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BEFORE THE STATE WATER RESOURCES CONTROL BOARD

IN RE: LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, COUNTY OF LOS ANGELES, AND 84 INCORPORATED CITIES WITHIN THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, LOS ANGELES COUNTY, CALIFORNIA	**REQUEST FOR STAY AND PETITION TO REVIEW CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION EXECUTIVE OFFICER'S AMENDMENT OF ORDER NO. 01-182 (NPDES PERMIT NO. CAS004001) DATED OCTOBER 19, 2010**

Pursuant to Water Code § 13320, Heal The Bay, Natural Resources Defense Council, and Santa Monica Baykeeper ("Petitioners") hereby petition the State Water Resources Control Board ("State Board") to review the California Regional Water Quality Control Board, Los Angeles Region ("Regional Board") Executive Officer's unlawful action on October 19, 2010, amending Order No. 01-182 (NPDES Permit No. CAS004001) ("LA County Permit") to delete receiving water effluent limitations necessary to implement the Santa Monica Beach Dry Weather Bacteria Total Maximum Daily Load ("Dry Weather Bacteria TMDL" or Bacteria TMDL"). The Executive Officer's modification of the LA County Permit should be vacated and redone because the action (1) violated the Regional Board's duty to issue the NPDES Permit consistent with the Dry Weather Bacteria TMDL and the Basin Plan (2) violated the Regional Board's duty pursuant to Water Code §§ 13263 and 13247 to take actions consistent with the applicable water quality control plans, (3) failed to comply with the mandatory procedural steps necessary to modify a NPDES permit (4) violated the Water Code's prohibition on the Regional Board to delegate authority to staff to modify any waste discharge requirement, and (5) violated the state and federal antidegradation requirements.

NPDES Permit No. CAS004001 sets forth effluent limitations and waste discharge requirements for municipal storm water and urban runoff discharges within the County of Los Angeles and the incorporated cities located there (with the exception of the City of Long Beach). The effluent limitations deleted by the Executive Officer's amendment were originally amended into the NPDES Permit in September 2006 as Order No. R4-2006-0074. The sole purpose of the 2006 amendments was to incorporate into the LA County Permit the waste load allocations established in Santa Monica Beach Dry Weather Bacteria TMDL ("Bacteria TMDL"). The Bacteria TMDL was previously adopted by the Regional Board in 2002 and incorporated into the Water Quality Control Plan, Los Angeles Region. *See* Resolution No. 02-004, Attachment A, Amendment to Water Quality Control Plan to Incorporate the Santa Monica Bay Beaches Bacteria TMDL (Order No. R4-2006-0074 Administrative Record ("AR") 101971-101978) (*see* Dec'l of Dr. Mark Gold, D. Env. ("Gold Dec."), Exhibit H (accompanying this petition). Neither the County of Los Angeles nor any of the other permittees subject to the NPDES Permit challenged the Bacteria TMDL at the time it was adopted.

The Executive Officer's amendment of the LA County Permit was in response to a judgment entered on July 23, 2010 by the Superior Court for the County of Los Angeles in the matter of *County of Los Angeles and Los Angeles County Flood Control District* v. *State Water Resources Control Board, California Regional Water Quality Control Board, Los Angeles Region, et al.*, Case No. BS122724. The Court ordered the Regional Board to vacate the provisions of the NPDES Permit implementing the Bacteria TMDL. The Court's judgment was based solely on a ruling that the Regional Board had erred during its administrative process. The Court ruled that the Regional Board and its counsel had stepped over the line and acted both as an advisor to the Board as well as an advocate to adopt the proposed permit amendments. *See* Reporter's Transcript of Proceedings, Case No. BS122724, pp. 2-14 (Sup. Ct. for the County of Los Angeles) (June 2, 2010). As a result, the Court ordered the Regional Board "[t]o void and set aside Los Angeles Regional Water Quality Control Board Order No. R4-2006-0074 and all amendments to the Los Angeles County Municipal Storm Water Permit (Order No. 01-182) effected thereby." Judgment, p. 2. The Court did not order the Regional Board or its Executive Officer to ignore the procedural requirements necessary to modify a NPDES permit. Indeed, the Judgment itself contemplates the likelihood that the Regional Board would hold a hearing to amend the permit in response to the Court's ruling. *Id*. The Court also did not excuse the Regional Board from its plain duty to make sure its actions, especially modifications to NPDES permits, be consistent with the Basin Plan and, where as here an adopted TMDL applies, modify the NPDES permit consistent with that TMDL. Nor did the Court suggest that in ordering the Regional Board to void the 2006 permit amendments, they could do so without observing the Water Code's careful circumscription of permitting authority to the Board itself and not its staff. Nevertheless, the staff wrongly treated the Court's limited vacatur based on the Board's procedural error as an invitation to run roughshod over the substantive and procedural permit requirements and compound rather than fix its previous abuse of discretion.

Petitioners seek State Board review in order to rectify the Executive Officer's unauthorized modification of the LA County Permit deleting the effluent limitations implementing the Bacteria TMDL without complying with the Code of Federal Regulation's notice and hearing requirements and replacing the deleted limitations with limitations consistent with the Bacteria TMDL and Basin Plan.

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II. REGIONAL BOARD AND STATE BOARD ACTIONS BEING PETITIONED.

This petition seeks review of an order issued by the Executive Officer and dated October 19, 2010, amending Order No. 01-182 (NPDES Permit No. CAS004001). A true and correct copy of the Executive Officer's order, including its accompanying enclosures, is attached hereto as Exhibit 1.

III. THE DATE THE REGIONAL BOARD ACTED.

October 19, 2010.

IV. STATEMENT OF REASONS THE REGIONAL BOARD'S ACTION WAS INAPPROPRIATE OR IMPROPER.

As discussed in more detail below in Petitioners' Statement of Points and Authorities, the Executive Officer's response to the Superior Court's judgment and writ violated no less than five substantive and procedural mandates with which the Regional Board had to comply when modifying the NPDES permit. Nothing in the Court's judgment and remand required that the Regional Board violate any of these mandated requirements.

First, by modifying the LA County Permit to exclude any provision implementing the fully effective Bacteria TMDL, the Executive Officer's action violates the Regional Board's duty to issue a NPDES permit that is consistent with the TMDL pursuant to 33 U.S.C. § 1313(d)(4) and 40 C.F.R. § 122.44(d).

Second, by modifying the LA County Permit to exclude any provision implementing the fully effective Bacteria TMDL, the Executive Officer also violated Water Code § 13263 which mandates the waste discharge requirements "shall implement any relevant water quality control plans that have been adopted. . . ." Similarly, by issuing the LA County Permit without the required TMDL, the Executive Officer's action violates Water Code § 13247's mandate that the Regional Board comply with its own Basin Plan, including the Bacteria TMDL.

Third, the Executive Officer's unilateral amendment of the LA County Permit ignores the mandatory federal and state procedures that are prerequisites to the Regional Board's adoption or modification of a NPDES permit, including the requirement that the Board transmit the permit change to EPA for review and potential veto.

Fourth, the Executive Officer acted without authority in amending the LA County Permit because the authority to modify or revoke waste discharge requirements is reserved exclusively to the Regional Board and expressly forbidden by Water Code § 13223 to be delegated to staff.

Fifth, the Executive Officer decision to completely omit the LA County Permit's dry weather bacterial limit was done without any consideration of the federal antidegradation policy or the State's own High Quality Waters policy. 40 C.F.R. § 131.12; SWRCB Resolution 68-16. There can be no doubt that, by authorizing bacterial discharges without regard to the Basin Plan's Bacteria TMDL, resulting dry weather discharges from the County's storm drains will degrade the waters of Santa Monica Bay's beaches.

The final reason, in addition to the Executive Officer's blatant violations of the critical Clean Water Act and Porter-Cologne requirements outlined above, is to protect the millions of beachgoers who swim and play in the iconic waters of Santa Monica Bay's beaches. Santa

Monica Bay beaches are among the most heavily used beaches in the world, with 55 million visitors annually. Regional Board Agenda Report (Jan. 24, 2002) (Order No. R4-2006-0074) (AR, pp. 101198; 101210) (Gold Dec., ¶ 19 & Exhibit D); Lifeguard Los Angeles 15-Year Statistics (AR, p. 101743) (Gold Dec., ¶ 19 & Exhibit E). In the Los Angeles area, 70 to 80 percent of beach visits occur during the dry, summer months of June through September. Transcript, Los Angeles Regional Water Quality Control Board Meeting (Sept. 14, 2006) ("Transcript") (AR, pp. 123816:10-12) (Gold Dec., ¶ 19 & Exhibit F). Fourteen percent of tourists visit Santa Monica Bay beaches, and these beaches directly contribute $1.7 billion a year to the California economy. Agenda Report (AR, p. 101210) (Gold Dec., ¶ 19 & Exhibit D). This all adds to the overall direct and indirect contribution by California's beaches of $73 billion and 883,000 jobs to the national economy. Phillip King, Ph.D, "The Fiscal Impact of Beaches in California," p. 3 (Public Research Institute, Sept. 1999) (AR, p. 101833) (Gold Dec., ¶ 19 & Exhibit G).

Despite this heavy reliance on the beach for recreation and revenue, Santa Monica Bay beaches do not meet the water quality standards designed to protect the public's health and, as such, are designated as "impaired." The Regional Board has concluded that 44 beaches are polluted from the Los Angeles/Ventura County line to Outer Cabrillo Beach just south of Palos Verdes Peninsula. Resolution 02-004 (AR, p. 104564) (Gold Dec., ¶ 19 & Exhibit H).

Polluted runoff is the major cause of these impairments. Transcript (AR, pp. 123970:19-20; 123978:17-20) (Gold Dec., Exhibit F). *See* Resolution No. 02-004, Attachment A (AR101972) (Gold Dec., Exhibit H). Every summer, beach postings and closures document the persistent threat to the public's health from using these runoff-polluted beaches. Epidemiological studies demonstrate that recreating in polluted runoff causes an increased health risk to swimmers. Transcript (AR, pp. 123978:17-123980:21) (Gold Dec., Exhibit F); Agenda Report (AR, p. 101972) (Gold Dec., Exhibit D). The most commonly observed health impact associated with recreation in water contaminated with fecal bacteria is gastroenteritis or stomach flu. Transcript (AR, p. 123981:19-23) (Gold Dec., Exhibit F). By some estimates, nearly a million people become sick each year because of stormwater pollution in southern California. *Id*. (AR, p. 123828:14-21).

V. STATEMENT OF POINTS AND AUTHORITIES.

A. By Deleting the Bacteria TMDL Effluent Limitation, The Executive Officer Modified the LA County Permit to be Inconsistent With the Bacteria TMDL and the Basin Plan.

Because the Bacteria TMDL applies and is an effective part of the Basin Plan, the Executive Officer cannot simply erase the effluent limitation implementing the TMDL in a NPDES Permit. In order to comply with the Clean Water Act and its implementing regulations, the Regional Board had to simultaneously issue a replacement effluent limitation that was consistent with the TMDL. This is especially true where, as here, the flaw in the limitation found by the superior court was limited to a state law procedural error. By eliminating that Bacterial TMDL effluent limitation , there is no way that the Executive Officer or Regional Board could conclude that the remaining permit limitations are consistent with the binding TMDL.

By modifying the NPDES Permit to exclude any provision implementing the fully effective Bacteria TMDL, the Executive Officer's action violates the Regional Board's duty to issue a NPDES permit that is consistent with the TMDL pursuant to 33 U.S.C. § 1313(d)(4) and 40 C.F.R. § 122.44(d).[1] First, the Executive Officer's modification of the LA County Permit to exclude any effluent limitation assuring compliance with the Basin Plan's bacterial standard and the Dry Weather Bacteria TMDL specifically designed to implement that standard in Santa Monica Bay violates 40 C.F.R. § 122.44(d)(1) which states unequivocally that:

> each NPDES permit shall include conditions meeting the following requirements when applicable . . .
>
> (d) Water quality standards and State requirements: any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318 and 405 of CWA necessary to:

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[1] Indeed, the implementation schedule for the Bacteria TMDL required the County and other dischargers to meet their waste load allocations by 2006, over four years ago.

> (1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality.
>
> (i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.

40 C.F.R. § 122.44(d)(1). And those mandated limitations must be consistent with any applicable TMDL, in this case the Bacteria TMDL: "the permitting authority shall ensure that . . . : (B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7." 40 C.F.R. § 122.44(d)(1)(vii)(A).

Because Santa Monica Bay's beaches are listed for bacterial pollution and subject to an approved TMDL, it is undisputed that dry weather discharges of bacterial pollutants from the storm drains in Los Angeles County cause or contribute to violations of standards. The Bacteria TMDL effluent limitation is a water quality-based effluent limitation. 40 C.F.R. § 130.2(h); *See Communities for a Better Environment v. State Water Resources Control Bd.* (2005) 132 Cal.App.4th 1313, 1322. By modifying the LA County Permit's effluent limitation for the Bacteria TMDL by simply deleting it without at the same time establishing a replacement limitation (presumably the very same limitation), the Executive Officer has violated 40 C.F.R. § 122.44(d)(1) by issuing a NPDES permit that does not achieve water quality standards and does not control <u>all pollutants</u> causing or contributing to excursions above the applicable bacterial standards at Santa Monica Bay's beaches. The Executive Officer's error – putting beachgoers health in jeopardy – is particularly frustrating because the superior court's criticism of the provision was limited to staff's previous oversight of state procedural law.

Both state and federal courts have had no difficulty in underscoring the clear mandate that any NPDES permit issued to point sources subject to a TMDL and its waste load allocations must be consistent with the TMDL. "When a TMDL and specific wasteload allocations for point sources have been established, **any NPDES permits issued to a point source must be consistent** with the terms of the TMDL and WLA. *Dioxin/Organochlorine Ctr. v. Clarke*, 57 F.3d 1517, 1520 (9th Cir. 1995) (citing 40 C.F.R. § 130.2) (emphasis added). *See also City of Arcadia v. United States EPA*, 265 F. Supp. 2d 1142, 1145 (N.D. Cal. 2003); *Pronsolino v. Marcus*, 91 F. Supp. 2d 1337, 1349 (N.D. Cal. 2000); *Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1095–1096 ("[o]nce a TMDL is developed, effluent limitations in NPDES permits must be consistent with the [waste load allocations] in the TMDL"); *City of Arcadia v. State Water Resources Control Bd.* (2006) 135 Cal.App.4th 1392, 1404. By simply deleting the Bacteria TMDL effluent limitation from the LA County Permit without replacing it, the Executive Officer has adopted a permit that is blatantly **inconsistent** with the applicable Bacteria TMDL contrary to the clear rule established in the Clean Water Act, the regulations and numerous court decisions.

Second, the Clean Water Act itself prohibits any revision to the NPDES Permit's waste load allocation effluent limitation unless the Regional Board can show its revision is addressed cumulatively by all other effluent limitations based on that TMDL. 33 U.S.C. § 1313(d)(4)(A) provides that "[f]or waters identified under paragraph (1)(A) where the applicable water quality standard has not yet been attained, <u>*any effluent limitation based on a total maximum daily load*</u> or other waste load allocation established under this section <u>*may be revised only*</u> if (i) the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section." 33 U.S.C. § 1313(d)(4)(A). In this case, the Executive Officer revised the effluent limitation based on the Bacteria TMDL without making either of the requisite showings. Indeed, the primary sources of the pollutants addressed in the Bacteria TMDL regulated by a NPDES permit are the storm drains operated by the county and municipal permittees regulated by the LA County Permit. *See* Regional Board Agenda Report (Jan. 24, 2002) (Order No. R4-2006-0074 Administrative Record ("AR"), pp. 101228) (*see* Gold Dec., Exhibit D. The beneficial uses being harmed by the County's ongoing bacterial discharges are existing uses – not designated uses – in Santa Monica Beach's waters – swimming, wading, surfing, fishing – none of which the Board has any authority to remove. As a result, the Regional Board can never make the second finding required by 33 U.S.C. § 1313(d)(4)(A). In order to comply with both the Superior Court's order (addressing procedural concerns) and Section 1313(d)(4)(A) (providing substantive pollution controls protecting public health), the Regional Board had to vacate the limit and immediately restore the limit in the same proceeding so as not to substantively revise the limit.

B. The Executive Officer Took an Action That Does Not Comply With the Basin Plan in Violation of Water Code §§ 13263 and 13247.

The Regional Board and its Executive Officer are bound by the Regional Board's water quality control plans. Even where the Regional Board is ordered to vacate a portion of a waste discharge requirement, it cannot leave a hole in the requirements that would make the permit inconsistent with the Regional Board's Basin Plan. It is a fundamental tenet of Porter-Cologne that any action by or on behalf of the Regional Board or any permit that is issued must be consistent with the Basin Plan. In the case of permit actions, Water Code § 13263 states that "the regional board, after any necessary hearing, shall prescribe requirements as to the nature of any … discharge" and that "the requirements **shall implement** any relevant water quality control plans. . . ." Water Code § 13263 (emphasis added). Similarly, though applied to <u>any</u> action by a state entity, Water Code § 13247 mandates that "[s]tate offices, departments, and boards, in carrying out activities which may affect water quality, shall comply with water quality control plans approved or adopted by the state board unless otherwise directed or authorized by statute … ." That mandate applies to the Regional Board's actions. *See State Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, 729-730 (holding that the State Board "was compelled by section 13247 to comply with" an applicable water quality control plan).

As far back as 1973, the State Board held that a Regional Board waste discharge requirements were incomplete and in violation of Water Code § 13263 for failing to include a provision implementing a relevant Basin Plan objective. *See In the Matter of the Petition of*

Orange County Water District for Review of Order No. 72-16, State Board Order No. 73-4 (1973 Cal. ENV LEXIS 28) (Feb. 1, 1973). That petition involved a discharge to the Santa Ana River and the Arlington-Riverside Groundwater Basin. The applicable water quality control plan contained a specific objective for total dissolved solids. The Regional Board's order contained no requirement implementing that objective. Noting the extensive evidence submitted to the Board, the State Board noted that it need not wade through the details of that evidence but could rely on the already adopted Basin Plan and Section 13263:

> our decision requiring a limitation on TDS in Order No. 72-16 is based on the legal requirements of Water Code Section 13263 which requires waste discharge requirements to implement the provisions of the water quality control plan. We can find no more appropriate means of assisting the implementation of the TDS objective for the groundwater basin than by inclusion of a limit on TDS in waste discharge requirements.

Order No. 73-4 at *7-8 (1973 Cal. ENV LEXIS 28, 7-9 (Cal. ENV 1973)). The Executive Officer's deletion of the Bacteria TMDL effluent limitation violates Section 13263 in the same manner. By not proposing and establishing a replacement limitation at the same time, the Executive Officer has modified the NPDES Permit in a manner that directly conflicts with the Basin Plan. *See also, e.g.* Continuing Planning Process Report, p. 41 (2001) ("All permit requirements must also comply with any water quality control plans (Basin Plans). . ."); *In the Matter of the Petition of The Cities of Palo Alto, Sunnyvale, and San Jose, et al.*, Order No. WQ 94-8 (Sept. 22, 1994) (1994 Cal. ENV LEXIS 10 (Cal. ENV 1994)) ("If there are applicable objectives in a basin plan, effluent limitations must be at least as stringent as limitations implementing the objective"); *In the Matter of the Petition of Pacific Water Conditioning Association, Inc.*, Order No. WQ 77-16 (July 21 1977) (1977 Cal. ENV LEXIS 20 (Cal. ENV 1977)) ("Since Water Code Section 13263 requires a Regional Board to implement any relevant basin plan, the Regional Board must, at a minimum, incorporate into the waste discharge requirements applicable beneficial uses and relevant water quality objectives together with such other requirements as a Regional Board may deem necessary to protect water quality").

As the Court of Appeal has held, "[w]hen a plan has been adopted the discharge requirements are to implement the plan." *Hampson v. Superior Court* (1977) 67 Cal.App. 3d

472, 481. The Executive Officer lost sight of this directive and did the opposite when he deleted the Bacteria TMDL from the LA County Permit. As a result, his action violates both Water Code § 13263 and § 13247.

C. By Deleting the Bacteria TMDL Effluent Limitation, the Executive Officer Modified the NPDES Permit Without Complying With the Mandatory NPDES Permit Issuance Procedures.

The Executive Officer's deletion of the Bacteria TMDL effluent limitation also failed to comply with numerous NPDES permitting procedures. When a NPDES permit is modified, the Regional Board must follow the decision-making steps set forth in the Code of Federal Regulations for draft NPDES permits. *See* 40 C.F.R. § 122.62. Unless a modification qualifies as a "minor modification," in order to modify a NPDES permit, "a draft permit must be prepared and other procedures in part 124 (or procedures of an approved State program) followed." *Id*.[2] The procedures include, for example, the preparation of a draft permit (40 C.F.R. § 124.6),[3] a fact sheet (40 C.F.R. § 124.8), public notice and an opportunity for the public to comment on the proposed modification (40 C.F.R. § 124.10), and an agency response to comments (40 C.F.R. § 124.17). A permit may only be modified for one or more of the causes specifically listed at 40 C.F.R. § 122.62 ("If cause exists, the Director may modify or revoke and reissue the permit accordingly. . ."). The modification made by the Executive Officer would presumably be covered by 40 C.F.R. § 122.62(a)(15), which authorizes a permit modification "[t]o correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions." That modification triggers all of the procedural requirements listed above. By modifying the NPDES Permit without following the mandatory permit issuing procedures, the Executive Officer violated the federal regulations.

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[2] Minor modifications are limited to specific permit alterations not applicable to the Executive Director's action, including for example typographical errors, changes in ownership, additional monitoring or reporting or deleting terminated outfalls. 40 C.F.R. § 122.63. The removal of limitations implementing a TMDL can hardly be deemed a minor modification.

[3] "Draft permit means a document prepared under Sec. 124.6 indicating the Director's tentative decision to issue or deny, **modify, revoke** and reissue, terminate, or reissue a 'permit.''" 40 C.F.R. § 122.2 (emphasis added).

D. The Executive Officer Violated The Memorandum of Agreement With EPA By Failing To Transmit the Permit Change to EPA For Review.

The Executive Officer also acted inconsistently with one other important procedural requirement when modifying a permit as a result of a judicial decision. The state's implementation of the federal NPDES permitting program within California is guided by a Memorandum of Agreement entered into by the State and EPA. NPDES Memorandum of Agreement Between the U.S. Environmental Protection Agency and the California State Water Resources Control Board (Sept. 22, 1989) ("MOA"). That agreement provides, among other requirements, that "If the terms of any permit . . . are affected in any manner by administrative or court action, the Regional Board or State Board shall immediately transmit a copy of the permit, with changes identified, to EPA and **shall allow 30 days for EPA to make written objections** to the changed permit pursuant to Section 402(d)(2) of the CWA." MOA, p. 26 (emphasis added). The Executive Officer's unilateral and immediate modification of the LA County Permit to remove the Bacteria TMDL effluent limitation failed to comply with this MOA provision.

E. The Executive Officer Had No Authority To Delete the Bacteria TMDL Effluent Limitation Because That Modification of the NPDES Permit is Beyond the Duties the Regional Board is Authorized to Delegate to Staff Pursuant to Water Code § 13223.

Water Code § 13223 provides that "[e]ach regional board may delegate any of its powers and duties vested in it by this division to its executive officer excepting only the following: . . . (2) the issuance, modification, or revocation of any . . . waste discharge requirement. . . ." Although there are limited judicial and State Board decisions advising one on the precise scope of the Regional Board's delegation authority, it cannot reasonably be disputed that vacating a waste discharge requirement's effluent limitation is a modification or revocation of a waste discharge requirement. *Cf. Russian River Watershed Protection Comm. v. City of Santa Rosa*, 142 F.3d 1136, 1143 (9th Cir. 1998) (establishment of a method of compliance with an NPDES permit does not constitute a modification of the permit that cannot be delegated to staff). Indeed, the permit itself identifies the Executive Director's change to the permit as an amendment. *See* Amended Permit, footer. Section 13223 does not provide for an exception where the reason for the modification or revocation was in response to a Superior Court remand.[4] The fact that the remand preserved the Regional Board's discretion regarding how to respond to the remand also counsels in favor of enforcing Section 13223's plain language. As the Court's judgment anticipates, the Regional Board was free to hold a new hearing in response to the remand. Judgment, p. 2. The Court's writ should have been executed by the Regional Board itself, along with any other revisions necessary to comply with the Clean Water Act's requirements.

F. By Removing the NPDES Permit's Limitation on Dry Weather Bacteria Discharges, the Executive Officer Violated Both State and Federal Antidegradation Requirements.

The Executive Officer failed to consider or apply the state and federal antidegradation policies when he cavalierly deleted the Bacteria TMDL effluent limitation. California's antidegradation policy is composed of both the federal antidegradation policy and the State Water Resources Control Board's ("SWRCB") Resolution 68-16. State Water Resources Control Board, Water Quality Order 86-17, p. 20 (1986) ("Order 86-17); Memorandum from William Attwater, SWRCB to Regional Board Executive Officers, "Federal Antidegradation Policy," pp. 2, 18 (Oct. 7, 1987) ("State Antidegradation Guidance"). As part of the state policy for water quality control, the antidegradation policy is binding on all of the Regional Boards. Order 86-17, pp. 17-18. The state's antidegradation policy is implemented pursuant to the State Antidegradation Guidance, SWRCB Administrative Procedures Update 90-004, July 2, 1990 ("APU 90-004") and USEPA Region IX, "Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12" (June 3, 1987) (" Region IX Guidance"), as well as Water Quality Order 86-17.

The antidegradation policy is triggered whenever the Regional Board takes an action that will lower water quality. State Antidegradation Guidance, at 3, 5 and 18; Region IX Guidance, at 1. See also Section 303(a)(4) of the Clean Water Act. Actions that trigger the application of

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[4] Regional Board Resolution No. R08-003's provision that "The Executive Officer may set aside a Regional Board action, in whole or in part, as commanded by a peremptory writ of mandate issued to the Regional Board" also is inconsistent with the plain language of Water Code § 13223 and, hence, unlawful.

the antidegradation policy include, *inter alia* the issuance, re-issuance, and modification of NPDES permits and waste discharge requirements. State Antidegradation Guidance, at 7-10; Region IX Guidance, at 2-3; APU 90-004, at 3. Application of the policy does not depend on whether the action will actually impair beneficial uses, but rather whether the Regional Board's action will lower water quality. State Antidegradation Guidance, at 6.

In this instant, the Regional Board has deleted an effluent limitation that was implementing a TMDL and waste load allocations. Given that the Bacteria TMDL was adopted to address seasonal degradation of Santa Monica Bay beaches, there can be little doubt that the Executive Officer's deletion of the requirements designed to protect those beaches will lead to degradation of their near-shore waters. In order to take that drastic action, the Regional Board had to conduct the required analyses pursuant to the state and federal antidegradation policies.

VI. PETITIONERS ARE AGGRIEVED.

Petitioners Heal The Bay, NRDC and Santa Monica Baykeeper and their tens of thousands of members are aggrieved by the Executive Officer's decision to illegally delete the Bacteria TMDL effluent limitation from the NPDES Permit. Petitioners' members frequent Santa Monica Bay's beaches and have been exposed to excessive bacterial levels. *See, e.g.,* Gold Dec. By deleting the primary mechanism intended to reduce dry weather bacteria discharges at Santa Monica Bay beaches without taking steps to amend the NPDES Permit with an effluent limitation consistent with the Basin Plan and TMDL and by sidestepping critical NPDES procedural requirements as well as a hearing before the Regional Board, the Regional Board and its Executive Officer have adversely affected Petitioners' members by allowing substantial discharges threatening not only Petitioners' members' health, but the health of millions of beachgoers and cutting off critical public participation requirements.

VII. REQUESTED STATE BOARD ACTION.

Petitioners request the State Board to issue an order 1) immediately staying the Executive Officer's October 19, 2010 amendment to the NPDES Permit; 2) immediately ordering the Regional Board to vacate the Executive Officer's October 19, 2010 amendment to the NPDES Permit; 3) ordering the Regional Board to immediately initiate a proceeding to comply with the Superior Court's order and simultaneously amend the NPDES Permit to assure its inclusion of an effluent limitation consistent with the Dry Weather Bacteria TMDL or, alternatively, take steps necessary for the State Board to immediately initiate a proceeding to comply with the Superior Court's order and simultaneously amend the NPDES Permit to assure its inclusion of an effluent limitation consistent with the Dry Weather Bacteria TMDL.

The State Board should immediately stay the Executive Officer's action. Petitioners can readily demonstrate each of the three criteria that warrant the State Board's issuance of a stay. Cal. Code of Regs., tit. 23, § 2053.

First, there will be substantial harm to the petitioner or to the public interest if a stay is not granted. By eliminating the permit provision directly implementing the Bacteria TMDL, the Executive Officer has removed a critical tool for the State and the public to limit the gross number of violations of the bacteria standards occurring in the surf zone of Santa Monica Bay's beaches. The numerous beach postings and closures that occur every summer up and down the Santa Monica Bay coastline speak for themselves. *See* Gold Dec. Not surprisingly, epidemiological studies confirm that recreating in dry weather runoff that is polluted with bacteria causes an increased health risk to swimmers, including gastroenteritis or stomach flu. Gold Dec., ¶ 20 & Exhibits D & F. Petitioners' members become sick every summer. Gold Dec., ¶ 3, 5, 20 and accompanying exhibits. Those members are, unfortunately, a small fraction of the nearly one million people estimated to be sickened every year because of bacterial pollution in southern California. Gold Dec., ¶ 20 & Exhibit I).

Second, there will be no substantial harm to other interested persons and to the public interest if a stay is granted. The municipal dischargers already should have complied with the Dry Weather Bacteria TMDL four years ago. By adopting that firm compliance date, the

Regional and State Boards already have balanced the interests of the municipal dischargers and determined compliance by that date was required by Porter-Cologne. The Bacteria TMDL was unopposed by the municipalities, so they also believed at the time that the timeline and requirements were reasonable. Accordingly, the municipalities have waived any financial or other concerns associated with implementing that valid and important TMDL requirement.

Third, as the above petition evidences, there are substantial questions of fact or law regarding the disputed action. Unlike the procedural problem in the Regional Board's permit adoption process identified by the Superior Court, most of the above legal flaws described in this petition are substantive requirements designed to protect Californians from unhealthy pollution. The State Board should immediately stay the Executive Officer's action in order to immediately restore the Dry Weather Bacteria TMDL effluent limitation and make sure the permittees take immediate steps to bring their chronic violations under control before the start of the next year's dry weather beach season.

Time is of the essence. In order to comply with the Superior Court's order in a manner that also complies with the procedural and substantive requirements of the Water Code and Clean Water Act, the Regional or State Board must complete a permit amendment process which may take four to six months. If that process begins now, either Board could complete the amendment in time to go into effect prior to the upcoming 2011 dry season. The State Board already reviewed and upheld the Bacterial TMDL effluent limit vacated by the Executive Officer. There is no substantive reason why the State Board should not amend the permit to vacate the provision while at the same time reissuing the very same limit while assuring that the Board's legal advisor on the amendment not engage in advocacy for the amendment. Petitioners request the State Board to expedite this review given that the Board already reviewed and approved the Bacteria TMDL effluent limitation and the need to cure the permit issue before the conclusion of the rainy season in order to prevent millions of beachgoers from being unnecessarily exposed to high bacteria levels at Santa Monica Bay beaches.

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VIII. STATEMENT OF COPIES SENT TO THE REGIONAL BOARD AND DISCHARGERS.

Copies of this petition and the accompanying Dec'l of Dr. Mark Gold, D. Env., are being sent to the Regional Board at the following e-mail addresses. Copies of the petition and Dr. Gold's declaration are being sent via e-mail to each of the 86 permittees subject to the LA County NPDES Permit. Petitioners requested a list of the current contacts and e-mail addresses of each of the dischargers. On November 16, 2010, Jennifer Fordyce, counsel for the Regional Board, forwarded the list of discharger contacts attached hereto as Exhibit 2.

Samuel Unger, Executive Officer
California Regional Water
Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013
sunger@waterboards.ca.gov

Jennifer L. Fordyce, Staff Counsel
Office of the Chief Counsel
State Water Resources Control Board
1001 I Street, 22nd Floor
Sacramento, CA 95814
jfordyce@waterboards.ca.gov

86 Dischargers – *see* attached Exhibit 2

IX. ISSUES RAISED BEFORE REGIONAL BOARD.

The Executive Officer's action was unilateral and completed without any prior notice to the public or opportunity to comment, making it impossible for Petitioners or other members of the public to raise any issues prior to the decision. Because no administrative proceeding was available to Petitioners, they had no opportunity and no obligation to raise any issues or otherwise exhaust administrative remedies before the Regional Board. Although Water Code § 13320's 30-day time limit to seek review of a Regional Board action precludes Petitioners from meaningfully requesting reconsideration by the Regional Board, Petitioners are submitting such a request contemporaneous with the filing of this petition. To the extent the Regional Board does not take any action within 60-days, Petitioners intend to petition the State Board to review that

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inaction as well. Given the overlap in the current and that likely future petition, Petitioners respectfully request the State Board not to delay its processing of this current petition.

Dated: November 18, 2010

Respectfully submitted,

Michael R. Lozeau
Lozeau Drury LLP
Attorneys for Petitioners Heal The Bay, Natural Resources Defense Council and Santa Monica Baykeeper

EXHIBIT 1

California Regional Water Quality Control Board
Los Angeles Region

Linda S. Adams
Secretary for
Environmental Protection

320 West Fourth Street, Suite 200, Los Angeles, California 90013
(213) 576-6600 • Fax (213) 576-6640
http://www.waterboards.ca.gov/losangeles

Arnold Schwarzenegger
Governor

October 19, 2010

ORDER NO. 01-182 (AMENDED ON SEPTEMBER 14, 2006 BY ORDER R4-2006-0074; AUGUST 9, 2007 BY ORDER R4-2007-0042; DECEMBER 10, 2009 BY ORDER R4-2009-0130; AND OCTOBER 19, 2010 PURSUANT TO THE PEREMPTORY WRIT OF MANDATE IN L.A. SUPERIOR COURT CASE NO. BS122724)

Dear Permittees and Interested Persons:

On July 23, 2010, the Superior Court for the County of Los Angeles (Court) entered a judgment and peremptory writ of mandate in the matter of *County of Los Angeles and Los Angeles County Flood Control District v. State Water Resources Control Board, California Regional Water Quality Control Board, Los Angeles Region, et al.*, Case No. BS122724 (enclosed). This lawsuit concerned the Los Angeles Regional Water Quality Control Board's (Regional Board) incorporation of the Santa Monica Bay Beaches Dry Weather Bacteria TMDL (SMB TMDL) into the Los Angeles County MS4 Permit (Order No. 01-182) by Regional Board Order No. R4-2006-0074. By order of the Court, Order No. R4-2006-0074 is hereby voided and set aside.[1]

Please be advised that only the operative requirements of Order No. R4-2006-0074 as they pertain to the SMB TMDL have been voided and set aside. Because the Regional Board relied upon most of the general findings and definitions that were added by Order No. R4-2006-0074 during the Regional Board's incorporation of the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (MDR TMDL) by Order No. R4-2007-0042, I have not voided those findings and definitions in their entirety. Voiding in its entirely all language that was added by Order No. R4-2006-0074 would result in an incomplete permit, lack of clarity (i.e. terms used for the MDR TMDL-related provisions would not be defined), and would eliminate findings that support the way in which the Regional Board incorporated the MDR TMDL. Thus, to the extent that some of the findings and provisions in Order No. R4-2006-0074 are necessary to implement the MDR TMDL provisions, those findings and provisions have been retained.

For the Permittees' and public's convenience, I am providing a copy of the Los Angeles County MS4 Permit that does not include the provisions that have been voided and set aside (enclosed). A red-lined version reflecting the changes will be posted on the Regional Board's website.

Lastly, on March 4, 2008 and October 15, 2009, the Regional Board Executive Officer issued Notices of Violation (NOV) and Water Code section 13383 Orders to 20 cities, Los Angeles County, and the Los Angeles County Flood Control District. The NOVs and Orders issued to 18 cities solely referenced violations of the Receiving Water Limitations for bacteria in Part 2.5 of Order No. 01-182 (as amended by Order No. R4-2006-0074 and Order No. R4-2007-0042). As indicated above, by order of the Court in the above-referenced matter, Part 2.5 of Order No.

[1] Pursuant to Regional Board Resolution R08-003, "[t]he Executive Officer may set aside a Regional Board action, in whole or in part, as commanded by a peremptory writ of mandate issued to the Regional Board."

01-182 (as amended by Order No. R4-2006-0074 and Order No. R4-2007-0042). As indicated above, by order of the Court in the above-referenced matter, Part 2.5 of Order No. 01-182, as amended, has been voided and set aside. Accordingly, the NOVs and Orders issued to the cities of Agoura Hills, Beverly Hills, Calabasas, Culver City, El Segundo, Hermosa Beach, Hidden Hills, Inglewood, Los Angeles, Malibu, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Santa Monica, Torrance, West Hollywood, and Westlake Village are hereby rescinded in their entirety.

The NOVs and Orders issued to the City of Culver City, the City of Los Angeles, Los Angeles County, and the Los Angeles County Flood Control District referenced violations of the Receiving Water Limitations for bacteria in both Part 2.5 and Part 2.6 of Order No. 01-182, as amended. As indicated above, only Part 2.5 of Order No. 01-182, as amended, has been voided and set aside. Accordingly, for these 4 entities, only the provisions in the NOVs and Orders relating to Part 2.5 of Order No. 01-182, as amended, are hereby rescinded. Part 2.6 of Order No. 01-182, and all notices and orders issued pursuant thereto, remain valid and enforceable.

If you have any questions, please contact Renee Purdy at (213) 576-6622 or rpurdy@waterboards.ca.gov, or Staff Counsel Jennifer Fordyce at (916) 324-6682 or jfordyce@waterboards.ca.gov.

Sincerely,

Samuel Unger

Samuel Unger
Executive Officer

Enclosures:
1) Notice of Entry of Judgment and Issuance of Peremptory Writ of Mandate
2) Regional Board Order No. 01-182 (Amended by Orders R4-2006-0074, R4-2007-0042, and R4-2009-0130, and further amended pursuant to L.A. Superior Court Case No. BS122724)

ANDREA SHERIDAN ORDIN, County Counsel
JUDITH A. FRIES, Principal Deputy (SBN 070897)
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Attorneys for Petitioners COUNTY OF LOS ANGELES and LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

EXEMPT FROM FILING FEES
GOVERNMENT CODE § 6103

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

COUNTY OF LOS ANGELES and LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, Petitioners, v. STATE WATER RESOURCES CONTROL BOARD; CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION; and DOES 1 through 50, inclusive, Respondents.	CASE NO. BS122724 [Assigned to the Hon. David P. Yaffe] NOTICE OF ENTRY OF JUDGMENT AND ISSUANCE OF PEREMPTORY WRIT OF MANDATE

PLEASE TAKE NOTICE that on July 16, 2010, the court entered judgment in this matter. A copy of the judgment is attached hereto as Exhibit 1.

PLEASE TAKE FURTHER NOTICE that on July 23, 2010, in accordance with the judgment, the clerk of the court issued a Peremptory Writ of Mandate. A copy of the Peremptory Writ of Mandate is attached hereto as Exhibit 2.

Dated: July 23, 2010

ANDREA SHERIDAN ORDIN, County Counsel
JUDITH A. FRIES, Principal Deputy County Counsel
LAURIE E. DODS, Deputy County Counsel

BURHENN & GEST LLP
HOWARD GEST
DAVID W. BURHENN

By: ______________________
Howard Gest
Attorneys for Petitioners County of Los Angeles and Los Angeles County Flood Control District

EXHIBIT 1

ANDREA SHERIDAN ORDIN, County Counsel
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Attorneys for Petitioners COUNTY OF LOS ANGELES and LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

ORIGINAL FILED

JUL 16 2010

LOS ANGELES SUPERIOR COURT

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

COUNTY OF LOS ANGELES and LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, Petitioners, v. STATE WATER RESOURCES CONTROL BOARD; CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION; and DOES 1 through 50, inclusive, Respondents.	CASE NO. BS122724 **~~[PROPOSED]~~ JUDGMENT GRANTING PEREMPTORY WRIT OF MANDATE** Date: June 2, 2010 Time: 9:30 a.m. Place: Dept. 86

This matter came on for trial before the Honorable David P. Yaffe, Superior Court Judge, on June 2, 2010. Petitioners were represented by Howard Gest and David W. Burhenn of Burhenn & Gest LLP. Respondents were represented by Helen G. Arens, Deputy Attorney General. Intervenor Heal the Bay was represented by Steve Fleischli.

The Court, having reviewed the record of Respondents' proceedings in this matter, the briefs submitted by counsel, and having heard the arguments of counsel, and being fully advised,

IT IS HEREBY ORDERED, ADJUDGED, AND DECREED that:

1. The Petition for Writ of Mandate is granted. For the reasons set forth in the Court's minute order dated June 2, 2010, Respondent California Regional Water Quality Control Board, Los Angeles Region ("Regional Board"), committed a prejudicial abuse of discretion.

2. A Peremptory Writ of Mandate shall issue commanding Respondents:

(a) To void and set aside Los Angeles Regional Water Quality Control Board Order No. R4-2006-0074 and all amendments to the Los Angeles County Municipal Storm Water Permit (Order No. 01-182) effected thereby;

(b) To void and set aside State Water Resources Control Board Order WQ 2009-0008, without prejudice to the State Water Resources Control Board's consideration of the matters addressed in Order WQ 2009-0008 based on any new administrative record that may come before it;

(c) To cease and suspend any and all activities taken by Respondents pursuant to Los Angeles Regional Water Quality Control Board Order No. R4-2006-0074 or State Water Resources Control Board Order WQ 2009-0008; and

(d) To make and file a return to this writ ninety (90) days from the date a copy of this writ is served on them showing what they have done to comply with this writ.

3. The Peremptory Writ shall further command that, should Respondent Regional Board choose to CONDUCT ANY FURTHER HEARING UPON REMAND, AT SUCH HEARING ~~amend the Los Angeles County Municipal Storm Water Permit (Order No. 01-182) to reflect the terms of the Santa Monica Bay Beaches Dry Weather Bacteria TMDL, Regional Board Resolution No. 02-004, such amendment shall occur at a hearing in which~~ the same person SHALL ~~does~~ not act as both an advocate before the Los Angeles Regional Water Quality Control Board and an advisor to the Los Angeles Regional Water Quality Control Board, and ~~in which~~ the Regional Board counsel who participated in the last Regional Board hearing SHALL ~~does~~ not participate.

4. OBJECTIONS BY RESPONDENTS AND INTERVENOR TO THIS PROPOSED JUDGMENT ARE OVERRULED.

4. Petitioners are awarded their costs of suit in the amount of $__________.

Dated: JUL 1 6 2010

David P. Yaffe

Superior Court Judge

PROOF OF SERVICE

I am employed in Los Angeles County. I am over the age of 18 and not a party to this action. My business address is 624 S. Grand Avenue, 22nd Floor, Los Angeles, California 90017.

