



October 13, 2016

Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Attention: Linda Candelaria, Ph.D.
RB8-CuTMDL@Waterboards.ca.gov

Subject: Comments on Proposed TMDL for Copper in Newport Bay, California

Dear Dr. Candelaria and Members of the Board,

We appreciate the opportunity to provide comments on the proposed total maximum daily load (TMDL) for copper in Upper and Lower Newport Bay as described in the *Basin Plan Amendments for Copper TMDLs and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic and Chromium in Newport Bay, California*, dated August 30, 2016 (*Staff Report*).¹

We have been a partner with the Regional Board, the County, cities, and NGOs within the Newport Bay watershed. Our commitment to environmental protection and conservation guides our actions in the watershed and our continued participation in the TMDL working groups that are committed to addressing environmental concerns in the watershed. We recognize that an ecologically healthy Bay is central to the economic health of the local area and to the appeal of the Bay as a destination for boating and recreation.

We are writing to request that the Regional Board decline to adopt the proposed TMDL for copper and direct Regional Board staff to work collaboratively with stakeholders to update the evaluation of the current condition of the Bay, to define clearly any problems that require action, and to develop an effective, efficient, and collaborative solution for Newport Bay. Our request is based on the following concerns.

¹ RWQCB 2016. Staff Report - Basin Plan Amendments for Copper TMDLs and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic, and Chromium in Newport Bay, California. Santa Ana Regional Water Quality Control Board. August 30.

The impairment assessment in the proposed copper TMDL relies primarily upon outdated data that are not representative of current conditions within Newport Bay. Management actions have resulted in declining concentrations of copper in Bay sediments, including dredging to remove more than 600,000 cubic yards of sediment in the Lower Bay (conducted in 2012-2013), the State's mandated use of anti-fouling paints (AFPs) with reduced copper leach rates (adopted in 2014), and legislation that mandates a switch from copper-containing brake pads to brake pads that contain minimal levels of copper (adopted in 2009 and to be fully implemented by 2025). These significant management actions are reducing copper concentrations and improving conditions within the Bay – and will result in continued improvement in the future.

We disagree with the Regional Board's Staff Report that sediments are currently impaired—available data show that conditions in Bay sediments have improved markedly over time, and there is little indication of sediment toxicity in samples collected since 2013. While CTR criteria for dissolved copper are exceeded on occasion, available data indicate that the CTR criteria may not be reliable indicators of water column toxicity to aquatic organisms.

The proposed TMDL does not include a peer review, as required by California law, and the Regional Board does not have the authority to regulate marina owners and operators using a TMDL or using Cleanup and Abatement Orders, as they are not dischargers under the California Water Code and the Clean Water Act. We also note that the proposed TMDL implementation measures conflict with the federal regulations that apply to recreational vessels and their owners.

The proposed TMDL uses data dating back to 2000, which are not representative of current conditions, and calculations that overstate the amount of copper leaching from boats in the Bay. It relies on Sediment Quality Guidelines, which were superseded when the State Water Board's Sediment Quality Objectives (SQO) Policy became effective in 2009.

Based on available information, it is not clear that the Bay is currently impaired with respect to copper. We believe a more appropriate course of action would be to revisit the impairment assessment and conducting targeted data collection as needed to evaluate the extent of any problem, and then to determine appropriate regulatory endpoints and actions. Consistent with the past collaborative model of stakeholder participation in the watershed, we are willing to participate in a stakeholder program or working group to characterize current conditions and develop appropriate regulatory endpoints and implementation actions in lieu of a TMDL for copper.

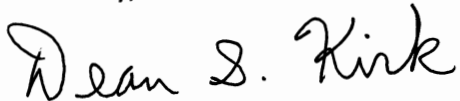
October 13, 2016

Page 3

Technical comments are detailed in the memorandum prepared by Susan C. Paulsen, Ph.D., P.E., of Exponent, which are attached to this letter.

We look forward to continuing to work with the Santa Ana Regional Board members and staff.

Sincerely,

A handwritten signature in black ink that reads "Dean S. Kirk". The signature is written in a cursive style with a large initial 'D' and 'K'.

Dean S. Kirk
Vice President
Environmental Affairs

Enclosure

cc: Kurt Berchtold, Executive Officer
William Ruh, Chair
Linda I. Ackerman, Vice Chair
Tom M. Rivera, Board Member
William von Blasingame, Board Member
James Famiglietti, Board Member
Amanda Carr, County of Orange
Dave Webb, City of Newport Beach
Balt Mejia, City of Costa Mesa
Chris Macon, City of Laguna Woods
Thomas Wheeler, City of Lake Forest
Doug Stack, City of Tustin
Gene Estrada, City of Orange
Thomas Lo, City of Santa Ana
Victor Kao, City of Irvine
Fiona Sanchez, Irvine Ranch Water District



E X T E R N A L M E M O R A N D U M

TO: Dean S. Kirk, V.P. Environmental Affairs, Irvine Company
FROM: Susan C. Paulsen, Ph.D., P.E.
DATE: October 13, 2016
SUBJECT: Technical Comments on Basin Plan Amendments for Copper TMDLs and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic, and Chromium in Newport Bay, California

This memorandum summarizes our technical comments on the Santa Ana Regional Water Quality Control Board's (Regional Board's) proposed total maximum daily load (TMDL) for copper in Upper and Lower Newport Bay.¹ Exponent's comments focus upon the technical basis of the TMDL, including concerns that the TMDL and Staff Report have not adequately characterized current conditions within Newport Bay (the Bay) and have not fully considered management actions that have already been taken to address copper in the water column and sediments of the Bay. Based on our analysis, it is not clear that a TMDL for copper in Newport Bay is needed. We recommend that the impairment assessment for the Bay be revisited, placing particular emphasis on recent data that are representative of current conditions within the Bay and identifying any additional data collection needs. The need for and extent of implementation measures should then be reassessed. The primary technical concerns we have identified, and that are discussed in this memorandum, are:

1. The sediment thresholds used in the impairment assessment and used as TMDL targets are not appropriate.
2. Many of the data used to assess impairment within the Bay are not representative of current conditions in the Bay.
3. Management actions have resulted in marked improvement within the Bay, and conditions will continue to improve in the future. These activities must be considered when assessing impairment.
4. The Regional Board's impairment assessment is incomplete, and because the assessment does not give appropriate weight to current conditions, its conclusions are not supported.
5. The Regional Board's calculations of copper loading to the Bay due to leaching from boat paints overestimate the current loading of copper to the Bay and should be revisited.

