Memorandum

To: *Lake Elsinore and Canyon Lake Nutrient TMDL Task Force*

From: *Steve Wolosoff and Paula Kulis, CDM Smith*

Date: *April 18, 2022*

Subject: *Implementation Details for Task Force Consideration*

The Lake Elsinore and Canyon Lake (LE/CL) nutrient TMDL was subject to potential revision starting in 2015 to incorporate data collected since the 2004 TMDL was adopted, and to improve upon the preceding scientific basis with new data and modeling tools. Lake Elsinore and San Jacinto Watersheds Authority (LESJWA) submitted a technical report to support revisions to the Lake Elsinore and Canyon Lake (LECL) Nutrient TMDLs ("TMDL Technical Report") to the Santa Ana Regional Water Quality Control Board (Regional Board) in December 2018 (LESJWA 2018). The purpose of the TMDL Technical Report was to support Basin Plan Amendments(BPA) to formally revise the LECL TMDLs originally adopted by the Regional Board. External peer review of the TMDL Technical Report was completed in 2019. Since then, the Task Force has been working with the Regional Board in an attempt to address certain peer review comments and Regional Board staff concerns regarding the underlying scientific basis of the TMDL revision. These discussions have led the Task Force to first consider reaching agreement on key elements of TMDL implementation and compliance deadlines prior to making changes to the scientific analysis and revision of tables that are the basis for allocations and numeric targets.

This technical memorandum extracts and summarizes the key elements of the implementation and compliance demonstration chapters of the 2018 TMDL Technical Report, which are then incorporated into the actual BPA. The technical memorandum then identifies suggested revisions to these key elements that could be incorporated into the Technical TMDL Report as well as the draft BPA language for Task Force discussion. The suggestions are open for debate and modification and we will work with various Task Force members to explore minor refinement or alternatives. Topics are organized around three general themes: 1) providing multiple paths to achieving numeric targets or Wasteload allocations/load allocations (WLAs/LAs), 2) guidance for demonstrating achievement of targets or WLAs/LAs , and 3) compliance deadlines for achieving targets or WLAs/LAs. Notably, the TMDL and its various components are not immediately applicable to permittee stakeholder members of the Task Force as they are not self-executing. Rather, such elements become applicable when incorporated into relevant waste discharge requirements (WDRs), waivers of waste discharge requirements (waivers), or National Pollutant Discharge Elimination System (NPDES) permits.

Multiple Paths to Achieve Numeric Targets or WLAs/LAs

1. The 2018 TMDL Technical Report was developed to allow for multiple paths to achieve numeric targets or WLAs/LAs . Generally, numeric targets or WLAs/LAs can be achieved through reduction of external nutrient loads from the watershed to achieve WLAs and LAs or implementation of water quality controls that directly affect the response targets (chlorophyll-a, DO, and ammonia) in the lakes. Specifically, five approaches were provided in the 2018 TMDL Technical Report, including 1) comparison of in-lake monitoring data to numeric response target CDFs, 2) comparison of in-lake monitoring data to results of lake water quality model for reference condition scenario for sampled time period, 3) comparison of watershed monitoring data to allocations, 4) reduce internal loads with in-lake controls to offset watershed nutrient loads in excess of reference condition, and 5) retain all runoff on-site. See Chapter Section 9 "Demonstrating Compliance" for more detail on each. <u>These same approaches are proposed for any update to the 2018 TMDL Technical Report.</u>
2. The 2018 TMDL Technical Report introduces the term "group of jurisdictions" as an option for demonstrating achievement with the revised TMDL through either external load reduction based on measured data at downstream mass emission sites (see Section 9.3) or with in lake offsets (see Section 9.4). Since the 2018 TMDL Technical Report was completed, the Task Force effectively demonstrated achievement with the 2004 TMDL in Lake Elsinore with measured mass emissions for Canyon Lake overflows and in Canyon Lake with in-lake offsets. Both of these demonstrations involved the collective efforts of all watershed stakeholders as a "group of jurisdictions". <u>The update to the TMDL Technical Report should continue to allow for collective strategies and use the example of the recent 2020 demonstration with the 2004 TMDL to make this more clear in the document that supports revisions to the 2004 TMDL and in the draft BPA language as well.</u>
3. The use of in-lake water quality controls are more effective measures to improve water quality than on-site retention in the San Jacinto River watershed. This finding was supported by modeling that showed that increased volumes of stormwater was more beneficial to Lake Elsinore than a proportional increase in nutrient load (Figure 1). Given this, and a proven track record of performance of alum additions in Canyon Lake and LEAMS operation and fishery management in Lake Elsinore, <u>the update to the TMDL revision will make clear (in Section 9.4, elsewhere in the document and in the proposed BPA language) that the use of in-lake nutrient reductions to offset load reductions for external sources can be used to achieve WLAs/LAs.</u>
4. Control of a single nutrient, nitrogen or phosphorus, that is limiting to algal growth may provide the same benefit to in-lake water quality as implementation designed for both nutrients. The 2018 TMDL Technical Report provides an option for achieving WLAs/LAs by focusing on a single limiting nutrient. If compliance with the single nutrient strategy is not sufficient to bring the lakes to meet response targets within the first five year reporting period after the compliance milestone, then compliance must be demonstrated using dual nutrient WLA/LA or by meeting in-lake response targets in the second reporting period

