

Appendix D

Response to Comments

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PART I

Staff Response to Written Comments on the Draft Staff Report and Proposed Basin Plan Amendment

(January 15, 2016)

We received five comment letters during the public comment period, which began on January 15 and closed on February 29, 2016. Three questions were common to more than one Commenter, and we respond broadly to these first. Next, we provide the comments from, and our responses to, each Commenter in alphabetical order. Staff responses are shown in italic.

Comment letters received:

1. City of San Mateo (San Mateo, Sarah Scheidt, Regulatory Compliance Manager)
2. Lennar Urban (Lennar, Therese A. Brekke, Director of Planning)
3. San Francisco Baykeeper (Baykeeper, Ian Wren, Staff Scientist, and Erica A. Maharg, Staff Attorney)
4. San Francisco Public Utilities Commission (SFPUC, Tommy Moala, Assistant General Manager, Wastewater Enterprise)
5. State of California Department of Parks and Recreation (State Parks, Gerald O'Reilly)

Common comments:

- A. The City of San Mateo, Lennar, and SFPUC comment that the Basin Plan amendment should include consideration of natural/environmental sources of Enterococci.

Response: *This comment is interpreted as a request to assign a portion of the wasteload allocation to natural sources of bacteria. We agree with the underlying concept that natural sources of Enterococci are present in waters at the beaches, and the relative contribution of naturally occurring bacteria is not quantified yet. However, given the clear evidence of human bacteria sources to the beaches, we disagree that the naturally occurring bacteria should be quantified before adopting the Basin Plan amendment or beginning efforts to control human bacteria sources and restore recreational uses of the beaches.*

We encourage implementing parties to refine their understanding of bacteria sources at the beaches. During the three years of TMDL development, bacteria source tracking methods have changed dramatically, from expensive library-dependent gene matching techniques to the more rapid and less expensive

genetic testing methods available today. The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches¹ published in 2013, provides implementing parties a useful guide for obtaining data on nonhuman bacteria sources. In combination with ongoing beach monitoring programs, such tools will allow implementing parties to more effectively (1) identify anthropogenic bacteria sources; (2) target control efforts, and, (3) identify natural sources of bacteria at the beaches that cannot be controlled.

It is both reasonable and necessary to begin controlling human sources of bacteria to our beaches before identifying or accounting for all natural or non-controllable sources. Commenters do not dispute that human fecal bacteria are present at the Bay Beaches or that these bacteria reach the beaches in the ways the TMDL identifies. The public health benefit to controlling human sources is significant, whether or not the contributions of natural sources have been precisely defined. Our approach is not unique to this TMDL. For example, the Los Angeles Regional Water Board also rejected a natural source exclusion in its update of the 2002 Malibu Creek and Lagoon Bacteria TMDL,² concluding that “a natural sources exclusion approach was premature when not all anthropogenic sources of bacteria to the lagoon have been controlled.” The San Francisco Bay Beaches Bacteria TMDL takes a similar approach, calling for anthropogenic sources of bacteria to be controlled, before a natural source exclusion is considered.

- B. The City of San Mateo and SFPUC request the Board to delay the TMDL but (1) move forward with requiring implementation of cost-effective measures to control anthropogenic sources (e.g., inspection and repair of the sanitary sewers, review of existing stormwater BMPs); (2) continue beach monitoring; (3) form a regional workgroup (ideally through the Regional Monitoring Program) to develop and implement a regional source identification plan.

Response: *Because data have shown human sources of bacteria to be present in the water at each of the beaches, we do not agree there is merit in delaying adoption of the TMDL. In fact, the approach in the TMDL is much the same as that advocated by the Commenters. That is, it will require implementing parties to move forward with controlling anthropogenic sources while continuing to investigate the contribution of natural bacteria sources and monitor bacterial densities at the beaches. This approach also was supported by two scientific peer reviewers (see Part III of this Response to Comments).*

Moreover, beach monitoring, which is conducted to satisfy State Health and Safety and permit requirements, will continue regardless of the TMDL status.

¹ Griffith, J., et al. 2013. *The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches*. Southern California Coastal Water Research Project Technical Report 804. December 2013.

² California Regional Water Quality Control Board, Los Angeles Region. 2012. *Staff Report - Reconsideration of Certain Technical Matters of the Malibu Creek and Lagoon Bacteria TMDL*. March 2012. Page 8.

We see adoption of the TMDL as the best way to ensure that implementation actions are taken. Implementing parties often lack resources for controlling sources, and adoption of a TMDL can help ensure that resources are allocated to its implementation. Adoption of the TMDL not only underscores the need for local leaders to take action, in some cases it helps implementing parties obtain grant funding.

Regarding the formation of a work group within the Regional Monitoring Program (RMP), assembling a work group within or outside of the RMP to discuss common issues could benefit implementing parties, but delaying the TMDL while such a group forms and conducts studies is not necessary. We are open to working with stakeholders and encourage collaboration as TMDL implementation goes forward, especially if focused on gaining a common understanding of new techniques in analyzing bacteria and assessing risks to humans from different bacteria sources. However, we are not likely to support efforts to “develop and implement a regional source identification plan,” in that the utility of studying natural sources of bacteria to the entire Bay is limited because the relative contribution of bacteria from natural sources varies from beach to beach.

- C. Lennar and SFPUC comment that additional time could also allow the statewide bacteria objectives update to be incorporated into the TMDL. The draft objectives are expected to be issued for public comment in summer 2016 and adopted in 2016 and may include implementation guidance on addressing natural sources, mixing zones and seasonal modifications. These potential measures should be assessed for use in this TMDL and incorporated where appropriate.

Response: *The proposed TMDL is based on the water quality objectives for Enterococcus currently in our Basin Plan. Our selection of Enterococcus and not E.coli or fecal coliform anticipates the statewide bacteria objectives update, which will propose only Enterococcus objectives for marine water bodies. In addition, the update will provide for natural source exclusions statewide, so that each region may proceed with developing natural source exclusions without amending their Basin Plans to allow for this approach. We have communicated with State Water Board³ staff responsible for developing the statewide bacteria objectives update, and we are not expecting it to contain implementation guidance such as the Commenters describe. If such guidance is included, we do not expect it to conflict with anything in the proposed TMDL. Thus, we do not agree that the TMDL should be delayed in order to incorporate elements of the statewide policy.*

³ Personal conversation with Zane Poulson. 2016. State Water Board, March 22, 2016.

Comment Letter No. 1: City of San Mateo

Introduction: Unlike the open bay, Marina Lagoon is enclosed, receives most of its water from a neighboring slough, is insulated from tidal stage height variation, has mudflats and organic rich bottom sediments, has seasonal infestations of aquatic weeds, and a 6-day residence time during dry weather. Factors that affect bacteria abundance and patterns in Marina Lagoon will be dissimilar from those in the open-water beaches included in the TMDL. Please consider these conditions as relevant to the comments below.

Comment 1.1: The City requests that the Basin Plan Amendment (BPA) include consideration of natural/environmental sources of enterococci. The BPA does not take into account natural or “environmental” sources of enterococci, which may be found in a variety of habitats, such as ambient waters, aquatic and terrestrial vegetation, beach sand, soil, and sediment. Studies show that not all enterococcus species are specific to fecal matter, and an Orange County study found about 50% of enterococcus from urban runoff, bays, and the ocean are plant-associated species. Even if the enterococcus is of fecal origin, it could come from wildlife.

Response: *See our response to Common Comment A. We also acknowledge that the physical conditions in Marina Lagoon are much different than those at all the other beaches (see Staff Report Section 2.4 and 7.3.4). While data clearly indicate the presence of controllable sources of bacteria at Marina Lagoon beaches, we recognize that the City of San Mateo is concerned that non-controllable sources are also present and perhaps could be responsible for a significant portion of the water quality objective exceedances. This is why the proposed implementation plan allows for supplemental monitoring, which could include identification of non-controllable bacteria sources, to begin at any time, and not just after the first five years of implementation. Whether it begins early or as part of adaptive implementation, supplemental monitoring is designed to consider natural/environmental sources of Enterococci.*

Comment 1.2: The City requests and supports calculation of appropriate dry- and wet-weather allocations be considered in section 8.2. The Regulatory Background (p.2) states “...The TMDL must take into account seasonal variations and include a margin of safety to address uncertainty in the analysis.” Section 8.5 states that “Recreational uses of San Francisco Bay beaches are most prevalent in the summer, but can also occur year-round. Therefore, we are not proposing seasonal variation to the TMDLs and load allocations.”

Marina Lagoon is primarily a flood control channel, which is lowered by three feet during the winter to allow for stormwater runoff. For this reason, the beaches at Marina Lagoon received significantly less recreational swimming during the winter months. The City strongly feels there should be different dry and wet weather allocations, which are provided in other region’s bacteria TMDLs, but not (so far) in Region 2.

Response: *Other Water Board Regions have selected different numeric targets for wet and dry weather; however, those TMDLs' allowable exceedance frequencies commonly are based on using a reference beach approach.⁴ The purpose of the reference beach approach is to account for the uncontrollable sources (e.g., birds and wildlife feces) in the wet weather loads from the discharging watershed. An undeveloped watershed that is reasonably comparable to the watersheds discharging to San Francisco Bay beaches has not and is not likely to be identified. Thus, this TMDL does not use the reference beach approach, and we have no scientific basis for developing wet weather targets at this time.*

Comment 1.3: **The City requests that the Cities of Foster City, Belmont, and the Belmont Slough be listed as additional urban runoff and wildlife sources in section 7.3.4.** The City has no control over Belmont Slough, which drains into Marina Lagoon. Belmont Slough is surrounded by urban cities (Foster City and Belmont), and Bair Island State Marine Park and Redwood Shores Marine Park are located at its mouth.

In addition, Section 8.3 of the Staff Report states “... *individual facilities ... shall not ... release a load of pollution that will increase the density of fecal coliforms in the downstream portion of the nearest water body This allocation scheme assumes that the concentration of FIB upstream from the discharge point is not in excess of the assigned load allocations.*”

Including Marina Lagoon in the Bay Beaches TMDL is inherently flawed. No other beach has another jurisdiction's watershed draining into their beach, with poor water quality and zero control.

Response: *The TMDL does not include Foster City and Belmont primarily because these cities have had very few sanitary sewer overflows (SSOs) within one mile of Marina Lagoon over the seven-year reference timeframe (2008-2014). Foster City experienced two SSOs totaling 30 gallons during that time, and Belmont had six SSOs totaling about 600 gallons, primarily in 2008. Conversely, the City of San Mateo reported over four million gallons of sewage overflows during that timeframe (Staff Report pg. 54) and an estimated 0.4 million gallon overflow to Borel Creek and San Mateo Lagoon during the rainy week of March 8, 2016, alone.*

In addition, the topography of the land surrounding Marina Lagoon does not support naming Belmont or Foster City. As shown in Figure 7.6 of the Staff Report, the watershed of Marina Lagoon is complex. Although Foster City borders the eastern shore of the Lagoon for half of its length, the majority of Foster City's urban runoff flows to Foster City Lagoon or San Francisco Bay.

