levels in inches (one significant digit) and in decimal feet (two significant digits).

Comment #214:
Page 40, 3rd paragraph: Is the personal observation by Heather Boyd? The reference should include the primary person's name and date/year of observation.

Response:
See Response to Comment #70.

Comment #215:
Page 43, last sentence: Are there other commercial or non-commercial uses that "large mats of nuisance aquatic plants, and subsequent increase in temperature and pH and decrease in dissolved oxygen concentrations" can affect (besides fishery)?

Response:
As discussed in the Staff Report on Nutrient TMDLs for Big Bear Lake, Page 37, noxious aquatic plants can also affect boating and other recreational activities on the lake.

Comment #216:
Page 44, 1st sentence: Please be more specific about "through the end of 2003". Which and how many months does that period cover?

Response:
Data were collected approximately once per month from January 27, 2003 through December 10, 2003.

Comment #217:
Page 44, mid paragraph: Please cite other references or studies that show the similar pattern of early a.m. low dissolved oxygen concentrations.

Response:

Petr, T. 2000. *Interactions between fish and aquatic macrophytes in inland waters. A review.* FAO Fisheries Technical Paper. No. 396. Rome, FAO. 185 p.

Pearson, Elmer G. and George A. Irwin. 1972. *Limnological studies of Big Bear Lake, California.* Open-file report, Menlo Park, CA: US Geological Survey, Water Resources Division.

Wetzel, Robert G. 2001. Limnology: *Lake and river ecosystems.* 3d edition. San Diego: Academic Press (pg. 161).

Comment #218:
Page 46, Section 3.1, 1st paragraph: What is the justification for including an interim and final target for total phosphorus, but only a final target for total nitrogen? Also, see page 76, first para., bold text. It appears that the primary reason for having the target is due to federal requirement. Perhaps, it would help to reemphasize the evidence of impairment and impacted beneficial uses in Big Bear Lake.

Response:
Staff believe that the explanations provided on page 50 and Section 5.1 of the Staff Report on Nutrient TMDLs for Big Bear Lake are adequate.

Comment #219:
Page 46, Section 3.1, last paragraph: Will the additional investigation of attainability and water quality measures needed to achieve the proposed final numeric targets take place after the TMDL is adopted?

Response:
Yes. The implementation plan identified in the Attachment to Resolution No. R8-2006-0023, specifies the tasks needed to implement the TMDL.

Comment #220:
Page 48, 1st paragraph: Currently, the paragraph describes what information is needed to define the effects of macrophytes on beneficial uses. An equal discussion on what is clear or known about macrophytes should be included.

Response:
Staff believe that the Staff Report on Nutrient TMDLs for Big Bear Lake, page 37 provides an adequate description of what is clear or known about certain macrophytes.

Comment #221:
Page 48, footnote 25: This discussion is confusing and vague. Please delete.

Response:
Staff does not believe that this footnote is confusing or vague. The footnote provides staff's reasoning for the need to consider incorporating numeric water quality objectives for biological parameters such as macrophyte coverage and/or chlorophyll *a*. Incorporating these parameters into biocriteria specific to Big Bear Lake is proposed as Task 7 of the Implementation Plan.

Comment #222:
Page 51, numeric targets, last sentence: Please change sentence to: "When future studies are conducted to evaluate the link between macrophyte coverage and a healthy fishery in Big Bear Lake, Regional Board will review the proposed numeric target for macrophyte coverage, if needed."

Response:
The existing sentences states:

> "When future studies are conducted to establish the link between macrophyte coverage and a healthy fishery in Big Bear Lake, the proposed numeric target for macrophyte coverage will be reviewed and revised accordingly."

Staff believes that this sentence reflects Boards staff's intent and that no revision to the language is warranted.

Comment #223:
Page 52, 2nd paragraph: Please delete the paragraph because it adds to the unclarity and does not add to the discussion.

Response:
Staff believe it is important to note that there are not clear correlations between phosphorus and nitrogen concentrations and macrophyte coverage. It is clear, however, that rooted macrophytes depend on nutrient concentrations in sediment for growth and floating macrophytes depend on nutrient concentrations in the water column for growth. Because of these complexities, all these factors need to be taken into account as a Lake Management Plan is formulated and macrophyte control measures are implemented.

Comment #224:
Page 52, numeric target: Is it possible to show the calculation and reasoning behind the selection of the 25th percentile and the resulting 10ug/L?

Response:
Appendix B of the Staff Report on Nutrient TMDLs for Big Bear Lake contains the data used to calculate the target. The reasoning behind the selection of the 25th percentile is discussed in Section 3.0 of the Staff Report.

Also see Responses to Comments #34 and 202.

Comment #225:
Page 53, 3rd paragraph: Please delete the last sentence of this paragraph, beginning with, "These values would then be used to rerun....."

Response:
This paragraph provides justification for including specific source nutrient monitoring requirements and also provides an explanation of how the data generated on nutrient sources could be used in future modeling and/or other decision making processes. As shown in Attachment to Resolution No. R8-2006-0023, Task 6 includes updating the watershed model (6A) with the additional data and information obtained from the monitoring programs (Tasks 4.1 and 4.2). Therefore, staff does not believe that it would be appropriate to delete this sentence.

Comment #226:
Page 54, 1st paragraph: After the sentence, "This was considered sufficient due to the fact……", please include a following sentence on appropriateness of the approach when addressing dry weather conditions, such as, "In addition, this is sufficiently appropriate when addressing dry weather conditions…."

Response:
This statement relates to the calibration of the HSPF model and has nothing to do with the approach used for establishing the dry hydrological conditions TMDL.

Comment #227:
Page 57, Figure 4-4: It appears that the interpretation of this figure is not complete. For example, what about the effect of high urban loads between 1990-2003?

Response:
Pages 56 and 57 of the Staff Report on Nutrient TMDLs for Big Bear Lake state that the highest phosphorus loads come from the forested areas during the period 1990-2003 and from urban land uses during the period 1999-2003. As shown in Table 4-2, phosphorus loads from urban land uses during the period 1999-2003 range from 256 to 1049 lbs/year with an average of 475 lbs/year for the five-year period.

Comment #228:
Page 59, last paragraph: The statement, "Most of the phosphorus is associated with the sediment/particulate discharge present when surface runoff occurs, with the most significant contributions from forest land use" is supported only by the year 1993 in Table 4-2 and not by Figure 4-4.

Response:
Comment noted.

Comment #229:
Page 60, Table 4-2: It appears that the largest proportion of TP (70%) is from urban land uses. Why does the previous section state "the highest total phosphorus loads come from the forested areas….(p. 56, bottom)?"

Response:
During the 1999-2003 period, 70% of the total phosphorus load is from urban land uses, but during the 1990-2003, period, 55% of the total phosphorus load is from forest land use.

Comment #230:
Page 61, last sentence: Please modify last sentence to, "The loading rates that were used to calculate these estimates will be refined with empirical data for both wet and dry conditions during the implementation phase." Is this the correct assumption that it is during the implementation period that atmospheric loads will be addressed?

Response:
As explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, the atmospheric deposition rates were based on the data available at the time. Atmospheric deposition is addressed in the implementation phase as shown in Attachment to Resolution No. R8-2006-0023, Task 5.

Comment #231:
Page 66, 2nd paragraph, bottom: Why did Tetra Tech use three times the average calculated volumetric density in their calculations? Footnote 40 did not explain why either.

Response:
Staff believes that this is explained in the staff report (page 66, 2nd paragraph and page 76, paragraph "c"). Tetra Tech used 3 times the measured average because of uncertainties related to the measurement/collection of macrophytes. As explained in the staff report, a rake method was used for macrophyte collection, however use of the rake likely resulted in an underestimation of macrophytes (coontail might not have been collected by the rake method and therefore might not be included in the measurement). Therefore, Tetra Tech took a conservative approach by assuming higher macrophyte mass than what was actually measured.

Comment #232:
Page 67, 4th paragraph: The last sentence, "As stated previously, these values need to be compared....." undercuts your findings and leads to general uncertainty of the report's conclusions about atmospheric deposition.

Response:
As explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 4.2, there is uncertainty associated with the atmospheric deposition rates for Big Bear Lake, which supports Task 5 as shown in the Attachment to Resolution No. R8-2006-0023.

Comment #233:
Page 68, Table 4-7: How confident are the authors of the proportion of nutrient loads from forest nonpoint source loads (43.5%)? Does this percentage match the author's best professional judgment?

Response:
This percentage, 43.5%, applies only to the wet scenario (1993) as shown in the Staff Report on Nutrient TMDLs for Big Bear Lake and is calculated from the HSPF loads received by Hydmet, Inc. in 2004. The percentage is thus not based on BPJ, but on model simulations.

Comment #234:
Page 71, 2nd paragraph: Again, the last sentence of this paragraph undercuts the general initial findings. This technical report did not have all the data possible (and not many TMDLs do), but it did evaluate two different precipitation periods and found general patterns of rainfall and associated loads.

Response:
Comment noted.

Comment #235:
Page 72, top of page: Please explain the model runs. Some background information on the model runs would be helpful (just 1-2 sentences).

Response:
The results are explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 5.1.

Comment #236:
Page 72, last sentence: The conclusion is that during dry conditions, a reduction in external loads is unnecessary. However, a reasonable explanation as to why an external load reduction is then required was not provided. Perhaps, more clarification on the external load reduction coming from wet hydrological conditions need to be reemphasized.

Response:
As shown in Attachment to Resolution No. R8-2006-0023, there are no reductions required for external sources during dry periods; the only reductions required are from internal sediment and macrophytes. Staff does note, however that the external load dischargers are responsible for the internal loads.

See also Responses to Comments #6, 119, 143 and 145.

Comment #237:
Page 74, first sentence: Modify sentence to, " Second, WASP efforts to simulate macrophyte nutrient dynamics were achieved by adopting various assumptions regarding macrophyte nutrient loads, rates of uptake and release, etc., that were simulated via nonpoint....." A sentence on how this is a common approach in the absence of specific data would help strengthen your conclusions.

Response:
Comment noted.

Comment #238:
Page 74, 3rd paragraph: This paragraph is not clear. What are the main points of the paragraph?

Response:
This paragraph explains the uncertainties associated with modeling macrophyte dynamics.

Comment #239:
Page 75, 1st paragraph: What is the purpose of this extensive discussion on model limitations in the main technical document. How about have three short bulleted sections: (1) model limitations in bulleted form and (2) ramifications of these limitations, and (3) what the model does provide for this technical analysis.

Response:
Staff described the limitations of the models with the intent that these limitations could be explored as the models are updated as is specified in Task 6A of the Attachment to Resolution No. R8-2006-0023.

Comment #240:
Page 76, 2nd paragraph: The last sentence in this paragraph offers an implicit margin of safety.

Response:
Comment noted. As shown in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 8.0, staff did incorporate the macrophyte assumptions as part of the implicit margin of safety.

Comment #241:
Page 78, 4th paragraph: Why is model run 20a used to calculate the load capacity for interim targets?

Response:
This is explained in the conclusions in Section 5.1 of the Staff Report on Nutrient TMDLs for Big Bear Lake (page 78). Staff relied on the phosphorus flux, macrophyte and nitrogen reductions assumed in model run 20a to evaluate the appropriateness of meeting the interim numeric targets. See also the discussion in Section 5.1, d "Feasibility of Nutrient Reduction Simulated by WASP" (page 76).

Comment #242:
Page 78, 5th paragraph: This section's clarity can be improved by stressing the main points. Also, do staff believe that macrophyte coverage should range between 30-60% due to BPJ or based on information from other lakes?

Response:
See Response to Comment #38.

Comment #243:
Page 81, Figure 5-4: Why did TP and TN concentrations increase after the Sonar applications?

Response:
Sonar was applied in 2002 and 2003 at the start of the growing season. In summer 2002, observed total phosphorus and total nitrogen concentrations measured after the Sonar application were lower than those reported in 2001 (staff did not determine if they were statistically significant differences). Staff postulates that this occurred because Sonar was applied at the start of the growing season and thus prevented macrophyte growth. The result was less macrophyte biomass than would normally have occurred. Macrophytes store nutrients in their tissues and release these nutrients back into the water column as they die. It is likely that during 2002 and 2003, there was less macrophyte biomass overall and therefore, less nutrients than usual were released from the macrophytes back into the water column.

In 2003, Sonar was again applied at the start of the growing season, but total nitrogen and total phosphorus concentrations were higher than those observed in 2001 and 2002 (again, staff did not determine if they were statistically significant differences). Staff hypothesizes that the reason for these increases is that the biomass from 2002 and from 2003 was not removed from the lake and instead the decaying biomass from 2002 and 2003 was left on the lake bottom and over time the nutrients were released back into the water column. In 2003, there was very little macrophyte coverage and therefore, excess nutrients were not stored in the macrophyte tissues as usually occurs, but instead remained available in the water column. This also resulted in increased algae growth as shown by an increase in chlorophyll *a* concentrations from 2001 to 2004, prior to the application of alum.

Comment #244:
Page 83, 3rd paragraph: If the final TN target cannot be achieved, why not include an interim target for TN?

Response:
This is explained in the Staff Report on Nutrient TMDLs for Big Bear Lake, Section 3.1.1. To summarize, staff had initially proposed an interim target of 1000 µg/L and a final total nitrogen target of 200 µg/L. Since the WASP mode projections showed that even the interim target could not be met, staff decided to replace the final proposed total numeric target of 200 ug/L with the interim target of 1000 ug/L. As discussed in the Staff Report, staff believe that the compliance problems are likely related to model deficiencies, which are to be addressed as a requirement of the proposed implementation plan.

(Proposed changes to the Environmental Checklist presented on August 26, 2005 are shown in ~~strikeout~~ for deletions and underline for additions)

ATTACHMENT C
ENVIRONMENTAL CHECKLIST

I. BACKGROUND

1. **Project title:** *Basin Plan amendment to incorporate Nutrient TMDLs for Big Bear Lake in the Big Bear Lake Watershed*

2. **Lead agency name and address:** *California Regional Water Quality Control Board, Santa Ana Region, 3737 Main Street, Suite 500, Riverside, CA 92501-3348*

3. **Contact person and phone number:** *Hope Smythe (951) 782- 4493*

4. **Project location:** *Big Bear Lake Watershed, San Bernardino County (all portions of the City of Big Bear Lake)*

5. **Project sponsor's name and address:** *California Regional Water Quality Control Board, Santa Ana Region, 3737 Main Street, Suite 500, Riverside, CA 92501-3348*

6. **General plan designation:** *Not applicable*

7. **Zoning:** *Not applicable*

8. **Description of project:** *Adoption of a Basin Plan amendment to incorporate Nutrient TMDLs for Big Bear Lake. The TMDLs establish wasteload allocations and load allocations for allowable nutrient inputs by all identified sources that discharge to Big Bear Lake. The intent is to achieve numeric, water quality targets that will protect the beneficial uses of the lake. The Basin Plan amendment includes an implementation plan that details the actions required by the Regional Board and other dischargers ~~responsible parties~~ responsible for implementing the TMDLs.*

9. **Surrounding land uses and setting:** *Not applicable*

10. **Other public agencies whose approval is required:** *The Basin Plan amendment must be approved by the State Water Resources Control Board, the Office of Administrative Law, and the U.S. Environmental Protection Agency before it becomes effective.*

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:
The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agricultural Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality	☐ Land Use / Planning
☐ Mineral Resources	☐ Noise	☐ Population / Housing
☐ Public Services	☐ Recreation	☐ Transportation / Traffic
☐ Utilities / Service Systems	☐ Mandatory Findings of Significance	

II. DETERMINATION

On the basis of this initial evaluation:

~~X~~ I find that the proposed project COULD NOT have a significant effect on the environment.

__X__ I find that the proposed project MAY have a significant effect on the environment. However, there are feasible alternatives and/or mitigation measures available that will substantially lessen any adverse impact. These alternatives are discussed in the attached written report.

____ I find that the proposed project MAY have a significant effect on the environment. There are no feasible alternatives and/or feasible mitigation measures available that would substantially lessen any significant adverse impact. See the attached written report for a discussion of this determination.

_____ _____
Signature Date

Hope Smythe
Senior Environmental Scientist~~pecialist~~

III. ENVIRONMENTAL IMPACTS

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
I. AESTHETICS - Would the project:				
a) Have a substantial adverse effect on a scenic vista?			X	
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			X	~~X~~ |
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			X	~~X~~ |
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?				X
II. AGRICULTURE RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				X
III. AIR QUALITY - Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				X
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			X	~~X~~ |
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient			X	~~X~~ |

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				
d) Expose sensitive receptors to substantial pollutant concentrations?			X	~~X~~
e) Create objectionable odors affecting a substantial number of people?		X		~~X~~
IV. BIOLOGICAL RESOURCES - Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X	~~X~~	
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?		X	~~X~~	
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?			X	~~X~~
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X	~~X~~	
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X
V. CULTURAL RESOURCES - Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §~~=~~15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §~~=~~15064.5?				X
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Disturb any human remains, including those interred outside of formal cemeteries?				X
VI. GEOLOGY AND SOILS - Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				X
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?				X
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X
VII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?		X		~~X~~ |
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		~~X~~ |
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X
VIII. HYDROLOGY AND WATER QUALITY - Would the project:				
a) Violate any water quality standards or waste discharge requirements?		X		~~X~~ |
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on-site or off-site?				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-site or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?			X	~~X~~ |
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?				X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j) Inundation by seiche, tsunami, or mudflow?			X	~~X~~
IX. LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X
X. MINERAL RESOURCES - Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X
XI. NOISE - Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		~~X~~
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?		X		~~X~~
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			X	~~X~~
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		X	~~X~~	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people			X	~~X~~

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
residing or working in the project area to excessive noise levels?				
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?			X	~~X~~
XII. POPULATION AND HOUSING - Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X
XIII. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Fire protection? Police protection? Schools? Parks? Other public facilities?				X
XIV. RECREATION - Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?				X
XV. TRANSPORTATION/TRAFFIC - Would the project:				
a) Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?			X	

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?			X	~~X~~
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Result in inadequate parking capacity?				X
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X
XVI. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			~~X~~	X
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X
XVII. MANDATORY FINDINGS OF SIGNIFICANCE -				

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		X		~~X~~
b) Does the project have impacts that are individually limited, but cumulatively considerable? ('Cumulatively considerable' means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	~~X~~
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?		X		~~X~~

Attachment - Environmental Checklist

Discussion of Environmental Impacts

Explanation of Environmental Checklist "Less than significant with mitigation incorporation" Answers

Note: Adoption of the Basin Plan amendment to incorporate Nutrient TMDLs for Big Bear Lake will not have any direct adverse impact on the environment. Implementation of actions necessary to achieve the TMDLs may affect the environment, as described below. However, the intent of TMDL implementation is to restore and protect the water quality of the lake and its beneficial uses. Any potential adverse environmental effects associated with TMDL implementation will be subject to project-specific CEQA analysis and certification to assure appropriate avoidance/minimization and mitigation.

