California Regional Water Quality Control Board
Santa Ana Region

December 12, 2014

ITEM: 12

SUBJECT: REVISED REGIONAL MONITORING PROGRAM FOR THE NEWPORT BAY WATERSHED NUTRIENT TMDL

INTRODUCTION

On April 17, 1998 and October 9, 1998, the Santa Ana Regional Water Quality Control Board (Regional Board) adopted Resolution No. 98-9 and Resolution No. 98-100, respectively, establishing a nutrient TMDL for the Newport Bay/San Diego Creek Watershed. The nutrient TMDL was approved by U.S. EPA on April 16, 1999.

On October 7, 1999, the Regional Board adopted Resolution No. 99-77, establishing a regional monitoring program (RMP) for the nutrient TMDL. The objective of the RMP is to provide data for assessing the three endpoints of the TMDL:

1. The seasonal nitrogen and phosphorus loading to San Diego Creek and Newport Bay (collectively, the Newport Bay watershed);
2. The concentration of nitrogen and phosphorus in Reach 1 and Reach 2 of San Diego Creek; and,
3. The extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay.

The RMP specified routine data collection at nine freshwater tributary monitoring stations, five in-bay stations and nine in-bay macroalgae biomass stations. In addition to routine monitoring, the RMP also specified eight special monitoring studies to fill data gaps and assess the appropriateness of the TMDL. All eight of these studies have been completed (Table 1).

The County of Orange has been implementing the RMP on behalf of the cities and other stakeholders in the watershed and submitted the first annual report for the monitoring program in November 2001. In 2006, the RMP was amended to include quarterly reporting requirements (Resolution No. 2006-0063), and the County has been submitting quarterly reports since January 2007.

A considerable volume of data has been collected to date. Based on these data, significant progress has been made towards achieving the nutrient TMDL objectives. In addition, land use in the watershed has changed substantially as former agricultural lands have been converted to urban land uses. These land use changes can substantially alter the nature and magnitude of nutrient sources. Taken together, these circumstances warrant revision of the RMP.

Staff proposes changes to the RMP, reducing the number of stations and the frequency of monitoring and reporting. The revised monitoring program (Monitoring and Reporting Program No. R8-2014-0079) is included as an attachment to Resolution No. R8-2014-0079. Changes to the monitoring program and the rationale for these changes are detailed below.

CHANGES TO THE MONITORING AND REPORTING PROGRAM

Tables 2 and 3 list the proposed locations, analytes, and monitoring frequencies for the freshwater tributary and Newport Bay monitoring program elements, respectively. Table 4 lists the proposed locations, analytes and monitoring frequencies for the Newport Bay macroalgae monitoring element of the program. Recommended revisions to the existing monitoring plan are shown in strikeout and underline format.

The recommended changes to the RMP are summarized below:

1. Reduce dry-weather sampling frequency:
    - From weekly to monthly at one station (SDMF05)
    - From twice per month to monthly at three stations (SADF01, BARSED, and WYLSED)
    - From monthly to quarterly at one station (BCF04)
    - From monthly to quarterly at all five in-bay water quality stations
    - Eliminate off-season monitoring at the in-bay macroalgal biomass stations

2. Remove stations:
    - Remove Lane Channel freshwater tributary monitoring station (LANF08)
    - Remove macroalgae monitoring station Horne #18
    - Remove planned but unused nursery and agricultural stations

3. Reduce reporting/data transmittal frequency:
    - From quarterly to annual for the monitoring program report and transmittal of flow data
    - From quarterly to semi-annual for transmittal of water quality data

4. Correct minor typographical errors in station names (SADF01, MIRF07, UNBNSB)

5. Remove unnecessary analyte (hardness)

6. Formalize minor corrections/adjustments made at the outset of the macroalgal monitoring program:
   - Replace "transect" with "quadrat"
   - Replace station Horne#8 by Horne#7
   - Replace station Horne#10 by Horne#9
   - Replace station Horne#16 by Horne#15
   - Replace station Horne#12 by Horne#13