⁴ See, for example, San Diego Regional Water Quality Control Board. 2010. *Revised Total Maximum Daily Loads for Indicator Bacteria Project I – Twenty Beaches and Creeks in the San Diego Region, Final Technical Report, Appendix I, Methodology for Calculating and Allocation Bacteria Loads*. Feb. 10, 2010. Page I-2. Also, Los Angeles Regional Water Quality Control Board. 2012. *Reconsideration of Certain Technical Matters of the Malibu Creek and Lagoon Bacteria TMDL Staff Report*. June 7, 2012.

Similarly, while the City of Belmont is located on the south end of Belmont Slough, which intermittently drains into Marina Lagoon, Belmont Slough is tidally-influenced and its connection to the beaches is not known. Thus, based on the hydrology and topography of the area, the overwhelming portion of SSOs attributable to the City of San Mateo, and the TMDL's emphasis on controlling controllable sources of anthropogenic bacteria, Staff determined that there is no compelling evidence at this time connecting the cities of Foster City and Belmont to the water quality exceedances at the Marina Lagoon beaches.

San Mateo's sampling data from the vicinity of the weir between Marina Lagoon and Belmont Slough do not provide a compelling reason to name the City of Belmont either. The City of San Mateo collected 25 samples from April 21, 2014, to January 5, 2015. The data show that the Enterococcus single sample maximum objective was exceeded in eight of the samples, primarily in late October through December. Four samples collected at each beach also exceeded the objective. The exceedance dates at the beaches did not necessarily correspond to the exceedance dates at the weir. Although this type of data may demonstrate the utility of conducting a natural source identification study, it does not provide compelling evidence that bacteria from sources in Belmont and Foster City are affecting water quality at the two Marina Lagoon beaches, which lie within the boundaries of the City of San Mateo.

Thus, the TMDL calls for the City of San Mateo to reduce controllable bacteria sources, such as SSOs, and to continue to reduce nuisance goose populations at the beaches in the near term and to conduct supplemental monitoring to identify sources of bacteria to the beaches over a longer timeframe. As we gain more information through adaptive implementation, we will consider whether additional parties may be responsible for significant sources of bacteria to the beaches on Marina Lagoon.

Comment 1.4a: Request rephrasing for consistency with other requirements. The Implementation Plan proposes, *"Comply with Cease and Desist Order No. R2-2009-0020 (CDO) In next annual report, submit enhancements to the Sewer System Management Plan that prioritize sewer system inspections ... within ¼ mile of beach"*

The City would prefer to keep terminology and regulatory requirements consistent. The proposed language confuses requirements listed in the CDO, which requires annual progress reporting on capacity assessment and infrastructure renewal projects, and the SSO Statewide Permit, which requires development of an SSMP. The City therefore recommends the following language in place of the above proposed language:

2a. Comply with Cease and Desist Order No. R2-2009-0020 (CDO) and any future amendments. In next annual CDO report, submit enhancements to the Infrastructure Renewal and Capacity Assurance Plans that prioritize sewer system inspections and repairs in areas within ¼ mile of beach to the extent possible within the framework of the CDO. Include a diagram of prioritized infrastructure and time schedule. Complete inspections and repairs in prioritized area(s).

Response: *Agreed. As suggested by the Commenter, we modified the Basin Plan amendment (see Appendix B) and Staff Report as follows:*

Table 10.5:

2.a Comply with Cease and Desist Order No. R2-2009-0020 (CDO) and any future amendments. In next annual CDO report, submit enhancements to the Sewer System Management Plan-Infrastructure Renewal and Capacity Assurance Plans, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ¼ mile of the beach to the extent possible within the framework of the CDO. Include a diagram of prioritized infrastructure and time schedule.

Comment 1.4b: Similarly, implementation Item 4 (*prioritize sewer system inspections within ½ mile of beach*) is already being conducted at a larger scale. The city recommends removing item 4, as there are already control mechanisms to ensure that the sewer system is being evaluated and prioritized. If Item 4 is kept, the timeframes for completing sewer repairs/replacements should be flexible and self-implementing. The schedule for repairs is driven by inspections, studies, and other condition based priorities, some of which are outside of the City's potential to control. Minimally revise the language to:

If targets not met, submit enhanced Infrastructure Renewal and Capacity Assurance Plans that prioritize sewer system inspections and repairs in areas within ½ mile of a beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs in prioritized area(s) per the schedule developed by the City and per the CDO.

Response: *We agree with the suggested language but do not agree to remove the requirement. As suggested by the Commenter, we modified the Basin Plan amendment (see Appendix B) and Staff Report as follows:*

Table 10.5:

4. If targets not met, submit an enhanced Sewer System Management Plan Infrastructure Renewal and Capacity Assurance Plans, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beach.

Comment 1.5: **The City requests that item 2b be removed from the implementation plan.** Item 2b requires the City to investigate the feasibility of diverting stormwater and dry weather urban runoff to the Wastewater Treatment Plant. The City submitted a sanitary sewer master plan per CDO requirements, with commitments over 10-20 years for infrastructure repair, renewal, capacity assurance for wet weather flows, and close to one billion dollars in capital costs. The proposed requirement introduces a significant change to the master planning efforts, and at this time it is not feasible to introduce this plan of action.

Response: *We disagree that removal of this implementation action is warranted. This action was intended to cause consideration of diverting stormwater to the Wastewater Treatment Plant at a time when the plant was undergoing redesign. To the extent the City has determined such diversion is infeasible, it has met the intention of that implementation action, and the City's efforts in this regard should be reported in its Infrastructure Renewal and Capacity Assurance Plan.*

Comment 1.6: **The City requests that item 5 be removed from the implementation plan, as we already have an adequate private lateral program.** Item 5 requires the City to establish and implement a private lateral replacement program if private laterals are a likely source of bacteria to the beach. As described in the Staff Report, the City already has a private lateral replacement program. This voluntary cost sharing program paid out \$424,433 in fiscal year 15/16 and replaced 113 cleanouts and 7,449 linear feet of private laterals within the City. The City is budgeting \$500,000 for fiscal year 15/16 for the continuation of this program. The City's position is that the existing cost sharing program is sufficient; it provides a valuable service to the community and protects the entire watershed including Marina Lagoon.

Response: *Because the City has a private lateral replacement program, the City of San Mateo already meets the TMDL's implementation action to establish a private lateral replacement program. The action item is still needed in the TMDL implementation to convey the TMDL's intention that such a program will continue as needed to address bacteria pollution at Marina Lagoon beaches from private laterals. However, we have added the following phrase (underlined below) to Implementation Action 5 in Sanitary Sewer Collection System actions in both the Basin Plan amendment and Draft Staff Report Table 10.5:*

5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program or refocus existing lateral program efforts to address these sources.

Comment 1.7: The City is subject to a number of regulatory requirements that are anticipated to improve water quality within Marina Lagoon specifically for pathogens. In particular, Cease and Desist Order No. R2-2009-0020 (CDO), SSO Statewide Permit Order No. 2006-0003 DWQ, and Municipal Regional Stormwater Permit Order No. Order No. R2-2015-0049. Therefore, a TMDL alternative or single regulatory action could reasonably be considered. Additionally, and in consideration of the first six comments and issues with the proposed TMDL, the City requests the following:

Request: Delay the TMDL but (1) move forward with requiring implementation of cost-effective measures to control anthropogenic sources (e.g., inspection and repair of the sanitary sewers, review of existing stormwater BMPs); (2) continue beach monitoring; (3) form a regional workgroup (ideally through the RMP) to develop and implement a regional source identification plan.

Response: *See our response to Common Comment B.*

Comment Letter No. 2: Lennar Urban

Introduction: Lennar Urban is the Master Developer of the Candlestick Point (former Candlestick Park football and baseball stadium) urban renewal project.

Comment 2.1: With respect to urban runoff at Candlestick Point being a source of fecal indicator bacteria (FIB) and pathogens, the draft TMDL states:

(1) Water quality samples collected by the SFPUC from the separate stormwater drainage network at Candlestick Point in 2003 and 2013 (before the stadium was demolished) had concentrations of Enterococcus and *E.coli* significantly less than water quality standards, although total coliform concentrations were greater than the water quality standard.

(2) A study conducted by Boehm Research Group at Stanford University evaluated two water samples from the storm drain outfall at Windsurfer Circle. The samples were analyzed for FIB and a microbial source tracking technique for human fecal markers. Although the Enterococcus concentrations were above the single sample maximum objective, the human fecal material marker was not detected in either sample.

These data suggest a lack of correlation between the quality of MS4 discharges at Candlestick Point and exceedances of the Enterococcus water quality objective in the receiving water, and a lack of evidence of human fecal contamination in the MS4 discharges, which is the primary focus of control efforts in the TMDL.

Beach water quality studies conducted in southern California found no correlation between illness rates and indicator bacteria concentrations (Colford et. al 2005, Griffith 2011). Lennar also cites four other reports.

In light of inconclusive correlations linking MS4 discharges to fecal water quality objective exceedances, we request that the Water Board delay the adoption of the TMDL until additional data can be collected to support a strong correlation that would warrant the required TMDL Implementation Plans.

Response: *As the Commenter implies, Candlestick Point is undergoing redevelopment from a large, occasional-use arena to a high-density urban residential and mixed-use area. Section 7.2.3 of the Staff Report cites evidence of the positive relationship between fecal bacteria and the density of housing, population, development, percent impervious area, and domestic animals. This evidence includes a number of studies in Southern California, including a 2014 study that concluded that water quality at beaches might be improved by extending drainpipe outlets further into the water to minimize human contact with runoff and/or by building green infrastructure aimed at collecting, retaining, evapotranspiring, and/or reusing dry weather runoff. We disagree that the data cited by the Commenter can be interpreted to mean there is no correlation between urban runoff (present or future) from the Candlestick Point area and bacteria densities at Candlestick Point beaches.*

Regarding the comment that there is no correlation between illness rates and indicator bacteria concentrations, we disagree with this assertion. Section 4.2.2 of the Staff Report cites the studies conducted by the U.S. Environmental Protection Agency (EPA) from 2003 to 2009 that reaffirmed the association of Enterococcus with gastrointestinal illness.

Comment 2.2: Additional time could also allow the statewide bacteria objectives update to be incorporated into the TMDL; the draft objectives are expected to be out for public comment in summer 2016.

Response: *See our response to Common Comment C.*

Comment 2.3: Specific consideration should be given to the relatively low risk of illicit discharge contamination impacting MS4 discharges from a redeveloped area that incorporates pollutant-specific BMPs, per the Phase II Small MS4 General Permit requirements. Lennar's redevelopment of Candlestick Point will conform to San Francisco Design Guidelines and will implement BMPs aimed at eliminating potential sources of bacteria (such as pet waste) by effectively removing bacteria from runoff using vegetated treatment systems. A modern redevelopment project with a comprehensive suite of pollutant-specific structural and institutional BMPs is not expected to be a source of human fecal contamination.

