Public Comment
SF Bay PCB TMDL's
Deadline: 6/4/09 by 12 noon

CLEAN WATER ACTION
CALIFORNIA

ERF

SAN FRANCISCO
BAYKEEPER

June 2, 2009

State Water Resources Control Board
1001 I Street. 24th Floor
Sacramento, CA 95814

RE: Comment Letter – San Francisco Bay PCBs TMDL

Dear Chairman Hoppin and Members of the State Board:

On behalf of San Francisco Baykeeper, the Ecological Rights Foundation, and Clean Water Action we submit these comments on the proposed Basin Plan Amendment ("BPA") incorporating a Total Maximum Daily Load ("TMDL") for Polychlorinated Biphenyls ("PCBs") in San Francisco Bay. Collectively, our organizations represent tens of thousands of residents of the Bay-Delta area, who are deeply concerned about the state and health of our watershed and the ecosystems they support. PCBs are potent, persistent, and bioaccumulative toxins that have been polluting our waterways and wildlife, and threatening the health of our communities for far too long. We therefore support the San Francisco Bay Regional Water Quality Control Board's ("Regional Board") efforts to complete an overdue TMDL for PCBs. However, the TMDL is flawed and significant changes must be made to the BPA and accompanying staff report to ensure that this TMDL and implementation plan are based on sound scientific, legal and policy principles.

We have previously submitted comments on this TMDL to the Regional Board on January 22, 2008, August 17, 2007, and on February 20, 2004 that described our various concerns. To ensure that this TMDL results in tangible and meaningful reductions in PCBs loading and complies with all applicable legal requirements, we ask that the State Board carefully consider and address the concerns raised in this comment letter.

In addition to the comments we have submitted previously and those below, we are also submitting a review of the TMDL Staff Report done by Dr. William Rogers, Environmental Science Program Director at West Texas A&M University (Appendix A), a recognized expert on ecological risk assessment. Dr. Rogers has identified fundamental flaws in the science behind the assumptions underlying the PCBs TMDL – many of these same concerns are echoed by the two PCBs TMDL's official peer reviewers.

Specifically, our letter highlights three areas we feel must be addressed prior to adoption of this TMDL:

1. The fish tissue target is scientifically unsupportable and does not protect those communities who are known to eat the most Bay fish.
2. Important ecological receptors are not incorporated into the analysis, thus leading to a less protective margin of safety and a failure to adequately protect beneficial uses.
3. The TMDL lacks a meaningful implementation plan: the Central Valley is given a large load reduction even though the Region has no plans for a PCBs TMDL, and the San

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Francisco Bay draft municipal stormwater permit that is supposed to implement the PCBs TMDL stormwater load allocation completely fails to do so.

A. The fish tissue target does not adequately implement all applicable water quality standards and is not sufficiently protective of all populations.

One of the stated objectives of this TMDL is to protect those people who consume fish from the Bay[1]. In our previous comments we have stated that the approach taken by the Regional Board underestimates the risk faced by the members of the public who consume fish from the Bay. The TMDL is weak with respect to human health in three ways:

1. **The Fish Tissue Target is not sufficiently protective because it inappropriately uses the lowest possible consumption rate from the Seafood Consumption Report.**

The TMDL uses a consumption rate of 32 $g \cdot d^{-1}$ instead of the range of rates provided in EPA's guidance (54, 63, 70-170 $g \cdot d^{-1}$). The justification for this consumption rate was that the rate of 32 g/d was based on local research and that it reflects the 95th percentile of actual consumption in the Bay Area and thus is protective of the vast majority of consumers in the Bay Area. However, a close inspection of the TMDL's supporting document, The San Francisco Bay Seafood Consumption Report ("Consumption Report"), shows that the Regional Board has chosen the least conservative consumption rate available in the Consumption Report. Rather than using the consumption rate that the Consumption Report identifies as the most accurate and representative of Bay fish consumption, the Regional Board inexplicably chose to use the lower, and therefore less protective, rate that contained more bias.

The authors of the Consumption Report classify the study subjects into two main categories: recent consumers and consumers. *Recent consumers* are "anglers who reported consuming fish caught from SF Bay in the four weeks prior to the date they were interviewed." *Consumers* are "anglers who report consuming fish caught from SF Bay (no time period specified)".[2] The study authors note the distinction is important because the four week recall time period used to define *recent consumers* was done "to maximize the time period over which a consumption rate estimate could be made while minimizing recall bias."[3] Thus the Consumption Report indicates that the rate that would be the most accurate and have the least bias would be the one calculated for *recent consumers*. According to the Consumption Report, the 95th percentile consumption rate for *recent consumers* is 80 $g \cdot d^{-1}$ [4]. The 32 $g \cdot d^{-1}$ used by the TMDL is the 95th percentile for the *consumer* group. Thus, the screening value of 32 g/d used by the Regional Board in the TMDL is one that has greater uncertainty and is least representative of actual San Francisco Bay fish consumption rates.

2. **The use of a 10^{-5} risk level is not justified.**

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[1] San Francisco Bay PCBs TMDL Staff Report December June 2007. Section 2.3 Pg 6

[2] SFEI. 2000. San Francisco Bay Seafood Consumption Study. San Francisco Estuary Institute, Richmond, CA. pg 25

[3] SFEI. 2000. San Francisco Bay Seafood Consumption Study. San Francisco Estuary Institute, Richmond, CA. pg 13, emphasis added.

[4] See Table 4 & 5 in the San Francisco Bay Seafood Consumption Study. San Francisco Estuary Institute, Richmond, CA. pg 41; this consumption rate is the rate adjusted for avidity or the influence of fishing frequency.

