

**ATTACHMENT TO RESOLUTION NO. R8 2005–0002**

(Proposed Basin Plan amendment changes are shown as in **strikeout** for deletions and **underline** for additions)

*(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.)*

**Chapter 5 - Implementation Plan, Page 5-42****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~~of 73,320~~73,328~~ 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~~6,744 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 ~~joins~~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. Deeper water during the summer months may exhibit severe oxygen deficits. Nutrient enrichment has resulted in the growth of ~~rooted~~ 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, ~~and~~ 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 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

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

In 2000, the Regional Board initiated development of Total Maximum Daily Loads for the Big Bear Lake watershed.

~~As in previous Big Bear Lake Studies, phosphorus was found to be the limiting nutrient. Approximately 80% of the phosphorous load emanates from Rathbone Creek. The large amount of precipitation in Southern California during 1993 resulted in more runoff from the Big Bear Lake tributaries and an increased input of nutrients. For instance, the total phosphorous load increased between 1992 to 1993 by a factor of 2, and the total nitrogen load by a factor of 100. Given the increasing eutrophic condition of the Lake, harvesting of aquatic vegetation may not be effective much longer. It is appropriate to implement control measures for reducing the input of nutrients from the major tributaries, Rathbone Creek and Grout Creek.~~

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

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.

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.

Table 5-9a-c  
Big Bear Lake Nutrient TMDL Numeric Targets<sup>a</sup>

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

<sup>a</sup> Compliance with the targets to be achieved as soon as possible, but no later than the date specified

<sup>b</sup> 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 time; a calendar year average is obtained for each sampling location; 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. E. Implementation, Task 4.2, Table 5-9a-i).

<sup>c</sup> 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.E. Implementation, Task 8)

<sup>d</sup> Growing season is the period from May 1 through October 31 of each year

### 1. B. 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. TMDL Implementation, Task 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

	<u>Total Phosphorus</u> <u>(lb/yr)<sup>c</sup></u>	<u>Total Nitrogen</u> <u>(lb/yr)<sup>c</sup></u>
<u>Interim TMDL<sup>a</sup></u>	<u>26,012</u>	<u>N/A</u>
<u>Final TMDL<sup>b</sup></u>	<u>21,735</u>	<u>280,900</u>

<sup>a</sup> Interim compliance to be achieved as soon as possible, but no later than December 31, 2010.

<sup>b</sup> Final compliance to be achieved as soon as possible, but no later than December 31, 2015.

<sup>c</sup> 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

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

<sup>a</sup> Interim allocation compliance to be achieved as soon as possible, but no later than December 31, 2010.

<sup>b</sup> Final allocation compliance to be achieved as soon as possible, but no later than December 31, 2015.

<sup>c</sup> Specified as an annual average for dry hydrological conditions only

### 1.C. Margin of Safety

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

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

### 1. 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 and to develop TMDLs that address other hydrological conditions (see 1. E. TMDL Implementation).

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. E. TMDL Implementation**

Table 5-9a-f outlines the tasks and schedules to implement the TMDL. Each of these tasks is described below.