III. Air Quality (e)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include sediment removal, fishery management, macrophyte management, the application of aluminum sulfate (alum) or other mechanisms. Sediment removal may result in the excavation of lake bottom material and the storage of the material near the lake for drying. Without incorporation of mitigation measures, the top few inches of the sediment may contain organic material that may cause objectionable odors; fishery management also might result in potential objectionable odors if fish are removed and then not disposed of properly after their removal; and removal of macrophytes and subsequent disposition of macrophytes might also cause potential objectionable odors.

Possible mitigation measures to reduce these impacts to less than significant:
Coverage of potential odiferous materials to control odors from materials that are stored on site; expeditious removal of odiferous materials; proper storage of removed fish (i.e., freeze) until they can be removed from the site.

Any of these proposed implementation actions would be subject to specific CEQA analysis and certification.

IV. Biological Resources (a), (b), (d)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include such activities as the application of aluminum sulfate (alum), fishery management, macrophyte management, sediment removal and aeration. The Big Bear Lake watershed is host to many sensitive species, including the Federally-threatened Bald Eagle as well as riparian and sensitive habitats. Without incorporation of mitigation measures, implementation of in-lake remediation measures has the potential to impact riparian or sensitive habitat and nesting birds, alter suitable wintering waterfowl habitat, have a negative effect on the amount of available forage area for the bald eagle and other nesting and wintering raptors, and affect other wildlife or plant species.

Mitigation measures to reduce these impacts to less than significant:
Conduct the requisite surveys (e.g., biological, botanical, nesting, tree, etc.) for each project, identify suitable alternatives to avoid or minimize any adverse impacts and apply the proper mitigation dependent upon the species and habitat found.

Conduct in-lake remediation or construction activities outside of the known bald eagle wintering period (December through March) and any other known nesting, wintering or breeding period for observed candidate, sensitive or special status species.

VII. Hazards and Hazardous Materials (a), (b)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include such activities as the application of aluminum sulfate (alum), fishery management, macrophyte management, sediment removal and aeration. PCBs and other organics as well as mercury have been observed in some fish tissue samples but to date have not been observed in lake sediments. Without incorporation of mitigation measures, implementation of in-lake remediation measures could potentially cause the release of these pollutants to the local environment; disposal of contaminated sediments could pose a human health hazard during transport, following an accident condition and would have to be disposed of in a landfill that accepts hazardous materials.

Potential mitigation measures to reduce these impacts to less than significant:
Analyze sediments to be dredged for possible pollutants for each project. Identify and implement appropriate BMPs and possible avoidance/remediation alternatives.
Implement BMPs to the maximum extent practicable to mitigate project-specific impacts.

VII. Hydrology and Water Quality (a)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include such activities as the application of aluminum sulfate (alum), fishery management, macrophyte management, sediment removal and aeration. Without incorporation of mitigation measures, implementation of the in-lake remediation measures has the potential to exceed Basin Plan objectives for several constituents (pH, turbidity, dissolved oxygen, etc.), cause the short-term release of nutrients, metals, and organics which might exceed Basin Plan objectives and cause impacts to the beneficial uses of the lake (i.e., RARE, COLD, WARM, REC1, REC2, and WILD).

The application of alum in Big Bear Lake is problematic in that background aluminum concentrations in the lake exceed EPA's recommended aluminum criteria for the protection of freshwater aquatic life. Alum application could cause or contribute to further violations of this criterion. The development of a site-specific objective for aluminum appears to be warranted.

Potential mitigation measures to reduce these impacts to less than significant:
If alum application is authorized pursuant to waste discharge requirements, implement BMPs, monitor dosage rates and methods to assure that established water quality objectives are not violated.
Implement BMPs to the maximum extent practicable to mitigate project-specific impacts and assure that any impacts are limited spatially and/or temporally.

XI. Noise (a), (b), (d)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may such activities as the application of aluminum sulfate (alum), fishery management, macrophyte management, sediment removal and aeration. The lake is surrounded by residential areas, schools, and businesses. Implementation of the in-lake remediation activities has the potential to cause noise disturbances through the use of heavy-equipment, haul trucks and other equipment. Without incorporation of mitigation measures, in-lake remediation activities could result in significant, though short-term noise impacts to noise sensitive land uses within proximity to the project site.

Potential mitigation measures to reduce these impacts to less than significant:
Ensure that construction equipment is properly maintained and has properly fitted mufflers.
Limit in-lake remediation activities to Monday through Saturday, between the hours of 7:00 A.M. to 7:00 P.M., in compliance with San Bernardino Development Code, Chapter 9, Performance Standards (87.0905).

Explanation of Environmental Checklist "Less than significant" Answers

Note: Adoption of the Basin Plan amendment to incorporate Nutrient TMDLs for Big Bear Lake will not have any direct adverse impact on the environment. Implementation of actions necessary to achieve the TMDLs may affect the environment, as described below. However, the intent of TMDL implementation is to restore and protect the water quality of the lake and its beneficial uses. Any potential adverse environmental effects associated with TMDL implementation will be subject to project-specific CEQA analysis and certification to assure appropriate avoidance/minimization and mitigation.

I. Aesthetics (a), (b), (c)

The proposed TMDLs call for reductions in nutrient loads within~~to~~ the lake, which may include the implementation of BMPs and in-lake remediation measures that are ~~could be~~ aesthetically unpleasing. The aesthetic effect on scenic vistas, scenic resources and the visual character of Big Bear Lake are expected to be limited spatially and/or temporally and are considered less than significant.

III. Air Quality (b), (c), (d)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake. Some of the in-lake remediation measures may require the use of construction equipment. Use of the construction equipment and construction activities in general, may cause short-term impacts.

IV. Biological Resources (c)

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include application of aluminum sulfate (alum), macrophyte management and sediment removal. Some of these actions may cause impacts to land that currently supports riparian habitat or sensitive species. Any such actions would be subject to specific CEQA analysis and certification, and would be intended to restore and protect the biological resources of the lake and the Big Bear Lake watershed.

~~**IV. Biological Resources (a), (b), (d)**~~

~~The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include the application of aluminum sulfate (alum), fishery management, macrophyte management and sediment removal. The Big Bear Lake watershed is host to many sensitive species including the Federally-threatened Bald Eagle. Such actions have the potential to affect the biota, including sensitive species. Any such actions are likely to be temporary and in the long-term, would result in the enhancement of Big Bear Lake aquatic habitat utilized by sensitive species.~~

VII. Hydrology and Water Quality (f), (j)

The proposed TMDLs call for reductions in nutrient loads within the lake, which may include the implementation of BMPs and in-lake remediation measures that could result in short-term impacts to water quality as explained above. These effects are expected to be limited spatially and/or temporally. The intent of TMDL implementation is to restore and protect the water quality of the lake and its

beneficial uses. If the TMDLs are not implemented, water quality will remain impaired until the in-lake remediation activities remove or control the sources of nutrients.

XI. Noise (c), (e), (f)~~(d)~~

Implementation of actions necessary to implement the proposed TMDLs may result in increases in noise levels. However, these effects are expected to be limited in scope and duration and are not considered significant. Again, proposed implementation actions would be subject to specific CEQA analysis and certification.

XV. Transportation/Traffic (a), (b)

Implementation of actions necessary to implement the proposed TMDLs, such as transporting alum to Big Bear Lake and/or removal and disposal of dredge materials, may result in increases in traffic on the two main highways that serve Big Bear Lake. However, these effects are expected to be limited in scope and duration and are not considered significant. Again, proposed implementation actions would be subject to specific CEQA analysis and certification.

~~**XVI.Utilities and Service Systems (e)**~~

~~The proposed TMDLs call for reductions in nutrient contributions to the lake from internal sources. To achieve these reductions, modifications to the storm drainage system may be necessary. Any such projects associated with storm drainage systems modifications would be subject to further, case-specific environmental review and certification.~~

XVII. Mandatory Findings of Significance

The proposed TMDLs call for actions to reduce internal nutrient loading to the lake, which may include such activities as the application of aluminum sulfate (alum), fishery management, macrophyte management, sediment removal and aeration. Implementation of the in-lake remediation activities has the potential to cause impacts to resources as identified in the checklist. Some of these impacts are considered less than significant, as discussed above. In other instances, the mitigation measures identified in this document along with mitigation measures identified in any subsequent project-specific analyses are expected to ensure that impacts are reduced to a less than significant level.

Implementation of the in-lake remediation activities will not eliminate important examples of the major periods of California history or prehistory.

Implementation of the in-lake remediation activities would ultimately result in the long-term improvement in the lake's water quality since the intent of TMDL implementation is to restore and protect the water quality of the lake and its beneficial uses. Short-term impacts from construction activities related to the in-lake remediation activities have the potential to result in impacts to air emissions and noise levels during implementation. With the incorporation of the mitigation measures identified in this document to reduce air emissions and noise levels, along with mitigation measures identified in any subsequent project-specific analysis, the in-lake remediation activities would not result in environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

29 January 2004 Hand-delivered

Heather Boyd & Hope Smythe
Regional Water Quality Control Board – Santa Ana Region
3131 Main St.
Riverside, CA

RE: CEQA Scoping Issues

Dear Ms. Boyd:

On behalf of the members of the Big Bear Lake TMDL Task Force, and particularly the directors of the Big Bear Municipal Water District, we thank you for the considerable effort you have made to restore beneficial uses to the lake. We also sincerely appreciate the financial support provided by the Regional Water Quality Control Board and State Water Resources Control Board. We are very proud of the significant improvements made possible by Proposition-13 grant funding.

As the Regional Board considers adoption of a formal TMDL we would like to submit the following questions:

1) What metrics and threshold values must be met in order to remove Big Bear Lake from the 303(d) list of impaired waterbodies?

2) By what standard will we know when beneficial uses (particularly COLD & REC1) are fully attained?

3) How will the anti-degradation threshold be determined?

4) How will the baseline (pre-anthroprogenic) condition be defined for a man-made waterbody?

5) How will the Regional Board evaluate "economic considerations," as specified in Section 13241 of the California Water Code if the means of compliance are not yet known?

6) How will natural nutrient and sediment loads be distinguished from the net increase in such loads caused by human activities?

7) How will legacy loads, such as the nutrients stored in sediments washed into Bear Valley from the surrounding mountains long before the dam was built, be accounted for?

8) What is the legal distinction between water quality "goals" or "targets" differ from water quality "criteria" or "objectives?"

9) What process would be required to change a water quality "goal" or "target?" Is EPA approval required to change a goal or target?

10) How will the Regional Board determine what level of water quality can "reasonably be achieved through the coordinated control of all factors which affect water quality in the area" as described in Section 13241 of the California Water Code? In particular, how will "reasonability" be assessed when evaluating various control alternatives?

11) How will the Regional Board apportion the load allocation between various non-point sources (proportionate to loading or based on ability to control the loads)?

12) How will the Regional Board implement the load allocations for non-point sources if there is no NPDES permit or Waste Discharge Requirements (WDRs) in place?

13) Does the Regional Board staff intend to recommend a "safety factor" for each TMDL? If so, how will the safety factor be determined?

14) If the scientific research studies demonstrate that in-lake sediment are contributing significant nutrient loads to the water column, will the Regional Board staff recommend dredging such sediments if necessary to meet water quality targets?

15) If dredging the sediments would cause more environmental damage than to leave it in place, will the Regional Board staff recommend revising the beneficial use classification pursuant to 40 CFR 131.10(G)(3)?

Thank you for allowing us the opportunity to raise these issues as part of the CEQA scoping process. Please call if you wish to discuss our questions in greater detail.

Respectfully submitted,

Timothy F. Moore
Risk Sciences
1417 Plymouth Dr.
Brentwood, TN 37027
Ph: 615-370-1655
Fax: 615-370-5188
tmoore@risk-sciences.com

United States Department of Agriculture | Forest Service | San Bernardino National Forest Supervisor's Office | 1824 S Commercenter Circle
San Bernardino, CA 92408-3430
Phone: 909-382-2600
Fax: 909-383-5770
TTD: 909-383-5616

KVB 6/20

2005 JUN 17 PM 3:04

File Code: 2500/2520/2530-3

Date: JUN 15 2005

HAS 6/21
dMB 6/24

Gerard Thibeault
Executive Officer
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501

Dear Mr. Thibeault:

The San Bernardino National Forest supports the Santa Ana Regional Water Quality Control Board's efforts to address nutrient-induced water quality impairments in Big Bear Lake. As a Water Quality Management Agency, the Forest has substantial authority and responsibility for managing and protecting our lands and associated waters.

We have some significant concerns, though, that were not addressed in the stakeholder meeting March 15, or subsequent emails between representatives of our agencies. Given that there are significant questions related to the conclusions being drawn from limited available data, the Forest requests that the Draft Final version of the TMDL in question be released to interested stakeholders for a 30-day collaborative review prior to the 30-day release to the public. We would like to note that this pre-release process is being used by other Regional Boards in other areas of California.

We feel that there are major concerns that should be addressed by the stakeholders before it is released. The major stakeholders need a chance to address these concerns and an opportunity to resolve them before the document goes public. It is also very likely that once the stakeholders have this chance, it will help facilitate buy-in from the concerned public.

We appreciate the significant staff resources expended in developing the TMDL. With your concurrence to provide the stakeholders a copy of the document before release to the public, we feel that this would greatly enhance the process to complete this TMDL.

Sincerely,

GENE ZIMMERMAN
Forest Supervisor

cc: Brian Staab, Douglas Pumphrey

SNOW SUMMIT
SKI CORPORATION

880 Summit Boulevard P.O. Box 77 Big Bear Lake, CA 92315 v: 909.866.5766 f: 909.866.3201

HAS HMB 9/7/05

2005 SEP -6 PM 12:24

JCS Hard Copy

September 2, 2005

Ms. Heather Boyd
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501

Re: Comment on the Draft TMDL Plan for Big Bear Lake

Dear Ms. Boyd,

Snow Summit Ski Corporation, owner and operator of Bear Mountain and Snow Summit ski resorts, objects in the draft TMDL plan to our designation as a "Responsible Party". Since most of the acreage of our ski resorts is under Special Use Permit from the Forest Service, and the remaining acreage consists of our base areas which are within the city limits of Big Bear Lake, we fall within the jurisdiction of those agencies as well as that of San Bernardino County. Therefore, from a jurisdictional standpoint we are no different from any other business enterprise that lies within the boundaries of those agencies and should not be singled out.

However, we are unique in that for many years prior to the recent efforts to develop a TMDL plan for the Big Bear Lake watershed, our company, under the jurisdiction of the Forest Service, the City and the County has implemented comprehensive erosion/flood control/water quality measures, including re-vegetation, culverting, check dams and silt collection to fully mitigate impacts upon the lake caused by our activities. This, of course, is at variance with the proposed TMDL's assumption that recreational areas such as ours have taken no such measures.

Moreover, as a part of our contract with the Mutual Water District (MWD) for lake water for snowmaking, we are obligated to work with that agency to control runoff and silting and have worked off site in the Rathbun drainage to that end.

Inasmuch as we fall within the jurisdiction of the agencies that are properly designated as "Responsible Parties", and the fact that we are heavily engaged thereby in significantly reducing our impacts upon the lake, we respectfully request we be removed from the designation "Responsible Party".

Sincerely,

R. Kun

Richard C. Kun
President
SNOW SUMMIT SKI CORPORATION

Cc: Sheila Hamilton, MWD General Manager

RCK:dh

City of Big Bear Lake

HMS 9/7/05
HMP
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IOS c e

September 2, 2005

Heather Boyd
Regional Water Quality Control Board – Santa Ana Region
3131 Main St.
Riverside, CA

Re: **Letter of concerns from the City Big Bear Lake pertaining to the implementation of the TMDL's**

Dear Ms. Boyd,

On behalf of the City of Big Bear Lake, we thank you for the opportunity to participate in the California Regional Water Quality Control Board Meeting held on August 26, 2005 at Big Bear Lake. As a Stakeholder in the Big Bear Lake TMDL's, we would appreciate responses to the following concerns:

1. How will natural sediment and nutrients from uncontrollable contributors such as the atmosphere, ash/erosion from fires, and wildlife animal waste be distinguished from the net increase caused by human activities and domestic pets?
2. Current water quality stations do not appear to be positioned to distinguish proportional contributory loads from S.B. Co. Flood Control District, USFS, or the City of Big Bear. How will individual accountability be established?
3. If current BMP's are properly installed and monitored but still do not achieve TMDL targets, will the Stakeholder(s) be penalized? Who is responsible for developing new BMP's when current BMP's do not achieve desired targets?
4. During winter the City of Big Bear and other agencies in the Big Bear Valley area place sand on icy roads for safety. How has this been factored into the proposed TMDL's?
5. We desire more specific information to define 'storm event'. The City of Big Bear is subject to localized short bursts of heavy rains primarily from monsoonal weather patterns. For example it is possible that a microburst occurs over the Rathbun Creek tributary area but not over the Knickerbocker Creek tributary area. Does this constitute a 'storm event' and trigger sampling as defined in Table 5-9a-o at all sampling locations or just the tributary impacted by the storm?

City of Big Bear Lake Civic Center and Performing Arts Center
39707 Big Bear Boulevard, P.O. Box 10000, Big Bear Lake CA 92315-8900 • 909/866-5831 •Fax 909/866-6766

6. We desire more specific information regarding interruptions during 'snowmelt periods' and temperature measurements. What sampling are we required to do if we have multiple snowmelt periods separated by periods with below freezing temperatures? Do we restart the sampling process after each freezing period, which could last a few days or a few weeks? Will a single temperature station be identified for the Big Bear TMDL to trigger sampling or will sampling be triggered by an individual temperature reading at each sampling station?
7. The City of Big Bear Lake has limited funding and staffing. How will the RWQCB define and apply "economic considerations" for the City of Big Bear Lake relative to the pursuit of the proposed TMDL targets and tasks outlined in Table 5-9a-m?
8. Who will decide and how long will it take to judge whether the Watershed-wide Sediment Monitoring Plan is a 'reasonable plan'?
9. Will the proposed targets become law after adoption by the RWQCB or after adoption by the EPA?
10. How will mediation be handled if two or more agencies disagree on issues such as the Watershed-wide Sediment Monitoring Plan or methodology in identifying pollution sources or BMP's to achieve TMDL proposed targets?

Thank you for allowing us the opportunity to raise these concerns. We look forward to your responses.