Response: *The Commenter is correct to point out a large portion of the watershed discharging to Candlestick Point beaches will consist of new development, which will occur in the former Candlestick Park area and adjoining areas. The City of San Francisco is responsible for requiring the new development to incorporate stormwater treatment BMPs as required in the General Permit for Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems, and thus it could be reasonably assumed that at least the minimum stormwater treatment requirements will be met. However, as discussed in Section 10.1.2 of the Staff Report, not all BMPs are equally effective in removing bacteria from urban runoff. When we first became aware that development plans were underway, we initiated a discussion of options for minimizing future stormwater impacts to the beaches that might go beyond the minimum requirements, but also might be more effective for minimizing bacteria at Candlestick Point beaches, such as diverting stormwater to the combined sewer system, using BMPs with the highest rates of bacteria removal, and deep water outfalls, such as the outfall Caltrans installed at the west end of Crissy Field Beach. At the time of preparation of this Response to Comments, we are not aware of a final decision on the selection of BMPs.*

As described elsewhere in this Response to Comments and the Staff Report, studies have shown that even well-designed stormwater BMPs have limited success in minimizing bacteria in urban runoff. While the new development at Candlestick Point will create an unusual situation, the Aquatic Park watershed is not dissimilar, because it has a small urban watershed. At both beaches, it might

be reasonable to posit that urban runoff may not be a major source of bacteria at the beach, as compared to other potential sources such as sewage infrastructure and potentially natural sources. Implementing parties at both of these beaches may benefit from rapidly and thoroughly inspecting sewer infrastructure and initiating a source investigation soon after TMDL adoption, in order to potentially demonstrate that human bacteria sources are controlled and that natural sources prevent reaching the TMDL's numeric target.

Comment 2.4: We request an extension for Implementing Parties to submit a BMP plan for reducing bacteria discharges from MS4s, from 6 months to 3 years from the TMDL effective date. This would provide an appropriate period of time for Implementing Parties to test BMPs to evaluate if the infrastructure meets the objectives of the TMDL.

Response: *As the Commenter points out, stormwater BMPs will be included in the Candlestick Point development plans, which we understand are under development. Because the stormwater infrastructure will be under construction but is not currently in operation, the BMP plan that the Commenter is currently developing should be sufficient for meeting this timeframe.*

Comment 2.5: The TMDL includes a provision to evaluate new information at six-year intervals, and will consider a Basin Plan amendment that reflects any necessary modifications. We request that a specific date be set for a reopener, no longer than four years from the TMDL effective date. The TMDL reopener purpose would be to evaluate new relevant information, which may include:

- Approval of a natural source exclusion or similar Basin Plan amendment within the San Francisco Bay Region;
- Approval of the statewide bacteria objectives update (which is expected in late 2016); or
- Data from relevant special studies, such as regional or discharger-specific microbial source tracking investigations, quantitative microbial risk assessments, and/or epidemiology studies.

Response: *A reopener clause is not warranted on the grounds that the Commenter suggests. As described in our response to Common Comment A, the TMDL provides for implementing parties to conduct studies of natural sources, such as microbial source tracking investigations and quantitative microbial risk assessments, which would support a natural source exclusion. Delaying the TMDL until such studies are completed is not necessary, because data have shown human sources of bacteria to be present in the water at each of the beaches. As described in our response to Common Comment C, the statewide bacteria objective update is not expected to conflict with the TMDL. The update is expected to provide for Regional Water Boards' consideration of natural source exclusions without amending their Basin Plans. In addition, a reopener clause is not required to be able to reopen the TMDL; all TMDLs may be reopened if there is new information that warrants it.*

Comment Letter No. 3: San Francisco Baykeeper

Introduction: Some urban beaches in this TMDL are among the only high quality resources for board sport enthusiasts, and the Water Board should use this TMDL as a means to enhance water-oriented recreation, in general.

Baykeeper is primarily concerned that the proposed Implementation and Monitoring program lacks specificity, generally follows a status quo approach, and is insufficient to determine the effectiveness of implementation actions or whether allocations are met. Specific comments follow.

Comment 3.1: For example, Table 10.1 establishes general elements for implementation plans. Elements addressing bacteria loading from sanitary sewer collection systems and urban runoff call for the mere submission of vaguely-specified assessment and implementation plans by the regulated entities. If implementation of those plans, which are not subject to public review or even Executive Officer approval, is unsuccessful within 5 years, yet another plan, generally identical in nature to the prior plan, shall be generated – and there are no specifications for what that plan should entail. Nor are there any consequences, in the likely event that implementation of the plan fails to meet allocations within any specified timeline.

This pattern of assigning responsibility for the development of implementation and monitoring programs to regulated entities, and the pursuit of decadal plan-development processes, has been demonstrated in a number of TMDLs and NPDES permits approved in recent years by the San Francisco Bay Regional Water Board. This is a source of concern for Baykeeper and other observers.

Response: *Table 10.1 is intentionally general, as its express purpose is to lay out, in general, a TMDL implementation framework for urban beaches along San Francisco Bay. If this comment is extended to the implementation plans specific to each beach, we disagree that the level of specificity is inappropriate for the TMDL. On the contrary, it would be inappropriate to specify the numbers, types, and locations of implementation actions within the TMDL, because initial actions to, for example, control sewer collection system leakage could drive subsequent actions.*

We agree with the comment that implementation plans should be subject to review by the Executive Officer or the public, given that the exact details of the plans are not dictated. We inadvertently left out such an approval and have added “acceptable to the Executive Officer” to steps 2 and 4 of the Sanitary Sewer Collection System actions and steps 1 and 3 of the Urban Runoff sections of the implementation plans for Aquatic Park, Crissy Field, Candlestick Point, and Marina Lagoon beaches in the Basin Plan amendment (see Appendix B) and the Staff Report as shown below:

Tables 10.2, 10.3, 10.4 and 10.5

2. Submit an enhanced Sewer System Management Plan and Combined Sewer Operations and Maintenance Plan as applicable, acceptable to the Executive

Officer, that prioritizes sewer system inspections and repairs in areas within ¼ mile of beach or otherwise connected to the beach.

4. If targets not met, submit an enhanced Sewer System Management Plan and Combined Sewer Operations and Maintenance Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of beach or otherwise connected to the beach.

1. Submit a plan acceptable to the Executive Officer describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach.

3. If targets not met, submit, acceptable to the Executive Officer:

Comment 3.2a: Implementation Plan Elements do not demonstrate knowledge of industry practices to prioritize sanitary system rehabilitation. For example, Table 10.1 indicates implementation measures should focus on sewer improvements within 0.25 miles of the beaches. If not successful within 5 years, the radius of focus shall expand to 0.5 miles. No rationale is provided.

Response: *The radii of initial and expanded implementation efforts are based on the likelihood of sewer leakage impacting the beach and are intended to focus efforts on those areas, while considering what is reasonably achievable by implementing agencies. For beaches in San Francisco with small watersheds, the quarter-mile radius can encompass their entire watershed. For example, Aquatic Park Beach's watershed boundaries are within less than 0.25 miles. A further consideration is the relatively common scenario statewide in which a sewer pipe near a beach was discovered to be a major source of bacteria, despite the implementing parties' theories that other sources were more likely. If the initial implementation radius were overly large, implementing parties would potentially be free to follow existing priorities rather than focus inspection and repairs close to the beaches, where they should have the most impact.*

We agree that the Staff Report does not clearly state the rationale behind the selected focus areas and have added the following statement:

Section 10.1.1, page 71, paragraph 2:

The radii of initial and expanded implementation efforts are based on the likelihood of sewer leakage impacting the beach and are intended to focus efforts on those areas, while considering what is reasonably achievable by implementing agencies.

Comment 3.2b: Specifications for prioritizing sewer infrastructure rehabilitation do not recognize national and international standards for assessing and prioritizing the rehabilitation of underground utilities. The industry standard, Pipeline Assessment and Certification Program (PACP), is not cited as a means to grade and prioritize the remediation or replacement of sewerage infrastructure, for example. Nor is there

discussion of strategies for addressing sewer exfiltration, which is a concern given the age and composition of pipes in our seismically active region.

Response: *Implementing parties are required by Clean Water Act permits and other Water Board orders to inspect and repair sanitary sewer systems independently of this TMDL. Where permit conditions have not been met, the Water Board has followed up to compel compliance, as is the case with the Cease and Desist Order issued to the City of San Mateo. Implementation of this TMDL is not intended to change permit conditions, other than to ensure that sewer system components with the highest potential to impact the beaches are inspected in the near term. It is likely, but beyond the scope of this TMDL, that implementing parties follow industry standards such as PACP.*

Sewer exfiltration is a concern, is mentioned in the staff report, and is included in the TMDL's sewer collection system inspection and improvement requirements. Sewer inspection procedures look for leaking points, which are points of exfiltration.

Comment 3.2c: Implementation plans do not follow US EPA 1999 TMDL Guidance for bacteria TMDLs, which says implementation plans will "explain the techniques that will be used to meet load reductions." Specifically, the implementation plan must include a "description of the implementation actions/management measures required to implement the allocations, along with a description of the effectiveness of these actions/measures in achieving the required pollutant load or reductions." The proposed TMDL does not satisfy the stated purpose or minimum requirements of TMDL implementation plans. We respectfully request staff conduct the analysis necessary to present the minimum elements necessary for any TMDL submitted to EPA, established by EPA guidance.

Response: *We relied on the 2001 U.S. EPA Protocol for Developing Pathogen TMDLs, First Edition, in developing this TMDL. The TMDL does describe techniques for meeting load reductions. While Table 10.1 presents "generic" implementation plan elements, Tables 10.2-10.5 present the implementation actions to be taken at each beach. Implementation actions are described in more detail in Staff Report sections 10.1.1 – 10.1.5.*

Comment 3.3a: Section 10.1.6, Monitor for Effectiveness of Load Reduction Actions, merely summarizes existing monitoring activities and conceptual options for monitoring in the future. The TMDL does not call for any monitoring from stormwater agencies, in conflict with bacteria TMDLs and stormwater NPDES permits throughout the Los Angeles, Santa Ana and San Diego regions.

Response: *Section 10.1.6 is intentionally generic, because its purposes are to lay out the timing considerations and the management questions to be addressed by a bacteria monitoring program for a San Francisco Bay beach. In Sections 10.2.1-10.2.4, more specific monitoring actions are described for each*

beach. The rationale for including less stormwater monitoring for San Francisco Bay beaches than what may be appropriate elsewhere follows.