On July 1, 2010, I served the foregoing documents, described as

[PROPOSED] JUDGMENT GRANTING PEREMPTORY WRIT OF MANDATE

☐ the original of the document
☒ true copies of the document

in separate sealed envelopes addressed as follows:

See Attached List

☒ **BY U.S. MAIL**: I sealed and placed such envelope for collection and mailing to be deposited on the same day at Los Angeles, California. The envelopes were mailed with postage thereon fully prepaid. I am readily familiar with Burhenn & Gest LLP's practice of collection and processing corresponding for mailing. Under this practice, documents are deposited with the U.S. Postal Service on the same day that is stated in the proof of service, with postage fully prepaid at Los Angeles, California in the ordinary course of business.

☐ **BY FEDERAL EXPRESS**: I am familiar with the firm's practice of collecting and processing correspondence for delivery via Federal Express. Under that practice, it would be picked up by Federal Express on that same day at Los Angeles, California and delivered to the parties as listed on this Proof of Service the following business morning.

☒ **BY FACSIMILE**: I caused the above referenced document to be transmitted via facsimile and to the parties as listed on this Proof of Service.

☐ **BY PERSONAL SERVICE**: I caused such envelope to be delivered by messenger to the office or home of the addressee(s).

☒ **STATE**: I declare under penalty of perjury under the laws of the state of California that the above is true and correct.

☐ **FEDERAL**: I declare that I am employed in the office of a member of the bar of this court at whose direction the service was made.

Executed on July 1, 2010 at Los Angeles, California.

Jan Dunlap

SERVICE LIST

County of Los Angeles v. State Water Resources Control Board
Case No. BS122724

Edmund G. Brown Jr. Attorney General of the State of California Mary E. Hackenbracht Senior Assistant Attorney General Helen G. Arens Deputy Attorney General 300 South Spring Street, Suite 1702 Los Angeles, CA 90013 Telephone: (213) 897-2607 Facsimile: (213) 897-2802	Attorneys for State Water Resources Control Board and Los Angeles Regional Water Quality Control Board
Steve Fleischli Law Office of Steve Fleischli 2515 Wilshire Blvd. Santa Monica, California 90403 Telephone: (310) 829-5568 Ext. 244 Facsimile: (310) 829-6820	Attorneys for Proposed Intervenor Heal the Bay

EXHIBIT 2

RECEIVED

JUN 02 2010

DEPT. 86

ANDREA SHERIDAN ORDIN, County Counsel
JUDITH A. FRIES, Principal Deputy (SBN 070897)
LAURIE E. DODS, Deputy (SBN 157756)
Kenneth Hahn Hall of Administration
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Attorneys for Petitioners COUNTY OF LOS ANGELES and LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

EXEMPT FROM FILING FEES GOVERNMENT CODE § 6103

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

COUNTY OF LOS ANGELES and LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, Petitioners, v. STATE WATER RESOURCES CONTROL BOARD; CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION; and DOES 1 through 50, inclusive, Respondents.	CASE NO. BS122724 ~~[PROPOSED]~~ **PEREMPTORY WRIT OF MANDATE** Date: June 2, 2010 Time: 9:30 a.m. Place: Dept. 86

TO RESPONDENTS STATE WATER RESOURCES CONTROL BOARD AND CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION:

WHEREAS judgment has been entered in this action ordering that a peremptory writ of mandate be issued from this Court,

THEREFORE, IN ACCORDANCE WITH THE JUDGMENT, YOU ARE HEREBY COMMANDED:

(a) To void and set aside Los Angeles Regional Water Quality Control Board Order No. R4-2006-0074 and all amendments to the Los Angeles County Municipal Storm Water Permit (Order No. 01-182) effected thereby;

(b) To void and set aside State Water Resources Control Board Order WQ 2009-0008, without prejudice to the State Water Resources Control Board's consideration of the matters addressed in Order WQ 2009-0008 based on any new administrative record that may come before it;

(c) To cease and suspend any and all activities taken by you pursuant to Los Angeles Regional Water Quality Control Board Order No. R4-2006-0074 or State Water Resources Control Board Order WQ 2009-0008;

(d) Should you choose to CONDUCT ANY FURTHER HEARING UPON REMAND, AT SUCH HEARING ~~amend the Los Angeles County Municipal Storm Water Permit (Order No. 01-182) to reflect the terms of the Santa Monica Bay Beaches Dry Weather Bacteria TMDL, Regional Board Resolution No. 02-004, such amendment shall occur at a hearing in which~~ the same person Shall ~~does~~ not act as both an advocate before the Los Angeles Regional Water Quality Control Board and an advisor to the Los Angeles Regional Water Quality Control Board, and ~~in which~~ the individual who participated as Regional Board counsel in the last Regional Board hearing SHALL ~~does~~ not participate; and

(e) To make and file a return to this writ ninety (90) days from the date a copy of this writ is served on you showing what you have done to comply with this writ.

Dated: July 23, 2010

John A. Clarke

LOS ANGELES SUPERIOR COURT CLERK

By: **Kelly Encinas**

LET THE FOREGOING WRIT ISSUE.

Dated: July __, 2010

Superior Court Judge

PROOF OF SERVICE

I am employed in Los Angeles County. I am over the age of 18 and not a party to this action. My business address is 624 S. Grand Avenue, 22nd Floor, Los Angeles, California 90017.

On July 1, 2010, I served the foregoing documents, described as

[PROPOSED] PEREMPTORY WRIT OF MANDATE

☐ the original of the document
☒ true copies of the document

in separate sealed envelopes addressed as follows:

See Attached List

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☒ **STATE**: I declare under penalty of perjury under the laws of the state of California that the above is true and correct.

☐ **FEDERAL**: I declare that I am employed in the office of a member of the bar of this court at whose direction the service was made.

Executed on July 1, 2010 at Los Angeles, California.

Jan Dunlap

SERVICE LIST *County of Los Angeles v. State Water Resources Control Board* *Case No. BS122724*	
Edmund G. Brown Jr. Attorney General of the State of California Mary E. Hackenbracht Senior Assistant Attorney General Helen G. Arens Deputy Attorney General 300 South Spring Street, Suite 1702 Los Angeles, CA 90013 Telephone: (213) 897-2607 Facsimile: (213) 897-2802	Attorneys for State Water Resources Control Board and Los Angeles Regional Water Quality Control Board
Steve Fleischli Law Office of Steve Fleischli 2515 Wilshire Blvd. Santa Monica, California 90403 Telephone: (310) 829-5568 Ext. 244 Facsimile: (310) 829-6820	Attorneys for Proposed Intervenor Heal the Bay

PROOF OF SERVICE

I am employed in Los Angeles County. I am over the age of 18 and not a party to this action. My business address is 624 S. Grand Avenue, 22nd Floor, Los Angeles, California 90017.

On July 23, 2010, I served the foregoing documents, described as

NOTICE OF ENTRY OF JUDGMENT AND ISSUANCE OF PEREMPTORY WRIT OF MANDATE

☐ the original of the document
☒ true copies of the document

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Executed on July 23, 2010 at Los Angeles, California.

Danette Armstead

Danette Armstead

SERVICE LIST

County of Los Angeles v. State Water Resources Control Board
Case No. BS122724

Edmund G. Brown Jr. Attorney General of the State of California Mary E. Hackenbracht Senior Assistant Attorney General Helen G. Arens Deputy Attorney General 300 South Spring Street, Suite 1702 Los Angeles, CA 90013 Telephone: (213) 897-2607 Facsimile: (213) 897-2802	Attorneys for State Water Resources Control Board and Los Angeles Regional Water Quality Control Board
Steve Fleischli Law Office of Steve Fleischli 2515 Wilshire Blvd. Santa Monica, California 90403 Telephone: (310) 829-5568 Ext. 244 Facsimile: (310) 829-6820	Attorneys for Proposed Intervenor Heal the Bay

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

December 13, 2001
(Amended on September 14, 2006 by Order R4-2006-0074; August 9, 2007 by Order R4-2007-0042; December 10, 2009 by Order R4-2009-0130; and October 19, 2010 pursuant to the peremptory writ of mandate in L.A. Superior Court Case No. BS122724)

Table of Contents

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the Regional Board) finds:

A. Existing Permit

The Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the Los Angeles County Flood Control District (see Attachment A, List of Permittees), hereinafter referred to separately as Permittees and jointly as the Discharger, discharge or contribute to discharges of storm water and urban runoff from municipal separate storm sewer systems (MS4s), also called storm drain systems. The discharges flow to water courses within the Los Angeles County Flood Control District and into receiving waters of the Los Angeles Region. These discharges are covered under countywide waste discharge requirements contained in Order No. 96-054 adopted by this Regional Board on July 15, 1996, which replaced Order No. 90-079 adopted by this Regional Board on June 18, 1990. Order No. 96-054 also serves as a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of municipal storm water.

B. Nature of Discharges and Sources of Pollutant

1. Storm water discharges consist of surface runoff generated from various land uses in all the hydrologic drainage basins that discharge into water bodies of the State. The quality of these discharges varies considerably and is affected by the hydrology, geology, land use, season, and sequence and duration of hydrologic events. The primary constituents of concern currently identified by the Los Angeles County Flood Control District Integrated Receiving Water Impacts Report (1994-2000) are cyanide, indicator bacteria, total dissolved solids, turbidity, total suspended solids, nutrients, total aluminum, dissolved cadmium, copper, lead, total mercury, nickel, zinc, bis(2-ethylhexyl)phthalate, polycyclic aromatic hydrocarbons (PAHs), diazinon, and chlorpyrifos.

2. Certain pollutants present in storm water and/or urban runoff may be derived from extraneous sources that Permittees have no or limited jurisdiction over. Examples of such pollutants and their respective sources are: PAHs which are products of internal combustion engine operation, nitrates, bis (2-ethylhexyl) phthalate and mercury from atmospheric deposition, lead from fuels, copper from brake pad wear, zinc from tire wear, dioxins as products of combustion, and natural-occurring minerals from local geology. However, the implementation of the measures set forth in this Order is intended to reduce the entry of these pollutants into storm water and their discharge to receiving waters.

3. Water quality assessments conducted by the Regional Board identified impairment, or threatened impairment, of beneficial uses of water bodies in the Los Angeles Region. The causes of impairments include pollutants of concern identified in municipal storm water discharges by the County of Los Angeles in the Integrated Receiving Water Impacts Report (1994-2000). Pollutants in storm water can have damaging effects on both human health and aquatic ecosystems.

4. The Los Angeles County Grand Jury, September 2000, completed an investigation into the health risks of swimming near beaches in Los Angeles County and made several recommendations to reduce public health risks (Final Report, Grand Jury, Los Angeles County, 1999-2000). The Grand Jury recommended that the Regional Board consider among other actions, (i) a focus on setting contaminant limits rather than programmatic evaluations, (ii) audit of MS4 Permittee programs; and (iii) clarifying enforcement responsibilities between the State and local governments.

5. Studies and research conducted by other Regional agencies, academic institutions, and universities have also identified storm water and urban runoff as significant sources of pollutants to surface waters in Southern California. See, e.g., [*Surface Runoff to the Southern California Bight*, Southern California Coastal Water Research Project, (1992); *Impacts of Urban Runoff on Santa Monica Bay and Surrounding Ocean Waters* (Gersberg, R.M., 1995); *State of the Bay 1998*, Santa Monica Bay Restoration Project; *Storm Water Impact*, In, Southern California Environmental Report Card 1999, Institute of the Environment, University

of California, Los Angeles (Stenstrom, M.S., 1999); *Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of Southern California Bight,* Shelly L. Moore and M. James Allen (1999); *The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff*, Haile, R.W. et al. (1999); *Huntington Beach Closure Investigation: Technical Review* (University of Southern California, 2000); *A Regional Survey of the Microbiological Water Quality Along the Shoreline of the Southern California Bight,* Rachel T. Noble *et al.* (2001*); Integrated Receiving Water Impacts Report (1994-2000)*, County of Los Angeles (2001)].

6. Development and urbanization increase pollutant load, volume, and discharge velocity. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing an effective natural purification process. In contrast, pavement and concrete can neither absorb water nor remove pollutants, and thus the natural purification characteristics are lost. Second, urban development creates new pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage waste, pesticides, household hazardous wastes, pet wastes, trash, and other anthropogenic pollutants. Development and urbanization especially threaten environmentally sensitive areas. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may in a particular sensitive environment become significant. These environmentally sensitive areas designated by the State and/or the County of Los Angeles include Areas of Special Biological Significance (ASBS), water bodies designated as supporting a RARE beneficial use, Significant Natural Areas (SNAs), and Significant Ecological Areas (SEAs).

7. The increased volume, increased velocity, and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion and impair stream habitat in natural drainages. Studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving waters. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 10 percent conversion from natural to impervious surfaces. Percentage impervious cover is a reliable indicator and predictor of potential water quality degradation expected from new development. (*Impervious Cover as An Urban Stream Indicator and a Watershed Management Tool*, Schueler, T. and R. Claytor, In, Effects of Water Development and Management on Aquatic Ecosystems (1995), ASCE, New York; Leopold, L. B., (1973), *River Channel Change with Time: An Example*, Geological Society of America Bulletin, v. 84, p. 1845-1860; Hammer, T. R., (1972), *Stream Channel Enlargement Due to Urbanization: Water Resources Research*, v. 8, p. 1530-1540; Booth, D. B., (1991), *Urbanization and the Natural Drainage System--Impacts,*

Solutions and Prognoses: The Northwest Environmental Journal, v. 7, p. 93-118; Klein, R. D., (1979), *Urbanization and Stream Quality Impairment*: Water Resources Bulletin, v. 15, p. 948-963; May, C. W., Horner, R. R., Karr, J. R., Mar, B. W., and Welch, E. B., (1997), *Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion*: Watershed Protection Techniques, v. 2, p. 483-494; Morisawa, M. and LaFlure, E. *Hydraulic Geometry, Stream Equilibrium and Urbanization* In Rhodes, D. P. and Williams, G. P. *Adjustments to the Fluvial System* p.333-350. (1979); Dubuque, Iowa, Kendall/Hunt. Tenth Annual Geomorphology Symposia Series; and *The Importance of Imperviousness*: Watershed Protection Techniques, 1(3), Schueler, T. (1994).)

8. The County of Los Angeles has identified as the seven highest priority industrial and commercial critical source types, (i) wholesale trade (scrap recycling, auto dismantling); (ii) automotive repair/parking; (iii) fabricated metal products; (iv) motor freight; (v) chemical and allied products; (vi) automotive dealers/gas stations; (vii) primary metal products (*Critical Source Selection and Monitoring Report*, Los Angeles County Department of Public Works -Sept 1996). Monitoring conducted by Los Angeles County and the Regional Board demonstrates that the priority industrial sectors and auto repair facilities (one of the commercial sectors) on the list, contribute significant concentrations of heavy metals to storm water (*Los Angeles County 1999-2000 Storm Water Monitoring Report*, Los Angeles County Department of Public Works -July 2000; *Compliance Assessment of the Auto Dismantling Industry; Evaluation of the California General Industrial Storm Water Permit*, H. Chang, (2001), 70 pp., California Regional Water Quality Control Board, Los Angeles Region).

9. The discharge of washwaters and contaminated storm water from industries and businesses specified in this Order for inspection by Permittees is an environmental threat and can also adversely impact public health and safety. For example, a review of industrial waste/ pretreatment records performed in 1995 in the County of Los Angeles on illicit discharges indicates that automotive service facilities and food service facilities sometimes discharge polluted washwaters to the MS4. The pollutants of concern in such washwaters include food waste, oil and grease, and toxic chemicals. Other storm water/industrial waste programs in California have reported similar observations. Illicit discharges from automotive service facilities and food service facilities have been identified elsewhere as a major cause of widespread contamination and water quality problems (Washtenaw County Statutory Drainage Board - 1987 Huron River Pollution Abatement Program).

10. Studies indicate that facilities with paved surfaces subject to frequent motor vehicular traffic (such as parking lots and fast food restaurants), or facilities that perform vehicle repair, maintenance, or fueling (automotive service facilities) are potential sources of pollutants of concern in storm water. [References: Pitt *et a*l., *Urban Storm Water Toxic Pollutants: Assessment, Sources, and Treatability*, Water Environment Res., 67, 260

(1995)*; Results of Retail Gas Outlet and Commercial Parking Lot Storm Water Runoff Study*, Western States Petroleum Association and American Petroleum Institute, (1994); *Action Plan Demonstration Project, Demonstration of Gasoline Fueling Station Best Management Practices*, Final Report, County of Sacramento (1993); *Source Characterization*, R. Pitt, In Innovative Urban Wet-Weather Flow Management Systems (2000) Technomic Press, Field, R *et al*. editors; *Characteristics of Parking Lot Runoff Produced by Simulated Rainfall*, , L.L. Tiefenthaler *et al*. Technical Report 343, Southern California Coastal Water Research Project (2001).]

11. Retail Gasoline Outlets (RGOs) are points of convergence for vehicular traffic and are similar to parking lots and urban roads. Studies indicate that storm water discharges from RGOs have high concentrations of hydrocarbons and heavy metals. [*The Quality of Trapped Sediments and Poor Water within Oil Grit Separators in Suburban MD,* Schueler T. and Shepp D. (1992), and *Concentrations of Selected Constituents in Runoff from Impervious Surfaces in Four Urban Catchments of Different Landuse*, Ranabal, F.I., and T.J. Gizzard (1995), In Proceedings of the Fourth Biennial Stormwater Research Conference, Florida, pp-42-52]. Pilot studies indicate that treatment control best management practices installed at retail gasoline stations are effective in removing pollutants, reasonable in capital cost, easy to operate, and do not present safety risks [*Rouge River National Wet Weather Demonstration Project, Task Product Memorandum – Evaluation of On-line Media Filters RPO-NPS-TPM59.00*, Wayne County, MI, March 1999]. The Regional Board and the San Diego Regional Board have jointly prepared a Technical Report on the applicability of new development BMP design criteria for retail gasoline outlets, (*Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts*, (June 2001)). Retail Gasoline Outlets in Western U.S. States (such as Washington and Oregon) are already subject to numerical BMP design criteria, as well in other U.S. States.

C. Permit Background

1. The essential components of the Storm Water Management Program, as established by federal regulations [40 CFR 122.26(d)] are: (i) Adequate Legal Authority, (ii) Fiscal Resources, (iii) Storm Water Quality Management Program (SQMP) - (Public Information and Participation Program, Industrial/Commercial Facilities Program, Development Planning Program, Development Construction Program, Public Agency Activities Program, Illicit Connection and Illicit Discharges Elimination Program), and (iv) Monitoring and Reporting Program.

2. The Permittees have filed a Report of Waste Discharge (ROWD), dated February 1, 2001, and applied for renewal of their waste discharge requirements that serves as an NPDES permit to discharge wastes to surface waters. The ROWD includes a proposed SQMP and a Monitoring Program. The proposed SQMP contains programs previously approved under Board Order No. 96-054 in the following areas:

Public Information and Participation
Development Planning
Development Construction
Public Agency Activities
Illicit Connection/Illicit Discharge Elimination Program

These programs are revised pursuant to the provisions of this Order after adoption.

3. The County of Los Angeles has previously conducted source identification and pollutant characterization consistent with 40 CFR 122.26(d)(1)(ii) and (iii) under its storm water Monitoring Program. The Monitoring Program submitted with the ROWD proposes to advance the assessment of receiving water impacts, identification of sources of pollution, evaluation of Best Management Practices (BMPs), and measurement of long term trends in mass emissions.

4. The Regional Board has reviewed the ROWD and has determined it to be complete under the reapplication policy of MS4s issued by the U.S. Environmental Protection Agency (USEPA) (61 *Fed. Reg*. 41697). The Regional Board finds that the Permittees' proposed SQMP, incorporating the additional and/or revised provisions contained in this Order would meet the minimum requirements of federal regulations.

5. The City of Los Angeles has conducted shoreline and nearshore water quality monitoring off the Santa Monica Bay since the 1950s under the monitoring program for the Hyperion Waste Water Treatment Plant (NPDES No. CA0109991). The monitoring results indicate that effluent from Hyperion's 5-Mile Outfall does not impinge the shoreline, and that elevated bacterial counts are associated with runoff from storm drains and discharges from piers. In 1994, the Regional Board approved the relocation of Hyperion's shoreline stations to implement a bay-wide, regional shoreline-monitoring program associated with storm drain outfalls in the Santa Monica Bay. The City of Los Angeles requested that the shoreline-monitoring requirement be incorporated in this Order. The shoreline pathogen monitoring requirements are outlined in the Monitoring Program for this Order.

D. Permit Coverage

1. The requirements in this Order cover all areas within the boundaries of the Permittee municipalities (see Attachment A) over which they have regulatory jurisdiction as well as unincorporated areas in Los Angeles County within the jurisdiction of the Regional Board. The Permittees serve a population of about 9.5 million [Reference: *2000 Census of Population and Housing,* Bureau of the Census, U.S. Department of Commerce (2001)] in an area of approximately 3,100 square miles.

2. Federal, state, regional or local entities within the Permittees' boundaries or in jurisdictions outside the Los Angeles County Flood Control District, and not currently named in this Order, may operate storm drain facilities and/or discharge storm water to storm drains and watercourses covered

by this Order. The Permittees may lack legal jurisdiction over these entities under state and federal constitutions. The Regional Board will coordinate with these entities to implement programs that are consistent with the requirements of this Order. The Regional Board will consider such facilities for coverage in 2003 under its NPDES permitting scheme pursuant to USEPA Phase II storm water regulations.

3. Sources of discharges into receiving waters in the County of Los Angeles but in jurisdictions outside its boundary include the following:

   About 34 square miles of unincorporated area in Ventura County, which drain into Malibu Creek and then to Santa Monica Bay,

   About 9 square miles of the City of Thousand Oaks, which also drain into Malibu Creek and then to Santa Monica Bay, and

   About 86 square miles of area in Orange County, which drain into Coyote Creek and then into the San Gabriel River.

   The Regional Board will ensure that storm water management programs for the areas in Ventura County and the City of Thousand Oaks that drain into Santa Monica Bay are consistent with the requirements of this Order. The Regional Board will coordinate with the Santa Ana Regional Board so that storm water management programs for the areas in Orange County that drain into Coyote Creek are consistent with the requirements of this Order.

4. This permit is intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the Maximum Extent Practicable (MEP) from the permitted areas in the County of Los Angeles to the waters of the U.S. subject to the Permittees' jurisdiction.

5. Permittees have expressed their intention to work cooperatively to control the contribution of pollutants from one portion of the MS4 to another portion of the system. Permittees may control the contribution of pollutants to the MS4 from non-permittee dischargers such as Caltrans, the U.S. Department of Defense, and other state and federal facilities, through interagency agreements.

E. Federal, State, and Regional Regulations

1. The Water Quality Act of 1987 added Section 402(p) to the federal Clean Water Act (CWA) (33 U.S.C. § 1251-1387). This section requires the USEPA to establish regulations setting forth NPDES requirements for storm water discharges in two phases.

   - The USEPA Phase I storm water regulations were directed at MS4s serving a population of 100,000 or more, including interconnected systems and storm water discharges associated with industrial activities, including construction activities. The Phase I Final Rule was published on November 16, 1990 (55 *Fed. Reg*. 47990).

- The USEPA Phase II storm water regulations are directed at storm water discharges not covered in Phase I, including small MS4s (serving a population of less than 100,000), small construction projects (one to five acres), municipal facilities with delayed coverage under the Intermodal Surface Transportation Efficiency Act of 1991, and other discharges for which the USEPA Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard, or is a significant contributor of pollutants to waters of the United States. The Phase II Final Rule was published on December 8, 1999 (64 *Fed. Reg*. 68722).

2. The USEPA published an 'Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits' on August 26, 1996 (61 *Fed. Reg.* 43761). This policy discusses the appropriate kinds of water quality-based effluent limitations to be included in NPDES storm water permits to provide for the attainment of water quality standards.

3. The USEPA published an 'Interpretative Policy Memorandum on Reapplication Requirements' for MS4 permits on August 9, 1996 (61 *Fed. Reg*. 41697). This policy requires that MS4 reapplication for reissuance for a subsequent five-year permit term contain certain basic information and information for proposed changes and improvements to the storm water management program and monitoring program.

4. The USEPA has entered into a Memorandum of Agreement (MOA) with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for enhancing coordination regarding the protection of endangered and threatened species under Section 7 of the Endangered Species Act and the CWA's Water Quality Standards and NPDES programs. Among other actions, the MOA establishes a framework for coordination of actions by the USEPA, the Services, and CWA delegated States on CWA permit issuance under Section 402 of the CWA [66 *Fed. Reg*. 11202 – 11217].

5. USEPA regulations at 40 CFR 122.26(d)(2)(iv)(A) and 40 CFR 122.26(d)(2)(iv)(C) require that MS4 permittees implement a program to monitor and control pollutants in discharges to the municipal system from industrial and commercial facilities that contribute a substantial pollutant load to the MS4. The regulations require that permittees establish priorities and procedures for inspection of industrial facilities and priority commercial establishments. This permit, consistent with the USEPA policy, incorporates a cooperative partnership, including the specifications of minimum expectations, between the Regional Board and the Permittees for the inspection of industrial facilities and priority commercial establishments to control pollutants in storm water discharges (58 *Fed. Reg*. 61157).

6. Section 402 (p) of the CWA (33 U.S.C. § 1342(p) provides that MS4 permits must "require controls to reduce the discharge of pollutants to the

maximum extent practicable, including management practices, control techniques and system, design engineering method and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." The State Water Resources Control Board's (State Board) Office of Chief Counsel (OCC) has issued a memorandum interpreting the meaning of MEP to include technical feasibility, cost, and benefit derived with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMPs costs would exceed any benefit to be derived (dated February 11, 1993).

7. The CWA authorizes the USEPA to permit a state to serve as the NPDES permitting authority in lieu of the USEPA. The State of California has in-lieu authority for an NPDES program. The Porter-Cologne Water Quality Control Act authorizes the State Board, through the Regional Boards, to regulate and control the discharge of pollutants into waters of the State. The State Board entered into a MOA with the USEPA, on September 22, 1989, to administer the NPDES Program governing discharges to waters of the U.S.

8. Section 303(d) of the CWA requires that the State identify a list of impaired water-bodies and develop and implement Total Maximum Daily Loads (TMDLs) for these waterbodies (33 U.S.C. §1313(d)(1)). A TMDL specifies the maximum amount of a pollutant that a water-body can receive, still meet applicable water quality standards and protect beneficial uses. The USEPA entered into a consent decree with the Natural Resources Defense Council (NRDC), Heal the Bay, and the Santa Monica BayKeeper on March 22, 1999, under which the Regional Board must adopt all TMDLs for the Los Angeles Region within 13 years from that date. This permit incorporates a provision to implement and enforce approved load allocations for municipal storm water discharges and requires amending the SQMP after pollutants loads have been allocated and approved.

9. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA (16 U.S.C. § 1451-1465) amends the Coastal Zone Management Act of 1972, to address five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The Regional Board addresses septic systems through the administration of other programs.

10. On May 18, 2000, the USEPA established numeric criteria for priority toxic pollutants for the State of California (California Toxics Rule (CTR)) 65 *Fed. Reg*. 31682 (40 CFR 131.38), for the protection of human health and aquatic life. These apply as ambient water quality criteria for inland surface waters, enclosed bays, and estuaries. The State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) – 2000,* on

March 2, 2000, for implementation of the CTR (State Board Resolution No. 2000-15 as amended by Board Resolution No. 2000-030). This policy requires that discharges comply with TMDL-derived load allocations as soon as possible but no later than 20 years from the effective date of the policy.

11. The State Board adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) on July 23, 1997. The Ocean Plan contains water quality objectives which apply to all discharges to the coastal waters of California.

12. The State Board in *In Re*: California Department of Transportation (State Board Order WQ 2001-08), determined that the discharge of storm water to ASBS is subject to the prohibition in the Ocean Plan against the discharge of wastes to an ASBS.

13. The Regional Board adopted an updated Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994, *'Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*, (1994).' The Basin Plan designates beneficial uses of receiving waters and specifies both narrative and numerical water quality objectives for the receiving waters in Los Angeles County.

14. The Regional Board on September 19, 2001, adopted amendments to the Basin Plan, to incorporate TMDLs for trash in the Los Angeles River Watershed (Resolution No. R01-013) and Ballona Creek Watershed (Resolution No. R01-014). The amendments were subsequently approved by the State Board, the Office of Administrative Law, and the United States Environmental Protection Agency. Twenty-two cities[1] ("Cities") sued the Regional Board and State Board to set aside the Los Angeles River Trash TMDL. The trial court entered an order deciding some claims in favor of the Water Boards and some in favor of the Cities. Both sides appealed, and on January 26, 2006, the Court of Appeal decided every one of the Cities' claims in favor of the Water Boards, except with respect to California Environmental Quality Act (CEQA) compliance (*City of Arcadia et al. v. Los Angeles Regional Water Quality Control Board et al.* (2006) 135 Cal.App.4th 1392). The Court therefore declared the Los Angeles River Trash TMDL void, and issued a writ of mandate that ordered the Water Boards to set aside and not implement the TMDL, until it had been brought into compliance with CEQA. As a result of the appellate court's decision, in 2006, the Regional Board set aside its 2001 action incorporating the TMDL into the Basin Plan (Resolution R06-013) (*City of Arcadia et al. v. Los Angeles Regional Water Quality Control Board et al.* (2006) 135 Cal.App.4th 1392). After conducting the required CEQA analysis, the Regional Board readopted

[1] The cities include Arcadia, Baldwin Park, Bellflower, Cerritos, Commerce, Diamond Bar, Downey, Irwindale, Lawndale, Monrovia, Montebello, Monterey Park, Pico Rivera, Rosemead, San Gabriel, Santa Fe Springs, Sierra Madre, Signal Hill, South Pasadena, Vernon, West Covina, and Whittier.

the Los Angeles River Watershed Trash TMDL on August 9, 2007 (Resolution No. R07-012). This TMDL was subsequently approved by the State Board (Resolution No. 2008-0024), the Office of Administrative Law (File No. 2008-0519-02 S), and the United States Environmental Protection Agency, and became effective on September 23, 2008. The Water Boards filed their final return to the writ of mandate on August 6, 2008, and on August 26, 2008, the superior court entered an order discharging the writ, and dismissing the case, thus concluding the legal challenges to the Trash TMDL.

15. The Regional Board on April 13, 1998, approved BMPs for sidewalk rinsing to minimize the discharge of wash waters to the storm drain system (Resolution No. 98-08). By the same resolution, the Regional Board prohibited the discharge of municipal street wash waters to the storm drain system.

16. The Regional Board on April 13, 1998, approved recommended BMPs for industrial/commercial facilities (Resolution No. 98-08).

17. The Regional Board on April 22, 1999, approved a list of BMPs for use in development planning and development construction (Resolution No. 99-03)

18. The Regional Board adopted and approved requirements for new development and significant redevelopment projects in Los Angeles County to control the discharge of storm water pollutants in post-construction storm water, on January 26, 2000, in Board Resolution No. R-00-02. The Regional Board Executive Officer issued the approved Standard Urban Storm Water Mitigation Plans (SUSMPs) on March 8, 2000. The State Board in large part affirmed the Regional Board action and SUSMPs in State Board Order No. WQ 2000-11 issued on October 5, 2000.

    - The State Board's Chief Counsel has issued a statewide policy memorandum (dated December 26, 2000), which interprets the Order to provide broad discretion to Regional Boards and identifies potential future areas for inclusion in SUSMPs and the types of evidence and findings necessary. Such areas include ministerial projects, projects in environmentally sensitive areas, and water quality design criteria for RGOs.
    - The State Board's Chief Counsel interprets the Order to encourage regional solutions and endorses a mitigation fund or "bank" that may be funded by developers who obtain waivers from the numerical design standards for new development and significant redevelopment.

19. 40 CFR 131.10(a) prohibits states from designating waste transport or waste assimilation as a use for any water of the U.S. Authorizing the construction of a storm water/ urban runoff treatment facility in a jurisdictional water body would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the

construction and operation of a pollution control facility in a water body can impact the physical, chemical, and biological integrity as well as the beneficial uses of the water body. Therefore, storm water treatment and/or mitigation in accordance with SUSMPs and any other requirements of this Order must occur prior to the discharge of storm water into a water of the U.S.

20. The Regional Board supports a Watershed Management Approach to address water quality protection in the region. The objective of the Watershed Management Approach should be to provide a comprehensive and integrated strategy towards water resource protection, enhancement, and restoration while balancing economic and environmental impacts within a hydrologically defined drainage basin or watershed. It emphasizes cooperative relationships between regulatory agencies, the regulated community, environmental groups, and other stakeholders in the watershed to achieve the greatest environmental improvements with available resources.

21. To promote a watershed management approach, the County of Los Angeles is divided into six Watershed Management Areas (WMAs) as follows:

    Malibu Creek and Rural Santa Monica Bay WMA
    Ballona Creek and Urban Santa Monica Bay WMA
    Los Angeles River WMA
    San Gabriel River WMA
    Dominguez Channel/Los Angeles Harbor WMA, and
    Santa Clara River WMA

    Attachment A shows the list of Permittees under each WMA and some Permittees have expressed an intent to form sub-watershed groups within the WMA to promote regional solutions for the mitigation of storm water discharge pollution.

22. To facilitate compliance with federal regulations, the State Board has issued two statewide general NPDES permits for storm water discharges: one for storm water from industrial sites [NPDES No. CAS000001, General Industrial Activity Storm Water Permit (GIASP)] and the other for storm water from construction sites [NPDES No. CAS000002, General Construction Activity Storm Water Permit (GCASP)]. The GCASP was reissued on August 19, 1999. The GIASP was reissued on April 17, 1997. Facilities discharging storm water associated with industrial activities and construction projects with a disturbed area of five acres or more are required to obtain individual NPDES permits for storm water discharges, or to be covered by a statewide general permit by completing and filing a Notice of Intent (NOI) with the State Board. The USEPA guidance anticipates coordination of the state-administered programs for industrial and construction activities with the local agency program to reduce pollutants in storm water discharges to the MS4.

    The Regional Board is the enforcement authority in the Los Angeles Region for the two statewide general permits regulating discharges from industrial facilities and construction sites, and all NPDES storm water and non-storm water permits issued by the Regional Board. These industrial and construction sites and discharges are also regulated under local laws and regulations.

23. The State Board, on October 28, 1968, adopted Resolution No. 68-16, which established an anti-degradation policy for the State and Regional Boards. This policy restricts the degradation of surface waters and protects waterbodies where existing water quality is higher than is necessary for the protection of beneficial uses.

24. The State Board, on June 17, 1999, adopted Order No. WQ 99-05, which, in a precedential decision, identifies acceptable receiving water limitations language to be included in municipal storm water permits issued by the State and Regional Boards. The receiving water limitations included herein are consistent with the State Board Order, USEPA Policy, and the U.S. Appellate court decision in, *Defenders of Wildlife v. Browner* (9^{th}. Cir, 1999). The State Board OCC has determined that the federal court decision did not conflict with State Board Order No. WQ 99-05 (memorandum dated October 14, 1999)

25. California Water Code (CWC) § 13263(a) requires that waste discharge requirements issued by the Regional Board shall implement any relevant water quality control plans that have been adopted; shall take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose; other waste discharges; the need to prevent nuisance; and provisions of CWC § 13241. The Regional Board has considered the requirements of § 13263 and § 13241, and applicable plans, policies, rules, and regulations in developing these waste discharge requirements.

26. CWC § 13370 *et seq.* requires that waste discharge requirements issued by the Regional Boards be consistent with provisions of the federal CWA and its amendments.

27. On March 12, 2001, the U.S. Court of Appeals ruled that it is necessary to obtain a NPDES permit for application of aquatic pesticides to waterways. (*Headwaters, Inc. vs. Talent Irrigation District,* 243 F.3d. 526 (9^{th} Cir., 2001)) This decision is controlling in California for nonagricultural applications of pesticides to waterways. The State Board adopted a general NPDES permit (Order No. 2001-12-DWQ) on July 19, 2001, for public entities that discharge pollutants to waters of the U.S. associated with the application of aquatic pesticides for resource or pest management. Public entities that conduct such activities must seek coverage under the general permit.

Findings Related To the Incorporation Of The Marina Del Rey Harbor Mothers' Beach And Back Basins Bacteria TMDL

28. [Intentionally left blank]

29. The Regional Board adopted the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (hereinafter "MDR Bacteria TMDL") on August 7, 2003. The TMDL was subsequently approved by the SWRCB, the OAL, and the USEPA and became effective on March 18, 2004.

30. The Waste Load Allocations (WLAs) in the MDR Bacteria TMDL are expressed as the number of allowable days that Mothers' Beach and Basins D, E, and F in Marina del Rey Harbor may exceed the Basin Plan water quality objectives for protection of Water Contact Recreation (REC-1) in marine waters, specifically the water quality objectives for bacteria. Appropriate modifications to this order are therefore included in Parts 1 (Discharge Prohibitions) and 2 (Receiving Water Limitations), pursuant to 40 CFR 122.41(f) and 122.62, and Part 6.I.1 of this Order. Additionally, 40 CFR 122.44(d)(1)(vii)(B) requires that NPDES permits be consistent with the assumptions and requirements of any available waste load allocation. Tables 7-5.1, 7-5.2, and 7-5.3 of the Basin Plan set forth the pertinent provisions of the MDR Bacteria TMDL. They require that during Summer Dry Weather there shall be no exceedances in the Wave Wash of the single sample or the geometric mean bacteria objectives set to protect the Water Contact Recreation (REC-1) beneficial use in marine waters. Accordingly, a prohibition is included in this Order barring discharges from a MS4 to Marina del Rey Harbor that result in exceedance of these objectives. Since the TMDL and the WLAs contained therein are expressed as receiving water conditions, Receiving Water Limitations have been included in this Order that are consistent with and implement the zero exceedance day WLAs.

31. Pursuant to federal regulations at 40 CFR 124.8, and 125.56, a Fact Sheet was prepared to provide the basis for incorporating the MDR Bacteria TMDL into this Order. This Fact Sheet is hereby incorporated by reference into these findings.

32. The iterative approach to regulating municipal storm water is not an appropriate means of implementing the MDR Summer Dry Weather WLAs for any and all of the following reasons: (a) The WLAs do not regulate the discharge of storm water; (b) The harm to the public from violating the WLAs is dramatic both in terms of health impacts to exposed beachgoers, and the economic cost to the region associated with related illnesses; (c) Under the iterative approach over three permit cycles, required elements of the MS4 permit (e.g., elimination of illicit connections/illicit discharges (IC/ID) into their MS4s, revisions to their SQMP, etc.) have not resulted in the elimination of exceedances of water

quality standards at the beach or in Basins D, E, and F of Marina del Rey Harbor.

33. On March 14, 2007, Marina del Rey watershed responsible agencies submitted to the Regional Board the results of a non-point source study conducted over a one year period between July 2005 and July 2006, which was required under the terms of the MDR TMDL. The study was designed to determine the relative bacterial loading to the harbor from sources including but not limited to storm drains, boats, birds, and other non-point sources. The study has not yet been peer reviewed, and is currently under review by Regional Board staff.

34. On January 8, 2007, as required by the MDR Bacterial TMDL, Marina del Rey watershed responsible agencies submitted to the Regional Board an implementation plan describing the strategy by which they intend to comply with the MDR Bacterial TMDL. This implementation plan was developed through a process that included both Regional Board staff and representatives from Heal the Bay and Santa Monica Baykeeper.

35. The Regional Board acknowledges the County's timely submittals of reports required by the TMDL and implementation measures initiated thus far towards meeting water quality standards for bacteria in Marina del Rey. As a result of the adoption of the MDR Bacterial TMDL in 2003, the County has funded or received grants to initiate the following activities:

- Marina Beach Water Quality Improvement Project, Phase I and Phase II through a CBI grant;
- Mothers' Beach and Back Basins Bacterial TMDL Non-point Source Study;
- Marina del Rey Harbor Mothers Beach and Back Basins Report of Small Drain Identification;
- Marina del Rey Vessel Discharge Report;
- Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Monitoring Plan; and
- Three low-flow diversion projects, which were partially funded by a grant, two of which have been completed.

In addition to participation in the above studies, the County and other Marina del Rey watershed responsible agencies continue to implement BMPs proposed in the January 8, 2007, Implementation Plan.

36. The Receiving Water Limitations have been revised to implement the Summer Dry Weather WLAs set forth in Basin Plan Table 7-5.1. These Receiving Water Limitations apply at the compliance monitoring sites

identified in the *Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Monitoring Plan* dated April 13, 2007.[2] Compliance with the Receiving Water Limitations shall be determined using monitoring data obtained in conformance with the *Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Monitoring Plan* dated April 13, 2007; and the Monitoring and Reporting Program CI 6948.

37. If the Receiving Water Limitations are exceeded at a compliance monitoring site, the Regional Board will generally issue an appropriate investigative order pursuant to Cal. Water Code § 13267 or § 13225 to the Permittees and other responsible agencies or jurisdictions within the relevant subwatershed to determine the source of the exceedance. Following these actions, Regional Board staff will generally evaluate the need for further enforcement as follows:

a) If the Regional Board determines that the exceedance did not result from discharges from the MS4, then the MS4 Permittees would not be responsible for violations of these provisions.

b) If the Regional Board determines that Permittees in the relevant subwatershed have demonstrated that their MS4 does not discharge dry weather flow into Basins D, E, or F in Marina del Rey Harbor, those Permittees would not be responsible for violations of these provisions even if the Receiving Water Limitations are exceeded at an associated compliance monitoring site.

c) If the Regional Board determines that Permittees in the relevant subwatershed have demonstrated that their MS4 summer dry weather discharge into Basins D, E, or F in Marina del Rey Harbor is treated to a level that does not exceed either the single sample or the geometric mean bacteria objectives, those Permittees shall not be responsible for violations of these provisions even if the Receiving Water Limitations are exceeded at an associated compliance monitoring site.

d) If the Regional Board determines that one or more Permittees have caused or contributed to violations of these Receiving Water Limitations, the Regional Board will consider appropriate enforcement action, including a cease and desist order with or without a time schedule for compliance, or other appropriate enforcement action depending upon the circumstances and the extent to which the Permittee(s) has endeavored to comply with these provisions.

[2] [Intentionally left blank]

38. A Permittee would not be responsible for violations of these provisions if the Regional Board Executive Officer determines that the Permittee has adequately documented through a source investigation of the subwatershed, pursuant to protocols established under Cal. Water Code 13178, that bacterial sources originating within the jurisdiction of the Permittee have not caused or contributed to the exceedance of the Receiving Water Limitations.

39. Water Code section 13389 exempts the Regional Board from compliance with Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code prior to the adoption of waste discharge requirements. Therefore the Regional Board is not required to prepare environmental documents to evaluate this permit modification. Nevertheless, the Regional Board has considered the policies and requirements set forth in Chapters 1 through 2.6 of CEQA, and further, has considered the final substitute environmental documents for the MDR Bacteria TMDL.

Findings Related to the Incorporation of the Los Angeles River Watershed Trash TMDL

40. The Regional Board adopted the Los Angeles River Trash Total Maximum Daily Load (TMDL) on August 9, 2007 as an amendment to the region's Water Quality Control Plan (Basin Plan) to address water quality impairments due to trash in the Los Angeles River Watershed that were identified in 1998 on the State's Clean Water Act Section 303(d) List. This TMDL was subsequently approved by the State Board, the Office of Administrative Law (OAL), and the USEPA, and it became effective on September 23, 2008.