RATIONALE FOR THE CHANGES

Freshwater tributary monitoring reductions: Changes to the freshwater monitoring element of the RMP are shown on Table 2. Reducing the dry-weather monitoring frequency from weekly or twice per month to monthly at the freshwater tributary monitoring stations is consistent with the findings of a study completed by the Southern California Coastal Water Research Project (SCCWRP)[1]. This study demonstrated that the optimal sampling frequency for detecting a statistically significant difference from a water quality threshold was between seven and fifteen samples per year in the three freshwater tributaries that discharge directly to Upper Newport Bay (San Diego Creek, Santa Ana Delhi, and East Costa Mesa Channel).

Quarterly monitoring at the Bonita Canyon (BCF04) station is sufficient because the loading from this station is low enough to not significantly affect the total nutrient load to Newport Bay. However quarterly data are still being required to assess the loading rate from this area of the watershed.

The Lane Channel monitoring station is being eliminated because although it was included in the RMP to provide data for calculating the urban nutrient load, the data demonstrate that most of the dry-weather flow in the channel originates from groundwater and it is thus not representative of urban runoff.

Bay water-column monitoring reductions: Reducing the monitoring frequency from monthly to quarterly at the in-bay water column monitoring stations is reasonable because the data are not being used to compare to a regulatory threshold but to provide general information about nutrient trends in the bay. These changes are shown on Table 3.

Bay macroalgae monitoring: In 1996, the Regional Board issued a discharge permit (Order No. 96-2) to the Irvine Ranch Water District (IRWD) that included a requirement to monitor macroalgae in Newport Bay. IRWD's consultant, Horne Associates, selected 24 locations in Upper Newport Bay to conduct the monitoring. The RMP specified that nine of these locations be used to quantify macroalgal biomass in the bay. Horne Associates subsequently transferred the macroalgal monitoring program to the County of Orange. However only eight locations were included and Horne Associates shifted four of the locations to adjacent stations in order to select the most representative

[1] Schiff KC, AE Fetscher, and M Hanken 2014. Newport Bay Watershed Monitoring Evaluation

subset of monitoring locations. While staff had no objection to these changes, they were never previously formalized in the RMP. These changes are shown on Table 4.

Macroalgal biomass data collected from mudflats in Upper Newport Bay over the past sixteen years demonstrate that the peak period for macroalgal biomass is typically between July and September. Peak macroalgal biomass has declined significantly since the monitoring program was established and, for the past two years, has been below levels indicative of impairment[2]. Quantifying macroalgal biomass outside of the peak period, when biomass levels are unlikely to impair beneficial uses, is not a high priority.

Agriculture/nursery monitoring: Although the RMP was intended to eliminate redundancies by encouraging dischargers to participate in a single monitoring program, the program did not expand to include nurseries and other agricultural land uses. Nurseries continued collecting monitoring data under their own discharge permits. Compliance with the TMDL load allocation for nurseries was assessed through monitoring required by these permits. Assessment of the unpermitted nurseries found only one with dry weather discharge, and it was issued a discharge permit. Three of the four permitted nurseries ceased operations in 2010. Monitoring of orchards and row crops was conducted separately from the RMP through a voluntary program undertaken by the University of California Cooperative Extension. Many of the areas that were included in this program have been converted to urban uses. Agricultural land use has declined from about six percent of the watershed area when the TMDL was adopted, to less than two percent currently. Runoff from the remaining agricultural land in the watershed will be assessed separately from the RMP.

Special studies: All eight special studies required by the RMP have been completed. Most of these studies were directed at characterizing nutrient sources that were not well-defined. The Nutrient TMDL reserved a portion of the nitrogen and phosphorus load for these "undefined" sources, including: open space runoff, atmospheric deposition, rising groundwater, groundwater dewatering and cleanup, and internal loading from Newport Bay. Table 1 lists these studies.