Because the City of San Francisco has a combined sewer system, the watersheds discharging to Aquatic Park and Candlestick Point beaches are extremely small relative to the watersheds discharging to beaches in the Los Angeles, Santa Ana and San Diego regions (see Staff Report Figures 5.1 and 5.3). In those regions, stormwater outfalls operated by numerous municipalities discharge urban runoff from the large watersheds to the beaches, and upland monitoring is needed to pinpoint problem areas and measure progress in reducing bacteria at those locations. For Aquatic Park and Candlestick Point beaches, such monitoring is not informative because urban runoff is routed to the combined sewer system and treated at the City's wastewater treatment plants.

At Crissy Field Beach, the vast majority of watershed runoff drains to Crissy Marsh, whose outlet is near East Crissy Field Beach. As detailed in the Staff Report, existing data from the mouth of Crissy Marsh largely do not exceed bacteria objectives. San Mateo Lagoon has one clear human source (sewer system infrastructure) and a myriad of potential sources as laid out in the City of San Mateo's comments and the Staff Report. Crissy Field Beach and the San Mateo Lagoon beaches will need to tailor their monitoring to their specific characteristics to best pinpoint sources and determine "next steps" beyond the initial implementation steps set out in the Staff Report. As the Commenter points out, appropriate approaches to such monitoring are laid out in the Staff Report. Widespread upland urban monitoring of the scale undertaken in Southern California is not appropriate for San Francisco Bay beaches. Where more data are needed to focus implementation actions in upland areas of a watershed, they will be collected under supplemental monitoring.

Comment 3.3b: The TMDL does not request refinement of bacteria source identification through, for example, methods described in *The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches*. In fact, the only optional monitoring presented in this section deals with considerations for entities seeking a natural source exclusion, rather than requesting monitoring data specific to the regulated entity and their discharges of concern.

Response: The TMDL does require monitoring specific to each implementing party/beach, including supplemental monitoring, which must investigate bacteria sources to the beach. This requirement is stated in each specific beach implementation plan and described further in the text associated with each beach (see Staff Report Section 10). In addition, the Staff Report states that implementing parties should use the methods described in *The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches* (See reference to Griffith, et al. in the Staff Report, Section 10, page 65). The Manual has been integral to the development of this TMDL. Board staff, implementing parties, nongovernmental entities, and other stakeholders have discussed the Manual and its role in implementing this TMDL

at numerous meetings of the Northern California Water Quality Monitoring Beach Workgroup, including an August 2015 meeting in which Staff presented how the Manual will be used within the implementation framework of this TMDL. The Manual has been posted on the TMDL's web page for approximately two years. Staff expects that the Manual will be an important reference in the source identification efforts that the implementing parties do.

To provide clarity, we have edited page 66 of the Staff Report as follows: The steps described in each chapter of this Staff Report and in The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches by Griffith et al. (Griffith 2013) should be used to guide adaptive implementation of the TMDL.

Comment 3.3c: Section 7.2.5.8 states the “[i]mplementing parties are responsible for developing and implementing a monitoring plan sufficient to assess compliance with the numeric targets at the beaches.” This is in conflict with EPA guidance, which requires all TMDL submittals to include a monitoring or modeling plan “designed to determine the effectiveness of the implementation actions and to help determine whether allocations are met” (per 1999 US EPA guidance).

Response: Here the Commenter quotes the first sentence in Section 7.2.5.8 of the proposed Basin Plan amendment. This section goes on to state that “At a minimum, implementing parties shall continue monitoring the beaches as required under California Health and Safety Code §115880 and provide a data evaluation report annually to the Water Board.” Such monitoring will determine whether the numeric targets, which are equal to allocations, are met and thus will help determine the effectiveness of implementation actions taken. Note that this “minimum” monitoring will occur at each beach, while the “supplemental” monitoring described in response to Comment 3.3b above, will be tailored to each beach to provide information about bacteria sources and the effectiveness of actions taken.

Comment 3.3d: The Regional Board attempts to delegate its duty to describe specific measures that will be taken to reduce pollutant loads to the sources themselves. The TMDL provides that the source of bacteria discharges, municipal stormwater and sewer system authorities, will develop plans to describe BMPs and other measures for implementation. The duty to develop these plans, for inclusion in TMDLs, rests on the Regional Board. We respectfully request that staff develop implementation and monitoring plans sufficient to meet the requisite standards established in EPA guidance.

Response: We disagree that the TMDL inappropriately or incorrectly delegates authority to implementing entities. The Staff Report and proposed Basin Plan amendment describe the general actions each entity must take to comply with the TMDL (e.g., reduce bacteria in urban runoff), and list a range of appropriate means of accomplishing these actions (e.g., implementing structural or nonstructural BMPs). However, a TMDL does not, by itself, require particular

actions to be taken.⁵ Instead, TMDLs serve as a guide for permitting and pollution control decisions in particular watersheds because load and wasteload allocations are met by adjusting the terms of individual NPDES permits or implementing nonpoint source control programs. In other words, TMDLs are not themselves self-executing. Therefore, the Commenter's request that staff develop implementation and monitoring plans on behalf of the implementing parties is beyond the scope of this TMDL.

Comment Letter No. 4: San Francisco Public Utilities Commission

Introduction: Three beaches addressed by this TMDL are in San Francisco. The SFPUC is concerned that the numeric target and wasteload allocation for urban runoff are likely unattainable due to non-controllable sources. Without a defined path to identifying the contribution from non-human sources, or clearly outlining the limits of stormwater BMPs, this TMDL could result in the expenditure of significant resources without producing measureable water quality benefits.

Comment 4.1: We request TMDL adoption be postponed until an approach for identifying and addressing natural or background sources in the Bay is developed. We support moving forward with measures to identify anthropogenic sources, continued beach monitoring, and development and implementation of a regional source identification plan to better characterize sources of fecal indicator bacteria and target future implementation measures.

Response: See our response to Common Comment A.

Comment 4.2: Delaying the TMDL may help harmonize this effort with the State Water Board's anticipated adoption of statewide water quality objectives for bacteria, which may include implementation guidance on addressing natural sources, mixing zones, and even seasonal modifications to the recreational beneficial use.

Response: See our response to Common Comment C.

Comment 4.3a: The BPA should more specifically address environmental sources of enterococcus. Specifically: Not all enterococcus are indicators of fecal contamination because not all enterococcus are specific to vertebrate intestinal tracts. The Commenter cites several studies. Even if enterococcus in receiving waters are of fecal origin, the current EPA approved culture-based method does not distinguish between human and other animal sources and the risk to humans from exposure to pathogens associated with animal feces is not well understood or characterized.

⁵ See *Conway v. SWRCB* (Cal. Ct. App. 2015) 235 Cal. App. 4th 671, 680; *City of Arcadia v. SWRCB* (Cal. Ct. App. 2006) 135 Cal. App. 4th 1392, 1414-1415.

Response: *The Commenter is correct in stating that not all Enterococcus are indicators of fecal contamination or of the presence of pathogens that cause human illness. The Staff Report at Section 4.1 makes this same point and goes on to explain why Enterococcus is nevertheless a good indicator of wastes from warm-blooded animals.*

The Commenter is also correct in stating that the current method does not distinguish between bacteria sources. However, we disagree with the implication that the risk to humans from contact with indicator bacteria has not been established. Section 4.2.2 of the Staff Report cites the studies conducted by U.S. EPA from 2003 to 2009 that reaffirmed the association of Enterococcus with gastrointestinal illness. Staff acknowledges that the Basin Plan amendment does not go into this level of detail.

Comment 4.3b: The BPA should more specifically address environmental sources of enterococcus. Specifically, monitoring conducted by the SFPUC in 2014 indicates that non-human sources of enterococcus may be significantly contributing to the observed frequency of water quality objective exceedances at some locations. In 2014 the SFPUC analyzed shoreline samples collected as part of the SFPUC's routine beach monitoring program for enterococcus using the culture-based EPA Method 1609.1, and for the presence of the human-associated HF183 Taqman marker using quantitative polymerase chain reaction (qPCR). 38 out of 88 samples (43%) collected at Sunnydale Cove exceeded the Enterococcus objective. 68 of those 88 samples were also analyzed for the presence of HF183. Of those 68 samples, only 7 (10%) had levels of HF183 above the method level of quantification.

Response: *We recognize the concern that nonhuman sources of Enterococcus could be a significant cause of water quality objective exceedances, as does the Staff Report. SFPUC staff recently discussed the referenced data with Board Staff but did not provide the data to us. While the data represent an initial step toward identifying natural sources of bacteria, more data are needed to determine how often human bacteria are present when Enterococcus objectives are exceeded and to determine if bacteria from other controllable sources, such as pets, present a risk to people who recreate at the Candlestick Point beaches. The Commenter points out that ten percent of the samples evaluated did contain the human marker. The TMDL's strategy is to control such human-caused bacteria sources while working toward identification of natural bacteria sources. We appreciate the Commenter's concern that non-anthropogenic bacteria sources are present in the waters at its beaches and encourage the Commenter to continue this line of study. The data do not, however, negate the need for this TMDL or provide cause for its delay.*

Comment 4.3c: The BPA should more specifically address environmental sources of enterococcus. Specifically: We are especially concerned that the TMDL target may be unattainable even if all human sources are controlled. Adoption of this TMDL is

premature without further investigating and identifying the sources and relative contributions of enterococcus at the impaired beaches.

Response: *The TMDL anticipates the possibility that natural sources may be significant enough that the TMDL target is unattainable. For this reason, the implementation plan for each beach includes “supplemental monitoring” to investigate remaining bacteria sources to the beach once human sources are addressed. The implementation plan states that supplemental monitoring may support “(i) locations and types of enhanced bacteria BMPs, and/or (ii) **revision of the numeric targets to reflect bacteria contributions from non-controllable sources**” (emphasis added). This monitoring, which may begin earlier if implementing parties choose, may yield data that demonstrate that natural bacteria sources are the cause of water quality exceedances. In this way, the TMDL provides an off-ramp from the implementation of additional controls.*

Comment 4.3d: The BPA should more specifically address environmental sources of enterococcus. Specifically: The Staff Report implies (p.65) that the City will be required to address non-anthropogenic sources using some “adaptive implementation” approaches. It is unclear how stakeholders could demonstrate that all anthropogenic sources are being controlled or what quantity and type of data would be needed to demonstrate that non-controllable sources of enterococcus (e.g., plant or wildlife) are causing or contributing to impairment, even assuming the City could be deemed responsible for those sources.

Response: *Implementing parties will not be required to address non-anthropogenic bacteria sources, but instead only known, controllable bacteria sources. See Staff Report, Section 10. However, we agree that the following sentence in Section 10, page 65, could be construed to imply that natural sources can only be evaluated after anthropogenic sources have been controlled: “Natural sources may then be addressed through adaptive implementation at beaches where numeric targets are not met after fully addressing anthropogenic and controllable sources.” This sentence has been modified to read:*

Section 10, page 66, paragraph 2:

Natural sources may then be addressed through adaptive implementation at beaches where numeric targets are not met after fully addressing anthropogenic and controllable sources. Either concurrently or as part of adaptive management, implementing parties may work to identify natural bacteria sources and obtain data to support revision of the numeric targets to reflect bacteria contributions from non-controllable sources. In all cases, implementing parties must control anthropogenic controllable sources of bacteria to the beach.