41. By its adoption of the Trash TMDL, the Regional Board determined that trash discharged to the Los Angeles River and its tributaries discourages recreational activity, degrades aquatic habitat, threatens wildlife through ingestion and entanglement, and also poses risks to human health. Existing beneficial uses impaired by trash in the Los Angeles River are contact recreation (REC-1) and non-contact recreation (REC-2); warm fresh water habitat (WARM); wildlife habitat (WILD); estuarine habitat (EST) and marine habitat (MAR); rare, threatened or endangered species (RARE); migration of aquatic organisms (MIGR) and spawning, reproduction and early development of fish (SPWN); commercial and sport fishing (COMM); wetland habitat (WET); and cold freshwater habitat (COLD).

42. The Los Angeles River Watershed Trash TMDL identifies discharges from the municipal separate storm sewer system as the principal source of trash to the Los Angeles River and its tributaries. As such, WLAs were assigned to MS4 Permittees that discharge to the MS4 in the watershed. The WLAs are expressed as progressively decreasing allowable amounts of trash discharges from jurisdictional areas within the watershed. The Trash TMDL requires MS4 Permittees to make annual reductions of their

discharges of trash to the Los Angeles River Watershed over a 9-year period, until the numeric target of zero trash discharged from the MS4 is achieved for the 2013-2014 storm year. The Basin Plan assigns MS4 Permittees within the Los Angeles River Watershed baseline Waste Load Allocations from which annual reductions are to be made. (See Basin Plan, Table 7-2.2.) The Basin Plan also specifies interim and final Waste Load Allocations as decreasing percentages of the Table 7-2.2 baseline WLAs, and specifies the corresponding "Compliance Points". (See Basin Plan, Table 7-2.3.)

43. The Los Angeles River Watershed Trash TMDL specifies that the WLAs shall be implemented through MS4 permits. Federal regulations require that NPDES permits be consistent with the assumptions and requirements of any available waste load allocation. (40 CFR 122.44(d)(1)(vii)(B).) State law requires both that the Regional Board implement its Basin Plan when adopting waste discharge requirements (WDRs) and that NPDES permits apply "any more stringent effluent standards or limitations necessary to implement water quality control plans…" (Wat. Code §§ 13263, 13377).

44. The Ninth Circuit Court of Appeals in *Defenders of Wildlife v. Browner* ruled that the Clean Water Act grants the permitting agency discretion either to require "strict compliance" with water quality standards through the imposition of numeric effluent limitations, or to employ an iterative approach toward compliance with water quality standards, by requiring improved BMPs over time (*Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159). In a precedential decision, the State Board acknowledged that the holding in *Browner* allows the issuance of MS4 permits that limit their provisions to BMPs that control pollutants to the MEP, and which do not require compliance with water quality standards. However, the Water Boards have declined to adopt that approach in light of the impacts of discharges from MS4s on waters throughout the State and Los Angeles region (see Order WQ 2001-15 and Part 2 of the LA County MS4 Permit). The State Board concluded and the Regional Board agrees that "where urban runoff is causing or contributing to exceedances of water quality standards, it is appropriate to require improvements to BMPs that address those exceedances" (Order WQ 2001-15, p. 8).

45. In a recent decision, the State Board also concluded that incorporation of the provisions of TMDLs into MS4 permits requires extra consideration. Specifically, the State Board held: "TMDLs, which take significant resources to develop and finalize, are devised with specific implementation plans and compliance dates designed to bring impaired waters into compliance with water quality standards. It is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits." The State Board stated that TMDLs should not be an "academic exercise", and indicated that in some instances when implementing TMDLs, numeric effluent limitations may be an appropriate means of controlling

pollutants in storm water, provided the Regional Board's determination is adequately supported in the permit findings (Order WQ 2009-0008). The following paragraphs support the Regional Board's determination to implement the Trash TMDL with numeric effluent limitations.

46. The Trash TMDL specified a specific formula for calculating and allocating annual reductions in trash discharges from each jurisdiction. The formula results in specified annual amounts of trash that may be discharged from each jurisdiction into the receiving waters. Translation of the compliance points described in the TMDL into jurisdiction-specific load reductions from the baseline levels, as specified in the TMDL, logically results in the articulation of an annual limit on the amount of a pollutant that may be discharged. The specification of allowable annual trash discharge amounts meets the definition of an "effluent limitation", as that term is defined in subdivision (c) of section 13385.1 of the California Water Code. Specifically, the trash discharge limitations constitute a "numeric restriction … on the quantity [or] discharge rate … of a pollutant or pollutants that may be discharged from an authorized location." While there may be other ways to incorporate the compliance points from the TMDL into permit conditions, the Regional Board is not aware of any other mechanisms that would result in actual compliance with the requirements of the TMDL as it was intended.

47. The process to establish the Trash TMDL was exceedingly lengthy, heavily litigated and scrutinized, and contained extensive analysis. The essence of this TMDL has been twice adopted by the Regional Board, and approved by the State Board, OAL, and the US EPA, and has been subject to considerable judicial review. Therefore, the assumptions underlying this TMDL have been thoroughly vetted by staff, stakeholders, other agencies, and the courts over a significant period of time.

48. In its resolution establishing the Trash TMDL, the Regional Board already determined that the implementation schedule was reasonable and feasible, and noted that the MS4 Permittees had notice of the trash impairment since at least 1998 (with its listing on the 1998 303(d) list) and had been required to attain water quality standards for trash in the receiving waters since this order was first adopted in December of 2001. (See e.g., Resolution R07-012, finding 14.) The Court of Appeal affirmed the Regional Board's determination that the final waste load allocations were attainable and not inordinately expensive. (*Cities of Arcadia*, 135 Cal.App.4th at 1413 and 1427-1430.) Full capture systems, partial capture devices, and institutional controls are presently available to feasibly and practicably attain the interim and final effluent limitations, and it is anticipated that this order will precipitate additional innovations in control strategies and technologies, just as the adoption of the Trash TMDL resulted in the proffering and certification of seven full capture systems.

49. The Trash TMDL and this order include provisions that allow Permittees to be deemed in compliance with their effluent limitations through the installation of certain best management practices (certified full capture

systems). Any Permittee that is deemed in compliance through the use of certified full capture systems would not be in violation of the effluent limitations even if some trash is discharged in excess of the annual limitations.

50. The Trash TMDL includes provisions requiring its reconsideration after a trash reduction of 50% has been achieved and sustained in the watershed, which provides an opportunity to reexamine some of the assumptions of the TMDL after tangible and meaningful progress has been made in the watershed. (See Basin Plan, Table 7-2.3, fn. 2.) Should this reconsideration result in a modification to the final waste load allocations, the permit will be reopened pursuant to Part 6., paragraph I.1.b, to ensure the effluent limitations contained in Tables 1a and 1b of Appendix 7-1 are consistent with the assumptions and requirements of any revised waste load allocations. (40 CFR § 122.44(d)(1)(vii)(B).)

51. Depending upon the compliance strategy selected by each Permittee, compliance with the effluent limitations set forth in Appendix 7-1 may require a demonstration that the Permittee is in strict compliance with water quality standards. It remains the Permittee's choice, however, to comply via certified full capture systems (which do not require a demonstration of strict compliance with water quality standards), or partial capture devices and/or institutional controls.

52. Section 402(p)(3)(B)(iii) of the Clean Water Act, requires MS4 Permittees to reduce the pollutants in their storm water discharges to the "maximum extent practicable" (MEP). As set forth herein, "practicable" options presently exist to achieve compliance with the effluent limitations. Since the effluent limitations can be practicably achieved, their imposition is within the federally mandated MEP standard, and no analysis contemplated by *City of Burbank v. SWRCB* (2005) 35 Cal.4th 613 pursuant to Water Code section 13241 is necessary to support these effluent limitations.

53. In its discretion, the Regional Board may administratively impose civil liability of up to $10,000 for "each day in which the violation [of waste discharge requirements] occurs." (Wat. C. § 13385, subd (c).) Not every storm event may result in trash discharges. The Los Angeles River Trash TMDL adopted by the Regional Board states that improperly deposited trash is mobilized during storm events of greater than 0.25 inches of precipitation. Therefore, violations of the effluent limitations are limited to the days of a storm event of greater than 0.25 inches. Once a Permittee has violated the annual effluent limitation, any subsequent discharges of trash during any day of a storm event of greater than 0.25 inches during the same storm year constitutes an additional "day in which the violation [of the effluent limitation] occurs".

54. Unlike subdivision (c) of Water Code section 13385 where violations of effluent limitations are assessed on a per day basis, the mandatory minimum penalties subdivisions (Wat. Code § 13385, subd. (h) and (i))

require the Regional Board to assess mandatory minimum penalties for "each violation" of an effluent limitation. The effluent limitations in Appendix 7-1 are expressed as annual limitations. Therefore, there can be no more than one violation of each interim or final effluent limitation per year. Trash is considered a Group I pollutant, as specified in Appendix A to section 123.45 of Title 40 of the Code of Federal Regulations. Therefore, each annual violation of an effluent limitation in Appendix 7-1 by forty percent or more would be considered a "serious violation" under subdivision (h). With respect to the final effluent limitation of zero trash, any detectable discharge of trash necessarily is a serious violation, in accordance with the State Board's Enforcement Policy. Violations of the effluent limitations in Appendix 7-1 would not constitute "chronic" violations that would give rise to mandatory liability under subdivision (i) because four or more violations of the effluent limitations subject to a mandatory penalty cannot occur in a period of six consecutive months.

55. Therefore, the modifications to the Order include effluent limitations in a manner consistent with the assumptions and requirements of the WLAs from which they are derived as well as an allowance to comply with these effluent limitations [*i.e.* WLAs] through proper installation and maintenance of certified full capture systems.

56. Modifications consistent with the assumptions and requirements of the TMDL are therefore included in Parts 4 (Special Provisions) and 5 (Definitions) of this Order. Part 7 (Total Maximum Daily Load Provisions) is added to this Order and incorporates provisions to assure that Los Angeles County MS4 Permittees achieve the Waste Load Allocations (WLAs) and comply with other requirements of Total Maximum Daily Loads (TMDLs) covering impaired waters impacted by the Permittees' discharges. These modifications are made pursuant to 40 CFR sections 122.41(f), 122.44.(d)(1)(vii)(B), and 122.62, and Part 6.I.1 of this Order. Tables 7-2.1, 7-2.2, and 7-2.3 of the Basin Plan set forth the pertinent provisions of the Los Angeles River Watershed Trash TMDL. The interim and final effluent limitations consistent with the assumptions and requirements of the waste load allocations, and related provisions required of Permittees within the watershed are provided in Part 7 of this Order.

57. Permittees identified as responsible agencies in the Trash TMDL may achieve compliance with interim and final effluent limitations through progressive installation of BMPs meeting the definition of "full capture" throughout their jurisdictions' drainage areas. Alternatively, Permittees may install "partial capture" devices and/or implement institutional controls to meet their respective interim and final effluent limitations. Where partial capture devices are utilized as the sole trash control measure, the degree of compliance may be demonstrated based upon performance data specific to the jurisdictional area. However, compliance with the final effluent limitation cannot be achieved through the exclusive use of partial capture devices. Where a combination of partial capture

devices and institutional controls are used, compliance shall be determined based on the approximation of jurisdiction-specific trash discharges.

58. The Executive Officer will develop a standard reporting form, consistent with these provisions, which shall be used by Permittees to report compliance with the effluent limitations on an annual basis.

60. Pursuant to federal regulations at 40 CFR sections 124.8 and 125.56, a Fact Sheet was prepared to provide the basis for incorporating the Los Angeles River Watershed Trash TMDL into this Order. This Fact Sheet is hereby incorporated by reference into these findings.

F. Implementation

1. The California Environmental Quality Act (CEQA) (Cal. Pub. Resources Code § 21000 *et seq.*) requires that public agencies consider the environmental impacts of the projects they approve for development. CEQA applies to projects that are considered discretionary and does not apply to ministerial projects, which involve the use of established standards or objective measurements. A ministerial project may be made discretionary by adopting local ordinance provisions or imposing conditions to create decision-making discretion in approving the project. In the alternative, Permittees may establish standards and objective criteria administratively for storm water mitigation for ministerial projects. For water quality purposes, the Regional Board considers that all new development and significant redevelopment activity in specified categories, that receive approval or permits from a municipality, are subject to storm water mitigation requirements.

2. The objective of this Order is to protect the beneficial uses of receiving waters in Los Angeles County. To meet this objective, this Order requires that the SQMP specify BMPs that will be implemented to reduce the discharge of pollutants in storm water to the maximum extent practicable. Further, Permittees are to assure that storm water discharges from the MS4 shall neither cause nor contribute to the exceedance of water quality standards and objectives nor create conditions of nuisance in the receiving waters, and that the discharge of non-storm water to the MS4 has been effectively prohibited.

3. The SQMP required in this Order builds upon the programs established in Order Nos. 90-079, and 96-054, consists of the components recommended in the USEPA guidance manual, and was developed with the cooperation of representatives from the regulated community and environmental groups. The SQMP includes provisions that promote customized initiatives, both on a countywide and watershed basis, in developing and implementing cost-effective measures to minimize discharge of pollutants to the receiving water. The various components of the SQMP, taken as a whole rather than individually, are expected to reduce pollutants in storm water and urban runoff to the maximum extent

practicable. Provisions of the SQMP are fully enforceable under provisions of this Order.

4. The emphasis of the SQMP is pollution prevention through education, public outreach, planning, and implementation as source control BMPs first and then Structural and Treatment Control BMPs next. Successful implementation of the provisions of the SQMP will require cooperation and coordination of all public agencies in each Permittee's organization, among Permittees, and with the regulated community.

5. The implementation of a Public Information and Participation Program is a critical component of a storm water management program. An informed and knowledgeable community is critical to the success of a storm water management program since it helps insure the following: (i) greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, and (ii) greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

6. This Order includes a Monitoring Program that incorporates Minimum Levels (MLs) established under the SIP. The SIP's MLs represent the lowest quantifiable concentration for priority toxic pollutants that is measurable with the use of proper method-based analytical procedures and factoring out matrix interference. The SIP's MLs therefore represent the best available science for determining MLs and are appropriate for a storm water monitoring program. The use of MLs allows the detection of toxic priority pollutants at concentrations of concern using recent advances in chemical analytical methods.

7. This Order provides flexibility for Permittees to petition the Regional Board Executive Officer to substitute a BMP under the SQMP with an alternative BMP, if they can provide information and documentation on the effectiveness of the alternative, equal to or greater than the prescribed BMP in meeting the objectives of this Order.

8. This Order contemplates that the Permittees are responsible for considering potential storm water impacts when making planning decisions in order to fulfill the Permittees' CWA requirement to reduce the discharge of pollutants in municipal storm water to the MEP from new development and redevelopment activities. However, the Permittees retain authority to make the final land-use decisions and retain full statutory authority for deciding what land uses are appropriate at specific locations within each Permittee's jurisdiction. This Order and its requirements are not intended to restrict or control local land use decision-making authority.

9. This Order is not intended to prohibit the inspection for or abatement of vectors by the State Department of Health Services or local vector agencies in accordance with Cal. Health and Safety Code § 2270 *et seq*. and §116110 *et seq*. Certain Treatment Control BMPs if not properly

designed, operated or maintained may create habitats for vectors (e.g. mosquito and rodents). This Order contemplates that the Permittees will closely cooperate and collaborate with local vector control agencies and the State Department of Health Services for the implementation, operation, and maintenance of Treatment Control BMPs in order to minimize the risk to public health from vector borne diseases.

G. Public Process

1. The Regional Board has notified the Permittees and interested agencies and persons of its intent to issue waste discharge requirements for this discharge, and has provided them with an opportunity to submit their written view and recommendations.

2. The Regional Board, in a public hearing, heard and considered all comments pertaining to the discharge and to the tentative requirements.

3. The Regional Board has conducted public workshops to discuss drafts of the permit. On April 24, 2001, Regional Board staff conducted a workshop outlining the reasoning behind the changes proposed for the new permit and received input from the Permittees and the public regarding those proposed changes. On July 26, 2001, a second public workshop was held at a special Regional Board meeting. The Permittees and the public had another opportunity to express their opinions regarding the proposed changes to the permit in front of the Regional Board members. A significant number of working meetings with the Permittees and other interested parties have occurred throughout the period from the submittal of the ROWD and completion of the tentative draft, in an attempt to incorporate and address all the comments presented.

4. The Los Angeles County Flood Control District, the County of Los Angeles and the other municipalities are co-permittees as defined in 40 CFR 122.26 (b)(1). Los Angeles County Flood Control District will coordinate with the other municipalities and facilitate program implementation. Each Permittee is responsible only for a discharge for which it is the operator.

5. This Order shall serve as a NPDES Permit, pursuant to CWA § 402, or amendments thereto, and shall take effect 50 days from Order adoption provided the Regional Administrator of the USEPA has no objections.

6. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA (Cal. Pub. Resources Code § 21100 *et seq.*), in accordance with CWC § 13389.

7. Pursuant to CWC §13320, any aggrieved party may seek review of this Order by filing a petition with the State Board. A petition must be sent to: State Water Resources Control Board, P.O. Box 100, Sacramento, California, 95812, within 30 days of adoption of the Order by the Regional Board.

8. This Order may be modified or alternatively revoked or reissued prior to its expiration date, in accordance with the procedural requirements of the NPDES program, and the CWC for the issuance of waste discharge requirements.

IT IS HEREBY ORDERED that the Los Angeles County Flood Control District, Los Angeles County, and the Cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bell, Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Cañada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA, as amended, and regulations and guidelines adopted thereunder, shall comply with the following:

Part 1. DISCHARGE PROHIBITIONS

Part 1. A. The Permittees shall effectively prohibit non-storm water discharges into the MS4 and watercourses, except where such discharges:

1. Are covered by a separate individual or general NPDES permit for non-storm water discharges; or

2. Fall within one of the categories below, and meet all conditions when specified by the Regional Board Executive Officer:

    a) Category A - Natural flow:

        (1) Natural springs and rising ground water;

        (2) Flows from riparian habitats or wetlands;

        (3) Stream diversions, permitted by the State Board; and

        (4) Uncontaminated ground water infiltration [as defined by 40 CFR 35.2005(20)].

    b) Category B - Flows from emergency fire fighting activity.

    c) Category C - Flows incidental to urban activities:

        (1) Reclaimed and potable landscape irrigation runoff;

(2) Potable drinking water supply and distribution system releases (consistent with American Water Works Association guidelines for dechlorination and suspended solids reduction practices);

(3) Drains for foundations, footings, and crawl spaces;

(4) Air conditioning condensate;

(5) Dechlorinated/debrominated swimming pool discharges;

(6) Dewatering of lakes and decorative fountains;

(7) Non-commercial car washing by residents or by non-profit organizations; and

(8) Sidewalk rinsing.

The Regional Board Executive Officer may add or remove categories of non-storm water discharges above. Furthermore, in the event that any of the above categories of non-storm water discharges are determined to be a source of pollutants by the Regional Board Executive Officer, the discharge will no longer be exempt from this prohibition unless the Permittee implements conditions approved by the Regional Board Executive Officer to ensure that the discharge is not a source of pollutants. Notwithstanding the above, the Regional Board Executive Officer may impose additional prohibitions of non-storm water discharges in consideration of antidegradation policies and TMDLs.

Part 1. B. Discharges of Summer Dry Weather flows from MS4s[3] into Marina del Rey Harbor Basins D, E, or F, including Mothers' Beach, that cause or contribute to exceedances of the bacteria Receiving Water Limitations in Part 2.6 below, are prohibited.[4]

Part 2. RECEIVING WATER LIMITATIONS

1. Except as provided in Part 2.6 below, discharges from the MS4 that cause or contribute to the violation of Water Quality Standards or water quality objectives are prohibited.

2. Discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible for, shall not cause or contribute to a condition of nuisance.

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[3] [Intentionally left blank]

[4] Responsibility for such prohibited discharges is determined as indicated in Footnote 2 part (1) of Table 7-5.1 of the Basin Plan. All Permittees within a subwatershed are jointly responsible for compliance with the limitations imposed in Table 7-5.1 of the Basin Plan.

3. The Permittees shall comply with Part 2.1. and 2.2. through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SQMP and its components and other requirements of this Order including any modifications. The SQMP and its components shall be designed to achieve compliance with receiving water limitations. If exceedances of Water Quality Objectives or Water Quality Standards (collectively, Water Quality Standards) persist, notwithstanding implementation of the SQMP and its components and other requirements of this permit, the Permittee shall assure compliance with discharge prohibitions and receiving water limitations by complying with the following procedure:

   a) Upon a determination by either the Permittee or the Regional Board that discharges are causing or contributing to an exceedance of an applicable Water Quality Standard, the Permittee shall promptly notify and thereafter submit a Receiving Water Limitations (RWL) Compliance Report (as described in the Program Reporting Requirements, Section I of the Monitoring and Reporting Program) to the Regional Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedances of Water Quality Standards. This RWL Compliance Report may be incorporated in the annual Storm Water Report and Assessment unless the Regional Board directs an earlier submittal. The RWL Compliance Report shall include an implementation schedule. The Regional Board may require modifications to the RWL Compliance Report.

   b) Submit any modifications to the RWL Compliance Report required by the Regional Board within 30 days of notification.

   c) Within 30 days following the approval of the RWL Compliance Report, the Permittee shall revise the SQMP and its components and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, an implementation schedule, and any additional monitoring required.

   d) Implement the revised SQMP and its components and monitoring program according to the approved schedule.

4. So long as the Permittee has complied with the procedures set forth above and is implementing the revised SQMP and its components, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Board to develop additional BMPs.

5. [Intentionally left blank][5]

6. During Summer Dry Weather there shall be no discharges of bacteria from MS4s

[5] [Intentionally left blank]

into Marina del Rey Harbor Basins D, E, or F, including Mothers' Beach that cause or contribute to exceedances of the applicable bacteria objectives. The applicable bacteria objectives include both the single sample and geometric mean bacteria objectives set to protect the Water Contact Recreation (REC-1) beneficial use, as set forth in the Basin Plan.[6]

Part 3. STORM WATER QUALITY MANAGEMENT PROGRAM (SQMP) IMPLEMENTATION

A. General Requirements

1. Each Permittee shall, at a minimum, implement the SQMP. The SQMP is an enforceable element of this Order. The SQMP shall be implemented no later than February 1, 2002, unless a later date has been specified for a particular provision in this Order.

2. The SQMP shall, at a minimum, comply with the applicable storm water program requirements of 40 CFR 122.26(d)(2). The SQMP and its components shall be implemented so as to reduce the discharges of pollutants in storm water to the MEP.

3. Each Permittee shall implement additional controls, where necessary, to reduce the discharges of pollutants in storm water to the MEP.

4. Permittees that modify the countywide SQMP (i.e., implement additional controls, implement different controls than described in the countywide SQMP, or determine that certain BMPs in the countywide SQMP are not applicable in the area under its jurisdiction), shall develop a local SQMP, no later than August 1, 2002. The local SQMP shall be customized to reflect the conditions in the area under the Permittee's jurisdiction and shall specify activities being implemented under the appropriate elements described in the countywide SQMP.

B. Best Management Practice Implementation

The Permittees shall implement or require the implementation of the most effective combination of BMPs for storm water/urban runoff pollution control. When implemented, BMPs are intended to result in the reduction of pollutants in storm water to the MEP.

C. Revision of the Storm Water Quality Management Program

The Permittees shall revise the SQMP, at the direction of the Regional Board Executive Officer, to incorporate program implementation amendments so as to comply with regional, watershed specific requirements, and/or waste load

[6] Samples collected for determining compliance with the receiving water limitations of Part 2.6 shall be processed in accordance with the sampling procedures and analytical methodology set forth in the *Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Shoreline Monitoring Plan* dated April 13, 2007 and the Monitoring and Reporting Program CI 6948.

allocations developed and approved pursuant to the process for the designation and implementation of Total Maximum Daily Loads (TMDLs) for impaired water bodies.

D. Designation and Responsibilities of the Principal Permittee

The Los Angeles County Flood Control District is hereby designated as the Principal Permittee. As such, the Principal Permittee shall:

1. Coordinate and facilitate activities necessary to comply with the requirements of this Order, but is not responsible for ensuring compliance of any individual Permittee;
2. Coordinate permit activities among Permittees and act as liaison between Permittees and the Regional Board on permitting issues;
3. Provide personnel and fiscal resources for the necessary updates of the SQMP and its components;
4. Provide technical and administrative support for committees that will be organized to implement the SQMP and its components;
5. Convene the Watershed Management Committees (WMCs) constituted pursuant to Part F, below, upon designation of representatives;
6. Implement the Countywide Monitoring Program required under this Order and evaluate, assess and synthesize the results of the monitoring program;
7. Provide personnel and fiscal resources for the collection, processing and submittal to the Regional Board of annual reports and summaries of other reports required under the SQMP; and
8. Comply with the "Responsibilities of the Permittees" in Part 3.E., below.

E. Responsibilities of the Permittees

Each Permittee is required to comply with the requirements of this Order applicable to discharges within its boundaries (see Findings D.1, D.2. and D.3.) and not for the implementation of the provisions applicable to the Principal Permittee or other Permittees. Each Permittee shall, within its geographic jurisdiction:

1. Comply with the requirements of the SQMP and any modifications thereto;
2. Coordinate among its internal departments and agencies, as appropriate, to facilitate the implementation of the requirements of the SQMP applicable to such Permittee in an efficient and cost-effective manner;
3. Designate a technically knowledgeable representative to the appropriate WMC;

4. Participate in intra-agency coordination (e.g. Fire Department, Building and Safety, Code Enforcement, Public Health, etc.) necessary to successfully implement the provisions of this Order and the SQMP.

5. Prepare an annual Budget Summary of expenditures applied to the storm water management program. This summary shall identify the storm water budget for the following year, using estimated percentages and written explanations where necessary, for the specific categories noted below:

   a) Program management
      - Administrative costs

   b) Program Implementation
      Where information is available, provide an estimated percent breakdown of expenditures for the categories below:
      - Illicit connection/illicit discharge
      - Development planning
      - Development construction
      - Construction inspection activities
      - Industrial/Commercial inspection activities
      - Public Agency Activities
        - Maintenance of Structural BMPs and Treatment Control BMPs
        - Municipal Street Sweeping
        - Catch basin clean-up
        - Trash collection
        - Capital costs

   c) Public Information and Participation

   d) Monitoring Program

   e) Miscellaneous Expenditures

6. Each Permittee, in addition to the Budget Summary, shall report any supplemental dedicated budgets for the same categories.

F. Watershed Management Committees (WMCs)

1. Each WMC shall be comprised of a voting representative from each Permittee in the WMA.

2. The WMC's chair and secretary shall be chosen by the WMC upon Order adoption and on an annual basis, thereafter. In the absence of volunteer Permittee(s) for the positions, the Principal Permittee shall assume those roles until the WMC chooses members of the committee for the positions.

3. Each WMC shall:

   a) Facilitate cooperation and exchange of information among Permittees;

b) Establish additional goals and objectives and associated deadlines for the WMA, as the program implementation progresses;

c) Prioritize pollution control efforts based on beneficial use impairment(s), watershed characteristics and analysis of results from studies and the monitoring program;

d) Develop and/or update and monitor the adequate implementation, on an annual basis, of the tasks identified for the WMA;

e) Assess the effectiveness of, prepare revisions for, and recommend appropriate changes to the SQMP and its components;

f) Continue to prioritize the Industrial/Commercial critical sources for investigation, outreach and follow-up; and

g) Meet four times per year and, as necessary.

G. Legal Authority

1. Permittees shall possess the necessary legal authority to prohibit non-storm water discharges to the storm drain system, including, but not limited to:

   a) Illicit discharges and illicit connections and require removal of illicit connections;

   b) The discharge of wash waters to the MS4 from the cleaning of gas stations, auto repair garages, or other types of automotive service facilities;

   c) The discharge of runoff to the MS4 from mobile auto washing, steam cleaning, mobile carpet cleaning, and other such mobile commercial and industrial operations;

   d) The discharge of runoff to the MS4 from areas where repair of machinery and equipment which are visibly leaking oil, fluid or antifreeze, is undertaken;

   e) The discharge of runoff to the MS4 from storage areas of materials containing grease, oil, or other hazardous substances, and uncovered receptacles containing hazardous materials;

   f) The discharge of chlorinated/ brominated swimming pool water and filter backwash to the MS4;

   g) The discharge of runoff from the washing of toxic materials from paved or unpaved areas to the MS4;

   h) Washing impervious surfaces in industrial/commercial areas that results in a discharge of runoff to the MS4;

i) The discharge of concrete or cement laden wash water from concrete trucks, pumps, tools, and equipment to the MS4; and

j) Dumping or disposal of materials into the MS4 other than storm water, such as:

(1) Litter, landscape debris and construction debris;

(2) Any state or federally banned or unregistered pesticides;

(3) Food and food processing wastes; and

(4) Fuel and chemical wastes, animal wastes, garbage, batteries, and other materials that have potential adverse impacts on water quality.

2. The Permittees shall possess adequate legal authority to:

a) Require persons within their jurisdiction to comply with conditions in Permittees' ordinances, permits, contracts, model programs, or orders (i.e. hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

b) Utilize enforcement mechanisms to require compliance with Permittees ordinances, permits, contracts, or orders;

c) Control pollutants, including potential contribution, in discharges of storm water runoff associated with industrial activities (including construction activities) to its MS4 and control the quality of storm water runoff from industrial sites (including construction sites). This requirement applies to Source Control, and Treatment Control BMPs;

d) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions, including the prohibition of illicit discharges to the MS4. Permittees must possess authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities (including construction sites) discharging polluted or with the potential to discharge polluted storm water runoff into its MS4;

e) Require the use of BMPs to prevent or reduce the discharge of pollutants to MS4s to MEP; and

f) Require that Treatment Control BMPs be properly operated and maintained to prevent the breeding of vectors.

3. Each Permittee shall, no later than November 1, 2002, amend and adopt (if necessary), a Permittee-specific storm water and urban runoff ordinance to enforce all requirements of this permit.

4. Each Permittee shall submit no later than December 2, 2002, a new or updated statement by its legal counsel that the Permittee has obtained all

necessary legal authority to comply with this Order through adoption of ordinances and/or municipal code modifications.

Part 4. SPECIAL PROVISIONS

Maximum Extent Practicable Standard

This permit, and the provisions herein, are intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the MEP from the permitted areas in the County of Los Angeles to the waters of the State.

A. General Requirements

1. Best Management Practice Substitution

   The Regional Board Executive Officer may approve any site-specific BMP substitution upon petition by a Permittee(s), if the Permittee can document that:

   a) The proposed alternative BMP or program will meet or exceed the objective of the original BMP or program in the reduction of storm water pollutants; or

   b) The fiscal burden of the original BMP or program is substantially greater than the proposed alternative and does not achieve a substantially greater improvement in storm water quality; and,

   c) The proposed alternative BMP or program will be implemented within a similar period of time.

B. Public Information and Participation Program (PIPP)

The Principal Permittee shall implement a Public Information and Participation Program (PIPP) that includes, but is not limited to, the requirements listed in this section. The Principal Permittee shall be responsible for developing and implementing the Public Education Program, as described in the SQMP, and shall coordinate with Permittees to implement specific requirements.

The objectives of the PIPP are as follows:

- To measurably increase the knowledge of the target audiences regarding the MS4, the impacts of storm water pollution on receiving waters, and potential solutions to mitigate the problems caused;
- To measurably change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and
- To involve and engage socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of storm water pollution.

The Principal Permittee shall convene an advisory committee to provide input and assistance in meeting the goals and objectives of the public education campaign. The advisory committee shall be consulted during the process of developing the PIPP campaign, and shall provide comments and advice during the process of preparing a Request For Proposals for a storm water public education contractor. The committee may participate as a part of a working group that evaluates contractor proposals and other tasks as appropriate. The committee shall be comprised of representatives of the environmental community, Permittee cities, Regional Board staff, and experts in the fields of public education and marketing. The Principal Permittee shall ensure that the committee meets at least once a year.

1. Residential Program

a) "No Dumping" Message

Each Permittee shall mark all storm drain inlets that they own with a legible “no dumping” message. In addition, signs with prohibitive language discouraging illegal dumping must be posted at designated public access points to creeks, other relevant water bodies, and channels no later than February 2, 2004. Signage and storm drain messages shall be legible and maintained as necessary during the term of the permit.

b) Countywide Hotline

The 888-CLEAN-LA hotline will serve as the general public reporting contact for reporting clogged catch basin inlets and illicit discharges/dumping, faded or lack of catch basin stencils, and general storm water management information. Each Permittee may establish its own hotline if preferred. Permittees shall include this information, updated when necessary, in public information, and the government pages of the telephone book, as they are developed or published. The Principal Permittee shall compile a list of the general public reporting contacts from all Permittees and make this information available on the web site (888CleanLA.com) and upon request. Permittees shall provide the Principal Permittee with their reporting contacts no later than March 1, 2002. Permittees are responsible for providing current, updated information to the Principal Permittee.

c) Outreach and Education

(1) The Principal Permittee shall continue to implement the following activities that were components of the first five-year PIPP:

(i) Advertising;

(ii) Media relations;

(iii) Public service announcements;

(iv) "How To" instructional material distributed in a targeted and activity-related manner;

(v) Corporate, community association, environmental organization and entertainment industry tie-ins; and

(vi) Events targeted to specific activities and population subgroups.

(2) The Principal Permittee shall develop a strategy to educate ethnic communities and businesses through culturally effective methods. Details of this strategy should be incorporated into the Public Education Program, and implemented, no later than February 3, 2003.

(3) The Principal Permittee shall enhance the existing outreach efforts to residents and businesses related to the proper disposal of cigarette butts.

(4) Each Permittee shall conduct educational activities within its jurisdiction and participate in countywide events.

(5) The Principal Permittee shall organize Public Outreach Strategy meetings for Permittees on a quarterly basis, beginning no later than May 1, 2002. The Principal Permittee shall provide guidance for Permittees to augment the countywide outreach and education program. Permittees shall coordinate regional and local outreach and education to reduce duplication of efforts. Permittees are encouraged to include other interested parties in the outreach strategy to strengthen and coordinate educational efforts.

(6) The Principal Permittee shall ensure that a minimum of 35 million impressions per year are made on the general public about storm water quality via print, local TV access, local radio, or other appropriate media.

(7) The Principal Permittee, in cooperation with the Permittees, shall provide schools within each School District in the County with materials, including, but not limited to, videos, live presentations, and other information necessary to educate a minimum of 50 percent of all school children (K-12) every 2 years on storm water pollution.

(8) Permittees shall provide the contact information for their appropriate staff responsible for storm water public education activities to the Principal Permittee no later than April 1, 2002, and changes to contact information no later than 30 days after a change occurs.

(9) The Principal Permittee shall develop a strategy to measure the effectiveness of in-school educational programs. The protocol shall include assessment of students' knowledge of storm water pollution problems and

solutions before and after educational efforts are conducted. The protocol shall be developed and submitted to the Regional Board Executive Officer for approval no later than May 1, 2002. It shall be implemented upon approval.

(10) In order to ensure that the PIPP is demonstrably effective in changing the behavior of the public, the Principal Permittee shall develop a behavioral change assessment strategy no later than May 1, 2002. The strategy shall be developed based on sociological data and studies (such as the County Segmentation Study). The Principal Permittee shall submit the assessment strategy to the Regional Board Executive Office for approval. It shall be implemented on approval.

d) Pollutant-Specific Outreach

The Principal Permittee, in cooperation with Permittees, shall coordinate to develop outreach programs that focus on the watershed-specific pollutants listed in Table 1 no later than February 3, 2003. Metals may be appropriately addressed through the Industrial/Commercial Facilities Program (e.g. distribute education materials on appropriate BMPs for metal waste management to facilities that have been identified as a potential source, such as metal fabricating facilities). Region-wide pollutants may be included in the Principal Permittee's mass media outreach efforts.

Table 1.

Watershed	***Target Pollutants for Outreach***
Ballona Creek	Trash, Indicator Bacteria, Metals, PAHs
Malibu Creek	Trash, Nutrients (Nitrogen), Indicator Bacteria, Sediments
Los Angeles River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals, Pesticides, PAHs
San Gabriel River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals
Santa Clara River	Nutrients (Nitrogen), Coliform
Dominguez Channel	Trash, Indicator Bacteria, PAHs

Each Permittee shall make outreach materials available to the general public and target audiences, such as schools, community groups, contractors and developers, and at appropriate public counters and events. Outreach material shall include information on pollutants, sources of concern, and source abatement measures.

2. Businesses Program

a) Corporate Outreach

The Principal Permittee shall develop and implement a Corporate Outreach program to educate and inform corporate managers about storm water regulations. The program shall target RGOs and restaurant chains. At a minimum, this program shall include:

(1) Conferring with corporate management to explain storm water regulations;

(2) Distribution and discussion of educational material regarding storm water pollution and BMPs, and provide managers with suggestions to facilitate employee compliance with storm water regulations.

Corporate Outreach for all RGOs and restaurant chain corporations shall be conducted not less than twice during the permit term, with the first outreach contact to begin no later than February 3, 2003.

b) Business Assistance Program

The Principal Permittee and Permittees may implement a Business Assistance Program to provide technical resource assistance to small businesses to advise them on BMPs implementation to reduce the discharge of pollutants in storm water runoff. Programs may include:

(1) On-site technical assistance or consultation via telephone to identify and implement storm water pollution prevention methods and best management practices; and

(2) Making available, distributing, and discussing of applicable BMP and educational materials.

C. Industrial/Commercial Facilities Control Program

Each Permittee shall require implementation of pollutant reduction and control measures at industrial and commercial facilities, with the objective of reducing pollutants in storm water runoff. Except as specified in other sections of this Order, pollutant reduction and control measures can be used alone or in combination, and can include Structural and Source Control BMPs, and operation and maintenance procedures, which can be applied before, during, and/or after pollution generating activities. At a minimum, the Industrial/Commercial Facilities Control Program shall include requirements to: (1) track, (2) inspect, and (3) ensure compliance at industrial and commercial facilities that are critical sources of pollutants in storm water.

1. Track Critical Sources

a) Each Permittee shall maintain a watershed-based inventory or database of all facilities within its jurisdiction that are critical sources of storm water pollution. Critical sources to be tracked are summarized below, and also specified in Attachment B:

(1) Commercial Facilities

- restaurants;
- automotive service facilities; and
- RGOs and automotive dealerships.

(2) USEPA Phase I Facilities (Tier 1 and 2)

(3) Other Federally-mandated Facilities [as specified in 40 CFR 122.26(d)(2)(iv)(C)]

- municipal landfills;
- hazardous waste treatment, disposal, and recovery facilities; and
- facilities subject to SARA Title III (also known as EPCRA).

b) Each Permittee shall include the following minimum fields of information for each industrial and commercial facility:

- name of facility and name of owner/operator;
- address;
- coverage under the GIASP or other individual or general NPDES permits; and
- a narrative description including SIC codes that best reflects the industrial activities at and principal products of each facility.

The Regional Board encourages Permittees to add other fields of information, such as material usage and/or industrial output, and discrepancies between SIC Code designations (as reported by facility operators) and the actual type of industrial activity has the potential to pollute storm water. In addition, the Regional Board recommends use of an automated database system, such as a Geographical Information System (GIS) or Internet-based system; however, this is not required.

c) Each Permittee shall update its inventory of critical sources at least annually. The update may be accomplished through collection of new information obtained through field activities or through other readily available intra-agency informational databases (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits).

2. Inspect Critical Sources

Each Permittee shall inspect all facilities in the categories and at a level and frequency as specified in the following subsections.

a) Commercial Facilities

(1) Restaurants

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee, in cooperation with its appropriate department (such as health or public works), shall inspect all restaurants within its jurisdiction to confirm that storm water BMPs are being effectively implemented in compliance with State law, County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each restaurant, inspectors shall verify that the restaurant operator:

- has received educational materials on storm water pollution prevention practices;
- does not pour oil and grease or oil and grease residue onto a parking lot, street or adjacent catch basin;
- keeps the trash bin area clean and trash bin lids closed, and does not fill trash bins with washout water or any other liquid;
- does not allow illicit discharges, such as discharge of washwater from floormats, floors, porches, parking lots, alleys, sidewalks and street areas (in the immediate vicinity of the establishment), filters or garbage/trash containers;
- removes food waste, rubbish or other materials from parking lot areas in a sanitary manner that does not create a nuisance or discharge to the storm drain.

(2) Automotive Service Facilities

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee shall inspect all automotive service facilities within its jurisdiction to confirm that storm water BMPs are effectively implemented in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each automotive service facility, inspectors shall verify that each operator:

- maintains the facility area so that it is clean and dry and without evidence of excessive staining;
- implements housekeeping BMPs to prevent spills and leaks;
- properly discharges wastewaters to a sanitary sewer and/or contains wastewaters for transfer to a legal point of disposal;
- is aware of the prohibition on discharge of non-storm water to the storm drain;
- properly manages raw and waste materials including proper disposal of hazardous waste;
- protects outdoor work and storage areas to prevent contact of pollutants with rainfall and runoff;
- labels, inspects, and routinely cleans storm drain inlets that are located on the facility's property; and
- trains employees to implement storm water pollution prevention practices.

(3) Retail Gasoline Outlets and Automotive Dealerships

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that BMPs are being effectively implemented at each RGO and automotive dealership within its jurisdiction, in compliance with the SQMP, Regional Board Resolution 98-08, and the Stormwater Quality Task Force Best Management Practice Guide for RGOs. At each RGO and automotive dealership, inspectors shall verify that each operator:

- routinely sweeps fuel-dispensing areas for removal of litter and debris, and keeps rags and absorbents ready for use in case of leaks and spills;
- is aware that washdown of facility area to the storm drain is prohibited;
- is aware of design flaws (such as grading that doesn't prevent run-on, or inadequate roof covers and berms), and that equivalent BMPs are implemented;
- inspects and cleans storm drain inlets and catch basins within each facility's boundaries no later than October 1st of each year;

- posts signs close to fuel dispensers, which warn vehicle owners/operators against "topping off" of vehicle fuel tanks and installation of automatic shutoff fuel dispensing nozzles;
- routinely checks outdoor waste receptacle and air/water supply areas, cleans leaks and drips, and ensures that only watertight waste receptacles are used and that lids are closed; and
- trains employees to properly manage hazardous materials and wastes as well as to implement other storm water pollution prevention practices.

b) Phase I Facilities

Permittees need not inspect facilities that have been inspected by the Regional Board within the past 24 months. For the remaining Phase I facilities that the Regional Board has not inspected, each Permittee shall conduct compliance inspections as specified below.

