ACTION NEEDED: A LOOK INTO CALIFORNIA'S IMPLEMENTATION OF TOTAL MAXIMUM DAILY LOADS TO SOLVE THE CURRENT MERCURY PROBLEM IN THE SAN FRANCISCO BAY

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INTRODUCTION

The overall purpose of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's Waters."[1] The Clean Water Act currently compels each individual state to develop a "total maximum daily load" ("TMDL") for pollutants in impaired waters and then provides the state with the discretion to decide which parties will reduce pollutant discharges.[2] California's TMDL program follows the brief and general provisions of the CWA § 303(d).[3]

This article analyzes some of the flaws of the current California TMDL program by examining a recent resolution of the San Francisco Bay Regional Water Quality Board ("S.F. Regional Board") to regulate the accumulation of mercury into San Francisco Bay. Part II of this article examines the unique mercury pollution the San Francisco Bay faces due to its geographical location. Part III presents a brief overview of the Clean Water Act dealing with point and non-point source pollution and California's similar Porter-Cologne Act. Part IV examines a recent resolution of the S.F. Regional Board to regulate the accumulation of mercury into San Francisco Bay and the subsequent action on the part of the State Water Resources Control Board. Part V analyzes how the S.F. Regional Board cannot solve the current mercury problem because of the numerous flaws in California's TMDL program. Finally, this article concludes that in order to attain water quality standards established to protect and support beneficial uses, California's Porter-Cologne Act needs strengthening, particularly through refining the definition of TMDLs and the implementation of adaptive implementation.

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[1] 33 U.S.C. § 1251(a) (2005); Arkansas v. Oklahoma, 503 U.S. 91, 101 (1992).

[2] *See* Federal Water Pollution Control Act, 33 U.S.C. § 1313(d)(1) (2005).

[3] CAL. WATER CODE § 13191.3 (Deering 2006).

I. CURRENT THREATS TO HUMAN HEALTH: MERCURY POLLUTION IN THE SAN FRANCISCO BAY

A. The San Francisco Bay

California's San Francisco Bay is located at the confluence of the Sacramento and San Joaquin Rivers.[4] The San Francisco Bay is an estuary whose sheltered waters support unique communities of plants and animals, making it one of the most productive environments on earth.[5] Since the discovery of gold in the Sierra Nevada foothills in 1848, the San Francisco Bay region has undergone rapid, large-scale, and permanent changes driven by explosive population migration attracted to the region's natural surroundings and economic opportunities.[6] Urbanization resulted in a loss of wetlands, alteration of freshwater inflows, water pollution and contamination, increase in sedimentation, and declines of fish and wildlife species.[7]

The size, location, and productivity of the San Francisco Bay support many beneficial uses, including sport fishing and habitat for wildlife and endangered species. [8] Unfortunately, since the Bay is a repository for many Northern California rivers and streams, it contains many pollutants, including mercury.[9] Fish tissue from the San Francisco Bay often contains relatively high concentrations of mercury.[10] The California Office of Environmental Health Hazard Assessment issued fish consumption advisories warning people to limit

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[4] CLEAN ESTUARY PARTNERSHIP, LEGACY POLLUTION: WHAT DOES IT MEAN FOR THE HEALTH OF THE BAY? (2003), *available at* http://www.cleanestuary.org/about/index.cfm?fuseaction=download [hereinafter CEP LEGACY POLLUTION] (the Clean Estuary Partnership is a collaborative effort of the San Francisco Bay Regional Water Quality Control Board, the Bay Area Clean Water Agencies, and the Bay Area Stormwater Management Agencies Association); U.S. GEOLOGICAL SURVEY, SAN FRANCISCO BAY AND DELTA (last modified Feb. 25 2002), *at* http://sfbay.wr.usgs.gov/access/access_about.html.

[5] G. TYLER MILLER, JR.., LIVING IN THE ENVIRONMENT: PRINCIPLES, CONNECTIONS, AND SOLUTIONS 156-57 (12th ed. 2002).

[6] Jonathan Smith & Alan Pendleton, *City and the Environment Symposium: San Francisco Bay Conservation and Development Commission: Challenge and Response After 30 Years*, 28 GOLDEN GATE U.L. REV. 269, 270 (1998); U.S. GEOLOGICAL SURVEY, SAN FRANCISCO BAY AND DELTA (2005), *available at* http://sfbay.wr.usgs.gov/access/access_about.html.

[7] Smith, *supra* note 6, at 270.

[8] CAL. REG'L. WATER QUALITY CONTROL BD., SAN FRANCISCO REGION, AMENDING THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY REGION TO ESTABLISH A TOTAL MAXIMUM DAILY LOAD AND IMPLEMENTATION PLAN FOR MERCURY IN SAN FRANCISCO BAY, EXHIBIT A, BASIN PLAN AMENDMENT, RESOLUTION R2-2004-0082, 1 (Sept. 15, 2004) [hereinafter BASIN PLAN AMENDMENT].

[9] *Id.*

[10] *Id.*

their consumption of San Francisco Bay fish.[11] In addition, studies have shown that birds consuming fish and other organisms from the San Francisco Bay pass mercury to their eggs, potentially contributing to reproductive failures.[12]

B. Mercury

Mercury is a naturally occurring element that exists in numerous forms and is found in soil, air, and water.[13] Mercury cannot be created or destroyed and is non-biodegradable.[14] The most common form of mercury found in coastal marine environments is methylmercury, an organic mercury compound.[15] Methylmercury is formed when microscopic organisms in soil and sediments convert inorganic mercury into organic mercury.[16] Methylmercury is a highly toxic form of mercury that builds up in fish and shellfish, accumulating up the food chain.[17] Due to this bioaccumulation, fish that are higher in the food chain, such as swordfish and sharks, contain elevated levels of methylmercury concentrations than fish lower in the food chain.[18] These larger fish can have concentrations of methylmercury in their tissues over a million-fold higher than the methylmercury levels in the surrounding water.[19] The main source of methylmercury exposure for people in the United States is consumption of fish and shellfish that contain methylmercury.[20] According to the EPA, "almost all people have at least trace amount of methylmercury in their tissues, reflecting methylmercury's widespread presence in the environment and people's exposure

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[11] PESTICIDE AND ENVTL. TOXICOLOGY SECTION, OFFICE OF ENVTL. HEALTH HAZARD ASSESSMENT, CAL ENVTL. PROT. AGENCY, ANGLER SURVEY: ANALYSIS OF SIGN EFFECTIVENESS AND ANGLER AWARENESS OF SAN FRANCISCO FISH CONSUMPTION ADVISORY, at 1 (1995) [hereinafter ANGLER SURVEY].

[12] BASIN PLAN AMENDMENT, *supra* note 8, at 1.

[13] MILLER, *supra* note 5, at 430.

[14] MARK B. BUSH, ECOLOGY OF A CHANGING PLANET 278 (2nd ed. 2000).

[15] U.S. ENVTL. PROT. AGENCY, MERCURY STUDY REPORT TO CONGRESS. VOLUME 3: FATE AND TRANSPORT OF MERCURY IN THE ENVIRONMENT, EPA-452/R-97-003, 2-17 (1997), *available at* http://www.epa.gov/mercury/report.htm; NAT'L RESEARCH COUNCIL, TOXICOLOGICAL EFFECTS OF METHYLMERCURY 1 (National Academy Press 2001) [hereinafter TOXICOLOGICAL EFFECTS OF METHYLMERCURY].

[16] TOXICOLOGICAL EFFECTS OF METHYLMERCURY, *supra* note 15, at 16.