Reporting: The quarterly reporting schedule was initiated in 2006 after very large macroalgal blooms occurred in Newport Bay following the heavy rainfall season of 2004-05. Quarterly reporting allowed staff to closely monitor algal bloom conditions and nutrient loads. However, such a large bloom has not occurred since 2006 and the monitoring data demonstrate that substantial reductions in nitrogen concentrations and loads occurred in subsequent years. As such, it is reasonable to return to an annual reporting frequency, while still requiring data transmittals on a semi-annual basis.

[2] Indicative levels recommended by SCCWRP: Sutula et al., 2014. Thresholds of Adverse Effects of Macroalgal Abundance and Sediment Organic Matter on Benthic Habitat Quality in Estuarine Intertidal Flats. Estuaries and Coasts, Volume 37, Issue 6, pp 1532-1548

Table 1: Completed Nutrient TMDL Special Studies

	RMP Proposed Study/Investigation	Completed Project Reference	Lead Organization
1	Aerial mapping of algae distribution	Nezlin, N., Kamer K. Stein ED, Carr A., and J. Hyde. Relationships Between Dissolved Oxygen and Macroalgal Distributions in Upper Newport Bay, SCCWRP Technical Report No. 494	SCCWRP
2	Open space nutrient loading	Meixner et al., 2004. Sources of Selenium, Arsenic, and Nutrients in the Newport Bay Watershed, (Contract Report to the SARWQCB)	UC-Riverside/CSU Los Angeles
3	Shallow groundwater contribution to San Diego Creek system	Hibbs, B. 2008. Selenium, Nitrate and Other Constituents in the San Diego Creek and Newport Bay Watersheds. Report to the Santa Ana Regional Water Quality Control Board. Contract No. 03-117-558-0	CSU Los Angeles
4	Algae survey of San Diego Creek system	Simpson 2006. Algae Survey in the Newport Bay Watershed	County of Orange
5	Nutrient fluxes from Newport Bay sediments and algae	Sutula, et al, 2006. Sediments as an Internal Source of Nutrients to Upper Newport Bay. SCCWRP Technical Report No. 482	SCCWRP
6	Nutrient concentrations in Newport Bay and San Diego Creek sediments	Sutula, et al, 2006 and County of Orange Sediment TMDL Reports	SCCWRP/County of Orange
7	Quantification of beneficial use impairment of Newport Bay	Sutula et al, 2013. Macroalgal abundance and benthic habitat quality in estuarine intertidal flats	SCCWRP
8	Quantification of precipitation loading	Meixner et al., 2004. Sources of Selenium, Arsenic, and Nutrients in the Newport Bay Watershed, (Contract Report to the SARWQCB)	UC-Riverside/CSU Los Angeles

Table 2: Newport Bay Watershed Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
~~SDMF01~~ SADF01 Santa Ana Delhi @ Irvine Avenue	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	~~Bi-monthly~~ Monthly	~~24~~ 12	1	~~24~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Bi-monthly~~ Monthly	~~24~~ 12	1	~~24~~ 12
	Physicals	Flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
SDMF05 San Diego Creek @ Campus Drive	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	~~Weekly~~ Monthly	~~52~~ 12	1	~~52~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Weekly~~ Monthly	~~52~~ 12	1	~~52~~ 12
	Physicals	Flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
BCF04 Bonita Canyon @ San Diego Creek	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	~~Monthly~~ Quarterly	~~12~~ 4	1	~~12~~ 4
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Monthly~~ Quarterly	~~12~~ 4	1	~~12~~ 4
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
CMCG02 Costa Mesa Channel @ Highland Avenue	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum

Table 2: Newport Bay Watershed Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
MICRF07 El Modena-Irvine Channel @ Michelle Drive	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
~~LANF08 Lane Channel @ Jamboree~~	~~Physicals~~	~~temp, conductivity, turbidity, pH, DO, hardness~~	~~Monthly~~	~~12~~	~~1~~	~~12~~
	~~Nutrients~~	~~TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)~~	~~Monthly~~	~~12~~	~~1~~	~~12~~
	~~Physicals~~	~~temp, conductivity, turbidity, pH, DO, hardness~~	~~Storm~~	~~3 minimum~~	~~1~~	~~3 minimum~~
	~~Nutrients~~	~~TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)~~	~~Storm~~	~~3 minimum~~	~~1~~	~~3 minimum~~
ACWF18 Agua Chinon Wash @ Irvine Center Drive	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
BARSED Peters Canyon Wash @ Barranca Parkway	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	~~Bi-monthly~~ Monthly	~~24~~ 12	1	~~24~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Bi-monthly~~ Monthly	~~24~~ 12	1	~~24~~ 12
	Physicals	Flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum

Table 2: Newport Bay Watershed Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
WYLSED San Diego Creek @ Culver Drive	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	~~Bi-monthly~~ Monthly	~~24~~ 12	1	~~24~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Bi-monthly~~ Monthly	~~24~~ 12	1	~~24~~ 12
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO~~, hardness~~	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
~~Currently permitted nurseries (Hines, El Modeno, Bordiers)~~	~~Physicals~~	~~temp, conductivity, turbidity, pH, DO, hardness~~	~~Weekly~~	~~52~~	~~1~~	~~52~~
	~~Nutrients~~	~~TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)~~	~~Weekly~~	~~52~~	~~1~~	~~52~~
	~~Physicals~~	~~flow~~	~~Daily~~	~~NA~~	~~NA~~	~~NA~~
~~Currently unpermitted nurseries (possibly 1 to 10)~~	~~Physicals~~	~~temp, conductivity, turbidity, pH, DO, hardness~~	~~Weekly~~	~~52~~	~~1~~	~~52~~
	~~Nutrients~~	~~TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)~~	~~Weekly~~	~~52~~	~~1~~	~~52~~
	~~Physicals~~	~~flow~~	~~Daily~~	~~NA~~	~~NA~~	~~NA~~
~~Agricultural Discharges (sites to be determined)~~	~~Physicals~~	~~temp, conductivity, turbidity, pH, DO, hardness~~	~~Irrigation/ Storm~~	~~NA~~	~~NA~~	~~NA~~
	~~Nutrients~~	~~TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)~~	~~Irrigation/ Storm~~	~~NA~~	~~NA~~	~~NA~~
	~~Physicals~~	~~flow~~	~~Daily~~	~~NA~~	~~NA~~	~~NA~~

temp = Temperature
DO = Dissolved Oxygen
TN = Total Nitrogen
TP = Total Phosphorus

Table 3: Newport Bay Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
UNBJAM	Physicals	temp, conductivity, turbidity, pH, DO, ~~hardness~~	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
UNBSDC	Physicals	temp, conductivity, turbidity, pH, DO, ~~hardness~~	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
UNBN~~B~~SB	Physicals	temp, conductivity, turbidity, pH, DO, ~~hardness~~	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
UNBCHB	Physicals	temp, conductivity, turbidity, pH, DO, ~~hardness~~	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
LNBHIR	Physicals	temp, conductivity, turbidity, pH, DO, ~~hardness~~	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	~~Monthly~~ Quarterly	~~12~~ 4	3 (1 @ 3 depths)	~~36~~ 12

temp = Temperature
DO = Dissolved Oxygen
TN = Total Nitrogen
TP = Total Phosphorus

Table 4: Newport Bay Algae Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
Horne #2 (South end of Shellmaker Is.)	Physicals	temp, conductivity, DO	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3
Horne #4 (South tip of Middle Is.)	Physicals	temp, conductivity, DO	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3
Horne ~~#8~~7 (~~N end of Middle Is.~~S end of Upper Is.)	Physicals	temp, conductivity, DO	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3