¹ RWQCB 2016. Staff Report - Basin Plan Amendments for Copper TMDLs and Non-TMDL Metals Action Plans for Zinc, Mercury, Arsenic, and Chromium in Newport Bay, California. Santa Ana Regional Water Quality Control Board. August 30.

6. The need for a TMDL has not been demonstrated, and the proposed implementation measures do not appear to be necessary.
7. Further actions are recommended instead of adoption of the proposed TMDL.

The impairment assessment in the TMDL and Staff Report rely primarily upon data collected prior to 2012 to conclude that sediment and the water column are impaired by copper but fish/mussel tissues are not. Several major management actions have reduced copper loading to the Bay since 2012, including the dredging and removal of more than 600,000 cubic yards of sediment from the Lower Bay in 2012-2013 and the 2014 requirement to use new anti-fouling paints with low copper leach rates. As described in these comments, the impairment assessment does not appear to fully consider data collected since 2012, which show lower copper concentrations in sediments and significant improvements in sediment toxicity within the Bay.

For sediment, the TMDL and Staff Report utilize “effects range medium” (ERM) and “effects range low” (ERL) Sediment Quality Guidelines (SQGs). However, the use of SQGs was superseded by the Sediment Quality Objectives (SQO) Policy that became effective throughout the State in 2009. The County of Orange has collected data at seven locations in Newport Bay since 2009 and compared analytical results to the SQOs; seven sediment samples analyzed in 2014 were all classified as “nontoxic,” continuing a trend of a significant improvement in sediment quality over the time period of 2009-2014. However, these data are not discussed in the Staff Report. Six sediment samples collected by the Orange County Coastkeeper and Linda Candelaria in 2013 similarly show no sediment toxicity, even in sediment samples collected from marina locations where ERM thresholds are exceeded for copper. The sediment data collected since 2012 show significant improvement and do not indicate that Bay sediments are impaired by copper.

The Staff Report also compared measured concentrations of dissolved copper to California Toxics Rule (CTR) criteria for copper; it appears that at least some of the exceedances of CTR criteria do not result in toxicity to aquatic organisms. These data may indicate that the CTR criteria are overly protective for Newport Bay. We recommend that additional studies be conducted to characterize current levels of dissolved copper in the Bay and to establish appropriate criteria for copper in Bay waters.

Given the data and information we have reviewed, we recommend that the impairment assessment for the Bay be revisited with a focus on recent data, using the State’s SQO Policy, and evaluating water column concentrations and toxicity, *before* a TMDL is adopted. The purpose of the reassessment would be to determine if a TMDL is needed and to determine if implementation actions are warranted beyond or in addition to those already completed or currently being implemented.

Detailed technical comments are provided below.

1. The sediment thresholds used in the impairment assessment and used as TMDL targets are not appropriate.

The assessment of sediment impairment in Newport Bay (the Bay) is not based upon the best available science. Instead of evaluating impairment using California’s SQOs, the TMDL and Staff Report used the “effects range medium” (ERM) sediment quality guideline (SQG), together with toxicity, to assess impairment of sediments. SQGs have historically been used to interpret the narrative requirements found in most Basin Plans; the narrative requirements of the Santa Ana Basin Plan are described on p. 17 of the Regional Board Staff Report.

The use of SQGs was supplanted by the State’s SQOs in August 2009 (the effective date of the SQO Policy); the State Water Board’s policy report on SQOs states that “Part 1 supersedes all applicable narrative water quality objectives and related implementation provisions in water quality control plans (basin plans) to the extent that the objectives and provisions are applied to protect bay or estuarine benthic communities from toxic pollutants in sediments.” The SQO Policy requires the collection and consideration of three lines of evidence (LOEs)—chemistry, toxicity, and benthic community health—to evaluate the condition of sediments. Results for all three LOEs are integrated for each station location, and a station is determined to be *unimpacted*, *likely unimpacted*, *possibly impacted*, *likely impacted*, or *clearly impacted*. The SQO Policy requires the use of multiple stations to assess impairment in a waterbody and states that water bodies or water segments “shall be placed on the section 303(d) list...only if the number of stations designated as not achieving the protective condition” meets the requirements of the binomial test in the State’s Listing Policy.² As discussed below, SQO data are available for the Bay but were not used by the Regional Board. The approach taken in the TMDL and Staff Report to determine impairment by relying on the combination of ERM exceedances and toxicity is inconsistent with the State’s SQO Policy.

Once SQOs have been determined to be exceeded, the SQO Policy also states that “if sediments fail to meet the narrative SQOs [according to the LOE assessment approach] the Water Boards shall direct the regional monitoring coalitions or Permittees to conduct stressor identification” to determine if a pollutant, and which pollutant(s), is/are responsible for the failure to meet SQOs. Not only has the Regional Board apparently failed to determine if the SQOs have been exceeded in the Bay, the Regional Board has not conducted stressor identification to determine if an SQO exceedance (if present) is caused by copper. Rather, the Regional Board has used the “effects range low” (ERL) SQG as the TMDL target for sediment. It is well established that sediment concentration thresholds, including SQGs such as the ERL, were not intended to be used as regulatory or compliance endpoints.³

² SWRCB. 2015. Water Quality Control Policy for Developing California’s Clean Water Act Section 303(d) List. Adopted September 30, 2004. Amended February 3, 2015.

³ The Scientific Steering Committee (SSC) convened by the SWRCB during the development of the State’s SQO Policy clearly indicated, as does the SQO Policy itself, that no single line of evidence, such as sediment chemistry concentrations of individual pollutants, can reliably be used to indicate impairment in the sediments. See, for example, the notes from the Sediment Quality Objectives Environmental Caucus Meeting with the SSC from April 6, 2005, and the SSC’s perspective on the MLOE approach, dated March 2, 2005. The SQO Policy further states at p.