Frequency of Inspection

Facilities in Tier 1 Categories: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Facilities in Tier 2 Categories: Twice during the 5-year term of the permit, provided that the first inspection occurs no later than August 1, 2004. Permittees need not perform additional inspections at those facilities determined to have no risk of exposure of industrial activity to storm water. For those facilities that do have exposure of industrial activities to storm water, a Permittee may reduce the frequency of additional compliance inspections to once every 5 years, provided that the Permittee inspects at least 20% of the facilities in Tier 2 each year.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

c) Other Federally-mandated Facilities

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

3. Ensure Compliance of Critical Sources

a) **BMP Implementation:** In the event that a Permittee determines that a BMP specified by the SQMP or Regional Board Resolution 98-08 is infeasible at any site, that Permittee shall require implementation of other BMPs that will achieve the equivalent reduction of pollutants in the storm water discharges. Likewise, for those BMPs that are not adequate to achieve water quality objectives, Permittees may require additional site-specific controls, such as Treatment Control BMPs.

b) **Environmentally Sensitive Areas and Impaired Waters:** For critical sources that are in ESAs or that are tributary to CWA § 303(d) impaired water bodies, Permittees shall consider requiring operators to implement additional controls to reduce pollutants in storm water runoff that are causing or contributing to the exceedences of Water Quality Objectives.

c) **Progressive Enforcement:** Each Permittee shall implement a progressive enforcement policy to ensure that facilities are brought into compliance with all storm water requirements within a reasonable time period as specified below.

(1) In the event that a Permittee determines, based on an inspection conducted above, that an operator has failed to adequately implement all necessary BMPs, that Permittee shall take progressive enforcement action which, at a minimum, shall include a follow-up inspection within 4 weeks from the date of the initial inspection.

(2) In the event that a Permittee determines that an operator has failed to adequately implement BMPs after a follow-up inspection, that Permittee shall take further enforcement action as established through authority in its municipal code and ordinances or through the judicial system.

(3) Each Permittee shall maintain records, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.

d) Interagency Coordination

(1) **Referral of Violations of the SQMP, Regional Board Resolution 98-08, and Municipal Storm Water Ordinances:** A Permittee may refer a violation(s) to the Regional Board provided that that Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

(2) **Referral of Violations of the GIASP, including Requirements to File a Notice of Intent:** For those facilities in violation of the GIASP, Permittees may escalate referral of such violations to the Regional Board after one inspection and one written notice to the operator regarding the violation. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Name of the facility;
- Operator of the facility;
- Owner of the facility;
- Industrial activity being conducted at the facility that is subject to the GIASP; and
- Records of communication with the facility operator regarding the violation, which shall include at least an inspection report and one written notice of the violation.

Permittees shall, at a minimum, make such referrals on a quarterly basis.

(3) **Investigation of Complaints Regarding Facilities – Transmitted by the Regional Board Staff:** Each Permittee shall initiate, within one business day, investigation of complaints (other than non-storm water discharges) regarding facilities within its jurisdiction. The initial investigation shall include, at a minimum, a limited

inspection of the facility to confirm the complaint to determine if the facility is effectively complying with the SQMP and municipal storm water/urban runoff ordinances, and to oversee corrective action.

(4) **Support of Regional Board Enforcement Actions:** As directed by the Regional Board Executive Officer, Permittees shall support Regional Board enforcement actions by: assisting in identification of current owners, operators, and lessees of facilities; providing staff, when available, for joint inspections with Regional Board inspectors; appearing as witnesses in Regional Board enforcement hearings; and providing copies of inspection reports and other progressive enforcement documentation.

(5) **Participation in a Task Force:** The Permittees, Regional Board, and other stakeholders may form a Storm Water Task Force, the purpose of which is to communicate concerns regarding special cases of storm water violations by industrial and commercial facilities and to develop a coordinated approach to enforcement action.

D. Development Planning Program

The Permittees shall implement a development-planning program that will require all Planning Priority development and Redevelopment projects to:

- Minimize impacts from storm water and urban runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances ;
- Maximize the percentage of pervious surfaces to allow percolation of storm water into the ground;
- Minimize the quantity of storm water directed to impervious surfaces and the MS4;
- Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices;
- Properly design and maintain Treatment Control BMPs in a manner that does not promote the breeding of vectors; and
- Provide for appropriate permanent measures to reduce storm water pollutant loads in storm water from the development site.

1. Peak Flow Control

The Permittees shall control post-development peak storm water runoff discharge rates, velocities, and duration (peak flow control) in Natural

Drainage Systems (i.e., mimic pre-development hydrology) to prevent accelerated stream erosion and to protect stream habitat. Natural Drainage Systems are located in the following areas:

a) Malibu Creek;

b) Topanga Canyon Creek;

c) Upper Los Angeles River;

d) Upper San Gabriel River;

e) Santa Clara River; and

f) Los Angeles County Coastal streams (see Basin Plan Table 2-1).

The Principal Permittee in consultation with Permittees shall develop numerical criteria for peak flow control, based on the results of the Peak Discharge Impact Study (see Monitoring Program Section II.I).

Each Permittee shall, no later than February 1, 2005, implement numerical criteria for peak flow control.

A Permittee or group of Permittees may substitute for the countywide peak flow control criteria with a Hydromodification Control Plan (HCP), on approval by the Regional Board, in the following circumstances:

(1) Stream or watershed-specific conditions indicate the need for a different peak flow control criteria, and the alternative numerical criteria is developed through the application of hydrologic modeling and supporting field observations; or

(2) A watershed-wide plan has been developed for implementation of control measures to reduce erosion and stabilize drainage systems on a watershed basis.

2. Standard Urban Storm Water Mitigation Plans (SUSMPs)

a) Each Permittee shall amend codes and ordinances not later than August 1, 2002 to give legal effect to SUSMP changes contained in this Order. Changes to SUSMP requirements shall take effect not later than September 2, 2002.

b) Each Permittee shall require that a single-family hillside home:

(1) Conserve natural areas;

(2) Protect slopes and channels;

(3) Provide storm drain system stenciling and signage;

(4) Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

(5) Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

c) Each Permittee shall require that a SUSMP as approved by the Regional Board in Board Resolution No. R 00-02 be implemented for the following categories of developments:

(1) Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments);

(2) A 100,000 or more square feet of impervious surface area industrial/ commercial development;

(3) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539);

(4) Retail gasoline outlets;

(5) Restaurants (SIC 5812);

(6) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces; and

(7) Redevelopment projects in subject categories that meet Redevelopment thresholds.

d) Each Permittee shall submit an ESA Delineation Map for its jurisdictional boundary, based on the Regional Board's ESA Definition, no later than June 3, 2002, for approval by the Regional Board Executive Officer in consultation with the California Department of Fish and Game, and the California Coastal Commission.

e) Each Permittee shall require the implementation of SUSMP provisions no later than September 2, 2002, for all projects located in or directly adjacent to or discharging directly to an ESA, where the development will:

(1) Discharge storm water and urban runoff that is likely to impact a sensitive biological species or habitat; and

(2) Create 2,500 square feet or more of impervious surface area.

3. Numerical Design Criteria

The Permittees shall require that post-construction Treatment Control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

a) Volumetric Treatment Control BMP

(1) The 85^{th} percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from

the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998*); or

(2) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook – Industrial/ Commercial,* (1993); or

(3) The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system; or

(4) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85^{th} percentile 24-hour runoff event.

b) Flow Based Treatment Control BMP

(1) The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

(2) The flow of runoff produced from a rain event equal to at least two times the 85^{th} percentile hourly rainfall intensity for Los Angeles County; or

(3) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

4. Applicability of Numerical Design Criteria

The Permittees shall require the following categories of Planning Priority Projects to design and implement post-construction treatment controls to mitigate storm water pollution:

a) Single-family hillside residential developments of one acre or more of surface area;

b) Housing developments (includes single family homes, multifamily homes, condominiums, and apartments) of ten units or more;

c) A 100,000 square feet or more impervious surface area industrial/ commercial development;

d) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534 and 7536-7539) [5,000 square feet or more of surface area];

e) Retail gasoline outlets [5,000 square feet or more of impervious surface area and with projected Average Daily Traffic (ADT) of 100 or more vehicles]. Subsurface Treatment Control BMPs which may endanger public safety (i.e., create an explosive environment) are considered not appropriate;

f) Restaurants (SIC 5812) [5,000 square feet or more of surface area];

g) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces;

h) Projects located in, adjacent to or discharging directly to an ESA that meet threshold conditions identified above in 2.e; and

i) Redevelopment projects in subject categories that meet Redevelopment thresholds.

5. Not later than March 10, 2003, each Permittee shall require the implementation of SUSMP and post-construction control requirements for the industrial/commercial development category to projects that disturb one acre or more of surface area.

6. Site Specific Mitigation

Each Permittee shall, no later than September 2, 2002, require the implementation of a site-specific plan to mitigate post-development storm water for new development and redevelopment not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where one or more of the following project characteristics exist:

a) Vehicle or equipment fueling areas;

b) Vehicle or equipment maintenance areas, including washing and repair;

c) Commercial or industrial waste handling or storage;

d) Outdoor handling or storage of hazardous materials;

e) Outdoor manufacturing areas;

f) Outdoor food handling or processing;

g) Outdoor animal care, confinement, or slaughter; or

h) Outdoor horticulture activities.

7. Redevelopment Projects

The Permittees shall apply the SUSMP, or site specific requirements including post-construction storm water mitigation to all Planning Priority Projects that undergo significant Redevelopment in their respective categories.

a) Significant Redevelopment means land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site.

Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, the entire project must be mitigated. Where Redevelopment results in an alteration to less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, only the alteration must be mitigated, and not the entire development.

b) Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety.

c) Existing single family structures are exempt from the Redevelopment requirements.

8. Maintenance Agreement and Transfer

Each Permittee shall require that all developments subject to SUSMP and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and or conditional use permits. Verification at a minimum shall include:

a) The developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either

b) A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and that it meets all local agency design standards; or

c) Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or

d) Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or

e) Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

9. Regional Storm Water Mitigation Program

A Permittee or Permittee group may apply to the Regional Board for approval of a regional or sub-regional storm water mitigation program to substitute in part or wholly SUSMP requirements. Upon review and a determination by the Regional Board Executive Officer that the proposal is technically valid and appropriate, the Regional Board may consider for approval such a program if its implementation will:

a) Result in equivalent or improved storm water quality;

b) Protect stream habitat;

c) Promote cooperative problem solving by diverse interests;

d) Be fiscally sustainable and has secure funding; and

e) Be completed in five years including the construction and start-up of treatment facilities.

Nothing in this provision shall be construed as to delay the implementation of SUSMP requirements, as approved in this Order.

10. Mitigation Funding

The Permittees may propose a management framework, for endorsement by the Regional Board Executive Officer, to support regional or sub-regional solutions to storm water pollution, where any of the following situations occur:

a) A waiver for impracticability is granted;

b) Legislative funds become available;

c) Off-site mitigation is required because of loss of environmental habitat; or

d) An approved watershed management plan or a regional storm water mitigation plan exists that incorporates an equivalent or improved strategy for storm water mitigation.

11. California Environmental Quality Act (CEQA) Document Update

Each Permittee shall incorporate into its CEQA process, with immediate effect, procedures for considering potential storm water quality impacts and providing for appropriate mitigation when preparing and reviewing CEQA documents. The procedures shall require consideration of the following:

a) Potential impact of project construction on storm water runoff;

b) Potential impact of project post-construction activity on storm water runoff;

c) Potential for discharge of storm water from areas from material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas;

d) Potential for discharge of storm water to impair the beneficial uses of the receiving waters or areas that provide water quality benefit;

e) Potential for the discharge of storm water to cause significant harm on the biological integrity of the waterways and water bodies;

f) Potential for significant changes in the flow velocity or volume of storm water runoff that can cause environmental harm; and

g) Potential for significant increases in erosion of the project site or surrounding areas.

12. General Plan Update

a) Each Permittee shall amend, revise or update its General Plan to include watershed and storm water quality and quantity management considerations and policies when any of the following General Plan elements are updated or amended: (i) Land Use, (ii) Housing, (iii) Conservation, and (iv) Open Space.

b) Each Permittee shall provide the Regional Board with the draft amendment or revision when a listed General Plan element or the General Plan is noticed for comment in accordance with Cal. Govt. Code § 65350 *et seq*.

13. Targeted Employee Training

Each Permittee shall train its employees in targeted positions (whose jobs or activities are engaged in development planning) regarding the development planning requirements on an annual basis beginning no later than August 1, 2002, and more frequently if necessary. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003.

14. Developer Technical Guidance and Information

a) Each Permittee shall develop and make available to the developer community SUSMP (development planning) guidelines immediately.

b) The Principal Permittee in partnership with Permittees shall issue no later than February 2, 2004, a technical manual for the siting and design of BMPs for the development community in Los Angeles County. The technical manual may be adapted from the revised California Storm Water Quality Task Force Best Management Practices Handbooks scheduled for publication in September 2002. The technical manual shall at a minimum include:

(1) Treatment Control BMPs based on flow-based and volumetric water quality design criteria for the purposes of countywide consistency;

(2) Peak Flow Control criteria to control peak discharge rates, velocities and duration;

(3) Expected pollutant removal performance ranges obtained from national databases, technical reports and the scientific literature;

(4) Maintenance considerations; and

(5) Cost considerations.

E. Development Construction Program

1. Each Permittee shall implement a program to control runoff from construction activity at all construction sites within its jurisdiction. The program shall ensure the following minimum requirements are effectively implemented at all construction sites:

a) Sediments generated on the project site shall be retained using adequate Treatment Control or Structural BMPs;

b) Construction-related materials, wastes, spills, or residues shall be retained at the project site to avoid discharge to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff;

c) Non-storm water runoff from equipment and vehicle washing and any other activity shall be contained at the project site; and

d) Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.

2. For construction sites one acre and greater, each Permittee shall comply with all conditions in section E.1. above and shall:

a) Require the preparation and submittal of a Local Storm Water Pollution Prevention Plan (Local SWPPP), for approval prior to issuance of a grading permit for construction projects.

The Local SWPPP shall include appropriate construction site BMPs and maintenance schedules. (A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP). The Local SWPPP must include the rationale used for selecting or rejecting BMPs. The project architect, or engineer of record, or authorized qualified designee, must sign a statement on the Local SWPPP to the effect:

"As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on storm water quality. The project owner and contractor are aware that the selected BMPs must be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity."

The landowner or the landowner's agent shall sign a statement to the effect:

"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/or inaccurate information, failing to update the Local SWPPP to reflect current conditions, or failing to properly and/or adequately implement the Local SWPPP may result in revocation of grading and/or other permits or other sanctions provided by law."

The Local SWPPP certification shall be signed by the landowner as follows, for a corporation: by a responsible corporate officer which means (a) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of the construction activity if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; for a partnership or sole proprietorship: by a general partner or the proprietor; or for a municipality or other public agency: by an elected official, a ranking management official (e.g., County Administrative Officer, City Manager, Director of Public Works, City Engineer, District Manager), or the manager of the construction activity if authority to sign Local SWPPPs has been assigned or delegated to the manager in accordance with established agency policy.

b) Inspect all construction sites for storm water quality requirements during routine inspections a minimum of once during the wet season. The Local SWPPP shall be reviewed for compliance with local codes, ordinances, and permits. For inspected sites that have not adequately implemented their Local SWPPP, a follow-up inspection to ensure compliance will take place within 2 weeks. If compliance has not been attained, the Permittee will take additional actions to achieve compliance (as specified in municipal codes). If compliance has not been achieved, and the site is also covered under a statewide general construction storm water permit, each Permittee shall enforce their local ordinance requirements, and if non-compliance continues the Regional Board shall be notified for further joint enforcement actions.

c) Require, no later than March 10, 2003, prior to issuing a grading permit for all projects less than five acres requiring coverage under a statewide general construction storm water permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for permit coverage and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

3. For sites five acres and greater, each Permittee shall comply with all conditions in Sections E.1. and E.2. and shall:

a) Require, prior to issuing a grading permit for all projects requiring coverage under the state general permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for coverage under the GCASP and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

b) Require proof of an NOI and a copy of the SWPPP at any time a transfer of ownership takes place for the entire development or portions of the common plan of development where construction activities are still on-going.

c) Use an effective system to track grading permits issued by each Permittee. To satisfy this requirement, the use of a database or GIS system is encouraged, but not required.

4. GCASP Violation Referrals

a) Referral of Violations of the SQMP, Regional Board Resolution 98-08, and municipal storm water ordinances:

A Permittee may refer a violation(s) to the Regional Board provided that the Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections within 3 months, and
- Two warning letters or notices of violation.

b) Referral of Violations of GCASP Filing Requirements:

For those projects subject to the GCASP, Permittees shall refer non-filers (i.e., those projects which cannot demonstrate that they have a WDID number) to the Regional Board, within 15 days of making a determination. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Project location;
- Developer;
- Estimated project size; and
- Records of communication with the developer regarding filing requirements.

5. Each Permittee shall train employees in targeted positions (whose jobs or activities are engaged in construction activities including construction inspection staff) regarding the requirements of the storm water management program no later than August 1, 2002, and annually thereafter. For Permittees with a population of 250,000 or more (2000 U.S. Census), initial training shall be completed no later than February 3, 2003. Each Permittee shall maintain a list of trained employees.

F. Public Agency Activities Program

Each Permittee shall implement a Public Agency program to minimize storm water pollution impacts from public agency activities. Public Agency requirements consist of:

- Sewage Systems Maintenance, Overflow, and Spill Prevention
- Public Construction Activities Management
- Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management
- Landscape and Recreational Facilities Management
- Storm Drain Operation and Management
- Streets and Roads Maintenance
- Parking Facilities Management
- Public Industrial Activities Management
- Emergency Procedures
- Treatment Feasibility Study

1. Sewage System Maintenance, Overflow, and Spill Prevention

   a) Each Permittee shall implement a response plan for overflows of the sanitary sewer system within their respective jurisdiction, which shall consist at a minimum of the following:

      (1) Investigation of any complaints received;

      (2) Upon notification, immediate response to overflows for containment; and

      (3) Notification to appropriate sewer and public health agencies when a sewer overflows to the MS4.

   b) In addition to 1.a.1, 1.a.2, and 1.a.3 above, for those Permittees, which own and/or operate a sanitary sewer system, the Permittee shall also implement the following requirements:

(1) Procedures to prevent sewage spills or leaks from sewage facilities from entering the MS4; and

(2) Identify, repair, and remediate sanitary sewer blockages, exfiltration, overflow, and wet weather overflows from sanitary sewers to the MS4.

2. Public Construction Activities Management

a) Each Permittee shall implement the Development Planning Program requirements (Permit Part 4.D) at public construction projects.

b) Each Permittee shall implement the Development Construction Program requirements (Permit Part 4.E) at Permittee owned construction sites.

c) Each Permittee shall obtain coverage under the GCASP for public construction sites 5 acres or greater (or part of a larger area of development) except that a municipality under 100,000 in population (1990 U.S. Census) need not obtain coverage under a separate permit until March 10, 2003.

d) Each Permittee, no later than March 10, 2003, shall obtain coverage under a statewide general construction storm water permit for public construction sites for projects between one and five acres.

3. Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management

a) Each Permittee, consistent with the SQMP, shall implement SWPPPs for public vehicle maintenance facilities, material storage facilities, and corporation yards which have the potential to discharge pollutants into storm water.

b) Each Permittee shall implement BMPs to minimize pollutant discharges in storm water including but not be limited to:

(1) Good housekeeping practices;

(2) Material storage control;

(3) Vehicle leaks and spill control; and

(4) Illicit discharge control.

c) Each Permittee shall implement the following measures to prevent the discharge of pollutants to the MS4:

(1) For existing facilities, that are not already plumbed to the sanitary sewer, all vehicle and equipment wash areas (except for fire stations) shall either be:

(i) Self-contained;

(ii) Equipped with a clarifier;

(iii) Equipped with an alternative pre-treatment device; or

(iv) Plumbed to the sanitary sewer.

(2) For new facilities, or during redevelopment of existing facilities (including fire stations), all vehicle and equipment wash areas shall be plumbed to the sanitary sewer and be equipped with a pre-treatment device in accordance with requirements of the sewer agency.

4. Landscape and Recreational Facilities Management

Each Permittee shall implement the following requirements:

a) A standardized protocol for the routine and non-routine application of pesticides, herbicides (including pre-emergents), and fertilizers;

b) Consistency with State Board's guidelines and monitoring requirements for application of aquatic pesticides to surface waters (WQ Order No. 2001-12 DWQ);

c) Ensure no application of pesticides or fertilizers immediately before, during, or immediately after a rain event or when water is flowing off the area to be applied;

d) Ensure that no banned or unregistered pesticides are stored or applied;

e) Ensure that staff applying pesticides are certified by the California Department of Food and Agriculture, or are under the direct supervision of a certified pesticide applicator;

f) Implement procedures to encourage retention and planting of native vegetation and to reduce water, fertilizer, and pesticide needs;

g) Store fertilizers and pesticides indoors or under cover on paved surfaces or use secondary containment;

h) Reduce the use, storage, and handling of hazardous materials to reduce the potential for spills; and

i) Regularly inspect storage areas.

5. Storm Drain Operation and Management

a) Each Permittee shall designate catch basin inlets within its jurisdiction as one of the following:

Priority A:	Catch basins that are designated as consistently generating the highest volumes of trash and/or debris.
Priority B:	Catch basins that are designated as consistently generating moderate volumes of trash and/or debris.
Priority C:	Catch basins that are designated as generating low volumes of trash and/or debris.

b) Permittees subject to a trash TMDL (Ballona Creek WMA) shall continue to implement the requirements listed below until trash TMDL implementation measures are adopted. Thereafter, the subject Permittees shall implement programs in conformance with the TMDL implementation schedule, which shall include an effective combination of measures such as street sweeping, catch basin cleaning, installation of treatment devices and trash receptacles, or other BMPs. Default requirements include:

(1) Inspection and cleaning of catch basins between May 1 and September 30 of each year;

(2) Additional cleaning of any catch basin that is at least 40% full of trash and/or debris;

(3) Record keeping of catch basins cleaned; and

(4) Recording of the overall quantity of catch basin waste collected.

If the implementation phase for the Los Angeles River and Ballona Creek Trash TMDLs has not begun by October 2003, subject Permittees shall implement the requirements described below in subsection 5(c), until such time programs in conformance with the subject Trash TMDLs are being implemented.

Permittees subject to the Los Angeles River Watershed Trash TMDL shall implement the requirements set forth in Part 7. Total Maximum Daily Load Provisions, subsection 1 “TMDL for Trash in the Los Angeles River Watershed”.

c) Permittees not subject to a trash TMDL shall:

(1) Clean catch basins according to the following schedule:

Priority A: A minimum of three times during the wet season and once during the dry season every year.

Priority B: A minimum of once during the wet season and once during the dry season every year.

Priority C: A minimum of once per year.

In addition to the schedule above, between February 1, 2002 and July 1, 2003, Permittees shall ensure that any catch basin that is at least 40% full of trash and/or debris shall be cleaned out. After July 1, 2003, Permittees shall ensure that any catch basin that is at least 25% full of trash and debris shall be cleaned out.

(2) For any special event that can be reasonably expected to generate substantial quantities of trash and litter, include provisions that require for the proper management of trash and litter generated, as a condition of the special use permit issued for that event. At a minimum, the municipality who issues the permit for the special event shall arrange for either temporary screens to be placed on catch basins or for catch basins in that area to be cleaned out subsequent to the event and prior to any rain event.

(3) Place trash receptacles at all transit stops within its jurisdiction that have shelters no later than August 1, 2002, and at all other transit stops within its jurisdiction no later than February 3, 2003. All trash receptacles shall be maintained as necessary.

d) Each Permittee shall inspect the legibility of the catch basin stencil or label nearest the inlet. Catch basins with illegible stencils shall be recorded and re-stenciled or re-labeled within 180 days of inspection.

e) Each Permittee shall implement BMPs for Storm Drain Maintenance that include:

(1) A program to visually monitor Permittee-owned open channels and other drainage structures for debris at least annually and identify and prioritize problem areas of illicit discharge for regular inspection;

(2) A review of current maintenance activities to assure that appropriate storm water BMPs are being utilized to protect water quality;

(3) Removal of trash and debris from open channel storm drains shall occur a minimum of once per year before the storm season;

(4) Minimize the discharge of contaminants during MS4 maintenance and clean outs; and

(5) Proper disposal of material removed.

6. Streets and Roads Maintenance

a) Each Permittee shall designate streets and/or street segments within its jurisdiction as one of the following:

Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris.

b) Each Permittee shall perform street sweeping of curbed streets according to the following schedule:

Priority A: These streets and/or street segments shall be swept at least two times per month.

Priority B: Each Permittee shall ensure that each street and/or street segments is swept at least once per month.

Priority C: These streets and/or street segments shall be swept as necessary but in no case less than once per year.

c) Each Permittee shall require that:

(1) Sawcutting wastes be recovered and disposed of properly and that in no case shall waste be left on a roadway or allowed to enter the storm drain;

(2) Concrete and other street and road maintenance materials and wastes shall be managed to prevent discharge to the MS4; and

(3) The washout of concrete trucks and chutes shall only occur in designated areas and never discharged to storm drains, open ditches, streets, or catch basins.

d) Each Permittee shall, no later than August 1, 2002, train their employees in targeted positions (whose interactions, jobs, and activities affect storm water quality) regarding the requirements of the storm water management program to:

(1) Promote a clear understanding of the potential for maintenance activities to pollute storm water; and

(2) Identify and select appropriate BMPs.

For Permittees with a population of 250,000 or more (2000 U.S. Census) training shall be completed no later than February 1, 2003.

7. Parking Facilities Management

Permittee-owned parking lots exposed to storm water shall be kept clear of debris and excessive oil buildup and cleaned no less than 2 times per month and/or inspected no less than 2 times per month to determine if cleaning is necessary. In no case shall a Permittee-owned parking lot be cleaned less than once a month.

8. Public Industrial Activities Management

Each Permittee shall, for any municipal activity considered a discharge of storm water associated with industrial activity, obtain separate coverage under the GIASP except that a municipality under 100,000 in population (1990 U.S. Census) need not file the Notice Of Intent to be covered by said permit until March 10, 2003 (with the exception of power plants, airports, and uncontrolled sanitary landfills).

9. Emergency Procedures

Each Permittee shall repair essential public services and infrastructure in a manner to minimize environmental damage in emergency situations such as: earthquakes; fires; floods; landslides; or windstorms. BMPs shall be implemented to the extent that measures do not compromise public health and safety. After initial emergency response or emergency repair activities have been completed, each Permittee shall implement BMPs and programs as required under this Order.

10. Treatment Feasibility Study

The Permittees in cooperation with the County Sanitation Districts of Los Angeles County shall conduct a study to investigate the possible diversion of dry weather discharges or the use of alternative Treatment Control BMPs to treat flows from their jurisdiction which may impact public health and safety and/or the environment. The Permittees shall collectively review their individual prioritized lists and create a watershed based priority list of drains for potential diversion or treatment and submit the priority listing to the Regional Board Executive Officer, no later than July 1, 2003.

G. Illicit Connections and Illicit Discharges Elimination Program

Permittees shall eliminate all illicit connections and illicit discharges to the storm drain system, and shall document, track, and report all such cases in accordance with the elements and performance measures specified in the following subsections.

1. General

   a) Implementation: Each Permittee must develop an Implementation Program which specifies how each Permittee is implementing revisions to the IC/ID Program of the SQMP. This Implementation Program must be documented, and available for review and approval by the Regional Board Executive Officer, upon request.

   b) Tracking: All Permittees shall, no later than February 3, 2003, develop and maintain a listing of all permitted connections to their storm drain system. All Permittees shall map at a scale and in a format specified by the Principal Permittee all illicit connections and discharges on their baseline maps, and shall transmit this information to the Principal Permittee. No later than February 3, 2003, the Principal Permittee shall use this information as well as results of baseline and priority screening for illicit connections (as set forth in subsection 2 below) to start an annual evaluation of patterns and trends of illicit connections and illicit discharges, with the objectives of identifying priority areas for elimination of illicit connections and illicit discharges.

   c) Training: All Permittees shall train all targeted employees who are responsible for identification, investigation, termination, cleanup, and reporting of illicit connections and discharges. For Permittees with a population of less than 250,000 (2000 U.S. Census), training shall be completed no later than August 1, 2002. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003. Furthermore, all Permittees shall conduct refresher training on an annual basis thereafter.

2. Illicit Connections

   a) Screening for Illicit Connections

      (1) Field Screening: All Permittees shall field Screen the storm drain system for illicit connections in accordance with the following schedule:

         (i) Open channels: No later than February 3, 2003;

         (ii) Underground pipes in priority areas: No later than February 1, 2005; and

(iii) Underground pipes with a diameter of 36 inches or greater: No later than December 12, 2006.

Permittees shall report, to the Principal Permittee, on the location and length of open channels or underground pipes that have been Screened *vis a vis* the entire storm drain network, and on the status of suspected, confirmed, and terminated illicit connections. Permittees shall maintain a list containing all permitted connections and the status of connections under investigation for possible illicit connection.

(2) Permit Screening: No later than December 12, 2006, Permittees shall complete a review of all permitted connections to the storm drain system, to confirm compliance with Part 1 (Discharge Prohibition).

b) Response to Illicit Connections

(1) Investigation: Upon discovery or upon receiving a report of a suspected illicit connection, Permittees shall initiate an investigation within 21 days, to determine the source of the connection, the nature and volume of discharge through the connection, and the responsible party for the connection.

(2) Termination: Upon confirmation of the illicit nature of a storm drain connection, Permittees shall ensure termination of the connection within 180 days, using enforcement authority as needed.

3. Illicit Discharges

a) Abatement and Cleanup: Permittees shall respond, within one business day of discovery or a report of a suspected illicit discharge, with activities to abate, contain, and clean up all illicit discharges, including hazardous substances.

b) Investigation: Permittees shall investigate illicit discharges as soon as practicable (during or immediately following containment and cleanup activities), and shall take enforcement action as appropriate.

Part 5. DEFINITIONS

The following are definitions for terms applicable to this Order:

"Adverse Impact" means a detrimental effect upon water quality or beneficial uses caused by a discharge or loading of a pollutant or pollutants.

"Anti-degradation policies" means the *Statement of Policy with Respect to Maintaining High Quality Water in California* (State Board Resolution No. 68-16) which protects surface and ground waters from degradation. In particular, this policy protects waterbodies where existing quality is higher than that necessary for the protection of beneficial uses including the protection of fish and wildlife propagation and recreation on and in the water.

"Applicable Standards and Limitations" means all State, interstate, and federal standards and limitations to which a “discharge” or a related activity is subject under the CWA, including “effluent limitations, "water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices,” and pretreatment standards under sections 301, 302, 303, 304, 306, 307, 308, 403 and 404 of CWA.

“**Areas of Special Biological Significance (ASBS)**” means all those areas of this state as ASBS, listed specifically within the California Ocean Plan or so designated by the State Board which, among other areas, includes the area from Mugu Lagoon to Latigo Point: Oceanwater within a line originating from Laguna Point at 34° 5’ 40” north, 119° 6’30” west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the meanhigh tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point.

"Authorized Discharge" means any discharge that is authorized pursuant to an NPDES permit or meets the conditions set forth in this Order.

“Automotive Service Facilities” means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 5511, 7532-7534, or 7536-7539. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to storm water.

“Baseline Waste Load Allocation” means the Waste Load Allocation assigned to a Permittee before reductions are required. The progressive reductions in the Waste Load Allocations are based on a percentage of the Baseline Waste Load Allocation. The Baseline Waste Load Allocation for each jurisdiction was calculated based on the annual average amount of trash discharged to the storm drain system from a representative sampling of land use areas, as determined during the Baseline Monitoring Program. The Baseline Waste Load Allocations are incorporated into the Basin Plan at Table 7-2.2.

"Basin Plan" means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Board on June 13, 1994 and subsequent amendments.

"Beneficial Uses" means the existing or potential uses of receiving waters in the permit area as designated by the Regional Board in the Basin Plan.

"Best Management Practices (BMPs)" means methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

"Commercial Development" means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

"Construction" means constructing, clearing, grading, or excavation that results in soil disturbance. Construction includes structure teardown. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility; emergency construction activities required to immediately protect public health and safety; interior remodeling with no outside exposure of construction material or construction waste to storm water; mechanical permit work; or sign permit work.

"Control" means to minimize, reduce, eliminate, or prohibit by technological, legal, contractual or other means, the discharge of pollutants from an activity or activities.

"Daily Generation Rate (DGR)" means the estimated amount of trash deposited within a representative drainage area during a 24-hour period, derived from the amount of trash collected from streets and catch basins in the area over a 30-day period.

"Dechlorinated/Debrominated Swimming Pool Discharge" means swimming pool discharges which have no measurable chlorine or bromine and do not contain any detergents, wastes, or additional chemicals not typically found in swimming pool water. The term does not include swimming pool filter backwash.

"Development" means any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Directly Adjacent" means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

"Director" means the Director of a municipality and Person(s) designated by and under the Director's instruction and supervision.

"Discharge" means when used without qualification the "discharge of a pollutant."

"Discharging Directly" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.

"Discharge of a Pollutant" means: any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or, any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. The term discharge includes additions of pollutants into waters of the United

States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

"Disturbed Area" means an area that is altered as a result of clearing, grading, and/or excavation.

"Dry Weather" means those days with less than 0.1 inch of rainfall, and occurring more than three days after a Rain Day.

"Environmentally Sensitive Areas (ESAs)" means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments (California Public Resources Code § 30107.5). Areas subject to storm water mitigation requirements are: areas designated as Significant Ecological Areas by the County of Los Angeles (*Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976)* and amendments); an area designated as a Significant Natural Area by the California Department of Fish and Game's Significant Natural Areas Program, provided that area has been field verified by the Department of Fish and Game; an area listed in the Basin Plan as supporting the "Rare, Threatened, or Endangered Species (RARE)" beneficial use; and an area identified by a Permittee as environmentally sensitive.

"Full Capture System" means any single device or series of devices, certified by the Executive Officer, that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in the sub-drainage area. The Rational Equation is used to compute the peak flow rate:

$$Q = C \times I \times A,$$

Where:
Q = design flow rate (cubic feet per second, cfs);
C = runoff coefficient (dimensionless);
I = design rainfall intensity (inches per hour, as determined per the Los Angeles County rainfall isohyetal maps relevant to the Los Angeles River watershed),[7] and
A = sub-drainage area (acres).

"General Construction Activities Storm Water Permit (GCASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from construction activities under certain conditions.

"General Industrial Activities Storm Water Permit (GIASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from certain industrial activities under certain conditions.

[7] The isohyetal map may be updated annually by the Los Angeles County hydrologist to reflect additional rain data gathered during the previous year. Annual updates published by the Los Angeles County Department of Public Works are prospectively incorporated by reference into this Order.

“Hillside” means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes.

“Illicit Connection” means any man-made conveyance that is connected to the storm drain system without a permit, excluding roof drains and other similar type connections. Examples include channels, pipelines, conduits, inlets, or outlets that are connected directly to the storm drain system.

“Illicit Discharge” means any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non storm-water discharges except discharges pursuant to an NPDES permit, discharges that are identified in Part 1, “Discharge Prohibitions” of this order, and discharges authorized by the Regional Board Executive Officer.

"Illicit Disposal" means any disposal, either intentionally or unintentionally, of material(s) or waste(s) that can pollute storm water.

"Industrial/Commercial Facility" means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by the Standard Industrial Classifications (SIC). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition.

“Infiltration” means the downward entry of water into the surface of the soil.

"Inspection" means entry and the conduct of an on-site review of a facility and its operations, at reasonable times, to determine compliance with specific municipal or other legal requirements. The steps involved in performing an inspection, include, but are not limited to:

1. Pre-inspection documentation research.;
2. Request for entry;
3. Interview of facility personnel;
4. Facility walk-through.
5. Visual observation of the condition of facility premises;
6. Examination and copying of records as required;
7. Sample collection (if necessary or required);
8. Exit conference (to discuss preliminary evaluation); and,
9. Report preparation, and if appropriate, recommendations for coming into compliance.

In the case of restaurants, a Permittee may conduct an inspection from the curbside, provided that such "curbside" inspection provides the Permittee with adequate information to determine an operator's compliance with BMPs that must be implemented per requirements of this Order, Regional Board Resolution 98-08, County and municipal ordinances, and the SQMP.

“Institutional Controls” means programmatic trash control measures that do not require construction or structural modifications to the MS4. Examples include street sweeping, public education, and clean out of catch basins that discharge to storm drains.

"Large Municipal Separate Storm Sewer System (MS4)" means all MS4s that serve a population greater than 250,000 (1990 Census) as defined in 40 CFR 122.26 (b)(4). The Regional Board designated Los Angeles County as a large MS4 in 1990, based on: (i) the U.S. Census Bureau 1990 population count of 8.9 million, and (ii) the interconnectivity of the MS4s in the incorporated and unincorporated areas within the County.

"Local SWPPP" means the Storm Water Pollution Prevention Plan required by the local agency for a project that disturbs one or more acres of land.

"Maximum Extent Practicable (MEP)" means the standard for implementation of storm water management programs to reduce pollutants in storm water. CWA § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. See also State Board Order WQ 2000-11 at page 20.

"Method Detection Limit (MDL)" means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136, Appendix B.

"Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

“Municipal Separate Storm Sewer System (MS4)” means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a State, city, county, town or other public body, that is designed or used for collecting or conveying storm water, which is not a combined sewer, and which is not part of a publicly owned treatment works, and which discharges to Waters of the United States.

“National Pollutant Discharge Elimination System (NPDES)” means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an “approved program.”

"Natural Drainage Systems" means unlined or unimproved (not engineered) creeks, streams, rivers or similar waterways.

“New Development” means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

"Non-Storm Water Discharge" means any discharge to a storm drain that is not composed entirely of storm water.

"Nuisance" means anything that meets all of the following requirements: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.; (3) occurs during, or as a result of, the treatment or disposal of wastes.

"Parking Lot" means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces.

"Partial Capture Device" means any structural trash control device that has not been certified by the Executive Officer as meeting the "full capture" performance requirements.

"Permittee(s)" means Co-Permittees and any agency named in this Order as being responsible for permit conditions within its jurisdiction. Permittees to this Order include the Los Angeles County Flood Control District, Los Angeles County, and the cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Canada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier.

"Planning Priority Projects" means those projects that are required to incorporate appropriate storm water mitigation measures into the design plan for their respective project. These types of projects include:

1. Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments)
2. A 100,000 or more square feet of impervious surface area industrial/ commercial development (1 ac starting March 2003)
3. Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539)
4. Retail gasoline outlets
5. Restaurants (SIC 5812)
6. Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces
7. Redevelopment projects in subject categories that meet Redevelopment thresholds

8. Projects located in or directly adjacent to or discharging directly to an ESA, which meet thresholds; and
9. Those projects that require the implementation of a site-specific plan to mitigate post-development storm water for new development not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where the following project characteristics exist:

   a) Vehicle or equipment fueling areas;
   b) Vehicle or equipment maintenance areas, including washing and repair;
   c) Commercial or industrial waste handling or storage;
   d) Outdoor handling or storage of hazardous materials;
   e) Outdoor manufacturing areas;
   f) Outdoor food handling or processing;
   g) Outdoor animal care, confinement, or slaughter; or
   h) Outdoor horticulture activities.

"Pollutants" means those "pollutants" defined in CWA §502(6) (33.U.S.C.§1362(6)), and incorporated by reference into California Water Code §13373.

"Potable Water Distribution Systems Releases" means sources of flows from drinking water storage, supply and distribution systems including flows from system failures, pressure releases, system maintenance, distribution line testing, fire hydrant flow testing; and flushing and dewatering of pipes, reservoirs, vaults, and minor non-invasive well maintenance activities not involving chemical addition(s). It does not include wastewater discharges from activities that occur at wellheads, such as well construction, well development (i.e., aquifer pumping tests, well purging, etc.), or major well maintenance.

"Project" means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065).

"Rain Days" are those days with greater than or equal to 0.1 inch of rainfall.

"Rain Event" means any rain event greater than 0.1 inch in 24 hours except where specifically stated otherwise.

"Rare, Threatened, or Endangered Species (RARE)" means a beneficial use for waterbodies in the Los Angeles Region, as designated in the Basin Plan (Table 2-1), that supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

"Receiving Waters" means all surface water bodies in the Los Angeles Region that are identified in the Basin Plan.

"Redevelopment" means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint;

addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Regional Administrator" means the Regional Administrator of the Regional Office of the USEPA or the authorized representative of the Regional Administrator.

"Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

"Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils.

"Runoff" means any runoff including storm water and dry weather flows from a drainage area that reaches a receiving water body or subsurface. During dry weather it is typically comprised of base flow either contaminated with pollutants or uncontaminated, and nuisance flows.

"Screening" means using proactive methods to identify illicit connections through a continuously narrowing process. The methods may include: performing baseline monitoring of open channels, conducting special investigations using a prioritization approach, analyzing maintenance records for catch basin and storm drain cleaning and operation, and verifying all permitted connections into the storm drains. Special investigation techniques may include: dye testing, visual inspection, smoke testing, flow monitoring, infrared, aerial and thermal photography, and remote control camera operation.

"Sidewalk Rinsing" means pressure washing of paved pedestrian walkways with average water usage of 0.006 gallons per square foot, with no cleaning agents, and properly disposing of all debris collected, as authorized under Regional Board Resolution No. 98-08.

"Significant Ecological Area (SEA)" means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan.[8]
Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.

[8] The 61 existing SEAs represent the findings of a study that was completed in 1976 by England and Nelson, Environmental Consultants, as amended through the adoption of a revised Los Angeles County General Plan in 1980. The results of an update study to evaluate existing SEAs within unincorporated Los Angeles County is currently being proposed to the Los Angeles County Planning Commission (*Los Angeles County Significant Ecological Area Update Study 2000, Background Report*, PCR Services Corporation). The *Update Study 2000*, which contains existing and proposed SEA boundaries, can be downloaded from the Los Angeles County Department of Planning website at http://planning.co.la.ca.us/drp_revw.html#SEA

4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas.[9]

"Significant Natural Area (SNA)" means an area defined by the California Department of Fish and Game (DFG), Significant Natural Areas Program, as an area that contains an important example of California's biological diversity. The most current SNA maps, reports, and descriptions can be downloaded from the DFG website at ftp://maphost.dfg.ca.gov/outgoing/whdab/sna/. These areas are identified using the following biological criteria only, irrespective of any administrative or jurisdictional considerations:

1. Areas supporting extremely rare species or habitats.
2. Areas supporting associations or concentrations of rare species or habitats.
3. Areas exhibiting the best examples of rare species and habitats in the state.

“Site” means the land or water area where any “facility or activity” is physically located or conducted, including adjacent land used in connection with the facility or activity.

“Source Control BMP” means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

“SQMP” means the Los Angeles Countywide Stormwater Quality Management Program.

“State Storm Water Pollution Prevention Plan (State SWPPP)” means a plan, as required by a State General Permit, identifying potential pollutant sources and describing the design, placement and implementation of BMPs, to effectively prevent non-stormwater Discharges and reduce Pollutants in Stormwater Discharges during activities covered by the General Permit.

“Storm Water” means storm water runoff, snow melt runoff, and surface runoff and drainage.

“Storm Water Discharge Associated with Industrial Activity” means industrial discharge as defined in 40 CFR 122.26(b)(14)

“Stormwater Quality Management Program” means the Los Angeles Countywide Stormwater Quality Management Program, which includes descriptions of programs, collectively developed by the Permittees in accordance with provisions of the NPDES Permit, to comply with applicable federal and state law, as the same is amended from time to time.

[9] These criteria from the 1976 study have been modified in the *Update Study 2000*.

"Structural BMP" means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

"Summer Dry Weather" means Dry Weather days occurring from April 1 through October 31 of each year.

"SUSMP" means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP shall address conditions and requirements of new development.

"Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background.