Regarding the comment on the quantity and type of data needed to demonstrate that non-controllable sources are causing impairment, at a minimum, we would expect that anthropogenic bacteria would not be present in samples in excess of

the state delisting policy.⁶ We expect that a natural source exclusion project to be conducted in the San Diego Region this year will provide further guidance on collecting data and conducting a quantitative microbial risk assessment. We anticipate working closely with implementing parties to ensure a transparent process for reviewing bacteria data and determining compliance with the numeric targets.

Comment 4.3e: The SFPUC requests that the Regional Board delay adopting this BPA until more data can be collected to ascertain the relative contribution of non-human sources of enterococcus and to develop a natural source exclusion approach, if a TMDL is still warranted. Adopting the BPA without recognizing the likely contribution of uncontrollable sources of enterococcus is likely to result in the need for yet another BPA amendment in the future and creates uncertainty about the level of effort stakeholders must invest in both monitoring and in management actions.

Response: *We find that a delay in implementing the TMDL is unnecessary; see our response to Common Comment A. The TMDL contains an adaptive implementation strategy that is intended to minimize any uncertainty implementing parties may have, by focusing actions on likely bacteria sources closest to the beaches over the first five years. During that time, implementing parties may also collect data to further identify bacteria sources, including natural sources. This is expected to allow enough time either to demonstrate that anthropogenic sources are not causing water quality impairment or to focus subsequent implementation actions on remaining sources.*

Comment 4.3f: Development and implementation of a source identification plan to inform this BPA should take place as part of the RMP. This will help ensure that all stakeholders actively support data generation and that source identification efforts will be consistent across all San Francisco Bay beaches. We recognize that RMP's budget for pilot and special studies is currently over-subscribed, and would commit to identifying additional funding from stakeholders and other sources to ensure that studies to support this TMDL proceed on an appropriate schedule.

Response: *As discussed in the response to Common Comment B, assembling a work group within or outside of the RMP to discuss common issues could benefit implementing parties, but delaying the TMDL while such a group forms and conducts studies is not necessary. We are open to working with stakeholders to develop a common understanding of new techniques in analyzing bacteria and assessing risks to humans from different bacteria sources and encourage collaboration as TMDL implementation goes forward.*

Comment 4.4a: Wasteload allocations for urban stormwater are unnecessarily stringent and unattainable. Specifically: Fecal indicator bacteria concentrations decline with time

⁶ Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List. Adopted Sept. 30, 2004. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf.

due to transport, mixing and dilution, predation, and die-off. It is inappropriate to require that urban stormwater discharges comply with numeric water quality objectives without taking into account these factors.

Response: *The Staff Report presents the current scientific literature, which demonstrates that urban runoff contains bacteria and is a source of bacteria at beaches where urban runoff is present. Thus, in this TMDL, urban runoff is given a concentration-based wasteload allocation equal to the numeric target, as were all other sources of bacteria to the beaches. As the Commenter points out, bacteria are not conservative pollutants, and their concentrations may decline due to die-off and predation. Therefore, the TMDL does not require direct monitoring of urban runoff. Instead, the water at the beach must be monitored to determine when/if the beach meets water quality objectives for recreational uses. Implementing parties may monitor urban runoff to identify sources of bacteria to the beach or to determine where to place/enhance BMPs as part of “supplemental monitoring.”*

Comment 4.4b: Even though the BPA states that numeric effluent limitations will not be incorporated into municipal separate storm sewer (MS4) permits, it is unclear whether this BPA can constrain future permitting actions. Notably, end-of-pipe monitoring (outfall) for stormwater is now being required in some MS4 permits, and this region’s Phase I MS4 permit has been appealed to the State Water Board on the grounds, inter alia, that it fails to require wet weather or end-of-pipe monitoring sufficient to determine compliance.

Additionally, while the BPA does not currently require end-of-pipe monitoring, such monitoring may be helpful to better characterize sources of loading to a particular beach. If exceedances of the water quality objective are detected as part of a source identification effort, these data could be used in future compliance determinations, regardless of this Regional Board’s intent and whether the exceedance is attributable to anthropogenic sources.

Response: *The commenter raises concerns as to whether:*

- a) *The proposed BPA can constrain unspecified permitting actions to preclude outfall sampling and analysis in light of State Water Board’s decision to review Water Board Municipal Regional Stormwater Permit (NPDES no. CAS612008 (Phase I MS4)); and*
- b) *Outfall data collected by dischargers to refine understandings of pathogen sources will be used by the Water Board for enforcement.*

Regarding the State Water Board’s decision to review the Phase I MS4, it would be speculative at best for the Water Board to predict the outcome of that review. In the absence of the proposed BPA, some future unknown regulatory action is possible. The proposed BPA, however, provides protection and certainty from future interpretations used to address compliance determinations for the pathogens impairment to Bay beaches. The TMDL Implementation Plan makes clear how compliance with the TMDL and wasteload and load allocations will be

determined. As the Implementation Plan states, it is not the Water Board's intent to include numeric limits in NPDES permits as long as the discharger demonstrates full implementation of technically, feasible, and cost efficient BMPs to control all controllable sources to, and discharges from, their storm drain system. Compliance determination by the Water Board will be based upon discharger adherence to the schedule in the amendment and meeting the numeric targets, equivalent to water quality objectives in the receiving water.

Should dischargers choose to design a study to further evaluate sources of pathogen loading to a beach, it is logical that study design would identify data and sampling needs, potentially including characterization of stormwater quality for a particular catchment or land use type. This work may involve outfall monitoring specific to a catchment. The proposed BPA provides an allowance for dischargers to undertake supplemental monitoring programs (supplemental to the beach monitoring) to investigate remaining bacteria sources to the beach while implementing BMPs to control all controllable sources of pathogens. As noted above, the data collected to support source identification efforts will not be used by the Water Board to determine discharger compliance with the proposed BPA, and we welcome these types of studies to better understand specific sources of bacteria.

Comment 4.4c: Wasteload allocations for urban stormwater are unnecessarily stringent and unattainable. Specifically:

- The non-structural best management practices available to reduce bacteria in urban runoff are limited and consist mainly of source control measures such as street cleaning and pet waste control programs, which are already implemented to some degree at San Francisco beaches. We are unaware of any instance in which *Enterococcus* in stormwater has been reduced to concentrations below the draft BPA's WLA through implementation of non-structural BMPs.
- Structural BMPs are also proving unable to consistently reduce *Enterococcus* levels to water contact standards. Structural BMPs, such as chemical or ultraviolet disinfection, have the potential to reduce concentrations to below the WLA. Such measures would likely have substantial environmental and financial costs, and would be exceedingly challenging to deploy across many stormwater outfalls. The SFPUC is concerned that the stringent WLA for urban stormwater may result in requirements to implement structural BMPs which are not feasible and without a cost/benefit analysis.

Response: *This comment expresses concern that it will be costly, if not impossible, to attain wasteload allocations, given the difficulties of effectively treating bacteria in urban runoff, which potentially contains high levels of bacteria of nonhuman origin. While we agree that some stormwater treatment measures have significant capital and maintenance costs, we believe that bacteria in urban runoff may be controlled largely by non-structural treatment methods, particularly at San Francisco's beaches that have relatively small watersheds. For instance, sewer system infrastructure inspections may identify and lead to the repair of*

cross connections or exfiltration that could be contributing human Enterococci to urban runoff.

Similarly, controlling pet waste or nuisance wildfowl at and near the beach could also reduce sources of bacteria to runoff without costly treatment. We are unaware of pet control programs at beaches within the City of San Francisco, with the exception of the proposed program at Crissy Field Beach. Where bacteria levels remain high at a beach following these types of initial steps, implementing parties may monitor urban runoff to determine if human sources are still present and assess locations where structural BMPs may be cost-effective. Supplemental monitoring may inform us that further inspections for cross connections or exfiltration are needed. For some beaches, these initial implementation actions may reduce current rates of water quality objective exceedances without the need to deploy structural stormwater BMPs. For other beaches, structural stormwater BMPs such as bioretention and biofiltration units will likely be necessary to reduce bacteria from urban runoff. We do not expect highly technical BMPs, such as chemical treatment or ultraviolet disinfection, to be deployed in implementing this TMDL.

Comment 4.4d: The SFPUC requests modifications to the Source Assessment section. The draft BPA states that “stormwater controls...must be incorporated into the new design(s) and construction as the property is redeveloped, with the goal of eliminating or minimizing urban runoff flows to the Candlestick Recreation Area shoreline,” and that “[a]ny new development of these parcels should be designed to eliminate or minimize runoff to the Candlestick Recreation Area shoreline.” These sentences should be deleted from the draft BPA. All redevelopments in the separate storm sewered area of San Francisco are required to capture and treat the rainfall from a 0.75 inch storm, with a preference towards approaches that retain stormwater. Accordingly, all private parcels and the future public right of way will be developed to comply with San Francisco’s Stormwater Management Ordinance. Additionally, in the absence of a source assessment, it is premature to speculate about the causes of exceedances at the Candlestick beaches or the appropriate control measures.

Response: *We believe the Commenter is referring to the Draft Staff Report, not the Basin Plan amendment. We understand the City of San Francisco requires redevelopments to incorporate stormwater treatment BMPs in accordance with its Stormwater Management Ordinance. However, as discussed in Section 10.1.2 of the Staff Report, not all BMPs are equally effective in removing bacteria from urban runoff. The Source Assessment section (in the Staff Report) that the Commenter refers to provides a perspective on the desirable condition, in which full consideration is given to the potential impact of increased urban runoff to the beaches and to measures most effective in reducing bacteria. We find it unnecessary to make the requested modifications to the Staff Report.*

Comment 4.5: Water Code §13241 requires a Water Board to take economic considerations into account when establishing objectives. This TMDL takes a general receiving water objective and redefines it as an objective that applies to end-of-pipe,

without any dilution or consideration of attenuation. This redefinition of the objective requires the §13241 cost/benefit analysis. An economic analysis for this TMDL is particularly critical because of the likelihood that significant public expenditures will be needed and the required measures may have only very limited impact on water quality due to the natural sources of bacterial at the beaches.

Response: We agree that Water Code section 13241 requires the Board to take economic considerations into account when developing water quality objectives. However, this TMDL does not establish new water quality objectives; therefore section 13241 does not apply. (See *San Joaquin River Exch. Contractors Water Auth. v. SWRCB* (Cal. Ct. App. 2010) 183 Cal. App. 4th 1110, 1119). Moreover, as stated in our response to Comment 4.4a, the TMDL does not require end-of-pipe monitoring. Rather, implementing parties must meet numeric targets at the beaches.