after the compliance milestone. This same approach is proposed for any update to the 2018 TMDL Technical Report.

Demonstrating Achievement of Numeric Targets or WLAs/LAs

1. Demonstrations of achievement with a numeric target that is expressed as a cumulative distribution frequency is not as simple as comparing ongoing monitoring data to seasonal or annual average numeric target, as is done for the 2004 TMDL. The CDF numeric target recognizes the impact of climatic variability on lake water quality, but challenges future assessments that attempt to relate data from a single year to a curve built from long-term lake water quality model simulation (20 years in Canyon Lake and 100 years in Lake Elsinore). The 2018 TMDL Technical Report provided a method for demonstrating achievement of numeric targets that involves extending the reference watershed scenario model (the basis for deriving the CDF) beyond the numeric target setting period (see Section 9.2 of the TMDL technical Report). Model results for lake water quality response targets will provide an estimate of what reference conditions would be like with recent climate for comparison to recent data collection. This same approach is proposed for any update to the 2018 TMDL Technical Report.
2. The implementation chapter of the 2018 TMDL Technical Report provides detailed quantitative analysis of the water quality benefit of existing watershed and in-lake controls. Given that the methods to assess effectiveness and actual nutrient removals are evolving, hard-wired benefit calculations may be limiting to the stakeholders. Internal and external nutrient load reductions and associated improvements to lake water quality will need to be demonstrated in future TMDL implementation plans (e.g. CNRP, AgNMP) and quantification of existing controls will be needed to demonstrate the expected benefits of these plans. Therefore, it is proposed that all quantitative analysis of the benefit of implementation projects be removed from the update to the TMDL Technical Report.
3. In the 2018 TMDL Technical Report, one demonstration approach proposed to use satellite imagery of chlorophyll-A concentrations in Canyon Lake and Lake Elsinore. However, recent efforts to assess satellite image data accuracy have shown a poor relationship between grab samples of chlorophyll-a concentration and satellite imagery analysis values. Figure 2 shows the poor correlation between observations and satellite pixels values where the samples were collected. Therefore, it is proposed that only analytical water sampling data be used for demonstrating achievement of chlorophyll-a response targets in the updated TMDL Technical Report.
4. When showing external load reduction as the method for achieving WLAs/LAs, the 2018 Technical TMDL explains that this approach (see Section 9.3 of the TMDL Technical Report) was designed to allow for removal of outliers in a 10 year watershed monitoring dataset prior to comparison with allocations. Recent monitoring has shown that outliers do occur and are often associated with recently burned drainage areas (Ortega Canyon, McVicker Canyon, Horsethief Canyon, San Jacinto River). Such outliers were excluded from the determination of allowable load and thus it is reasonable to allow for outliers to be removed

from future watershed monitoring datasets. This same approach is proposed for any update to the 2018 TMDL Technical Report.