[17] BUSH, *supra* note 14, at 278.

[18] *Id.*

[19] James G. Wierner, Cynthia C. Gilmour, & David P. Krabbenhoft, *Mercury Strategy for the Bay-Delta Ecosystem: A Unifying Framework for Science, Adaptive Management, and Ecological Restoration,* 11 (2003), *available at* http://calwater.ca.gov/Programs/Science/adobe_pdf/MercuryStrategy_FinalReport_1-12-04.pdf. "Methylmercury readily crosses biological membranes and accumulates to concentration in aquatic organisms that vastly exceed concentration in ambient surface waters; for example, concentrations in fish commonly exceed those in the water in which they reside by a factor of 10^6 to 10^7." *Id.*

[20] *Id.*

through the consumption of fish and shellfish."[21]

The principle sources of mercury contamination in fish are air emissions from coal burning power plants, incinerators, and other industrial sources.[22] After emitted into the air, mercury compounds readily settle either directly into water bodies, or on land, making their way into water bodies via runoff.[23] Besides air pollution, another significant source of mercury contamination of surface and ground water is leaching from mine sites and waste disposal sites that enter water bodies from runoff.[24]

Although environmental awareness, regulations, and laws eliminated many sources of mercury, human health is still threatened.[25] "Mercury compounds left by past industrial activities and mining continue to cycle through the land and water ecosystems."[26] In particular, estuarine water bodies become large repositories of mercury.[27] When polluted freshwater combines with saline coastal water, mercury compounds precipitate and settle to the bottom.[28] The compounds convert to methylmercury, are readily taken up by plants and animals, and work their way up the food chain.[29] One effective way to protect public health from mercury in the environment is the issuance of fish consumption advisories letting the public know what fish from specific waters is safe to eat.[30]

The effects of mercury exposure vary in severity depending largely on the magnitude of the dose.[31] Specific health risks from mercury can include harm to the brain, heart, kidneys, lungs, and immune system of people of all ages.[32]

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[21] U.S. ENVTL. PROT. AGENCY, MERCURY HEALTH EFFECTS, *available at* http://www.epa.gov/mercury/effects.htm. (last modified Jan. 18, 2005). EPA has identified various factors that determine how severe health effects will be from mercury exposure. *Id.* They include: 1) the dose—how much a person is exposed to, 2) the duration of exposure—how long, 3) the route of exposure—breathing, touching, injection, eating, 4) the age and health of the person, and 5) the chemical form of mercury—elemental, inorganic, or organic. *Id.*

[22] NAT'L CTR. FOR ENVTL. RESEARCH, U.S. ENVTL. PROT. AGENCY OFFICE OF RESEARCH AND DEV., STAR REPORT: MERCURY TRANSPORT AND FATE IN WATERSHEDS 2, Vol. 4 (2000).

[23] *Id.*

[24] *Id.*

[25] *Id.*

[26] *Id.*

[27] *Id.* at 7.

[28] *Id.*

[29] *Id.* at 2.

[30] ANGLER SURVEY, *supra* note 11, at 1 (stating "health advisory for the San Francisco Bay and delta region had been in effect since 1972 recommending limited striped bass consumption due to methylmercury contamination. OEHHA reviewed the basis for the advisory . . . and issued a new advisory . . . in December 2003).

[31] TOXICOLOGICAL EFFECTS OF METHYLMERCURY, *supra* note 15, at 16.

[32] MILLER, *supra* note 5, at 430.

Also, high dose exposure can cause "human retardation, cerebral palsy, deafness, blindness, and dysarthria in utero and in sensory and motor impairment in adults."[33] The greatest health concern, however, is neurotoxicty, especially to fetal and developing nervous systems.[34] Consumption of fish with high levels of methylmercury can elevate the levels of mercury in the bloodstream of fetuses and young children.[35] This migration of mercury can cause harm to developing nervous systems causing disabilities, including impaired visual and motor integration, inability to use language, and difficulties processing information.[36] A National Academy of Science study concluded that the population at highest risk for adverse health effects from methylmercury are fetuses and young children.[37] The Food and Drug Administration ("FDA") and the United States Environmental Protection Agency ("EPA") advise women who are pregnant or may become pregnant, nursing mothers, and young children to avoid fish and shellfish high in mercury and limit the amount of fish consumed each week.[38]

II. THE CLEAN WATER ACT AND TMDL PROGRAM –BACKGROUND OF WATER QUALITY REGULATION

In direct response to accelerating environmental degradation of rivers, lakes, and streams in this country, Congress dramatically amended the federal water pollution legislation in 1972.[39] Before this date, federal legislation in the field of water pollution control had been:

> [K]eyed primarily to an important principle of public policy: The States shall lead the national effort to prevent, control and abate water pollution. As a corollary, the Federal role has been limited to support of, and assistance to, the States.[40]

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[33] OFFICE OF SCI. AND TECH., OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, WATER QUALITY CRITERION FOR THE PROTECTION OF HUMAN HEALTH: METHYLMERCURY, EPA-823-R-01-001, at x, (2001) [hereinafter WATER QUALITY CRITERION].

[34] *Id.* at ix.

[35] *Id.*

[36] TOXICOLOGICAL EFFECTS OF METHYLMERCURY, *supra* note 15, at 17, 230.

[37] *Id.* at 17.

[38] U.S. FOOD AND DRUG ADMIN. AND U.S. ENVTL. PROT. AGENCY, PAMPHLET EPA-823-F-04-009, WHAT YOU NEED TO KNOW ABOUT MERCURY IN FISH AND SHELLFISH, ADVICE FOR WOMEN WHO MIGHT BECOME PREGNANT, WOMEN WHO ARE PREGNANT, NURSING MOTHERS, AND YOUNG CHILDREN (2004).

[39] S. REP. NO. 92-414, at 3369 (1971); Natural Res. Def. Council, Inc. v. Costle, 568 F.2d 1369, 1371 (1977).

[40] *Id.*

Driven by a growing concern for public health and the need for environmental planning on a broader scale, Congress revised the federal water pollution legislation to restore the balance of Federal-State effort to curb pollution.[41] The amendments also signaled a major change in the enforcement mechanism of the Federal water pollution control program, departing from water quality standards to effluent limits focused on discharge control.[42]

In addition to action on the federal level, California sought to control water pollution with the enactment of the Porter-Cologne Act in 1970. [43] The California Legislature was particularly concerned with pollution from inoperative businesses, particularly mines, and sought to give the Regional Boards authority to regulate such pollution.[44] The Legislature declared:

> [I]t is imperative, in order to remedy conditions of pollution and nuisance emanating from nonoperating industrial or business locations, such as mines, that regional water quality control boards be authorized to regulate such conditions in the manner provided in Section 13305 of the Water Code.[45]

A. The Federal Clean Water Act

In 1972, Congress enacted the Federal Water Pollution Control Act (33 U.S.C. §§ 1251-1387), commonly known as the Clean Water Act ("CWA").[46] The goal of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[47] To achieve this goal, the CWA's primary control strategy is the regulation of point source discharges; the Act imposes a general prohibition against the discharge of a pollutant by a person.[48] Generally, the Clean Water Act "prohibits the discharge of any pollutant except in compliance with one of several statutory exceptions."[49]

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[41] *Id.* at 3375.

[42] *Id.*

[43] CAL. WAT. CODE §§ 13000 et seq (Deering 2006).

[44] *Id.*

[45] *Id.*

[46] Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1387 (2005).