Table 4: Newport Bay Algae Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
Horne ~~#109~~ (NW side of ~~the Narrows~~ Upper Is.)	Physicals	temp, conductivity, DO	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3
Horne ~~#1213~~ (SW side of Unit II Basin)	Physicals	temp, conductivity, DO	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3
Horne ~~#165~~ (N end of Unit II Basin, W side of Dike)	Physicals	temp, conductivity, DO	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season~~/Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3

Table 4: Newport Bay Algae Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
~~Horne #18~~ ~~(S side of Unit I Basin)~~	~~Physicals~~	~~temp, conductivity, DO~~	~~Monthly during season/Bimonthly off-season~~	~~9~~	~~1~~	~~9~~
	~~Nutrients~~	~~TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)~~	~~Monthly during season/Bimonthly off-season~~	~~9~~	~~1~~	~~9~~
	~~Algae~~	~~biomass, species composition~~	~~Monthly during season/Bimonthly off-season~~	~~9~~	~~transect~~	~~9~~
Horne #19 (NW side of Unit I Basin)	Physicals	temp, conductivity, DO	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae	biomass, species composition	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3
Horne #24 (NE side of Unit I Basin)	Physicals	temp, conductivity, DO	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	1	~~9~~ 3
	Algae biomass, species composition		Monthly during peak season/~~Bi-monthly off season~~	~~9~~ 3	~~transect~~ quadrat	~~9~~ 3

temp = Temperature
DO = Dissolved Oxygen
TN = Total Nitrogen
TP = Total Phosphorus

California Regional Water Quality Control Board
Santa Ana Region

RESOLUTION NO. R8-2014-0079

Resolution Approving Revisions to the Regional Monitoring Program for the Nutrient TMDL in the Newport Bay/San Diego Creek Watershed.

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

1. **Basin Plan:** 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. **Nutrient TMDL:** Amendments to the Basin Plan to incorporate a nutrient Total Maximum Daily Load (TMDL) for the San Diego Creek/Newport Bay Watershed were adopted by the Regional Board on April 17 and October 9, 1998, and approved by the State Water Resources Control Board on November 4, 1998, by the Office of Administrative Law on February 10, 1999, and by the US Environmental Protection Agency on April 16, 1999.

3. **Clean Water Act:** The San Diego Creek/Newport Bay Watershed Nutrient TMDL was developed in accordance with Clean Water Act Section 303(d) and Water Code Section 13240 *et seq.* The amendment is incorporated into Chapter 5 "Implementation", of the Basin Plan.

4. **Monitoring Requirement:** The San Diego Creek/Newport Bay Watershed Nutrient TMDL requires the Regional Board to establish and oversee a Regional Monitoring Program (RMP) for the Newport Bay Watershed.

5. **RMP Objective:** Section 2.c.1 of the nutrient TMDL states that the objective of the RMP is to provide data for assessing the three endpoints of the TMDL:
   1. The seasonal nutrient loading from San Diego Creek and Newport Bay;
   2. The concentration of nitrogen in San Diego Creek Reach 1 and Reach 2; and,
   3. The extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay.

6. **Regional Monitoring Program:** On October 7, 1999 the Regional Board approved the Regional Monitoring Program (RMP) for the San Diego Creek/Newport Bay Watershed Nutrient TMDL. On August 25, 2006, the

Regional Board approved revisions to the RMP to include quarterly reporting and to specify data transmittal requirements.

7. **RMP Implementation:** In compliance with the RMP, the County of Orange, on behalf of the watershed cities and other stakeholders, began submitting annual monitoring reports on November 15, 2001, and quarterly reports in January 2007.

8. **TMDL Implementation:** To date, the RMP data demonstrate that the TMDL numeric targets for nitrogen loading to Newport Bay have been achieved. Macroalgal blooms in Upper Newport Bay have been greatly reduced and peak annual macroalgal biomass is currently below levels indicative of impairment. The TMDL numeric target for phosphorus loading to Newport Bay, and the TMDL numeric target for Reach 2 of San Diego Creek have not been achieved. The existing numeric objective for nitrogen in Reach 2 of San Diego Creek has also not been achieved.