Sincerely,

David J. Martinez

David J. Martinez
Deputy City Manager
Development Services

cc: M. Perry, City Manager

HAS 9/15
HMB

2 September 2005

Heather Boyd
Regional Water Quality Control Board
3737 Main St., Suite 500
Riverside, CA

RE: Comments on Draft Nutrient TMDL for Big Bear Lake

Dear Ms. Boyd:

Thank you for the opportunity to review the draft nutrient TMDL for Big Bear Lake. The following comments were prepared at the direction of and submitted on behalf of the Big Bear Lake TMDL Task Force. Members of the Task Force include: the City of Big Bear Lake, San Bernardino County, the U.S. Forest Service, CalTrans, Big Bear Area Water Reclamation Authority, Big Bear Municipal Water District, East Valley Conservation District, and various local business such as the ski resorts and marinas. Many of these organizations and agencies were also planning to submit individual comment letters and we encouraged them to do so.

General Comments

The draft TMDL represents an extraordinary level of effort. And, we wish to commend the Regional Board staff for the time and expertise it took to prepare the document. Big Bear Lake and the surrounding watershed present an unusually complex technical and regulatory problem. Therefore, we strongly support the theme of the proposed Implementation Plan - to develop and apply a strategy of adaptive management based on the best available scientific information.

With this comment letter, members of the TMDL Task Force renew our on-going commitment to protect the existing beneficial uses in Big Bear Lake. As we stated in our oral presentation at the Regional Board's workshop last week, we fully understand and accept our obligation to mitigate any excess nutrient concentration which may flow to the lake as a result of development activities by humans residing on or visiting Bear Valley. We believe the goal should be to reduce nutrient loads throughout the entire watershed back to the natural ambient background concentrations that occur in the nearby undeveloped forest.

The remainder of our comments are organized to address topics in the same order as they appear in the TMDL Table of Contents.

1.0 Comments Related to the Problem Statement

1.1) The problem statement should be updated to accurately represent current conditions in the lake. Eurasian milfoil and coontail were virtually eradicated as a result of a large-scale herbicide application program initiated in 2002. Subsequent follow-up surveys each spring demonstrate that these invasive plant species have been eliminated and Big Bear Lake is no longer impaired by aquatic weeds. BBMWD now maintains a permanent, long-term spot re-treatment program to ensure that Eurasian milfoil and coontail do not recolonize the lake. If future monitoring efforts prove the continuing success of that effort, we recommend that Big Bear Lake be de-listed for noxious aquatic plants in the next biennial update of California's 303(d) list.

1.2) Big Bear Lake is not impaired by algae. The draft problem statement provides a general description of problems that may be caused by excess algae. However, it does not provide any evidence that excess algae growth is occurring in Big Bear Lake. On the contrary, the draft report states that:

> *"For the most part, Big Bear Lake has experienced few problems with excessive algae." (p. 40)*

Algae blooms occasionally appear near the end of each summer. These blooms usually encompass a very small area and last only a few weeks. Naturally cool water temperatures preclude algal infestations from occurring on a scale that might impair beneficial uses in Big Bear Lake. In addition, the unusually large population of zooplankton also acts as a natural limit on algae growth in the lake.

Historical analysis indicates that small algae blooms have been occurring since the dam was first constructed in 1884. Apart from an obvious correlation with lake levels and water temperatures, there is no evidence to suggest that the frequency, duration or magnitude of algae growth is worsening. Consequently, there is no reason to believe that the narrative objective of the Basin Plan, prohibiting waste discharges from contributing to excessive algal growth, has been or is likely to be exceeded at Big Bear Lake.

1.3) Significantly reducing algae concentrations in Big Bear Lake may reduce overall productivity of the fishery. If the amount of algae declines the zooplankton population will as well. This, in turn, will likely reduce the number and size of fish living in the lake (see Fig. 1). The Virginia Department of Environmental Quality (equivalent to California's State Water Resources Control Board) concluded that "gains in habitat from oxygenated hyplimnia and reduced macrophytes will likely be outweighed by loss of biological productivity" in reservoirs where significant nutrient reductions are sought.[1]

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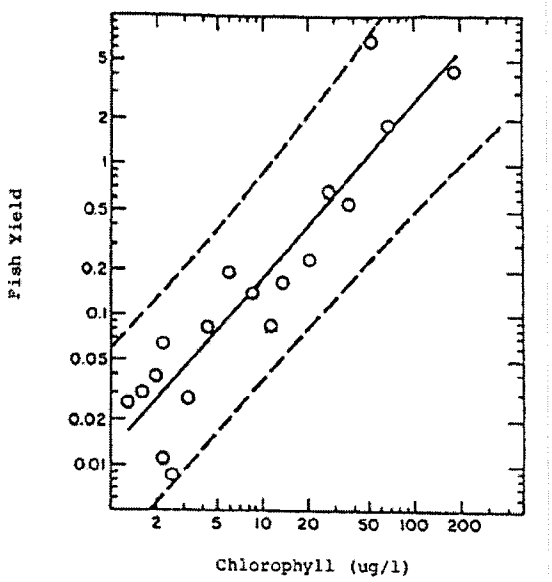
[1] Virginia Department of Environmental Quality - Division of Water Quality Programs. Report of the Academic Advisory Committee on Freshwater Nutrient Criteria. July 20, 2004 @ pg. 68.

Fig. 1: Relationship between Chlorophyll-a and Fishery Condition



Source: Oglesby, R.T. 1977. Relationships of fish yield to lake phytoplankton standing crop, production, and morphoedaphic factors. Journal of Fisheries. Resource Board of Canada. 34:2271-2279.

The graph in Figure 1 is meant to be illustrative of the general relationship between algae and fish abundance. It is not meant to suggest the specific relationship that may exist in Big Bear Lake. It is included because we believe it is necessary to know define the relationship with greater certainty before concluding that the present algae concentrations may be impairing the beneficial use or assuming that lower algae concentrations will be "better" for the aquatic ecosystem in the lake.

1.4) The low dissolved oxygen concentrations measured in the deepest portion of the lake are caused by naturally-occurring anaerobic conditions. There is no specific evidence presented to determine the degree to which nutrient levels are exacerbating the problem. In particular, there is no evidence that the richness or abundance of fish is materially harmed by the ambient DO levels. Recent fish kills are relatively small and most likely due to extreme low lake levels and high water temperatures in the summer.

There is also no evidence to demonstrate that the DO objective will be met if the TMDL targets are achieved. We recommend that the draft TMDL be revised to determine if the alum application in 2004 had any measurable impact on DO levels. The draft TMDL should also recognize the presence of and analyze the effectiveness of a large-scale aeration project at the west end of the lake. The project is designed to increase dissolved oxygen concentrations without destratifying the lake and destroying the only cold-water refuge available in late summer. Recent data submitted to the Regional Board indicate the active remediation strategy is effectively mitigating the potential for DO impairment near the dam.

2.0 Comments Related to the Numeric Targets

2.1) If numeric targets will differ substantially from current water quality objectives for nitrogen and phosphorous in the Basin Plan, then those objectives should be revised in accordance with Section 13241 of the California Water Code. This is particularly true if the numeric targets are to be used as the basis for developing mandatory limits in NPDES stormwater permits.

In this instance, the proposed numeric targets are not merely "translations" of other existing water quality objectives in the Basin Plan. As noted above, the draft TMDL acknowledges that there are few problems with excessive algal growth in Big Bear Lake. Therefore, even if the nitrogen and phosphorous targets are intended to translate the narrative algae objective, the resulting Chlorophyll-a values should not be less than the current average ambient levels. And, unlike the current numeric objectives for nitrogen and phosphorous, there is no indication that the current DO objectives in the Basin Plan are somehow inadequate. Thus, there is no need to use translated targets to implement those numeric DO objectives.

We understand the reluctance to revise the nitrogen and phosphorous objectives; amending the Basin Plan is a difficult task. However, we believe the process is more scientifically credible and more publicly acceptable when the Regional Board adheres to the six factors identified in Section 13241. We are particularly concerned that the proposed targets should be evaluated with respect to whether they are realistically attainable given the natural background concentration of nitrogen and phosphorous of soils in and around Big Bear Lake.

2.2) The proposed numeric targets do not properly translate some of the relevant water quality objectives. For example, the narrative objective for algae states that:

> *"Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters."*

However, the proposed targets for nitrogen and phosphorous are not limited to waste discharges. They apply to all nitrogen and phosphorous loads regardless of whether it is a waste discharge or naturally-occurring. The same is true for total inorganic nitrogen. The Basin Plan states that the TIN objective:

> *"...shall not be exceeded as a result of controllable water quality factors." (pg. 4-9)*

The proposed numeric targets do not carry forward the requirement to distinguish between controllable and uncontrollable water quality factors. Therefore, they are an imprecise translation of the narrative objectives and should be considered new or revised water quality objectives in their own right (and subject to review under Section 13241).

2.3) There is considerable scientific uncertainty regarding the preferred percent coverage range for aquatic macrophytes. The draft TMDL recommends a target of 30-60% coverage based on general literature values. However, experts (Leidy, Smart, Remetrix) who have performed site-specific studies of Big Bear Lake recommend target values between 10-30%. We suggest that the target be revised to include the entire range (10-60%) until the discrepancy can be resolved. Alternatively, we advise that the target be restated as "approximately 30%" (the area of overlap between the recommended ranges).

2.4) It would be more effective and efficient to regulate water quality by developing biocriteria for Big Bear Lake. We should first decide what level of richness and abundance is desirable and attainable. Then we should estimate the nutrient levels needed to achieve that outcome. The proposed numeric targets, while intended to protect the aquatic ecosystem, are not closely correlated with any specific change in richness or abundance. More important, there may be other implementation strategies that can improve the density and diversity of aquatic species without attempting to manipulate water chemistry.

Chlorophyll-a, Sechi depth, percent macrophyte coverage, nutrient concentrations and the trophic state index are all indirect indicators of ecosystem health and integrity. We believe it is better to use more direct measures of the true biological endpoints we are most concerned with. It may be more difficult and it will undoubtedly cost more, but it is a more rigorous approach to assessing whether or not genuine impairment is occurring or not. Moreover, it will avoid misapplying generic values from the scientific literature to the unique aquatic ecosystem of Big Bear Lake.

2.5) Target levels should not be set to values less than that which can be achieved under undisturbed natural background conditions. According to the State Water Resources Control Board's draft Impaired Waters Guidance (3/2/05):

> *"It would be inappropriate, for instance, to adopt stringent source reduction measures for the ostensible purpose of protecting a beneficial use that natural background levels of pollutants would prevent achieving, and thus some sort of standards action is the only appropriate regulatory response." (pg. 6-5; see also the flow-chart on pg. 6-2)*

The SWRCB guidance is consistent with the Santa Ana Regional Board's previous approach to addressing non-point pollution. For example, San Bernardino County's MS4 permit states:

> *"This order is intended to regulate the discharge of pollutants in urban storm water runoff from anthropogenic (generated from human activities) sources and is not intended to address background or naturally-occurring pollutants or flows."*[2]

[2] Finding #13 in Order No. R8-2002-0012

We recommend that Regional Board calculate the natural background load that would occur by rerunning the WASP model after converting all existing land uses back to an undisturbed forest conditions for the simulation. In addition, it will be necessary to estimate the internal loads that were likely to be present in the valley soils when it was inundated after the dam was built. Nutrient loads in excess of these values might be deemed "waste discharges" because they do not occur under natural conditions.

We recognize that tolerating natural background loads may mean that the lake will not meet some of the proposed numeric targets. We view this as a natural limitation on the true potential beneficial uses that can be achieved rather than as an impairment of the existing beneficial use. In the end, it may be desirable to reduce nutrient loads below natural background levels. And, the people of California may decide to do so at some future date. However, it is not required in order to comply with either the Clean Water Act or the Porter-Cologne Act.

3.0. Comments Related to the Source Assessment

3.1) The source assessment does not distinguish between naturally-occurring and anthropogenic pollutant loads. For example, the ski resorts may contribute 4% of the total phosphorous loads during a wet year, however a large percentage of this was likely to have also occurred if the same acreage had remained undisturbed natural forest. The ski resort is only responsible for the incremental increase in load that comes as a result of their activities on the mountainside. Only that is a "waste discharge." The rest is a natural background issue.

3.2) The source assessment assumes that the existing Best Management Practices and other mitigation/remediation strategies have zero effectiveness. We know that to be untrue because the draft TMDL document relied on data of sediment captured in man-made retention ponds to calibrate some of the models. Thousands of tons of sediment are prevented from reaching the lake each year. In addition, thousands of tons of nitrogen and phosphorous were removed when BBMWD operated an active weed harvesting program. Similarly, the City of Big Bear Lake and San Bernardino County have comprehensive regulations designed to mitigate the potential adverse impact of development on storm water quality. It is scientifically inaccurate to perform the source assessment based on the false assumption that none of these programs exist or are effective.

3.3) The source assessment should be updated to include the critical information gained during the recent very wet winter of 2004-05. Such data is not only important to characterize the true fate and transport model for the watershed, it is essential to understand whether the dominant external sources are "controllable" or not as that term is used in Section 13241 of the California Water Code and in the Basin Plan itself.

3.4) The draft Technical Report indicates that there was insufficient information to calculate a TMDL for wet hydrologic conditions. If so, then this calls in to question the accuracy and reliability of the entire source assessment analysis. The absence of stream gauges, lack of high elevation weather station and dearth of suspended sediment data means the source assessment is not much better than a "best guess" at this point. In all likelihood, according to the testimony given by Ruth Villa Lobos (U.S. Army Corps of Engineers-LA District) the existing information is not good enough to meet the requirements imposed by CEQA and NEPA for obtaining 401 certification or 404 permits necessary to implement mitigation or remediation projects.

3.5) Some of the nutrient loads attributed to "Urban Point Sources" originated in the surrounding and are merely passing through the city's storm water infrastructure. Since the source assessment is likely to be used to establish regulatory responsibility, it is important to characterize the full fate and transport path more precisely. What originated as a naturally-occurring source of pollution is not legally converted to a "waste discharge" just because it ultimately arrived at the lake through a storm water drain rather than flowing across open ground. The storm water agencies are only responsible to the extent that their facilities increase the overall load ("waste discharge") beyond what would have otherwise occurred under natural conditions.

4.0 Comments Related to the Linkage Analysis

4.1) The proposed targets are not limited to dry hydrologic conditions only. The targets also apply to wet and average hydrologic conditions. Because the TMDL is limited to dry hydrologic conditions, it is impossible to make the demonstrations needed to show that attaining the targets will protect the designated beneficial uses.

It is inappropriate to assume that the uses will be protected under dry conditions unless we know that the targets will be met under average and wet conditions. More than 90% of the total nutrient load under dry conditions comes from sediment and macrophytes already in the lake. And, these internal loads are, in turn, the result of external loads delivered under much wetter hydrologic conditions. To assume that internal loads can be controlled under dry conditions without first characterizing the transport mechanisms that deliver the source material under wet conditions is scientifically unsound. To the extent that internal nutrient loads are the result of legacy pollutants contributed to the lake during wet years, those loads should be addressed in the wet weather TMDL rather than being included as part of the TMDL for dry conditions.

4.2) The linkage analysis should include a sensitivity analysis to assess the degree to which any of the assumptions may be driving the calculations. This is particularly important where the model indicates a minimum load reduction must occur in order to meet the required targets but the TMDL opts for a lower load reduction.[3]

[3] See, for example, the discussion of macrophyte loads on page 79 of the Technical Report.

5.0 Comments Related to the TMDL Allocations

5.1) The draft Technical Report indicates that the "Responsible Parties" will be responsible for meeting the entire TMDL, including the internal load reductions. And, the Implementation Section states that the storm water permits will be revised to include new limits based on the Waste Load Allocation (WLA). However, the internal loads are assigned to the Load Allocation (LA) not the WLA. Therefore, it is unclear who is legally responsible for achieving the internal load reduction.

5.2) The proposed TMDL does not yet take into account the load reductions that have occurred as a cumulative result of all dredging activities over the last 30 years. Detailed records maintained by the BBMWD indicate that a net total of more than 500,000 cubic yards of sediment and nutrients have been removed from the lake sine 1977. This is considerably more than the sum of all sediment inflows believed to occur during the same time. In addition, BBMWD harvested and removed more than 20,000 tons of weeds between 1991 and 2001. The alum application in 2004 sequestered many additional tons of nitrogen and phosphorous thereby preventing it from entering the water column. All of these activities must be shown in the TMDL allocation particularly as they relate to determining responsibility for the net internal load contribution.

5.3) The proposed TMDL does not yet account for the nutrient loads that were present in the soil when the valley was initially flooded to form the lake. This is a naturally-occurring source that is being improperly combined with all other sediments transported to the lake over the last 100 years.

If BBMWD's records are correct, then the net sediment and nutrient load to Big Bear Lake should be less now than at any time in the last 30 years. However, there does not appear to by any significant change in water quality over the same period of time. This indicates that the single most important factor driving nutrient concentrations in Big Bear Lake was present before the City of Big Bear Lake was incorporated, before the Big Bear Municipal Water District was formed and before the ski resorts were built. The nutrients were already present, in abundance, in the soils of the valley's marshy meadow that was destined to become the bottom of Big Bear Lake.

Core samples collected at the east end of Big Bear Lake in May of 2005 demonstrate that there is no clear trend in phosphorous concentrations with increasing sediment depth (see Fig. 2). Therefore, it is inappropriate to assign responsibility for internal loads to present day storm water permittees. For, even if those agencies were to remove 100% of the sediment that was deposited since the dam was constructed, it would likely only uncover more of the same lying beneath.

Fig. 2: Phosphorous Concentrations by Depth in Sediment Core Samples from East End

Sediment Depth	Site B-2	Site B-3
0 ft.	770 mg/kg	
-1 ft.		
-2 ft.		
-3 ft.		440 mg/kg
-4 ft.		
-5 ft.		910 mg/kg
-6 ft.		730 mg/kg
-7 ft.	1000 mg/kg	
-8 ft.	800 mg/kg	640 mg/kg
-9 ft.		
-10 ft.		
-11 ft.	990 mg/kg	460 mg/kg
-12 ft.	860 mg/kg	
-13 ft.		480 mg/kg
-14 ft.		
-15 ft.	340 mg/kg	

The data presented in Figure 2 is meant to illustrate the danger of assuming that phosphorous concentrations decrease as depth increases. It is unknown whether the data collected at the east end is representative of sediment conditions throughout the remainder of Big Bear Lake. However, the Army Corps of Engineers is engaged in a large-scale sediment sampling project designed to develop data to better characterize the greater lake. Results from that effort are expected to be available next year.