[47] 33 U.S.C. § 1251(a) (2005); *see* Arkansas v. Oklahoma, 503 U.S. 91, 101 (1992).

[48] 33 U.S.C. § 1311(a) (2005); William L. Andreen, *Water Quality Today—Has the Clean Water Act Been a Success?*, 55 ALA. L. REV. 537 (2004); Robin Kundis Craig, *Beyond SWANCC: The New Federalism and Clean Water Act Jurisdiction*, 33 ENVTL. L.J. 113, 115 (2003).

[49] WaterKeepers N. Cal. v. State Water Res. Control Bd., 102 Cal. 4th 1448, 1452 (Cal. App. 2002); *see also* 33 U.S.C. § 1311(a) (2005) (stating "except as in compliance with this section and sections 302, 306, 307, 318, 402, and 404 of this Act [33 USCS §§ 1312, 1316, 1317, 1328, 1342, 1344], the discharge of any pollutant by any person shall be unlawful"); Brentwood v. Central

The Clean Water Act establishes two primary methods of water quality measures: effluent limitations, found in 33 U.S.C. § 1311, and water quality standards, found in 33 U.S.C. § 1313.[50] Effluent limitations, the CWA's primary control strategy, focus on the control of "point sources" into navigable waters.[51]

The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.[52]

The Clean Water Act provides that the discharge of any "pollutant" by any person is unlawful.[53] The term "pollutant" is defined as:

> [D]redged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.[54]

To provide consistency among state and federal jurisdictions enforcing the Act, effluent limitations are uniform in nature and "apply to all dischargers in particular industrial categories."[55] Generally, these limitations are "based upon the application of specific kinds of control technology for particular waste

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Valley Reg'l Water Quality Control Bd., 123 Cal. 4th 714, 723 (Cal. App. 2004) (the Clean Water Act is a strict liability statute); Natural Res. Def. Council, Inc. v. U.S. Envtl. Prot. Agency, 822 F.2d 104, 123 (D.C. Cir. 1987) ("[T]he first principle of the statute is . . . that it is unlawful to pollute at all. The Clean Water Act does not permit pollution whenever that activity might be deemed reasonable or necessary; rather, the statute provides that pollution is permitted only when discharged under the conditions or limitations of a [NPDES] permit.").

[50] *See* 33 U.S.C. §§ 1311, 1313 (2005); *see also* North Dakota v. U. S. Army Corps of Eng'rs, 270 F.Supp. 1115, 1123 (2003).

[51] *North Dakota*, 270 F.Supp. 2d at 1123. *See also* Andreen, *supra* note 48, at 547.

[52] 33 U.S.C. § 1362(14) (2006).

[53] 33 U.S.C. § 1311(a) (2006). *See also* Craig, *supra* note 48, at 115 (explaining that the Act imposes general prohibition against a discharge of a pollutant by a person).

[54] 33 U.S.C. § 1362(6) (2006). The terms "pollution" and "pollutant" mean different things. "Pollution" has a broader definition under federal law and means the "man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of the water." 33 U.S.C. § 1362(19) (2006); *North Dakota*, 270 F.Supp. 2d, at 1124.

[55] Andreen, *supra* note 48, at 548. A driving force underlying Congress's adoption of effluent limitations was to provide "uniformity" among federal and state jurisdictions enforcing the Clean Water Act and "prevent the 'Tragedy of the Commons' that might result if jurisdictions can compete for industry and development by providing more liberal limitations than their neighboring states." Natural Res. Def. Counsel v. Costle, 568 F.2d 1369, 1378 (D.C. Cir. 1977) (citing Natural Res. Def. Council v. Train, 510 F.2d 692, 709 (D.C. Cir. 1975)); see Andreen, *supra* note 48, at 548.

streams."[56]

The CWA's prohibition on discharges of pollutants is not without exception. Upon meeting certain criteria and with the approval of the EPA Administrator or the Secretary of the Army, a discharger can obtain a section 402 National Pollutant Discharge Elimination System ("NPDES") permit or a section 404 "dredge and fill" permit.[57] While Congress granted "EPA and the Army Corps of Engineers initial authority to implement these permit programs, it also allowed states to assume responsibility for the programs when states meet certain statutory requirements. Thus, the permit programs, like much of the CWA, are a complex balance of state and federal regulatory control."[58]

In addition to effluent limitations, the CWA's other major pollution prevention measure focuses on water quality standards.[59] Congress recognized that effluent limitations alone might not be sufficient to reach the Act's goals of making the nation's waters fishable and swimmable.[60] Therefore, Congress

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[56] *Id.*

> [E]ffluent limitations for categories and classes of point sources, other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act [33 USCS § 1314(b)(2)], which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 315 [33 USCS § 1325]), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act [33 USCS § 1314(b)(2)], or (ii) in the case of the introduction of a pollutant into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, shall require compliance with any applicable pretreatment requirements and any other requirement under section 307 of this Act [33 USCS § 1317].

33 U.S.C. § 1311 (2006).

[57] *See* 33 U.S.C. §§ 1342, 1344 (2006). *See generally* Craig, *supra* note 48, at 117-18.

[58] Craig, *supra* note 48, at 118-19. States can include additional requirements in permits that are based on state law as long as they are more stringent than the minimum federal technology and water quality-based requirements. It is well settled that the Clean Water Act authorizes states to impose water quality controls that are more stringent than are required under federal law. 33 U.S.C. §1370 (2006); Jefferson City v. Wash. Dept. of Ecology, 511 U.S. 700, 705 (1994); Northwest Envtl. Advocates v. Portland, 56 F.3d 979, 989 (9th Cir. 1995). California law specifically allows the imposition of controls more stringent than federal law. CAL. WATER CODE § 13377 (2005); Bldg. Indus. Ass'n. of San Diego County v. State Water Res. Control Bd. 124 Cal. 4th 866 (Cal. App. 2004).

[59] 33 U.S.C. § 1313 (2006). *See also* Jack R. Tuholske, *Can TMDLs Ensure a Clean and Healthful Environment? A Litigator's Prespective: The Montana TMDL Litigation,* 22 PUB. LAND & RESOURCES L. REV. 3, 4-5 (2001).

[60] Kenneth J. Warran, *Total Maximum Daily Loads: A Watershed Approach to Improved*

promulgated CWA § 303(d) to focus on the creation of ambient water quality standards.[61] Under the Clean Water Act, the states are primarily responsible for adopting water quality standards.[62] The U.S. Environmental Protection Agency ("EPA") may adopt water quality standards for the states if a revised or new water quality standard submitted by a state is not consistent with the applicable requirements of this Act or in any case where EPA determines that a revised or new standard is necessary to meet the requirements of this Act.[63]

Unlike technologically based effluent limitations, which can be uniformly applied across the nation, legislatures mold water quality standards for specific waters and uses.[64] The CWA requires states to create water quality standards which will "protect public health and welfare, and enhance the quality of water, which includes the protection of aquatic ecosystems, fisheries and other species that depend upon certain levels of clean water in order to thrive."[65] Therefore, it is a state's responsibility to develop water quality standards relating to thermal heat, turbidity, and other environmental parameters in order to protect the unique water quality of that waterway.[66]

Water Quality, SJ028 ALI-ABA 193, 196 (2003).

[61] 33 U.S.C. § 1313(d) (2005).

> Under the Clean Water Act, a state may set individualized ambient water quality standards by taking into consideration the designated uses of the navigable waters involved. 33 U.S.C.S. § 1313(c)(2)(A). Those water quality standards, in turn, directly affect local National Pollutant Discharge Elimination System permits; if standard permit conditions fail to achieve the water quality goals for a given water body, the state must determine the total pollutant load that the water body can sustain and then allocate that load among the permit-holders who discharge to the water body. 33 U.S.C.S. § 1313(d).