Deadlines for Achieving WLAs/LAs and Timelines for Special Studies

1. The characterization of a reference watershed nutrient concentration in the 2018 TMDL Technical Report involved statistical analysis of 54 samples collected over the course of 11 wet weather events in 2003-2005, 2008, and 2010 from the San Jacinto River at Cranston Guard Station. The site was used to represent forested land use in the 2004 TMDL source assessment and its contributing watershed is over 92.4 percent undeveloped. The median concentration of these samples is 0.32 mg/L for TP and 0.92 mg/L for TN. These median nutrient concentrations were applied to all runoff volume inflow to the lakes to estimate loads for a hypothetical reference watershed condition, which serves as the allocations for watershed sources in the proposed TMDL revision. The median concentration values were characterized as conservative when compared with means of the same dataset and in relation to other sampling below undeveloped canyons in the watershed (see Section 3.2.2.3 of the 2018 TMDL Technical Report). For these reasons, the values may be a reasonable characterization of a reference watershed, making any further reductions technically infeasible even with a complete return to a predeveloped condition.

   Prior to the peer review comments that expressed concern with the reference nutrient concentrations, especially for TP, the CDM Smith science team also identified the SJR at Cranston Guard Station results as different from sampling downstream of experimental forest or other reference stream in the xeric west ecoregion. The 2018 TMDL Technical Report presents multiple reasons why the SJR watershed is unique and may release naturally high TP during wet weather. Moreover, data from reference streams that the peer reviewers may have been relating to the SJR at Cranston Guard Station may have been associated with dry condition sampling; wet weather nutrient sampling in undeveloped watersheds in the west in not commonly reported. In order to address uncertainty, the implementation element of the 2018 TMDL Technical Report included a special study to be completed by all entities with allocated load to collect supplemental data from other undeveloped drainage areas in the SJR watershed within three years of the revised TMDL effective date (see Table 7-12 of the 2018 TMDL Technical Report). This data was intended to be used to validate the basis for the TMDL or trigger further revisions or adaptation of implementation plans.

   Despite these safeguard provisions in the 2018 TMDL Technical Report, Regional Board staff have indicated that they recommend a different reference nutrient concentration be employed to provide increased conservatism given the inherent uncertainty in quantifying nutrient washoff from undeveloped reference drainage areas in the SJR watershed. Watershed stakeholders propose to address concerns about reference concentration uncertainty by incorporating Phase 1 interim allocations and numeric target CDFs in the update to the TMDL revision based on the median of the Cranston Guard Station (0.32 mg/L TP and 0.92 mg/L TN), and then by indicating that the time for achieving these interim allocations and numeric CDFs would be as originally proposed in the 2018 Technical

Report, which is 20 years from effective date of the revised TMDL. There would also be a need for Regional Board review of the TMDL at the end of Phase 1 to determine if final allocations and associated numeric target CDFs set to the 25th percentile of the Cranston Guard Station dataset (0.16 mg/ TP and 0.68 mg/L TN) are appropriate or if they need to be revised based on the data and information obtained during Phase 1. It is also anticipated that the timeline for achieving any final allocations or associated numeric target CDFs based on the 25th percentile would need to be set at a period of at least 10 years after the completion of Phase 2. The update to the implementation chapter of the TMDL revision and the BPA language will describe key elements of a Phase 1 Review to re-evaluate numeric targets, linkage analysis, and load allocations based on findings from special studies including, but not limited to, supplemental wet weather sampling to assess nutrient washoff concentrations from other undeveloped drainage areas in the SJR watershed. The Task Force will work with the Regional Board to characterize the Phase 1 Review scope, function, and schedule within the updated Implementation chapter of the revised TMDL. .

2. Analyses completed by Dr. Michael Anderson to support the Task Force in 2012 estimated 15-year half-life for nutrients in Lake Elsinore sediments and 10 year half-life in Canyon Lake. This indicates that reduced internal loads from management measures implemented in the lakes will lag external load reductions and full benefits of projects may not be realized until 30 years after implementation. Before that time, in-lake concentrations in both lakes may be above numeric targets to a degree that doesn't fully reflect the impacts of BMP implementation, due to lingering sediment loads that are residual from historical nutrient watershed loading. Thus, a final compliance milestone at 30 years from the effective date of the revised TMDL is proposed for achieving final WLAs/LAs.