9. **RMP Revision:** It is appropriate to update the RMP station locations and reduce the monitoring and reporting frequencies in view of the enhanced characterization of nutrient sources developed over the past sixteen years of monitoring, the significant land use changes in the watershed after the TMDL was adopted, and the progress that has been made towards achieving the TMDL numeric targets.

NOW, THEREFORE, BE IT RESOLVED THAT:

1. The Regional Board approves the revisions to the nutrient TMDL Regional Monitoring Program, as set forth in Monitoring and Reporting Program No. R8-2014-0079 (Attachment A to this Resolution).

2. The County of Orange shall submit the first annual report and data transmittal under the new schedule on December 15, 2015.

I, Kurt V. Berchtold, 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 December 12, 2014.

Kurt V. Berchtold
Executive Officer

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SANTA ANA REGION

MONITORING AND REPORTING PROGRAM NO. R8-2014-0079

FOR THE
NEWPORT BAY/SAN DIEGO CREEK WATERSHED NUTRIENT TMDL
(RESOLUTION NO. 98-9 AND RESOLUTION NO. 98-100)

California Water Code sections 13267 and 13383 authorize the Regional Water Quality Control Board (Regional Board) to require technical and monitoring reports. On April 17, 1998 and October 9, 1998, the Regional Board adopted Resolution No. 98-9 and Resolution No. 98-100, respectively, establishing a nutrient Total Maximum Daily Load (TMDL) for the Newport Bay/San Diego Creek Watershed. The nutrient TMDL was approved by U.S. EPA on April 16, 1999. On October 7, 1999 the Regional Board adopted Resolution No. 99-77, establishing a regional monitoring program (RMP) for the nutrient TMDL. In 2006, the Regional Board adopted Resolution No. 2006-0063, amending the RMP to include quarterly reporting requirements.

A. GENERAL MONITORING PROVISIONS

1. Where applicable, all sampling and sample preservation shall be in accordance with the current edition of *"Standard Methods for the Examination of Water and Wastewater"* (American Public Health Association).

2. All laboratory analyses shall be performed in accordance with test procedures under 40 CFR 136 "Guidelines Establishing Test Procedures for the Analysis of Pollutants," promulgated by the United States Environmental Protection Agency (USEPA), unless otherwise specified in this MRP. In addition, the Regional Board and/or USEPA, at their discretion, may specify test methods that are more sensitive than those specified in 40 CFR 136.

3. Chemical, bacteriological, and bioassay analyses shall be conducted at a laboratory certified for such analyses by the Environmental Laboratory Accreditation Program administered by State Water Resources Control Board (SWRCB) in accordance with Water Code Section 13176, and must include quality assurance/quality control data with the reports, or at laboratories approved by the Regional Board's Executive Officer or the USEPA.

4. Whenever the County monitors any pollutant more frequently than is required by this Resolution, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the monitoring report specified by the Executive Officer.

5. The County shall have, and implement an acceptable written quality assurance plan (QAP) for laboratory analyses. Duplicate chemical analyses must be conducted on a minimum of ten percent (10%) of the samples, or at least one sample per month, whichever is greater. A similar frequency shall be maintained for analyzing spiked samples.

6. All analytical data shall be reported with identification of practical quantitation levels and with method detection limits, as determined by the procedure found in 40 CFR 136.

7. The flow measurement system shall be calibrated at least once per year or more frequently, to ensure continued accuracy.

8. All monitoring instruments and devices used by the County to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

9. Monitoring and reporting shall be in accordance with the following:

   a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

   b. Whenever the County monitors any pollutant more frequently than is required by this Resolution, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the monitoring report specified by the Regional Board's Executive Officer.

   c. A "grab" sample is defined as any individual sample collected in less than 15 minutes.

   d. A composite sample is defined as a combination of no fewer than eight individual grab samples obtained over the specified sampling period. The volume of each individual grab sample shall be proportional to the discharge flow rate at the time of sampling. The compositing period shall equal the specific sampling period, or 24 hours, if no period is specified.

   e. Daily samples shall be collected on each day of the week.

   f. Monthly samples shall be collected on any representative day of each month.

   g. Quarterly samples shall be collected on any representative day of February, May, August, and November.