S. Fla. Water Mgt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 102 (2004).

[62] 33 U.S.C. § 1313(c) (2005).

[63] 33 U.S.C. § 1313(c)(4) (2005).

[64] Andreen, *supra* note 48, at 548.

> Under this program, all states are required, subject to federal approval, to zone their waters for specific uses—such as fish and wildlife protection and propagation or public water supply—and then set technical criteria—maximum levels of certain pollutant, minimum levels of dissolved oxygen, and perhaps a narrative description of the resulting ecosystem-that are designated to protect those uses.

Id.

[65] Tuholske, *supra* note 59, at 4. *See also* 33 U.S.C. § 1313(c)(2) (2005); 40 C.F.R. § 130.2(d) (2006) (water quality standards are "[p]rovisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act").

[66] 33 U.S.C. § 1313 (2006). *See also* Tuholske, *supra* note 59, at 4-5.

B. The TMDL Program

Section 303(d) of the Clean Water Act establishes the Total Maximum Daily Load ("TMDL") program, which is "a water quality-based approach to regulating waters that fail to meet water quality standards despite the use of effluent limitations and other pollution control requirements."[67] A TMDL "is a calculation of the maximum quantity of a given pollutant that may be added to a water body from all sources without exceeding the applicable water quality standard for that pollutant."[68] The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated

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[67] THE CLEAN WATER ACT HANDBOOK 205 (2nd ed. 2003). Section 303(d) of the Clean Water Act establishes TMDL programs and water quality standards:

> Identification of areas with insufficient controls; maximum daily load; certain effluvient limitations revision.
> (A) Each State shall identify those waters within its boundaries for which the effluent limitations required by section 301(b)(1)(A) and section 301(b)(1)(B) [33 USCS § 1311(b)(1)(A), (B)] are not stringent enough to implement any water quality standard applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.
> (B) Each State shall identify those waters or parts thereof within its boundaries for which controls on thermal discharges under section 301 [33 USCS § 1311] are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife.
> (C) Each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 304(a)(2) [33 USCS § 1314(a)(2)] as suitable for such calculation. Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.
> (D) Each State shall estimate for the waters identified in paragraph (1)(B) of this subsection the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the dissipative capacity of the identified waters or parts thereof. Such estimates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of knowledge concerning the development of thermal water quality criteria for such protection and propagation in the identified waters or parts thereof.

33 U.S.C. § 1313(d)(1) (2006).

[68] THE CLEAN WATER ACT HANDBOOK, *supra* note 67 at 214-15. The definition of "pollutant" and "pollution" are different under the CWA. "A 'pollutant' is any one of the number of listed contaminants...that is 'discharged into water.'" However, the definition of "pollution" is more inclusive. "It comprehends any 'man-made or man-induced alteration of the chemical, physical, or biological, and radiological integrity of water.'" Section 303(d) requires TMDLs *only* for "pollutants." *Id.* at 214-15.

and must also account for seasonal variation in water quality.[69]

Although the Clean Water Act outlines the process for creating TMDLs, CWA § 303(d) "does not expressly provide for their implementation."[70] Under CWA § 303(d), states must "identify those waters that are below certain quality limits; establish a priority ranking for those waters; and establish TMDLs in accordance with the priority ranking."[71] The Ninth Circuit recently upheld EPA's interpretation of CWA § 303(d) to include *all* impaired waters.[72] Thus, when establishing §303(d) lists, states must include waters impaired by point sources, non-point sources, and blended waters (combinations of point and non-point sources).[73]

After identifying impaired water bodies and determining the TMDL of each pollutant the water body can endure before its quality becomes impaired, a state must establish a waste load allocation or load allocation for each source to ensure that the sum of all pollutants does not exceed the TMDLs.[74] EPA must approve both the § 303(d) list and the state promulgated TMDLs.[75] If a state fails to submit a § 303(d) list or a TMDL, or if EPA does not approve the state regulation, EPA, in turn, must establish the list or the TMDL.[76]

C. California's Porter-Cologne Water Quality Control Act

In addition to the federal CWA, California promulgated its own water act in 1969. The Porter-Cologne Water Quality Control Act ("Porter-Cologne Act") establishes as California state policy "that the quality of all the waters of the state shall be protected for use and enjoyment by the people of the state."[77] The

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[69] *Id.* at 206.

[70] THE CLEAN WATER ACT HANDBOOK, *supra* note 67, at 215.

[71] 33 U.S.C. § 1313(d)(1) (2006); Alaska Ctr. for the Env't v. Reilly, 762 F.Supp. 1422, 1426 (1991). *See also* U.S. ENVTL. PROT. AGENCY, OVERVIEW OF CURRENT TOTAL MAXIMUM DAILY LOAD—TMDL—PROGRAM AND REGULATIONS (2005) *at* http://www.epa.gov/owow/tmdl/overviewfs.html.

[72] Pronsolino v. Nastri, 291 F.3d 1123 (9th Cir. 2002).

[73] James R. May, *The Road to Perdition: The Demise of TMDL Litigation*, SJ059 ALI-ABA 349, 356 (2004). A "non-point source" is a pollutant discharged through diffuse means such as urban and agricultural runoff and irrigation return flows. *See* Central Delta Water Agency v. State Water Res. Control Bd. 17 Cal. App. 4th 621, 634 (1993).

[74] 33 U.S.C. § 1313(d)(1)(C) (2006); Pronsolino v. Marcus, 91 F.Supp. 2d 1337, 1343 (N.D. Cal. 2000). Generally, a waste load allocation refers to discharges from point sources and load allocation refers to non-point sources. *See* Mary E. Christopher, *Time to Bite the Bullet: A Look at State Implementation of Total Maximum Daily Loads (TMDLs) Under Section 303(d) of the Clean Water Act,* 40 Washburn L.J. 480, 508 (2001).

[75] 33 U.S.C. § 1313(d)(2) (2006).

[76] 33 U.S.C. § 1313(d)(2) (2006); *Pronsolino*, 91 F.Supp. 2d at 1344; San Francisco Baykeeper, Inc. v. Browner, 2001 WL 618258 *2-3, 5-7.

[77] CAL. WATER CODE § 13000 (Deering 2006).

Porter-Cologne Act designates the State Water Resources Control Board ("SWRCB") and nine Regional Water Quality Control Boards ("Regional Boards") as the principal state agencies with primary responsibility for coordination and control of water quality.[78] The SWRCB formulates policies and plans and is authorized to exercise any power delegated to the state under the CWA.[79]

The Porter-Cologne Act requires the nine Regional Boards to adopt water quality control plans, also called Basin Plans, for the hydrologic areas within each region.[80] The Basin Plans: 1) identify the beneficial uses of the water to be protected; 2) establish "water quality objectives" to protect those uses; and 3) establish implementation programs for achieving the objectives.[81] The SWRCB approves Basin Plans and, when activities are subjected to the CWA, the EPA will also review the plan.[82] The beneficial uses and water quality objectives in the Basin Plan, applicable state water quality control plans, and an anti-degradation policy constitute the water quality standards for purposes of compliance with the CWA.[83]

The Regional Boards have primary responsibility for translating the requirements of state water quality policy and the Basin Plans into "waste discharge requirements" ("WDRs") imposed on individual sources of pollution.[84] WDRs issued to dischargers subject to the CWA are also called NPDES permits.[85] In addition, under the Porter-Cologne Act, a Regional Board may set more stringent standards then current national levels.[86] Section 13377 specifically states: "the state board or the regional board shall issue...permits...together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."[87]

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[78] *Id.* at §§ 13000, 13100, 13200. The 9 regions are the North Coast region, the San Francisco Bay region, the Central Coast region, the Los Angeles region, the Santa Ana region, the San Diego region, the Central Valley region, the Lahontan region, and the Colorado River Basin region. *Id.* at § 13200.