"Toxicity Identification Evaluation (TIE)" means a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

"Toxicity Reduction Evaluation (TRE)" means a study conducted in a step-wise process to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity.

"Treatment" means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media absorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

"Treatment Control BMP" means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

"USEPA Phase I Facilities" means facilities in specified industrial categories that are required to obtain an NPDES permit for storm water discharges, as required by 40 CFR 122.26(c). These categories include:

i. facilities subject to storm water effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR N)
ii. manufacturing facilities
iii. oil and gas/mining facilities
iv. hazardous waste treatment, storage, or disposal facilities
v. landfills, land application sites, and open dumps
vi. recycling facilities
vii. steam electric power generating facilities
viii. transportation facilities
ix. sewage of wastewater treatment works
x. light manufacturing facilities

"Vehicle Maintenance/Material Storage Facilities/Corporation Yards" means any Permittee owned or operated facility or portion thereof that:

i. Conducts industrial activity, operates equipment, handles materials, and provides services similar to Federal Phase I facilities;
ii. Performs fleet vehicle service/maintenance on ten or more vehicles per day including repair, maintenance, washing, and fueling;
iii. Performs maintenance and/or repair of heavy industrial machinery/equipment ; and
iv. Stores chemicals, raw materials, or waste materials in quantities that require a hazardous materials business plan or a Spill Prevention, Control , and Counter-measures (SPCC) plan.

"Water Quality Standards and Water Quality Objectives" means water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans. Such plans are used by the Regional Board to regulate all discharges, including storm water discharges.

"Waters of the State" means any surface water or groundwater, including saline waters, within boundaries of the state.

"Waters of the United States" or "Waters of the U.S." means:

a. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
b. All interstate waters, including interstate "wetlands";
c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

    1. Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    3. Which are used or could be used for industrial purposes by industries in interstate commerce;

d. All impoundments of waters otherwise defined as waters of the United States under this definition;
e. Tributaries of waters identified in paragraphs (a) through (d) of this definition;
f. The territorial sea; and
g. "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraph (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.22(m), which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to man-made bodies of water, which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with USEPA.

"Wave Wash" means the point at which a storm drain or creek empties and the effluent from the storm drain initially mixes with the receiving ocean water.

"Wet Season" means the calendar period beginning October 1 through April 15.

Part 6. STANDARD PROVISIONS

A. Standard Requirements

1. Each Permittee shall comply with all provisions and requirements of this permit.
2. Should a Permittee discover a failure to submit any relevant facts or that it submitted incorrect information in a report, it shall promptly submit the missing or correct information.
3. Each Permittee shall report all instances of non-compliance not otherwise reported at the time monitoring reports are submitted.
4. This Order includes the attached Monitoring and Reporting Program, and SUSMP(Regional Board Resolution No. R00-02), which are a part of the permit and must be complied with in the same manner as with the rest of the requirements in the permit.

B. Regional Board Review

Any formal determination or approval made by the Regional Board Executive Officer pursuant to the provisions of this Order may be reviewed by the Regional Board. A Permittee(s) or a member of the public may request such review upon petition within 30 days of the effective date of the notification of such decision to the Permittee(s) and interested parties on file at the Regional Board.

C. Public Review

1. All documents submitted to the Regional Board in compliance with the terms and conditions of this Order shall be made available to members of the public pursuant to the Freedom of Information Act (5 U.S.C. § 552 (as amended) and the Public Records Act (Cal. Government Code § 6250 *et seq.*).
2. All documents submitted to the Regional Board Executive Officer for approval shall be made available to the public for a 30-day period to allow for public comment.

D. Duty to Comply

1. Each Permittee must comply with all of the terms, requirements, and conditions of this Order. Any violation of this order constitutes a violation of the Clean Water Act, its regulations and the California Water Code, and is grounds for enforcement action, Order termination, Order revocation and reissuance, denial of an application for reissuance; or a

combination thereof [40 CFR 122.41(a), CWC § 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350].

2. A copy of these waste discharge specifications shall be maintained by each Permittee so as to be available during normal business hours to Permittee employees and members of the public.

3. Any discharge of wastes at any point(s) other than specifically described in this Order is prohibited, and constitutes a violation of the Order.

E. Duty to Mitigate [40 CFR 122.41 (d)]

Each Permittee shall take all reasonable steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment.

F. Inspection and Entry [40 CFR 122.41(i), CWC § 13267]

The Regional Board, USEPA, and other authorized representatives shall be allowed:

1. Entry upon premises where a regulated facility is located or conducted, or where records are kept under conditions of this Order;

2. Access to copy any records, at reasonable times, that are kept under the conditions of this Order;

3. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and,

4. To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with this Order, or as otherwise authorized by the CWA and the CWC.

G. Proper Operation and Maintenance [40 CFR 122.41 (e), CWC § 13263(f)]

The Permittees shall at all times properly operate and maintain all facilities and systems of treatment (and related appurtenances) that are installed or used by the Permittees to achieve compliance with this Order. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar system that are installed by a Permittee only when necessary to achieve compliance with the conditions of this Order.

H. Signatory Requirements [40 CFR 122.41(k) & 122.22]

Except as otherwise provided in this Order, all applications, reports, or information submitted to the Regional Board shall be signed by the Director of Public Works, City Engineer, or authorized designee and certified as set forth in 40 CFR 122.22.

I. Reopener and Modification [40 CFR 122.41(f) & 122.62]

1. This Order may only be modified, revoked, or reissued, prior to the expiration date, by the Regional Board, in accordance with the procedural requirements of the CWC and CCR Title 23 for the issuance of waste discharge requirements, 40 CFR 122.62, and upon prior notice and hearing, to:

   a) Address changed conditions identified in the required reports or other sources deemed significant by the Regional Board;

   b) Incorporate applicable requirements or statewide water quality control plans adopted by the State Board or amendments to the Basin Plan;

   c) Comply with any applicable requirements, guidelines, and/or regulations issued or approved pursuant to CWA Section 402(p); and/or,

   d) Consider any other federal, or state laws or regulations that became effective after adoption of this Order.

2. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

   a) Violation of any term or condition contained in this Order;

   b) Obtaining this Order by misrepresentation, or failure to disclose all relevant facts; or,

   c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

3. The filing of a request by the Principal Permittee or Permittees for a modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

4. This Order may be modified to make corrections or allowances for changes in the permitted activity listed in this section, following the procedures at 40 CFR 122.63, if processed as a minor modification. Minor modifications may only:

   a) Correct typographical errors, or

   b) Require more frequent monitoring or reporting by the Permittee.

J. Severability

The provisions of this permit are severable; and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected.

K. Duty to Provide Information [40 CFR 122.41(h)]

The Permittees shall furnish, within a reasonable time, any information the Regional Board or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Permittees shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

L. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)][10]

1. The Permittees shall report to the Regional Board any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time any Permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The Regional Board may waive the required written report on a case-by-case basis.

M. Bypass [40 CFR 122.41(m)][11]

Bypass (the intentional diversion of waste streams from any portion of a treatment facility) is prohibited. The Regional Board may take enforcement action against Permittees for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.);

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventive maintenance;

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[10] This provision applies to incidents where effluent limitations (numerical or narrative) as provided in this Order or in the Los Angeles County SQMP are exceeded, and which endanger public health or the environment.

[11] This provision applies to the operation and maintenance of storm water controls and BMPs as provided in this Order or in the SQMP.

3. The Permittee submitted a notice at least ten days in advance of the need for a bypass to the Regional Board; or,

4. Permittees may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The Permittee shall submit notice of an unanticipated bypass as required.

N. Upset [40 CFR 122.41(n)][12]

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

1. A Permittee that wishes to establish the affirmative defense of an upset in an action brought for non compliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a) An upset occurred and that the Permittee can identify the cause(s) of the upset;

   b) The permitted facility was being properly operated by the time of the upset;

   c) The Permittee submitted notice of the upset as required; and,

   d) The Permittee complied with any remedial measures required.

2. No determination made before an action for noncompliance, such as during administrative review of claims that non-compliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

O. Property Rights [40 CFR 122.41(g)]

This Order does not convey any property rights of any sort, or any exclusive privilege.

P. Enforcement

1. Violation of any of the provisions of the NPDES permit or any of the provisions of this Order may subject the violator to any of the penalties

[12] *Supra*. See footnote number 3.

described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalties may be applied for each kind of violation. The CWA provides the following:

a) Criminal Penalties for:

(1) Negligent Violations:

The CWA provides that any person who negligently violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $2,500 nor more than $25,000 per day for each violation, or by imprisonment for not more than 1 year, or both.

(2) Knowing Violations:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

(3) Knowing Endangerment:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 307, 308, 318, or 405 and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

(4) False Statement:

The CWA provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both. (See CWA § 309(c)(4))

b) Civil Penalties

The CWA provides that any person who violates a permit condition implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a civil penalty not to exceed $27,500 per day for each violation.

2. The CWC provides that any person who violates a waste discharge requirement provision of the CWC is subject to civil penalties of up to $5,000 per day, $10,000 per day, or $25,000 per day of violation; or when the violation involves the discharge of pollutants, is subject to civil

penalties of up to $10 per gallon per day or $25 per gallon per day of violation; or some combination thereof, depending on the violation or combination of violations.

Q. Need to Halt or Reduce Activity not a Defense [40 CFR 122.41(c)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

R. Rescission

Regional Board Order No. 96-054 is hereby rescinded.

S. Expiration

This Order expires on December 12, 2006. The Permittees must submit a Report of Waste Discharges and a proposed Storm Water Quality Management Program in accordance with CCR Title 23 as application for reissuance of waste discharge requirements no later than June 12, 2006.

PART 7 - TOTAL MAXIMUM DAILY LOAD PROVISIONS

The provisions of this Part implement and are consistent with the assumptions and requirements of Waste Load Allocations from TMDLs for which some or all of the Permittees in this Order are responsible.

1. TMDL for Trash in the Los Angeles River Watershed

A. Waste Load Allocations: Each Permittee identified in Appendix 7-1 shall comply with the interim and final effluent limitations set forth in Appendix 7-1 hereto.[13]

B. Compliance:

(1) Permittees may comply with the effluent limitations using any lawful means. Such compliance options are broadly classified as *full capture*, *partial capture*, or *institutional controls*, as described below, and any combination of these may be employed to achieve compliance:

(a) Full Capture Systems:

1) The Basin Plan authorizes the Executive Officer to certify *full capture systems*, which are systems that meet the operating and performance requirements as described in this Order, and the procedures identified in "Procedures and Requirements for Certification of a Best Management Practice for Trash Control as a Full Capture System." (See Appendix 7-2.)[14]

2) Permittees are authorized to comply with their effluent limitations through certified *full capture systems* provided the requirements of paragraph 3), immediately below, and any conditions in the certification, continue to be met.

3) Permittees may comply with their effluent limitations through progressive installation of *full capture systems* throughout their jurisdiction until all areas draining to the Los Angeles River system are addressed. For purposes of this Permit, attainment of the effluent limitations shall be conclusively presumed for any drainage area to the Los Angeles River (or its tributaries)[15] where certified *full capture systems* treat all drainage from the area, provided that the *full capture systems* are adequately sized and maintained, and that maintenance records are up-to-date and available for inspection by the Regional Board.

i. A Permittee relying entirely on *full capture systems* shall be deemed in compliance with its final effluent limitation if it demonstrates that all drainage areas under its jurisdiction are serviced by appropriate

[13] The interim and final effluent limitations set forth in Appendix 7-1 are equivalent to the Compliance Points identified in Table 7-2.3 of the Basin Plan.

[14] The Regional Board currently recognizes eight *full capture systems*. These are: Vortex Separation Systems (VSS) and seven other Executive Officer certified *full capture systems*, including specific types or designs of trash nets; two gross solids removal devices (GSRDs); catch basin brush inserts and mesh screens; vertical and horizontal trash capture screen inserts; and a connector pipe screen device.

[15] Tributaries to the Los Angeles River include, but are not limited to, Pacoima Wash, Tujunga Wash, Burbank Western Channel, Verdugo Wash, Arroyo Seco, Rio Hondo, and Compton Creek.

certified *full capture systems* as described in paragraph (a)(3).

ii. A Permittee relying entirely on *full capture systems* shall be deemed in compliance with its interim effluent limitations:

1. By demonstrating that *full capture systems* treat the percentage of drainage areas in the watershed that corresponds to the required trash abatement.
2. Alternatively, a Permittee may propose a schedule for jurisdiction-wide installation of *full capture systems*, targeting first the areas of greatest trash generation (based upon the information on drainage area and litter generation rates by land use provided in Appendices I and III of the Los Angeles River Trash TMDL Staff Report) for the Executive Officer's approval. The Executive Officer shall not approve any such schedule that does not result in timely compliance with the final effluent limitations. A Permittee shall be deemed in compliance with its interim effluent limitations provided it is fully in compliance with any such approved schedule.

(b) Partial Capture Devices and Institutional Controls: Permittees may comply with their interim and final effluent limitations through the installation of *partial capture devices* and the application of *institutional controls*.[16]

1) Trash discharges from areas serviced solely by *partial capture devices* may be estimated based on demonstrated performance of the device(s) in the jurisdictional area.[17] That is, trash reduction is equivalent to the *partial capture devices'* trash removal efficiency multiplied by the percentage of drainage area serviced by the devices.
2) Except as provided in subdivision 3), below, trash discharges from areas addressed by *institutional controls* and/or *partial capture devices* (where site-specific performance data is not available) shall be calculated using a mass balance approach, based on the daily generation rate (DGR) for a representative area.[18] The DGR shall be determined from direct measurement of trash deposited in the drainage area during any thirty-day

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[16] While interim effluent limitations may be complied with using partial capture devices, compliance with final effluent limitations cannot be achieved with the exclusive use of partial capture devices.
[17] Performance shall be demonstrated under different conditions (e.g. low to high trash loading).
[18] The area should be representative of the land uses within the jurisdiction and shall be approved by the Executive Officer prior to the 30-day collection period.

period between June 22nd and September 22nd exclusive of rain events[19], and shall be re-calculated every year thereafter. The DGR shall be calculated as the total amount of trash collected during this period divided by 30 (the length of the collection period).

DGR = (Amount of trash collected during a 30-day collection period[20]) / (30 days)

The DGR for the applicable area of the jurisdiction shall be extrapolated from that of the representative drainage area. A mass balance equation shall be used to estimate the amount of trash discharged during a storm event.[21] The *Storm Event Trash Discharge* for a given rain event in a Permittee's drainage area shall be calculated by multiplying the number of days since the last street sweeping by the DGR and subtracting the amount of any trash recovered in the catch basins.[22] For each day of a storm event that generates precipitation greater than 0.25 inches, the Permittee shall calculate a *Storm Event Trash Discharge*.

Storm Event Trash Discharge = [(Days since last street sweeping*DGR)] – [Amount of trash recovered from catch basins][23]

The sum of the *Storm Event Trash Discharges* for the storm year shall be the Permittee's calculated annual trash discharge.

Total Storm Year Trash Discharge = ∑Storm Event Trash Discharges from Drainage Area

3) The Executive Officer may approve alternative compliance monitoring approaches for calculating total storm year trash discharge, upon finding that the program will provide a scientifically-based estimate of the amount of trash discharged from the MS4.

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[19] Provided no special events are scheduled that may affect the representative nature of that collection period.
[20] Between June 22nd and September 22nd
[21] Amount of trash shall refer to the uncompressed volume (in gallons) or drip-dry weight (in pounds) of trash collected.
[22] Any negative values shall be considered to represent a zero discharge.
[23] When more than one storm event occurs prior to the next street sweeping the discharge shall be calculated from the date of the last assessment.

(c) <u>Combined Compliance Approaches</u>:
Permittees may comply with their interim and final effluent limitations through a combination of *full capture systems*, *partial capture devices*, and *institutional controls*. Permittees relying on a combination of approaches shall demonstrate compliance with the interim and final effluent limitations as specified in (a)(3) in areas where *full capture systems* are installed and as specified in (b)(2) in areas where *partial capture devices* and *institutional controls* are applied.

(2) Permittees that are not in compliance with the applicable interim and/or final effluent limitations as identified in Appendix 7-1 shall be in violation of this permit.

(a) Permittees relying on *partial capture devices* and/or *institutional controls* that have violated their interim or final effluent limitations as identified in Appendix 7-1 shall be presumed to have violated the applicable limitation for each day of each storm event that generated precipitation greater than 0.25 inches during the applicable storm year, except those storm days on which they establish that their cumulative Storm Event Trash Discharges have not exceeded the applicable effluent limitation.

(b) For Permittees relying on full capture systems who have failed to demonstrate that the *full capture systems* for any drainage area are adequately sized and maintained, and that maintenance records are up-to-date and available for inspection by the Regional Board, and that they are in compliance with any conditions of their certification, shall be presumed to have discharged trash in an amount that corresponds to the percentage of the baseline waste load allocation represented by the drainage area in question.

1) A Permittee may overcome this presumption by demonstrating (using any of the methods authorized in this Part 7.1.B(1)(b)) that the actual or calculated discharge for that drainage area is in compliance with the applicable interim or final effluent limitations as specified in Appendix 7-1.

(3) Each Permittee shall be held liable for violations of the Effluent Limitations assigned to its jurisdiction in Appendix 7-1. Any Permittee whose compliance strategy includes full or partial capture devices and who chooses to install a full or partial capture device in the MS4 physical infrastructure of another public entity is responsible for obtaining all necessary permits to do so. If a Permittee believes it is unable to obtain the permits needed to install a full capture or partial capture device within another Permittee’s MS4 physical infrastructure, either Permittee may request the Executive Officer to hold a conference with the Permittees. Nothing in this Order shall affect the right of that public entity or a Permittee to seek indemnity or other recourse from the other as they deem appropriate. Nothing in this subsection shall be construed as relieving a Permittee of any liability that the Permittee would otherwise have under this Order.

C. Monitoring and Reporting Requirements (pursuant to Water Code section 13383)

(1) Within 60 days of adoption of Part 7, Section 1 (Los Angeles River Trash TMDL) and on October 31, 2010 and every year thereafter, each Permittee identified in Appendix 7-1 shall submit a TMDL Compliance Report detailing compliance with the interim and final effluent limitations. Reporting shall include the information specified below. The report shall be submitted on a reporting form to be specified by the Executive Officer. The report shall be signed under penalty of perjury by the Director of Public Works or other agency head (or their delegee) that is responsible for ensuring compliance with this permit. Permittees shall be charged with and shall demonstrate compliance with the relevant effluent limitations beginning with their October 31, 2010 TMDL Compliance Report.

(a) Reporting Compliance based on Full Capture Systems: Permittees identified in Appendix 7-1 shall provide information on the number and location of full capture installations, the sizing of each full capture installation, the drainage areas addressed by these installations, and compliance with the applicable interim or final effluent limitation, in their TMDL Compliance Report. The Regional Board will periodically audit sizing, performance, and other data to validate that a system satisfies the criteria established for a *full capture system* and any conditions established by the Executive Officer in the certification.

(b) Reporting Compliance based on Partial Capture Systems and/or Institutional Controls:

(1) Using Performance Data Specific to the Jurisdictional Area: Permittees identified in Appendix 7-1 shall provide (i) site-specific performance data for the applicable device(s), (ii) information on the number and location of such installations, and the drainage areas addressed by these installations, and (iii) calculated compliance with the applicable effluent limitations, in their TMDL Compliance Report.

(2) Using Direct Measurement of Trash Discharge: Permittees identified in Appendix 7-1 shall provide an accounting of DGR and trash removal via street sweeping, catch basin clean outs, etc., in a database to facilitate the calculation of discharge for each rain event. The database shall be maintained and provided to the Regional Board for inspection upon request. Permittees identified in Appendix 7-1 shall provide the annual DGR, calculated storm year discharge, and compliance with the applicable effluent limitation, in their TMDL Compliance Report.

(c) Reporting Compliance based on Combined Compliance Approaches:
Permittees identified in Appendix 7-1 shall provide the information specified in subsection (a) for areas where full capture systems are installed and that specified in subsection (b)(1) or (b)(2), as appropriate, for areas where partial capture devices and institutional controls are applied. Permittees shall also provide information on compliance with the applicable effluent limitation

based on the combined compliance approaches, in their TMDL Compliance Report

(2) Violation of the reporting requirements of this Part shall be punishable pursuant to inter alia Water Code subdivision (a)(1) of section 13385.1 and/or subdivision (a)(3) of section 13385.

I, Tracy J. Egoscue, Regional Board Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of the order amended by the California Regional Water Quality Control Board, Los Angeles Region, on December 10, 2009.

ORIGINAL SIGNED BY
Tracy J. Egoscue
Executive Officer

EXHIBIT 2

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November 18, 2010

Via E-Mail

Samuel Unger, Executive Officer
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Re: Heal The Bay, Natural Resources Defense Council and Santa Monica Baykeeper Request to Reconsider or Otherwise Vacate the Executive Officer's Action Dated October 19, 2010, Amending Order No. 01-182, NPDES Permit No. CAS004001.

Dear Mr. Unger and Ms. Fordyce,

I am writing on behalf of Heal The Bay, Natural Resources Defense Council and Santa Monica Baykeeper to formally request the Los Angeles Regional Water Quality Control Board to reconsider and vacate the Executive Officer's action of October 19, 2010, amending Order No. 01-182 (NPDES Permit No. CAS004001). As you are aware, the amendment deleted the receiving water effluent limitations necessary to implement the Santa Monica Beach Dry Weather Bacteria Total Maximum Daily Load. Contemporaneous with this letter, I also am serving you via e-mail the Petition for Review the environmental groups filed today with the State Water Resources Control Board. *See* Request For Stay And Petition To Review California Regional Water Quality Control Board, Los Angeles Region Executive Officer's Amendment Of Order No. 01-182 (NPDES Permit No. CAS004001) dated October 19, 2010 (Nov. 18, 2010). The Petition sets forth in detail the reasons the Executive Officer's action was in error. I hereby incorporate by reference the entire Petition for Review and the accompanying Declaration of Dr. Mark Gold, D. Env., including their respective exhibits, as the basis for this request to the Regional Board.

If the Regional Board fails to act within 60-days of this request to reconsider and vacate the Executive Officer's October 19, 2010 action and take the necessary actions set forth in the Petition for Review, Heal The Bay, Natural Resources Defense Council and Santa Monica Baykeeper intend to amend their pending petition to the State Water Resources Control Board to request review of the Regional Board's inaction. If you have any questions or would like to discuss this request further, please give me a call at (510) 749-9102 x. 103.

Sincerely,

Michael R. Lozeau, Lozeau Drury LLP
Attorneys for Heal The Bay, Natural Resources Defense Council and Santa Monica Baykeeper

cc: All Permittees (Order No. 01-182 (NPDES Permit No. CAS004001) – see Petition for Review, Exhibit 2

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BEFORE THE STATE WATER RESOURCES CONTROL BOARD

IN RE: LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, COUNTY OF LOS ANGELES, AND 84 INCORPORATED CITIES WITHIN THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, LOS ANGELES COUNTY, CALIFORNIA	**DECLARATION OF MARK GOLD, D. ENV., IN SUPPORT OF REQUEST FOR STAY AND PETITION TO REVIEW CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION EXECUTIVE OFFICER'S AMENDMENT OF ORDER NO. 01-182 (NPDES PERMIT NO. CAS004001) DATED OCT. 19, 2010**

DECLARATION OF MARK GOLD, D. ENV

I, Mark Gold, D.Env., hereby declare as follows:

1. The following facts are within my personal knowledge, and I am competent to testify, and if called upon to testify, I could and would testify to the truth of these facts.

2. I am President of Heal the Bay. I have been employed in various capacities at Heal the Bay since 1988. I was Executive Director of the organization from 1994 until 2006, when I became the organization's President. I have worked extensively over the last 22 years at Heal the Bay in the field of coastal protection and water pollution, including on research projects on urban runoff pollution, DDT and PCB contamination in fish, and the health risks of swimming at runoff contaminated beaches. I have served on the U.S. Environmental Protection Agency's Urban Wet Weather Federal Advisory Committee and am vice chair of the National Estuary Program's Santa Monica Bay Restoration Commission and was vice chair of the California Ocean Science Trust. I have a doctorate in Environmental Science & Engineering from the University of California, Los Angeles. My doctoral dissertation was on the policy issues surrounding the health risks of swimming at Santa Monica Bay beaches. As part of the dissertation, I was the principle investigator on a series of studies on pathogens in dry weather runoff, and the fate and transport of fecal indicator bacteria at Santa Monica Bay beaches. In 2007, I served as one of approximately 45 scientific and public health experts from around the world invited by the USEPA to provide research recommendations to the agency on beach water quality. A true and correct copy of my resume, which attests to my experience, is attached as Exhibit A hereto.

3. Heal the Bay is a California non-profit corporation based in Santa Monica, California, with approximately 13,000 members and volunteers residing throughout Southern California, including Los Angeles County. On behalf of its members, Heal the Bay is dedicated to making Santa Monica Bay, Southern California coastal waters, and tributary streams safe and healthy again for people and aquatic life. To achieve its mission, Heal the Bay conducts scientific research and participates in scientific studies; takes active part in the stakeholder process preceding the drafting of Clean Water Act permits; comments on proposed Los Angeles Region Basin Plan amendments, proposed TMDLs and discharge permits; sponsors and authors state legislation to

address clean water issues; organizes the annual Coastal Clean Up Day for all of Los Angeles County including over 60 sites, many of which are in inland communities; and organizes and educates the community on the water quality impacts of urban waste and runoff.

4. Members of Heal the Bay regularly utilize waters in and around Los Angeles County for recreational and aesthetic enjoyment, scientific study, and educational purposes. In addition, Heal the Bay members derive ecological, scientific, aesthetic, recreational, and educational benefit from the conservation of water quality and natural resources in Los Angeles County and Santa Monica Bay.

5. Heal the Bay's members are prevented from safely using the waters at issue due, in large part, to the effects of storm water and dry weather runoff which currently is regulated through municipal storm water permits and Total Maximum Daily Loads ("TMDLs"). The dry weather bacteria discharges adversely affecting Heal the Bay's members are the subject of the Executive Officer's decision on October 19, 2010 to amend Order No. 01-182 (NPDES Permit No. CAS004001) ("LA County Permit") deleting receiving water effluent limitations necessary to implement the Santa Monica Beach Dry Weather Bacteria Total Maximum Daily Load ("Dry Weather Bacteria TMDL" or "Bacteria TMDL").

6. In addition, the interests of Heal the Bay and its members have been, are, and will be directly, adversely and irreparably affected by Los Angeles County and the Los Angeles County Flood Countrol District's ("County") failure to comply with the requirements of the current municipal separate storm sewer permit ("Permit") and other applicable laws, and will continue to be prejudiced by the County's actions as well as the County's attempt to weaken water quality protections for Santa Monica Bay.

7. Since its founding in 1985, Heal the Bay has been instrumental in the protection of Santa Monica Bay from pollution and government inaction, including regarding stormwater pollution. Heal the Bay was formed and continues to exist to support the protection of Santa Monica Bay from the same types of pollution at issue in this matter. Heal the Bay is the longest-serving environmental organization dedicated to ensuring the health and well-being of Santa Monica Bay. This long term, intimate involvement places Heal the Bay in a unique position vis-à-

vis the current stormwater Permit and the bacteria contamination at issue in the TMDL that had been incorporated into the Permit by the Regional Board.

8. Heal the Bay regularly participates in Los Angeles Regional Water Quality Control Board meetings and workshops, where we provide testimony and written comments. Many of our comments are focused on stormwater issues, including implementation and monitoring plans to address stormwater and urban runoff pollution. In my estimate, we participate in over 90% of the monthly Board meetings held by the Los Angeles Regional Water Quality Control Board in any given year.

9. Heal the Bay has a history of comprehensive involvement in stormwater regulation and in the protection of Santa Monica Bay, and, in particular, in the existing municipal stormwater Permit and its regulatory predecessors. Heal the Bay thoroughly participated during the Regional Board workshops regarding the Permit on July 21, 2006, as well as the Regional Board's September 16, 2006 hearing at which the Permit amendments were adopted. Heal the Bay also submitted written comments regarding the Permit on June 30, 2006 and September 1, 2006. Heal the Bay was also involved in the 1990, 1996 and 2001 MS4 permitting process for Los Angeles County.

10. Heal the Bay actively participated at the State Board level in the bacteria TMDL permit amendment. On November 20, 2008, Heal the Bay submitted a lengthy letter in opposition to the petitions for review challenging the Permit. On February 2, 2009 and June 3, 2009, Heal the Bay submitted additional comment letters on the matter. In addition, Heal the Bay actively participated in the June 16, 2009 and August 4, 2009 State Board hearings whereafter the State Board denied petitioners' petition. Heal the Bay also participated as an intervenor on behalf of the Regional Board in the County's recent state court challenge to the 2006 Permit Amendment.

11. During the entire administrative and judicial process, Heal the Bay acted as, and was treated as, a formal party advocating for effective measures in the Permit. Unfortunately, the Regional Board Executive Officer's recent decision to delete the Bacteria TMDL effluent limitation from the LA County Permit threatens to render moot all of that effort and significantly undermines the public's ability to meaningfully participate in permit decisions. Unless the State

Board immediately steps in to stay the Executive Officer's action, the TMDL's safeguards – and the public's right to participate in permitting decisions – will be compromised severely.

12. In addition to involvement in stormwater issues discussed above, Heal the Bay has extensive involvement in the establishment of Total Maximum Daily Loads in the Los Angeles and Ventura areas. In 1999, Heal the Bay filed a federal lawsuit against the United States Environmental Protection Agency ("U.S. EPA") to force the agency to develop TMDLs for impaired water bodies listed in the 1998 303(d) list mandated by the federal Clean Water Act. This action was resolved by a consent decree under which a number of TMDLs, including those for bacteria, for the coastal and inland waters of the Los Angeles region have been and are still being developed to address storm water and urban runoff pollution.

13. Following the consent decree with the U.S. EPA, Heal the Bay has continued its commitment to limiting and stopping storm water and urban runoff pollution from entering inland and coastal waters in the Los Angeles region. We commented on the technical merit and implementation aspects of approximately 25 TMDL Basin Plan Amendments in Southern California, including those relating to the bacteria TMDL, and participated in stakeholder groups for TMDL development and implementation at the state and regional level. This is one of our principal advocacy activities.

14. Since 1990, Heal the Bay has prepared for its members and the public a Beach Report Card that highlights the state of bacteria contamination at local beaches. Heal the Bay's Beach Report Card is the only comprehensive analysis of coastline water quality in California. Today, we analyze monitoring data from approximately 550 beaches weekly from Washington to the Mexico border, assigning an A to F grade based on water quality and the health risks of swimming or surfing at that location and publish that information for members and the public. The Beach Report Card includes a summary of the number of exceedances of Assembly Bill 411 water quality health standards for Santa Monica Bay beaches. Since the TMDL deadline for summer (April 1st through October 31st) dry weather came into effect on July 15th, 2006, there have been 2,302 AB 411 exceedances at Santa Monica Bay beaches (excluding Marina del Rey). During the summer of 2010, there were 499 AB 411 exceedances. Attached hereto as Exhibit B is

a true and correct copy of the tabulation of Heal the Bay Beach Report Card data for AB 411 exceedances at Santa Monica Bay beaches (available at http://healthebay.org/brcv2/ by selecting Los Angeles County, expanding details in the upper right corner and selecting "TMDL Summary"). Swimming at beaches that exceed AB 411 health standards poses an increased health risk of illness.

15. To support the water quality standards for bacteria established in the Los Angeles Region Basin Plan and to help with the establishment of TMDLs for water in the Los Angeles region, Heal the Bay was a key participant in a 1995 epidemiological study of beach-goers swimming near flowing storm drains during summer months. This study, which I co-authored, resulted in a published, peer-reviewed paper which demonstrated the connection between urban runoff and human health impacts at Los Angeles County beaches. Haile, et al., "*The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff*," Epidemiology, Vol. 10, No. 4 (July 1999) (a true and correct copy of this study is attached hereto as Exhibit C)

16. Since 2007, I have served as an investigator with the Southern California Coastal Water Research Project, University of California, Berkeley and the Orange County Sanitation Districts on epidemiology studies at Doheny Beach, Surfrider Beach and Avalon. The studies are on the health risks to swimmers associated with swimming in recreational waters with high microbial densities.

17. Heal the Bay works closely with local governments in Los Angeles and Ventura Counties on the development of plans to implement measures to reduce storm water and urban runoff pollution. For example, we assisted the City of Los Angeles with the development of a Water Quality Compliance Master Plan to Control Urban Runoff which the City is using to comply with applicable TMDLs. We also partnered with Los Angeles County and the City of Los Angeles to develop a best management practice ("BMP") prioritization tool which helps determine effective storm water structural BMP implementation strategies to meet water quality standards and established TMDLs. The City of Los Angeles uses the tool to develop their watershed BMP implementation plans for TMDL compliance. By deleting the Bacteria TMDL receiving water limitation, the Executive Officer and the Regional Board jeopardize all of these efforts.

18. To allow TMDL implementation to be further delayed by the continuing inactions of the County harms Heal the Bay and it members. The Executive Officer's action materially affects the applicability and enforceability of Waste Load Allocations and implementation requirements set forth in the Los Angeles Basin Plan, adopted TMDLs and the terms and conditions of the Los Angeles Municipal Storm Water Permit and other storm water permits approved by the State Board, and directly affects the aesthetic, recreational, and scientific interests of Heal the Bay's members. Water quality standards and associated TMDLs have been the driving force to reducing storm water and urban runoff pollution and the objective measure to show improvement. Eliminating the TMDL's applicability to storm water and urban runoff discharges—even temporarily—has resulted in a significant backsliding in water quality protection and is now slowing down progress toward achieving the goal of clean waters to which Heal the Bay has been committed since its inception. Additional delay in making the Bacteria TMDL enforceable compromises the integrity of not only the TMDL consent decree but of Heal the Bay's success in achieving the development and implementation of all TMDLs in the Los Angeles region.

19. The water quality problem that the now deleted receiving water limitations were directly addressing is serious. Santa Monica Bay beaches are among the most heavily used beaches in the world, with 55 million visitors annually. Regional Board Agenda Report (Jan. 24, 2002) (Order No. R4-2006-0074) Administrative Record ("AR"), pp. 101198; 101210) (a true and correct copy of this document excluding its attachments is attached hereto as Exhibit D); Lifeguard Los Angeles 15-Year Statistics (AR101743) (a true and correct copy of this document is attached hereto as Exhibit E). In the Los Angeles area, 70 to 80 percent of beach visits occur during the dry, summer months of June through September. Transcript, Los Angeles Regional Water Quality Control Board Meeting (Sept. 14, 2006) ("Transcript") (AR, pp. 123816:10-12) (a true and correct copy of an excerpt of this transcript is attached hereto as Exhibit F). Fourteen percent of tourists visit Santa Monica Bay beaches, and these beaches directly contribute $1.7 billion a year to the California economy. Agenda Report (AR, p. 101210) (Exhibit D). Phillip King, Ph.D, "The Fiscal Impact of Beaches in California," p. 3 (Public Research Institute, Sept. 1999) (AR, p.

101833) (a true and correct copy of this report is attached hereto as Exhibit G). Despite this heavy reliance on the beach for recreation and revenue, Santa Monica Bay beaches do not meet the water quality standards designed to protect the public's health and, as such, are designated as "impaired." The Regional Board has concluded that 44 beaches are polluted from the Los Angeles/Ventura County line to Outer Cabrillo Beach just south of Palos Verdes Peninsula. Los Angeles Regional Board Resolution 02-004, Amendment to the Water Quality Control Plan (Basin Plan) for the Los Angeles Region to Incorporate a Dry Weather Total Maximum Daily Load for Bacteria at Santa Monica Bay Beaches (Jan. 24, 2002) (AR, p. 104564) (a true and correct copy of this Resolution and its accompanying attachments is attached hereto as Exhibit H).

20. Polluted runoff is the major cause of these impairments. Transcript (AR, pp. 123970:19-20; 123978:17-20) (Exhibit F). *See* Resolution No. 02-004, Attachment A (AR101972) (Exhibit H). Every summer, beach postings and closures document the persistent threat to the public's health from using these runoff-polluted beaches. Epidemiological studies demonstrate that recreating in polluted runoff causes an increased health risk to swimmers. Transcript (AR, pp. 123978:17-123980:21) (Exhibit F); Agenda Report (AR, p. 101972) (Exhibit D). The most commonly observed health impact associated with recreation in water contaminated with fecal bacteria is gastroenteritis or stomach flu. Transcript (AR, p. 123981:19-23) (Exhibit F). By some estimates, nearly a million people become sick each year because of stormwater pollution in southern California. *Id*. (AR, p. 123828:14-21). For example, in 2000, swimming in contaminated water caused beachgoers between 627,800 and 1,479,200 excess gastrointestinal illnesses in Los Angeles and Orange Counties alone. Suzan Given et al., *Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches*, 40 Environ. Sci. Technol., p. 4851 (2006) (a true and correct copy of this report is attached hereto as Exhibit I). Although water quality is typically worse during the wet season compared to the dry season, more excess GI are predicted for the dry season for most beaches. *Id*. at 4855 (2006). Rashes, eye and ear infections, and significant respiratory disease are also associated with swimming near storm drains. *Id.* at 4853. One of the largest sources of pollution contributing to these health impairments is urban runoff. *See* Steven Bay et al., *Study of the Impact of Stormwater*

Discharge on Santa Monica Bay (Nov. 1, 1999), at 1 (a true and correct copy of this report is attached hereto as Exhibit J).

21. Unless the State Board immediately stays the action of the Executive Officer, at least pending its review of the petition for review filed contemporaneously with this declaration, there is a substantially greater likelihood that bacterial discharges and resulting illnesses at Santa Monica Bay beaches will continue or increase.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on November 17, 2010 at Santa Monica, California.

Mark Gold, D. Env.

EXHIBIT A

MARK GOLD, D.Env.
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EXPERIENCE

President or Executive Director at Heal the Bay (6-94 to present)
Oversee advocacy, legislative, research, and education programs for the successful environmental group. Set priorities and help create strategic plan and implementation strategies for the organization on science and policy, programs, communications, development, education and finance. Chief administrator for the organization. Develop and oversee annual budget of $5.4 million. Primary spokesperson for the organization to the media, agencies, elected officials and at conferences. Responsible for meeting yearly fundraising goals of $5.4 million. Manage a staff of 52. Responsible for the acquisition of the Santa Monica Pier Aquarium (formerly the UCLA Ocean Discovery Center). Often maintain responsibilities as the organization's Science and Policy Director (see below). Principle negotiator for the organization on a wide variety of issues including the Los Angeles and Ventura County Municipal Storm Water Permit, Total Maximum Daily Loads, California's Recycled Water Policy, contaminated sediment issues, and California and National Bathing Water Standards issues. Water quality technical expert. Helped author state legislation including AB 411, AB 538, AB 885, AB 1186, AB 2019, SB 72, SB 899, and California's Education and the Environment Initiative and Clean Beach Initiative. Chaired Santa Monica's successful Measure V campaign that raised the parcel tax to clean beaches and reduce runoff pollution. Also, helped author, pass and implement Proposition O: a $500 million water quality bond for Los Angeles. Chaired statewide workshop on contaminated sediments in 1997 and conference on Urban Storm Water Best Management Practices for the South-West United States in 1998.

Professor at UCLA (11/97 – 3/98 graduate) (12/01 to 4/02 graduate) (3/10 to 6/10 - undergraduate)
Adjunct Faculty at the School of Public Health. The graduate level class focused on coastal pollution problems and their potential solutions. Course material covered the regulatory acts (the Clean Water Act, National Environmental Protection Act, the Porter-Cologne Act, California Environmental Quality Act, and the California Coastal Act), regulatory agencies associated with those Acts, and water quality problems facing California's coast from point and non-point sources, oil, and development. The undergraduate class in Environmental Science focused on water supply, water quality and leadership issues. Frequent guest lecturer at numerous universities including UCLA, USC, Loyola Marymount University, Stanford University, UCSB, UC Berkeley, UCI, Duke University, etc.

Issues and Programs Director (9/88 - 6/94)
Provide technical support for the environmental public interest group. Responsibilities included: Analyze EIRs/EISs, discharge permit applications, consistency determinations, and local, state and federal regulations; complete field research and supervise the preparation of the

organization's technical reports; manage technical and programmatic staff; write and present testimony for public hearings at the State and Regional Water Boards, California Coastal Commission, City Councils, the State Legislature and in front of other agencies; technical review of all of the organization's publications, educational materials, and press releases; provide technical support to Heal the Bay and other environmental groups on source reduction, water quality treatment management strategies and technologies, watershed management strategies, water quality regulatory compliance issues, and the toxicological and ecological impacts of water pollution on humans and aquatic life; decide on and implement issues agenda; review grants; create educational programs for the organization; serve as a spokesperson for the organization to the media; co-author, comment and testify on proposed water quality and natural resources legislation; research and write position papers; exchange information and work cooperatively with elected officials, engineers, scientists and agencies that work on coastal issues. Developed Heal the Bay's Beach Report Card.

Environmental Consultant at Engineering Science Inc. (10/86 – 3/88)
Involved in the preparation of EIRs and environmental assessments. Primarily involved in writing the biological and water quality sections. Projects included: Development at Ballona Lagoon and Ormond Beach wetlands and the L.A. city urban runoff characterization study.

EDUCATION

UCLA -	D.Env., Environmental Science and Engineering: June, 1994
UCLA -	M.A., Biology: June, 1986
UCLA -	B.S., Biology: June, 1984

RESEARCH PROJECTS

Current investigator with SCCWRP, UC Berkeley, and the OCSD on NSF, California, and EPA funded epidemiology studies at Doheny Beach, Surfrider Beach and Avalon. The studies are on the health risks to swimmers associated with swimming in recreational waters with high microbial densities.

Coauthor on a paper in *Journal of Water and Health* The paper is on recommendations to EPA on how to improve current national beach water quality criteria. The paper is entitled "A Sea Change Ahead for Recreational Water Quality Criteria". Boehm, A., Ashbolt, N., Colford, J., Dunbar, L., Fleming, L., Gold, M., et al. 07.1, 2009

Principal Investigator on a study of the PCB and DDT contaminant levels in commercially sold white croaker. Included in the study was a cancer risk assessment, an analysis of the current regulatory framework on contaminated fish, and numerous recommendations to reduce the cancer risks to the population consuming white croaker. The results were used in the Natural

Resources damages/Superfund enforcement action on the DDT contaminated sediments off of Palos Verdes.

Investigator on an epidemiological study of the possible adverse health effects of swimming in the urban runoff contaminated waters of Santa Monica Bay. The study was completed under the auspices of the Santa Monica Bay Restoration Project. 6-94 to 5-96. In Epidemiology 1999. Haile, R., Witte, J., Gold, M. et al.

Co-author of a paper on seafood monitoring for contaminants. Bernstein, B., Allen, M., Dorsey, D., Gold, M., et al.M.J. Lyons, G. A. Pollock, D. Smith, J.K. Stull, G.Y. Wang. 1999. Compliance monitoring in a regional context: Revising seafood tissue monitoring for risk assessment. Ocean and Coastal Management. 42: 399-418.

Principle investigator on a series of storm drain and surf zone pathogen studies completed under the auspices of the Santa Monica Bay Restoration Project. 6-88 to 6-92.