The State's SQO Policy became effective when approved by the U.S. Environmental Protection Agency (EPA) on August 25, 2009, and was adopted in part because the use of a single LOE, such as pollutant sediment concentration, produced unreliable and misleading results. The SQO Policy was intended to correct and supersede the practice of using SQGs as regulatory endpoints or guidelines. Based on this information, the impairment assessment should be revisited using the SQO Policy and current data (see also the discussion below), and any impairment, if found to exist, should be addressed using the provisions of the SQO Policy.

2. Data used for impairment assessment are not representative of current conditions in the Bay.

The Regional Board's Staff Report and proposed TMDL include a Metals Impairment Assessment and Problem Statement, which concludes that the sediments and water column of the Bay are impaired by copper. However, it appears that the impairment assessment conducted by the Regional Board relies primarily upon non-representative data and data collected from older studies that do not represent the current water quality and sediment conditions in the Bay.

Although the Regional Board relied upon several different studies to evaluate impairment in the Bay, most of the studies used data from water, sediment, and tissue samples collected in the Bay prior to 2011. The Staff Report indicates that Regional Board staff relied on two primary datasets for assessing impairment in the Bay: (1) a 2007 study by the Orange County Coastkeeper and Linda Candelaria that evaluated copper concentrations in water and sediment in Lower Newport Bay (Coastkeeper and Candelaria 2007)⁴ and (2) storm water monitoring data collected by the County of Orange from 2006 to 2009 and 2009 to 2011. As discussed below, these datasets are not representative of the waterbody as a whole or current conditions and thus are not suitable for assessing impairment within the Bay.

Coastkeeper and Candelaria (2007) sampled water in the Bay specifically to evaluate whether copper present in anti-fouling paints (AFPs) applied to boats may lead to elevated copper concentrations in the water column and sediments in the vicinity of the boats. For this reason (and by design), the majority of the water and sediment samples collected during the study were collected in close proximity to boats. Although water samples were collected from the main channel as well, more samples were collected in proximity to boats than were collected in channel areas away from mooring locations. The dataset is thus biased towards elevated concentrations of copper due to the selected spatial regime of the sampling program, and the dataset does not reflect the average or typical water quality and sediment conditions within the waterbody as a whole.

To characterize conditions within the Bay, a random sampling design representative of the Bay as a whole should have been required. Many other sampling and monitoring programs in Southern

20 that the chemistry LOE (line of evidence), including threshold values, "shall not be used for setting cleanup levels or numeric values for technical TMDLs." Sediment quality guidelines, such as the ERL and ERM, are sediment threshold values that are not suitable to be used as regulatory endpoints.

⁴ Coastkeeper and Candelaria 2007. Lower Newport Bay Copper/Metals Marina Study. Final Report. Prepared by the City of Newport Beach by Orange County Coastkeeper and Linda M. Candelaria. July.

California use computer-aided random grid selection to determine the most appropriate distribution of samples to be taken from a given waterbody during a sampling event. In addition, the report appears to indicate that these data were collected in May, August, November, and December of 2006 (the year of sample collection appears to be indicated only in figure labels), and, as discussed in greater detail below, do not reflect current conditions within the Bay.

Similarly, the Staff Report utilizes data collected by Orange County from 2006 to 2009 and from 2009 to 2011 (i.e., between five and ten years ago) that do not reflect current conditions within the Bay. The staff report appears to utilize water column copper measurements collected by the County between 2006 and May 2011 to determine exceedances of California Toxics Rule (CTR) criteria for dissolved copper within the Bay.⁵ The Staff Report also appears to present the number of ERL and/or ERM exceedances for sediment metals that were measured during the period of 2006 to 2009 in the Upper and Lower Bays.⁶ Although we have received some of the data used in the impairment assessment, we have been unable to confirm where the samples were collected. In any case, these data appear to be five or more years old and, as discussed below, do not reflect recent changes that would affect copper concentrations in the Bay.

The Regional Board also relied upon smaller datasets included in several other studies, such as a study by Allen et al. 2008,⁷ which evaluated copper concentrations in sediment and fish tissue collected from the Bay, and a study by Greenstein et al. 2004 (referred to in the Staff Report as Bay et al. 2004),⁸ which evaluated sediment toxicity in the Bay. However, these studies were conducted over 8 years ago and do not represent current conditions in the Bay.

Although the Staff Report discussed more recent data that were collected in 2013, these more recent data were not fully considered in the TMDL impairment analysis. Data were collected by the Regional Board and presented in a March 2014 report.⁹ The Coastkeeper and Candelaria (2014) report indicates that concentrations of dissolved copper exceeded CTR values less frequently in the

⁵ It appears that 88 and 68 water samples were collected by the County in the Upper Bay from 2006 to 2009 and 2009 to 2011, respectively, while 44 and 34 water samples were collected by the County from the Lower Bay during the same time periods. Only the number of exceedances of the CTR value(s) is provided in the 2016 Staff Report in Table 4-5; the actual water column concentrations are not presented in the report.

⁶ The locations for sediment samples are not presented in the 2016 Staff Report or in data received from the Regional Board. It is unclear if the information in Table 4-5 of the Report represents the number of ERM or ERL exceedances or both. It appears that Table 4-5 may include information for the time period 2006–2011. In contrast, the information in Table 4-5 does not appear to be consistent with the information in Figures 4-3 and 4-4 on p. 149 of the Staff Report; these figures do not include units or a y-axis label and appear to be for the time period of 2006–2009 only.

⁷ Allen, M.J. et al. 2008. Assessment of Foodweb Transfer of Organochlorine Compounds and Trace Metals in Fishes in Newport Bay, California in 2005–2006. Southern California Coastal Research Project. May 29.

⁸ Greenstein, D.J., S.M. Bay, and J.S. Brown. 2004. Characterization of Sediment Toxicity in Newport Bay.

⁹ Coastkeeper and Candelaria 2014. *Metals Sediment Study in Lower Newport Bay [Post-dredging]*. Available at http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/sd_crk_nb_toxics_tmdl/14-03-31-LNB_Sediment_Final_Report.pdf.