[79] *Id.* at §§ 13140, 13160.

[80] *Id.* at § 13240.

[81] *Id.* at §§ 13240, 13241, 13242.

[82] *Id.* at §§ 13170, 13240, 13241, 13242, 13243, 13244.

[83] *Id.* at §§ 13142, 13240, 13241, 13242.

[84] *Id.* at §§ 13263, 13377, 13382.5.

[85] *Id.* at § 13374.

[86] *Id.* at § 13377.

[87] *Id.*

In 1972, after Congress passed the CWA, the California Legislature amended the Porter-Cologne Act to implement the federal CWA.[88] These Amendments also allowed the State to assume responsibility for issuing permits pursuant to the CWA.[89] The 1972 amendments provided that, "[n]othwithstanding any other provision" of the Porter-Cologne Act, waste discharge requirements issued by the State must "apply and ensure full compliance" with the CWA.[90] Additionally the Porter-Cologne Act must be read to conform to the requirements of the CWA, even if this results in inconsistencies with the specific provisions of the Porter-Cologne Act.[91]

California's TMDL program is a prime example of a provision in the Porter-Cologne Act that must be read to conform to the CWA. Section 13191.3(a) of the Porter-Cologne Act establishes the guidelines for listing waters and developing the TMDL program.[93] It states:

> The state board, on or before July 1, 2003, shall prepare guidelines to be used by the state board and the regional boards for the purpose of listing and delisting waters and developing and implementing the total maximum daily load (TMDL) program and total maximum daily loads pursuant to Section 303(d) of the federal Clean Water Act (33 U.S.C. Sec. 1313(d)).[94]

Thus, California's TMDL program follows the brief and general provisions of the CWA § 303(d).[95] The Porter-Cologne Act does provide a few more specifics regarding which agency carries out the provisions of the TMDL program. The appropriate Regional Board has the authority to prepare and adopt a TMDL as part of the water quality control plan for that hydrologic

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[88] *Id.* at § 13377.

[89] *Id.* at § 13370 *et seq.*

[90] *Id.* at § 13377, 13372.

[91] *Id.* § 13372.

> The provisions of this chapter [Chapter 5.5. Compliance With the Provisions of the Federal Water Pollution Control Act as Amended in 1972] shall prevail over other provisions of this division to the extent of any inconsistency. The provisions of this chapter apply only to actions required under the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto.

Id. See 33 U.S.C. § 1342(c)(3) (2006), 40 C.F.R., § 123.63 (2006) (stating that failure by states to comply with the requirements of the CWA can result in revocation of the state's authority to issue NPDES permits); CAL. WATER CODE § 13370 (Deering 2006) (the Legislature declared that it was in states' interest to avoid direct implementation of the CWA by federal government).

[93] CAL. WATER CODE § 13191.3 (Deering 2006).

[94] *Id.*

[95] *Id.*

region.[96] After the determination of waste load allocations and load allocations, the appropriate Regional Board must plan for and implement the reductions in order to reduce pollutant loading.[97]

III. THE SAN FRANSICSO BAY MERCURY TMDL

A. Action by the San Francisco Bay Regional Water Quality Control Board to Create a TMDL for Mercury

Even with the Clean Water Act, California's Porter-Cologne Act, and the establishment of TMDLs for impaired waterways, many waters in our state and and nation continue to be impaired. The vast number of impaired water bodies identified in the most recent required submission of state § 303(d) lists to EPA reaffirms the stark reality that pollution still threatens many of our nation's waters:[98]

> [t]he states and territories identified nearly 22,000 individual water bodies, including river and stream segments, lakes, and estuaries, that do not attain state water quality standards despite 28 years of pollution control efforts under the Clean Water Act....These impaired waters include approximately 300,000 miles of rivers and coastal shorelines and approximately 5 million acres of lakes. This quantity of impaired waters represents about 1/3 of the length/acreage of all waters in the U.S. whose water quality has been assessed, or about 10% of all the waters nationwide. Approximately 210 million people live within 10 miles of one or more of the impaired water bodies currently listed under § 303(d).[99]

In California, the San Francisco Bay is an impaired waterway and is a host to many pollutants including polychlorinated biphenyls ("PCBs") and mercury.[100] In an effort to address and combat this problem, the S.F. Regional Board

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[96] 33 U.S.C. §§ 1313(d)(1)(D)(2), 1313(e)(2), 1313(e)(3) (2006); Pronsolino v. Marcus, 91 F.Supp. 2d 1337, 1340, 1344-45 (N.D. Cal. 2000).

[97] 33 U.S.C. § 1313(d)-(e) (2006).

[98] U.S. ENVTL. PROT. AGENCY, THE NATIONAL COSTS OF THE TOTAL MAXIMUM DAILY LOAD PROGRAM (DRAFT REPORT), EPA-841-D-01-003 (2001), *available at* http://www.epa.gov/owow/tmdl/coststudy/coststudy.pdf. The most recent required submission was in April 1998. EPA waived the requirement for a list to be submitted in 2000 given that they were in the process of revising the TMDL program regulations. *Id.*

[99] *Id.* at 12.

[100] CAL. REG'L WATER QUALITY CONTROL BD., SAN FRANCISCO REGION, AMENDING THE

spent over five years studying the effects and sources of mercury in the Bay, seeking to gather evidence in order to amend the Basin Plan and establish a TMDL and implementation plan.[101]

Specifically, the San Francisco Bay Mercury TMDL Project examines water quality problems due to the presence of mercury, studies the effects of bioaccumulation of mercury, and identifies key sources of mercury pollution.[102] Key sources of mercury pollution include runoff from historic mines, urban runoff, wastewater discharges, atmospheric deposition, resuspension of historic deposits of mercury-laden sediment already in the San Francisco Bay, and sediment dredging and disposal.[103] Most of the historic mercury deposits can be traced back to gold mining in the 1800s, when mercury was mined throughout the Coastal Range for use in the Sierra Nevada to extract gold.[104] The principal source of mining-related mercury pollution comes from the Central Valley, where rivers carry mercury from remote regions of Northern California and deposit it into the San Francisco Bay.[105]

In September of 2004, the San Francisco Bay Regional Water Quality Control Board ("S.F. Regional Board") updated the 1995 Water Quality Control Plan for the San Francisco Bay Region and amended the TMDL and implementation plan for mercury.[106] Based upon their studies, the S.F. Regional Board concluded that the elevated levels of mercury in fish tissue posed a health threat to humans, wildlife, and endangered species consuming Bay fish.[107] It

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WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY REGION TO ESTABLISH A TOTAL MAXIMUM DAILY LOAD AND IMPLEMENTATION PLAN FOR MERCURY IN SAN FRANCISCO BAY, Resolution R2-2004-0082, at 1 (Sept. 15, 2004) [hereinafter BASIN PLAN RESOLUTION]. PCBs are dangerous pollutants, extremely persistent in the environment, and have both acute and chronic affects on human health. Gen. Elec. Co. v. U.S. Envtl. Prot. Agency, 53 F.3d 1324, 1325 (1995).