6.0 Comments Related to Seasonal Variations and Critical Conditions

6.1) We support the Regional Board's approach to distinguish between various hydrologic conditions. However, the distinction also bears directly on how targets should be established in the first place. The lake is incapable of achieving the same level of water quality under low pool conditions as it is under full pool conditions. We recommend that, just as the TMDL itself was divided into separate implementation tiers, different targets should be established for each of the major hydrologic condition (dry, average & wet). This would better account for the attainability and controllability issues the Board is obligated to consider.

6.2) The critical water quality condition occurs near the end of prolonged drought when lake levels, and available dilution, are at their lowest. However, the critical loading condition occurs during extreme wet ("El Nino") years. While we support developing different targets and different TMDLs for different hydrologic conditions, we recommend against attempting to adopt a TMDL for dry conditions and deferring development of the other TMDLs to a later (unspecified) time. Such a phased approach may waste considerable resources as agencies attempt to implement the dry weather TMDL only to discover, later, that the overall targets were never attainable due to uncontrollable factors intrinsic to average and wet weather conditions. Our recommendation is consistent with previous guidance prepared by the SWRCB's General Counsel:

> *"Question: Can a TMDL be adopted by the Regional Board and incorporated into the Basin Plan with an understanding that an implementation [plan] would be adopted at some later specified or unspecified date? Answer: Theoretically speaking, a Regional Water Board could probably adopt a TMDL in two phases. That is, the Regional Water Board could first adopt the TMDL without an implementation plan, followed by adoption of an implementation plan at some later date. Although this is theoretically possible, it wouldn't make much sense for several reasons. First, under state law, an implementation plan is required. Consequently, the first basin plan amendment wouldn't be complete, and could not be implemented, until the later adoption of an implementation plan. Second, to the extent that the TMDL is not complete under state law, query whether this would meet the requirements of 303(d). Third, for the reasons explained previously, CEQA compliance would probably be more difficult because the Regional Water Board would have to identify and analyze all reasonably foreseeable methods of compliance with the TMDL in the first phase. Fourth, adopting the TMDL in phases would require the Regional Water Board to use its resources for two public adoption processes rather than one. Finally, adopting a TMDL without an implementation plan may raise 'clarity' issues for the Office of Administrative Law (OAL). OAL may determine that the TMDL cannot be approved under the rulemaking provisions of the Administrative Procedure Act because its impact on the regulatory community is unclear, without an implementation plan. In any event, any lengthy delay in adopting an implementation plan is unsupportable."*[4]

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[4]William R. Attwater, Chief Counsel to the California State Water Resources Control Board. Memorandum to Gerard J. Thibeault, Executive Officer of the Santa Ana Regional Board entitled: "Do TMDLs Have to Include Implementation Plans" March 1, 1999 (pg. 9)

We understand that the proposed Implementation Plan fully implements the proposed TMDL for dry weather conditions. However, it does not assure continuous compliance with the proposed targets which do not distinguish between wet and dry hydrologic cycles. Therefore, this is clearly a phased or tiered implementation plan. To demonstrate good faith, we are prepared to go forward with the most substantial elements of the Implementation Plan (monitoring, modeling, plan preparation) voluntarily while the Board staff continues to develop the TMDLs for average and wet conditions. BBMWD is preparing a formal work plan to update and upgrade their Lake Management Plan to facilitate the proposed TMDL Implementation Plan.

7.0 Comments Related to the Implementation Plan

7.1) The proposed Implementation Plan is insufficiently complete to assess the real-world requirements associated with meeting the recommended targets. For example, item #2 in Section 9.1 of the Technical Report states that

> *"The Regional Board will review and revise, as necessary, the existing NPDES permits to incorporate appropriate WLAs, compliance schedules and monitoring program requirements." (pg. 91)*

It is necessary to know the exact nature of such permit limits in order to assess all of the potential impacts associated with building the facilities or implementing the programs necessary to assure compliance. Since revised permit limits are a "reasonably foreseeable" result of adopting the TMDL, the Regional Board is obligated to consider the specific effects of doing so. As before, it is improper to separate the impact analysis into distinct sub-phases and defer it to a later time when it is evident at the time the TMDL is adopted that the subsequent phases are likely or inevitable (see CEQA discussion below).

7.2) The proposed Implementation Plan does not provide a thorough environmental analysis of the means most likely to be used to reduce internal nutrient loads. A general list of options (dredging, alum, native plant species) is given, but a much more detailed review is necessary to demonstrate reasonable assurance that the targets will be attained and to comply with CEQA. For example, alum applications have been shown to be very effective at reducing phosphorous flux from the sediment. However, water quality samples collected during the previous alum application project indicate that the ambient aluminum concentrations in Big Bear Lake already exceed relevant water quality objectives. There is no assimilative capacity for additional aluminum. Therefore, if alum is likely to be used, it will be necessary to revise the water quality objectives or to approve a temporary variance. Without such regulatory modifications, it would be illegal to use alum as a strategy for meeting the proposed TMDL. And, as noted in comment #5.3 (above), one should not assume that compliance can be assured by dredging either.

7.3 We strongly support the Regional Board's proposal to develop and issue a general NPDES permit for restoration activities in Big Bear Lake. It will greatly facilitate BBMWD's on-going efforts to improve water quality and protect beneficial uses in the lake. We believe the proposed general permit will be considerably more effective if many of the CEQA demonstrations are integrated into the general permit at the time it is adopted. That is why we believe it is essential that the proposed Implementation Plan identify the specific compliance strategies envisioned, do the requisite environmental review, and make the findings necessary to support rapid execution of various mitigation and remediation projects.

8.0 Comments Related to Economic Considerations

8.1) The analysis of economic impacts is incomplete because the Implementation Plan is just a vague outline of potential options. The economic costs cannot be evaluated until the specific implementation requirements are identified. Under the California Supreme Court's recent Burbank decision, the Regional Board must do that at the time the TMDL is adopted because economics need not be considered at the time permit limits are enacted.

8.2) Much of the economic analysis is presented in unit costs (e.g. cost per sample or cost per acre). That is not adequate to evaluate the cumulate effect. How many samples, in how many locations, over what period of time and for what chemical parameters must be analyzed? Table 11-2 on page 97 of the Technical Report indicates that dredging two feet of sediment from a single acre may cost between $15,000 and $50,000. This does not include the cost to haul the material to a suitable disposal site which will add $75-$100/ton.

It is not evident from the unit cost data what the total probable cost will be to attain and maintain compliance with the proposed targets. For example, dredging just 200,000 cubic yards of sediment out of the east end cost $5-6 million. The total cost was manageable because the sediment was used to cap a local landfill just a few miles away. Without a nearby disposal option, such a project would have been beyond the means of the local sponsors. Finally, no costs shown for alternative methods of increasing the richness and abundance of aquatic organisms (such as supplemental fish stocking.

8.3) The City of Big Bear Lake and surrounding area has fewer than 15,000 full time residents. The median household income is less than $30,000 year and the entire valley is classified as a Disadvantaged Economic Community by the state of California. The combined budget of the BBMWD and the City is only about $12 million/year. Even if 100% of both budgets were earmarked to meet the TMDL targets, there would not be sufficient resources to reduce internal loads by 80% if dredging were the only legal alternative. And, it is very difficult to pass the cost-of-compliance on to the several million people who visit Bear Valley each year. The economic analysis must include a more realistic assessment of total cost, the means by which it will be paid, and the socioeconomic impact on this relatively poor rural community.

8.4) The tabular summary of expenditures to improve water quality in Big Bear Lake creates a false impression that state grants are the only significant investment occurring. On the contrary, state grant funds represent a very small percentage of the total costs borne by local stakeholders to protect the lake. Many millions of dollars are budgeted each and every year to maintain and protect the lake. For example, state grant funds paid less than one-third of the cost of the east end pilot dredging project, less than half of the Sonar application cost and less than half of the lake-wide alum application project. In addition, the U.S. Army Corps of Engineers has spent more than $1 million conducting a comprehensive investigation of Big Bear Lake and will spend nearly $3 million more before their study is complete. Their purpose is to identify and design specific project to restore the aquatic ecosystem of Big Bear Lake to its full potential.

Members of the TMDL Task Force are extremely grateful for the grant assistance provided by the Regional and State Water Boards. However, we believe it is very important to document the full scope of investments made by all stakeholders (local, state, federal, public and private) so that it is clear that no one is attempting to avoid their rightful responsibilities to the lake and surrounding watershed. BBMWD will prepare and submit a financial summary of the previous expenditures under separate cover.

8.5) While some of the initial costs of implementing an in-lake monitoring program and watershed-wide nutrient monitoring program are covered by state grant funds, it is unclear how long these programs will continue. State grants will expire in just two years. Beyond that, the Technical report indicates that costs will be borne by the responsible parties. That effort may absorb much of the local budgets that are presently earmarked to do actual lake improvement projects. Therefore, we beseech the Board to consider carefully the value of each and every monitoring mandate or study requirement. We must be careful that scarce resources are not diverted from worthwhile remediation and mitigation projects toward less productive efforts.

8.6) If the targets are set to a level that necessitates reducing nutrient loads below natural background concentrations, then the TMDL is imposing requirements more stringent than necessary to comply with federal regulations. We recognize that the Regional Board has authority to do so, however, the California Supreme Court recently ruled that a new economic analysis may be required in such instances. There is no evidence in the record to suggest that the economic consequences of reducing ambient background concentrations was contemplated or considered at the time the narrative or numeric objectives were previously adopted in the Basin Plan.

8.7) Finally, some of the projects that may be required to meet the proposed targets (esp. dredging) may seriously undermine the aesthetic appeal of the lake. Given the length of time required to complete such large-scale remediation efforts, these projects may significantly reduce tourism to the area and undermine the financial health of the local economy. It is very important that the Implementation Plan be more detailed so that the economic costs of compliance can be assessed and the indirect economic consequences of mitigation and remediation can be evaluated.

9.0 Comments Related to CEQA

9.1) Although the Basin Planning process has been deemed "functionally equivalent" to the preparation of an Environmental Impact Report, that is true only if each of the relevant CEQA elements is adequately addressed during the workshops and hearings. In this instance, CEQA would likely require a programmatic EIR:

> *"Where individual projects are, or a phased project is, to be undertaken and where the total undertaking comprises a project with significant environmental effect, the lead agency shall prepare a single program EIR..." (CEQA Guidelines §15165)*

The draft Technical Report incorrectly asserts that full CEQA review can be deferred until specific mitigation projects are proposed at some future date. Once again, the California Supreme Court has advised otherwise:

> *"...an EIR must include an analysis of the environmental effects of future expansion or other action if: (1) it is a reasonably foreseeable consequence of the initial project and (2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its environmental effects."*[5]

This is also consistent with the guidance previously provided by the SWRCB's General Counsel (refer to excerpt cited on page 10 of this comment letter). Therefore, to comply with CEQA, the TMDL must identify and thoroughly evaluate the potential environmental consequences of all reasonably foreseeable implementation strategies that would likely be used to achieve compliance with the proposed targets. The current Technical Report merely lists the various compliance options while providing no detailed environmental analysis.

9.2) The draft Technical Report does not identify or discuss all of the reasonable alternatives to the proposed project.[6] Reasonable alternatives must be considered "even if these alternatives would impede to some degree attainment of the proposed objectives."[7] Some of the reasonable alternatives not mentioned in the draft Technical Report include: setting nutrient targets equal to the ambient natural background loads, improving richness and abundance by increased stocking, alternatives to the proposed TSI, subcategorizing the beneficial uses to recognize natural limitations, and/or conducting a Use Attainability Analysis. Reasonable alternatives may also include using biocriteria rather than nitrogen and phosphorous targets to regulate nutrient levels in the lake or using Beneficial Use Maps to zone the lake to protect some uses in one place and other, competing uses, in other places.

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[5] Laurel Heights Improvement Association v. U. of California, 47 Cal.3d, 376, 396 (1988)
[6] Wildlife Alive v. Chickering, 18 Cal. 3d 190, 197 (1976) reaffirmed in Laurel Heights @ 400.
[7] CEQA Guidelines §15126(d)(3)

The draft Technical report asserts that other alternatives need not be considered because the proposed targets provide the best assurance that the narrative water quality objective for algal growth will be achieved and that beneficial uses will be protected. Even if true, CEQA requires more. It requires an analysis of other alternatives that are not necessarily "best" at achieving the lead agency's primary objectives.

9.3) The CEQA Checklist is inaccurate. It appears the draft checklist was prepared after considering only the immediate and direct impacts of amending the Basin Plan to include text related to the proposed TMDL. The checklist does not appear to have taken into consideration any of the reasonably foreseeable follow-on activities that will become legally-binding obligations once the TMDL is adopted despite acknowledging that:

> *"The Basin Plan amendment includes an implementation plan that details the actions required by the Regional Board and other responsible parties for implementing the TMDLs."*[8]

For example, the draft checklist states that the proposed action would not violate any water quality standards.[9] However, the Implementation Plan indicated that additional alum treatments may be necessary to meet the recommended targets. As noted earlier, data collected during the previous alum application program indicates that similar remediation programs in the future would likely violate the current water quality objective for aluminum in the Basin Plan. Therefore, the claim of "No Impact" does not accurately represent the reasonably foreseeable consequences of adopting the proposed Basin Plan amendment. There are several other places throughout the checklist that should be revised to reflect that potentially significant impacts will occur and that mitigation will be necessary.

10.0 One final concern...

The draft Technical Report repeatedly refers to some stakeholders as "Responsible Parties." In context, this term appears to identify the specific agencies and organizations that the Regional Board believes have a legal obligation to implement the TMDL and assure that the numeric targets are achieved. We recommend against using this particular phrase. The Clean Water Act and the Porter-Cologne Act provide the Regional Board authority to regulate "waste discharges" and, "waste dischargers." Therefore, phrase "Responsible Party" comes from CERCLA (Superfund) legislation and has a much broader meaning than does the term "waste discharger." Historically, neither the Clean Water Act nor the Porter-Cologne Act has interpreted naturally-occurring pollutants as "waste discharges" even where those substances may be impairing or limiting beneficial use attainment. The phrase "Responsible Party" is useful when discussing a groundwater plume but it merely confuses the issue when applied to natural conditions.

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[8] See item #I-8 on pg. 1 of Attachment B: Environmental Checklist
[9] See item #VIII-a on pg. 6 of Attachment B: Environmental Checklist

United States Department of Agriculture
Forest Service
San Bernardino National Forest
Supervisor's Office
1824 S Commercenter Circle
San Bernardino, CA 92408-3430
Phone: 909-382-2600
Fax: 909-383-5770
TTD: 909-383-5616

File Code: 2500/2520
Date: August 31, 2005

Heather Boyd
Environmental Scientist
Santa Ana Regional Water Quality Board
3737 Main Street, Suite 500
Riverside , CA 92501-3348

CRWQCB - REGION 8
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Ms. Boyd,

Thank you for allowing the San Bernardino National Forest the opportunity to review the "Staff Report on the Nutrient Total Maximum Daily Loads for Big Bear Lake" and the "Staff Report on the Sediment Total Maximum Daily Loads for Big Bear Lake and Rathbun Creek." We look forward to working with you during the evaluation of these comments, providing any clarification you would need. We would appreciate a full and complete review of the provided comments. Though some comments are specific to the sediment TMDL, which was 'pulled' from consideration on August 26, 2005, we would still appreciate replies in that some of the information from the sediment TMDLs is likely to be incorporated into the nutrient TMDL. Please contact Robert Taylor, Forest Hydrologist, 909-382-2660, with any concerns.

Sincerely,

for GENE ZIMMERMAN
Forest Supervisor

cc: Jon Regelbrugge, Douglas Pumphrey

"N" refers to "Nutrient" for comment references.

N01 **Section 2.0, Page 27, ¶ 2**: The TMDL does not refute the Leidy (2003) report stating that the reservoir is naturally eutrophic. Therefore, use of the arbitrary TSI value of 47 is not justified [see comment regarding TSI, Attachment C].

N02 **Section 2.0, Page 29, ¶ 2:** Has the amount of phosphorous sorbed to sediment loading considered background been taken into account such that phosphorous sorbed to background sediment is considered background phosphorous and is not included in the amount of phosphorous for possible reduction? Numerous publications have defined the natural background levels of phosphorous expected from a forested ecosystem [see below]. These levels of phosphorous should be defined as background and only the increment above these levels should be considered for reduction.

- Binkley, D., Ice, G., Kaye, J., and C. Williams. 2004. Nitrogen and Phosphorus Concentrations in Forest Streams of the United States. Journal of the American Water Resources Association (JAWRA) 40(5) 1277-1291. & Binkley, D. 2001. Patterns and Processes of Variation in Nitrogen and Phosphorous Concentrations in Forested Streams. National Council for Air and Stream Improvement. Technical Bulletin No. 836.
  - Survey of 300 streams in watersheds of 1 to 2500 acres
  - West: NO_3 comprises 30% of western nitrogen source; dissolved organic N is 60%
  - 90 Western forest streams (N as NO_3^-): mean 0.20 mg N/L, median 0.03 mg N/L
  - 6 Western forest streams (N as DON): mean 0.44 mg N/L, median 0.50 mg N/L
  - P and NO_3 concentrations in streams draining hardwood forests exceeded those for streams draining coniferous forests in each region by 2 to 3 times, but DON in conifers exceeds hardwood by 3 to 8 times
  - 47 Western forest streams: Inorganic P: mean 8 ug P/L, median 3 ug P/L
  - In 43 harvesting experiments, unlogged 0.21 mg N/L versus 0.44 mg N/L for 3 to 5 years following logging – not statistically significant with ANOVA, also phosphate does not increase statistically.
  - Williams and Melack (1997) found significant increases in stream water NO_3 concentrations following prescribed fires in mixed conifer forests of the Sierra Nevada in California.
    (1) N increased 5-10 times in first 2 years following fire, returned to background in 4th year
    (2) Similar results reported in Schindler et al. (1980) & Spencer (1998)
  - Wright (1976) & Tiedemann et al. (1978) studied inorganic P following wildfire, seeing increases of 3 times above background
- Thomas Meixner, Mark E. Fenn, Peter M. Wohlgemuth; Fire Disturbance and Nitrogen Deposition Impacts at the Watershed Scale in Southern California
  - San Dimas Experimental Forest (SDEF): atmospheric deposition (~35 kg ha-1 year-1), precipitation, prescribed fire effects from 1984
  - Export as well as VWM concentrations increase dramatically in wet years and are orders of magnitude lower in dry years. This inter-annual variability in export that is dependant on precipitation as well as antecedent conditions indicates that there is a hydrologic control on nutrient export from chaparral catchments.