Table 5-9a-f

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

<u>Task</u>	<u>Description</u>	<u>Compliance Date-As soon As Possible but No Later Than</u>
<u>TMDL Phase 1</u>		
<u>Task 1</u>	<u>Establish New Waste Discharge Requirements for Nutrient Sources</u>	<u>(*6 months after BPA approval*)</u>
<u>Task 2</u>	<u>Establish New Waste Discharge Requirements for Lake Restoration Activities</u>	<u>(*18 months after BPA approval*)</u>
<u>Task 3</u>	<u>Revise Existing Waste Discharge Requirements</u>	<u>(*6 months after BPA approval*)</u>
<u>Task 4</u>	<u>Nutrient Water Quality Monitoring Program</u> <u>4.1 Watershed-wide Nutrient Monitoring Plan(s)</u> <u>4.2 Big Bear Lake Nutrient Monitoring Plan(s)</u>	<u>Plan/schedule due (*3 months after BPA approval*)</u>  <u>Annual reports due February 15</u>
<u>Task 5</u>	<u>Atmospheric Deposition Determination</u>	<u>Plan/schedule due (*1 year after BPA approval*)</u>
<u>Task 6</u>	<u>Big Bear Lake and Watershed Model Updates</u>	<u>Plan/schedule due (*6 months after BPA approval*)</u>
<u>Task 7</u>	<u>Big Bear Lake In-Lake Sediment Nutrient Reduction Plan</u>	<u>Plan/schedule due (*1 year after BPA approval*)</u>
<u>Task 8</u>	<u>Big Bear Lake Aquatic Plant Management Plan</u>	<u>Plan/schedule due (*1 year after BPA approval*)*</u>  <u>5 year report due (*5 years after Regional Board approval of plan/schedule); thereafter, annual reports due February 15</u>
<u>Task 99</u>	<u>Big Bear Lake Multimetric Index Development Plan</u>	<u>Plan/schedule due (*1 year after BPA approval*)</u>
<u>TMDL Phase 2</u>		
<u>Task 10</u>	<u>Review and Revise Nutrient Water Quality Objectives</u>	<u>December 31, 2010</u>
<u>Task 11</u>	<u>Review Big Bear Lake Tributary Data</u>	<u>December 31, 2008</u>
<u>Task 12</u>	<u>Develop TMDLs, WLAs and LAs for wet and/or average hydrological conditions</u>	<u>December 31, 2012</u>
<u>Task 13</u>	<u>Review of TMDLs/WLAs/LAs</u>	<u>Once every 3 years</u>

[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 and monitoring and reporting requirements for Forested Area.

1.2 Waste Discharge Requirements (WDRs) or Conditional Waiver of WDRS to the Big Bear Mountain Resorts to incorporate the nutrient load allocation 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 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 nutrient wasteload allocation and TMDL monitoring 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. 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:

- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| • <u>total nitrogen</u>               | • <u>ammonia nitrogen</u>         |
| • <u>nitrate + nitrite nitrogen</u>   | • <u>total dissolved nitrogen</u> |
| • <u>total phosphorus</u>             | • <u>ortho-phosphate (SRP)</u>    |
| • <u>total dissolved phosphorus</u>   | • <u>temperature</u>              |
| • <u>total suspended solids (TSS)</u> | • <u>turbidity</u>                |
| • <u>chlorophyll <i>a</i></u>         | • <u>pH</u>                       |
| • <u>dissolved oxygen</u>             | • <u>conductivity</u>             |
| • <u>alkalinity</u>                   | • <u>hardness</u>                 |

Note: Chlorophyll *a* will only be collected and analyzed 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*