2014 study than in the 2007 study.¹⁰ Perhaps of greatest significance, the Coastkeeper and Candelaria 2014 study evaluated toxicity in sediments. It appears that Coastkeeper and Candelaria (2014) conducted toxicity tests using a total of six sediment samples collected in August 2013; these samples appear to have been selected because sediments at the sample locations had the highest copper concentrations and exceeded ERMs. Even though these samples appear to have been collected at sites with the highest observed copper concentrations, “no toxicity to *Eohaustorius* survival was determined at any site tested, and percent survival ranged from 95 to 98%. These toxicity results were different from toxicity determined in the marina study. In August 2006, eight out of ten (8/10) marina sites were toxic to *Eohaustorius* survival... Additional tests for the [2007] marina study, in November 2006, also showed toxicity in 6/6 *Eohaustorius* survival tests.”¹¹ However, the Staff Report Regional Board reaches conclusions about impairment in the Bay using a dataset that includes sediment and water column data collected prior to 2007 (and as early as 2000) in addition to data collected in 2013, which fails to account for the changes occurring in the Bay over time.

Certain datasets were also excluded from the impairment analysis. Sediment toxicity has been assessed by the County of Orange and during the Bight '08 and Bight '13 sampling programs. The County monitored seven stations throughout Upper and Lower Newport Bay between 2009 and 2014 and collected sediment toxicity data as well as sediment chemistry and benthic community health data. The SQO assessment conducted using these data was published in reports submitted to the Regional Board by the County of Orange.¹² The Southern California Bight Regional Monitoring Program (Bight '08 and Bight '13) also collected sediment toxicity and chemistry data in Newport Harbor from July to September in 2008 and 2013.¹³ Data from these programs are discussed in the sediment toxicity and water quality sections of the assessment reports and show that significant improvement has occurred over time; for a detailed discussion of the current status of the Bay, see Section 3 of these comments.

3. Management actions have resulted in marked improvement within the Bay, and conditions will continue to improve in the future; these activities must be considered when assessing impairment.

Much of the data considered by the Regional Board during its analysis was obtained largely prior to 2011 and as early as 2000, and these data do not represent the most current water quality and sediment conditions in the Bay. Several important actions have been taken since a significant portion of the data used by the Regional Board to determine impairment were collected.

¹⁰ For example, Coastkeeper and Candelaria (2007) reported that dissolved copper concentrations exceeded the criterion continuous concentration (CCC) in 75% of marina samples and in 48% of channel samples. In contrast, dissolved copper exceeded the saltwater in 4/15 samples (~27%) collected in October 2012, and in no samples (0%) collected in March 2013 following dredging.

¹¹ See Coastkeeper and Candelaria 2014 at p. 16.

¹² See, for example, Orange County. 2015. 2014–2015 Unified Annual Progress Report, Program Effectiveness Assessment. Appendix C-11-III, Estuary/Wetlands Monitoring. November 13.

¹³ The Bight sampling assessments are available on the Southern California Coastal Research Project Website at <http://www.sccwrp.org/Documents/BightDocuments.aspx>.

First, the City of Newport Beach and U.S. Army Corps of Engineers conducted extensive dredging in Lower Newport Bay between 2012 and 2013. The City removed more than 600,000 cubic yards of sediment from the Bay during the dredging activities (Coastkeeper and Candelaria 2014). This action effectively reset the baseline of copper concentrations in the Bay that should be used for the TMDL evaluation. Although we do not know some of the locations of the sediment sampling sites in the Upper and Lower Bay used for the impairment assessment (i.e., Orange County [OC] monitoring study data 2006–2009, pp. 148–149 in the 2016 Staff Report), it is possible that some or many of the sediment samples were collected from areas that were subsequently dredged. Only water or sediment copper concentrations collected after the dredging occurred (i.e., after February 2013) should be used to establish impairment; those concentrations collected prior to dredging are no longer representative of or relevant to the current water quality and sediment conditions in the Bay.

Second, anti-fouling paints (AFPs), believed to be the primary source of copper to the Bay, have been reformulated. The State of California mandated that AFPs with low leach rates must be used on recreational vessels beginning no later than February 1, 2014. The new paints must have leach rates of no more than $9.5 \mu\text{g}/\text{cm}^2/\text{day}$, while prior paint formulations had leach rates as high as $29.6 \mu\text{g}/\text{cm}^2/\text{day}$.¹⁴ Because the copper-containing paints typically need to be reapplied every two to three years, the full effects and benefits of this new policy on the water quality conditions in the Bay have yet to be fully realized and evaluated. Because boat AFPs are the primary source of copper to the Bay, it is clear that the change in copper AFPs will result in lower copper concentrations in the Bay.

Third, California Senate Bill SB-346 was passed in 2009 and will prohibit the sale of motor vehicle brake friction materials (brake pads) containing more than 0.5% copper (by weight) after January 1, 2025. The amount of copper in brake pads, and the number of copper-containing brake pads in use, is expected to decline between now and 2025. The new law is expected to result in substantial reductions in copper from motor vehicles and thus significant reductions in copper loads to California watersheds.

The data also indicate that sediment toxicity is likely to be improving over time. Sediment toxicity was found at 85% of the sites (12 of 14) that were tested in the Bay in 2007 (Coastkeeper and Candelaria 2007), whereas sediment toxicity was found at only 36% of the sites (22 of 60) in the OC 2006-2009 dataset. As noted above, 10-day *Eohaustarius* survival tests conducted on sediment samples collected in August 2013 (and presented in Coastkeeper and Candelaria 2014) show that no toxicity was present in any sediment sample collected from Lower Newport Bay, despite the fact that it appears that toxicity testing was conducted on the sediment samples with the highest copper concentrations.

Available data and information suggest that copper concentrations and water quality and sediment conditions in the Bay could in fact be improving over time. Additional time and data are needed to

¹⁴ See (1) Department of Pesticide Regulation Memorandum, “Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints per AB 425,” January 30, 2014, at p. 3; and (2) Florer, Joanna, “Evaluation of the Development and Effectiveness of Copper Total Maximum Daily Loads (TMDLs) to Achieve Marine Water Quality Criteria” (2014). Master’s Projects. Paper 24 at p. 55.

more fully establish these trends and quantify the rate at which water and sediment quality improvements are occurring prior to TMDL adoption or implementation.