- Kent, R. and Belitz, K. 2004. Concentrations of Dissolved Solids and Nutrients in Water Sources and Selected Streams of the Santa Ana Basin, California, October 1998–September 2001. USGS Water-Resources Investigations Report 03-4326.
  - Reference streams in Santa Ana Basin, including the South Fork of the Santa Ana River, draining into Bear Creek, were established. Reference condition for mountain sites established as 0.02 mg/L total phosphorous. This study, conducted by the U.S. Geological Survey as part of their National Water-Quality Assessment program, included monitoring at sites receiving wastewater, urban runoff and groundwater discharge, and runoff from the San Bernardino and San Gabriel mountains. The mountain sites receive much of their runoff from USFS lands that are managed according to the same practices as those in the San Jacinto Basin (e.g., USFS Best Management Practices). Phosphorus concentrations at these sites were very low. They rarely exceeded the U.S. EPA's reference criterion of 0.03 mg/l and their general goal level of 0.1 mg/l. In contrast, many downstream sites had concentrations that were orders of magnitude higher and that generally exceeded EPA's guidelines.
- The USFS review of published nutrient export rates from forested environments throughout the U.S identified several high quality sources of data, including the most comprehensive syntheses ever published on the topic (Binkley et al. 2004 and NCASI 2001). This information was used to compare current nitrogen and phosphorus export rates from forest and open space areas in the Big Bear watershed to median and average export rates from forests throughout the U.S., forests in the western U.S., and forests in Southern California. Comparisons were also made to the Environmental Protection Agency's (EPA 2002) proposed nutrient criteria for western forested mountains
- Based on these comparisons and the fact that changes in land use (from forest to agriculture or urban use) appear necessary to substantially increase nutrient concentrations in higher order streams (Binkley et al. 2004), the USFS believes that NFS lands in the watershed are functioning relatively naturally with respect to nutrient export. We believe that our scarce resources should be utilized to address demonstrated water quality problems and threats to water quality, such as catastrophic wildfire.

N03 **Section 2.0, Page 30, ¶ 1; Tables 2-1, 2-2, and 2-3**: The statistical analysis performed was incorrect relative to non-detects. Using ½ the detection limit is only applicable for certain distributions of data and then only when the number of non-detects is on the order of 15-25% of the population. The analysis should be redone given the information and references below. If insufficient data is available to draw conclusions, then the tables should not list results or should have results footnoted to show that data issues make conclusions questionable.

- "Nondetects and Data Analysis", Helsel, 2004. (http://www.practicalstats.com/nada/) explains the statistical methods needed when multiple detection limits are encountered as well as when greater than 25% of the data set are non-detects.
- For Table 2-1, 13/18 samples were non-detect. The resulting average and median values provided are not statistically defensible given current scientific understanding.
- Table 2-2 shows that only 4 samples were taken. This is an insufficient dataset from which to draw conclusions.
  - The U.S. Environmental Protection Agency (EPA 1992) asserts that there must be 8 to 10 independent samples before one can generate a passable estimate of the

population standard deviation for populations having normal or lognormal (parametric) distributions. In situations where a seasonal trend is present within the data set, the Seasonal Kendall Test requires a minimum of three years of monthly data or 36 data points (Gilbert, 1987, p.225). Harris et al. (1987) state that one is unlikely to be able to quantify serial correlation (independence) in quarterly ground water data without at least 10 years of quarterly data, or 40 data points. When there are fewer then 12 identifiable seasons, such as with quarterly data, the Kruskall-Wallis Test can be used as long as there are at least three years of data taken in the same months or 12 data points.

- Table 2-3 shows 135/144 non-detects of Total P data. Using ½ the detection limit is an incorrect method. The resulting average and median values provided are not statistically defensible given current scientific understanding.

N04 **Algae, Page 40, ¶ 2**: In regards to the "personal observation," was the person making the observation trained and/or have the documented expertise to make an accurate observation? Also, the sentence references "accounts" plural, yet the parenthetical notes "personal observation" singular. Please clarify.

N05 **Page 41, Table 2-7:** See previous statistical comment (N03) related to percent non-detect and number of samples required to make a statistical conclusion that will meet the assumptions inherent in data analysis. Specifically, years 1993 (2 samples), 1994 (4 samples), and possibly 1998 (8 samples) may have insufficient populations for conclusions to be drawn.

N06 **Pages 44-45, Figures 2-4 and 2-5:** Please provide the statistical tests showing a significant difference between these two data sets as discussed in the preceding ¶ ("experiences less pronounced dissolved oxygen stratification").

N07 Pages 47-51, Sections 3.1 and 3.1.1, Table 3-1

- 1) The targets, as presented, appear to apply at all times, not just in dry years. Given that the target of 35 ug/L was determined from an estimate at the 25th percentile of dry year data, setting of this as the long range target is irresponsible. What if the next five years are not dry? These numeric targets should be proposed as "dry year" targets (and the title of Table 3-1 changed appropriately) with a note that every 3 years, the data will be re-assessed and new targets based on the 25th percentile of the data will be quantified.
- 2) The approach that results in the final target of 20 ug/L ("a trophic index system was used to derive the final numeric targets" [Page 49, ¶2] is not based on the data, but rather an assessment of the Carlson Trophic State Index, which was derived by studying small lakes in Minnesota. The explanation in Appendix C is incomplete in its explanation. The use of the Carlson Trophic State Index as applicable to a reservoir that is not contained within the dataset used to derive the index is an unproven assumption. The information provided below should be assessed or added to Appendix C and further justification of the use of the Carlson Trophic State Index for this situation should be assessed.
- **3) Section 3.1.1, Page 50, Numeric Targets, ¶ 2:** The statement is made that a Carlson TSI of 47 is "on the high end of the mesotrophic level." The table below indicates that the mesotrophic TSI range for small Minnesota lakes is 40 to 60. The SBNF would like the

report to contain language indicating that the Carlson TSI was derived using data of small Minnesota lakes, which may or may not be applicable to Big Bear Lake. In addition, the comment related to the "high end" should be removed.

- 4) Ke-Sheng Cheng and Tsu-Chiang Lei, 2000, Reservoir Trophic State Evaluation using Landsat TM Data; Agricultural Engineering Department / Hydrotech Research Institute, National Taiwan University, Taipei, TAIWAN
  http://www.gisdevelopment.net/aars/acrs/2000/ts2/water0006pf.htm
  Ranges of Chla, TP, and SDD measurements in Taiwan's reservoirs are generally much larger than that of Minnesota's lakes which original TSI model was developed. In addition, using the Carlson method, these researchers determined separate equations.

Carlson's equations for Minnesota lakes.

$$TSI(SDD) = 10(6 - \frac{\ln SDD}{\ln 2}). \quad (1)$$

$$TSI(Chla) = 10(6 - \frac{2.04 - 0.68 \ln Chla}{\ln 2}), \quad (2)$$

$$TSI(TP) = 10(6 - \frac{\ln(48/TP)}{\ln 2}). \quad (3)$$

the following modified TSI model was developed for Te-Chi reservoir:

$$TSI(SDD) = 10\left(8.605 - \frac{\ln(SDD)}{\ln(1.544)}\right) \quad (4)$$

$$TSI(Chla) = 10\left(8.605 - \frac{1.8571 - 0.3264\ln(Chla)}{\ln(1.544)}\right) \quad (5)$$

$$TSI(TP) = 10\left(8.605 - \frac{2.1775 - 0.4230\ln(TP)}{\ln(1.544)}\right) \quad (6)$$

$$\overline{TSI} = (TSI(SDD) + TSI(Chla) + TSI(TP))/3 \quad (7)$$

TSI cutoff values for Taiwanese reservoirs are 0:52 for oligotrophic, 53:60 for mesotrophic, 61:65 for meso-eutrophic, 66:77 for eutrophic, and 78:100 for hypereutrophic.

Comparison of Trophic State Index to Water Quality Parameters and Lake Productivity

Trophic State	TSI	Secchi Disk (m)	Total Phosphorus (µg/L)	Chlorophyll a (µg/L)
Oligotrophic	0	64	0.75	0.04
	10	32	1.50	0.12
	20	16	3	0.34
	30	8	6	0.94
Mesotrophic	40	4	12	2.60

	50	2	24	6.40
Eutrophic	60	1	48	20
	70	0.500	96	56
	80	0.250	192	154
	90	0.120	38	427
	100	0.062	768	1,183

(NOTE: The original source of this table is Carlson, R.E. , 1997. A Tropic State Index for Lakes. *Limnology and Oceanography*, 22:361-369.)

- 5) Report for 2001CO1761B: Applicability of Trophic Status Indicators to Colorado Plains Reservoirs; http://water.usgs.gov/wrri/01grants/prog-compl-reports/2001CO1761B.pdf Although the Carlson TSI offers the advantage of retaining information about the system, there are several reasons why it may not be appropriate for the reservoirs of Colorado
- 6) EPA-822-B00-001 http://www.epa.gov/waterscience/criteria/nutrient/guidance/lakes/chapter2.pdf Probably the most sophisticated of the multivariate indices is that of Brezonik and Shannon (1971), which uses principal components analysis to derive a trophic state index (TSI) based on seven variables: (1) TP, (2) primary production, (3) inverse of Secchi depth, (4) total organic nitrogen, (5) chlorophyll *a*, (6) specific conductance, and (7) the inverse Pearsall cation ratio ([Ca]+[Mg]/[Na]+[K]). Other less sophisticated indices generally combine unweighted variables by one means or another. The EPA Index (U.S. EPA, 1974) ranked lakes based on "the percentage of the 200+ lakes exceeding Lake X in that parameter"; the index was "simply the sum of the percentile ranks for each of the parameters used." The variables used were TP, dissolved phosphorus, inorganic nitrogen, Secchi depth (500-Value [inches]), chlorophyll *a*, and minimum dissolved oxygen (15-DOmin).
  - 7) Summary Comment: The study of the Taiwan reservoir produced TSI equations that were different then the Carlson TSI equations developed for small lakes in Minnesota. Likewise, the TSI values defining oligotrophic, mesotrophic, and eutrophic conditions vary as well. The report regarding Colorado Plains reservoirs also indicates limitations of relying on the Carlson TSI when looking at water bodies different from the small Minnesota lakes of the original data set. Even EPA's Nutrient Criteria for Lakes and Reservoirs (EPA-822-B00-001) indicates that there are multiple indices that can be used given the data set and the type of water body being measured. These differences indicate that using Carlson's TSI equations for a setting away from small Minnesota lakes is fallible.
- **8) Section 3.1, Page 49, ¶ 2:** The "third approach" sited and the last sentence of the paragraph starting "Specifically" does not fully describe the method as presented in EPA-822-B00-001. The final sentence should more fully describe the method, "There are two approaches: (1) using the morphoedaphic index method (MEI) and (2) extrapolating natural background nutrient loading that would occur under undisturbed conditions followed by estimation of nutrient concentrations and trophic state with a mass balance model."

- **9) Section 3.1, Page 49, ¶ 2:** Was the "third approach" used by EPA to determine a value of 20 ug/L, as referenced on Page 50, Section 3.1.1, ¶ 2? If so, this should be documented. If not, then the documentation of the method used should add that the final target did not use the third approach as stated.
  - SBNF Suggestion: Therefore, the SBNF suggests that the current final target for total phosphorous in dry years be set using the lower 25th percentile of the data, listed as 31 ug/L, instead of 20 ug/L. Please reference comment **N34**, which discusses the statistical analysis that was used to determine the value of 31 ug/L.
- **10) Section 3.1, Page 48, last sentence before Figure 3-1**: Setting dates to meet final targets is premature given that erosion of sediment and associated nutrient loading will be increasing in the short term to return the forest to a more natural fuel loading condition. In addition, if the next few years continue to be wet, targets based on dry year data are unlikely to be correct or achievable.
- **11) Section 3.1, Page 49, ¶ 2**: The 25th percentile calculates to 31 ug/L, not 35 ug/L. The report should note the difference here, not just in footnote 27.
- **12) Page 50, Table 3-2**: This Table has no use in the report. This method is not used, and the data in the table was derived with no data from Southern California Mountains subecoregion. The Table might make it seem to some that a target of 20 ug/L is reasonable since it is more than twice the value in Table 3-2. Since the data set is not appropriate for Big Bear Lake, the implication raised by the table shouldn't occur. Please remove this table.
- **13) Section 3.1.1, Page 50, ¶ 2**: A statement is made that "EPA considers the dividing point between mesotrophic and eutrophic conditions" is 20 ug/L, yet the reference is a textbook, not an EPA document. Please provide the reference to the appropriate EPA document.

N08 **Section 4.0, Page 53, ¶ 2 and Section 6.0, Page 84, ¶ 5**: The effect of channelization and the loss of floodplain deposition should be more fully addressed. Sediment originating from the forest that in the pre-anthropogenic setting would have been deposited on the floodplain, now more likely reaches Big Bear Lake. Is this increase is sediment to the Lake assigned to the agency responsible for altering the stream channel? To state that the urban contribution is entirely encompassed by a waste load allocation (as in Table 6-1 and 6-2) discounts the increased contribution to the lake from the lack of floodplain deposition. This source of increased loading should be quantified or modeled and a portion of the load allocation should be transferred to the responsibility of the urban stakeholders.

N09 **Section 4.0, Page 53, ¶ 5:** A more thorough analysis of Plunge Creek needs to be added to show that it is adequate as a model for the hydrology of the Big Bear Lake watershed.

N10 **Section 4.0, Page 54, ¶ 2**: As stated in comment N03, variable detection limits and non-detects can still be evaluated for useful information. A more thorough statistical analysis should be conducted before stating that "phosphorous detection limits were too high."

N11 **Section 4.0, Page 54, ¶ 2**: The ***bold, italic*** statement needs to be reiterated on page 47 in conjunction with Table 3-1. This statement gives further justification for making the targets dry year targets only.

N12 **Section 4.0, Page 54, footnote 30:** Please clarify. Was the inability to use the WASP model for the entire data range due to a problem with the format of the output given to the RWQCB? If so, the stakeholders should not be penalized (forced to meet targets based on inadequate data) because the RWQCB had difficulty with the contractors. Why didn't the RWQCB get the output required from the HSPF model for the WASP model before setting targets?

N13 **Section 4.0, Page 55, ¶ 1**: In making the determination between low and high water holding capacity, who made the determination and how was it made? Was the practitioner a trained soil scientist? What soils dataset was used? As the soil survey gives descriptions of water holding capacity beyond high and low (e.g. DaF is very low), how were the varying groups placed in the two categories?

N14 **Section 4.0, Page 55, ¶ 3 and Section 6.0, Page 85, Tables 6-1 and 6-2**: Was an assessment made as to whether the flow data fit a normal distribution, a lognormal distribution, or a nonparametric distribution? The type of distribution has implications on the analysis performed, the amount of data needed to adequately address the distribution, and the setting of averages. There is also the implication that the high flow years will deposit the most nutrients in the lake. If the final targets are "specified as an annual average", then the RWQCB is possibly setting up the stakeholders for failure since high flow years are the hardest to control movement of sediment and nutrients.

N15 **Section 4.0, Page 55, Figures 4-3 and 4-4**: The targets are based on dry years, but these Figures show the high variability associated with nutrient loading. The real variability must be taken into account when setting the targets. In addition, as the phosphorus has been associated with "granitic sand" the final targets must take into account that a large percentage of the phosphorus is associated with background erosion. This natural background phosphorus should be classified appropriately, and a calculation of the internal load associated with this natural background should be identified in Table 4-2 (Page 60) and Tables 6-1 and 6-2 (Page 85). The SBNF should not be held liable for the phosphorus that would naturally erode with the background sediment.

N16 **Section 4.0, Page 58, ¶ 2; Section 4.0, Page 59, ¶ 1; Section 4.3, Page 62, ¶ 2**: The statements that "runoff from forest areas contributed 10% of the total nitrogen load and 26% of the total phosphorus load" and "the most significant contributions from forest land use" need to be clarified. The percentage of each nutrient associated with natural background erosion needs to be quantified and listed. Loading beyond natural background could then be better established for the various stakeholders.

N17 **Section 4.3, Page 62, ¶1 & Section 2.0, Page 27, ¶ 1**: The statement is made (Section 2.0, page 27) that "lakes naturally take thousands of years to progress from an oligotrophic condition ... to an eutrophic condition." The valley had thousands of years to build up sediment and nutrients prior to the arrival of humans and the building of the dam. Has the RWQCB taken into account that the lake bottom sediments deposited before the Forest Service was created are not the responsibility of the Forest Service? Also, has the RWQCB

determined what chance there is that the oligotrophic condition could ever be approached given the hundreds of feet of sediments that are naturally occurring in this watershed?

N18 **Section 4.5, Page 67, ¶ 3**: It is inaccurate to state, "phosphorus loading to Big Bear Lake during a wet year" without adding a reference to 1993. Without the year reference, the implication is that the statement and the associated loading will be accurate for all wet years.

N19 **Pages 69-70, Figures 4-6 and 4-7**: The labels next to the pie charts should encompass the years used in case, in the future, the charts are ever looked at without the accompanying figure text.

N20 **Section 5.1, Page 72, carryover ¶ and Section 5.1b, Page 76, carryover ¶**: An acknowledgement should be made that the load targets may not be possible to meet. The RWQCB only states that compliance is not achieved because of "model limitation" "incomplete understanding" and "model deficiency." The possibility exists that the targets cannot be met given the natural condition of the lake bottom and watershed (see N17).

N21 **Section 5.1a, Page 72, ¶ 1:** The final sentence of this paragraph defining what dry conditions are should be copied/reiterated near Table 3.1 in conjunction with the statements that the targets were derived for dry years only.

N22 **Section 5.1a, Page 72, ¶ 1:** The second sentence needs to acknowledge that the "external nutrient loads are greatest" post-fire and that fire is a natural background condition for this watershed.

N23 **Section 5.1b, Page 76, carryover ¶**: The "extended compliance schedule" of 10 years is likely inadequate. Three to four years will likely be spent collecting sufficient data to calibrate the model. If reductions are required, then it will take, at a minimum, an additional three years to begin to calculate if a downward trend exists. Given the variability of results for different hydrologic years, it is unlikely that 10 years will be adequate to meet a final target.

N24 **Section 5.1d, Page 77, ¶ 2 & 3:** The report should note that the studies performed by Welch and Cook (1995) and Welch and Jacoby (2001) were for shallow lakes and western Washington lakes, respectively. The applicability of these studies to Big Bear Reservoir has not been shown, and this possible lack of applicability should be acknowledged. In addition, the RWQCB should address what the environmental consequences of alum application are relative to any water quality objectives for aluminum.