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

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

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

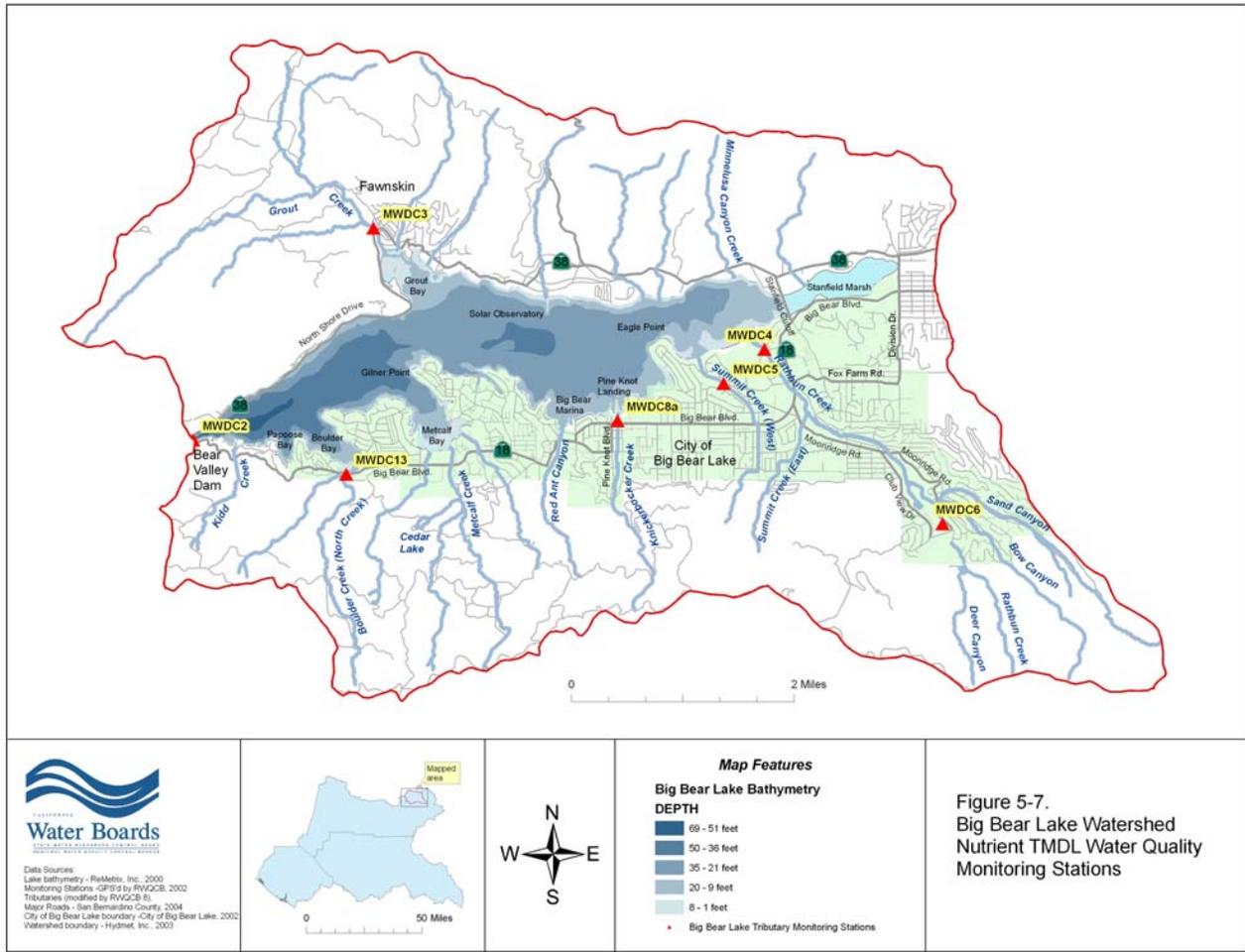
Big Bear Lake Watershed  
Sampling Frequency

<u>Flow type</u>	<u>Months monitoring is required</u>	<u>Frequency</u>
<u>Baseflow</u>	<u>January 1 – December 31</u>	<u>Once/month when baseflow is present;</u>
<u>Snow melt</u>	<u>January 1 – May 31<sup>1</sup></u>	<u>Varied -See note 2 below</u>
<u>Storm events</u>	<u>January 1 – December 31</u>	<u>3 storms per year<sup>3</sup></u>

<sup>1</sup> Sampling to begin after the first substantial snowfall resulting in an accumulation of 1.0 inch or more of snow

<sup>2</sup> Samples to be collected daily for the first three days of the snow melt period. If ambient air temperatures remain above freezing after three days have passed, snow melt sampling will then be performed once a week for the following three weeks or until the snow melt period ceases. Snow 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 snow melt event was initiated. Beginning March 15<sup>th</sup> of each year, snow melt flows will most likely be continuous since ambient air temperatures will usually remain above freezing. From March 15<sup>th</sup> through May 31 of each year, snow melt sampling events will be conducted daily for the first two days of a snow 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.

<sup>3</sup> 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. 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:

- specific conductance
- water temperature
- chlorophyll *a*
- total nitrogen
- nitrate +nitrite nitrogen
- total phosphorus
- total hardness
- total dissolved phosphorus
- dissolved organic carbon (DOC)
- total dissolved nitrogen
- dissolved oxygen
- water clarity (secchi depth)
- ammonia nitrogen
- alkalinity
- turbidity
- ortho-phosphate (SRP)
- total suspended solids (TSS)
- pH
- total dissolved solids (TDS)
- total organic carbon (TOC)