[101] Interview with Richard Looker, Water Resources Control Engineer, San Francisco Bay Regional Water Quality Control Board. (Apr. 13, 2005). *See generally* BASIN PLAN AMENDMENT, *supra* note 8.

[102] *See generally* BASIN PLAN AMENDMENT, *supra* note 8; CLEAN ESTUARY P'SHIP, INFORMATION ON THE SAN FRANCISCO BAY MERCURY TMDL (2004), *available at* www.swrcb.ca.gov/rwqcb2/sfbaymercurytmdl.htm [hereinafter CEP MERCURY]; CEP LEGACY POLLUTION, *supra* note 1.

[103] *See generally* BASIN PLAN AMENDMENT, *supra* note 8, at 4; CEP Legacy Pollution, *supra* note 4, at 2.

[104] CEP MERCURY, *supra* note 102, at 1. *See also* SAN FRANCISCO BAY REG'L. WATER QUALITY CONTROL BD., SAN FRANCISCO BAY MERCURY TMDL : BACKGROUND (last visited May 19, 2005), *at* http://www.waterboards.ca.gov/sanfranciscobay/sfbaymercurytmdl.htm. [hereinafter SF BAY MERCURY TMDL].

[105] CEP MERCURY, *supra* note 102, at 1. *See also* hereinafter SF BAY MERCURY TMDL *supra* note 104.

[106] BASIN PLAN RESOLUTION, *supra* note 100, at 1. The Water Quality Control Plan (Basin Plan) is a master policy document that contains the "legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay region." *Id.*

[107] *Id.*

also concluded that the current levels of mercury in the Bay prevent the Bay from meeting the narrative bioaccumulation water quality objectives set forth in the 1995 Basin Plan.[108] The S.F. Regional Board concluded that mercury contamination adversely affects the existing beneficial uses of the Bay's waters listed in the Basin Plan, specifically sports fishing.[109] Therefore, the S.F. Regional Board established the current mercury TMDL and implementation program, stating:

> The TMDL allocations and implementation plan focus on controlling the amount of mercury that reaches the Bay and identifying and implementing actions to minimize mercury bioavailability. The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited. However, this is an area of active research and strategies for controlling this process are forthcoming. The effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed and the TMDL may be adapted as warranted.[110]

Based on the 2003 study, the S.F. Regional Board's 2003 yearly estimate of total mercury inputs into the San Francisco Bay was about 1,220 kg/yr ("kilograms per year").[111] Main sources of mercury that currently still threatening the Bay are erosion, urban and non-urban storm runoff, direct atmospheric deposition, and wastewater discharges.[112] The S.F. Regional Board also concluded that mercury may potentially enter the Bay from abandoned mercury mine sites.[113]

Upon determining the amount and potential sources of mercury, the S.F, Board began the process of establishing the TMDL by first setting the numeric targets. In setting the numeric targets for the mercury TMDL, the S.F. Regional

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[108] BASIN PLAN AMENDMENT, *supra* note 8, at 1. The narrative bioaccumulation objective is interpreted by numeric targets:

> To protect sport fishing and human health, the average fish tissue mercury concentration for typically consumed fish shall not exceed 0.2 mg per kg fish tissue (wet weight). To protect wildlife and rare and endangered species, the concentration of mercury in bird eggs shall be less than 0.5 mg mercury per kg wet weight.

Id. at 2.

[109] *Id.*

[110] *Id.*

[111] *Id.* at 3.

[112] *Id.*

[113] *Id.*

Board decided that in order "to protect sport fishing and human health, the average fish tissue mercury concentration for typically consumed fish shall not exceed 0.2 milligram of mercury per kilogram of fish tissue ("wet weight")."[114] To obtain this numerical target, the S.F. Regional Board developed general implementation plan goals[115] and specific source control actions for each mercury source category.[116] The S.F. Regional Board also acknowledged specific actions may be required for mercury mines, Bay margin contaminated sites, and wetlands, as these sites have the potential to discharge mercury or enhance methylmercury production in the Bay.[117] In addition, the S.F. Regional Board recognized the need for collaboration with the Central Valley Regional Water Quality Control Board to develop mercury TMDLs for mercury-impaired water bodies in the Central Valley that drain to the San Francisco Bay.[118]

B. Tabling of the Mercury TMDL by the State Water Resources Control Board

The S.F. Regional Board worked on the mercury TMDL in earnest from 1999 until 2005, spending over $530,000 on technical expertise and staff costs.[119] After adopting Resolution No. R2-2004-0082, which amended the Basin Plan to incorporate a mercury TMDL for the San Francisco Bay, the S.F. Regional Board submitted its amendments to the State Water Resources Control Board ("SWRCB") for approval.[120] On March 13, 2005, the SWRCB indefinitely tabled the consideration of approval of Resolution No. R2-2004-

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[114] *Id.* at 2.

[115] *Id.* at 4-5. The San Francisco Bay mercury TMDL implementation plan has four objectives: (1) reduce mercury loads to achieve load and wasteload allocations; (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury; (3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system; and (4) encourage actions that address multiple pollutants. The plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it address potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. *Id.* at 5-7.

[116] *Id.* at 8. The S.F. Regional Board briefly outlined reductions in load allocations for: 1) Central Valley Watershed; 2) Urban Stormwater Runoff; 3) Guadalupe River Watershed (Mining Legacy); 4) Municipal Wastewater; 5) Industrial Wastewater; 6) Sediment Dredging and Disposal; and 7) Atmospheric Deposition. *Id.* at 8-13.

[117] *Id.* at 14.

[118] *Id.* at 8.

[119] Interview with Richard Looker, Water Resources Control Engineer, San Francisco Bay Regional Water Quality Control Board. (Apr. 13, 2005).

[120] STATE WATER RES. CONTROL BD., REGARDING AN AMENDMENT TO THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY REGION TO INCORPORATE A TOTAL MAXIMUM DAILY LOAD (TMDL) FOR MERCURY IN SAN FRANCISCO BAY, RESOLUTION NO. 2005-0026, 1 (March 13, 2005) [hereinafter SWRCB].

0082.[121]

In its decision to table the mercury TMDL, the SWRCB concluded that current consideration of the San Francisco Bay mercury TMDL was premature.[122] It also indicated that the S.F. Regional Board must consider additional factors and water bodies before creating and adopting a TMDL.[123] The SWRCB concluded that the S.F. Regional Board must control mercury pollution in upstream waters in order to combat the current mercury problem in the San Francisco Bay.[124] Therefore, the S.F. Regional Board shall work with the Central Valley Regional Water Quality Board to develop integrated TMDLs for the Sacramento/San Joaquin Delta, the San Francisco Bay, and the Guadalupe River.[125] Given California's Gold Rush legacy and the number of abandoned mines, the SWRCB also recognized the need for active participation between the Regional Board and the U.S. Environmental Protection Agency in order to force remediation and clean up of mining areas.[126] Although the SWRCB found that "time is of the essence in developing an appropriate plan to restore these waters," the SWRCB did not provide timelines or guidelines to aid the S.F. Regional Board as they re-create the TMDL.[127]

C. The Regional Board's Mercury TMDL Does Not Solve the Problem

Although the S.F. Regional Board spent ample amount of time and resources studying the causes and effects of mercury in the San Francisco Bay, the resulting TMDL is not adequate to solve the problem. The Bay is a catch-all basin, as it lies at the end of the Sacramento and San Joaquin Rivers and is the end point for waters from the urbanized Bay Area and urban and agricultural drainage from the Central Valley.[128] Therefore, no matter what independent action the S.F. Regional Board decides to take in order to reduce the amount of mercury in the Bay, the resulting action will be inadequate. To curtail the amount of mercury flowing into the Bay, the S.F. Regional Board must look beyond its watershed to all potential sources of mercury within the region. Hence, the S.F. Regional Board *must* work with and rely on other regional water quality control boards in order to adequately and permanently clean up the

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[121] *Id.* at 2.
[122] *Id.*
[123] *Id.*
[124] *Id.* at 1.
[125] *Id.* at 2.
[126] *Id.*
[127] *Id.*
[128] CEP LEGACY POLLUTION, *supra* note 4, at 1.