Figures

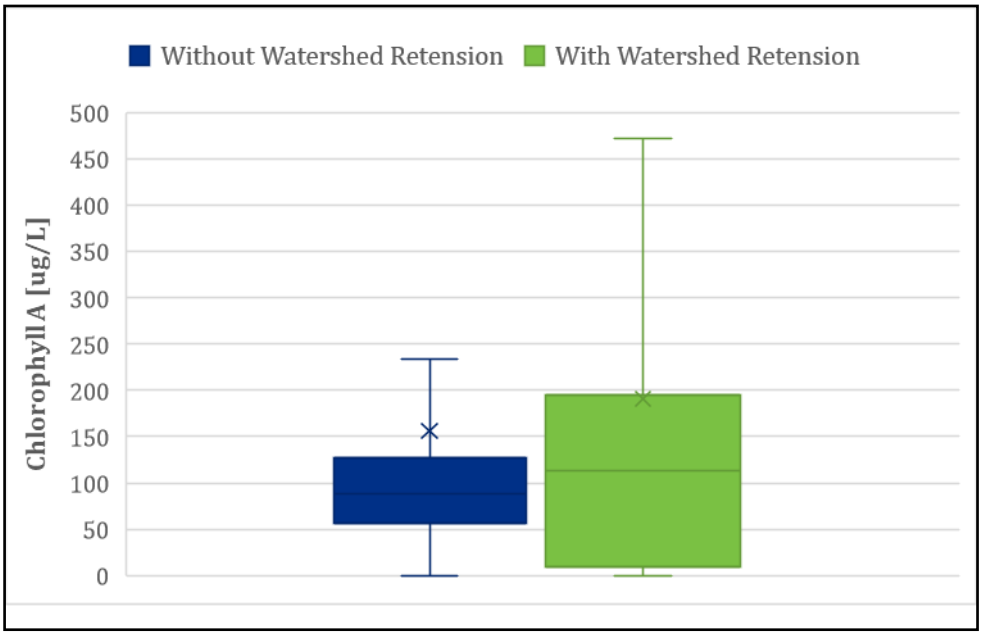

Figure 1. Box and whisker plot demonstrating simulated Chl A distributions with and without enhanced watershed retention. Colored boxes indicate 25-75% range, horizontal lines within colored boxes indicate median values, and brackets indicate 5-95% ranges. The "X" symbols indicate sample means (with outliers excluded)

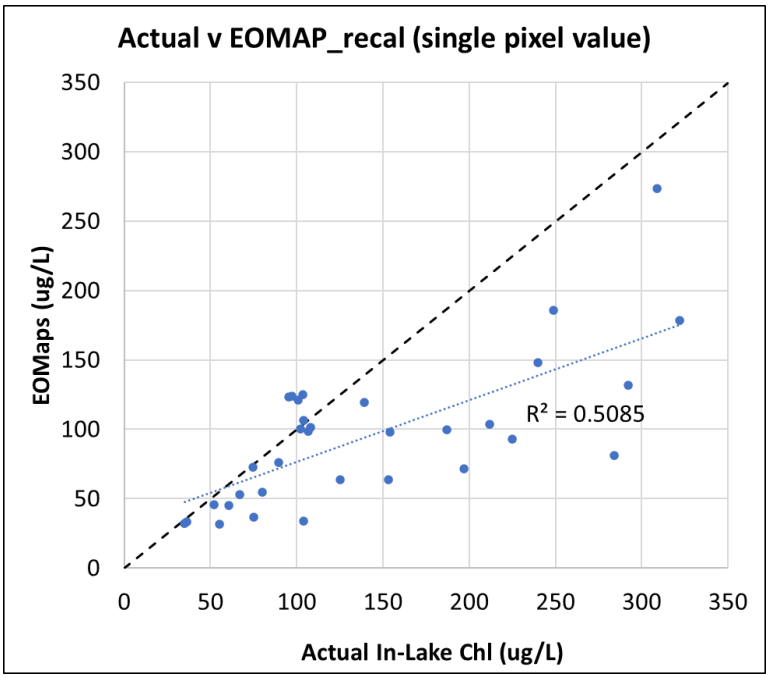

Figure 2. Comparison of satellite-derived chlorophyll-a concentrations compared with concentrations observed in grab samples collected in-lake for Lake Elsinore