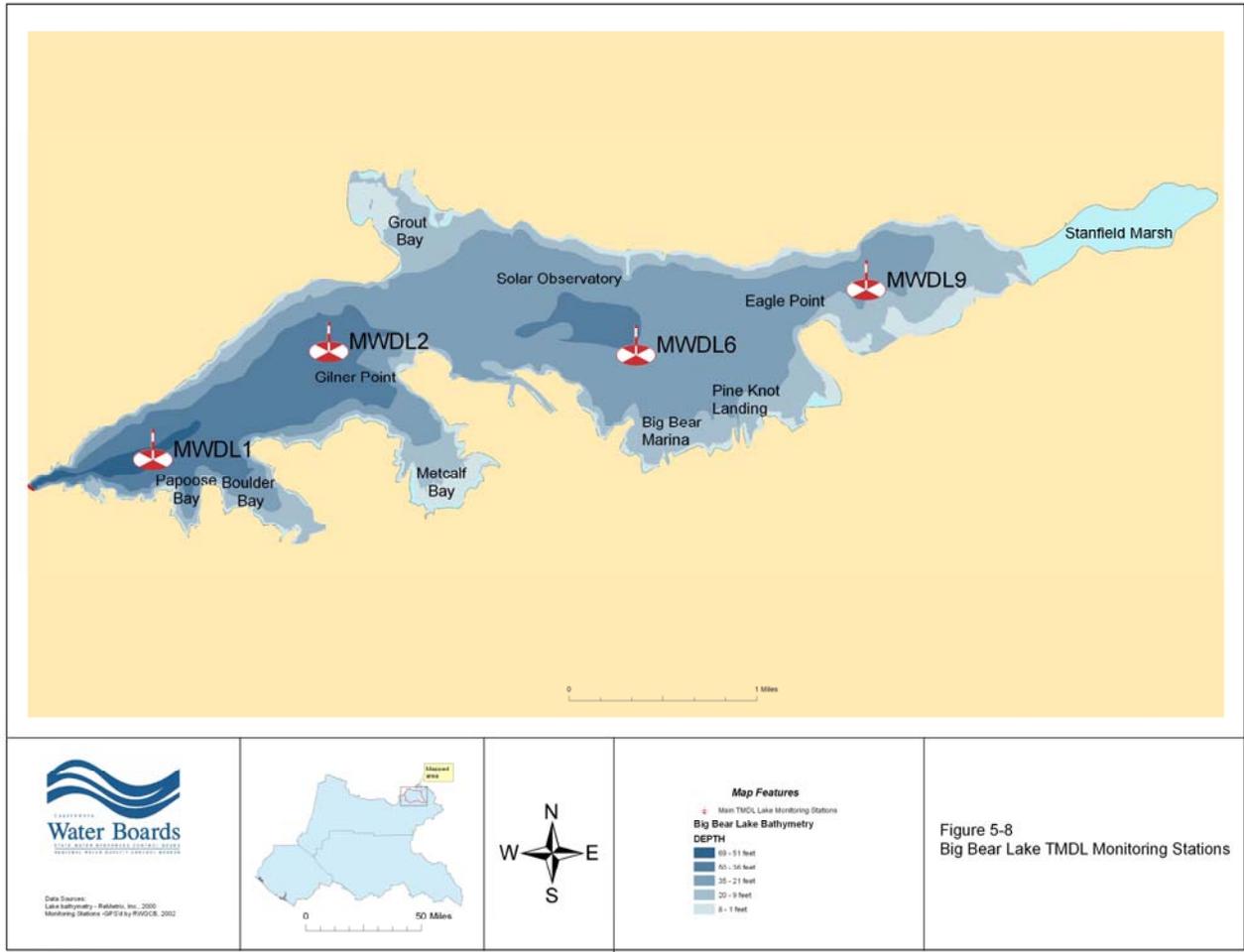
The monitoring plan shall be implemented upon Regional Board approval at a duly noticed public meeting. An annual report summarizing the data collected for the year and evaluating compliance with the TMDL shall be submitted by February 15 of each year.

Table 5-9a-i

Big Bear Lake Minimum Required Sampling Station Locations

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

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: 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 10: Review and Revision of Water Quality Objectives**

By December 31, 2010, the Regional Board shall review 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. Given budgetary constraints, completion of this task is likely to require substantive contributions from interested parties.

#### **Task 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 12: Development of TMDL for 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 6) to develop proposed nutrient TMDLs for Big Bear Lake for average and/or wet hydrological conditions.

**Task 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 schedule will be re-evaluated at least once every three years<sup>1</sup> 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.

**References**

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

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<sup>1</sup> The three-year schedule is tied to the 3 year triennial review schedule.