Bay.[129]

Besides relying on other Regional Boards, the San Francisco Bay Regional Board needs to give greater weight to future mercury pollution from inactive and abandoned mercury mines. The S.F. Regional Board's regulatory plan for mercury mines is reliance on property owners' compliance with NPDES permits.[130] However, relying on NPDES permits is completely inadequate for abandoned mines that do not have a permit and is insufficient as the sole means of regulation, even for those mines with permits.

The S.F. Regional Board is well aware of the long-term, persistent problem of mercury mines. It is a member of the Clean Estuary Partnership ("CEP"), which was formed to "support efforts to produce identifiable, sustainable water quality improvements for San Francisco Bay."[131] CEP, recognizing the seriousness of legacy pollutants in the Bay, stated:

> Because legacy pollutants in the Estuary are persistent, it may take decades for their levels to naturally decline. Because the significant mass of legacy pollutants already present in the sediments of the Estuary can be resuspended . . . the levels of these pollutants in the water column are repeatedly influenced by outside forces. Limiting management solely to ongoing contributions or sources (such as air deposition, storm water runoff, and municipal industrial wastewater) may not be sufficient to achieve water quality standards.[132]

Since the S.F. Regional Board is concious of and acknowledge the problem of mercury mines, the Board should be spending ample time gathering information and investigating mercury mine sources in order to create an adequate implementation plan to curb the "legacy."[133]

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[129] Integrated TMDLs should be created for the San Francisco Bay, the Guadalupe River, and the Sacramento/San Joaquin Delta.

[130] BASIN PLAN AMENDMENT, *supra* note 8, at 14.

[131] CEP LEGACY POLLUTION, *supra* note 4, at 1. The Clean Estuary Partnership was formed in September 2001 between the S.F. Regional Board, the Bay Area Stormwater Management Agencies Association (BASMAA), and the Bay Area Clean Water Agencies (BACWA). *Id.*

[132] CEP LEGACY POLLUTION, *supra* note 4, at 1. Legacy pollutants include mercury, DDT, Chlordane, Dieldrin, PCBs, Dioxins, and Furans. *Id.* at 2.

[133] This lack of information about the potential mercury contamination from mine sites is somewhat disturbing. Since the mines are abandoned, it can become difficult to find a responsible party to clean up the mines. Even when a responsible party can be found, it may take some time before any clean up will begin. So, the potential for future mercury contamination from these mines is apparent. Therefore, the lack of information about these sites and the minute contribution the Regional Board attributes to these abandoned mines is problematic. If the Regional Board aims to address all the sites of mercury contamination, more time and investigatory energy must be spent on these mines.

Within the mercury TMDL, the S.F. Regional Board outlined the need for specific control plans for the various sources of mercury.[134] All of these specific control plans have estimated times of implementation, most of which will be implemented over the next 20-years.[135] Although it is understandable that it will take time for specific dischargers to comply, should the environment and human health bear the costs and suffer over the next two decades? Since the specific mercury control source plans allow for 20-year compliance and achievement, what do we do in the interim? How will the public be protected from risks of high levels of mercury when eating fish from the Bay? Neither the Regional Board's TMDL nor the SWRCB's Resolution tabling of that TMDL address concrete measures and action plans to reduce mercury. Simply stating, "develop and implement effective programs to control mercury sources and loading" is not an adequate implementation plan.[136] To solve the problem, specifics must be laid out regarding what actions contributing parties need to take. Furthermore, timelines for compliance cannot be broad and general. These timelines must be broken down into detailed provisional attainment goals.[137]

In addition to having provisional attainment goals and specific implementation plans, it is essential that the TMDL plan establish penalties for noncompliance. Neither the S.F. Regional Board's Basin Plan Resolution nor Basin Plan Amendment address the consequences of mercury pollution sources/facilities not abiding by the actions outlined in the Basin Plan. For the TMDL to be taken seriously and actually achieve the desired water quality standards to protect and support beneficial uses, it must contain strict penalties for noncompliance.

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[134] Specific control plans to reduce load allocations for: the 7 sources of mercury: 1) Central Valley Watershed, 2) Urban Stormwater Runoff, 3) Guadalupe River Watershed (Mining Legacy), 4) Municipal Wastewater, 5) Industrial Wastewater, 6) Sediment Dredging and Disposal, and 7) Atmospheric Deposition. BASIN PLAN AMENDMENT, *supra* note 8, at 8-13.

[135] *See generally* BASIN PLAN AMENDMENT, *supra* note 8.

[136] BASIN PLAN AMENDMENT, *supra* note 8, at 11.

[137] For example, the Regional Board's TMDL numerical target for sport fishing was set at 0.2 mg mercury per kg fish tissue. BASIN PLAN AMENDMENT, *supra* note 8, at 2. If the various sources of mercury pollution have twenty years to comply (with a general status review every five years) with this numerical target, provisional attainment goals should be established for year 1, year 3, year 5, etc. Establishing provisional attainment goals will allow the Regional Board to see if overall compliance is actually achievable during the 20-year period instead of waiting until the conclusion of the 20-year period. Creating provisional attainment goals would also require the creation and use of implementation plans, which would aid specific facilities in their compliance and also the Regional Board. Provisional attainment goals and specific implementation plans will clearly demonstrate what actions facilities and sources of mercury pollution need to take in order to comply. Also, if a facility does not meet a provisional attainment goal, the Regional Board will be able to quickly see the compliance failure and can immediately impose fines or penalties.

IV. CHANGES ON THE HORIZON: IN ORDER TO SOLVE THE POLLUTION PROBLEM, CALIFORNIA'S APPROACH TO TMDLS MUST CHANGE

A. Strengthen California Porter Cologne Act

In order to attain water quality standards established to protect and support beneficial uses, California's Porter-Cologne Act needs strengthening. Currently, the only reference to TMDLs in the Porter-Cologne Act is in § 13191.3.[138] These "guidelines" for developing TMDLs merely state that the SWRCB and the Regional Boards should develop and implement TMDLs pursuant to the CWA § 303(d).[139] Under both the CWA and the Porter-Cologne Act, California has the authority to add additional requirements to those listed in CWA § 303(d).[140] Therefore, instead of simply referring to the CWA, the Porter-

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[138] The only reference to TMDLs in the Porter-Cologne Act is found in CAL. WATER CODE § 13191.3 (Deering 2006):

> Guidelines for listing waters and developing the total maximum daily load program
> (a) The state board, on or before July 1, 2003, shall prepare guidelines to be used by the state board and the regional boards for the purpose of listing and delisting waters and developing and implementing the total maximum daily load (TMDL) program and total maximum daily loads pursuant to Section 303(d) of the federal Clean Water Act (33 U.S.C. Sec. 1313(d)).
> (b) For the purposes of preparing the guidelines, the state board shall consider the consensus recommendations adopted by the public advisory group convened pursuant to Section 13191.
> (c) The guidelines shall be finalized not later than January 1, 2004.