B. FRESHWATER TRIBUTARY MONITORING

1. The County shall implement the monitoring program for freshwater tributaries to Newport Bay as listed in Table 1 below.

2. The stations listed in Table 1 are a subset of those described in Section C-11-III.1 of the County's 2012-13 Stormwater Report (Unified Annual Progress Report Program Effectiveness Assessment, Santa Ana Region).

3. The storm condition is defined as when the flow at the SDMF05 station exceeds 50 cubic feet per second due to precipitation.

Table 1: Newport Bay Watershed Freshwater Tributary Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
SADF01 Santa Ana Delhi @ Irvine Avenue	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
SDMF05 San Diego Creek @ Campus Drive	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum

Table 1: Newport Bay Watershed Freshwater Tributary Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
BCF04 Bonita Canyon @ San Diego Creek	Physicals	temp, conductivity, turbidity, pH, DO	Quarterly	4	1	4
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Quarterly	4	1	4
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
CMCG02 Costa Mesa Channel @ Highland Avenue	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
MIRF07 El Modena-Irvine Channel @ Michelle Drive	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
ACWF18 Agua Chinon Wash @ Irvine Center Drive	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum

Table 1: Newport Bay Watershed Freshwater Tributary Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
BARSED Peters Canyon Wash @ Barranca Parkway	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum
WYLSED San Diego Creek @ Culver Drive	Physicals	temp, conductivity, turbidity, pH, DO	Monthly	12	1	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly	12	1	12
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, pH, DO	Storm	3 minimum	1	3 minimum
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Storm	3 minimum	1	3 minimum

temp = Temperature
DO = Dissolved Oxygen
TN = Total Nitrogen
TP = Total Phosphorus

C. NEWPORT BAY WATER COLUMN MONITORING

1. The County shall implement the Newport Bay water column monitoring program as listed in Table 2 below.

2. The stations listed in Table 2 are a subset of those described in Section C-11-III.1 of the County's 2012-13 Stormwater Report (Unified Annual Progress Report Program Effectiveness Assessment, Santa Ana Region).

Table 2: Newport Bay Water Column Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
UNBJAM	Physicals	temp, conductivity, turbidity, pH, DO	Quarterly	4	3 (1 @ 3 depths)	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Quarterly	4	3 (1 @ 3 depths)	12
UNBSDC	Physicals	temp, conductivity, turbidity, pH, DO	Quarterly	4	3 (1 @ 3 depths)	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Quarterly	4	3 (1 @ 3 depths)	12
UNBNSB	Physicals	temp, conductivity, turbidity, pH, DO	Quarterly	4	3 (1 @ 3 depths)	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Quarterly	4	3 (1 @ 3 depths)	12
UNBCHB	Physicals	temp, conductivity, turbidity, pH, DO	Quarterly	4	3 (1 @ 3 depths)	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Quarterly	4	3 (1 @ 3 depths)	12
LNBHIR	Physicals	temp, conductivity, turbidity, pH, DO	Quarterly	4	3 (1 @ 3 depths)	12
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Quarterly	4	3 (1 @ 3 depths)	12

temp = Temperature
DO = Dissolved Oxygen
TN = Total Nitrogen
TP = Total Phosphorus

D. NEWPORT BAY MACROALGAE MONITORING

1. The County shall implement the monitoring program for macroalgae in Upper Newport Bay as listed in Table 3 below.

2. The peak season for macroalgal growth is July, August and September.

Table 3: Newport Bay Macroalgae Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
Horne #2 (South end of Shellmaker Is.)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3
Horne #4 (South tip of Middle Is.)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3
Horne #7 (S end of Upper Is)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3
Horne #9 (NW side of Upper Is.)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3