Comment 4.6a: The footnote on implementation plan tables states that the timeframe for completing the implementation actions begins on the effective date of the BPA. TMDLs are not self-implementing but must be incorporated into permits or other regulatory mechanisms. This footnote should be deleted and the Regional Board should continue to engage stakeholders in developing a logical and practical strategy for implementation.

Response: We disagree that implementation should be delayed. The Commenter is correct in stating that TMDLs are implemented through permits or other regulatory mechanisms. While we will incorporate this TMDL's requirements into permits, we have additional regulatory options, including Water Code §13267 orders. Initial implementation steps, such as inspecting sanitary sewer system components and implementing stormwater BMPs, are already required by permits issued to implementing parties; this TMDL proposes that some of the inspections and BMPs be focused on reducing bacteria at the beaches. In addition, it is appropriate for parties such as California State Parks, which must seek permit coverage, to begin to seek funding for sewer system inspections as soon as possible.

We will continue to engage with stakeholders as this TMDL is implemented.

Comment 4.6b: The implementation plan requires submittal of an “enhanced Sewer System Management Plan that prioritizes sewer system inspections and repairs in areas within ¼ mile of [the impaired] beach.” Most of SFPUC's pipes within this area are part of the combined sewer system and not subject to the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems' requirement to develop these plans.

Response: Where SFPUC's sanitary sewer system is not covered under the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, the inspection and repair of the sewer system is required by the City's NPDES permit (Order No. R2-2013-0029). We have amended the reference to Sewer

System Management Plan in the Basin Plan amendment (see Appendix B) and the Staff Report as follows:

Tables 10.2, 10.3 and 10.4:

2. Submit an enhanced Sewer System Management Plan and Operations and Maintenance Plan for the combined sewer system (O&M Plan), as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ¼ mile of the beach or otherwise connected to the beach.

4. If targets not met, submit an enhanced Sewer System Management Plan and O&M Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beach.

Section 10.1.1, page 71, paragraph 1:

In short, sewer collection system authorities are responsible for finding and repairing leaks and overflows of sanitary waste, regardless of the existence of an applicable TMDL. To achieve the numeric targets at San Francisco Bay beaches, authorities must amend their SSMPs (or other sewer collection system Operations and Maintenance Plans required by applicable permits or orders) as needed to prioritize the investigation and repair of faulty sewer pipes, pumps, and other infrastructure according to their proximity to the beach, the magnitude of leak or overflow risk, and similar considerations.

Comment 4.7: The TMDL should require inspection and repairs of sewer mains only. The City's large transport/storage (T/S) structures and force mains should be excluded. T/S structures should be excluded because inspection requires confined space entry and the technologies – such as closed circuit television and Electroscan – available for inspecting sewer mains have limited utility for inspecting T/S structures. Additionally, because they are designed to store very large volumes of stormwater, T/S structures typically contain very low volumes of dry weather sanitary flows, making exfiltration from these structures unlikely. Force mains similarly present inspection challenges in that they must be taken out of service to inspect, which may not be feasible if a particular force main does not have redundancy.

Response: *We are aware that they can be difficult to inspect but disagree that the Basin Plan should contain an exclusion for force mains and T/S structures. Water Board orders to assess and repair sewer collection systems have specifically included force mains.⁷ Force main pressure relief valve leakage has resulted in sanitary sewer overflows reported to the Water Board. The Bay Area Clean Water Agencies held a workshop on force condition assessment on July 12, 2012, in which strategies for assessing force main condition were presented. To the extent that SFPUC must prioritize and schedule for assessments of force mains and T/S structures in the vicinity of the beaches, this can be outlined in its*

⁷ For example see Order R2-2013-0005, Findings 5 and 6.

Sewer System Management Plan and plans required by Order No. R2-2013-0029.

Comment 4.8: We have estimated the length of sewer mains affected by the TMDL inspection provisions. We anticipate being able to complete these inspections within the three years specified by the draft TMDL without significantly disrupting our current condition-based asset preventative maintenance program. It is possible, however, that any needed repairs or replacements cannot be completed within three years. That schedule would be driven by inspection results, other condition-based priorities in the collection system, and factors outside our control such as the City's moratorium on disturbing newly paved roads for five years. The BPA should be revised to allow the collection system owner to propose a schedule for identified repairs based on feasibility and other priorities.

Response: *We understand that the City has to balance many, sometimes conflicting, demands. However, the ¼ mile radius for the first phase of implementation is intended to focus priorities on the beaches. In order to make progress during the first five years we would expect every effort would be made to repair leaking infrastructure within this radius of the beach. The Basin Plan amendment calls for implementing parties to submit a plan and schedule for inspections and repairs and to complete inspections and repairs with three years. This schedule is intended to prompt early action so that needed repairs can be identified and completed within this timeframe. Where additional time is needed due to conflicting requirements or the need to develop funds for large repairs, this should be proposed in the schedule submitted to the Water Board and acceptable to the Executive Officer.*

Comment 4.9: It is unclear whether the requirement to inspect sanitary sewer pipes within ¼ mile of the beach applies to pipes within ¼ mile of the property line of the beach, to all pipes within a quarter mile of the listed sampling location, or to some other measurement. For smaller beaches, such as Aquatic Park, it may be appropriate to require inspections within ¼ mile of the property line. For larger beaches where only one sampling station is driving impairment, such as Crissy Field, some other demarcation may be more appropriate.

Response: *One quarter mile of the beach refers to a quarter mile radius centered at the beach sampling location that has experienced the bacteria water quality objectives exceedances. To clarify this, as well as the rationale for the ¼ and ½ mile areas, the following addition was made to the Staff Report:*

Section 10.1.1, page 71, paragraph 2:

The radii of initial and expanded implementation efforts are based on the likelihood of sewer leakage impacting the beach and are intended to focus efforts on those areas, while considering what is reasonably achievable by implementing agencies. One quarter mile of the beach refers to a quarter mile

radius centered at the beach sampling location that has experienced the bacteria water quality objectives exceedances.

Comment 4.10: Implementing a city-wide private sewer lateral program in San Francisco would require Board of Supervisors approval and a substantial investment of resources. The benefit to water quality of a city-wide private sewer lateral program would be small or none. Moreover, the SFPUC has existing authority to compel repair or replacement of a private sewer lateral so, if laterals were identified as contributing to impairment, the SFPUC would take targeted actions against the owners of the properties associated with those laterals. The requirement to implement a private lateral replacement program should be deleted.

Response: *Because the SFPUC has authority to compel repair or replacement of private laterals suspected of leaking or malfunctioning, the City of San Francisco is meeting the TMDL's implementation action to establish a private lateral replacement program if needed. The action item is still needed in the TMDL implementation to convey the TMDL's intention that such a program will be implemented as needed to address bacteria pollution at City of San Francisco beaches from private laterals. However, we modified the Basin Plan amendment (see Appendix B) and Staff Report as follows:*

Tables 10.2, 10.3, and 10.4:

5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program or refocus existing lateral program efforts to address these sources.

Comment Letter No. 5: State of California Department of Parks and Recreation

Introduction: The Department of Parks and Recreation (State Parks) operates Candlestick Point State Recreation Area (CPSRA).

Comment 5.1: CPSRA is not currently operating under an NPDES Stormwater Permit. Outside the context of such a permit it will be very difficult to meet the terms and requirements of the proposed TMDL. Many State Parks currently operate under the state-wide Phase II MS4 NPDES Stormwater Permit, which is anticipated to be reissued in September 2018. Therefore, State Parks requests that CPSRA enroll in the next permit cycle; with the start date of meeting TMDL requirements corresponding with the effective date of the Phase II Stormwater Permit.

Response: *We agree that State Parks should seek coverage under the Statewide Phase II MS4 permit. State Parks' responsibility regarding stormwater runoff is to control pets and nuisance resident wildfowl if they are possible sources of bacteria to the beaches. Specifically, State Parks should monitor pets*

and wildfowl at the beaches and implement a pet and/or wildfowl waste minimization program when/if such waste is likely to contribute bacteria to the beaches. Given how limited State Parks' urban runoff implementation actions are, a change in the implementation date is not warranted.

Comment 5.2: Additionally, CPSRA is currently not enrolled in the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems. A preliminary assessment of the sanitary sewer system at CPSRA indicates that the sanitary sewer system has an estimated total length greater than 1 mile. Therefore, State Parks staff will initiate the enrollment process for the WDR SSS.

Response: *We agree that State Parks should seek coverage under the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems now that it is aware this requirement is applicable at CPSRA, and we encourage State Parks to seek funding to conduct inspections of its sanitary sewer collection system as soon as reasonably possible.*

Comment 5.3: State Parks recommends the following change to the Staff Report. No deadline in Table 10.3 should be less than 2 years to allow State Parks time to provide funding and comply with the provisions in the WDR SSS.

Response: *While we recognize the funding constraints State Parks has, we disagree with the recommended change. The deadlines that are under two years and applicable to State Parks are to submit a sewer management plan and a plan for stormwater BMPs within six months. Candlestick Point State Recreation Area encompasses a small area, and example documents can assist State Parks in preparing the necessary plans. To the extent funding is unobtainable in the near term, the plans should contain schedules with actions to occur at the earliest possible date. We also encourage State Parks to work with other parties in implementing the TMDL.*

PART II

Staff Response to Peer Reviewers' Comments on the Staff Report and Basin Plan Amendment Drafts

Dated October 1, 2015

**Comments from Dr. Patricia Holden, Professor of Environmental Microbiology
University of California at Santa Barbara
November 16, 2015**

1. Nature of the water quality problem

The scientific basis is sound for establishing the conclusion that “the Bacteria Water Quality Objective is not being fully supported in the subject watershed.” This assessment is based upon the indicator bacterial results as reported in the Staff Report. The magnitude of the water quality problem varies by beach, but the assessment overall is sound.

Response: We appreciate the comment that the assessment is sound.

2. Desired Target Conditions

The numeric target emphasizes Enterococcus and is consistent with EPA guidelines according to the Staff Report (Table 6.1). However, it is noted that strains of E. coli are known to be pathogenic and thus continued monitoring of E. coli may improve the relatedness of fecal indicator data to actual threats to human health.

Response: Monitoring at each beach will continue to include E.coli, as it is required under State public health regulations. We focus on Enterococcus in the Staff Report and Basin Plan amendment because Enterococcus is the recommended fecal indicator for marine waters. The comment does not request clarification of the Staff Report.

The implementation of numeric targets in section 6.2 uses two different cut-offs for rejecting the null hypothesis versus the alternate hypothesis. A ten percent proportion could strictly be used, and it is recommended that this be considered as it could be more protective.