4. The Regional Board's impairment assessment is incomplete, and its conclusions are not supported.

As noted above, the Regional Board's assessment and interpretation of the copper data for determining that impairment is present in the Bay is inadequate and incomplete. The Staff Report's evaluation of the sediment and water quality data and the metrics and criteria against which the data are assessed do not properly support the conclusions that Newport Bay is impaired.

4a. A TMDL and implementation actions for biota are not needed.

We agree with the Regional Board that no impairment of fish and mussel tissue is present in the Bay. Copper concentrations in tissue did not exceed fish tissue guidelines for either human health or wildlife.¹⁵ Thus, no further action is needed with respect to the regulation of copper in tissue in the Bay.

4b. Sediment is not impaired by copper, and a TMDL for copper in sediments is not needed.

Sediment SQO analyses conducted by the County of Orange from 2009–2014 indicate that sediment conditions in Upper and Lower Newport Bay have improved markedly between 2009 and 2014. As shown in Figures 1 and 2 below, which are reproduced from the County's 2015 PEA report,¹⁶ the number of stations in the Bay that are classified as likely or clearly impacted (i.e., that clearly exceed the State's SQOs) has declined over time.

Similar improvements in sediment toxicity have also been observed. The Bight '08 program collected sediment samples throughout the Bay in 2008. Five of seven of the sediment samples (71%) collected were either non-toxic or had low toxicity in 2008;¹⁷ the remaining two samples had moderate toxicity (29%). The Bight '13 program collected nine sediment samples in the Bay in 2013; eight of nine samples (89%) were non-toxic or had low toxicity, while only one sample was moderately toxic (11%).¹⁸ The Bight monitoring data indicate that there was little sediment toxicity in the Bay in 2013 and sediment conditions have improved since 2008 and 2009. In 2014, consistent with the results of Coastkeeper and Candelaria (2014), the County reported that there was no sediment toxicity at any sampling station in the Bay. In contrast, three out of six samples taken by the County in 2009 had "high toxicity," while one was "moderately toxic." Coastkeeper and

¹⁵ Note that we do not agree that the Staff Report used appropriate thresholds to evaluate impairment to fish and mussel tissues. However, the guidelines used were not exceeded and no impairment was found for tissue; thus, we do not present our concerns with these guidelines and thresholds in this memorandum.

¹⁶ Orange County. 2015. 2014–2015 Unified Annual Progress Report, Program Effectiveness Assessment. Appendix C-11-III, Estuary/Wetlands Monitoring. November 13.

¹⁷ <http://www.sccwrp.org/documents/BightDocuments/Bight08Documents.aspx>.

¹⁸ <http://www.sccwrp.org/documents/BightDocuments/Bight13Documents.aspx>.

Candelaria (2014) also showed that copper concentrations in the sediments exceeded the ERM at only 13% of sites (2 of 15) in the Lower Newport Bay in October 2012 and March 2013 and at only 20% of sites (3 of 15) in August 2013.

However, even if the Regional Board finds that SQOs are exceeded in the Bay, then a stressor identification test should be conducted to determine which pollutant is responsible for the impairment. A stressor identification test is conducted, per the requirements of the State's SQO Policy, to establish (1) that pollutant(s) are indeed responsible for the impairment and (2) which pollutant(s) are responsible for the impairment. The Regional Board concluded that "sediment chemistry [i.e., sediment contamination] had a low correlation with sediment toxicity."¹⁹ A low correlation would suggest that metals measured in the sediment, including copper, are not likely to be responsible for any sediment toxicity observed.

Furthermore, the proposed TMDL states that impairment is only indicated when the ERMs are exceeded *and* sediment toxicity is present. However, the Regional Board notes that no impairment for sediment is present in the Upper Newport Bay on the basis of exceedances of ERMs (see Table 4-10 on p. 46 of the 2016 Staff Report), yet it appears the sediment targets of the TMDL apply to both Upper and Lower Newport Bay. On this basis and given the impairment assessment method outlined in the Staff Report, then, it appears there should be no TMDL for sediments in the Upper Bay. Although the Regional Board concluded that sediment impairment is present in the Lower Bay due to toxicity and ERM exceedances, it is unknown whether toxicity correlated with copper concentrations, as the sample locations for the OC monitoring study (2006–2011) are not clearly delineated in the 2016 Staff Report.

The recent data from Coastkeeper and Candelaria (2014) definitively show that no sediment toxicity is present, even in samples where the ERM for copper is exceeded. Our review of data that are representative of current conditions within the Bay indicates that in fact, it appears that no sediment impairment is present. Therefore, no TMDL for sediment is needed.

¹⁹ Staff Report at p. 43.

Newport Bay Stations:

Station ID	LNBHIR	LNBTUB	UNBCHB	UNBJAM	UNBNSB	UNBSDC	LNBRIN
2009 Station Assessment	Possibly impacted	Possibly impacted	Likely unimpacted	Likely impacted	Possibly impacted	Clearly impacted	
2010 Station Assessment	Possibly impacted	Likely impacted	Possibly impacted	Possibly impacted	Possibly impacted	Likely impacted	
2011 Station Assessment	Possibly impacted	Likely impacted	Unimpacted	Possibly impacted	Likely unimpacted	Possibly impacted	Likely impacted
2012 Station Assessment	Possibly impacted	Possibly impacted	Unimpacted		Possibly impacted	Possibly impacted	
2014 Station Assessment	Possibly impacted	Possibly impacted	Unimpacted	Not Reported	Unimpacted	Possibly impacted	Likely impacted
2009 Integrated Chemistry Indicator	Moderate Exposure	High Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	
2010 Integrated Chemistry Indicator	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	High Exposure	
2011 Integrated Chemistry Indicator	Moderate Exposure	High Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	High Exposure
2012 Integrated Chemistry Indicator	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	Moderate Exposure	
2014 Integrated Chemistry Indicator	Moderate Exposure	Moderate Exposure	Low Exposure	Moderate Exposure	Low Exposure	Moderate Exposure	High Exposure
2009 Integrated Toxicity Indicator	Nontoxic	Nontoxic	Moderate Toxicity	High Toxicity	High Toxicity	High Toxicity	
2010 Integrated Toxicity Indicator	Moderate Toxicity	Nontoxic	Low Toxicity	Nontoxic	Nontoxic	Low Toxicity	
2011 Integrated Toxicity Indicator	Low Toxicity	Nontoxic	Nontoxic	Nontoxic	Low Toxicity	Nontoxic	Low Toxicity
2012 Integrated Toxicity Indicator	Low Toxicity	Nontoxic	Nontoxic	Nontoxic	Nontoxic	Nontoxic	
2014 Integrated Toxicity Indicator	Nontoxic	Nontoxic	Nontoxic	Nontoxic	Nontoxic	Nontoxic	Nontoxic
2009 Integrated Benthic Indicator	High Disturbance	High Disturbance	Reference	High Disturbance	Low Disturbance	High Disturbance	
2010 Integrated Benthic Indicator	Low Disturbance	Moderate Disturbance	Low Disturbance	High Disturbance	Moderate Disturbance	High Disturbance	
2011 Integrated Benthic Indicator	Low Disturbance	Moderate Disturbance	Low Disturbance	High Disturbance	Reference	Moderate Disturbance	Moderate Disturbance
2012 Integrated Benthic Indicator	Low Disturbance	High Disturbance	Low Disturbance		Moderate Disturbance	Moderate Disturbance	
2014 Integrated Benthic Indicator	Moderate Disturbance	Moderate Disturbance	Low Disturbance	Not Reported	Low Disturbance	Moderate Disturbance	Moderate Disturbance

Figure 1. Extracted Table showing SQO results from samples in Newport Bay from the County of Orange 2014–2015 Unified Annual Progress Report - Program Effectiveness Assessment.

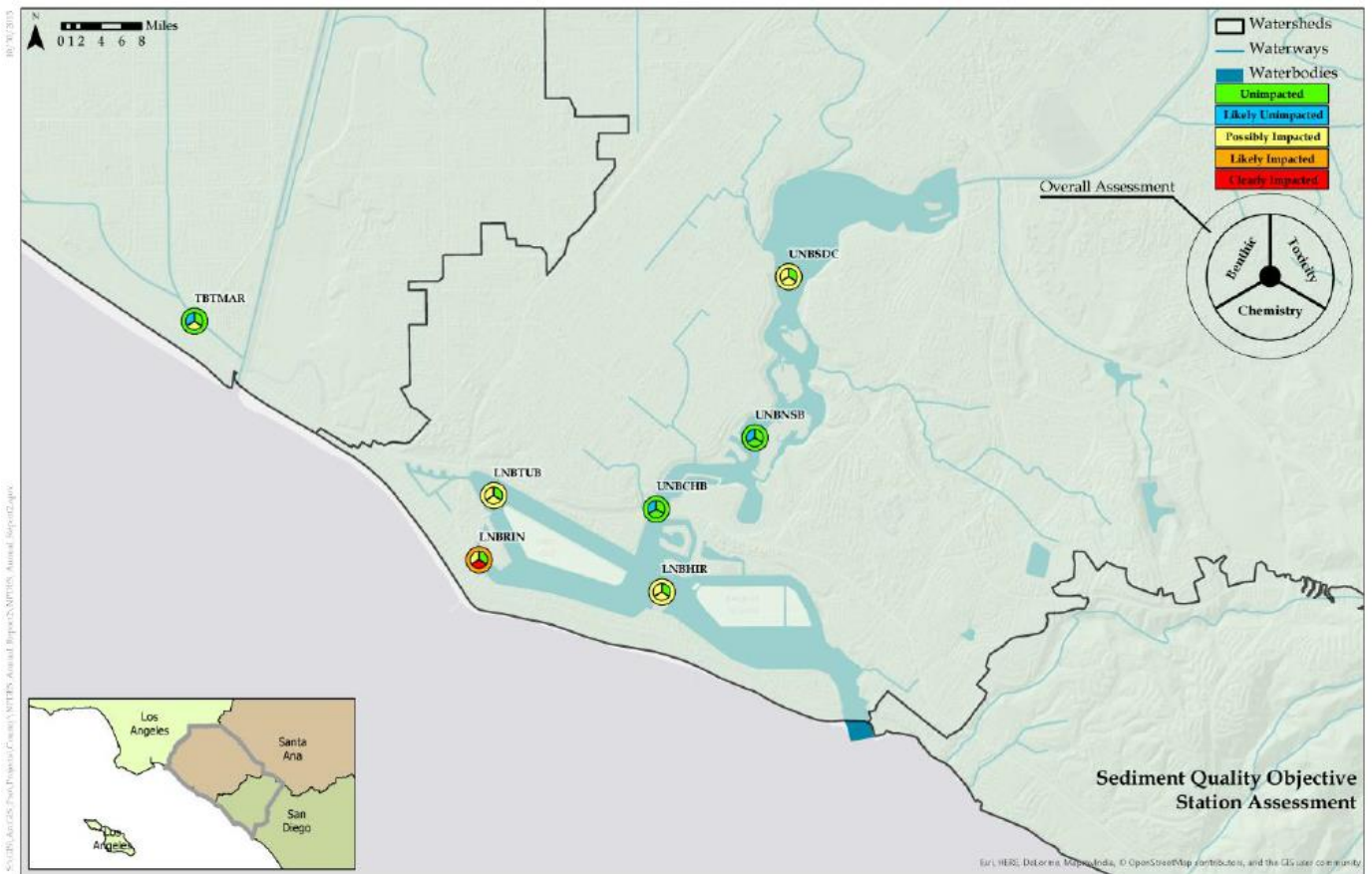


Figure 2. Map showing sediment sampling locations and SQO analysis results in Newport Bay from the County of Orange 2014-2015 Unified Annual Progress Report - Program Effectiveness Assessment.