Table 3: Newport Bay Macroalgae Monitoring

Station	Analysis	Constituents	Frequency	Annual Frequency	Samples per Station	Annual Samples per Station
Horne #13 (SW side of Unit II Basin)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3
Horne #16 (N end of Unit II Basin, W side of Dike)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3
Horne #19 (NW side of Unit I Basin)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3
Horne #24 (NE side of Unit I Basin)	Physicals	temp, conductivity, DO	Monthly during peak season	3	1	3
	Nutrients	TN(nitrate, nitrite, ammonia, kjeldahl) TP(ortho)	Monthly during peak season	3	1	3
	Algae	biomass, species composition	Monthly during peak season	3	quadrat	3

temp = Temperature
DO = Dissolved Oxygen
TN = Total Nitrogen
TP = Total Phosphorus

E. REPORTING

1. Annual Report Schedule

a. The County shall submit an annual monitoring report to the Regional Board by December 15 of each year. The report shall present the results of the preceding winter (October through March) and the prior year's summer (April through September) seasons. Final water quality and flow data for April through June of the same year shall also be included in the Annual Report but the analyses of those data will be included in the next Annual Report.

b. Annual reports shall be submitted electronically.

c. Annual reports shall, at a minimum, include summary statistics for each analyte sampled at each monitoring location in the watershed, categorized by season (as defined by the nutrient TMDL).

d. If the annual report due date listed above falls on a weekend, the report will not be due until the next business day.

2. Annual Report Compliance Evaluation

a. The annual report shall include an evaluation of compliance with the seasonal nitrogen and phosphorus loads to Newport Bay. This load shall be calculated using data from the following monitoring locations:

San Diego Creek at Campus Drive (SDMF05)
Santa Ana Delhi Channel at Irvine Boulevard (SADF01)
Bonita Canyon at MacArthur Boulevard (BCF04)
East Costa Mesa Channel at Highland Drive (CMCG02)

b. The annual report shall include an evaluation of compliance with the seasonal nitrogen and phosphorus urban load allocation. This load shall be calculated using data from the East Costa Mesa Channel at Highland Drive (CMCG02) and El Modena Irvine Channel at Michelle (MIRF07) monitoring stations. The urban load for nitrogen and phosphorus will be determined by applying the loading rates determined from these two stations to the total urban land use area in the watershed.

c. The annual report shall include an evaluation of compliance with the nitrogen water quality objectives in San Diego Creek, Reaches 1 and 2. The nitrogen concentration in San Diego Creek, Reaches 1 and 2, will be determined from samples collected at the San Diego Creek at Campus (SDMF05) and San Diego Creek at Culver (WYLSED) stations respectively.

d. The macroalgal monitoring data from Upper Newport Bay will continue to be used to quantify macroalgal biomass.

3. Data Transmittals

a. The County shall submit water quality data to the Regional Board on a semi-annual basis. The data transmittal for the winter season and the first half of the summer season (October through June) will be due by December 15 as part of the Annual Report submission. The data transmittal for the second half of the summer season (July through September) will be due by April 15. The data transmittals will thus include data that were collected six to twelve months prior to the transmittals.

b. The County shall submit finalized flow data (July through June) to the Regional Board staff on an annual basis along with the annual report.

c. The data transmittals to the Regional Board shall be in the form developed by the Stormwater Monitoring Coalition (SMC) and approved by the State Water Resources Control Board in the document entitled "Standardized Data Exchange Formats." This document was developed in order to provide a standard format for all data transfer so that data can universally be shared and evaluated from various programs.

e. The data transmittals shall be submitted electronically.

f. If the semi-annual data transmittal due date listed above falls on a weekend, the data transmittal will not be due until the next business day.

F. QUALITY ASSURANCE PLAN

Sampling and analysis should be performed according to a quality assurance plan that is compatible with the most recent state guidance from the Surface Water Ambient Monitoring Program (SWAMP).