Response: Section 6.2 restates the State policy for delisting impaired water bodies in accordance with the Clean Water Act Section 303(d). (See Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, Section 4, "Delisting Factors," at p. 11.) This policy is not subject to change under this TMDL action.

3. Source Analysis

The potential sources discussed are logical and, as described, are hypothetical. Since there are no data to determine if the sources are real, one can comment on the logic related to the “sanitary survey” dimension of this report which, again, is logical and shows a reasonably good understanding of the study areas, infrastructure, and possibly influential fecal sources. Further studies would be needed, for each beach, to examine actual sources that could be controlled to bring beaches into compliance.

Response: We appreciate the comment that the discussions provided on potential fecal sources and our understanding of the study areas are logical, reasonable and sound. We agree that further effort could help focus implementation actions on controllable sources. The comment does not ask that the Staff Report be clarified.

A question regards the SSOs: as mentioned in the detailed comments, it is unclear how the analysis was performed to rule these out as influential. The time period intervening the SSO event and sampling, even though sampling was after the SSO event, may be influential in determining the effect of SSOs on water quality. This deserves to be examined more carefully.

Response: As noted by the Commenter, this concept is discussed in more detail below. Please see our responses to detailed comments below regarding SSOs and CSOs.

4. TMDL, Loading Capacity, and Allocations, and Margin of Safety

The density basis of the TMDL is sound. The allocations as per Table 8.2 are sound. However, E. coli is a regulated fecal indicator that also includes pathogenic strains, and thus allocations of E. coli could be additionally protective.

Response: Comment noted. It is not clear that E.coli is a particularly useful fecal indicator in marine waters, based on the science presented by U.S. EPA in its 2012 Recreational Water Quality Criteria (referenced in the Staff Report). We base the TMDL and allocations on Enterococcus because U.S. EPA recommends only Enterococcus be used as a fecal indicator for marine waters and the new statewide bacteria objectives policy, currently underway, will establish an objective only for Enterococcus in marine waters.

5. Linkage Analysis

In this report, the sources are not identified, but are preliminarily hypothesized. The allocations in Table 8.2 are protective on the basis of Enterococcus. Because the allocations prohibit discharge of Enterococcus from human waste sources, these are likely to protect beneficial use as defined by the regulated water quality criteria. However, the absence of Enterococcus doesn't equate to the absence of pathogens.

Response: Comment noted. We agree that the absence of Enterococcus does not equate to the absence of pathogens; we use Enterococcus as an indicator of water quality.

6. Implementation Plan

The implementation plan involves invoking all relevant existing regulations regarding source controls (e.g. SSOs, sanitary sewer inspection and repair, pet waste cleanup enforcement, etc.) and performing MST according to State of California (Griffith et al. 2013) guidelines to determine sources of fecal indicator bacteria. This is reasonable, and can be reasonably applied to the already-hypothesized sources, including completing sanitary surveys and refining hypotheses, then designing study plans, and performing MST.

Response: We appreciate the comment that the implementation plan is reasonable and can be reasonably applied.

Other Issues: Broad comments

The discharge of WWTP effluent from multiple treatment plants into the areas described likely delivers other than fecal indicator bacteria: nutrients, contaminants of emerging concern and, as

already noted, viruses and other infectious microbial forms resistant to disinfection practices. The State of California should be evaluating such issues in aggregate, not in isolation of one another. The health of the public and the waters in which recreation occurs is simultaneously affected by multiple contaminants. Rarely are individual contaminants in a mixture singularly effective in causing harm to receiving streams and organisms within. A holistic approach to addressing co-occurring contaminants would be more protective overall.

Response: We appreciate the reviewer's thoughts on evaluating discharges from WWTPs and other dischargers holistically. This is accomplished through the [Regional Monitoring Program for Water Quality in San Francisco Bay](#), a comprehensive, long-term monitoring program supported by the Water Board, the regulated community, and the San Francisco Estuary Institute. This type of monitoring is beyond the scope of the TMDL.

Other Issues: Detailed comments about the Staff Report

Overall, this is a very readable and accessible Report. Below are some recommendations or comments that are intended as helpful.

Section 1, page 1: It would be helpful to mention if the beaches in Figure 1.1 that are not included in this TMDL are not impaired, or if there are other reasons that they are not addressed.

Response: Text was added stating that the beaches in Figure 1.1 that are not included in this TMDL are not impaired.

Section 4.1, P12: The second bullet at the bottom states: "Fecal coliform are a subset of total coliform and are more specific than total coliform to wastes from warm-blooded animals, but not necessarily to humans. As discussed further below, the U.S. EPA no longer recommends total coliform be used as FIB." The question is if the last "total coliform" is in error and therefore if the author meant "fecal coliform" here, since "total coliform" was addressed in the preceding bullet.

Response: The commenter is correct that the term "total coliform" was meant to say "fecal coliform." This has been corrected.

Tables 5.1, 5.3 – 5.5, 5.7: The text regarding these tables emphasizes that wet weather was when most exceedances occurred. The basis for this conclusion would be more clear if the Tables were modified to show exceedances in wet, versus dry, weather, and noted when those occurred during AB411 monitoring.

Response: The tables do not break out wet versus dry weather sample dates because, due to the number of samples collected over seven years at nine beaches, the analysis included comparing a subset of the data to precipitation records. The statements in the report say that elevated FIB occurred during winter months. In each case, this statement was edited to state that a complete analysis of rainfall events and sampling data was not conducted.

Table 5.6: Why doesn't Windsurfer Circle have a column in this Table?

Response: Table 5.6 includes Jackrabbit Beach because it is located closest to combined sewer discharge (CSD) outfalls 40-42 and Sunnydale Beach because it is located closest to CSD outfall 43. Including Windsurfer Circle Beach in the table is not

likely to provide additional information because it lies between the other two beaches. This explanation was added to the Staff Report.

P24: It is stated, as with most other beaches in the prior sections that, although Crissy Field Beach is exceeding water quality criteria mostly during wet weather, exceedances at Crissy Field Beach are not significantly from CSDs. How is this concluded? Table 5.8 displays overflow events relative to weekly sampling, but we don't know when the latter was. Was weekly sampling within a day, 2 days, etc. after the event? The timing of the overflow relative to weekly sampling at the beach could make a difference to this interpretation of the CSD not having an impact. Epidemiological studies guide swimmers to not swim within the vicinity of drains during 72 hours following a storm. Using 72 hours as a guide, does this window change the interpretation?

Response: The conclusion that CSDs are not a significant source of bacteria to Crissy Field Beach (and others) is supported by the disparity between the low number of CSDs (11 in 7 years) and the large number of water quality objective exceedances (58 in 7 years), as well as the analysis shown in Table 5.8. That said, we agree that the analysis in Table 5.8 would be strengthened by noting the time lapse between a CSD and the subsequent sampling event. We added this information and amended the associated text accordingly.

P37, Section 7.1.1: With the number of outfalls discharging to a Bay, the strict reliance on fecal indicator bacteria seems inadequate. It is known that viruses are more resistant to destruction by common disinfection approaches. The possibility for all of this discharge impinging on public health is the bigger issue that needs to be addressed, not just whether fecal indicator bacteria are being discharged. This would require other monitoring, e.g. for viruses, other resistant pathogens, and other inputs that can synergistically impair water quality.

Response: As stated in the response to a similar "Broad Issues" comment above, we appreciate the Commenter's broader approach to evaluating discharges from WWTPs and other dischargers. However, this TMDL focuses on the beaches and relies on fecal indicator bacteria data collected at the beaches. At this time we do not have data on viruses. We will discuss the need and possibility for collecting data on viruses through the contaminants of emerging concern work being conducted by the [Regional Monitoring Program for Water Quality in San Francisco Bay](#), a comprehensive, long-term monitoring program supported by the Water Board, the regulated community, and the San Francisco Estuary Institute. This type of monitoring is beyond the scope of the TMDL.

Table 7.3: The relationships are unclear regarding these (pumpout) locations relative to the beaches that are the foci of the Staff Report.

Response: Table 7.3 has been clarified to state that information about pumpout stations at individual beaches is found in Section 5 of the Staff Report.

P54, section 7.2.4, Conclusions: The Staff Report should be careful to not interchange "pathogens" with "fecal indicator bacteria" since, as pointed out early in the report, they are not the same, and the latter is all that are reported in the data used to drive this plan.

Response: We agree and changed "pathogens" to "bacteria."

**Comments from Dr. Peter Strom, Professor, Department of Environmental Science
Rutgers University
November 23, 2015**

Nature of the Water Quality Problem

1. Pathogenic indicator bacteria concentrations exceed the Bacteria Water Quality Objectives in the water column of each the listed beaches. Review focus: Staff Report Chapter 4: Water Quality Standards and Chapter 5: Beach Water Quality Data

Peer Reviewer's Comments:

REC-1 and REC-2 are designated beneficial uses at the 9 studied beaches. Since the REC-1 water quality objectives are more stringent, meeting them would also meet the REC-2 objectives. The present objectives are based on three indicator groups: total coliforms, fecal coliforms, and enterococci. The numeric values include objectives for both the geometric mean or median (depending on the indicator group) and the 90th percentile or maximum count.

Thus there were 6 objectives, two for each of the 3 indicator groups. One ambiguity is whether the median (indicated in Table 4.2) or the geometric mean (indicated in tables in Chapter 5) was used for total coliforms. (This is not critical to the results of the analysis, but should be clarified.) Waters are considered impaired if more than 10% of the samples showed counts greater than one or more of the 6 objectives.

Response: We clarified the Staff Report section 5.1 to show that the geometric mean was used for total coliforms, and why.

The monitoring results presented in Chapter 5 are drawn from a number of sources and in most cases represent multiple years of sampling on a regular basis. Fecal coliforms are not included, but E. coli, which are generally considered a subgroup of the fecal coliforms that is more specific to fecal contamination, were included and compared to the fecal coliform objective. This is a reasonable and useful comparison to make, although it could in some cases underestimate the number of exceedances of the fecal coliform water quality objectives.

All 9 beaches failed to meet at least one of the bacteria water quality objectives. Thus the waters are impaired, and the nature of the problem is clearly established.

Response: We appreciate the comment that the nature of the water quality problem is clearly established.

Desired Target Conditions

2. The desired numeric target represents conditions supportive of the Bacteria Water Quality Objectives and the beneficial use of water contact recreation (REC-1). Review focus: Staff Report Chapter 6: Numeric Targets

Peer Reviewer's Comments:

The proposed numeric targets will be a geometric mean and a single sample maximum for enterococci, dropping the present limits for total and fecal coliforms. This is based on recommendations from the U.S. Environmental Protection Agency (USEPA). As reported in Chapter 6, it has been found that for marine waters, enterococci are a better indicator of fecal contamination for recreation uses than total or fecal coliforms. Thus USEPA now recommends using enterococci as the sole bacteria indicator for this purpose.