Co-author of a comprehensive study on the use of oxidants for drinking water treatment for the Journal of the American Water Works Association. Summer 1988.

Co-author of a comprehensive study for the State Water Resources Control Board on the sources, fate, transport, aquatic toxicity and possible biological impacts of exposures to six chlorinated organics in the environment. Fall 1987 - Spring 1988.

Co-author of a paper entitled, "Current and Prospective Quality of California's Ground Water" presented at the 16th Biennial Conference on Ground Water. Summer, 1987.

MEMBERSHIPS and HONORS

Former vice chair of the California Oceans Science Trust; Vice Chair of the Santa Monica Bay Restoration Commission (SMBRC), member of the UCLA Institute of the Environment Advisory Board, member of the SMBRC Watershed Council and Technical Advisory Committee (TAC); member of UCLA School of Public Health Hall of Fame; inaugural recipient of the James Irvine Foundation Leadership Award; Durfee Fellowship recipient; inaugural recipient of the Stanton Fellowship; Inaugural recipient of the Catto Fellowship for energy and the environment from the Aspen Institute; member of the city of Los Angeles Proposition O Advisory Committee charged with making recommendations on how to spend $500M to clean beaches and polluted runoff; member of USC Sea Grant Advisory Board; member of the Palos Verdes Superfund Site Technical Advisory Committee; Member of the NOAA Natural Resources Damages Technical Advisory Committee for the Palos Verdes shelf. Chair of the City of Santa Monica's Environmental Task Force for 17 years; Member of California’s Beach Water Quality Task Force and the Clean Beach Advisory Group; Member of the SB 739 Stormwater Technical Advisory Committee on allocation of SWRCB stormwater bond funds; Member of the Advisory Board for the Environmental Media Association; Commencement speaker for the UCLA Department of Ecology and Evolutionary Biology in 2005; Keynote speech at the

Southern California Academy of Sciences in 2006; Keynote speaker or speaker at 40+ conferences nationally and internationally, Prior member of the of the Environmental Protection Agency's Urban Wet Weather Federal Advisory Committee and Beach Advisory Group, the Regional Water Board's Groundwater Technical Advisory Committee and the Technical Review Committee for Surface Water; the Los Angeles Regional Contaminated Sediment Management Committee and Technical Advisory Committee; the City of Malibu's Environmental Review Board; and the Malibu Creek Watershed Advisory Committee

EXHIBIT B

Los Angeles County

Bacteria Limits (TMDL) Violations

TMDL's are in effect from 4/1 through 10/31 of each year.

Exceeded This Week	Beach Name	Violations in AB411 2010	Total Violations Since Compliance Deadline
	Cabrillo Beach - harborside at restrooms	125	125
	Topanga State Beach at creek mouth	61	159
	Dockweiler State Beach at Ballona Creek mouth	47	311
	Redondo Municipal Pier - south side	41	170
	Surfrider Beach (breach location)-daily	31	221
	Santa Monica Municipal Pier	19	426
	Marina del Rey, Mothers' Beach - playground area	18	115
	Will Rogers State Beach at Bel Air Bay Club drain near fence	16	24
	Solstice Canyon at Dan Blocker County Beach	14	77
	Marie Canyon storm drain at Puerco Beach, at 24572 Malibu Rd.	13	125
	Herondo Street storm drain - in front of drain	13	19
	Paradise Cove Pier at Ramirez Canyon Creek mouth	12	49
	Will Rogers State Beach at Temescal Canyon drain	12	28
	Malibu Pier - 50 yards east	10	41
	Marina del Rey, Mothers' Beach-lifeguard tower	8	51
	Will Rogers State Beach at Santa Monica Canyon drain (Chautauqua)	8	48
	Cabrillo Beach- harborside at boat launch	8	8
	Puerco State Beach at creek mouth	7	17
	Las Flores State Beach at Las Flores Creek (point zero)	6	7
	Escondido Creek, just east of Escondido State Beach	5	34
	Manhattan Beach at 28th St. drain	5	15
	Big Rock Beach at 19948 PCH stairs	4	19
	Dockweiler State Beach at Culver Blvd. drain	4	13

Will Rogers State Beach at 17200 PCH (1/4 mile east of Sunset drain)	4	9
Torrance Beach at Avenue I drain	4	8
Santa Monica Beach at Pico/Kenter storm drain	3	37
Santa Monica Beach at Wilshire Blvd. drain	3	32
Redondo Beach- projection of Topaz St., north of jetty	3	21
Venice Beach at Windward Ave. drain	3	9
Dockweiler State Beach at Imperial Hwy drain	3	4
Will Rogers State Beach at Pulga Canyon storm drain	2	10
Dockweiler State Beach at Grand Ave. drain	2	4
Castlerock Storm Drain at Castle Rock Beach	1	47
Santa Monica Beach at Montana Ave. drain	1	28
Venice Beach- projection of Topsail St.	1	21
Will Rogers State Beach at Santa Ynez drain	1	21
Marina del Rey, Mothers' Beach- between lifeguard and dock	1	9
Ocean Park Beach at Ashland Ave. drain	1	9
Malaga Cove, Palos Verdes Estates- daily	1	7
Hermosa Beach Pier- 50 yards south	1	5
Venice City Beach, at the Rose Ave. storm drain	1	5
Dockweiler State Beach at World Way (south of D&W jetty)	1	5
Zuma Beach at Zuma Creek mouth	1	2
Nicholas Beach at San Nicholas Canyon Creek mouth	1	2
Latigo Canyon Creek mouth	0	20
Carbon Beach at Sweetwater Canyon	0	11
Surfrider Beach at Malibu Colony fence	0	10
Leo Carrillo Beach, at Arroyo Sequit Creek mouth	0	6
Santa Monica Beach at Strand St. (in	0	5

front of the restrooms)		
Venice Beach at Brooks Ave. drain	0	5
Venice Fishing Pier - 50 yards south	0	5
Royal Palms State Beach	0	4
Cabrillo Beach- oceanside	0	3
Walnut Creek, projection of Wildlife Rd. (private)	0	2
Dockweiler Beach- opposite Hyperion Treatment Plant	0	2
Manhattan Beach Pier drain	0	2
Hermosa Beach- projection of 26th St.	0	1
Manhattan Beach- projection of 40th St.	0	1
Broad Beach at Trancas Creek mouth	0	1
North Westchester Storm Drain at Dockweiler State Beach	0	1
Portuguese Bend Cove, Rancho Palos Verdes	0	1

EXHIBIT C

The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff

Robert W. Haile,[1] John S. Witte,[2] Mark Gold,[3] Ron Cressey,[4] Charles McGee,[5] Robert C. Millikan,[6] Alice Glasser,[7] Nina Harawa,[8] Carolyn Ervin,[1] Patricia Harmon,[1] Janice Harper,[1] John Dermand,[1] James Alamillo,[3] Kevin Barrett,[1] Mitchell Nides,[9] and Guang-yu Wang[10]

Waters adjacent to the County of Los Angeles (CA) receive untreated runoff from a series of storm drains year round. Many other coastal areas face a similar situation. To our knowledge, there has not been a large-scale epidemiologic study of persons who swim in marine waters subject to such runoff. We report here results of a cohort study conducted to investigate this issue. Measures of exposure included distance from the storm drain, selected bacterial indicators (total and fecal coliforms, enterococci, and *Escherichia coli*), and a direct measure of enteric viruses. We found higher risks of a broad range of symptoms, including both upper respiratory and gastrointestinal, for subjects swimming (a) closer to storm drains, (b) in water with high levels of single bacterial indicators and a low ratio of total to fecal coliforms, and (c) in water where enteric viruses were detected. The strength and consistency of the associations we observed across various measures of exposure imply that there may be an increased risk of adverse health outcomes associated with swimming in ocean water that is contaminated with untreated urban runoff. (Epidemiology 1999;10:355–363)

Keywords: environmental epidemiology, gastrointestinal illness, ocean, recreational exposures, sewage, storm drains, waterborne illnesses, waterborne pathogens.

Runoff from a system of storm drains enters the Santa Monica Bay adjacent to Los Angeles County (CA). Even in the dry months of summer 10–25 million gallons of runoff (or non-storm water discharge) per day enter the bay from the storm drain system. Storm drain water is not subject to treatment and is discharged directly into the ocean. Total and fecal coliforms, as well as enterococci, are sometimes elevated in the surf zone adjacent to storm drain outlets; pathogenic human enteric viruses have also been isolated from storm drain effluents, even when levels of all commonly used indicators, including F2 male-specific bacteriophage, were low.[1]

Approximately 50–60 million persons visit Santa Monica Bay beaches annually. Concern about possible adverse health effects due to swimming in the bay has been raised by numerous interested parties.[2] Previous reports indicate that swimming in polluted water (for example, due to sewage) increases risks of numerous adverse health outcomes (Pruss[3] provides a recent review of this literature). To our knowledge, however, there has never been a large epidemiologic study of persons who swim in marine waters contaminated by heavy urban runoff.

These circumstances provided the motivation to study the possible health effects of swimming in the bay. We present here the main results from a large cohort study of people that addressed the issue of adverse health effects of swimming in ocean water subject to untreated urban runoff.

Methods

Design and Subjects

The exposures of interest were distance swimming from storm drains, levels of bacterial indicators (total coli-

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This work was supported by the Santa Monica Bay Restoration Project, City of Los Angeles, California State Water Resources Control Board, Beach Cities Health District, City of Santa Monica, Los Angeles County Department of Public Works, Heal the Bay, Los Angeles Regional Water Quality Control Board, Chevron USA, Las Virgenes Municipal Water District, U. S. Environmental Protection Agency, and Milken Families Foundation.

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Editors' note: See related editorial on page 351 of this issue.

forms, fecal coliforms, enterococcus, *Escherichia coli*) for pathogens that potentially produce acute illness, and human enteric viruses. We studied three beaches located in Santa Monica Bay (CA) that exhibited a wide range of pathogen indicator counts and a high density of swimmers (Santa Monica, Will Rogers, and Surfrider).

Persons who immersed their heads in the ocean water were potential subjects for this study. There was no restriction based on age, sex, or race. We excluded anyone who swam at the study beaches or in heavily polluted areas (that is, Mothers' Beach in Marina del Rey or near the Santa Monica Pier) within 7 days before the study date, or between the date of the beach interview and the telephone follow-up interview. We excluded subjects who swam on multiple days, as one of our primary questions was whether risk of health outcomes was associated with levels of indicator organisms on the specific day a subject entered the water. We targeted persons bathing within 100 yards upcoast or downcoast of the storm drain and persons bathing greater than 400 yards beyond a storm drain.

For this study, 22,085 subjects were interviewed on the beach from June 25 to September 14, 1995, to ascertain eligibility and willingness to participate. We found that 17,253 of these subjects were eligible and able to participate (that is, had a telephone and were able to speak English or Spanish). Of these, 15,492 (90% of the eligible subjects) agreed to participate. They were interviewed about their age, residence, and swimming, particularly immersion of the head into ocean water. The interviewer noted distance from the storm drain (within the categories 0, 1–50, 51–100, or 400 yards), gender, and race of the subject. (Distances from each drain were marked with inconspicuous objects such as beach towels and umbrellas.)

Nine to 14 days after the beach interview, subjects were interviewed by telephone to ascertain the occurrence(s) of: fever, chills, eye discharge, earache, ear discharge, skin rash, infected cuts, nausea, vomiting, diarrhea, diarrhea with blood, stomach pain, coughing, coughing with phlegm, nasal congestion, and sore throat. For this study we defined *a priori* three groupings of symptoms indicative of gastrointestinal illness or respiratory disease. In particular, following Cabelli *et al*,[4] subjects were classified as having highly credible gastrointestinal illness 1 (HCGI 1) if they experienced at least one of the following: (1) vomiting, (2) diarrhea and fever, or (3) stomach pain and fever. We also classified subjects as having highly credible gastrointestinal illness 2 (HCGI 2) if they had vomiting and fever. Finally, we classified subjects as having significant respiratory disease (SRD) if they had one of the following: (1) fever and nasal congestion, (2) fever and sore throat, or (3) coughing with phlegm.

We were able to contact and interview 13,278 subjects (86% follow-up). Of those interviewed, 1,485 were found to be ineligible because they swam (and immersed their heads) at a study beach or in heavily polluted waters between the day of the beach interview and the telephone follow-up. We excluded 107 subjects because they did not confirm immersing their faces in ocean water, leaving 11,686 subjects. One subject had a missing value for age, which we imputed (as the median value among all subjects) for inclusion in the adjusted analyses (discussed below). For the bacteriological analyses, we excluded an additional 1,227 subjects who had missing values, leaving 10,459 subjects. In the virus analyses we included only the 3,554 subjects who swam within 50 yards of the drain on days when viruses were measured (as the samples were collected only at the storm drain).

Collection and Analysis of Samples for Bacterial Indicators

Samples were collected on days that subjects were interviewed on the beaches. Each day, ankle depth samples were collected from each location (0 yards, 100 yards upcoast and downcoast of the drain, and one sample at 400 yards). One duplicate sample per site was collected daily. Samples were collected in sterile 1 liter polypropylene bottles and transferred on ice to the microbiology laboratory. All samples were analyzed for total coliforms, fecal coliforms, enterococcus, and *E. coli*. Densities of total and fecal coliforms and enterococci were determined using the appropriate membrane filtration techniques in Ref 5. *E. coli* densities were determined by membrane filtration using Hach Method 10029 for m-ColiBlue24 Broth.

Collection and Analysis of Samples for Enteric Viruses

For looking at enteric viruses, we collected samples from the three storm drain sites on Fridays, Saturdays, and Sundays, using Method 9510 C g of Ref 5. Ambient pH, temperature, conductivity, and total dissolved solids were measured. Samples as large as 100 gallons chosen to minimize the impacts of seawater dilution were filtered through electropositive filters at ambient pH. Adsorption filters were eluted in the field with 1 liter of sterile 3% beef extract adjusted to pH 9.0 with sodium hydroxide. Field eluates were reconcentrated in the laboratory using an organic reflocculation procedure.[6] All final concentrates were detoxified before analysis.[7]

All samples were analyzed for infectious human enteric viruses in Buffalo green monkey kidney cells (BGMK) by the plaque assay technique. Ten percent of the final concentrate was tested in this manner to determine whether there were a quantifiable number of viruses present. The remaining concentrate volume was divided in half and analyzed using the liquid overlay technique known as the cytopathic effect (CPE) assay.[8] The CPE assay generally detects a greater number of viruses than the plaque assay, but it is not quantitative. Flasks that did not exhibit CPE were considered to be negative for detectable infectious virus. We further examined any flask exhibiting CPE by the plaque-forming unit method to confirm the presence of infectious viruses.

STATISTICAL ANALYSIS

Our analysis addressed two main questions. First, are there different risks of specific outcomes among subjects swimming 0, 1–50, 51–100, and 400 or more yards from a storm drain? If pathogens in the storm drain result in increased acute illnesses, one would expect higher risks among swimmers closer to the drain. Second, are risks of specific outcomes associated with levels of specific bacterial indicators or enteric viruses?

To address the second question, we estimated risks arising from exposure to levels within categories defined *a priori* by existing standards or expert consensus. Specifically, for total coliforms we defined categories using 1,000 and 10,000 colony-forming units (cfu) per 100 ml as cutpoints, which are based on the California Code of Regulations (S.7958 in Title 17).[9] For fecal coliforms we created categories using cutpoints of 200 and 400 cfu per 100 ml, which reflect criteria set by the State Water Resources Control Board.[10] For enterococcus we used cutpoints of 35 and 104 cfu per 100 ml of water, which were established by the U.S. Environmental Protection Agency.[11] Finally, categories for *E. coli* were selected in meetings with staff from the Santa Monica Bay Restoration Project (SMBRP), Heal the Bay, and the Los Angeles County Department of Health Services. These meetings resulted in initially selecting categories based on cutpoints of 35 and 70 cfu per 100 ml, and then subsequently adding categories using cutpoints of 160 and 320 cfu per 100 ml; the latter were added because it is believed that *E. coli* comprises about 80% of the fecal coliforms. Using these knowledge-based categories, however, assumes a homogeneous risk between cutpoints. This might not be a reasonable assumption because the adequacy of these cutpoints is unclear, and because a large percentage of the subjects were in a single (that is, the lowest) category. Therefore, we further explored the bacteriological relations using categories defined by deciles.

In addition to considering total and fecal coliforms separately, we investigated the potential effect of the ratio of total to fecal coliforms. Motivation for this arose from our expectation that the risk of adverse health outcomes might be higher when the ratio is smaller, indicating a relatively greater proportion of fecal contamination. We used categories of this ratio defined by a cutpoint of 5 (where 5 corresponds to there being 5 times as much total as fecal coliform in the water). The human enteric virus exposure was reported as a dichotomous (that is, virus detected *vs* not detected) measure.

We first calculated simple descriptive statistics giving the number of subjects with each adverse health outcome who swam (1) at the prespecified distances from the drain or (2) in water with the prespecified levels of pathogens. From these counts we estimated the crude risk associated with each exposure. We then used logistic regression to estimate the adjusted relative risks of each outcome. For each exposure/outcome combination, we fit a separate model. All models adjusted for the potential confounding of: age (three categories: 0–12 years, 13–25 years, >25 years); sex; beach; race (four categories: white, black, Latino/a, and Asian/multiethnic/other); California *vs* out-of-state resident; and concern about potential health hazards at the beach (four categories: not at all, somewhat, a little, and very).

Results

Table 1 presents results for each of the adverse health outcomes by distance swimming from the storm drain. Across all distances, risks ranged from about 0.001 (that is, 1 per 1,000) for diarrhea with blood to about 0.1 for runny nose. The risk of numerous outcomes was higher for people who swam at the drain (0 yards away), in comparison with those who swam 1–50, 51–100, or >400 yards from the drain. In particular, we observed increases in risk for fever, chills, ear discharge, coughing with phlegm, HCGI 2, and SRD. In addition, the risks for eye discharge, earache, sore throat, infected cut, and HCGI 1 were also slightly elevated. A handful of outcomes exhibited small increased risks among swimmers at 1–50 yards (skin rash) or at 51–100 yards (cough, cough with phlegm, runny nose, and sore throat). Adjusted estimates of relative risk (RR) comparing swimmers at 0, 1–50, or 51–100 yards from the drain with swimmers at least 400 yards away from the drain showed similar relations as the aforementioned patterns of risks (Table 1). Among the positive associations for swimmers at the drain, RRs ranged in magnitude from about 1.2 (eye discharge, sore throat, HCGI 1) to 2.3 (earache), with varying degrees of precision; most of these RRs ranged from 1.4 to 1.6.

In Table 2 we see that the risk of skin rash increased for the highest prespecified category of total coliforms (that is, >10,000 cfu). Furthermore, the adjusted RR comparing swimmers exposed at this level *vs* those exposed to levels ≤1,000 cfu was 2.6. Whereas the RR for diarrhea with blood also suggested a positive association, this result was based on a single adverse health event (as evinced by the wide 95% CIs). When looking at deciles, in relation to the lowest exposure level (that is, the lowest 10%), we observed increased risks of skin rash at all other levels (Figure 1). The adjusted RRs ranged from 1.6 to 6.2, with five of the nine RRs in the 2–3 range. In addition, there were increased risks of HCGI 2 for all deciles except one (the eighth); the corresponding adjusted RRs ranged from 1.4 to 4.7, with varying levels of precision (Figure 1).

When looking at fecal coliforms, we again observed among those in the highest category (that is, >400 cfu) an increased risk for skin rash (Table 3). There were also *slight* increased risks for infected cut, runny nose, and diarrhea with blood in the highest category, as well as for nausea, vomiting, coughing, sore throat, and HCGI 2 in the middle category (200–400 cfu). The adjusted RRs also indicated positive associations for these outcomes (Table 3). When we used deciles to categorize subjects, however, in comparison with the lowest decile, we only observed marginal increased risks for infection and skin rash (not shown). In our investigation of the ratio of

TABLE 1. Adverse Health Outcomes by Distance Swimming from Drain: Number Ill, Acute Risks, Adjusted Relative Risk (RR) Estimates and 95% Confidence Intervals (CI)

	Distance from Drain (in Yards)										
	>400 (N = 3030)*		51–100 (N = 3311)			1–50 (N = 4518)			0 (N = 827)		
Outcome	No. Ill	Risk	No. Ill	Risk	RR (95% CI)†	No. Ill	Risk	RR (95% CI)†	No. Ill	Risk	RR (95% CI)†
Fever	138	0.046	158	0.048	1.06 (0.84–1.34)	208	0.046	1.07 (0.85–1.33)	59	0.071	1.61 (1.16–2.24)
Chills	72	0.024	85	0.026	1.07 (0.77–1.47)	108	0.024	1.05 (0.77–1.42)	31	0.037	1.60 (1.03–2.50)
Eye discharge	61	0.020	59	0.018	0.88 (0.61–1.27)	73	0.016	0.77 (0.55–1.09)	19	0.023	1.15 (0.67–1.98)
Earache	116	0.038	116	0.035	0.89 (0.68–1.16)	136	0.030	0.81 (0.63–1.04)	38	0.046	1.34 (0.91–1.98)
Ear discharge	21	0.007	19	0.006	0.78 (0.42–1.46)	25	0.006	0.80 (0.45–1.44)	13	0.016	2.09 (1.01–4.33)
Skin rash	23	0.008	30	0.009	1.16 (0.67–2.01)	53	0.012	1.50 (0.91–2.46)	4	0.005	0.62 (0.21–1.83)
Infected cut	17	0.006	16	0.005	0.79 (0.40–1.58)	37	0.008	1.51 (0.84–2.69)	6	0.007	1.48 (0.57–3.87)
Nausea	133	0.044	115	0.035	0.77 (0.60–1.00)	143	0.032	0.75 (0.59–0.95)	40	0.048	1.13 (0.78–1.65)
Vomiting	57	0.019	58	0.018	0.97 (0.67–1.40)	63	0.014	0.76 (0.53–1.09)	25	0.030	1.40 (0.85–2.31)
Diarrhea	204	0.067	163	0.049	0.70 (0.56–0.86)	202	0.045	0.69 (0.56–0.84)	53	0.064	1.04 (0.75–1.44)
Diarrhea with blood	7	0.002	2	0.001	0.26 (0.05–1.26)	3	0.001	0.27 (0.07–1.06)	2	0.002	0.87 (0.15–4.57)
Stomach pain	206	0.068	194	0.059	0.85 (0.70–1.05)	271	0.060	0.93 (0.77–1.12)	61	0.074	1.11 (0.82–1.51)
Cough	209	0.069	263	0.079	1.18 (0.97–1.42)	296	0.066	0.98 (0.82–1.18)	55	0.067	1.01 (0.73–1.38)
Cough and phlegm	90	0.030	114	0.034	1.16 (0.88–1.54)	143	0.032	1.09 (0.83–1.43)	39	0.047	1.65 (1.11–2.46)
Runny nose	273	0.090	351	0.106	1.18 (1.00–1.40)	371	0.082	0.95 (0.80–1.12)	74	0.089	1.10 (0.84–1.46)
Sore throat	190	0.063	244	0.074	1.17 (0.96–1.43)	304	0.067	1.12 (0.93–1.35)	59	0.071	1.25 (0.92–1.71)
HCGI 1	102	0.034	96	0.029	0.88 (0.66–1.17)	121	0.027	0.84 (0.64–1.10)	35	0.042	1.21 (0.81–1.82)
HCGI 2	26	0.009	28	0.008	1.04 (0.61–1.79)	32	0.007	0.90 (0.53–1.53)	15	0.018	1.64 (0.84–3.21)
Significant respiratory disease	139	0.046	177	0.053	1.18 (0.94–1.49)	205	0.045	1.03 (0.82–1.23)	63	0.076	1.78 (1.29–2.45)

The total number of swimmers in each category is given in parentheses (N). HCGI1, highly credible gastrointestinal illness with vomiting, diarrhea and fever or stomach pain and fever. HCGT2, highly credible gastrointestinal illness with vomiting and fever only. Significant respiratory disease, fever and nasal congestion, fever and sore throat or coughing with phlegm.
* Referent category (RR = 1.0).
† Adjusted for age, sex, beach, race, California *vs* out-of-state resident, and concern about potential health hazards at the beach.

total to fecal coliforms, we observed a consistent pattern of higher risks for diarrhea and HCGI 2 as the ratio category became lower (not shown, but available in Ref 12). Because any effect of this lower ratio should be stronger when there was a higher degree of contamination, indicated by total coliform counts in excess of 1,000 or 5,000 cfu, we then restricted our analysis to subjects swimming in water above these levels. In the first case, increased risks with decreasing cutpoints were observed for nausea, diarrhea, and HCGI 2.[12] When we restricted our investigation to subjects in water in which the total coliforms exceeded 5,000 cfu, we observed

TABLE 2. Adverse Health Outcomes by Total Coliform Levels: Number Ill, Acute Risks, Adjusted Relative Risk (RR) Estimates and 95% Confidence Intervals (CI)

	Total Coliforms (cfu/100ml)							
	≤1,000 (N = 7,574)*		>1,000–10,000 (N = 1,988)			>10,000 (N = 757)		
Outcome	No. Ill	Risk	No. Ill	Risk	RR†	No. Ill	Risk	RR†
Fever	368	0.049	88	0.044	0.92 (0.72–1.17)	42	0.055	1.23 (0.87–1.73)
Chills	193	0.025	51	0.026	1.03 (0.75–1.42)	9	0.012	0.51 (0.26–1.01)
Eye discharge	151	0.020	21	0.011	0.46 (0.29–0.74)	15	0.020	0.81 (0.47–1.41)
Earache	270	0.036	66	0.033	0.96 (0.72–1.27)	21	0.028	0.86 (0.54–1.38)
Ear discharge	51	0.007	15	0.008	1.22 (0.67–2.23)	2	0.003	0.46 (0.11–1.93)
Skin rash	65	0.009	14	0.007	0.75 (0.41–1.36)	19	0.025	2.59 (1.49–4.53)
Infected cut	49	0.006	11	0.006	0.97 (0.49–1.91)	3	0.004	0.82 (0.25–2.72)
Nausea	292	0.039	69	0.035	0.94 (0.72–1.24)	18	0.024	0.71 (0.43–1.16)
Vomiting	137	0.018	34	0.017	0.90 (0.61–1.33)	9	0.012	0.64 (0.32–1.29)
Diarrhea	434	0.057	85	0.043	0.80 (0.63–1.03)	33	0.044	0.95 (0.65–1.39)
Diarrhea with blood	8	0.001	2	0.001	1.08 (0.22–5.35)	1	0.001	1.73 (0.19–15.88)
Stomach pain	487	0.064	125	0.063	1.05 (0.85–1.29)	29	0.038	0.69 (0.47–1.02)
Cough	546	0.072	133	0.067	0.90 (0.73–1.10)	51	0.067	0.94 (0.69–1.28)
Cough and phlegm	267	0.035	58	0.029	0.81 (0.60–1.09)	27	0.036	1.03 (0.68–1.57)
Runny nose	703	0.093	170	0.086	0.93 (0.78–1.12)	67	0.089	1.06 (0.81–1.40)
Sore throat	534	0.071	116	0.058	0.83 (0.67–1.03)	47	0.062	0.95 (0.69–1.30)
HCGI 1	242	0.032	54	0.027	0.84 (0.62–1.14)	17	0.022	0.74 (0.44–1.23)
HCGI 2	72	0.010	16	0.008	0.89 (0.51–1.55)	5	0.007	0.83 (0.32–2.12)
Significant respiratory disease	396	0.052	84	0.042	0.80 (0.62–1.02)	42	0.055	1.11 (0.79–1.55)

The total number of swimmers in each category is given in parentheses (N).
* Referent category (RR = 1.0).
† Adjusted for age, sex, beach, race, California *vs* out-of-state resident, and concern about potential health hazards at the beach.

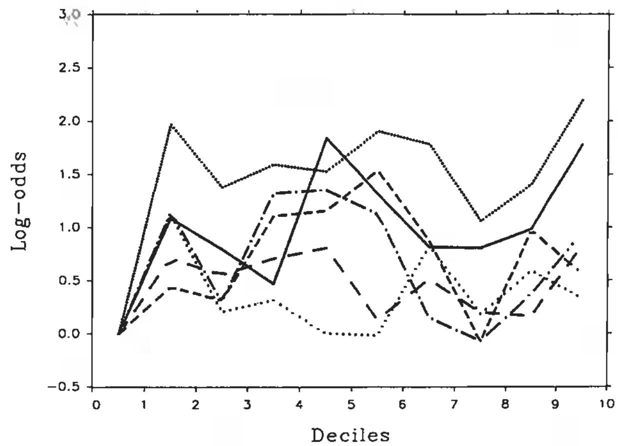

FIGURE 1. Log odds of adverse health outcomes by deciles of exposure for selected bacterial exposures. —, Total coliform and skin rash; – – – ·, total coliform and HCGI 2; · · ·, Enterococci and infected cut; — — —, *E coli* and eye discharge; ···, *E coli* and skin rash; · — ··, *E coli* and infected cut. HCGI 2 = highly credible gastrointestinal illness with vomiting and fever only.

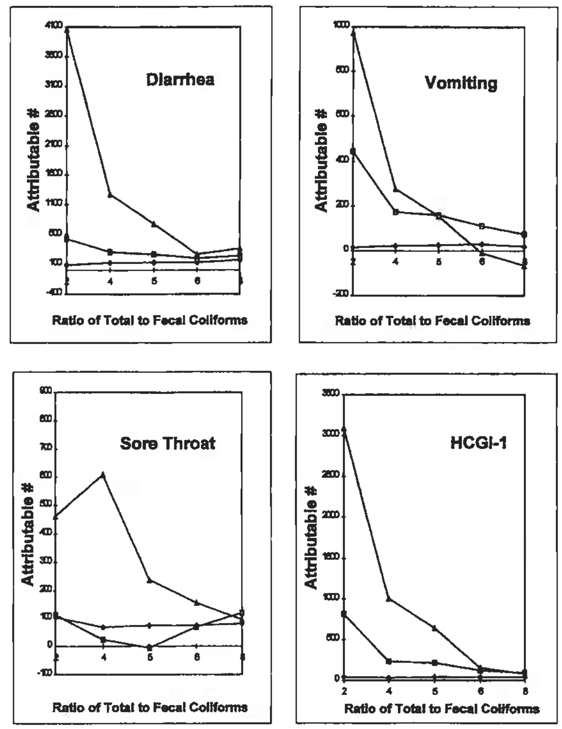

FIGURE 2. Selected attributable numbers/10,000 exposed subjects for total to fecal coliforms. ◆, All days; ■, >1000; ▲, > 5000. HCGI 1 = highly credible gastrointestinal illness with vomiting, diarrhea and fever or stomach pain and fever.

increased risks with eye discharge, ear discharge, skin rash, nausea, diarrhea, stomach pain, nasal congestion, HCGI 1, and HCGI 2.[12] There was a consistent pattern of stronger risk ratios as the cutpoint became lower (when the analyses were restricted to times when total coliforms exceeded 1,000 or 5,000 cfu), with the strongest effects generally observed with the cutpoint of 2, as illustrated in Figure 2 for diarrhea, vomiting, sore throat, and HCGI1.

Table 4 gives results for the relation among enterococci and the adverse health outcomes. Again, we observed an increased risk of skin rash among those in the highest category (that is, >104 cfu). In addition, comparing the highest to other categories of exposure, there

TABLE 3. Adverse Health Outcomes by Fecal Coliform Levels: Number Ill, Acute Risks, Adjusted Relative Risk (RR) Estimates and 95% Confidence Intervals (CI)

	Fecal Coliforms (cfu/100ml)							
	≤200 (N = 8,005)*		>200–400 (N = 768)			>400 (N = 1,636)		
Outcome	No. Ill	Risk	No. Ill	Risk	RR†	No. Ill	Risk	RR†
Fever	381	0.048	39	0.051	1.04 (0.74–1.46)	80	0.049	1.02 (0.80–1.32)
Chills	197	0.025	24	0.031	1.14 (0.74–1.76)	34	0.021	0.78 (0.54–1.14)
Eye discharge	149	0.019	11	0.014	0.70 (0.38–1.31)	30	0.018	0.97 (0.65–1.46)
Earache	275	0.034	26	0.04	0.93 (0.62–1.41)	57	0.035	1.00 (0.75–1.35)
Ear discharge	53	0.007	8	0.010	1.29 (0.60–2.73)	7	0.004	0.56 (0.25–1.24)
Skin rash	69	0.009	5	0.007	0.64 (0.26–1.60)	26	0.016	1.86 (1.17–2.95)
Infected cut	47	0.006	2	0.003	0.40 (0.10–1.65)	15	0.009	1.50 (0.83–2.74)
Nausea	289	0.036	38	0.049	1.29 (0.91–1.84)	57	0.035	0.93 (0.69–1.24)
Vomiting	133	0.017	18	0.023	1.33 (0.81–2.21)	31	0.019	1.07 (0.71–1.60)
Diarrhea	425	0.053	50	0.065	1.17 (0.86–1.60)	81	0.050	0.90 (0.70–1.15)
Diarrhea with blood	7	0.001	1	0.001	1.22 (0.15–10.01)	3	0.002	1.69 (0.42–6.75)
Stomach pain	495	0.062	51	0.066	1.04 (0.77–1.41)	103	0.063	0.98 (0.78–1.23)
Cough	551	0.069	70	0.091	1.34 (1.03–1.74)	117	0.072	1.06 (0.86–1.31)
Cough and phlegm	265	0.033	31	0.040	1.16 (0.79–1.70)	60	0.037	1.10 (0.82–1.47)
Runny nose	722	0.090	72	0.94	1.03 (0.79–1.33)	160	0.098	1.11 (0.93–1.34)
Sore throat	527	0.066	70	0.091	1.40 (1.07–1.82)	106	0.065	0.99 (0.80–1.24)
HCGI 1	239	0.030	28	0.036	1.18 (0.79–1.77)	50	0.031	0.99 (0.72–1.36)
HCGI 2	65	0.008	11	0.014	1.63 (0.85–3.12)	17	0.010	1.13 (0.65–1.95)
Significant respiratory disease	399	0.050	42	0.055	1.08 (0.77–1.50)	85	0.052	1.04 (0.81–1.33)

The total number of swimmers in each category is given in parentheses (N).
* Referent category (RR = 1.0).
† Adjusted for age, sex, beach, race, California *vs* out-of-state resident, and concern about potential health hazards at the beach.

TABLE 4. Adverse Health Outcomes by Enterococci Levels: Number Ill, Acute Risks, Adjusted Relative Risk (RR) Estimates and 95% Confidence Intervals (CI)

	Enterococci (cfu/100ml)							
	≤35 (N = 7,689)*		>35–104 (N = 1,863)			>104 (N = 857)		
Outcome	No. Ill	Risk	No. Ill	Risk	RR†	No. Ill	Risk	RR†
Fever	371	0.048	84	0.045	0.91 (0.71–1.16)	45	0.053	1.00 (0.72–1.40)
Chills	198	0.026	33	0.018	0.67 (0.46–0.97)	24	0.028	0.94 (0.60–1.48)
Eye discharge	149	0.019	25	0.013	0.69 (0.45–1.07)	16	0.019	1.01 (0.58–1.75)
Earache	270	0.035	57	0.031	0.82 (0.61–1.11)	31	0.036	0.88 (0.59–1.31)
Ear discharge	52	0.007	12	0.006	0.85 (0.45–1.62)	4	0.005	0.53 (0.19–1.51)
Skin rash	74	0.010	13	0.007	0.71 (0.39–1.30)	13	0.015	1.72 (0.89–3.31)
Infected cut	46	0.006	12	0.006	0.95 (0.49–1.82)	6	0.007	0.90 (0.37–2.18)
Nausea	271	0.035	72	0.039	1.07 (0.82–1.41)	41	0.048	1.19 (0.84–1.70)
Vomiting	130	0.017	34	0.018	1.13 (0.77–1.67)	18	0.021	1.20 (0.71–2.04)
Diarrhea	398	0.052	101	0.054	0.99 (0.78–1.25)	57	0.067	1.01 (0.75–1.36)
Diarrhea with blood	8	0.001	0	—	—	3	0.004	2.90 (0.66–12.68)
Stomach pain	464	0.060	126	0.068	1.09 (0.89–1.35)	59	0.069	0.97 (0.72–1.30)
Cough	554	0.072	121	0.065	0.91 (0.73–1.12)	63	0.074	1.00 (0.75–1.34)
Cough and phlegm	266	0.035	59	0.032	0.91 (0.68–1.22)	31	0.036	1.03 (0.69–1.54)
Runny nose	704	0.092	165	0.089	0.96 (0.80–1.15)	85	0.099	1.01 (0.79–1.30)
Sore throat	533	0.069	118	0.063	0.89 (0.72–1.10)	52	0.061	0.80 (0.59–1.09)
HCGI 1	230	0.030	51	0.027	0.92 (0.67–1.26)	36	0.042	1.31 (0.89–1.92)
HCGI 2	67	0.009	14	0.008	0.82 (0.46–1.48)	12	0.014	1.30 (0.67–2.51)
Significant respiratory disease	397	0.052	84	0.045	0.86 (0.67–1.11)	45	0.053	0.98 (0.70–1.37)

The total number of swimmers in each category is given in parentheses (N).
* Referent category (RR = 1.0).
† Adjusted for age, sex, beach, race, California *vs* out-of-state resident, and concern about potential health hazards at the beach.

were increased risks of nausea, vomiting, diarrhea with blood, HCGI 1, and HCGI 2. Our adjusted RRs suggested similar positive associations, except for diarrhea; although the risk increased from 0.05 to 0.07, the adjusted RR comparing the highest to lowest category was 1.0 (Table 4). When comparing the lowest to higher deciles, we observed increased risks in most categories for infected cut and skin rash (Figure 1). Other adverse health outcomes—infected cut, nausea, diarrhea, diarrhea with blood, HCGI 1, and HCGI 2—exhibited increased risks only in particular quantiles. In comparison with the lowest decile, the risk of each of these outcomes was higher in the 10th decile. For example, the risk for HCGI 2 was 0.007 in the first decile, but 0.015 in the 10th.

Table 5 presents results for *E. coli*. We once again found an increased risk of skin rash in the highest prespecified category (that is, >320 cfu). Furthermore, we observed slight increased risks in this highest category for eye discharge, earache, stomach pain, coughing with phlegm, runny nose, and HCGI 1 (Table 5). In our decile-based analysis, however, we only observed materially increased risks for eye discharge, skin rash, and infection (Figure 1).

Numerous adverse health outcomes exhibited higher risks among subjects swimming on days when samples were positive for viruses (Table 6). In particular, the risk of fever, eye discharge, vomiting, sore throat, HCGI 1, and HCGI 2, and to a lesser extent, chills, diarrhea, diarrhea with blood, cough, coughing with phlegm, and SRD were higher on days when viruses were detected. Our adjusted RR estimates showed similar relations, most ranging from 1.3 to 1.9 (Table 6). Additionally, adjusting for each bacterial indicator (one-at-a-time) also left these results essentially unchanged.[12] As expected, there was an association between presence of virus and fecal coliforms within 50 yards of the drain. The mean density of fecal coliforms when no virus was detected was 234.8 cfu (SD 542.5 cfu); whereas it was 2,233.8 (SD 2,634.1) when viruses were detected (N = 386). The median values were 47.8 and 452.6 cfu, respectively.

Discussion

We observed differences in risk for a number of outcomes when we compared subjects swimming at 0 yards *vs* 400+ yards. Most of the relative risks suggested an approximately 50% increase in risk. Furthermore, as evinced by both the risks and RRs, there is an apparent threshold of increased risk occurring primarily at the drain: no dose response is evinced with increasing closeness to the drain, but there is a jump in risk for many adverse health outcomes among those swimming at the drain. We also found that distance is a reasonably good surrogate for bacterial indicators, with higher levels observed closer to the drain.[12]

For bacterial indicators, we observed a relation among numerous higher exposures and adverse health outcomes. These increases were mostly restricted to the highest knowledge-based categories (no effect was observed below any existing standards). When looking at quantiles, we found higher risks of skin rash and infection at fairly low levels. In contrast with what one might expect, however, there was no clear dose-response pattern across increasing levels of bacteriological exposures.

TABLE 5. Adverse Health Outcomes by E. coli Levels: Number Ill, Acute Risks, Adjusted Relative Risk (RR) Estimates and 95% Confidence Intervals (CI)

	E. coli (cfu/100ml)													
	≤35 (N = 6,104)*		>35–75 (N = 1,620)			>75–160 (N = 1,145)			>160–320 (N = 518)			>320 (N = 991)		
Outcome	No. Ill	Risk	No. Ill	Risk	RR†	No. Ill	Risk	RR†	No. Ill	Risk	RR†	No. Ill	Risk	RR†
Fever	274	0.045	89	0.055	1.22 (0.95–1.56)	61	0.053	1.20 (0.90–1.60)	29	0.056	1.22 (0.81–1.84)	45	0.045	0.98 (0.70–1.37)
Chills	145	0.024	41	0.025	1.00 (0.70–1.44)	28	0.024	1.00 (0.66–1.52)	18	0.035	1.38 (0.82–2.33)	22	0.022	0.79 (0.49–1.26)
Eye discharge	116	0.019	30	0.019	0.99 (0.65–1.49)	14	0.012	0.65 (0.37–1.15)	6	0.012	0.61 (0.26–1.43)	23	0.023	1.36 (0.84–2.19)
Earache	214	0.035	45	0.028	0.75 (0.54–1.04)	33	0.029	0.78 (0.53–1.14)	18	0.035	0.91 (0.55–1.50)	47	0.047	1.25 (0.89–1.77)
Ear discharge	42	0.007	8	0.005	0.60 (0.28–1.28)	5	0.004	0.57 (0.22–1.46)	6	0.012	1.28 (0.52–3.15)	6	0.0066	0.67 (0.27–1.62)
Skin rash	57	0.009	15	0.009	1.01 (0.56–1.80)	7	0.006	0.66 (0.30–1.46)	6	0.012	1.21 (0.49–2.98)	15	0.015	2.04 (1.11–3.76)
Infected cut	42	0.007	7	0.004	0.53 (0.24–1.20)	3	0.003	0.33 (0.10–1.06)	3	0.006	0.66 (0.20–2.19)	9	0.009	1.02 (0.48–2.19)
Nausea	216	0.035	74	0.046	1.22 (0.93–1.61)	34	0.030	0.80 (0.55–1.16)	18	0.035	0.88 (0.53–1.46)	42	0.042	1.03 (0.73–1.47)
Vomiting	107	0.018	31	0.019	1.09 (0.72–1.64)	16	0.014	0.82 (0.48–1.40)	8	0.015	0.87 (0.41–1.85)	20	0.020	1.05 (0.63–1.74)
Diarrhea	310	0.051	101	0.062	1.14 (0.90–1.44)	63	0.055	1.00 (0.75–1.33)	25	0.048	0.80 (0.52–1.23)	56	0.057	0.91 (0.67–1.23)
Diarrhea with blood	5	0.001	3	0.002	2.06 (0.48–8.89)	1	0.001	1.03 (0.12–9.01)	2	0.004	3.98 (0.68–23.21)	0	—	—
Stomach pain	353	0.058	124	0.077	1.28 (1.03–1.59)	70	0.061	1.02 (0.78–1.33)	31	0.060	0.95 (0.64–1.40)	70	0.071	1.06 (0.80–1.40)
Cough	444	0.073	96	0.059	0.81 (0.64–1.02)	86	0.075	1.04 (0.82–1.33)	29	0.056	0.77 (0.51–1.14)	82	0.083	1.14 (0.88–1.48)
Cough and phlegm	226	0.037	41	0.025	0.66 (0.47–0.92)	34	0.030	0.78 (0.54–1.12)	11	0.021	0.53 (0.28–1.00)	43	0.043	1.12 (0.79–1.59)
Runny nose	566	0.093	136	0.084	0.87 (0.71–1.06)	105	0.092	0.96 (0.77–1.20)	38	0.073	0.76 (0.53–1.08)	108	0.109	1.12 (0.89–1.41)
Sore throat	417	0.068	99	0.061	0.86 (0.68–1.08)	82	0.072	1.02 (0.80–1.31)	29	0.056	0.78 (0.52–1.17)	75	0.076	1.04 (0.80–1.37)
HCGI 1	183	0.030	51	0.031	1.03 (0.75–1.42)	30	0.026	0.88 (0.59–1.30)	17	0.033	1.06 (0.63–1.80)	36	0.036	1.12 (0.76–1.64)
HCGI 2	48	0.008	21	0.013	1.55 (0.92–2.64)	8	0.007	0.85 (0.40–1.81)	6	0.012	1.25 (0.51–3.03)	10	0.010	1.04 (0.51–2.13)
Significant respiratory disease	319	0.052	71	0.044	0.82 (0.62–107)	58	0.051	0.96 (0.72–1.28)	21	0.041	0.74 (0.47–1.18)	56	0.057	1.03 (0.76–1.40)

The total number of swimmers in each category is given in parentheses (N).
* Referent category (RR = 1.0).
† Adjusted for age, sex, beach, race, California *vs* out-of-state resident, and concern about potential health hazards at the beach.