Id.

[139] *Id.*

[140] *See* CAL. WATER CODE § 13377 (Deering 2006); 33 U.S.C. § 1251(b), (g) (2005).

> (b) Congressional recognition, preservation, and protection of primary responsibilities and rights of States. It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this Act [33 U.S.C.S. §§ 1251 et seq.]. It is the policy of Congress that the States manage the construction grant program under this Act [33 U.S.C.S. §§ 1251 et seq.] and implement the permit programs under sections 402 and 404 of this Act [33 U.S.C.S. §§ 1342, 1344]. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution, and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection with the prevention, reduction, and elimination of pollution.
> (g) Authority of States over water. It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act [33 U.S.C.S. §§ 1251 et seq.]. It is the further policy of Congress that nothing in this Act [33 U.S.C.S. §§ 1251 et seq.] shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert

Cologne Act should be amended to specifically set out a stringent approach to developing TMDLs.[141] TMDLs shall stand for something and be given greater weight. It is essential that TMDLs are "total," "daily," and reflect "loads." They also must include implementation plans and steps must be taken to actually implement the programs aimed to curb water pollution.[142] TMDLs and their coordinating implementation plan have to be enforceable. All the information and studies in the world regarding pollution clean up measures won't make a difference without enforceable implementation.

Enforcement of TMDL implementation and compliance, requires mandatory civil and criminal penalties for noncompliance.[143] Without punishment for noncompliance, the success of TMDLs will depend on those *willing* to undertake the challenge of solving non-point source pollution. But TMDL success can not depend on voluntary compliance. Mandatory enforcement necessitates a strong legal backbone. The California legislature should amend the Porter-Cologne Act to strengthen the guidelines for developing TMDLs. The legislature should also grant SWRCB and the Regional Boards statutory authority to impose land-use restrictions where necessary to curb non-point pollution.[144] With regards to other resources, like land, it is readily accepted that the authority to make land use management decisions lies in the hands of state, county, and local governments.[145] Perhaps it is time to extend additional authority to the SWRCB and Regional Boards to allow them authority to restrict land uses in order to combat pollution, particularly non-point pollution.

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with programs for managing water resources.
33 U.S.C. §§ 1251(b), 1251(g) (2006).

[141] The entire approach to TMDLs should be reanalyzed. Currently, the creation of a TMDL takes years and hundreds of thousands of dollars. Even after the creation of a TMDL, it might not become effective, as seen with the SWRCB's tabling of the Regional Board's mercury TMDL. Therefore, in order to get a TMDL in place and actually start solving the pollution problem, the TMDL process should be easier in the beginning and ask less at start. Then upon review and analysis of additional information and data, further and more stringent restrictions may be placed on specific sources of pollution.

[142] *See generally* May, *supra* note 73.

[143] *See generally* Mary E. Christopher, Note, *Time to Bite the Bullet: A Look at State Implementation of Total Maximum Daily Loads (TMDLs) Under Section 303(d) of the Clean Water Act*, 40 WASHBURN L.J. 480, 523 (2001).

[144] *Id.* at 525.

[145] *Id.* at 518.

B. Redefining TMDLs

In general, it is a prerequisite in order to solve current and future water pollution problems that TMDLs receive a makeover. In order to strengthen TMDLs and to ensure the achievement of water quality standards, TMDLs cannot be solely defined by quantitative terms. Instead, TMDLs should be defined by the main goal they try to achieve, cleaning up polluted water.[146] When redefining TMDLs, the new definition should require TMDLs to identify the sources of pollutants. Knowing the identity of pollutant sources, specifically non-point and point sources, will aid in the achievement of environmental results and ensure equity between sources.[147]

The new TMDL definition should also include allocation for future growth. When formulating a TMDL, water agencies must look forward and plan for potential "impact of growth on water quality impairments, whether they are due to pollution from all sources, runoff, or increased withdrawals of water from streams."[148] TMDLs must also define the geographical scope of the applicable TMDL. In some cases, TMDLs are local in nature and in other cases, like mercury in the San Francisco Bay, a larger watershed approach is necessary.

C. Implement Adaptive Implementation

To see results, TMDLs must be implemented. However, as the TMDL process currently stands, barriers of uncertain science, lack of money, and policy decisions prevent TMDL adoption. In order to solve this problem, TMDLs should be implemented through adaptive implementation. Adaptive implementation, a "concurrent process of action and learning,"[149] has four main elements: "immediate actions, an array of possible long-term actions, success monitoring, and experimentation for model refinement."[150]

When implementing immediate actions, water agencies "should expect such actions to be undertaken within a fixed time period specified in the plan."[151] Longer-term actions "are those that show promise, but need further evaluation and development."[152] These actions should "be formulated in recognition of

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[146] Nina Bell, *Can TMDLs Ensure a Clean and Healthful Environment? TMDLs at a Crossroads: Driven by Litigation, Derailed by Controversy?*, 22 PUB. LAND & RESOURCES L. REV. 61, 66 (2001).

[147] *Id.* at 67.

[148] *Id.*

[149] NAT'L RESEARCH COUNCIL, ASSESSING THE TMDL APPROACH TO WATER QUALITY MANAGEMENT 94 (2001).

[150] *Id.*

[151] *Id.*

[152] *Id. at 95.*

emerging and innovative strategies for water body restoration."[153] After implementing the TMDL, the water agency will then look to success monitoring. "If success monitoring shows that the water body is meeting water quality standards including designated uses, then no further implementation actions would be taken."[154] Finally, experimentation, the last element, comes into play if the pollution problem is complex and the water agency needs to "learn more about the system for subsequent model refinement and decision-making."[155]

Adaptive implementation will facilitate action because TMDLs will actually be put into practice. As stated by EPA, "complex, uncertain analyses call for an adaptive management process to speed initial remediation and fine-tune pollution controls as implementation proceeds."[156] Since adaptive implementation will allow the TMDL program to move forward notwithstanding all of these uncertainties surrounding it and will expedite TMDL development, the California's TMDL program should be revised to require adaptive implementation.[157]

CONCLUSION

TMDLs are the best mechanism currently available to control the last major unregulated source of water pollution, non-point sources.[158] However, TMDLs are not without flaws. In California, the legislature must amend and strengthen the Porter-Cologne Act to adequately curb water pollution. The current definition of TMDLs must change to represent what TMDLs actually do, cleaning up polluted water. California must also require adaptive implementation within *every* TMDL program. With these amendments to the Porter-Cologne Act and cooperation between Regional Boards, reinforcement from the courts, penalties for noncompliance, and concrete action, we can win the battle against non-point source pollution.

The San Francisco Bay mercury TMDL is a step in the right direction. Its aim to eradicate mercury above the numerical targets is honorable, but it alone is not enough. To adequately address the mercury problem in the Bay, mercury pollution must be viewed from a watershed perspective with cooperation between Regional Boards. Trying to bypass the origins of mercury pollution

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[153] *Id.* at 95.

[154] *Id.* at 96.

[155] *Id.* at 96-97.

[156] OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, THE TWENTY NEEDS REPORT: HOW RESEARCH CAN IMPROVE THE TMDL PROGRAM, EPA841-B-02-002, at 18 (2002).

[157] *Id.* at 18.

[158] OLIVER A HOUCK, THE CLEAN WATER ACT TMDL PROGRAM 260 (2002).

and simply focusing on the end result will never solve the problem. Water pollution is a state-wide problem and thus should be fixed from a state-wide watershed perspective.