The numeric targets presented in Table 6.1 are based on a most probable number technique, rather than a colony forming unit method shown in Table 4.3 for the USEPA recommendation. The MPN is a valid test, and in some ways is more reliable than the methods that yield colony forming units. It is also the method presently being used, which thus adds consistency that would be lost if the method were to be changed.

Table 6.1 also differs slightly from Table 4.3 in that a single sample maximum is given, rather than a statistical threshold value. It would be helpful if the report provided the methodology used to arrive at the value in Table 6.1. Additionally, the USEPA provides two slightly different possible numeric values (geometric means of 30 vs. 35 cfu/100 mL), one providing a slightly lower human disease risk (3.2 vs. 3.6%). It is recommended that the report indicate why the slightly higher risk level was chosen for this application. This is not a criticism of this choice, which is identical to the existing enterococci objectives and may be justified on several grounds, only a request that the basis for it be explicitly stated.

To summarize, the switch to use of enterococci only, dropping the total and fecal coliform objectives, is scientifically justified, as is the use of the MPN procedure. However, it is recommended that the report comment on the choice of 35 instead of 30 MPN/100 mL for the target geometric mean, and indicate the procedure used to calculate the single sample maximum chosen.

Response: We appreciate the comment that the numeric targets are scientifically justified. The report states that the numeric targets are based on the Basin Plan water quality objectives for Enterococcus for water contact recreation uses, thus, no calculations or choices were made to derive these targets. To improve clarity regarding the relationship between the Basin Plan objectives and U.S. EPA's 2012 recommended Enterococcus criteria, the following change was made to the Staff Report:

Section 6.1, page 38:

The numeric targets for San Francisco Bay beaches are based on the Basin Plan water quality objectives for Enterococcus for water contact recreation uses in marine and estuarine waters and are consistent with U.S. EPA's 2012 recommended Recreational Water Quality Criteria for Enterococcus in marine and fresh water. The U.S. EPA recommendations provide two slightly different possible values (geometric means of 30 vs. 35 cfu/100 mL), and the State Board is considering an action to adopt one of those values statewide for Enterococcus in marine waters. The value adopted statewide will be used for future beach delistings and will not replace the numeric targets, listed in Table 6.1.

Source Analysis

3. The analysis reasonably and accurately identifies the probable sources of pathogen indicator bacteria. Review focus: Staff Report Chapter 7: Source Assessment

Peer Reviewer's Comments:

There are numerous potential sources of bacterial indicators at the beaches, as presented in detail in Chapter 7, with each beach having its own combination of major and minor contributors. Further, these sources change in relative importance based on season and environmental conditions, especially rainfall. Definitive identification of the multiple sources and their relative contributions to the total concentrations of enterococci would be prohibitively expensive, even if it were technologically feasible (which is not certain). Instead the report evaluates the data available, and uses logic to determine the most likely sources in each situation.

While it is recognized that there is uncertainty in these determinations, it appears to make sense to proceed with implementation based on this best available information, rather than expend additional resources prior to implementation. Further, this uncertainty will be addressed by evaluating progress and making changes if the need arises.

Response: We appreciate the comment that the source analysis is logical, implementation should proceed based on available information, and that uncertainty can be addressed through evaluation of progress made towards addressing controllable sources of bacteria.

TMDL, Loading Capacity, and Allocations, and Margin of Safety

4. The concentration-based TMDLs are a reasonable loading capacity for San Francisco Bay beaches and will likely be supportive of the Bacteria Water Quality Objective. Review focus: Staff Report Chapter 8: TMDL and Pollutant Allocations

Peer Reviewer's Comments:

Although water quality objectives are usually concentration based (mass or number per volume), total maximum daily loads (TMDLs) are normally load based (mass or number per day), as their name indicates. Typically a mathematical model is used to determine the concentrations that will result at specific waterbody locations from wasteloads and loads contributed by the various point and non-point sources, taking into account dilution as well as other factors that might affect water concentrations (e.g., for chemical contaminants: biotransformation, sorption, volatilization, sedimentation, photolysis; e.g., for indicator bacteria: predation, die-off, growth, sedimentation, sorption). The loads from the various sources are then reduced so that the allocations result in achieving the TMDL and meeting the standard. As indicated above in my introduction, this is particularly difficult to do for indicator organisms compared to some other contaminants, and for San Francisco Bay compared to a stream flowing in one direction.

In recognition of these difficulties, the proposed TMDL has taken a different approach. It sets certain controllable wasteload (sanitary sewer collection systems) and load (vessels) allocations to 0, as these discharges are prohibited under current regulations. Other sources (urban runoff, pets, and wildlife) are limited to the TMDL concentration itself, with no allowance for dilution or other reduction factors. Since the sources themselves will meet the TMDL, there is no need for an additional margin of safety, nor for separate consideration of critical conditions.

Overall, this argument is compelling. It reduces many of the large uncertainties that would be introduced by a modeling approach, and would seem to be highly protective of water quality and the designated beneficial uses. In fact, the only way that the water quality standard could be exceeded would be if the enterococci indicator organisms grew after entering the bay.

On the other hand, an argument might be made that the TMDL is too stringent, requiring unnecessarily low levels of enterococci in urban runoff, for example. Supporters of this viewpoint might point to dilution and die-away as mechanisms that would allow achievement of the water quality standards even at higher loadings. However, the models to support such an argument, including an appropriate margin of safety, do not appear to exist, and there can be concern that during critical periods the water at the beaches may consist almost entirely of urban runoff. Thus the proposed approach appears justified.

Response: We appreciate the comment that the TMDL, loading capacity, allocations and margin of safety are justified.

In Table 8.2, footnote “e” states that, “Wildlife is not believed to be a readily controllable source of bacteria ...” However, geese and some other wildlife may be controllable (e.g., Section 10.1.5, and Basin Plan Amendment Table 7.2.5-3, footnote “c”), so that some expansion upon this comment may be needed.

Response: We agree and edited footnote “e” to be consistent with Section 10.1.5 and draft Basin Plan Amendment Table 7.2.5-3.

Linkage Analysis

5. The Staff Report provides a reasonable description of the relationship between the desired target conditions and impairment to beneficial uses of water. Review focus: Staff Report Chapter 9: Linkage between Water Quality Targets and Pollutant Sources

Peer Reviewer's Comments:

Chapter 9, in combination with the previous chapters, establishes the linkage between the water quality target and the indicator bacteria sources. However, the risk of illness given, based on the US EPA (1986) citation, is lower than the risks given in Table 4.3, which is based on a different USEPA (2012) citation. It would be helpful to explain the reason for this difference.

Response: We appreciate the comment that the linkage between the water quality target and the indicator bacteria sources is clearly established. Section 9 was edited to explain the difference between U.S. EPA's 1986 and 2012 recommended water quality objectives.

Implementation Plan

6. The implementation plan will reasonably ensure progress towards attaining water quality standards and supporting recreational beneficial uses. Review focus: Staff Report Chapter 10: Implementation Plans and Monitoring

Peer Reviewer's Comments:

The implementation plan described in Chapter 10 would appear to address many of the relevant issues. It is likely that it will lead to progress in attaining the water quality standards. Further, it includes monitoring and an adaptive strategy so that changes can be made if the standards are not met according to the timetable provided.

Response: We appreciate the comment that the implementation plan will likely lead to attaining the water quality objectives.

Summary

Peer Reviewer's Comments:

Development of a TMDL for indicator bacteria designed to protect San Francisco Bay beaches is a challenging task. Taken as a whole, the scientific portion of the reviewed Draft Staff Report and Basin Plan Amendment appear to be based upon sound scientific knowledge, methods, and practices, and to appropriately incorporate good professional judgment.

Response: We appreciate the comment.

PART III

Staff Initiated Changes to the Staff Report and Basin Plan Amendment

Water Board staff has made insignificant editorial changes to the Staff Report, intended to clarify or correct the January 15, 2016, draft. These include correcting typographic errors and other minor changes to add clarity. These changes are shown below and in underline/strikeout in the revised Basin Plan amendment (Appendix B).

Other staff-initiated changes are shown below:

1. A clarification was made in the introduction of the Staff Report as follows:

Staff Report Section 1, page 1, paragraph 4:

Figure 1.1 shows all the beaches located along San Francisco Bay that are monitored for bacteria under section 115880 of the California Health and Safety Code. The CWA Section 303(d)-listed beaches highlighted; based on current data the remaining beaches are not impaired.

2. We made the changes below to clarify which sources are assigned a waste load allocation and thus to clarify future permitting requirements.

Basin Plan amendment Section 7.2.5.2:

Wet weather discharges from the City of San Francisco's combined sewer system that are authorized pursuant to U.S. EPA's Combined Sewer Overflow (CSO) Control Policy are not considered a significant source of bacteria to these San Francisco beaches.

Basin Plan amendment Section 7.2.5.5:

Discharges of raw or inadequately treated human waste are prohibited, and thus ~~sources of untreated or inadequately treated human waste~~ sanitary sewer collection systems and vessels have an allocation of zero.

Basin Plan amendment Section 7.2.5.6, Sanitary Sewer Collection Systems section:

This TMDL requires no modifications to NPDES permitting of wet weather discharges from the City of San Francisco's combined sewer system, authorized pursuant to U.S. EPA's CSO Control Policy, as they are unnecessary to achieve the TMDL. The wasteload allocation in Table 7.2.5-2 applies only to the collection system portion of San Francisco's combined sewer system.

Staff Report Section 8.3, page 63, paragraph 3:

For these reasons, zero wasteload allocations for these source categories are both feasible and warranted. Wet weather discharges from the City of San Francisco's combined sewer system authorized pursuant to U.S. EPA's Combined Sewer Overflow (CSO) Control Policy are not given a waste load allocation because at this

time such discharges are not deemed to contribute significantly to bacteria at the beaches; changes to NPDES permit requirements are unnecessary to achieve this TMDL.

3. A corresponding clarification was made by adding a footnote to Basin Plan Table 7.2.5-2 (see Appendix B) and the Staff Report as follows:

Staff Report Table 8.2, page 63, paragraph 3:

^a For the City of San Francisco the wasteload allocation applies only to the collection system portion of the combined sewer system.

4. Also to clarify future permitting requirements, the following municipal separate storm sewer system NPDES permit numbers were added to Basin Plan Table 7.2.5-2, footnote c:

Wasteload allocation for discharges from municipal separate storm sewer systems (NPDES No. CAS612008, CAS000004 and CAS000003).

These numbers correspond to the Municipal Regional Stormwater Permit, the State Water Board Permit for Small Municipal Separate Storm Sewer Systems, and the State Water Board Stormwater Permit for State of California Department of Transportation, respectively.

5. To further clarify that implementing parties are not responsible for controlling non-controllable sources of bacteria, the following change was made to Basin Plan amendment Section 7.2.5.5:

Discharging entities will not be held responsible for uncontrollable discharges originating from wildlife. If non-nuisance wildlife contributions are found to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of adaptive implementation.