The screening value for the TMDL used a maximum acceptable risk level of 10^{-5}. EPA guidance recommends using a maximum acceptable risk level ranging from 10^{-4} to 10^{-6}, thus 10^{-5} is the middle value of this range. The staff report does not explain why the Regional Board has chosen a "middle of the road" instead of using the maximum risk level. The Regional Board used this less protective risk level despite the fact that one of the peer reviewers of this TMDL emphasized that the 10^{-6} is the 'desirable' level and the 10^{-5} risk level, while allowable, is not 'ideal'[5].

3. **The fish screening value inappropriately assumes that all fish consumers will eat only the skinless fillet, but in reality all parts of the fish are consumed including those that tend to accumulate the highest levels of PCBs.**

In developing this TMDL, the Regional Board assumed that all consumers would eat fish fillets with the skin off. However, this scenario does not reflect the way a large portion of Bay area fish consumers actually eat their fish – subsistence fishing groups in the Bay Area, which make up a very large portion of Bay fish consumers, tend to eat fish with the fat and skin intact. PCBs bioaccumulate in the fatty tissues of fish. Davis et al 2002[6] demonstrated that the total concentration of PCBs in fish measured with the skin on is significantly higher than fish that are measured with the skin off. Therefore, eating fish prepared with a cooking method that drains the fat and without the skin on minimizes a person's exposure to PCBs. However, due to a lack of knowledge, cultural or personal preference, and daily dietary requirements, many people consume the whole fish or consume the fish with the skin on.

The Consumption Report found that, particularly among Asian ethnic groups, consumers will regularly eat fish with the skin on. For example, among Bay Area pier anglers, consumers of striped bass and white croaker ate skin 40% and 52% of the time respectively[7]. Furthermore, these rates were slightly higher (49% and 56%, respectively) for Asians who consumed these species. Other studies of subsistence fishing in the Bay have found similar patterns of fish consumption habits. A study of pier fishers reported that 49% of consumers of striped bass ate the skin and 36% of white croaker consumers ate the skin in the previous 30 days[8]. The majority of the participants in this study were African American and Asian Americans. Anecdotal reports and focus groups in other regions also point to consumption by various ethnic groups of other fatty parts of locally caught fish, including the head and inner organs. Dr. Rogers' review clearly articulates the role that ethnicity plays in fish consumption in the Bay Area and how that should be taken into consideration in a TMDL process[9].

Taken together, these three flaws indicate that this TMDL does not provide a margin of safety adequate to meet the requirements for TMDLs. The Regional Board argues that the use of the

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[5] Peer Review of the Technical Basis for the PCB TMDL in San Francisco Bay. David O. Carpenter, M.D. Director, Institute for Health and the Environment. University at Albany. www.swrcb.ca.gov/rwqcb2/water_issues/programs/TMDLs/sfbaypcbs/AppE_PCBs_Comments.pdf., p 386: "And it must be noted that the 1 in 100,000 limit is far from the 1 in 1,000,000 that is desirable. The EPA level given for unlimited consumption so as to avoid non-cancer adverse health effects is 5.9 ng/g (ppb), so even for non-cancer effects the screening level of 10 ng/g is somewhat high. Nevertheless setting this level is realistic, even if not ideal…".

[6] Davis et al 2002

[7] P 75. These numbers are not adjusted for avidity.

[8] Wong, K. (1997). Fishing for food in San Francisco Bay: Part II. *Save San Francisco Bay Association*

[9] see pg 4–5 of Dr Rogers Review

95th percentile consumption rate of fish consumers combined with the 10^{-5} risk level provide an adequate margin of safety for the population *as a whole,* which includes people who do not eat fish. But the purpose of this TMDL should not be to protect those who will not be eating fish from the Bay, instead it must be designed to specifically protect those at greatest risk of exposure. The main driver behind this TMDL is a fish consumption advisory, it therefore is completely illogical to provide a margin of safety for the portion of the population that will not be eating fish from the Bay. Without adequate protections for the most vulnerable populations, and especially given the long and uncertain timeline for attainment of this TMDL, we are deeply concerned about the serious environmental justice issues raised by this TMDL.

The TMDL cannot rely solely on exposure reduction through education and outreach to change the way people consume fish as in OEHHA's fish consumption advisory recommendations. Education and outreach are not the long-term solution to protecting our most at-risk consumers – using the TMDL as the intended regulatory tool to ensure our ecosystem is healthy and free of toxic pollution is the only way to protect our communities.

Recommendation: The State Board should require the Regional Board to craft a fish tissue target based on the most defensible consumption rate available – 80 $g \cdot d^{-1}$, including a risk level of 10^{-6}, and on patterns of fish consumption that reflect the way the most at risk groups eat fish (whole and with the skin on).

B. Not all ecological receptors are appropriately considered in this TMDL

PCBs are known endocrine disruptors that can cause reproductive impairment, cancer, thyroid alteration, and immune suppression[10]. The fact that PCBs are both persistent and tend to biomagnify up the food web makes their presence in the San Francisco Bay ecosystem particularly alarming. Marine mammals are particularly susceptible to exposure given their life history, their long life span and position at the top of the food web. Similarly, fish eating birds also have a risk of high exposure to PCBs. Research in the Bay has borne this out – PCBs are already accumulating and potentially harming more than just the fish in the Bay. In fact, PCB concentrations in Bay harbor seals (*Phoca vitulina*) are elevated in comparison to other parts of the world and a cause for concern for seal health[11]. A recent study of harbor seals in the Bay found that concentrations in various tissues are still in approximately the same range as those found in dead seals in the 1970's[12]. Furthermore, their analysis of blood health parameters indicated that current environmental exposures of harbor seals to persistent pollutants like PCBs may be sufficiently high to produce adverse health effects[13]. Likewise, recent work on

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[10] *Citations in* Park,JS, O. Kalantzia, D. Kopecb and M. Petreas. Polychlorinated biphenyls (PCBs) and their hydroxylated metabolites (OH-PCBs) in livers of harbor seals (*Phoca vitulina*) from San Francisco Bay, California and Gulf of Maine. Marine Environmental Research (2009) 67(3): 129–135.