N25 **Conclusions, Page 79, ¶ 3:** Has the RWQCB made a determination of how an 80% reduction in phosphate sediment flux is to be achieved given the natural condition of the watershed (e.g. several hundred feet of sediment forming the lake bottom) [see N17]?

N26 **Page 80, Table 5-1**: Based on our comments in N07, if the final target is set to 31 ug/L instead of 20 ug/L, then it seems possible that a scenario could be found to simulate a successful target acquisition.

N27 **Page 83 & 85, Tables 5-2, 5-3, 6-1 and 6-2**: As each of these tables specifically reference that these nutrient TMDLs are associated with dry conditions, then Table 3-1 (page 47) should also explicitely be for dry conditions (see comment N07, 1).

N28 **Section 6.0, Page 84, ¶ 3**: The final sentence implies that the stakeholders are being required to fulfill the role of the RWQCB, "to calibrate the model and develop TMDLs/allocations that address all hydrological conditions." It appears inappropriate for the stakeholders to regulate themselves. This sentence also does not deal with the idea of whether multiple targets are appropriate for the Big Bear reservoir.

N29 **Section 6.0, Pages 84-85, ¶ 3 & formulae**: a) As noted in N08, the urban stakeholders are partially responsible for the load allocations from the upper watershed because floodplain deposition has been reduced by channelization and loss of floodplain due to making the surface impervious. An acknowledgement is needed here relative to this fact. The formula for $\sum$LA needs to be amended to include a portion associated with urban. b) The TMDL formula should also include an assessment of the nutrient load associated with natural background erosion.

N30 **Section 7.0, Page 87, ¶ 1**: The third sentence should be amended to indicate that the greatest loading of nutrients will occur following a significant wildfire.

N31 **Appendix A, Page A2, Table A-1**: Having 2 and 3 samples is insufficient to provide any statistical confidence in averages. In addition, the median has no meaning with only 2 samples. Also, the method for calculating an average value from 3 values when 1 is a non-detect is not stated. (see N03)

N32 **Appendix A, Page A11, Figures A-3 and A-4**: The title of this figure "percentage of average" does not match the y-axis. Either the title or the y-axis needs to be changed.

N33 **Appendix A, Page A12, Table A-8**: The record of data is insufficient to make the claim that 1999-2003 was an "extreme" dry event.

N34 **Appendix B, Pages B5-B6**: Was an assessment made to statistically show that photic and bottom data came from the same population distribution and also to show whether these two data sets could be combined? To determine the appropriate statistical tests to perform, each of the two separate data sets should be individually checked for normality and lognormality. The Shapiro-Wilk Test for Normality is appropriate for this testing. If the data is normal or lognormal, then the data sets can be compared using the t-test for the mean and the F-test for the standard deviation. If the data is shown to be lognormal, then the mean and standard deviation for each data set must be computed appropriately before applying the t-test and the F-test. If the data sets are shown to be nonparametric, then the Levene test can check for statistical homogeneity of variance and the Kruskal-Wallis test can be used to check the statistical similarity of the median values. Only after these assessments are made can conclusions be drawn regarded the entire data set. Please provide the data for the photic and

bottom as separate data sets and perform this more complete statistical analysis. This analysis provides the basis for the 31 ug/L value presented in the report.

N35 **Attachment A, Page 1 of 17, Big Bear Lake, ¶ 1:** Groundwater is another contributor to the lake through base flow. This source of water should be added.

N36 **Attachment A, Page 4 of 17, Table 5-9a-c**: Please make this table coincide with information and comments related to Table 3-1. Footnote c indicates a 5-year running average, but the staff report speaks of annual averages.

N37 **Attachment A, Page 6 of 17, 1.C. 1., Editorial:** The third word should be "of" not "f".

N38 **Attachment A, Page 6 of 17, 1.D.:** An acknowledgment is needed that a post-wildfire condition would be the worst critical condition for this watershed relative to loading.

Implementation Plan/Monitoring Program – legal issues

The Organic Administration Act authorizes the Secretary of Agriculture to manage National Forest System (NFS) Lands (16 U.S.C. §§ 473-475, 477-482, and 551). Originally, this authority was given to the Secretary of the Interior. In 1905, Congress transferred administrative authority over the management of surface use of forest reserves from the Secretary of the Interior to the Secretary of Agriculture pursuant to the Transfer Act of 1905, 16 U.S.C. § 472. Moreover, funds can only be expended for the purpose for which they have been appropriated (16 U.S.C. §§ 1301). Thus, the Forest Service only has jurisdiction, custody, and control to administer or to conduct activities on NFS lands (16 U.S.C. § 551). The Forest Service is typically only allowed to allocate funding to activities on NFS lands. In some limited circumstances, monies can be expended on private lands, but only when the project benefits NFS lands or resources (e.g., Widen Amendment, 16 U.S.C. § 1011(a) and P.L. 105-227 § 323).

Participation in developing a coordinated monitoring plan, as well as certain of the required elements of that coordinated monitoring plan, may require the Forest Service either to conduct activities off NFS with this task as part of a coordinated group may be problematic. The Forest Service could participate in a coordinated effort only within the legal constraints described above. The Forest Service could not be compelled either to undertake activities on private lands where it lacks authority to act or to spend funds it is not authorized to spend.

Monitoring to demonstrate compliance with TMDLs, including developing and providing data necessary to review and update the TMDLs is a requirement for states, not a person, under the CWA (33 U.S.C. § 1313(d)(1)(C)). As a basis for these additional monitoring requirements, the Regional Board appears to be relying upon Cal. Water Code § 13267, which provides authority for the Regional Board to either investigate, or require the investigation of, the quality of any waters of the state within its region and "any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region...or outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires." Cal. Water Code §13267(b)(1). In requiring the report, the Regional Board shall provide the person with a written explanation with regard to the need for the reports and identify

the evidence that supports requiring that person to provide the reports. Cal. Water Code § 13267(b)(1).

Investigation of water quality is the state's responsibility under the CWA. 33 U.S.C. §1313(d)(1)(C)(each state shall establish for [impaired waters]...the total maximum daily load). The requirements in the CWA for a person are directed to the control and abatement of water pollution through control and abatement of point source discharges and nonpoint source releases. Investigation is not the control and abatement of water pollution. Investigation falls outside the scope of the waiver of sovereign immunity, and the Forest Service could not be compelled to comply with investigation tasks.

In addition, investigation tasks conflict with the CWA and other provisions of federal laws relating to the limitations of Forest Service jurisdiction and ability to expend funds. To the extent that California law is inconsistent, the principles of preemption support the conclusion that the Forest Service could not be compelled to comply with these tasks. If a state statute conflicts with, or frustrates, federal law, the former must give way. See, CSX Transp., Inc. v. Easterwood, 507 U.S. 658, 663 (1993).

N39 **Attachment A, Page 8 of 17, Table 5-9a-f:** Given the complexities in the watershed as well as the annual budgetary process and limited funding (see comment S07), the SBNF feels that the time frames listed in Attachment A, Table 5-9a-f are overly optimistic and do not take into account the timing of BPA approval nor the time available for Forest Service staff and approval process.

- As stated in S20, Task 1 should have a minimum time frame of 1 year.
- Task 4: The plan would require the input of multiple technical specialists as well as review by decision makers, and possibly public input. The RWQCB should take into account that all proposed actions by the Forest Service are required to assess NEPA requirements, which includes public comment, adding time to any planning period. Scheduling and budgeting for these tasks is also dependant on when the BPA is approved. As the Forest Service conducts the planning for the following fiscal year in July and August, the compliance date for this task should be set relative to when the BPA is approved, but not less than 1 year following approval. The economics associated with collected data for five storms per year and eight samples per storm should be evaluated relative to the watershed budgetary comments made in S07, reiterated here.
  - Though the SBNF lands comprise ~65% of the watershed, the watershed in question comprises only 2% of SBNF land. Given that our 2005 planning budget for all SBNF watershed management activities was ~$185,000, it may be economically infeasible for the SBNF to contribute the resources required to collect this level of data. As with all projects on Forest Service Land, the Big Bear Lake Nutrient Monitoring Plan will have to take into account the NEPA process.
- Task 6: Reiterating the timing and budgetary restraints on the SBNF, the effective date for this task should be a minimum of 1 year following BPA approval.
- Task 7: Given the complexity of the project to reduce in-lake sediment, the time frame of 1 year should not start until the Army Corp of Engineers has completed their feasibility study. In addition, if the feasibility study shows that this task is not feasible, then this task should be removed from the implementation requirements.

- Task 9: Given the complexity of the project and the limited staff available at the SBNF to support this task, the effective date for this task should be a minimum of 18 months following BPA approval.
- Task 12 has the implicit assumption that adequate data from average and wet years are collected between now and 2012. Language is required that allows this date to be extended if inadequate data is collected.

N40 **Attachment A, Page 8 of 17, Table 5-9a-f:** The following comments are in regards to the legal information provided above. An acknowledgement needs to be made in the report discussing the possible limitations on the Forest Service with the participation and completion of these tasks. In some cases, listed below, the legal ramifications will prevent the Forest Service from participating, and therefore, the US Forest Service should not be named as a participant in the particular tasks.

- Task 4: The Forest Service may develop a monitoring plan within its authorities to fulfill Task 4.1. To the extent feasible, the Forest Service's proposed monitoring plan should address all the elements specified by the Regional Board. However, the Forest Service may be precluded from including all elements because of the legal constraints described above. For example, most of the monitoring stations are located off of Forest Service land, so the Forest Service cannot participate in data collection from these monitoring stations. In addition, the monitoring listed in the tasks goes beyond demonstrations of compliance to monitoring for investigation. As stated previously, the Forest Service cannot be compelled to perform investigation monitoring. With respect to Tasks 4.1 and 4.2, the Forest Service may comply in a fair and reasonable manner, to the extent feasible, within jurisdiction and funding constraints.
- Task 6: The Forest Service may comply in a fair and reasonable manner, to the extent feasible, within jurisdiction and funding constraints. For this task, the Forest Service will be able to provide collected data, within the constraints listed in Task 4 above. However, the Forest Service is of the opinion that funding a modeler is a task required of the Regional Board, and could not be compelled onto the Forest.
- Task 7: The focus of this task is on in-lake control of existing sediments, rather than on the CWA's objective of source control and abatement. The state's efforts in this task are more akin to a cleanup alternative for historical and existing sediments in the lakes. The CWA does not provide a remedy for the cleanup of historic pollution. As discussed above, to the extent that the tasks are not requirements related to the control and abatement of water pollution, the federal government has not waived its sovereign immunity, and the Forest Service could not be compelled to comply. However, the Forest Service could make a good faith effort to determine whether it can propose some type of monitoring program within its authorities that could contribute to the state's efforts.
- Task 8: As discussed above, the investigation of water quality is the state's responsibility. 33 U.S.C. § 1313(d)(1)(C). In addition, there is no provision in the CWA for development of technologies to control the presence of noxious and nuisance aquatic plants. Given that this task does not appear to be a requirement for the control and abatement of water pollution, or related to the subject matter of the CWA, the federal government has not waived its sovereign immunity, and the Forest Service could not be required to comply with this task.

- Task 9: Nothing in this task is a requirement of the CWA. Nor, like Task 8 above, is it even within the scope of the CWA. On its face this Multimetric Index Development Plan does not appear related to state obligations under the CWA. However, to the extent that this task is related to the development either of TMDLs or a development of a methodology for TMDLs, this is the state's responsibility under the CWA. The federal government has not waived its sovereign immunity with respect to this task, and the Forest Service could not be not required to comply with this task.

N41 **Attachment A, Page 9 of 17, Task 2:** The SBNF questions the requirement for the US Forest Service to be issued an NPDES permit. What point source is the SBNF responsible for? Why was this aspect of the task not listed in Section 9.1, Page 91?

N42 **Attachment A, Page 11 of 17, Table 5-9a-g**: With the Zoo's current lease ending and the plan to move the zoo to the north side of the lake in 2009, under special use permit with the Forest Service, will MWDC6 continue to have to be monitored in the future? Will an additional monitoring station be required?

"J" refers to "Joint" because the comments refer to both the sediment and nutrient TMDL reports.

J01 Because forest and open space areas naturally export nutrients, the USFS believes that these areas should be considered potential problems only if there is supporting evidence, such as nutrient export rates that exceed the rates expected for these ecosystems under relatively natural conditions. This approach of considering and accommodating natural background loading has been widely applied throughout California by other Regional Boards and the Environmental Protection Agency in addressing water quality impairments associated with other natural constituents (e.g., sediment, temperature).

J02 The SBNF would also appreciate if the RWQCB follows SB 469 TMDL Guidance to evaluate the natural background condition and conducts a use attainability analysis. SBNF disagrees that naturally eroding sediment is a pollutant. All references to naturally eroding sediment should list it in the natural background condition category and not as a "waste."

- SB 469 states that conducting a Use Attainability Analysis (UAA) may be the appropriate regulatory response in cases where "(1) Naturally occurring pollutant concentrations prevent the attainment of the use, and (4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way that would result in the attainment of the use." (SB 469, Appendix C-1 to C-2).
- In evaluating the natural background condition, the following website provides downloads of Fire Regime and Condition Class (FRCC), Fire Threat, and Post Fire Erosion Potential.
  - frap.cdf.ca.gov/data/frapgisdata/select
- In addition, our information shows that the return interval of fire for this watershed is 30 to 50 years. This return interval for fire should be built into the ecological succession of the model to allow for percentages of the land to be in the barren, grasses, shrubs, forested, etc conditions. This analysis should replace the provided model of fully forest north and fully forested south.

J03 **Nutrient: Page 5, ¶ 1 and Page 7, #6; Sediment: Page 5, ¶ 1 and Page 6, #6**: The SBNF agrees that critical conditions are an extremely important topic that must be discussed fully and dealt with appropriately. The SBNF does not agree that the most critical condition occurs during summer and during dry years. In our opinion, the most critical time occurs following a wildfire. The reduction in plant cover will cause an increase of sediment loading. "Erosion after wildfire 40 times greater than erosion after prescribed fire with buffers. Erosion after thinning, is 70% of prescribed fire with buffers, or about 1% of wildfire" (Elliot and Robichaud, 2001), which will increase the input of nutrients. The SBNF believes that this critical condition needs to be more thoroughly addressed.

J04 **Nutrient & Sediment: Page 7, #8; Sediment: Page 32, ¶ 2 & Page 77, ¶ 1; Nutrient: Section 4.3, Page 62, ¶1 & Section 9.0, Page 90, ¶ 3**: As the owner of the dam and the lake bottom, the BBMWD should be defined as a local stakeholder, not just a cooperating partner. Ownership of the lake bottom indicates ownership of the sediment included on the lake

bottom since the formation of the entity in question, though not of sediment already laid down before the dam was built. In addition, the language should be the same in both reports.

J05 **Nutrient: Page 7, #8 and Page 20-21 Land use; Sediment: Page 7, #8 and Page 18-19 Land use**: Since each of the Big Bear Mountain Resorts has some land on SBNF under special use permits, reducing nutrient and sediment loading from the ski areas could be considered a reduction from the forest if the treatments occur on SBNF land. Likewise, BMP implementation and monitoring can be written into the special use permits by the SBNF. Snow Forest has reverted back to the Forest Service and is no longer a resort. Its acreage should be added to the Forest category and the model should adjusted appropriately.

J06 **Nutrient and Sediment: Section 1.1, Page 10, ¶ 3**: Please present the evidence (e.g. literature references) that the groundwater basin is being mined. Mining implies that extraction is exceeding input and that the aquifer in question is trending to a lack of available, usable water.

J07 **Nutrient and Sediment: Editorial**: Figure 1-1 should list what "Field" this watershed is showing.

J08 **Nutrient and Sediment: Section 1.1, Page 14, Rathbun Creek - State Highway 18 to Big Bear Lake**: Does the "background" modeling deposit sediment on the floodplain? If the city channelization prevents deposition that would naturally occur (see reference below), then the city has some responsibility as to the increased sediment loading. If such sediment loading comes from a creek not under an NPDES permit, then the city's load needs to be increased in the area of external non-point source loading.

- Using a palynological approach, measured overbank deposition rates increased by 4-10 times within years of logging events and that the increased rates persisted for less than 4 years. After logging-induced deposition peaked, overbank deposition decreased 60-70% relative to the pre-logging background values. The decreased deposition rates persisted for over 40 years (Constantine et al. 2005).

J09 **Nutrient: Page 20, Wastewater; Sediment: Page 18, Wastewater**: Please expand on what the "limited exemptions" are and discuss how the exemptions influence nutrient loading.

J10 **Nutrient: Page 20, Land Use; Sediment: Page 18, Land Use**: The final sentence starting "This site" implies that the previous two sites are not "contributors of sediment and potentially nutrients." This sentence should be altered to indicate all three areas are potential contributors.

J11 **Nutrient: Page 31; Sediment: Section 2.1, Page 33**: Please clarify your definition of "controllable water quality factors." The controllability of the issue must be further expanded on, especially given that the majority of runoff and nutrient transport occurs in "wet" years when most sediment controlling structures are not designed to accommodate such flows.

- **Sediment, Table 6-1**: Please clarify the notion of "controllable water quality factors" as it applies to setting the sediment loading target to 10% less than the modeled natural background erosion (since 10% reserved for MOS). Since the watershed is no longer pristine, even meeting the modeled natural background sediment erosion is unlikely. To set the target 10% less is unreasonable, and arguably un-controllable.
- The SBNF is concerned that a zero discharge standard would severely hamper our fuels reduction activities, which in the long-term will reduce the risk of large discharges associated with wildfire and protect the communities surrounding Big Bear Lake.
- Furthermore, we believe the estimated background erosion rates are too low because they only consider fully forested conditions with no natural wildfire. Under natural conditions, the Big Bear watershed would likely have burned 2-3 times in the last 100 years. As a result of fire suppression, however, there have been no large fires. This reduction in sediment and nutrient loading is important, but not considered in the analysis.

J12 **Nutrient: Section 6.0, Page 84, ¶ 2**: Please clarify why no MOS is used for the nutrient TMDL given the many comments that the model has numerous deficiencies but that an MOS was used in the sediment TMDL when similar conditions exist relative to a complete lack of understanding.

J13 **Nutrient: Section 8.0, Page 89, ¶ 2 and ¶ 3; Sediment: Section 8.0, Page 76, ¶ 2 and ¶ 3:** Of the sources of uncertainty, both reports share the first 3 points. Point 6 in the Nutrient TMDL is equivalent to Point 4 in the Sediment TMDL. The final sentence of ¶2 is the same. The discussion in the nutrient TMDL discusses how conservative assumptions were applied. The final sentence of ¶ 3 is the same in both reports. It seems appropriate that unless conservative assumptions were not used in the sediment TMDL report (isn't supported by the report) that the MOS should be similar in both cases, namely implicit.