4c. Copper concentrations in the water column do not appear to cause toxicity, and further study is warranted instead of a TMDL.

Water column samples collected during the 2007 study by Coastkeeper and Candelaria show exceedances of the CTR criteria, but (as discussed above) this study specifically examined water samples from areas near marinas and in close proximity to boats and thus did not represent the average or typical conditions in the Bay. Although Coastkeeper and Candelaria (2007) concluded that “there is no significant difference in dissolved copper levels in the marinas and their adjacent channel sites” (p. 45), the average dissolved copper concentration at all marina sites was higher than the adjacent channel sites (p. 20). Coastkeeper and Candelaria (2007) showed the mean copper concentration in channels in the Bay (i.e., adjacent to marina areas but generally not within them) was 3.11 µg/L—i.e., less than the CTR acute criterion of 4.8 µg/L and approximately equal to the CTR chronic criterion of 3.1 µg/L, indicating that inclusion of numerous marina areas likely biased the water concentration results.

Even with exceedances of the CTR criteria, the information in the TMDL Staff Report indicates that water toxicity was not observed in any of the 16 samples tested (see Staff Report Table 4-5). It appears that Coastkeeper and Candelaria (2007) found no toxicity present in the water column, the sediment-water interface, or porewater extracted from the sediment at all ten sites tested, even though there appeared to be exceedances of the dissolved copper CTR criteria in both the water column and in sediment porewater (p. 44). Additionally, the water quality data in the 2007 study were collected prior to extensive dredging conducted by Newport Beach in 2012 and 2013.

Bottom water samples collected in October 2012 and March 2013 (results presented in Coastkeeper and Candelaria 2014) show that the chronic dissolved copper CTR criterion was exceeded in 27% of samples (4 of 14) collected in October 2012, while the CTR acute criterion was exceeded in about 7% of these samples (1 of 14). Neither the CTR acute nor chronic criteria for copper were exceeded in any of the 15 bottom water samples collected in March 2013.

Although it appears as if there are some exceedances of the copper CTR criteria in the water column in the Bay, it appears the exceedances are not causing toxicity. This may indicate the CTR criteria are overly protective for the Newport Bay system.²⁰ Additional time and studies are needed to determine the concentrations of copper in the water column in the Bay and whether these concentrations lead to direct toxicity to aquatic organisms. Water samples should be analyzed for both dissolved copper concentrations and toxicity at randomly-selected sites throughout the Bay to determine if toxicity is present, and if so, the concentrations of dissolved copper that result in measurable toxicity. Concentrations of copper over time should also be established in the Bay to determine temporal trends and the impact of recent activities in the Bay (e.g., sediment dredging) on those concentrations. Due to a lack of sufficient current data, it is premature to conclude that copper concentrations in the water column of the Bay cause toxicity or impair beneficial uses. TMDL implementation actions are insufficiently substantiated on the basis of the water column and water toxicity data collected and presented by the Regional Board.

The available data show that exceedances of the CTR values in Bay waters and sediment porewaters do not result in toxicity to aquatic organisms (see discussion above and Coastkeeper and Candelaria 2007). This shows that the CTR values are likely overprotective of aquatic life and are not an indicator of impairment in the Newport Bay water column. Thus, the appropriate TMDL targets for dissolved copper in Bay waters are unknown at the current time. We recommend that the Regional Board (or stakeholders) conduct further study to determine the appropriate numeric targets for copper in water prior to assessing impairment or establishing regulatory targets.

²⁰ Indeed, the CTR criteria recognize explicitly the fact that they may be conservative, and that higher concentrations of dissolved copper in environmental samples may not result in toxicity. The CTR criteria provide for a study called a “water effect ratio” (WER) that can be conducted to adjust the CTR criteria to more appropriate levels (U.S. EPA 2000, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California*; Rule [40 CFR Part 131]). WER studies have been conducted in other Southern California water bodies, and the default CTR criteria have been found to be lower than necessary to protect aquatic life (see, e.g., LWA 2008, *Final Report- Los Angeles River Copper Water-Effect Ratio Study*, Prepared by Larry Walker Associates for the City of Los Angeles and the City of Burbank, June 3, 2008).

5. The Regional Board's calculations of copper loading to the Bay due to leaching from boat paints need to be redone.

It appears there may be several inaccurate assumptions made in the Staff Report's calculations of the total copper loading to the Bay from recreational boats. The Regional Board calculates a dissolved copper loading from recreational boats of 36,000 lbs/year to the Bay (2016 Staff Report at Table 5-2, p. 62). To obtain this loading, the Regional Board multiplied an assumed copper leach rate by an average hull area and by the total number of boats in the Bay (copper loading = leach rate \times hull area \times # boats). The number of boats assumed by the Regional Board was 10,000 (Appendix 6 of the Staff Report, pp. 152–160); however, our analysis of aerial photographs of the Bay indicates that the number of boats is lower. Exponent used ArcGIS software to digitize all boats in the Bay from an aerial photograph taken May 13, 2014, and the number counted from the digitization was approximately 4,268 boats within Upper and Lower Newport Bay. This overestimate in the number of boats used by the Regional Board (10,000 vs. approximately 4300) yields a copper loading that may be over two times larger than the actual loading.

Additionally, the Regional Board's assumed copper leach rate from AFPs of 9.5 $\mu\text{g}/\text{cm}^2/\text{day}$ is the maximum allowable leach rate established by the California Department of Pesticide Regulation (DPR) and likely overestimates the actual copper leach rates from boats. Leach rates are expected to be highest (at maximum levels) after application and potentially after hull cleaning, but to decrease as material builds up on boat hulls. Thus, the use of the maximum leach rate is conservative and likely overstates copper loadings from boats.