[11] Davis, J., F. Hetzel, and J. Oram. PCBs in San Francisco Bay: Impairment Assessment/Conceptual Model Report Prepared for Clean Estuary Partnership. February 2006. 77 pg

[12] Neale, J., F. M. Gulland, K. Schmelzer, J. Harvey, E. Berg, S. Allen, D. Greig, E. Grigg, R.S. Tjeerdema. Contaminant Loads and Hematological Correlates In The Harbor Seal (*Phoca vitulina*) Of San Francisco Bay, California Journal of Toxicology and Environmental Health, Part A, .2005. 68(8):617 – 633.

[13] Neale, J., F. M. Gulland, K. Schmelzer, J. Harvey, E. Berg, S. Allen, D. Greig, E. Grigg, R.S. Tjeerdema. Contaminant Loads and Hematological Correlates In The Harbor Seal (*Phoca vitulina*) Of San Francisco Bay, California Journal of Toxicology and Environmental Health, Part A, 2005. 68(8):617 – 633

Caspian tern's, Forster's terns, and the endangered Clapper Rail have found that PCB concentrations are near thresholds for impairment to these species[14].

The Regional Board's stated assumption that a TMDL that will protect human health will automatically protect ecological receptors is not justified. This TMDL is based in large part on the food web model developed by Gobas and refined by Gobas and Arnot[15]. We recognize that Gobas and Arnot followed specific criteria for selecting the fish species to be included in the food web model[16]. However, the model overall leaves out several important key trophic components that can affect the final conclusions about how much biomagnification of PCBs occurs in the San Francisco Bay food web. The food web model as described by Gobas and Arnot (2005) does not include two trophic levels for zooplankton – one for microzooplankton such as rotifers and a separate trophic level for macrozooplankton such as copepods. Furthermore, the food web model also indicates that energy flows from phytoplankton to bivalves but does not include a consumer of bivalves. Research on the trophic relationships in the Bay has clearly demonstrated that key fish species regularly consume bivalves as prey items.

In their 2004 study on San Francisco food webs, Stewart et al. (2004) used stable carbon and nitrogen isotopes[17] to quantify consumption pathways in the Bay. Their analysis clearly demonstrated that in the North Bay, there is a distinct clam-based food web and a distinct crustacean based food web. Crabs, Sacramento splittail and white sturgeon all fed predominantly on clams[18]. Thus, the model created by Gobas and Arnot clearly leaves out key known aspects of the San Francisco Bay food web that underestimates of total PCB accumulation in wildlife at the top of the food web.

Furthermore, as outlined by Dr. Rogers in multiple points of his review (attached), the TMDL assumes that because the Continuous Chronic Concentration (CCC) is set at a higher concentration than the human health standard, that wildlife will necessarily be protected by the use of this human health standard. The TMDL Staff Report does not provide sufficient support for this assertion. The human health criterion is designed to protect humans and is based on a very low consumption of fish. But many wildlife species have diets that are largely made up of fish and thus their exposure rate can be much higher than for humans. For example, harbor seals in the Bay eat a diet largely made up of fish so it stands to reason that their consumption rates might actually be much higher than what is used to determine the CTR's human health criterion. Additionally, Bay birds are particularly susceptible to the estrogen-mimicking dangers of PCBs and often experience reproductive harms at levels much lower than human risk levels. It is also important to note that wildlife do not remove the fat, skin or organs before they consume fish and thus ingest the parts of fish that have the highest PCBs concentration.

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[14] Adelsbach, T., S.E. Schwarzbach, C. Stroong, and C. Eagles-Smith. 2003. Mercury, PCBs, and dioxin equivalents in piscivorous seabirds breeding in San Francisco Bay. Presented at 6th Biennial State of the Estuary Conference, October 21, 2003, Oakland, CA.

[15] Gobas, F, and J. Arnot. 2005. San Francisco Bay PCB Food Web Bioaccumulation Model Final Technical Report July 4, 2005. Prepared for the Clean Estuary Partnership Simon Fraser University. 184 pgs.

[16] Gobas and Arnot 2005 Section 2.3.2, p 29.

[17] Differences in carbon and nitrogen isotope ratios between consumers and their diet provide information on energy flows, nutrient sources, and trophic relationships. They are an ideal tool, because unlike food web analysis based on gut contents, isotopes provide a temporally integrated picture of what organisms are consuming.

[18] Stewart, A.R., S. Luoma, C. Schlekat, M. Doblin, and K. Hieb. 2004. Food Web pathways determines how selenium affects aquatic ecosystems: A San Francisco Bay study. Environ. Sci. Technol. 38: 4519–4526.

Recommendation: The Regional Board should be required to update the food web model to include all appropriate wildlife endpoints and revise calculations accordingly.

C. The TMDL does not contain a meaningful implementation plan and fails to identify how the most uncontrollable sources (Central Valley and municipal stormwater) will achieve load reductions.

Even if the TMDL had no flaws in the underlying science, this TMDL would still be wholly inadequate as it does not provide any kind of meaningful action plan for achieving the load reductions. The Regional Board has not provided any justifiable reason for not including a real action plan for implementation that includes required actions. Instead, this TMDL relies almost entirely on natural processes to reduce loading from the Central Valley and on vague and unspecified actions by the stormwater agencies to reduce the loadings from stormwater. As win the mercury TMDL, developing a detailed, lengthy TMDL to then simply rely on Mother Nature to naturally remove pollution from the Bay seems like a waste of staff resources, time and energy and risks not fulfilling the purpose of TMDLs, and the mandates of the Clean Water Act.