J14 **Nutrient: Section 9.0, Page 90, ¶ 3; Sediment: Section 9.0, Page 77, ¶ 1**: The identification of stakeholders needs to be updated (see comment **J04**). Ownership of the lake bottom indicates ownership of the sediment included on the lake bottom since the formation of the entity in question, though not of sediment already laid down before the dam was built. As such BBMWD should be an identified stakeholder.

J15 **Nutrient: Section 9.1, Pages 91, 1.b); Sediment: Section 9.1, Page 77, 1.a.**: Does the proposed activity coincide with the current MAA indicating that "issuance of waste discharge requirements for nonpoint source discharges will be waived by the Regional Board" given that the SBNF has been implementing BMPs for all projects on its land?

J16 **Nutrient: Section 10.2, Page 93; Sediment: Section 10.2, Page 80**: The RWQCB should acknowledge that installation and maintenance of a "high elevation weather station" on SBNF land will require that NEPA be followed, and the location of the station could cause environmental damage and mitigation requirements.

J17 **Nutrient: Section 10.3, Page 94, bullet 2; Sediment: Section 10.3, Page 80, bullet 3**: Does the RWQCB contemplate that the only option on modeling is to use the model

developed by Hydmet, Inc? The USFS already has a model, WEPP, designed to assess the effectiveness of BMPs applied on Forest Service land. Could the SBNF use the WEPP model to fulfill this purpose?

- WEPP model was used to show that erosion from fuel management operations, including thinning and prescribed fire, are less than wildfire, even when road erosion rates are included. Thinning and prescribed fire leave 85% surface cover. Wildfire tends to leave only 45% surface cover. Generally, forest erosion only occurs after a disturbance, then drops by 90% each subsequent year [Elliot and Robichaud, 2001, Elliot and Miller, 2002].
- Erosion prediction methods are used to evaluate different management practices and control techniques. One of the prediction tools recently developed is the Water Erosion Prediction Project (WEPP; Flanagan and Livingston 1995). WEPP is a physically-based soil erosion model, and is particularly suited to modeling the conditions common in forests.

J18 **Nutrient: Section 11.0, Page 97, Table 11-2; Sediment: Section 11.0, Page 82, Table 11-2**: Does the cost range given include costs for sampling the dredged material for constituents beyond those listed in the TMDL (e.g. RCRA constituents, lead, PCBs, etc)? Does the cost range given include transport of the dredged material to a landfill able to accept contaminated waste? See the Attachment to Resolution No. R8-2005-00002, Chapter 5 – Implementation Plan, Page 5-42, ¶ 4: PCBs in fish tissue have been indicated.

J19 **Nutrient: Section 11.0, Page 98, Table 11-3; Sediment: Section 11.0, Page 84, Tables 11-3 and 11-4**: These tables are incomplete in that they do not show the monetary contributions that the SBNF has made to the Big Bear Lake watershed. The reports state that over $4 million will be spent by the end of 2007. The following details how the SBNF has spent over $20 million between 2001 and 2005 in protecting the urban infrastructure from catastrophic wildfire as well as keeping the increased sediment loading from wildfire out of Big Bear Lake.

- Erosion after wildfire 40 times greater than erosion after prescribed fire with buffers. Erosion after thinning is 70% of prescribed fire with buffers, or about 1% of wildfire. (Elliot and Miller, 2002)
- In 2002 in the fall, the SBNF started cutting dead trees and selling them for firewood. Spending is estimated at $250,000 for cutting trees, assisting the public with firewood cutting (bucking), and burning slash. This work took place on the sides of Forest Service roads in the Fawnskin area and also behind Sugarloaf.
- In 2003 there was a fire team assigned to protect Big Bear from a catastrophic fire. The team spent about $1,000,000 cutting fuel breaks around Big Bear City, Big Bear Lake, Fawnskin and other subdivisions East of Fawnskin, etc. Following the Grand Prix/Old Fire, in winter 2003 and 2004, about $500,000 was spent rehabilitating those control lines. The rehabilitation used the BMPs of waterbarring, covering the lines with chips, recontouring benches in some cases, and fixing creek crossings, including Kid Creek. In addition, much of the work was done with excavators with thumbs so that vegetation could be put on the lines (covered and blocked) as they were being rehabilitated.
- In 2005, the SBNF has spent about $2,500,000 in the Big Bear Watershed. The SBNF has a) continued vegetation management projects behind Sugarloaf (cutting and

chipping), b) removed all of the dead trees from the 3 Big Bear tracts, Metcalf, Lakeview, and other tracts. These projects again removed large dead trees that if consumed by fire would have damaging effects on the soil and hence the watershed. The SBNF has been working with NRCS on these tasks.

- Also in 2005, the SBNF entered into a partnership agreement with the ski areas to do restoration work in the tree islands. We intend to contribute and have matched $300,000 for a total of $600,000.
- Also the SBNF has invested millions of dollars on the Santa Ana side of the Mountain (the fire prone South facing slope) in order to keep fires from going over the Mountain and into Big Bear. One of the biggest threats to the Bear Creek Watershed comes from the neighboring and downstream drainages, so even though this investment is outside the watershed in question, it is directly tied to reducing sedimentation into Big Bear Lake.
- Also between 2001 and the present, the SBNF has successfully suppressed every lightning and man caused fire that has started in the Big Bear Valley in order to protect the watershed of Big Bear. The cost of these activities, counting pre-suppression work is on the order of $16 million. This includes staging a type 1 helicopter at the Big Bear Airport for several of those seasons, maintaining a hotshot crew during the period, bringing in resources such as smokejumpers and rapellers, etc. as well as Air tankers and other assets.
- Road maintenance dollars spent in the Big Bear watershed from 2001 through August 2005 total $119,500. All Forest Service roads are constructed with State approved BMPs according to the MAA between the USFS and SWQCB.
- In addition, see comment S10 as it details BMP effectiveness in multiple cases for multiple project types.
- The above bullets do not count grants from the Forest Service made to the County of San Bernardino, nor does it count all the other protection work and native plant restoration work that has been contributing by FS District staff and the non catalogued roads that have been closed, and the money used to manage off highway vehicle (OHV) use to limit it effects on the watershed.

J20 **Nutrient: Section 12.0, Page 99, ¶ 2; Sediment: Section 12.0, Page 86, ¶ 2**: The SBNF disagrees with the assessment that there "would be no potentially significant impacts on the environment caused by adoption of this Basin Plan amendment." Mitigation measures may be required in numerous areas, as detailed in the CEQA Comments section, below.

J21 **Nutrient: Section 12.0, Page 99, Alternative 2; Sediment: Section 12.0, Page 86, Alternative 2**: Has the RWQCB taken into account the time requirements placed on the USFS relative to NEPA compliance? NEPA is required on all Forest Service projects. Given that the budget process has been completed for the FY2006, any projects beyond the Snow Forest restoration will be required to await an additional funding cycle. Given that determination of seasonal effects requires a minimum of 3 years of data and given the variability inherent in the data, a compliance date of 2010 seems unreasonable. What if the BPA is delayed? Will the compliance dates be delayed as well? Please address the reasonableness given the aforementioned issues, especially in regards to the scheduled approval date of the BPA.

J22 **Nutrient: Section 13.0, Page 100, ¶ 2; Sediment: Section 13.0, Page 87, ¶ 2**: The SBNF takes exception to the term "just recently" in regards to participation in the TMDL workgroup. As these documents may be referenced in the future, a more precise date should be used or the "and just recently" language should be removed. In addition, as a Management Agency, the SBNF has been an active steward of our lands using BMPs (see comment J19 and S10 for effectiveness studies). The implication of the "just recently" statement is that the SBNF has not been involved in watershed activities that are helpful to the protection of Big Bear Lake. Please clarify this statement and acknowledge the ongoing participation of the SBNF as a Management Agency.

CEQA Checklist comments

Many of comments below will refer to the ongoing land management work in this watershed. A summary is provided here to reduce the redundancy of the comments.

1) Fuels treatment work: The SBNF is currently receiving Congressionally Earmarked funding to reduce fuel loading in the Big Bear Lake watershed. This thinning, masticating, and prescribed burning has the goal of reducing the risk of catastrophic wildfire to the communities surrounding Big Bear Lake. These projects, though they use BMPs, will reduce the cover on the forest floor and open the canopy, restoring the forest to a more natural, background state. These projects will also, in the short term, increase erosion of sediment. Given that erosion after wildfire is 40 times greater than erosion after prescribed fire with buffers and erosion after thinning is 70% of prescribed fire with buffers, or about 1% of wildfire (Elliot and Miller, 2002), this work is critical to this watershed. In addition, this work is supported by the Firesafe Council in the production of a Community Wildfire Protection Plan.
2) Fire suppression: Given that roads are a major producer of sediment (Beechie et al. *2003*), it is anticipated that meeting the requirements of the sediment TMDL would require the closing and decommissioning of roads. As with any project on the forest, the National Environmental Protection Act (NEPA) would have to be followed before such work could be accomplished and one aspect would be whether the closing of the roads would adversely affect the Forest Service's ability to suppress fire.

II. Determination

J23 Based on the comments below (J24 through J32), the SBNF recommends that the determination should be at least the second category (i.e. may have significant effect, but alternatives and mitigations available), with the possibility that some of the comments will push the determination into the third category.

III. Environmental Impact Comments

J24 **IV. Biological Resources – Would the project: e) Conflict with any local policies or ordinances protecting biological resources:** Both the fuels treatment work and the fire suppression work could be prevented by the implementation of these targets. As such, the

SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

J25 **V. Cultural Resources, a) through d):** Implementing the TMDL will likely require the installation of engineered works to control and catch sediment. In each case, any project performed by the Forest Service requires that NEPA be followed. Relative to cultural resources, the regulations that the Forest Service must follow are listed in 36 CFS Part 800. In addition, the Forest Service has a Programmatic Agreement (PA) with the California State Historic Preservation Officer regarding the process for compliance with Section 106 of the National Historic Preservation Act. Attachment B of the PA discusses the Standard Resource Protection Measures, which shall be implemented as a part of NEPA to take into account the effect of all undertakings on historic properties. If the proposed project impacts a site eligible for the National Register of Historic Properties, and if the proposed project cannot be sited at another location, then the NEPA procedure will weigh the significance of reducing sediment relative to the TMDL versus the possible destruction of a historic site. To mitigate destruction of a historic site could require excavation and cataloging of the site in question, which is a highly expensive endeavor. Experience on the Forest indicates that mitigation of a 50 foot by 150 foot area can cost between $50,000 and $100,000. In addition, relative to located possible historic sites in the mountains, many, if not most, sites are located on or near watercourses. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" or the "Potentially significant impact" box be checked for each of these and that an evaluation is made in the discussion section in lieu of this comment.

J26 **VI. Geology and Soils, a)iv) and b):** If the implementation of the TMDL prevented fuels treatments from being implemented because of the short term increase in sediment, and thus nutrient, loading, then the increased risk of wildfire would lead to an increased risk of landslides and soil erosion associated with wildfire. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

J27 **VII. Hazards and Hazardous Materials, a) and b):** As stated in comment J20, dredging of sediment will require sampling of the material prior to its transport and deposition at a new site. The possibility exists that the sampling protocol will discover hazardous substances in the sediment (e.g. lead [fishing sinkers], PCBs [though banned in 1977 are very persistent in environment, Nutrient TMDL Basin Plan Amendment states PCBs have been indicated in fish tissue], etc). If such hazardous substances are discovered from dredged materials, then they could pose a human health hazard during the transport, following an accident condition, and would have to be disposed of in a sanctioned landfill, thus raising the costs. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" or the "Potentially significant impact" box be checked for each of these and that an evaluation is made in the discussion section in lieu of this comment.

J28 **VII. Hazards and Hazardous Materials, g) and h):** As detailed in 1) and 2) above, reduction in fuels treatments or decommissioning of roads to reduce erosion would interfere with the local Community Wildfire Protection Plan and could increase the risk of wildland fire. As such, the SBNF recommends that the "Less than significant with mitigation

incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

J29 **IX. Land Use and Planning, b):** As detailed in 1) above, reduction in fuels treatments, which will increase sediment loading, and thus nutrient loading, in the short term, would interfere with the local Community Wildfire Protection Plan and could increase the risk of wildland fire. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" or the "Potentially significant impact" box be checked for each of these and that an evaluation is made in the discussion section in lieu of this comment.

J30 **XV. Transportation/Traffic, e):** As detailed in 2) above, decommissioning of roads to reduce erosion would interfere with emergency access to wildland fires. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

J31 **XVII. Mandatory Findings of Significance, a):** As detailed in 1) above, if the sediment TMDL limits the Forest's ability to conduct fuels treatments, which will increase sediment loading, and thus nutrient loading, in the short term, then the risk of wildland fire increases which gives the potential to degrade the quality of the environment in multiple ways. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

J32 **XVII. Mandatory Findings of Significance, b) and c):** As a part of the required NEPA done for every Forest project, a Cumulative Effects Analysis is conducted relative to erosion within a watershed. Implementation of projects could be hampered given the limited time frame (i.e. 10 years) of the TMDL. If the TMDL lowers the erosion target for a particular watershed such that fuels treatments cannot be done in a timely manner, while the SBNF is receiving Congressionally earmarked funding, then the cumulative effect is higher risk for fire in that watershed and higher risk of potentially significant effects to human health. As such, the SBNF recommends that the "Less than significant with mitigation incorporation" box be checked and that an evaluation is made in the discussion section in lieu of this comment.

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENVIRONMENTAL ANALYSIS, MS 27
1120 N STREET
P. O. BOX 942874
SACRAMENTO, CA 94274-0001
PHONE (916) 653-7507
FAX (916) 653-7757
TTY (916) 653-4086

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JES nasce

Flex your power!
Be energy efficient!

September 2, 2005

Heather Boyd, Environmental Scientist
Inland Waters Planning Section
Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501
Fax: (951) 781-6288
Email: hboyd@waterboards.ca.gov

Re: Comments on "Staff Report on the Nutrient Total Maximum Daily Loads for Big Bear Lake"

Dear Ms. Boyd:

The Department of Transportation (Department) appreciates the opportunity to comment on the subject report, dated June 1, 2005. We support the efforts of the Santa Ana Regional Water Quality Control Board (RWQCB) to protect the environment and achieve the best water quality possible. Our Department manages 18 miles (approximately 70 acres) of roadway throughout Big Bear. The watershed draining into Big Bear Lake measures approximately 23,000 acres. Our Right-of-Way (ROW) constitutes 0.3 percent of the entire watershed.

We have concerns about this Total Maximum Daily Load (TMDL), especially regarding the:

1. Primary source of sedimentation for the lake;
2. Lack of identification and quantification of the natural background loads; and
3. Lack of economic considerations.

Primary Source of Lake Sedimentation

The Department's first concern is the RWQCB's assumption that external sediment loads (storm runoff) are an indirect yet significant cause of dry period nutrient loading into Big Bear

Lake. On page 92 of the staff subject report, the RWQCB states:

"...it is recognized that external inputs remain in the lake for an extended period and contribute significantly to internal sediment loading and macrophyte growth, which are addressed by these TMDLs. Accordingly, the proposed implementation plan includes requirements for external nutrient dischargers to participate in the development of internal sediment loading control measures and macrophyte reduction/aquatic plant management programs."

A study[i] by Dr. Matthew E. Kirby, Ph.D., Assistant Professor for the Department of Geological Sciences, California State University, Fullerton, revealed that the primary sedimentation in Big Bear Lake over the past 40 years was the result of prolonged low level of the lake and not external inputs.

The Department should not be required to participate in the development of internal sediment loading control measures and macrophyte reduction/aquatic plant management programs because:

a. There is a zero percent reduction from the Urban Point Source Load of both Total Nitrogen and Total Phosphorus for this TMDL;

b. The results of Dr. Kirby's study verify that internal loading of nutrients is not caused by external sediment loads; and

c. Total Nitrogen and Total Phosphorus loads from the Urban Point Source Load during an average year represent a very small fraction of the total load compared to the loading from internal sources. External inputs that apparently "remain in the lake for an extended period" do not "contribute significantly to internal sediment loading and macrophyte growth" compared to the significant internal sediment loading.

Identification and Quantification of Natural Background Loads

Our second concern is the lack of identification and quantification of the natural background loads. The State Water Resources Control Board (SWRCB) defines, a TMDL as "The sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources and natural background, and a margin of safety[ii]." In the TMDL for Nutrients in Big Bear Lake, the natural background is not included in the load allocations on page 84 of the staff report. The TMDL needs to be amended to include natural background in the load allocations. The U.S. Army Corps of Engineers is currently engaged in a study of Big Bear Lake that involves performing 450 sediment cores of the lake bottom. This study will help identify the natural background loads and the primary source of sedimentation in the lake. The Department requests that the RWQCB postpone the finalization of this TMDL until the Corps' study concludes and quantifies the sediment loads associated with background conditions. A

[i] Matthew Kirby, M.E., *Determination of Sedimentation Rate and Sedimentation Processes at Big Bear Lake: Using a Paleo-Perspective to Understand Modern Sedimentary Systems*, Contract Report submitted to Big Bear Municipal Water District, 41pp. (2005)

[ii] State Water Resources Control Board, *Revised Draft Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options* (2005)

SWRCB report[iii] indicates that if natural background levels exceed water quality standards (WQS), revision of WQS is appropriate. The Department requests that the RWQCB postpone finalization of the TMDL until it determines whether the natural background levels exceed the WQS, in which case the WQS will need to be revised, and the TMDL will need to be recalculated.

Economic Considerations

Finally, the Department is concerned with the economic considerations in this report. A SWRCB memorandum[iv] indicates proposed RWQCB regulations, such as the regulatory provisions of basin plans, must include:

- An environmental analysis of the reasonably foreseeable methods of compliance with those standards or requirements; and
- A consideration of economic factors.

This memo also cites California Public Resources Code Section 21159, which states that because TMDLs contain quantifiable targets and load allocations (which together can be considered performance standards), the RWQCB must:

- Identify the reasonable foreseeable methods of compliance with the wasteload and load allocations; and
- Consider economic factors for those methods.

Thank you for the opportunity to comment on this matter. If you have any questions, please call Ivan Karnezis of my office at (916) 653-5417.