TABLE 6. Number Ill, Risks, and Adjusted Relative Risk (RR) Estimates of Adverse Health Outcomes by Virus

	Viruses				
	No (N = 3,168)*		Yes (N = 386)		
Outcome	No. Ill	Risk	No. Ill	Risk	RR (95% CI)†
Fever	126	0.040	23	0.060	1.56 (0.98–2.50)
Chills	65	0.021	10	0.026	1.25 (0.63–2.50)
Eye discharge	36	0.011	8	0.021	1.86 (0.85–4.09)
Earache	93	0.029	10	0.026	0.92 (0.47–1.80)
Ear discharge	15	0.005	0		
Skin rash	32	0.010	4	0.010	0.97 (0.34–2.82)
Infected cut	31	0.010	2	0.005	0.57 (0.13–2.40)
Nausea	101	0.032	12	0.031	0.93 (0.50–1.73)
Vomiting	44	0.014	10	0.026	1.86 (0.92–3.80)
Diarrhea	130	0.041	21	0.054	1.27 (0.78–2.07)
Diarrhea with blood	2	0.001	1	0.003	5.82 (0.45–75.72)
Stomach pain	191	0.060	23	0.060	0.92 (0.58–1.45)
Cough	181	0.057	28	0.073	1.22 (0.80–1.86)
Cough and phlegm	92	0.029	13	0.034	1.20 (0.66–2.18)
Runny nose	246	0.078	32	0.083	1.01 (0.68–1.49)
Sore throat	198	0.063	32	0.083	1.38 (0.93–2.06)
HCGI 1	72	0.023	15	0.039	1.69 (0.95–3.01)
HCGI 2	22	0.007	6	0.016	2.32 (0.91–5.88)
Significant respiratory disease	133	0.042	21	0.054	1.34 (0.83–2.18)

The total number of swimmers in each category is given in parentheses (N).
* Referent category (RR = 1.0).
† Adjusted for age, sex, beach, race, California *vs* out-of-state resident, and concern about potential health hazards at the beach.

When looking at the ratio of total to fecal coliforms using the entire dataset, no consistent pattern emerged.[12] This is not entirely surprising inasmuch as an analysis of all data points treats all ratios of similar numerical value equally. Thus, for example, even though a ratio of 5 when the total coliforms are very low may not increase risk, the same ratio may be associated with increased risks when the density of total coliforms is above 1,000 or 5,000 cfu. When the analysis was restricted to swimmers exposed to total coliform densities above 1,000 or 5,000 cfu, a consistent pattern emerged, with higher risks associated with low ratios.[12]

This is the first large-scale epidemiologic study that included measurements of viruses. A number of adverse health effects were reported more often on days when the samples were positive, suggesting assays for viruses may be informative for predicting risk. Norwalk-like viruses are a plausible cause of gastroenteritis.[4,13] Enteroviruses, the most common viruses in sewage effluent, can cause respiratory symptoms. Not only are viruses responsible for many of the symptoms associated with swimming in ocean water but also they die off at slower rates in sea water than do bacteria, and they can cause infection at a much lower dose.[14]

Our design substantially reduced the potential for confounding by restricting the study entirely to swimmers and making comparisons between groups of swimmers (for example, defined by distance from the drain) to estimate relative risks. Previous studies looking at the effects of exposure to polluted recreational water (for example, due to sewage outflows) have been criticized for comparing risks in swimmers with risks in nonswimmers.[4,14,15] In these earlier studies, background risks among subjects who swim *vs* those choosing not to swim may differ because there are many other (potentially noncontrollable) exposures/pathways that can produce the symptoms under investigation. By restricting the present study to swimmers, we have reduced potential differences between the background risks of exposed *vs* unexposed subjects (for example, swimmers choosing to swim at the drain *vs* those swimming at the same beach but farther away from the drain). Furthermore, we were able to adjust our relative risk estimates for a number of additional factors (listed above) that could confound the observed relations. Of course, this does not exclude the possibility that residual confounding in these factors, or other unknown factors, might have confounded the observed relations.

Nevertheless, any actual (that is, causal) effects may be higher than we observed in this study because both distance and pathogenic indicators are proxy measures of the true pathogenic agents. Also, recall that we excluded subjects who frequently entered the water at these beaches. If there is a dose-response relation such that higher cumulative exposures are associated with increased risk, then one may infer that persons who frequently enter the water and immerse their heads (for example, surfers) may have a higher risk of adverse health outcomes than the relatively infrequent swimmers included in this study.

In summary, we observed positive associations between adverse health effects and (1) distance from the drain, (2) bacterial indicators, and (3) presence of enteric viruses. Taken together, these results imply that there may be an increased risk of a broad range of adverse health effects associated with swimming in ocean water subject to urban runoff. Moreover, attributable numbers—that is, estimates of the number of new cases of an adverse health outcome that is attributable to the exposure of interest—reached well into the 100s per

10,000 exposed subjects for many of the positive associations observed here.[12] This finding implies that these risks might not be trivial when we consider the millions of persons who visit these beaches each year. Furthermore, the factors apparently contributing to the increased risk of adverse health outcomes observed here are not unique to Santa Monica Bay (similar levels of bacterial indicators are observed at many other beaches). Consequently, the prospect that untreated storm drain runoff poses a health risk to swimmers is probably relevant to many beaches subject to such runoff, including areas on the East, West, and Gulf coasts of North America, as well as numerous beaches on other continents.

Acknowledgments

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EXHIBIT D

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

Pasadena, California
January 24, 2002
449th Regular Meeting

ITEM:	16
SUBJECT:	Consideration of a Proposed Resolution amending the Water Quality Control Plan (Basin Plan) to incorporate a Dry Weather Total Maximum Daily Load to reduce bacteria at Santa Monica Bay beaches.
PURPOSE:	To incorporate into the Basin Plan a Dry Weather Total Maximum Daily Load (TMDL) to reduce bacteria at Santa Monica Bay beaches to reduce the risk of illness associated with swimming in marine waters contaminated with human sewage. The TMDL is being set to protect the Water Contact Recreation (REC-1) beneficial use during dry weather, which is designated as an existing use for all coastal beaches in the Santa Monica Bay watershed.

BACKGROUND:

Santa Monica Bay (SMB) beaches are some of the most heavily used beaches in the world. On average, 55 million beach goers visit these beaches each year. Analysis of the extensive shoreline bacteriological monitoring data collected at SMB beaches has consistently shown that bacteria densities frequently exceed the Water Contact Recreation (REC-1) water quality objectives and State health standards for protection of public health during both dry and wet weather. Swimming in waters with elevated bacteria densities has long been associated with adverse health effects. Local and national epidemiological studies compel the conclusion that there is a causal relationship between adverse health effects, such as gastroenteritis, and recreational water quality, as measured by bacteria indicator densities.

In order to protect one of the Los Angeles Region's most valuable resources, the Regional Board has prepared this TMDL to address the documented bacteriological water quality impairments at 44 coastal beaches from the Los Angeles/Ventura County line, to the northwest, to Outer Cabrillo Beach, just south of the Palos Verdes Peninsula.

The Regional Board is charged with implementing the provisions of both the Porter Cologne Water Quality Control Act (California law) and the federal Clean Water Act in the Los Angeles Region. One of the ways in which the Regional Board implements these laws is through the development and implementation of water quality standards for all of the water bodies within the Region.

Under the federal Clean Water Act, water quality standards consist of beneficial use designations of water bodies and numeric or narrative water quality objectives that are protective of those beneficial uses as well as the state's anti-degradation policy. Section 303(d)(A)(1) of the Clean Water Act requires the Regional Board to identify those waters within the region that are impaired by pollution (not meeting water quality standards), and establish TMDLs for the pollutants causing the impairments. A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and allocates the acceptable pollutant load to point and non-point sources. The TMDL is the sum of the waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources. The TMDL can be expressed in terms of either mass per time, toxicity, concentration, or other appropriate measure.

The SMB beaches TMDL establishes a 6-year plan for reducing the number of dry weather days that exceed REC-1 bacteriological objectives at SMB beaches. The TMDL is expressed in terms of days of exceedance of the single sample bacteriological standards, which were adopted by the Regional Board on October 25, 2001 (Resolution 01-018).

The first phase to be achieved in 3 years addresses the summer dry weather period (April 1 to October 31). To fully protect public health during this critical high-use period, no days of exceedance are permitted at any beach. This is also consistent with historical shoreline monitoring data for 1996-2000, which show no exceedances for the reference beach during the summer.

The second phase to be achieved in 6 years addresses winter dry weather (November 1 to March 31). During winter dry weather, the allowable exceedance days is set to ensure that (1) bacteriological water quality is as good as that of a "reference" beach (i.e., a beach with a largely natural drainage area) and (2) no degradation of existing water quality occurs. During winter dry weather, a <u>maximum</u> of four days of exceedance due to urban runoff is permitted. Based on historical exceedance levels, some shoreline monitoring locations are allocated fewer than four allowable exceedance days in order to maintain existing water quality.

Urban runoff in the Santa Monica Bay watershed is regulated under the Los Angeles County Municipal Storm Water NPDES Permit and the California Department of Transportation (Caltrans) Storm Water Permit. The Regional Board will hold responsible jurisdictions and agencies within a subwatershed jointly accountable for achieving the necessary reduction in exceedance days at the corresponding beach(es) for the two time periods. The three Publicly Owned Treatment Works (POTWs) are each given individual WLAs of zero (0) days of exceedance during these two periods.

The third phase addresses wet weather (defined as days with 0.1 inch of rain or more and the three days following the rain event). Staff has separated the wet weather phase from the two dry weather phases and will present the wet weather TMDL at a Board meeting later this year.

CURRENT STATUS: Staff began developing the proposed TMDL by soliciting input from the Santa Monica Bay Restoration Project (SMBRP) Technical Advisory Committee and, in July 1999, convening a Steering Committee including representatives from the City of Los Angeles Regulatory Affairs Division and Environmental Monitoring Division; County of Los Angeles Department of Public Works; Heal the Bay, Inc.; and the Southern California Coastal Water Research Project (SCCWRP). The Steering Committee assisted in the development and implementation of a 2-year work plan to support the TMDL, including an intensive wet weather monitoring effort, watershed modeling, and various special studies (e.g., a bacteria degradation study and bacteria dispersion study).

On November 9, 2001, the draft TMDL with attachments, including the California Environmental Quality Act (CEQA) checklist, Notice of Public Hearing, and Notice of Filing, was mailed to all interested persons on the Basin Planning mailing list and Santa Monica Bay mailing list, totaling 512 individuals and organizations. Furthermore, notice of the public hearing was published in the *Daily News Los Angeles* and *Daily Breeze*, newspapers of general circulation, on November 21, 2001. All interested persons were given a 45-day period to submit written comments to the Regional Board on the proposed TMDL.

ISSUE(S): There are two significant issues about which Board members should be aware. The first is that staff has decided to bifurcate the wet and dry components of the TMDL and present them as two separate Basin Plan amendments. Staff made this decision based on extensive comments received on the wet weather portion of the TMDL. This will give staff additional time to evaluate comments and clarify elements of the wet weather TMDL. Staff will only be presenting the dry weather elements of the TMDL at this Board meeting.

The second issue is the decision by staff to use the wave wash as the point of compliance for the TMDL. The wave wash (also known as point zero) is the point at which water from the storm drain or creek initially mixes with ocean water. The wave wash was selected as the point of compliance because access to storm drains and freshwater creeks flowing across beaches is not restricted with the exception of warning signs posted near flowing storm drains. People are often observed swimming near storm drains, and in addition, children are often observed wading in the storm water flowing across the beach. Therefore, staff selected the wave wash for the compliance point as a conservative approach to protecting public health.

PROPOSED CHANGES: Based on extensive comments received on the wet weather portion of the TMDL, staff has bifurcated the dry weather and wet weather components of the TMDL. Staff is only presenting the dry weather TMDL for the Board's consideration at this time. This will give staff the opportunity to further evaluate and clarify certain components of the wet weather TMDL.

In addition, staff is proposing a change in the allowable number of winter dry weather exceedances. This is because staff made an inappropriate assumption in calculating the number of wet weather days in the design year. Based on this assumption, staff estimated 116 wet weather days in the design year and a corresponding 35 days of winter dry weather. Based on a re-examination of the rainfall data for the design year, staff calculated 29 wet weather days and a corresponding 122 days of winter dry weather. This re-calculation affects the number of allowable exceedance days during winter dry weather. The allowable exceedance days were determined by multiplying the average percentage of winter dry weather exceedance days (3%) at the reference beach (Leo Carrillo Beach) for the period 1996-2000 by the number of winter dry weather days in the design year. Based on the original estimate of wet weather days, the allowable number of winter dry weather exceedance days was set at two days. Based on the re-calculation, the allowable number of winter dry weather is revised to four days.

DISCUSSION: A strikeout/underline version of the draft TMDL released on November 9, 2001 is attached along with a change sheet for the staff report.

COMMENTS RECEIVED: Fourteen comment letters were received. Copies of these letters are included in the Board Package. These were from:

1. Ballona Creek/Santa Monica Watershed Committee
2. California Stormwater Quality Task Force
3. City of Burbank
4. City of Calabasas
5. City of Downey
6. City of Los Angeles, Bureau of Sanitation
7. City of Redondo Beach
8. City of Signal Hill
9. County of Los Angeles, Department of Public Works
10. County Sanitation Districts of Los Angeles County
11. Heal the Bay, Inc.
12. John Hunter
13. Natural Resources Defense Council and Santa Monica BayKeeper
14. Southern California Alliance of Publicly Owned Treatment Works

Staff responses to these letters will be summarized in a Responsiveness Summary and sent as an addendum to the Board Package.

OPTIONS:

1. No action.

If the Regional Board does not adopt the proposed TMDL, the U.S. EPA will act in place of the Regional Board to promulgate a TMDL to reduce bacteria at Santa Monica Bay beaches in order to meet the deadline established in the consent decree between Heal the Bay, Inc. *et al.* and the U.S. EPA.

2. Adopt the TMDL.

RECOMMENDATION: Adopt the proposed Basin Plan amendment incorporating the dry weather bacteria TMDL for Santa Monica Bay beaches as set forth in Attachment A to the Tentative Resolution.

ATTACHMENTS:

Revised Staff Report
Underline/Strikeout Version of November 9 Staff Report
Change Sheet for Staff Report
CEQA Checklist
Public Comments
Revised Tentative Resolution with Revised Attachment A

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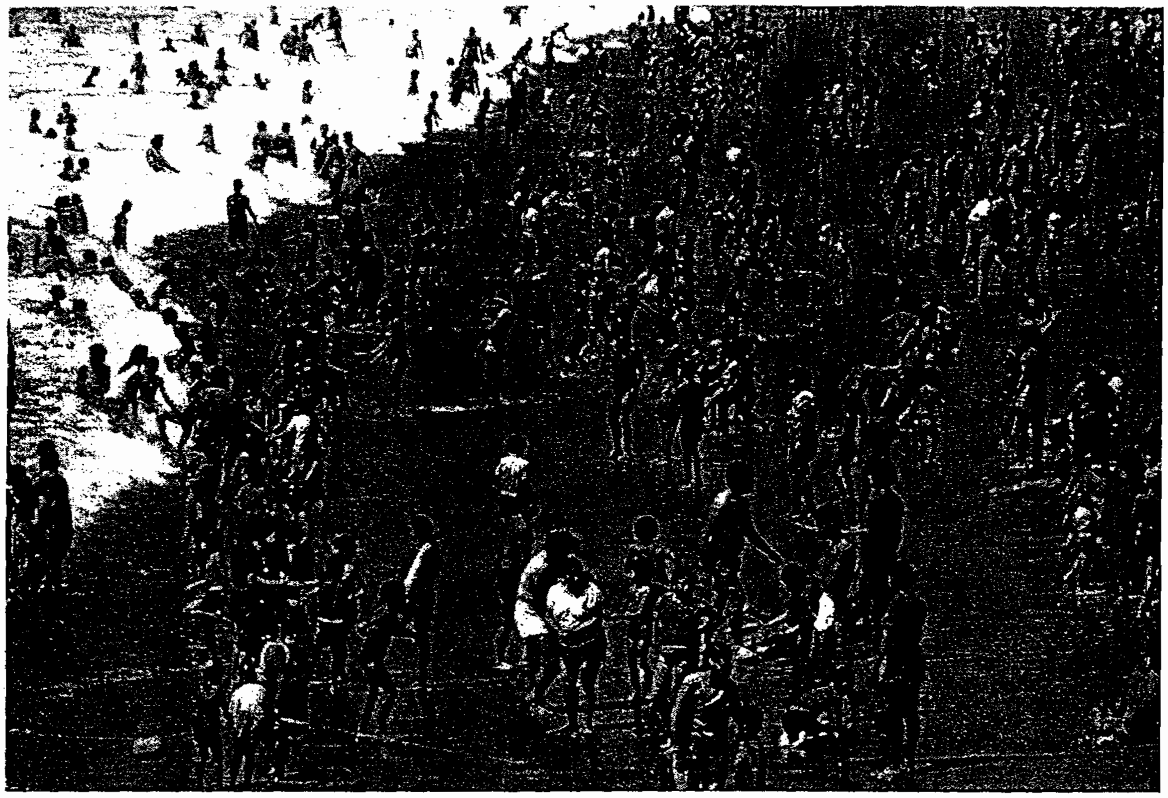
Total Maximum Daily Load to Reduce Bacterial Indicator Densities during Dry Weather at Santa Monica Bay Beaches



Prepared by
California Regional Water Quality Control Board, Los Angeles Region

January 11, 2002

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H Assembly Bill 538, Public beaches: bacteriological standards

Santa Monica Bay Beaches Dry Weather Bacteria TMDL

Draft – January 10, 2002

1 Introduction

This document covers the required elements of the Total Maximum Daily Load (TMDL) for bacteria at Santa Monica Bay beaches (SMB beaches) as well as providing a summary of some of the supporting technical analysis used in the development of the TMDL by the California Regional Water Quality Control Board, Los Angeles Region (Regional Board). The goal of this TMDL is to determine and set forth measures needed to prevent impairment of water quality due to bacteria for SMB beaches.[1] This TMDL is based on extensive information from other entities concerning bacteriological water quality at SMB beaches as well as an intensive wet weather sampling and modeling effort undertaken specifically to support the development of this and other TMDLs.

The TMDL has been prepared pursuant to state and federal requirements to preserve and enhance water quality in Santa Monica Bay and for the benefit of the 55 million beachgoers that visit the SMB beaches each year (Los Angeles County Fire Department, Lifeguard Operations, 2001). At stake is the health of swimmers and surfers and sizeable revenues to the local economy. Visitors to SMB beaches spend approximately $1.7 billion annually (Hanemann *et al.*, 2001).

What follows is a brief overview of the beaches included in this TMDL and the basis for their inclusion, the geographical setting, and the regulatory requirements for preparing this TMDL.

Santa Monica Bay is the major receiving water for one of the largest population centers in the United States. The principal geographic features that define its extent are Point Dume to the

[1] Bacteria can cause disease in and of itself, but is also used as an indicator of the likely presence of other disease-causing pathogens, such as viruses. Viruses are the principal agent of waterborne diseases throughout the world (National Research Council, 1999).

northwest and the Palos Verdes Peninsula to the southeast as depicted in Figure 1. For the purposes of this report, the Regional Board is concerned with the beaches from the Los Angeles/Ventura county line, to the northwest, to Outer Cabrillo Beach, just south of the Palos Verdes Peninsula. This area of concern covers approximately 55 miles of shoreline.

This TMDL includes 44 beaches along Santa Monica Bay. These beaches were listed on the state's 1998 303(d) list as impaired due to bacteria for two reasons – the total and/or fecal coliform water quality standards were exceeded based on shoreline monitoring data or there were one or more beach closures during the period assessed.

Fourteen of the 44 beaches on the 1998 303(d) list were listed due to exceedances of total and/or fecal coliform water quality standards (LARWQCB, 1996). (See Table 1 and Figures 2-4.) The assessment of these beaches was conducted during the 1996 regional water quality assessment (WQA). In the 1996 WQA, beaches were listed as impaired due to bacteria if, for the entire data set: (1) the fecal coliform standard of 400 organisms per 100 ml was exceeded in more than 15% of samples and/or (2) the total coliform standard of 10,000 organisms per 100 ml was exceeded in more than 20% of samples.[2]

In addition to the beaches above, four storm drains that discharge to SMB beaches are listed on the 1998 303(d) list as impaired due to coliform: Santa Monica Canyon; Ashland Avenue Drain; Sepulveda Canyon[3] and Pico Kenter Drain.

In addition, 42 beaches are listed on the 1998 303(d) list as impaired due to beach closures (LARWQCB, 1996). (See Table 2 and Figures 5-7.) Twelve of these are listed for both beach

[2] It should be noted that while this was the assessment guideline used in 1996, the fecal coliform assessment guideline recommended by the U.S. EPA (1997) is that no more than 10% of samples should exceed the fecal coliform objective of 400 organisms per 100 ml. Furthermore, the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan) states that not more than 20% of samples shall exceed a density of 1,000 total coliform per 100 ml and that no single sample shall exceed a density of 10,000 total coliform per 100 ml. The 10% threshold is used in section 2.3 (below), which reviews more recent data to confirm water quality impairments due to bacteria.

[3] Sepulveda Canyon is a "tributary" to Ballona Creek, and as such will be dealt with in detail as part of the Ballona Creek Bacteria TMDL.

closures and coliform as indicated by a "*" in Table 2.[4] Nine more of these have been identified as exceeding water quality standards based on more recent data collected or analyzed by other entities, including the City of Los Angeles, Heal the Bay, and Santa Monica BayKeeper. These nine include: Nicholas Canyon Beach, Zuma Beach, Escondido Beach, Puerco Beach, Malibu Beach, Castlerock Beach, Hermosa Beach, Malaga Cove Beach, and Long Point. (See Table 2.)

The majority of beach closures are due to the release of inadequately treated sewage. Closures may also result from oil spills, vessel spills and persistent elevated bacteria densities.[5] These beaches were originally listed in 1996 because there were one or more beach closures during the period assessed. Sewage spills are primarily addressed through enforcement actions such as Administrative Civil Liability (ACL) fines, Cease and Desist Orders (CDOs), and litigation.[6]

1.1 Geographical Setting

The Santa Monica Bay watershed is 1,072 km^2 (414 mi^2) as shown in Figure 1 and has an estimated population of 1,950,265 based on the 2000 U.S. Census. Open space represents the primary land use in the watershed (55%), while high-density residential areas represent the largest developed area (25% of the total watershed). Low-density residential constitutes 5% of the land area. Commercial, industrial and mixed urban areas cover 10%. The remaining 5% of land area is covered by transportation (1.7%), educational institutions (1.6%), agriculture (0.8%), recreational uses (0.8%), public facilities and military installations (0.2%), and water (0.4%).

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[4] It should be noted that some of the beaches listed as impaired for beach closures do not have shoreline monitoring stations; therefore, they should be considered unassessed in terms of actual monitoring data. These include Robert H. Meyer Beach, Sea Level Beach, Point Dume Beach, Carbon Beach, La Costa Beach, Las Tunas Beach, and many of the beaches along the Palos Verdes Peninsula.

[5] Beach postings on the other hand may result from routine monitoring that shows elevated bacteria densities at a particular sampling location.

[6] For example, the Los Angeles Regional Board is a plaintiff in a lawsuit against the City of Los Angeles regarding sewage spills (*United States, et al. v. City of Los Angeles*, U.S.D.C. Cent. Dist. Cal., CV No. 01-00191).

While this provides an overview of the watershed as a whole, land use is in fact highly differentiated within the watershed. For the purposes of this TMDL, the Regional Board has divided the watershed into 28 subwatersheds. The two largest of these, the Malibu Creek and Ballona Creek subwatersheds, are further divided into 6 and 7 subdrainages, respectively. (Figure 1) Subwatersheds in the northern part of the Bay (northwest of Santa Monica subwatershed) have on average 85% of their land area in open space. Subwatersheds in the central and southern portion of the Bay (southeast of Santa Monica Canyon subwatershed) have on average 16% of their area in open space. (See Table 3 and Figures 8-10 for land use breakdowns by subwatershed.)

1.2 Regulatory Background

The California Water Quality Control Plan, Los Angeles Region (Basin Plan) sets water quality standards for the Los Angeles Region, which include beneficial uses for surface and ground water, numeric and narrative objectives necessary to support beneficial uses, and the state's antidegradation policy, and describes implementation programs to protect all waters in the region. The Basin Plan establishes water quality control plans and policies for the implementation of the Porter-Cologne Water Quality Act within the Los Angeles Region and, along with the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan), serves as the State Water Quality Control Plan applicable to Santa Monica Bay, as required pursuant to the federal Clean Water Act (CWA).

Section 303(d)(1)(A) of the CWA requires each state to conduct a biennial assessment of its waters, and identify those waters that are not achieving water quality standards. The resulting list is referred to as the 303(d) list. The CWA also requires states to establish a priority ranking for waters on the 303(d) list of impaired waters and to develop and implement TMDLs for these waters.

A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and allocates the acceptable pollutant load to point and nonpoint sources. The elements of a TMDL are described in 40 CFR 130.2 and 130.7 and section 303(d) of the CWA, as well as in U.S. Environmental Protection Agency guidance

(U.S. EPA, 1991). By law, a TMDL is defined as the "sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background" (40 CFR 130.2) such that the capacity of the waterbody to assimilate pollutant loads (the Loading Capacity) is not exceeded. The Regional Board is also required to develop a TMDL taking into account seasonal variations and including a margin of safety to address uncertainty in the analysis (40 CFR 130.7(c)(1)). Finally, states must develop water quality management plans to implement the TMDL (40 CFR 130.6).

The U.S. EPA has oversight authority for the 303(d) program and is required to review and either approve or disapprove the state's 303(d) list and each TMDL developed by the state. If the state fails to develop a TMDL in a timely manner or if the U.S. EPA disapproves a TMDL submitted by a state, EPA is required to establish a TMDL for that waterbody (40 CFR 130.7(d)(2)).

As part of its 1996 and 1998 regional water quality assessments, the Regional Board identified over 700 waterbody-pollutant combinations in the Los Angeles Region where TMDLs would be required (LARWQCB, 1996, 1998). A 13-year schedule for development of TMDLs in the Los Angeles Region was established in a consent decree (*Heal the Bay Inc., et al. v. Browner, et al.* C 98-4825 SBA) approved on March 22, 1999.

For the purpose of scheduling TMDL development, the decree combined the over 700 waterbody-pollutant combinations into 92 TMDL analytical units. Analytical unit 48 consists of beaches and key storm drains/channels to Santa Monica Bay with impairments related to pathogens. (The beaches included in TMDL analytical unit 48 are listed in Tables 1 and 2.) The consent decree also prescribed schedules for certain TMDLs, and according to this schedule, a bacteria TMDL for SMB beaches is to be adopted by March 2002.

2 Problem Identification

This section briefly discusses the health risks associated with swimming in ocean water contaminated with human sewage and other sources of pathogens. It is these risks to public health that the Regional Board intends to reduce through the development and implementation of the TMDL. Second, the section describes the applicable water quality standards and provides background on their development. Finally, the section presents more recent data to support the original 303(d) listings made in 1996.

2.1 Health Risks of Swimming in Water Contaminated with Bacteria

Swimming in marine waters contaminated with human sewage has long been associated with adverse health effects (Favero, 1985). The most commonly observed health effect associated with recreational water use is gastroenteritis with symptoms including vomiting, fever, stomach pain and diarrhea. Other commonly reported health effects include eye, ear, and skin infections, and respiratory disease.

Since the 1950s, numerous epidemiological studies have been conducted around the world to investigate the possible links between swimming in fecal-contaminated waters and health risks. Recently, the World Health Organization completed a comprehensive review of 22 published epidemiological studies, 16 of which were conducted in marine waters (Pruss, 1998). Fourteen of the 16 marine water studies found a significant association between bacteria indicator densities and the rate of certain symptoms or groups of symptoms. Most significant associations were found for gastrointestinal illnesses. In a few studies, similar associations were found for respiratory, eye, ear, nose, throat, and skin symptoms. For marine waters, the bacteria indicators that correlated best with health effects were enterococci and fecal streptococci. Other indicators showing correlations were fecal coliform and staphylococci. The studies compel the conclusion that there is a causal relationship between gastrointestinal symptoms and recreational water quality, as measured by bacteria indicator densities.

2.1.1 Santa Monica Bay Epidemiological Study

One of the studies reviewed in Pruss (1998) was the Santa Monica Bay Restoration Project epidemiological study conducted in 1995. This was the first epidemiological study to specifically evaluate the increased health risks to people who swam in marine waters contaminated by *urban runoff* (Haile, *et al.*, 1996, 1999). The results of the Santa Monica Bay study provided much of the basis for the current recreational water quality standards for marine waters in California (e.g., standards developed by the California Department of

Health Services in response to Assembly Bill 411 (1997 Stats. 765)). The study collected health effects data from 11,793 individuals visiting three SMB beaches, including Santa Monica Beach, Will Rogers State Beach, and Surfrider Beach. Bacteria indicators measured in the study included total coliform, fecal coliform, *E. coli*, and enterococcus.

The epidemiological study was unique in two ways. First, the source of bacteria was not effluent from a sewage treatment plant, but instead urban runoff discharged from storm drains. Second, the study compared people swimming near a flowing storm drain to other people swimming 400 meters away from the drain. Positive associations were observed between adverse health effects and the distance an individual swam from the drain. The number of excess cases of illness attributable to swimming at the drain reached into the hundreds per 10,000 exposed participants, suggesting that significant numbers of swimmers in the water near flowing storm drains are subject to increased health risks. In addition, an increased health risk was associated with increasing densities of bacteria.

2.2 Water Quality Standards

The Basin Plan designates beneficial uses for waterbodies in the Los Angeles Region. These uses are recognized as existing (E), potential (P), or intermittent (I) uses. All beneficial uses must be protected. SMB beaches have a variety of beneficial use designations including Navigation, Contact and Non-contact Recreation, Commercial and Sport Fishing, Marine Habitat, Wildlife Habitat, Spawning, Reproduction and/or Early Development, and Shellfish Harvesting. However, the focus of this TMDL is on the Water Contact Recreation (REC-1) beneficial use, which is designated as an existing use for all SMB beaches.[7]

The REC-1 beneficial use is defined in the Basin Plan as "[U]ses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs" (Basin Plan, p. 2-2). The Basin Plan and the California Ocean Plan, the provisions of which are included in the Basin Plan by reference, contain bacteria water quality objectives to protect the REC-1 use. In the current plans, total and fecal coliform bacteria are used as indicators of the likely presence of disease-causing pathogens in surface waters.

On October 25, 2001, the Regional Board adopted a Basin Plan amendment updating the bacteria objectives for waters designated as REC-1 (Regional Board Resolution 01-018, see Appendix A). The revised objectives include geometric mean limits and single sample limits for four bacterial indicators, including total coliform, fecal coliform, the fecal-to-total coliform ratio, and enterococcus.

The revised Basin Plan objectives for marine waters designated for Water Contact Recreation (REC-1) are as follows:

1. <u>*Geometric Mean Limits*</u>

a. *Total coliform density shall not exceed 1,000/100 ml.*
b. *Fecal coliform density shall not exceed 200/100 ml.*
c. *Enterococcus density shall not exceed 35/100 ml.*

2. <u>*Single Sample Limits*</u>

a. *Total coliform density shall not exceed 10,000/100 ml.*
b. *Fecal coliform density shall not exceed 400/100 ml.*
c. *Enterococcus density shall not exceed 104/100 ml.*
d. *Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.*

The revised objectives are consistent with current U.S. EPA guidance (1986), which recommends the use of enterococcus in marine water based on more recent epidemiological studies (LARWQCB, 2001; Cabelli, 1983). The revised objectives are also consistent with recent state law (California Code of Regulations, title 17, section 7958, which implements Assembly Bill 411 (1997 Stats. 765)), which was passed in large part due to the Santa Monica Bay epidemiological study described above. Assembly Bill 411 resulted in changes to California Department of Health Services' regulations for public beaches and public water

[7] Protection of REC-1 (the water contact recreation use) will result in protection of REC-2 (the non-contact recreation use) as the water quality objective for fecal coliform to protect REC-2 is set at 10 times the REC-1 fecal coliform objective.

contact sports areas. These changes included (1) setting minimum protective bacteriological standards for waters adjacent to public beaches and public water contact sports areas based on four indicators (total coliform, fecal coliform, enterococcus, and the fecal-to-total coliform ratio) and (2) altering the requirements for monitoring, posting, and closing certain coastal beaches based on these four bacterial indicators. Finally, the changes are consistent with those being drafted for the California Ocean Plan (Linda O'Connell, State Water Resources Control Board, personal communication). See Table 4 for the revised water quality objectives for protection of marine waters designated as REC-1 adopted by the Regional Board on October 25, 2001.

2.3 Data Review

Santa Monica Bay beaches are some of the most comprehensively and intensively monitored in the nation. Four agencies contribute to this wealth of data. The City of Los Angeles Environmental Monitoring Division at the Hyperion Wastewater Treatment Plant (Hyperion) monitors 20 locations on a daily basis; the Los Angeles County Department of Health Services monitors 33 locations on a weekly basis; and the County Sanitation Districts of Los Angeles County (CSDLAC) monitors eight locations, six daily and two weekly. Approximately one-third of these locations are 25 to 50 yards upcoast or downcoast of the mouth of a storm drain or creek.

Analysis of these data has consistently shown that bacteria densities at many SMB beaches exceed REC-1 bacteria objectives during both dry and wet weather. In the 1996 WQA, the Regional Board evaluated total and fecal coliform monitoring data collected between 1988 and 1994 by the agencies listed above to determine whether a beach was impaired due to exceedances of the existing water quality objectives. The 1996 WQA supported the conclusion that many SMB beaches exceed the REC-1 bacteria objectives.

More recent shoreline monitoring data (1996-2001) collected by the City of Los Angeles, Environmental Monitoring Division, County Sanitation Districts of Los Angeles County, and the Los Angeles County Department of Health Services, and analyzed by Heal the Bay, is summarized in Table 5 and confirms many of the listing decisions made in 1996. On average, during wet weather, 43 of the 56 shoreline locations monitored exceeded at least one indicator more than 10% of sample days per year.[8] During the winter months (November through March), but excluding wet weather, this number drops to 16 of 56 locations. Finally, during summer months (April through October), only seven sites exceeded the standards more than 10% of sample days – Surfrider (two locations), Malibu Pier, Big Rock Beach, Santa Monica Canyon, Santa Monica Pier and Ashland storm drain.

In addition to the above analysis, several other entities have collected and analyzed shoreline bacteriological monitoring data for SMB beaches. First, Heal the Bay compiles and analyzes data collected by local health agencies throughout Southern California. It publishes its results monthly on the Internet and in an annual Beach Report Card (BRC). The BRC assigns each beach a grade from A to F, taking into consideration the frequency and magnitude of indicator threshold exceedances over a 28-day period.[9] Table 6 summarizes the annual BRC grades for SMB beaches for the period April 2000 through March 2001. The 2000-01 BRC also confirms the findings of the Regional Board's 1996 WQA with some additions. Specifically, beaches not listed as impaired due to coliform in the 1996 WQA, but which received an annual BRC grade of "C" or worse include: Nicholas Canyon, Zuma, Puerco, Malibu Pier, Hermosa Pier, Malaga Cove, and Long Point.

Second, two dry-weather assessments of shoreline bacterial water quality have been conducted by the City of Los Angeles and Heal the Bay at selected storm drains since the 1996 WQA. In both studies, samples were taken in the storm drain, the "mixing zone"[10] and at various distances from the storm drain. The results presented in Table 7 are for samples collected in the mixing zone. All locations exceeded at least one single sample objective in more than 10% of mixing zone samples, while seven of 10 locations exceeded all three single

[8] In this analysis and throughout the TMDL, wet weather days were defined as those with rainfall of 0.1 inch or more plus the 3 days following the rain event following the protocol used by the Los Angeles County Department of Health Services to post beaches during and after a rain event.
[9] The indicator thresholds used in the BRC are the same as those recently adopted by the Regional Board for marine waters designated as REC-1 and those proposed as targets in the TMDL, which include total coliform, fecal coliform, enterococcus, and a fecal-to-total coliform ratio.
[10] The mixing zone is the volume of water into which the storm drain or creek empties and the effluent from the storm drain initially mixes with the receiving water. In the context of this TMDL, the mixing zone is the point at which the TMDL numeric targets will apply and is the same as "point zero" and the "wave wash" described in section 3 (below).

sample objectives (total coliform, fecal coliform, and enterococcus) in more than 10% of samples.

Finally, in support of the TMDL, the Southern California Coastal Water Research Project (SCCWRP) conducted a 5-year (1995-99) retrospective evaluation of shoreline bacteria data (SCCWRP, 2001). Rather than examining the percentage of samples that exceeded the water quality objectives for a particular monitoring location, SCCWRP analyzed the percentage of shoreline mile-days that exceeded water quality objectives.[11] It should be noted that while examining exceedances in terms of shoreline mile-days provides insight into the frequency of exceedances, it does not shed light on the magnitude of exceedances.

SCCWRP's evaluation reached several conclusions about the nature of bacteria contamination along beaches. First, SCCWRP found that only 13% of shoreline mile-days exceeded bacteria objectives during the 5-year period. This result highlights the fact that during dry weather most beaches do not exceed water quality standards. Second, SCCWRP found that although rainstorms are relatively infrequent in Southern California, the extent of water quality exceedances during and immediately following wet weather was similar to that of dry weather. Only one-quarter of the samples were collected during wet weather, but approximately 40% of fecal coliform exceedances, 50% of enterococcus exceedances, and 65% of total coliform exceedances occurred during wet weather.

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[11] Shoreline mile-days are calculated as follows:

$$SMD = \frac{\sum_{i=1}^{n} s_i \times d_i \times 200}{\sum_{i=1}^{n} d_i \times 200}$$

Where:
SMD = proportion of shoreline mile-days that exceed a water quality threshold for a stratum (i.e., storm drain, open beach)
s_i = samples that exceed water quality threshold for indicator y (i.e., fecal coliform) for strata i
d_i = temporal weighting equivalent to the number of days until the next sampling event in strata i
200 = shoreline distance weighting (in meters)
The water quality objectives used in the evaluation are the single sample objectives recently adopted by the Regional Board and proposed as the numeric targets in the TMDL.

SCCWRP's analysis also enables the Regional Board to rank sites, and groups of sites, in terms of their relative contribution to the total number of shoreline mile-days that exceed the bacteria objectives. For both wet and dry weather, 53% of exceedances occurred near storm drains, while 40% occurred on sandy beaches. (It should be noted that the influence of storm drains may have been underestimated in the analysis, since sampling sites are located 50 meters north or south of storm drains and water quality impairments may have occurred at less than 50 meters.[12])

Five freshwater outlets/storm drains (Malibu Creek, Santa Monica Pier, Santa Monica Canyon, Pico-Kenter, and Topanga Point) accounted for over half of the drain-related exceedances during dry weather. Exceedances were more evenly spread across storm drain-impacted beaches during wet weather. For open beach sites, the top five most contaminated sites (Surfrider, Malibu Pier, Big Rock Beach, Las Flores Beach, and Paradise Cove) accounted for 37% of exceedances during dry weather, but only 27% of exceedances in wet weather. See Appendix B for the complete retrospective evaluation published in SCCWRP's 2000-01 Annual Report.

In summary, most of the monitored beaches in Santa Monica Bay have been identified by the Regional Board in its 1996 WQA or more recently by other entities as impaired due to exceedances of bacteriological water quality standards.

3 Numeric Target

The TMDL will have a multi-part numeric target based on the bacteria objectives for marine waters designated for contact recreation (REC-1), specified in the Basin Plan amendment adopted by the Regional Board on October 25, 2001. As stated earlier, these objectives are consistent with those specified in the California Code of Regulations, title 17, section 7958 "Bacteriological Standards" and "Ambient Water Quality for Bacteria – 1986" (U.S. EPA,

[12] A recent Southern California Bight-wide summer shoreline bacteriological survey showed that 90% of all exceedances of health standards observed during the 5-week study occurred near a flowing storm drain (Noble *et al.* 1999).

1986). The objectives include four bacterial indicators: total coliform, fecal coliform, enterococcus, and the fecal-to-total coliform ratio. (See Table 4.)

For the TMDL, the numeric targets will be the same as the recently adopted Basin Plan objectives, as measured at point zero (also referred to as the "mixing zone" or "wave wash").[13] For beaches without freshwater outlets (i.e., storm drains or coastal creeks), the targets will apply at existing or new monitoring sites, with samples taken at ankle depth. These targets apply during both dry and wet weather, since there is water contact recreation throughout the year, including during wet weather, at the beaches. The geometric mean targets are based on a rolling 30-day period, and may not be exceeded at any time.

For the single sample targets, the Regional Board has chosen to set an allowable number of exceedance days for each shoreline monitoring site based on one of two criteria. The two criteria require that: (1) bacteriological water quality at any site is *at least* as good as at a designated reference site and (2) there is no degradation of existing shoreline bacteriological water quality if historical water quality at a particular site is *better than* the designated reference site. Applying these two criteria allows the Regional Board to avoid imposing requirements to treat natural sources of bacteria from undeveloped areas. Based on these criteria, no exceedances will be allowed during summer dry weather (April 1 to October 31).[14] This approach, including the allowable exceedance levels during winter dry weather, is further explained in section 7, Waste load allocations.