In addition to the lack of a real plan of implementation, the potential success of this TMDL is further hampered by several key weaknesses:

- The TMDL relies most heavily on reductions from urban stormwater, which is one of the least controllable sources and results in great uncertainty about whether TMDL targets will be achieved within the already lengthy timeframe;
- Given the unreliability of depending on stormwater control, the TDML fails to include necessary specificity on addressing land sources of contamination that impact stormwater;
- The TMDL relies heavily on reductions from the Central Valley without any assurances that the Central Valley is prepared to achieve those targets;[19]
- The TMDL does not require permits to contain numeric effluent limits for wastewater permittees, instead permits are based on their current performance;
- Wastewater permittees are not required to use analytic methods with the lowest detection limit, which will make it extremely challenging, if not impossible, to determine whether they are in compliance with their wasteload allocations;
- There is no load-allocation for erosion, dredging or in-Bay contaminated sites (hotspots) and no timeframe for clean-up of in-Bay hotspots.

These points were thoroughly detailed in our January 22, 2008 comment letter and in our opinion are still major causes for concern.

D. Improved implementation for urban stormwater

Urban stormwater is by far the largest Bay Area source of PCBs and though it is an unwieldy non-point source, it has the potential for the greatest reductions in loading. For the TMDL to be

[19] As in the San Francisco Bay Mercury TMDL, the Regional Board has heavily relied on the Central Valley to make reductions in order to achieve the TMDL targets. However, in the case of the mercury TMDL, Region 5 actually had planned a Delta Mercury TMDL. As we know, that TMDL is not complete – and the State Board's original instinct to require more of Region 5 in Region 2's process was well-founded as we are nowhere on track towards achieving Central Valley reductions for mercury. In the case of PCBs, the Delta is not even listed for this pollutant – therefore there are even fewer assurances that the Central Valley's load reduction will be met, and thus there is more of a need for the State Board to require more explicit coordination and a detailed reduction plan.

successful, therefore, loading from urban stormwater must be dramatically reduced and that reduction must be quantifiable and demonstrable. Yet this TMDL only requires that municipal stormwater permittees monitor and quantify how much PCB their current management practices remove from the system[20]. Even the BPA recognizes that the implementation plan for MS4s may be inadequate to achieve the required reductions and states that the assigned load reductions will be revised if allocations cannot be achieved[21]. Furthermore, the requirements laid out in the most recent draft of the San Francisco Bay Area's Municipal Regional Permit do not improve upon this weakness as the stormwater permittees are only asked to conduct pilot projects and do not contain any meaningful actions that will actually lead to a reduced loading of PCBs. [22]

As Dr. Rogers notes in his review, the Regional Board can provide strategies and technologies that can guide responsible parties towards achieving their load allocations and offers an example of a TMDL that specifically incorporated implementation guidance and a detailed implementation schedule (see Dr. Rogers General Comment 7 regarding the Aquilla TMDL). He attributes the success of that TMDL largely to these detailed components.

We fully recognize that there is still much work to be done to understand how PCBs move through the San Francisco Bay watershed and its ecosystem. However, we feel that there are several concrete actions that the Regional Board could require that would immediately start the process of reducing and removing PCBs in our environment. For example, as Dr. Rogers points out, this TMDL fails to address a large potential reservoir of PCBs on land – transformers and capacitors that contain <50ppm PCB. This TMDL could incorporate a plan of action for identifying where these transformers are located and a plan for their removal. In addition, the TMDL Staff Report identifies on-land areas with high concentrations of PCBs in stormwater conveyance systems[23]. It is unclear why this TMDL could not describe an immediate course of action that would immediately require the clean-up and removal of these sites.

The implementation plan should require stormwater permitees to expand their industrial inspections program to include inspections of inactive industrial sites and a description of what will be done at such sites when PCBs pose a threat to Bay water quality. The TMDL should specify the regulatory actions the Water Board and permittees will take to ensure all sites which are potentially significant sources of PCBs (i.e., industrial sites active at any time from the 1940s through the early 1980s) will be identified, investigated, prioritized for sampling and inspection, and followed up with appropriate cleanup action.

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[20] Appendix A-Basin Plan Amendment, pg A-11.

[21] Basin Plan Amendment, pg A-10

[22] The Regional Board's argument during the San Francisco Bay Mercury TMDL hearings on this very same point was that the TMDL was not the appropriate place for a great level of detail and guidance on municipal stormwater reductions. Therefore, they asked us to wait until the Municipal Regional Permit was released, indicating that it would contain far more in terms of requirements for achieving the reductions outlined in the TMDL. The San Francisco Bay Area's Draft Municipal Regional Permit is now available and it is sorely lacking in any detail or guidance or manner of achieving the load reductions outlined in either the Mercury TMDL or the PCBs TMDL. The Regional Board cannot keep punting the ball – the State Board must hold them accountable for laying out an adequate implementation plan somewhere in the regulatory regime if we ever hope to achieve the clean up reductions targeted by these two TMDLs.

[23] Staff Report, Figure 23. Overview of in-Bay and on-Land Sediment PCBs Concentrations, pg 57

The Regional Board has the regulatory authority to investigate and abate on-land contaminated properties.
The TMDL Staff Report does not identify how the Regional Board plans to exercise this authority to assist municipalities and other agencies in identifying and abating sites. For example, the implementation plan should, at the very least, outline a program for (1) using section 13267 requests for information to assist municipalities in gathering information about potentially contaminated sites, (2) tracking and prioritizing sites requiring remediation, (3) using Cleanup and Abatement and Cease and Desist Orders to clean up privately-owned sites, and (4) working with other regulatory agencies to ensure that on-land cleanups occur to a level and in a manner that does not frustrate TMDL implementation.