The Regional Board also cites the calculations of a 2014 study conducted by the U.S. Navy²¹ (Earley et al.) as the basis for determining copper leaching and loading from boats; Earley et al. 2014 showed that copper leach rates from AFPs decrease rapidly after initial application and cleaning events. It does not appear that the leach rates used by the Regional Board accounted for these factors. The 3-year copper loadings due to leaching determined in Earley et al. 2014 were lower than those used by the Regional Board. For example, the Staff Report presents a copper loading of approximately 3.6 lbs/boat/year using the DPR leach rate of 9.5 $\mu\text{g}/\text{cm}^2/\text{day}$ (Staff Report p. 153), while the Staff Report indicates a copper loading of 2.6 lbs/boat/year using the leach rates published in Earley et al. 2014 (Staff Report p. 154). The Staff Report does not indicate why the leach rate of Earley et al. (2014) was not used, stating only that the higher leach rates were used.

The Regional Board's estimated copper loading to the Bay from recreational boats is likely too high and may significantly over-predict the actual loading to the Bay. We request that the Board reconsider and revise the leach rate calculations to include a more accurate number of boats in the Bay as well as average (not maximum allowable) expected copper leach rates from AFPs.

²¹ Earley, P.J., B.L. Swope, K. Barbeau, R. Bundy, J.A. McDonald, I. Rivera-Duarte. 2014. Life Cycle Contributions of Copper from Vessel Painting and Maintenance Activities. *Biofouling: The Journal of Bioadhesion and Biofilm Research*. 30:51-68.

6. The need for a TMDL has not been demonstrated, and the proposed implementation measures do not appear to be necessary.

First, the TMDL Staff Report states that no tissue impairment was indicated in any of the monitoring data collected, so monitoring of additional organisms (or vegetation) is unnecessary. The Regional Board's proposed special studies to determine copper loading from in-Bay sediments, algae, and vegetation (Section 6 in Attachment to the Staff Report) are not needed and should be removed. Benthic monitoring should be conducted only as needed to perform routine SQO assessments.

Second, as discussed above, sediments in the Bay do not appear to be impaired by copper. While routine monitoring for SQO assessment metrics is required by and consistent with the State's SQO Policy, no additional monitoring is needed, and implementation actions such as dredging do not appear to be necessary. We recommend that the Regional Board's proposed targeted monitoring for copper concentrations in sediments as well as sediment toxicity be removed from the TMDL (Sections 1.2.2.4 and 5 in Attachment A of the 2016 Staff Report), and that future monitoring should be conducted in accordance with the SQO Policy. Additionally, the Board's proposed remediation of sediment, including in marina and boatyard areas, should also be removed from the TMDL (Section 2 in Attachment A), unless SQO exceedances are indicated and stressor identification indicates that copper is responsible for the SQO exceedance(s).

Third, although some water column copper concentrations have exceeded CTR criteria values, these exceedances do not appear to be correlated with toxicity to aquatic organisms. The proposed TMDL water column targets and implementation measures to reach those targets are inappropriate at this time and not supported by the impairment assessment or monitoring data used to conduct the impairment assessment.

Additionally, it appears that monitoring and TMDL targets and water quality-based effluent limits (WQBELs) are not needed for storm water runoff and upstream discharges to the Bay, as proposed and suggested by the Regional Board in the TMDL in Section 4 in Attachment A ("Evaluate Copper [Cu] discharges from storm drains for local impacts"). Monitoring data have shown that the dissolved copper concentrations are lower in the Bay's main channels than they are in marinas or near boats, indicating that the Bay has assimilative capacity for copper loading and that mixing and dilution of copper within the Bay must be considered when determining numeric targets for those loads or discharges. Criteria specific for saltwater bodies (i.e., CTR salt water criteria) should not be applied to fresh water inflows, such as tributaries and storm water runoff. It is notable also that the copper loading from storm drain inflows also appears to be small relative to other sources such as boats. Both the TMDL Staff Report and a 2007 study (Coastkeeper and Candelaria 2010)²² that evaluated the concentrations of copper in 20 storm drains during both wet and dry events showed that the copper loading to the Bay from the runoff is small relative to other sources, such as San Diego Creek and Santa Ana Delhi Channel and boats. In addition, San Diego Creek was removed from the Section 303(d) list (delisted) for metals in 2010 indicating that impairment due to metals was no longer present in the creek. It does not appear that WQBELs for copper are needed for

²² Coastkeeper and Candelaria. 2010. Newport Bay Stormdrain Metals Study. Final Report. Prepared for the City of Newport Beach by Orange County Coastkeeper and Linda M. Candelaria. January.

freshwater flows entering the Bay; however, if they were to be developed, the concentration limits established would need to rigorously account for variations in freshwater flows upstream of the Bay and the varied mixing and dilution of the flows within the Bay. Concentration limits would also need to clearly distinguish between total copper and dissolved copper and account for the impact of other water quality parameters (such as pH) on the distribution of the total and dissolved forms of the metal.

7. Further actions are recommended instead of adoption of the proposed TMDL.

As noted above, available data describing current conditions within the Bay indicate neither tissues nor sediments are impaired by copper. Further studies and monitoring efforts are needed to assess impairment in the water column within Newport Bay. We recommend dissolved copper concentrations be collected in waters throughout Upper and Lower Newport Bay over the next three to five years to characterize current conditions within the Bay (i.e., establish a current baseline that reflects post-dredging conditions and implementation of low-leaching AFPs) and to evaluate trends in water column copper concentrations over time. We recommend that sampling be conducted in a randomly-distributed manner so that the average waterbody conditions are reflected in the datasets generated from future sampling.

We also recommend that additional water column toxicity tests be conducted to determine the relationship between dissolved copper concentrations in water and water toxicity to aquatic organisms. The data presented in Coastkeeper and Candelaria (2007) suggest that there is no correlation between water toxicity and copper concentrations; these analyses should be repeated with recent samples collected from the Bay to confirm or revise these conclusions. A water-effect ratio (WER) study conducted in accordance with EPA guidance²³ may also provide useful information for identifying copper concentrations that are harmful to aquatic organisms and for establishing water quality criteria.

The data used to assess impairment in the water column should only come from recently-collected samples. Data collected prior to 2013 do not reflect current water quality conditions in the Bay and thus should not be considered when determining impairment. TMDL development and implementation is only then required if impairment is indicated by current data.

²³ U.S. EPA. 1994. Interim Guidance on Determination and Use of Water-Effect Ratios for Metals. United States Environmental Protection Agency. February.