Sincerely,

Mike Roger

for MICHAEL FLAKE
Chief
Storm Water Policy

[iii] State Water Resources Control Board, *SB 469 TMDL Guidance: Attachment A: Impaired Waters Regulatory Decision Tree* (11/22/04)
[iv] State Water Resources Control Board, *Economic Considerations in TMDL Development and Basin Planning* (10/27/99)

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PUBLIC AND SUPPORT
SERVICES GROUP

825 East Third Street • San Bernardino, CA 92415-0835 • (909) 387-8104
Fax (909) 387-8130

PATRICK J. MEAD
Director of Public Works

August 31, 2005

Gerard J. Thibeault
California Regional Water Quality Control Board, Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

File#10(NPD)-2.06

RE: COMMENTS ON THE STAFF REPORT AND PROPOSED BASIN PLAN AMENDMENT PRESENTED AT THE AUGUST 26, 2005 PUBLIC WORKSHOP: INCORPORATION OF TOTAL MAXIMUM DAILY LOADS FOR NUTRIENTS IN BIG BEAR LAKE

Dear Mr. Thibeault:

The San Bernardino County Flood Control District (District) has recently reviewed the Staff Report and the draft Basin Plan Amendment (BPA) for the Nutrient Total Maximum Daily Loads in Big Bear Lake, as presented at the Regional Board Public Workshop on August 26, 2005. The implementation of these Total Maximum Daily Loads (TMDLs) has substantial implications for the Permittees under the Municipal Stormwater Permit for the Santa Ana River Watershed in San Bernardino County (Order No. R8-2002-0012) (MS4 Permit).

Due to the complexity of the Staff Report, at this time, we are commenting primarily on the larger policy issues, and intend to review the technical aspects more thoroughly in the near future. We also understand that the Nutrient Staff Report and draft BPA will likely undergo revision in the near future to incorporate relevant information and/or requirements from the proposed sediment TMDL (Staff Report and draft BPA), for which a public workshop was not conducted at the August 26, 2005, Regional Board meeting.

The District understands that the development of these TMDLs is a complex task requiring significant technical support. We appreciate the efforts of Regional Board staff and the stakeholder work group (Workgroup). The Big Bear Municipal Water District (BBMWD) has led the Workgroup efforts and successfully engaged the Big Bear community in this issue. Through the Workgroup, significant funding has been secured to collect data and conduct needed investigations. Some investigations are complete and others are ongoing.

As stakeholders, we support all of the comments made by Mr. Tim Moore of Risk Sciences, including verbal comments made at the August 26 Workshop, and subsequent written comments. As the Principal Permittee under the MS4 Permit, the District provides the following comments on the Nutrient TMDL Staff Report and draft BPA on behalf of the MS4 Permittees (the sixteen cities, the District, and the County of San Bernardino).

The purpose of the TMDL will be best served by allowing sufficient time to incorporate the findings of ongoing investigations into the TMDL provisions. In particular, the study currently being conducted by the U.S. Army Corps of Engineers should provide essential data on the nutrient content of the lake sediments, which will have significant implications for the effectiveness of possible dredging activities. We, therefore, request that sufficient time be allocated to review these data before developing the TMDL allocations, and proposed implementation plan.

The Permittees should not he held responsible for nutrient loads from natural sources. This is especially important for implementation of the TMDL, because all of the proposed nutrient load reductions are applied to the internal sediment source and/or the internal macrophyte source. While the stakeholders have applied resources to reduce the invasive plants, to reduce phosphorous concentrations in the lake, and to remove lake sediments through dredging, the vast majority of the existing lake sediments (and associated nutrients) are attributed to natural sources. To achieve the load reductions called for in the draft BPA, these existing natural sources will have to be addressed. Regulating these existing natural sources conflicts with the intent of the MS4 Permit which states that "This Order is intended to regulate the discharge of pollutants in urban storm water runoff from anthropogenic (generated from human activities) sources, and is not intended to address background or naturally occurring pollutants or flows" (Finding 13, page 5).

It is inappropriate to characterize natural sources as "waste discharges." According to the Porter-Cologne Water Quality Control Act (§13050):

> "'Waste' includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

The internal loads of sediment and nutrients for Big Bear Lake do not meet this definition of "waste" (as suggested on pages 31, 47, and 91 of the Staff Report, and used throughout the draft BPA). This calls into question whether the Basin Plan objective for algae is applicable or appropriate for Big Bear Lake.

The Permittees should not be characterized as "responsible parties", as described in Section 10.3 of the Staff Report. Although we understand that we have compliance responsibilities under the MS4 Permit, the term "responsible parties" carries with it the regulatory implications derived from RCRA (Resource Conservation and Recovery Act), and is inappropriate in the TMDL.

The MS4 Permit already requires the Permittees to address pollutant sources (including nutrients). The MS4 Permit requires that urban activities and land uses be evaluated to determine the potential pollutants they may generate, and that best management practices (BMPs) be implemented for all potential pollutants. This includes the recently adopted Water Quality Management Plan, which specifies the process to develop post-construction BMPs for new and re-development projects, based on pollutants of concern. Other MS4 Permit BMPs, such as street sweeping, commercial, industrial, and construction site inspections, drainage facility cleaning, and public education, are already being implemented.

The Regional Board's Basin Plan objectives for nitrogen and phosphorous are apparently not protective, and should be evaluated and revised if necessary. The current Basin Plan objectives for nutrients are being met, in spite of the perceived beneficial use impairments. In the process of evaluating the appropriate nutrient levels to be included as water quality objectives in the Basin Plan, the requirements under Porter-Cologne §13241 will be triggered.

The use of modeling and literature values to set target nutrient levels warrants caution. There are inherent uncertainties in applying general guidelines to a specific case without considerable evaluation. As discussed at the August 26 Workshop, it may be more damaging to reduce nutrients than to leave the system alone. The example discussed at the Workshop described how reducing nutrients might reduce the zooplankton, and result in a compromised fishery in the lake.

Big Bear Lake has exhibited a cycle of periodic lake level change over the past 120 years. The quality of the lake attributes varies considerably with these cycles, independent of any anthropogenic influence, with low water levels generally associated with less desirable conditions. This variability is intrinsic to the hydrologic regime and must be considered as part of the background state of the lake conditions.

The District appreciates the significant efforts from Regional Board staff to develop this TMDL, and the efforts of the BBMWD and the Workgroup to improve conditions in Big Bear Lake. We are committed to participating in Workgroup efforts for the foreseeable future.

Thank you for considering our comments.

If you have questions regarding our comments, please contact Matt Yeager or Naresh Varma at (909) 387-8109.

Sincerely,

PATRICK J. MEAD, P.E.
Flood Control Engineer

PJM:NPV:MAY:jm/BBL Nutrient TMDL Letter 083105

cc: Dennis Hansberger, Supervisor, Third District
Hope Smythe, CRWQCB-SAR
Heather Boyd, CRWQCB-SAR
Sheila Hamilton, Big Bear MWD
NPDES Coordinators
Matt Yeager, DPW--Environmental Management Division
MK Reading File

Peer Review
Proposed Nutrient TMDL for Big Bear Lake
K.H. Reckhow
Duke University

1. The nature of the water quality problem.

Based on data and graphs presented in Boyd (2005), measurements for total phosphorus and total inorganic nitrogen exceeded the water quality objectives for Big Bear Lake and thus resulted in the 303(d) listing. This is clear. However, it appears that there were relatively few exceedances. Perhaps natural variability and the impact of sample location and timing should be taken into consideration to make the case that a small percentage (e.g., 5% or 10%) of exceedances be permitted without listing.

2. Numeric target derivation

I am troubled by the numeric nutrient criteria – what is the relationship between the 25th percentile for N&P and the designated use? The goal of the TMDL is to achieve compliance with the water quality standard. The standard is essentially expressed in the designated use; the criterion is merely an assessable (measurable) surrogate for designated use. Presumably P&N would relate to phytoplankton density (expressed as chlor a); however, Figure 3.1 (Boyd 2005) shows a miserable bivariate relationship. As a final point with respect to N&P, I do not understand why the Basin Plan (Boyd 2005; page 32) specifies objectives for TOTAL phosphorus, yet for INORGANIC nitrogen – why the inconsistency?

The National Eutrophication Survey trophic state criteria (as well as Carlson's TSI, I believe) were set based on conditions in deep, nutrient-poor north temperate lakes (from Europe, the US, and Canada), and thus should not be given serious consideration for Big Bear Lake.

3. Identification of nitrogen and phosphorus sources

HSPF Model: Contrary to the Humphrey memo (2003), I do not believe that "EPA recommends HSPF "as the most accurate and appropriate management tool for the continuous simulation of hydrology and water quality in watersheds." Certainly, EPA recommends HSPF, since it is part of the EPA BASINS package, as are many other pollutant loading models. However, the statement that HSPF is "the most accurate" has no basis, as there is no evidence to confirm this statement. To be specific, there have been virtually no uncertainty analyses undertaken using HSPF, so accuracy is essentially unknown.

Despite the fact that the TMDL is focused on nutrient loading, the Humphrey memo provides judgmental estimates of the accuracy of the hydrology, but is mute on the accuracy of the nutrient loads from HSPF! Sadly, this is common practice, but it is a dis-service to the client who should want to know "How good are the nitrogen and phosphorus loading estimates?"

Apparently, the HSPF model was not calibrated due to insufficient data (Nutrient Budget study 2003, page 4-10). Normally, failure to calibrate would be associated with bad modeling practice. However, HSPF is over-parameterized, which means that even a

large data set cannot easily distinguish between many different sets of "optimal" parameters. This condition, termed "equifinality" (Beven, numerous references) could and should be addressed using a procedure such as generalized likelihood uncertainty estimation (GLUE) and would lead to the estimate of parameter sets (not individual parameters) all of which meet some pre-defined aquatic behavior criterion. GLUE has the added advantage of providing at least some basis for estimation of HSPF prediction error See MOS discussion below).

4. Linkage Analysis

WASP Model: Tetra Tech and Steven Davies have considerable experience with WASP, so I assume that this should be a good modeling effort, given the limitations of the data and of WASP. The graphs in the Tetra Tech report comparing predictions and observations for nutrients and chlorophyll are not confidence-building (particular when considered as a scientific basis for costly TMDL decisions). However, it is refreshing to read the candid appraisals of the lack-of-fit on pages 32 and 33; Tetra Tech is to be commended for these statements, and for recommendations (bottom of page 33) for further study in support of the WASP model. I suggest that a regionalized (generalized) sensitivity analysis (Hornberger and Spear references) be used to assist in prioritizing new data collection.

5. TMDL/Wasteload Allocations(WLAs)/Load Allocations

Internal load is difficult to assess and predict on a whole-lake basis, but I do not know enough about the topic to comment critically on the Anderson and Dyal (2003) work. Load allocations determined using HSPF are subject to the weaknesses of the model that I discussed above.

6. Margin of Safety/Seasonal Variation and Critical Conditions

MOS: While implicit margins of safety are common; they are to some degree a "cop-out." There are better approaches. For example, run an uncertainty analysis, and then use that assessment to guide initial actions in the adaptive process. Further, by doing the uncertainty analysis, you are determining what information is important to the TMDL assessment, yet is relatively poorly known – hence, what needs to be studied in the post-implementation adaptive phase.

Seasonal variations and critical conditions appear to be handled well.

7. Implementation and Monitoring

The TMDL implementation is proposed to be "phased" (Boyd 2005; Executive Summary). In fact, as stated, this TMDL is not phased; it is adaptive. While this may appear to be a picky semantic point, in fact there is a crucial difference. A phased TMDL is established at the time of initial approval and is then unchanged; it is simply implemented in a phased (gradual) manner. An adaptive TMDL is a "learning while doing" (NRC 2001) exercise; it may result in a change in the loading, the criterion level, or the designated use (effectively becoming a UAA). As such, an adaptive TMDL is most effective when the post-implementation monitoring/research is thoughtfully designed to assess compliance and to provide the critical learning opportunities. As noted under my MOS comments, undertaking an uncertainty analysis as the basis for the MOS would

naturally lead to priorities for post-implementation monitoring. This should be adequately described in the TMDL application (but it was not).

Other Comments

In brief, this appears to be a fairly typical TMDL that follows a routine procedure for approval rather than a clear linkage to attainment of designated use. Thus, my criticisms are to some degree directed at the overall TMDL process and not to this proposed TMDL alone.

November 4, 2005

Hope Smythe
Regional Water Quality Control Board
Santa Ana

Dear Hope,

I have reviewed the Staff Report on the Nutrient Total Maximum Daily Loads for Big Bear Lake (June 1, 2005). EPA commends you and your staff on completing an extensive evaluation of the existing data and approaches towards lake nutrient impairment to address the 303(d) listed impairments in Big Bear Lake. I have provided below my general and specific comments on the draft document.

General Comments

Overall, the draft technical TMDL appropriately provides the existing information and conducts the necessary analysis (i.e., source assessment, linkage analysis, waste load and load allocations, etc.). However, the document can improve by focusing on primary objectives achieved and less on the limitations of the data and analysis, which would be better addressed in one section. For example, the importance of setting numeric targets should be emphasized because these state and federally mandated requirements address serious water quality impairments and stressed beneficial uses.

The discussion on load reductions can improve by providing a more clear justification for the selected percentage reductions. The technical document currently provides an extensive discussion, but perhaps clarity of the selected reductions and numeric targets could be improved by having one explanatory statement for each finding.

The margin of safety discussion outlines all the uncertainties and limitations related to this technical TMDL. But, how do these uncertainties affect the actual load calculations? Do the TMDLs underestimate or overestimate the nutrient loads and/or load reductions? This section can be strengthened by identifying how the uncertainties affect the TMDLs, which consequently would provide more support for the identified numeric targets.

Specific Comments

Page	Section	Comment
31	Footnote 17	Is there currently an update since the review of the UIA objectives since Regional Board's 2002 Triennial Review List?

38	Figure 2.2	Are 6740.15 feet and 6729.58 feet referring to the elevation of the lake level? Also, do these two lake levels have the appropriate number of significant digits?
40	3rd para.	Is the personal observation by Heather Boyd? The reference should include the primary person's name and date/year of observation.
43	Last sentence	Are there other commercial or non-commercial uses that "large mats of nuisance aquatic plants, and subsequent increase in temperature and pH and decrease in dissolved oxygen concentrations" can affect (besides fishery)?
44	1st sentence	Please be more specific about "through the end of 2003". Which and how many months do that period cover?
44	Mid para.	Please cite other references or studies that show the similar pattern of early a.m. low dissolved oxygen concentrations.
46	Section 3.1, 1st para.	What is the justification for including an interim and final target for total phosphorus, but only a final target for total nitrogen? Also, see page 76, first para., bold text. It appears that the primary reason for having the target is due to federal requirement. Perhaps, it would help to reemphasize the evidence of impairment and impacted beneficial uses in Big Bear Lake.
46	Section 3.1, last para.	Will the additional investigation of attainability and water quality measures needed to achieve the proposed final numeric targets take place after the TMDL is adopted?
48	1st para.	Currently, the paragraph describes what information is needed to define the effects of macrophytes on beneficial uses. An equal discussion on what is clear or known about macrophytes should be included.
48	Footnote 25	This discussion is confusing and vague. Please delete.
51	Numeric Targets, last sentence	Please change sentence to: "When future studies are conducted to evaluate the link between macrophyte coverage and a healthy fishery in Big Bear Lake, Regional Board will review the proposed numeric target for macrophyte coverage, if needed."
52	2nd para.	Please delete the paragraph because it adds to the unclarity and does not add to the discussion.
52	Numeric Target	Is it possible to show the calculation and reasoning behind the selection of the 25th percentile and the resulting 10ug/L?
53	3rd para.	Please delete the last sentence of this paragraph, beginning with, "These values would then be used to rerun……"
54	1st para.	After the sentence, "This was considered sufficient due to the fact……", please include a following sentence on appropriateness of the approach when addressing dry weather conditions, such as, "In addition, this is sufficiently appropriate when addressing dry weather conditions…."
57	Figure 4-4	It appears that the interpretation of this figure is not complete. For example, what about the effect of high urban loads between 1990-2003?
59	Last	The statement, "Most of the phosphorus is associated with the

	sentence	sediment/particulate discharge present when surface runoff occurs, with the most significant contributions from forest land use" is supported only by the year 1993 in Table 4-2 and not by Figure 4-4.
60	Table 4-2	It appears that the largest proportion of TP (70%) is from urban land uses. Why does the previous section state "the highest total phosphorus loads come from the forested areas....(p. 56, bottom)?"
61	Last sentence	Please modify last sentence to, "The loading rates that were used to calculate these estimates will be refined with empirical data for both wet and dry conditions during the implementation phase." Is this the correct assumption that it is during the implementation period that atmospheric loads will be addressed?
66	2nd para, bottom	Why did Tetra Tech used three times the average calculated volumetric density in their calculations? Footnote 40 did not explain why either.
67	4th para.	The last sentence, "As stated previously, these values need to be compared....." undercuts your findings and leads to general uncertainty of the report's conclusions about atmospheric deposition.
68	Table 4-7	How confident are the authors of the proportion of nutrient loads from forest nonpoint source loads (43.5%)? Does this percentage match the author's best professional judgement?
71	2nd para.	Again, the last sentence of this paragraph undercuts the general initial findings. This technical report did not have all the data possible (and not many TMDLs do), but it did evaluate two different precipitation periods and found general patterns of rainfall and associated loads.
72	Top of page	Please explain the model runs. Some background information on the model runs would be helpful (just 1-2 sentences).
72	Last sentence	The conclusion is that during dry conditions, a reduction in external loads is unnecessary. However, a reasonable explanation as to why an external load reduction is then required was not provided. Perhaps, more clarification on the external load reduction coming from wet hydrological conditions need to be reemphasized.
74	First sentence	Modify sentence to, " Second, WASP efforts to simulate macrophyte nutrient dynamics were achieved by adopting various assumptions regarding macrophyte nutrient loads, rates of uptake and release, etc., that were simulated via nonpoint....." A sentence on how this is a common approach in the absence of specific data would help strengthen your conclusions.
74	3rd para.	This paragraph is not clear. What are the main points of the paragraph.
75	1st para.	What is the purpose of this extensive discussion on model limitations in the main technical document. How about have three short bulleted sections: (1) model limitations in bulleted form and (2) ramifications of these limitations, and (3) what the model does provide for this technical analysis.

76	2nd para.	The last sentence in this paragraph offers an implicit margin of safety.
78	4th para.	Why is model run 20a used to calculate the load capacity for interim targets?
78	5th para.	This section's clarity can be improved by stressing the main points. Also, Do staff believe that macrophyte coverage should range between 30-60% due to BPJ or based on information from other lakes?
81	Figure 5-4	Why did TP and TN concentrations increase after the Sonar applications?
83	3rd para.	If the final TN target cannot be achieved, why not include an interim target for TN?