Failure to provide reasonable assurances that nonpoint source reductions will be met
When all of these factors are taken together, we believe that this TMDL does not provide the necessary reasonable assurances that implementation of waste load allocations will occur. Federal law requires that TMDLs must require point sources to bear the burden of all necessary load reductions unless the State can provide "reasonable assurance that nonpoint source controls will be implemented and maintained."[24] When point sources such as municipal and industrial wastewater dischargers receive less stringent wasteload allocations because nonpoint source reductions are expected, the TMDL must include a demonstration that the nonpoint source controls are practicable and "reasonably assured of being implemented in a reasonable period of time."[25] Reasonable assurances must include an "actual demonstration that the measures identified will result in the predicted reductions and that the State is able to *assure* this result."[26] Assurances include "the application or utilization of local ordinances, grant conditions, or other enforcement authorities."[27]

Unjustifiably long timeframe
All of the above described weaknesses are compounded by the excessively long timeframe to attainment of this TMDL. EPA policy requires that TMDL implementation plans "be sufficient to implement all wasteload and load allocations in a *reasonable* period of time". Our understanding of the mass budget model is that the TMDL will not result in achievement of the sediment "goal" until at least 2060 – that is assuming that the MS4s can meet their load allocation, which seems unlikely. Again, the success of this TMDL seems to rest almost entirely on the shoulders of the MS4s, yet even the MS4s do not believe that they will be able to meet their load allocations in the allotted timeframe: "The proposed urban runoff allocation of 2 kg/year represents a 95% reduction in PCBs loads, based upon the estimated existing urban runoff load of 40 kg/year. Two kg/year is also estimated to be the resulting load when all sediment in urban runoff has a concentration of 1 ug/kg, the sediment PCB concentration goal. Meeting this allocation and sediment target in the proposed 20-year time frame is almost certainly unrealistic, impracticable and infeasible."[28] We respectfully submit that this TMDL will only continue to allow humans and wildlife to be exposed to the harmful effects of consuming PCBs for far too long a period of time.

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[24] *See* Cal. TMDL Guidance at p. 12; U.S. EPA, EPA440-4-91-001, Guidance for Water Quality-Based Decisions: The TMDL Process, ch. 3 at pp. 5-6, 1991 (available at http://www.epa.gov/OWOW/tmdl/decisions). ("EPA TMDL Guidance")
[25] Cal. TMDL Guidance at p. 10.
[26] *Id.*
[27] EPA TMDL Guidance, ch. 3.
[28] August 20, 2007 BASMAA comments round one

Conclusion
We do not need more vague promises of further study or claims about the complexity of a difficult situation. **We need clean water, sediment and, most of all, clean fish.** We are therefore asking the State Board to require the San Francisco Bay Regional Board to assure that:

1. The fish tissue target incorporate a much more stringent margin of safety to ensure that the TMDL is protective for those people who are at greatest risk of exposure,
2. To ensure that wildlife will be adequately protected by these targets, and
3. To require that the Regional Board provide an adequate implementation plan to ensure that the goals of this TMDL are met and met in a timely manner.

Thank you for considering these comments.

Sincerely,

Sejal Choksi,
Baykeeper and Program Director

Andria Ventura
Clean Water Action

Michelle D. Smith
Ecological Rights Foundation

Appendix A

Review Comments "Total Maximum Daily Load"
for PCBs in San Francisco Bay", California Regional
Water Quality Control board, San Francisco Bay Region
June 22, 2007 Revised December, 2007

Prepared for:

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Program Director San Francisco Baykeeper
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By

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Date: June 1, 2009

The California Regional Water Quality Control Board has obviously conducted a lengthy and detailed evaluation of the polychlorinated biphenyl (PCB) contamination in the San Francisco Bay area. Condensing the vast amount of technical data into a "Total Maximum Daily Load" (TMDL) report is a daunting task and the report contains a wealth of information. However, as described below, some of the core analysis used in support of the report is not technologically defensible. The following comments are intended to provide suggestions on improving the defensibility and technical soundness of the report.

General Comment (1): The document outlines the 303(d) Clean Water Act requirements and standards for water quality as: beneficial uses, meeting water quality standards and demonstrating antidegradation. The document clearly identified San Francisco Bay beneficial uses impaired by PCBs as:

(1) Ocean, commercial, and sport fishing (COMM)
Uses of water for commercial or recreational collection of fish, shellfish, or other organisms in oceans, bays, and estuaries, including but not limited to, uses involving organisms intended for human consumption or bait purposes.

(2) Estuarine habitat (EST)
Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g. estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance and migration of estuarine organisms.

(3) Preservation of rare and endangered species (RARE)
Uses of water that support habitats necessary for the survival and successful maintenance of plant and animal species established under state and federal law as rare, threatened or endangered.

(4) Wildlife habitat (WILD)
Uses of water that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The document provides a detailed summary of the biological and physical data collection activities. The document also presents a clear understanding of the actions needed to protect human health (Item 1) but does not address how the TMDL will address items 2, 3 and 4. As such, the TMDL is clearly focused on protection of human health and is silent on how the TMDL will meet the 303(d) objectives for wildlife, Threatened and Endangered species and habitat protection. In summary, the TMDL is a human health focused report.

General Comment (2): On page 23, last paragraph, outlines the entire TMDL approach and is unsupported and in error or the statements made are not supported in the text or supporting information.

For example, the following statements are made: (Note: Statement numbers have been added to the text for clarification in the subsequent comments.)

Two applicable numeric water quality standards for PCBs are promulgated at 40 CFR 131.38, also known as the California Toxics Rule (CTR) and the report states: **(1)** "These standards include the saltwater criterion continuous concentration (CCC) of 30 nanograms per liter (ng/L) for protection of aquatic life and its uses from chronic toxicity, and the human health criterion of 170 picograms per liter (pg/L) for the protection from consumption of aquatic organisms. **(2)** These criteria apply to total PCBs, as defined as the sum of all Aroclors, or all congeners or homologs or isomers, and were derived to protect against adverse effects due to PCBs in water. **(3)** PCB concentration in the Bay waters are generally below the CCC water quality standard, indicating that current conditions are protective of aquatic life from chronic toxicity. We, therefore, propose to use the more protective human health criterion as the applicable water quality standard for the PCBs TMDL…". **(4)** "This criterion was developed using a bioconcentration factor (BCF) approach with an upper bound potency factor reflective of high risk and persistence. However, in the development of this criterion it is explicitly recognized that it is not as protective of sub-populations that consume greater quantities of fish than the general population, and that subsistence fish consumers may only be protected from an increased risk of one in ten thousand." **(5)** "The CTR does not promulgate a separate numeric water quality criterion for dioxin-like PCBs."

Statement (1) is incorrect: "These standards include the saltwater criterion continuous concentration (CCC) of 30 nanograms per liter (ng/L) for protection of aquatic life and its uses from chronic toxicity, and the human health criterion of 170 picograms per liter (pg/L) for the protection from consumption of aquatic organisms."

Statement (1) correction: The TMDL reliance on human health criteria is not protective of wildlife, including birds, where the endocrine effects are seen at levels much lower that the human health levels. The CCC "equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects." (CTR, 2000). The document implies that the CCC and the human health standards are comparable when they are not and that the CCC provides the same level of protection to wildlife as the human health standard. This is incorrect and completely unsupported. The human health level is based on a 10^{-6} cancer risk based on a consumption rate of 6.5 g/d, which is not typically comparable to wildlife. PCBs are also suspected of impacting reproductive behavior in birds including estrogen mimicking which can represent an important class of toxicants to birds because the avian reproductive system is estrogen dependent (Fry, 1994). These endocrine effects may be manifested at levels much lower than the human health protective level. Fry (1994) summarized the effects as direct effects on breeding and development effects on embryos including mortality, hatchability, failure of development (wasting), suppression of egg formation, eggshell thinning and impaired incubation behaviors.

Statement (2) is incorrect: "These criteria apply to total PCBs, as defined as the sum of all Aroclors, or all congeners or homologs or isomers, and were derived to protect against adverse effects due to PCBs in water".

Statement (2) correction: This statement again assumes that the CCC and the human health standard are comparable which is incorrect and results in not protecting wildlife. The CCC is based on only seven (7) of the 209 PCB congeners (1242, 1254, 1221, 1232, 1248, 1260 and 1016). The human health criterion is based on total PCBs, e.g. the sum of all congener or isomer or homolog or Aroclor analyses. The human health value is also based on a 10^{-6} cancer risk value and a consumption rate of only 6.5 g/d. The TMDL proposed consumption rate of 32 g/d is five times the rate used in the CTR standard and would dramatically alter the human health protective goals in the TMDL. Additional discussion is needed to clarify how the human health criterion is protective of wildlife when all PCB congeners are considered. When all congeners are summed the CCC value would be expected to be significantly reduced and the human health level may in fact not be protective of wildlife as discussed under statement (1) correction.

Statement (3) is incorrect: "PCB concentration in the Bay waters are generally below the CCC water quality standard, indicating that current conditions are protective of aquatic life from chronic toxicity."

Statement (3) correction: Data listed in the supporting documentation referenced in the report identifies and states that deleterious effects have been observed in San Francisco Bay wildlife, which indicates that current conditions are harming wildlife. The CCC "equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects (CTR, 2000)." The document implies that the CCC and the human health standards are comparable when they are not and that the CCC provides the same level of protection to wildlife as the human health standard. This is incorrect and completely unsupported. Additional discussion is needed to demonstrate that the "4 day" criterion has been met for all portions of the Bay system and clarification needs to be added that the CCC does not in fact offer chronic effects protection for wildlife.

Statement (4): "This criterion was developed using a bioconcentration factor (BCF) approach with an upper bound potency factor reflective of high risk and persistence. However, in the development of the criterion it is explicitly recognized that it is not as protective of sub-populations that consume greater quantities of fish than the general population, and that subsistence fish consumers may only be protected from an increased risk of one in ten thousand."

Statement (4) correction: Statement (4) is unsupported and there is no rationale for using an inappropriately low consumption rate to represent San Francisco Bay fish consumption. The TMDL should address why subsistence fishing and high fish consumers are not considered. The document lacks demographic data to support the 32g/d consumption rate proposed in the TMDL on page 58, or the assumptions that the fish will be consumed as skinned fillets. Considering that San Francisco has a population made up of approximately 31% Asians and that 18% of those make less than $20,000.00/year (U.S. Census Bureau, 2007), the cultural fish preparation and customs need to be addressed to support the proposed low ingestion rate. Typically EPA (1991) recommends a 54g/d rate for high consumers of locally caught fish. Seventy-six (76)

percent of Laotian community members that had fished in San Francisco Bay reported that they "always" ate the fillet with the skin, and 23% "sometimes" and only 1% "never" ate the skin (Chiang, 1998). Wong (1997) in a study on San Francisco Bay fishing for food activities found that the majority of anglers were persons of color (70%) with Asian-Americans the most numerous and that 98% of 228 mixed race fishermen residing near San Francisco Bay consumed "non-fillet parts" of perch. Matter, (1994) and Johnsen et al., (1996) found that crab hepatopancreas was eaten 43% of the time (15-20% fat content) and head, bone, eggs and/or organs were common and eaten 20% of the time. Allen et al. (1996) as a part of a study of fishing behavior in the Santa Monica Bay area of California, found that Asian Americans (including Pacific Islanders) exhibited higher rates of fish consumption and were more likely than other ethnic groups to eat whole (gutted) fish. Allen et al. (1996) also found that Asian Americans also consumed more varieties of fish and consumed more body parts than other groups studied. In addition, individuals of Asian, African, and Native American ancestry are often "lactose" intolerant so dairy products are not a viable alternative protein source. On average, Asian Americans consumed approximately three times the quantity of fish recommended by current advisories. Nakano (1996) found that Asian Americans and Pacific Islanders had a preference for a wide range of seafood, including species likely to experience higher levels of contamination, especially shellfish and bottom feeders. They also found that the consumption of fish heads, internal organs, skin and cooking water is common. Due to cultural, economic and language/communication barriers, institutional controls such as advisories may not fully protect these ethnic groups.

Using a "sport fishery" consumption rate for fish that are typically bottom feeders, very small and typically used as "subsistence" food is not appropriate. PCBs have high bioconcentration factors, and due to lipophilicity, especially of highly chlorinated congeners, tend to accumulate in the fat of fish, birds, mammals, and humans (ATSDR 1995). Considering the fish sizes reported by Gobas (2003) as ranging in size from 2 oz to 8 oz, the assumption that these very small fish would be filleted and that the skin would be removed is unsupported and completely disregards "social justice" issues and considerations. The fish consumption rate issue should be revisited and supported. The assumption that the organs, skin and associated fatty tissue would be removed would significantly reduce the tissue concentration and potential dose to the consumer. It is unlikely that the "sport fishery" scenario is appropriate or defensible.

The statement, "subsistence fish consumers may only be protected from an increased risk of one in ten thousand" is based on the report's use of an extremely low consumption rate. Considering the demographics and cultural norms a more defensible fish consumption rate based on EPA (1991) guidance for all caught fish of 54 g/d and even as high as 63 g/d (EPA general population high estimate) to from 70-170 g/d (recommended for Native American subsistence populations) may be appropriate. Considering the "general population high" ingestion value of 63 g/d for the American general population, nearly twice the TMDL proposed level of 32 g/d, would translate to a <u>significant risk</u> to the dominant local fisherman and consumers. Considering the doubling of the ingestion rate and inclusion of skin, fatty portions of the fish that contain the highest levels of contamination, the risk level could easily exceed 1/1000 or more. This results in a cancer protective risk of 1,000X less than the level of 10^{-6} or 1/ 1,000,000 goal stated in the TMDL.

Statement (5): "The CTR does not promulgate a separate numeric water quality criterion for dioxin-like PCBs."

Statement 5, correction: There is no discussion on the how the cumulative effects of PCBs and dioxins and furans will be addressed in the TMDL although the expected effects of PCBs are considered additive to those of the dioxins and furans (HSDB, 2008). The CTR addresses this issue by introducing the applicability of using toxicity equivalency factors (TEFs). TEFs were developed to enable consideration of the cumulative effects of polychlorinated dibenzo-p-dioxins (PCDDs), and dibenzofurans (PCDFs) and dioxin-like polychlorinated biphenyls (PCBs) in human, fish and wildlife risk assessment (Van den Berg et al. 1998, 2007). Considering the common mechanism of these compounds, the toxicity of the numerous congeners were evaluated relative to 2,3,7,8-TCDD, the most potent congener within these groups of compounds, to enable the determination of cumulative and relative toxicity of the PCDD, PCDF and PCB in risk assessment. An expert meeting was assembled by the World Health Organization to gain a consensus on the TEF approach (Van den Berg, 1998 and 2007). CTR standards exist for Dioxins and PCBs and the use of TEFs could be used to address these compounds. On page 28 of the TMDL, TEFs are discussed as a possible approach but the discussion does not state why the approach is not used. The TEF approach could be used to address the cumulative effects of the PCB and PCB-like compounds as well as the dioxins and furans. There is no discussion on how the cumulative effects of PCBs and dioxins and furans will be addressed in the TMDL.

General Comment (3): The TMDL conceptual model Figure 25 and food web, Figure 26, are not representative of typical marine food webs and the use of human health (humans) consuming only low trophic level receptors does not provide the information needed to determine if the TMDL goals will protect wildlife. The Food Web model on page 64 is unreadable and skips important benthic and micro and macro plankton relationships as well as the multiple predatory consumers typically found in marine ecosystems. As such, the proposed model short circuits trophic level relationships and potential for significant biomagnification of the PCBs and PCB like substances up the food chain to higher consumers. A clear statement of PCB biological transport through the trophic levels or indicator species is required to determine the appropriate food chain multipliers to be considered in the biomagnification modeling.

Comment (3) correction: The model should be corrected to reflect that presented in Gobas and Arnot, 2005. The model should be revised to reflect the trophic levels and guilds used to select the indicator species and to demonstrate that those species are representative of the feeding guilds.

General Comment (4): On page 63, the statement, "Using this model, we can associate a specific PCBs concentration in fish to that in sediment, the main compartment of PCBs in aquatic environments, and water. Starting with a numeric fish tissue target of 10 ng/g, the model yields a corresponding concentration of 1 ug/kg PCBs in sediment." This statement is unsupported and without scientific basis.

Comment (4) Correction: The model is based again on a human health target for fish tissue without foundation that it truly protects wildlife. Food web bioaccumulation modeling is discussed as are bioaccumulation factors (BAFs) and biota-sediment accumulation factors (BSAFs) but the numeric factors and applicable trophic levels are not given. Food chain

multipliers are also not given. In aquatic food chains, biomagnifying compounds may pass through 5-6 levels. The proposed model as described short circuits the process and does not represent the true potential for the PCBs to biomagnify up the food chain to ecological receptors such as the seal depicted in the Figure 26 food web model. Without this information the reviewer cannot determine if wildlife and wildlife habitat are protected or if the 303(d) requirements have been met.

General Comment (5): Environmental reservoirs Page 37. Contaminant concentration contour maps would be helpful in understanding the distribution of PCBs in the Bay and would also be useful in the implementation strategy. Point data is presented but concentration contour maps along with inflows would be very valuable in understanding sources and areas of concern and target areas for the TMDL.

General comment (6): Table 3-Self Reporting of PCBs Uses in the Bay Area (1999) presents the PCB transformers that are in service but the discussion is silent on the far greater source in transformers not considered as PCB contaminated or as PCB containing. Under the Toxic Substances Control Act transformers and capacitors containing < 50 ppm were not considered as PCB regulated, from 50-500 ppm were considered PCB contaminated and >500 ppm as PCB containing. The vast majority of transformers and capacitors fall into the <50 ppm but also serve as a huge reservoir of PCB that could ultimately end up in the soil and surface water discharges to San Francisco Bay. These unaccounted for sources should be addressed in this section as well as in the implementation section of the report.

General comment (7): Implementation, page 77, outlines very generic management steps but lacks a strategic approach to address timely TMDL attainment. The municipalities and those with control over the major watersheds and tributaries, like the Central Valley, are given waste load allocations but little guidance on how to accomplish those goals. The analytical detection methods and levels are also set at a level that will not enable those entities to demonstrate improvement or attainment in the TMDL annual reports. Assuming that the municipalities and those parties with control or management of the watersheds have the expertise to develop their own mitigation strategies is optimistic at best. The Regional Board has the capability to provide suggested strategies and technologies to assist the TMDL parties. For example, in Appendix A under Urban Stormwater Runoff the plan states only that "(a) pollution prevention activities, and (b) source and treatment controls" will be used to control annual average PCB discharges. The Board could suggest a comprehensive strategy and implementation plan that could be used by the numerous entities. For example, in the Aquilla TMDL *(www.tceq.state.tx.us/assets/public/implementation/water/tmdl/10aquilla/10-aquillapo.pdf)* informational meetings and water shed management technique brochures were distributed to assist area farmers and water shed managers in the TMDL implementation. The plan also included a detailed implementation schedule for all aspects of the plan. While the Aquilla TMDL was orders of magnitude less complicated than the San Francisco Bay PCB TMDL, it was very successful and demonstrates the value of a centralized strategy and support.

- The Board could identify watershed management techniques used by the Great Lakes initiative to control PCBs and their successes using wetlands and control strategies that would be useful in meeting their site-specific needs. A centralized strategy and

technology transfer/assistance program would reduce duplication of effort and mobilize a basin wide strategy.

General comment (7): On page 59 it is stated, "Using these BAF values, we calculated an expected concentration of PCBs in the water column when the fish tissue numeric target is met. The model calculations predict that the CTR water quality standard will be attained upon attainment of the fish tissue numeric target for PCBs." There is inadequate discussion in the document or in the referenced supporting literature to support this statement. Predictive modeling has not defined the assessment endpoints or effects nor the food chain multipliers used in the assessment.

General comment (8): The statement on page 59, "Comparison of the numeric target to these fish species constitutes an implicit margin of safety as sport fishers do not limit their fish consumption to these species (SFEI, 2001c). Rather, sport fishers consume a variety of fish species including many with lower PCB concentrations. Attainment of the fish tissue target in these two species ensures attainment of the fish tissue target for all Bay species sport fishers consume, and provides a implicit margin of safety as these other species consumed will have lower PCBs concentration than the fish tissue target" cannot be supported based on the need to address the Asian subsistence angler and the use of the inappropriate "sport angler" scenario and low fish consumption rate (as discussed above in general comment (1) statement 4).

General comment (9): On page 60 the discussion of BAF and the restriction of the discussion to only lower trophic level consumers does not provide the data needed to evaluate biomagnification to higher trophic levels such as the harbor seal. Protection of the two indicator species referenced in Table 18 does not support the statements regarding attainment of ecological protection.

General comment (10): The linkage analysis discussion on page 63 and statement, "food web model specifically predicts that this sediment goal will also be protective of risks to wildlife such as harbor seals, and birds such as cormorants and terns" cannot be supported without a clear understanding of the biological fate of the PCBs through the expected trophic levels and receptors. The figure skips at least two trophic levels and as such significantly reduces the expected biomagnification of PCBs to upper trophic levels. In addition, Gobas (2003) used the smaller fish for tissue analysis and the larger fish for stomach analysis. This approach would significantly understate the fish tissue concentration used as a dose as well as the source term for the BSAF calculations. Without understanding the relative sizes and ages of fish used in the tissue studies, the conclusions made concerning protection of the ecological receptors or humans cannot be supported. Fishers, man and animal, often prefer larger and older prey that would be expected to have accumulated significantly higher tissue concentrations.

General comment (11): On page 74 the discussion regarding the largest source contributor states, "However, natural attenuation will lower the Central Valley load to 5 kg/yr in about 40 years. As this load reduction will result in attainment of the TMDL, we propose using 5 kg/yr as the load allocation to the Central Valley watershed." Significant steps could be taken to reduce the sediment load through watershed management techniques that have been employed at other site TMDLs. Waiting 40 years for mother nature to address the problem alone does not meet the

objectives of the TMDL guidance. Source identification, watershed education and support for runoff and sediment management could significantly reduce the time needed to meet the TMDL goal for the Central Valley source.

General comment (12): On page 78 the discussion on municipal and industrial wastewater dischargers does not outline a comprehensive strategy nor a timetable for implementation. The monitoring levels of 5 ug/L will, in virtually all cases, not allow meaningful monitoring of attainment of the TMDL waste allocation goals. The TMDL takes a "wait and see" approach and does not identify steps or a time schedule for implementation. As such the TMDL does not meet the requirements of the TMDL guidance on implementation.

General comment (13): The discussion of "Stormwater Runoff" again defers to other agencies and processes such as "natural attenuation" and a "20 year schedule" for attainment. There is no schedule other than a total reliance on others to accomplish unspecified actions to meet the goal. TMDL guidance allows phased strategies but only as new data and technologies are identified. The phased implementation process or "adaptive implementation" is not a substitute for a clearly defined strategy and timetable in the initial TMDL. In my experience in over 30 years of reviewing national and international TMDL plans, watershed recovery plans, and surface water attainment strategies, this plan stands out and is remarkable in its lack of identifying a clear management strategy to proactively clean up the Bay in a timely manner. Natural attenuation is not the answer but only one aspect or consideration to be used in the over-all strategy. Clear identification of a detailed strategy, timelines and methods to monitor attainment must be identified.

Summary Statement:

I n my preparation and review, I have also noted that many of my concerns were voiced by the Regional Board's own peer reviewers and have not been addressed in this TMDL document.

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