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[13] Point zero is the point at which water from the storm drain or creek initially mixes with ocean water. Point zero has been selected as the compliance point for the numeric target because access to these drains is, on the whole, not restricted, with the exception of efforts by lifeguards to prevent beach goers from swimming in or adjacent to a storm drain. People are often observed swimming near storm drains, and in addition, children are often observed wading in the storm water flowing across the beach. (See Figure 11.)

[14] This is further supported by the fact that the California Department of Health Services has established minimum protective bacteriological standards – the same as the numeric targets proposed in this TMDL – which when exceeded during the period April 1 to October 31 are used to post beaches with health hazard warnings (California Code of Regulations, title 17, section 7958). In order to fully protect public health and prevent beach postings during this period, staff does not intend to change the zero (0) exceedance days during summer dry weather (April 1 to October 31).

4 Assessing Sources

The TMDL requires an estimate of loadings from point sources and nonpoint sources. In the TMDL process waste load allocations are given for point sources and load allocations for nonpoint sources. Point sources typically include discharges from a discrete human-engineered point (e.g., a pipe from a wastewater treatment plant or industrial facility). These types of discharges are regulated through a National Pollutant Discharge Elimination System (NPDES) permit, typically issued in the form of Waste Discharge Requirements (WDRs) issued by the Regional Board.

Nonpoint source by definition includes pollutants that reach waters from a number of diffuse sources. However, the regulatory distinction between point and nonpoint sources is blurred in the Los Angeles Region. This is because urban runoff to Santa Monica Bay is regulated under two storm water NPDES permits. The first is the Los Angeles County Municipal Storm Water NPDES Permit, which was renewed in 1996 and is currently in the process of being updated. There are 86 co-permittees covered under this permit including 85 cities and the County of Los Angeles. The second is a separate storm water permit specifically for the California Department of Transportation (Caltrans).

In general, sources of elevated bacteria to marine waters include sanitary sewer and sewage plant overflows and spills, illegal discharges from boats, malfunctioning septic tanks, illicit discharges from private drains, and urban runoff discharged from publicly owned storm drain systems. Urban runoff from the storm drain system may have elevated levels of bacterial indicators due to sanitary sewer leaks and spills, illicit connections of sanitary lines to the storm drain system, runoff from homeless encampments, illegal discharges from recreational vehicle holding tanks, and malfunctioning septic tanks among other things. Swimmers can also be a direct source of bacteria to recreational waters. The bacteria indicators used to assess water quality are not specific to human sewage; therefore, fecal matter from animals and birds can also be a source of elevated levels of bacteria, and vegetation and food waste can be a source of elevated levels of total coliform bacteria, specifically.

4.1 Point Sources

There are seven major NPDES permit discharges in the Santa Monica Bay Watershed. Three are Publicly Owned Treatment Works (POTWs) (two with direct ocean discharges), one is a refinery, and three are electricity generating stations. The three POTWs are Hyperion Treatment Plant, Joint Water Pollution Control Plant, and Tapia Wastewater Reclamation Plant. In light of their operations, the refinery and the three generating stations are not considered probable sources of bacteria.

Hyperion is a full secondary treatment plant with a dry weather design capacity of 450 MGD and wet weather peak hydraulic capacity of 850 MGD. The treated wastewater from Hyperion discharges through a 5-mile outfall pipe into Santa Monica Bay. Hyperion discharges approximately 360 MGD to the Bay during dry weather. As part of its permitted operations, Hyperion measures physical, chemical and microbiological parameters at an array of 11 inshore locations five times per month to determine whether the effluent plume reaches the shore. In its 1997-98 Santa Monica Bay Biennial Assessment Report, the City concludes that bacteria loads from Hyperion are not impacting the shoreline. Inshore stations showed 100% compliance with bacteriological receiving water limits with the exception of a few stations in the vicinity of Ballona Creek and Marina del Rey and King Harbor, which may be impacted by boat activity, birds, harbor runoff, and flow from Ballona Creek. (CLA-EMD, 1999).

The Joint Water Pollution Control Plant (Joint Plant) is a partial secondary treatment plant with a design capacity of 385 MGD. Treated wastewater from the Joint Plant discharges through an approximately 2 mile-long outfall network onto the Palos Verdes Shelf. The Joint Plant discharges 334 MGD to the Bay, and continuously disinfects its discharge. The Joint Plant measures total coliform, fecal coliform, and enterococcus at its two main outfalls as well as at six inshore stations located near the 9-meter isobath. In 2000, the inshore stations monitored by the Joint Plant consistently met REC-1 bacteriological water quality objectives. In addition, the Joint Plant Annual Monitoring Report for 2000 shows that the monthly geometric mean densities of total coliform, fecal coliform and enterococcus from the two outfalls are consistently low (CSDLAC, 2001).

The Tapia Wastewater Reclamation Plant is a tertiary treatment plant with a design capacity of 16.1 MGD. It discharges approximately 8-10 MGD to Malibu Creek during the winter season only (November 16 to April 16).[15] Tapia also disinfects before discharging to Malibu Creek. Tapia's 1999 Annual Report indicates that total coliform is less than 1.1 MPN/100 ml based on monthly monitoring of the effluent discharged to Malibu Creek (LVMWD, 1999).

There are 21 minor NPDES permitted discharges in the Santa Monica Bay watershed. In addition, there are numerous discharges covered under general permits or industrial and construction storm water permits. The bacteria loads associated with these dischargers are largely unknown. Most do not monitor for bacteria. The discharge flows associated with these permits are generally low. In addition, many of these permits are for episodic discharges rather than continuous flows. Rather than attempt to compile the data from all the minor NPDES permits, general permits, and industrial and construction storm water permits in the Santa Monica Bay Watershed, the Regional Board assumes that bacteria loadings from these point source discharges will be accounted for in the watershed-wide assessment of nonpoint source loadings, discussed below.

4.2 Nonpoint Sources

As mentioned above, urban runoff to Santa Monica Bay is primarily regulated as a point source under the Los Angeles County Municipal Storm Water NPDES Permit (LA County MS4 Permit) and the Caltrans Storm Water Permit. However, because of the nature of urban runoff, it is discussed in this section.

4.2.1 Existing Data Characterizing Sources

The following section summarizes existing data on bacteria densities for a variety of land uses and receiving water sites for dry and wet weather. Despite an intensive shoreline bacteriological monitoring program, there is little routine monitoring in the subwatersheds draining to the impaired beaches. The Los Angeles County Department of Public Works, the

[15] Based on data from 1996-2000.

lead permittee for the existing municipal storm water permit,[16] conducts a storm water monitoring program, which is the principal source of data on water quality during wet weather.

Additional data for Ballona Creek is collected by the City of Los Angeles, Environmental Monitoring Division and for Malibu Creek by the Las Virgenes Municipal Water District. In addition, there are several volunteer monitoring groups that collect data on a regular basis. Volunteer sampling programs usually focus on dry weather due to the difficulties associated with mobilizing volunteers on short notice to sample during a storm. Finally, several agencies have conducted "snapshot" surveys of water quality at key storm drains/freshwater outlets draining to the Bay.

Summaries of data on dry weather sources of bacteria, and then wet weather sources are presented below.

4.2.2 Dry Weather Source Characterization

Many of the canyon creeks and storm drains to Santa Monica Bay flow during both wet and dry weather. Dry weather flows are not directly attributable to precipitation, but rather to natural springs, over-irrigation of lawns, and other activities in the watershed. Dry weather flows and associated pollutant loads are not well documented in the Santa Monica Bay watershed, and to accurately describe them would require a detailed sanitary survey of each subwatershed. Such detailed surveys were outside the initial scope of the TMDL development; however, staff identified several sources of data characterizing bacteria densities during dry weather in Ballona Creek, Malibu Creek, and major storm drains that empty to the Bay.

Tables 8 through 10 summarize these data sets. Table 8 is a summary of data for 13 major storm drains discharging to Santa Monica Bay, collected by the City of Los Angeles, Los Angeles County, and Heal the Bay between 1998-2001. Ten of the 13 drains exceeded the

[16] In the draft permit under consideration by the Regional Board at the time this report was prepared, the Los Angeles County Flood Control District is named the principal permittee.

single sample total coliform objective in more than 50% of samples. All 13 exceeded the single sample fecal coliform objective in more than 50% of samples, and 11 of 13 exceeded the single sample enterococcus objective in more than 50% of samples.

Table 9 is a summary of data for Ballona Creek, collected by the City of Los Angeles, Los Angeles County, and Santa Monica BayKeeper. Again, overall the data show that the total coliform, fecal coliform, and enterococcus single sample objectives are exceeded frequently and by a significant amount.

Table 10 is a summary of data for Malibu Creek and Lagoon, collected by Los Angeles County and Heal the Bay. Data collected by Heal the Bay indicate that the single sample objective for total coliform is exceeded in 31% of samples, for fecal coliform in 85% of samples, and for enterococcus in 23% of samples.

In addition to the above sources of data, the City of Los Angeles conducted a one-time dry weather sanitary survey in Temescal (Pulga) Canyon (see Figure 3), sampling ten locations from September to October 2000. The City found that almost all locations exceeded the REC-1 single sample bacteria objectives. Specifically, 80% of samples exceeded the total coliform objective and/or the enterococcus objective. (The City also tested for *E. coli*; 74% of samples exceeded the *freshwater* single sample objective of 235 organisms per 100 ml.[17])

Finally, the BeachKeeper volunteer monitoring program administered by the Santa Monica BayKeeper takes quarterly samples from up to 342 coastal drains from Point Dume to Malaga Cove with the potential to discharge to the beach, including private drains, large publicly-maintained storm drains, and creeks such as Malibu, Topanga, and Escondido. Their results show that during dry weather half of the samples from these coastal drains and creeks exceeded the marine single sample objective of 10,000 total coliform per 100 ml (104 out of 203 samples, or 51.2%) and the freshwater single sample objective of 235 *E. coli* per 100 ml

[17] There is no marine water quality objective for *E. coli*.

(109 out of 207 samples, or 52.7%) for the period 1999 to 2001 (Santa Monica BayKeeper, unpublished data).[18]

5 Linkage Analysis

Based on the retrospective evaluation of shoreline monitoring data discussed in section 2.3 and source analysis presented in section 4.2.2, staff has concluded that, with the exception of isolated sewage spills, dry weather urban runoff conveyed by storm drains and creeks is the primary source of elevated bacterial indicator densities to SMB beaches during dry weather. Limited natural runoff and groundwater sources may also potentially contribute to elevated bacterial indicator densities during winter dry weather. This is supported by the finding that historical monitoring data from the reference beach (discussed in detail in section 7) indicate no exceedances of the single sample targets during summer dry weather and on average only three percent exceedance during winter dry weather. Studies show that bacterial degradation and dilution during transport from the watershed to the beach do not significantly affect bacterial indicator densities at SMB beaches (see Appendices E and F). Therefore, the loading capacity is defined in terms of bacterial indicator densities and is equivalent to the numeric targets in section 3.

5.1 Critical Condition

The critical condition in a TMDL defines an extreme condition for the purpose of setting waste load allocations to meet the TMDL numeric target. While a separate element of the TMDL, it may be thought of as an additional margin of safety such that the waste load allocations are set to meet the numeric target during an extreme (or above average) condition.[19]

The critical period for this dry weather bacteria TMDL is during winter months, when historic shoreline monitoring data for the reference beach indicate that the single sample bacteria objectives are exceeded on average 3% of the dry weather days sampled. (See

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[18] See Appendix C for a complete list of these drains/freshwater outlets, as compiled by Santa Monica BayKeeper. Only a small number of these (perhaps 3 dozen) are large systems. Fewer still are among those currently proposed for diversion during low flows.

section 7.3.1, Exceedance criteria for dry weather.) The reason for this is believed to be the result of winter rains, which raise the groundwater table. The higher groundwater tables continue to discharge to freshwater creeks for some time after the rains.

The number of allowable exceedances during winter dry weather is based on a percentage (3%) of dry weather days assumed for the reference year. Staff selected the 10^{th} percentile year in terms of non-rain days as the reference year based on an evaluation of rainfall data at LAX from 1947-2000 (see Appendix D for annual rainfall data at the LAX meteorological station). The 10^{th} percentile year in terms of number of non-rain days was 1993. In 1993, there were 122 days with less than 0.1 inch of rain. Selecting the 10^{th} percentile year to set the allowable number of winter dry weather exceedance days is a conservative approach because in nine years out of ten there will be more non-rain days than in the reference year, which increases the opportunity for a greater number of exceedance days.

6 Margin of Safety

Waste load allocations (WLAs) of zero (0) days of exceedance during summer dry weather (described in section 7) include an implicit margin of safety. The WLAs for winter dry weather are based on historic shoreline data, which staff believes to be conservative because samples from the reference beach and other locations were taken up to 50 yards downcurrent from the storm drain outfall or freshwater creek. Findings from a bacterial dispersion study of selected freshwater outlets show that there is typically significant dilution between the freshwater outlet, the wave wash (the compliance point), and a point 50 yards downcurrent.

7 Waste Load Allocations

Waste load allocations in this TMDL are expressed in a unique way. Waste load allocations are expressed as the number of sample days at a shoreline monitoring site that may exceed the single sample targets identified in section 3. For each shoreline monitoring site and corresponding subwatershed, allowable exceedance levels are set on an annual basis as well as for three other time periods. These three periods are: (1) summer dry weather (April 1 to

[19] Critical conditions are often defined in terms of flow, such as the seven-day-ten-year low flow (7Q10), but may also be defined in terms of rainfall amount, days of measurable rain, etc.

October 31), (2) winter dry weather (November 1 to March 31), and (3) wet weather (days of 0.1 inch of rain or more plus three days following the rain event). Wet weather allowable exceedance levels and annual allowable exceedance levels will be set in a separate TMDL (i.e., SMB Beaches Wet Weather Bacteria TMDL). A joint WLA is given to LA County MS4 permittees and Caltrans for each shoreline monitoring location and for each of the two compliance periods (summer dry weather and winter dry weather). All WLAs for summer dry weather are zero (0) exceedance days. WLAs for winter dry weather vary by location from a maximum of four exceedance days to zero (0) exceedance days based on the method described below. As discussed in section 4.1, the three POTWs have demonstrated the ability to comply with bacteriological receiving water limits and, therefore, are each assigned WLAs of zero (0) exceedance days for both compliance periods.

7.1 Why waste load allocations are defined as allowable exceedance days: The role of natural subwatersheds

The bacteria indicators used to assess water quality are not specific to human sewage. Fecal matter from wildlife and birds can be a source of elevated levels of bacteria, and vegetation can be a source of elevated levels of total coliform bacteria, specifically.

As discussed in section 1.1, subwatersheds in the northern part of the Bay have on average 85% of their land area in open space. (See Figures 8 and 9.) It is not the intent of this TMDL to require diversion of natural coastal creeks or to require treatment of natural sources of bacteria from undeveloped areas. Therefore, the approach staff has chosen is to define reference subwatershed(s) and beach(es) within Santa Monica Bay, which can then be used to set the allowable number of exceedance days. Arroyo Sequit Canyon and the beach to which it drains, Leo Carrillo Beach, have been selected as the reference system.[20] This system was selected for three reasons: (1) Arroyo Sequit is the most undeveloped subwatershed in the Santa Monica Bay watershed, (2) there is a freshwater outlet (creek), which drains to the beach, and (3) staff have historical shoreline monitoring data for this system.

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[20] Arroyo Sequit Canyon is approximately 12 square miles in size and has the highest percentage of land area in open space (98%) in comparison to all other subwatersheds in Santa Monica Bay.

7.2 *Two methods for measuring exceedance days: The role of modeling and shoreline monitoring data*

Staff have used two methods to determine the number of days that exceed the single sample objectives at various shoreline locations. The first method is the water quality model described in the Wet Weather Bacteria TMDL. The second method is a site-by-site evaluation of historical shoreline bacteriological monitoring data for the 5-year period 1996-2000. Only the second method is applicable for estimating dry weather days of exceedance.

7.2.1 Historical shoreline bacteriological data method

Under this method, staff used the most recent five years of shoreline monitoring data (1996-2000) to determine the average percent exceedance for each shoreline monitoring site.[21] This was calculated for each of the three time periods of concern (i.e., summer dry weather, winter dry weather, and wet weather).[22] There are two important distinctions between the measured exceedance days under this method as compared to Method I (the water quality model). First, shoreline monitoring sites are typically located 50 yards upcoast or downcoast of a storm drain or creek. The shoreline compliance point set for this TMDL is the "wave wash" or "point zero" rather than 50 yards away. Therefore, it is likely that historical shoreline monitoring data *under-estimates* the average percent exceedance that would be observed at a beach if the sample were collected from the wave wash. Second, an average percent exceedance value is calculated for each shoreline monitoring site, rather than for a subwatershed. In some cases, one subwatershed is the drainage area for multiple shoreline monitoring sites. (See Figure 3, for example.)

7.3 *Criteria for determining allowable exceedance days: The role of the reference system and antidegradation*

Staff has chosen to set the number of allowable exceedance days for each beach to ensure that (1) shoreline bacteriological water quality is at least as good as that of a largely undeveloped system and (2) there is no degradation of existing shoreline bacteriological

[21] Only four years of data (1997-2000) were available for the County Sanitation Districts' sites on the Palos Verdes Peninsula.

water quality. The selected approach prevents the undesirable result of requiring natural sources of bacteria from undeveloped areas to be treated. Staff achieves this result by using the smaller of two measurements of exceedance days. These are: (1) exceedance days in the reference system, or (2) exceedance days based on historical bacteriological data at a particular shoreline monitoring site. In other words, if the number of dry-weather or wet-weather exceedance days in the reference system surpasses historical levels at another shoreline monitoring site, then the historical levels at the other site will apply to that particular site (i.e., the site-specific historical exceedance levels would override the "default" exceedance levels of the reference system). Below are discussions of the criteria used to consider allowable dry weather exceedances.

7.3.1 Exceedance criteria for dry weather

For dry weather, staff again used one of two criteria: (1) exceedance days in the reference system or (2) exceedance days as measured by historical bacteriological data at a particular site.

Historical data for Leo Carrillo Beach show no exceedances during summer dry weather (April 1 to October 31) and on average 3% exceedance during winter dry weather. Therefore, the reference system criterion is 0% exceedance days for summer dry weather and 3% exceedance (or four days under a daily sampling regime) during winter dry weather.[23]

The second criterion is the exceedance level as measured by historical bacteriological data for a particular shoreline monitoring site.

[22] Wet weather was defined as those days with 0.1 inch of rain or more, and the three days following the rain event. This definition is the same as that used by the Los Angeles County Department of Health Services for rain-related beach postings.
[23] Again, we extrapolated from the 5-year average percent exceedance to an estimated number of exceedance days during winter dry weather by using rainfall data for 1993. There are 151 days from November 1 to March 31. Subtracting from this the 29 wet-weather days leaves 122 winter dry-weather days. Staff recognizes that the number of winter dry weather days will change from year to year and, therefore, 3% of dry weather days will not always equate to 4 days. However, staff is setting the allowable number of exceedance days based on the reference year, rather than allowing the number to float based on the number of wet and dry days in a particular year.

Again, remember that the smaller of these two criteria (or exceedance-day measurements) holds for dry weather. For summer dry weather this is very straightforward – no exceedances are allowed at any site, since 5 years of historical data for Leo Carrillo Beach, the reference beach, show no exceedances during this period.[24] For winter dry weather, look at Table 11, if a shoreline monitoring site exceeded the single sample objectives more than four days under a daily sampling regime (or 3% of the time) during winter dry weather, the "Winter Dry Weather Daily Sampling" column was re-set to four days and the "Winter Dry Weather Weekly Sampling" column was re-set to one day. If a site exceeded four days or less based on a daily sampling regime (or 3% of the time) during winter dry weather, the two columns were left unchanged. That is, the exceedance days remain the same as the historical 5-year average exceedance level for that particular shoreline monitoring site. In Table 12, staff presents the site-by-site 5-year average percent exceedance for winter dry weather and the corresponding required reduction in winter dry weather exceedance days for daily sampling regimes.

7.4 Future growth

Potential growth is implicitly addressed, since the numeric targets are based on bacteria density and the number of allowable exceedance days, not a total load. The actual reductions in the number of days necessary to meet this target may change based on growth; however, the final compliance target will remain the same.

7.5 Re-evaluating allowable exceedance levels and interim compliance

Due to shortcomings of the historic shoreline monitoring data method described above, the Regional Board intends to re-open the TMDL three years after adoption to re-evaluate the allowable winter dry weather exceedance levels defined above.

[24] The WLA of zero (0) exceedance days is further supported by the fact that the California Department of Health Services has established minimum protective bacteriological standards – the same as the numeric targets proposed in this TMDL – which, when exceeded during the period April 1 to October 31, are used to post beaches with health hazard warnings (California Code of Regulations, title 17, section 7958). In order to fully protect public health and prevent beach postings during this period, staff does not intend to change the zero (0) exceedance days during summer dry weather (April 1 to October 31).

For the historical shoreline bacteriological data method, where there is a freshwater outlet (drain or creek) that reaches the surf zone during wet weather, shoreline monitoring stations will need to be placed (or re-located) at the "wave wash" (the compliance point for the TMDL). As stated earlier, many shoreline monitoring locations are currently located 50 yards upcoast or downcoast of a storm drain or creek. Once the Regional Board has several years of shoreline monitoring data from the "wave wash," the Regional Board will re-open the TMDL and revise as necessary the average percentage of exceedance days during winter dry weather for both the reference system(s) and each individual beach monitoring location.

Until the TMDL is re-opened, the allowable number of winter dry weather exceedance days will remain as presented in Table 11. Re-opening the TMDL will not create a conflict in the interim, since the TMDL does not require compliance during winter dry weather until six years after the effective date of the TMDL. Therefore, the TMDL will be re-opened and the allowable exceedance levels for winter dry weather will be revised as necessary before the compliance deadline.

8 Implementation

8.1 Regulatory Mechanisms

As required by the Clean Water Act, discharges of pollutants to Santa Monica Bay from storm water are prohibited, unless the discharges are in compliance with a NPDES permit. In June 1990, the Regional Board's first Municipal NPDES Storm Water Permit was issued jointly to Los Angeles County and 85 cities as co-permittees. The Los Angeles County Municipal Storm Water NPDES Permit and the Caltrans Storm Water Permit will be key implementation tools for this TMDL. Because bacteria is primarily considered a storm water contaminant, the numeric targets presented in this TMDL will be incorporated as effluent limits in future storm water permits, which will be modified in order to address implementation and monitoring of this TMDL.

Discharges of waste that may affect the quality of the waters of the region must file a Report of Waste Discharge (ROWD) and obtain the appropriate discharge permits. Santa Monica BayKeeper has identified 342 potential discharges to the shore between Malaga Cove and

Point Dume. Ten to 12 of these are natural creeks or washes; the status of the remaining 330 to 332 discharges is unknown at this time. Within 120 days of the effective date of this TMDL, ROWDs must be filed for these discharges if they have not been already individually reported or if the discharges are not already regulated by the Los Angeles County Municipal Storm Water NPDES Permit or Caltrans Storm Water Permit.

Finally, per the California Ocean Plan, no discharge of waste to an Area of Special Biological Significance (ASBS) is allowed. In the Santa Monica Bay watershed, the area from Latigo Point to Point Mugu (beyond the County line) is designated an ASBS. Therefore, no discharge of waste to the shore is allowed in this region. Santa Monica BayKeeper has identified 271 potential waste discharges to the shore in this area; the status of these is unknown at this time. Within 120 days of the effective date of this TMDL, these discharges must be identified and all illegal discharges eliminated.

8.2 Phased Implementation Schedule

The general implementation schedule includes two phases and is summarized in Table 13.

Phase I: Compliance during Summer Dry Weather. Within three years of the effective date of this TMDL, there may be no exceedances at any location during summer dry weather (April 1 to October 31). This compliance target may be achieved by employing one or more strategies in Table 13 or by any other viable strategies, including diverting storm drain flows to treatment plants (where possible); eliminating illicit discharges; controlling sources of bacteria (including groundwater sources); or implementing "end-of-pipe" treatment. The County of Los Angeles, City of Los Angeles and several other cities adjacent to Santa Monica Bay are well on the way to achieving this goal through aggressive summer, dry-weather storm drain diversion programs. Thus far 11 of 27 major storm drains have been diverted and funding is secured for another six to be diverted. This leaves only 10 major drains discharging to Santa Monica Bay beaches during dry weather from April 1 to October 31.

Phase II: Compliance during Winter Dry Weather. Within six years of the effective date of this TMDL, compliance with the allowable number of exceedance days during winter dry weather must be achieved. (See Table 11.) This compliance target may be achieved by employing one or more strategies in Table 13 or by any other viable strategies, including diverting dry weather storm drain flows to treatment plants year-round, where possible.

Each permittee or group of permittees along with other responsible agencies within a subwatershed may decide how to achieve the necessary reductions in number of days of exceedance at each shoreline location by employing one or more of the strategies listed in Table 13. In many cases there are multiple incorporated and unincorporated areas and responsible agencies within a subwatershed; therefore, all jurisdictions and responsible agencies within a subwatershed are jointly responsible for achieving the necessary reductions in days of exceedance. See Appendix G for responsible jurisdictions by subwatershed. If a storm drain has been diverted at a particular shoreline monitoring location, responsibility for any continued exceedances will fall to the adjacent municipality, County agency(ies), or State agency(ies). Staff expects that after an additional year or two of sampling, the source characterization study and model results will assist municipalities in focusing their implementation efforts.

8.3 Implementation Approach

As mentioned earlier, the necessary reductions in the number of days of exceedance must be achieved in the wave wash or at ankle depth for "open beach" monitoring stations (i.e., monitoring stations located away from any storm drain or coastal creek). This means that cities, or groups of cities/permittees, will be required to meet the total reduction in the subwatershed associated with the shoreline monitoring station, not necessarily an allocation for their municipality or for specific land uses. Clearly the focus should be on developed areas or areas with significant human use (i.e., open space heavily used for recreation). Flexibility will be allowed in determining how to reduce bacteria densities as long as the required allocations are achieved in the wave wash or at ankle depth.

8.4 Cost Considerations

To estimate the cost of implementing the TMDL, staff has compiled (1) the capital costs of diverting the remaining 10 major storm drains and the operation and maintenance (O&M) costs of diverting all the major storm drains entering Santa Monica Bay during the period from April 1 to October 31, (2) the additional O&M costs to divert the 27 major storm drains during dry weather throughout the year, and (3) the cost to address dry weather runoff from natural creeks.. The costs for beaches drained by the Malibu Creek watershed and Ballona Creek watershed are not addressed below, as there are separate TMDLs for bacteria for these two systems. As such, cost considerations will be considered in the individual bacteria TMDLs for these two systems.

8.4.1 Dry Weather Treatment Costs

The total estimated costs for low-flow diversion of the 27 major storm drains entering Santa Monica Bay during the period April 1 to October 31 are as follows. These costs are based on a report prepared by the City of Los Angeles (2001), discussions with staff at the City of Los Angeles, Bureau of Sanitation, and proposals submitted to the Regional Board and Santa Monica Bay Restoration Project under the Clean Beaches Initiative and Proposition 12. The annualized capital cost to construct the remaining 10 low-flow diversions is estimated at $717,386, assuming financing for 20 years at 7 percent. The operation and maintenance costs during the period from April 1 to October 31 for all 27 diversions are estimated at approximately $1.7 million. (See Table 14.) For households in the SMB watershed, this translates into an annual cost of $3.23.[25]

The total estimated costs for diverting the 27 major storm drains during dry weather from November 1 to March 31 are as follows. If charged, the one-time sewer facility charge to pay for capacity in the sewer system is estimated at approximately $28 million (or $2.65 million in annualized costs). The annual operation and maintenance costs are estimated at $872,841.

[25] Based on the 2000 U.S. Census, there are approximately 744,376 households in the SMB watershed. (This was derived based on the total population in the watershed (1,950,265) and the average number of people per household in the watershed (2.62).)

(See Table 14.) For households in the SMB watershed, this translates into an annual cost of $4.72 per household.

Staff has also estimated the cost of addressing dry weather runoff from some of the natural creeks that impact beaches, such as Topanga Creek. We expect that similar prevention and treatment measures to those being implemented in the Malibu watershed will be needed. Specifically, we expect that some storm drain disinfection systems may need to be installed and, in addition, a watershed source control program will need to be implemented to reduce anthropogenic nonpoint sources of bacteria such as from malfunctioning septic systems. The estimated cost per watershed is estimated at $1.0 to $2.0 million (based on cost estimates for similar management measures in the Malibu watershed). Dry weather implementation programs are likely to be needed in eight subwatersheds based on the historical data analysis: Nicholas Canyon, Trancas Canyon, Zuma Canyon, Latigo Canyon, Corral Canyon, Las Flores Canyon, Piedra Gorda Canyon, and Topanga Canyon. Estimating on average $1.5 million per watershed equals a total cost of $12 million ($1.1 million in annualized costs). Again, for households in the Santa Monica Bay watershed, this translates into an annual cost of $1.52 per household.

Collectively, the estimated annual cost per household to achieve compliance with the TMDL during *dry weather* throughout the year is $9.50.

9 Monitoring Programs

The monitoring program for the TMDL consists of two key components: a source characterization component and a shoreline compliance monitoring component.

9.1 Source Characterization

The purpose of the source characterization component is three-fold. Each of these purposes is described below. First, it will allow the Regional Board to refine estimates of the "baseline" level of exceedance in the reference system. The TMDL waste load allocations are set such that the number of days of exceedance at the base of a subwatershed should be the lesser of that observed in the reference system or existing levels of exceedance for a particular shoreline site. Staff selected Arroyo Sequit Canyon and Leo Carrillo Beach as the "reference" system for the purpose of defining a baseline level of exceedance. At the time of writing, staff did not have data on bacteria densities at the mouth of this system (i.e., the wave wash). Over the course of the year, staff will be collecting data from this system, and potentially others, to better define the baseline level of exceedance observed in local natural systems during both wet and dry weather.

The second purpose of the source characterization component is to allow the Regional Board to better calibrate and validate the model used in the wet weather TMDL and refine estimates of the necessary reductions in the number of days of exceedance for each subwatershed and by municipality. Over the next one to two years, a coalition of agencies will collect water quality data under wet weather conditions to refine estimates of bacteria densities from particular land uses and critical sources and at various instream locations. This will be a continuation of the wet weather sampling program to support this and other TMDLs begun in 2001.

Finally, the source characterization component will assist municipalities implementing the TMDL. The data collected on average bacteria densities from different land uses, and the range of bacteria densities within a land use and during different storm events will be used in the model to evaluate different management scenarios and prioritize areas for implementation of storm water best management practices.

An additional component of the source characterization monitoring program will be to identify the ownership and status of all private drains identified by the Santa Monica BayKeeper through its BeachKeeper monitoring program. As stated earlier, Santa Monica BayKeeper has documented 342 storm drains that discharge to SMB beaches from Point Dume to Malaga Cove (see Appendix C) and an additional 271 discharges to the Area of Special Biological Significance (ASBS). Responsible agencies and/or individuals must notify the Regional Board within 120 days after the effective date of this TMDL of any additions, deletions, or changes to this list. Furthermore, the Regional Board must be notified of the ownership of the discharge (if applicable), the type of discharge, and any permits held for the discharge.

9.2 Compliance Determination

Compliance will be determined by daily or weekly sampling in the wave wash at all major drains and creeks or at existing monitoring stations at beaches without storm drains or freshwater outlets.[26] At all locations, samples must be taken at ankle depth, on an incoming wave, when the tide height is less than +2 feet. If any geometric mean target is exceeded for a rolling 30-day period, or if the number of days exceeding the single sample objectives exceeds the allowable levels set in Table 11 for either of the two time periods of concern, the contributing area and responsible jurisdictions and agencies will be considered out-of-compliance with the TMDL. Once source elimination, treatment or diversion is implemented for a freshwater outlet (i.e., storm drain or creek), and exceedance will only be considered a violation upon sampling confirmation within 24 hours.

9.2.1 Follow-up Monitoring

If a single sample shows the discharge or contributing area to be out of compliance, daily sampling in the wave wash or at the existing open shoreline monitoring location shall be conducted (if it is not already) until all single sample objectives are below the thresholds. Furthermore, if a beach location with a freshwater outlet is out-of-compliance (based on a confirmation sample within 24 hours), responsible jurisdictions and agencies under the LA County MS4 and Caltrans Storm Water Permits will be required to initiate an initial investigation, which may lead to a sanitary survey of the subwatershed(s) per Assembly Bill 538 protocols to more specifically locate the source of the problem, and may wish to conduct compliance monitoring at key municipal boundaries as part of this effort. (See Appendix H for text of Assembly Bill 538.)

If a beach location without a freshwater outlet is out-of-compliance or if the outlet (i.e., storm drain) is diverted, the adjacent municipality, County agency(ies), or State agency(ies) will be responsible for conducting the investigation.

[26] The frequency of sampling (i.e., daily versus weekly) will be at the discretion of the implementing agencies. However, the number of sample days that may exceed the objectives will be scaled accordingly (see Table 11).

The County of Los Angeles and municipalities within the Santa Monica Bay watershed are strongly encouraged to pool efforts and coordinate with other appropriate monitoring agencies in order to meet the challenges posed by this TMDL by developing cooperative compliance monitoring programs.

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EXHIBIT E

STATISTICS

Year	Rescues	Medical Aids	Boat Rescues	Missing Persons	Resuscitations	Drownings	Attendance
1984	12,853	10,525	874	3,151	445	5	75,636,665
1985	7,498	9,847	821	2,394	558	3	59,622,884
1986	6,703	8,506	810	1,692	488	4	51,694,962
1987	7,063	7,837	839	1,771	369	7	55,893,551
1988	4,960	7,911	997	1,728	375	3	59,561,476
1989	9,169	7,903	976	1,891	416	4	60,259,880
1990	8,561	8,139	1,104	2,073	582	3	56,337,739
1991	6,008	6,184	888	1,110	586	3	46,155,378
1992	11,729	7,759	943	1,760	708	2	58,024,023
1993	10,466	7,332	904	1,446	661	2	55,265,647
1994	8,311	7,230	833	1,794	515	3	50,369,739
1995	5,824	6,464	963	1,547	524	4	41,725,117
1996	11,216	8,666	922	1,614	511	1	53,188,115
1997	14,096	10,382	1,423	1,740	475	1	53,594,562
1998	13,717	10,667	873	1,484	465	0	57,529,992
Totals	**138,174**	**125,352**	**13,825**	**27,240**	**7,678**	**45**	**834,859,730**

15 Year Averages:

Rescues	Medical Aids	Boat Rescues	Missing Persons	Resuscitations	Drownings	Attendance
9,212	**8,357**	**922**	**1,816**	**512**	**3**	**55,657,315**

EXHIBIT F

BOARD MEETING

STATE OF CALIFORNIA

LOS ANGELES

REGIONAL WATER QUALITY CONTROL BOARD

THE METROPOLITAN WATER DISTRICT

OF SOUTHERN CALIFORNIA

BOARD ROOM

700 NORTH ALAMEDA STREET

LOS ANGELES, CALIFORNIA

THURSDAY, SEPTEMBER 14, 2006

9:20 A.M.

JAMES F. PETERS, CSR, RPR
CERTIFIED SHORTHAND REPORTER
LICENSE NUMBER 10063

9-296

R123737

APPEARANCES

BOARD MEMBERS

Ms. H. David Nahai, Chairperson

Ms. Francine Diamond, Vice Chairperson

Ms. Susan Cloke

Ms. Bonny Herman

Ms. Maribel Marin

Mr. Bradley Mindlin

Mr. F.W. Dick Richardson

Mr. Leo VanderLans

STATE WATER RESOURCES CONTROL BOARD

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STAFF

Mr. Jonathan Bishop, Executive Officer

Ms. Debbie Smith, Chief Deputy Executive Officer

Mr. David Bacharowski, Assistant Executive Officer

Mr. Stephen Cain

Ms. Renee DeShazo

Ms. Ronji Harris, Executive Assistant

Mr. Michael Levy, Senior Staff Counsel

Mr. Robert Sams, Staff Counsel

Dr. Xavier Swamikannu

APPEARANCES CONTINUED

ALSO PRESENT

Ms. Larissa Aumand, Weston Solutions

Ms. Michelle, Baccay, Natural Resources Defense Council

Ms. Jose Bacauss

Mr. Dave Beckman, Natural Resources Defense Council

Ms. Lili Boyle

Ms. Lisa Boyle

Ms. Valerie Burkholder

Mr. Diego Cadena, County of Los Angeles

Ms. Kelly Chapman-Meyer, Heal The Bay

Mr. Matthew Cohen, Richards, Watson & Gershon

Ms. Tracy Egoscue, Baykeeper

Mr. Nicholas Fash

Ms. Laurie Feldman

Mr. Steve Fleischli, Waterkeeper Alliance of New York

Mr. Howard Gest, Los Angeles County Flood Control District

Ms. Madelyn Glickfield

Dr. Mark Gold, Heal The Bay

Ms. Dorothy Green, Heal The Bay, Los Angeles and San Gabriel Rivers Watershed Council

Mr. Paul Herzog, Ballona Wetlands Land Trust

Ms. Heather Hoecherl, Heal The Bay

Ms. Kirsten James, Heal The Bay

Mr. Daniel Lafferty, County of Los Angeles

APPEARANCES CONTINUED

ALSO PRESENT

Mr. Grant Noie, Malibu Surfing Association

Mr. Frankie Orrata

Mr. Dana Palmer, Santa Monica Baykeeper

Mr. Dusty Peak

Dr. Linwood Pendleton, University of California Los Angeles

Mr. Mark Pestrella, County of Los Angeles

Dr. Robert Pousman, Univerity of California Los Angeles

Mr. Patrick Rowen, Malibu Surfing Association

Mr. Ken Schiff, Southern California Coastal Water Research Project

Ms. Alexis Strauss, United States Environmental Protection Agency

Mr. Ray Tahir, TECS Environmental

Mr. Jim Thorsen, City of Malibu

Ms. Anne Tobin

Mr. Marcus Weakley, Senator Sheila Kuehl's Office

Ms. Deborah Weinstein, Los Angeles City Councilman Bill Rosendahl's office

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Board members have requested a break. I think we can do it in five minutes.

So let's take a five-minute break. And then we'll resume with the staff presentation at that time.

(Thereupon a recess was taken.)

CHAIRPERSON NAHAI: All right. Please come to order.

Okay. We're now going to proceed by hearing the staff presentation. The time allocated for this is 40 minutes.

Okay. Please sit down.

Come on, everybody. Come to order please.

All right. Mr. Swamikannu, please continue.

DR. SWAMIKANNU: Good morning, Chairman Nahai and members of the Board. I'm Dr. Xavier Swamikannu, Chief of the Storm Water Permitting Program at the Los Angeles Regional Water Board.

(Thereupon an overhead presentation was Presented as follows.)

DR. SWAMIKANNU: Over the next few minutes I will present staff recommendation to reopen the L.A. Municipal Storm Water Permit, to incorporate the summer dry weather bacteria total maximum daily load waste-load allocation for Santa Monica Bay beaches.

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DR. SWAMIKANNU: First, background on the more than 15-year history of the Los Angeles County Municipal Storm Water Permits.

Mr. Howard Gest made a statement that all the actions of the permittees were voluntary. That is not in fact true. This Board adopted the first Los Angeles County Municipal Storm Water Permit in 1990. That permit phased in about six watersheds into the program over a three-year period. And the objective then was to identify and implement best management practices to control storm water pollution. A basic chemical monitoring program was also introduced to characterize pollution. And that was largely initiated through the County of Los Angeles.

In 1996 the L.A. County Municipal Storm Water Permit was reissued, this time to require the adoption of storm water quality control ordinances and the development of countywide model programs in public involvement education, industrial commercial inspections, new development planning and construction, elicit connection, elicit discharge elimination and public agency activities.

In addition, the monitoring program was enhanced to evaluate the -- water impacts from storm water pollution.

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DR. SWAMIKANNU: In 2001, the L.A. County

Municipal Storm Water Permit was reissued, this time incorporating State Board directed language to require compliance with water quality standards. The new development standards affirmed by the State Board in the Suisun decision or the standard of storm water and mitigation plan decision were consolidated and updated. More comprehensive monitoring requirements were included at that time to support participation in bio-assessment, other regional surveys, such as by 2003, and also to perform river tributary monitoring. We also at that time directed default trash reduction controls.

That takes us to the present, which is the subject of this hearing: Prohibition of summer dry weather flows from municipal separate storm sewer systems to Santa Monica Bay beaches.

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DR. SWAMIKANNU: The TMDL, total maximum daily load, was adopted by the Water Board over four and a half years ago after extensive technical and policy input from stakeholders, and ultimately went into effect on July 15th, 2003. That is Three years ago.

I present on the slide before you the sequence of the approval dates.

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DR. SWAMIKANNU: The Santa Monica Bay beaches bacteria dry weather TMDL sets numeric targets and waste-load allocations to achieve water quality standards at beaches along Santa Monica Bay. The numeric targets are the water quality objectives for fecal indicator bacteria set to protect the water contact recreation beneficial use in marine waters which were adopted by the Water Board in 2001.

These objectives are the same as that of the Assembly Bill -- or AB 411 bacteriological standards for protection of public health contained in the California Code of Regulations. The TMDL establishes summer dry weather waste-load allocations for each beach of no exceedances of the bacteria objectives during dry weather from April 1 to October 31.

Compliance with the summer dry weather waste-load allocations was required by July 15th of this year.

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DR. SWAMIKANNU: The total maximum daily load when adopted in 2002 specified that the primary implementation mechanisms for the dry weather TMDL will include the Los Angeles County Municipal Storm Water Permit.

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DR. SWAMIKANNU: The next slide. This slide is taken from the journal paper that Professor Linwood, who would be going after me, will be discussing.

On the vertical axis is a list of Los Angeles and Orange County beaches. L.A. beaches on the top upper two-thirds.

On the horizontal axis we have recorded beach attendance for the year 2000, and the units are measured in hundred thousand visitors. The orange shaded area is the attendance during summer months, and your action today is about that period.

Generally about 70 to 80 percent of beach visits annually occur during the summer months of June through September.

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DR. SWAMIKANNU: We considered several options, some of which were proposed by the municipal storm water permittees, for incorporating the summer dry weather bacteria waste-load allocations for Santa Monica Bay beaches into the federal permit scheme. These are requiring amendments to the Storm Water Quality Management Program. This is the iterative approach within the permit. But what we are talking about is not storm water. It is dry weather flow, which is non-storm water.

Next, the prohibition of non-storm-water discharges containing bacteria, that is, summer dry weather flow.

C. Combined non-storm-water and storm-water permit for the municipal separate storm sewer permit, and recognizing separate criteria. That sudden set of criteria apply to dry weather flows and another set of criteria apply to storm water flows.

D. A separate individual permit for the municipal separate storm sewer system addressing only non-storm-water discharges.

And the final option of course, no action.

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DR. SWAMIKANNU: Staff reasoning is detailed in the draft fact sheet that was mailed out with the agenda package.

Next, staff recommends -- staff recommends Option B. That's to incorporate the summer dry weather bacteria waste-load allocation as a prohibition in the municipal separate storm water permit for Los Angeles County, and make these text additions that I've listed above to Part 1B, which is to discharge prohibitions, and Part 2.5, receiving water limitations.

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DR. SWAMIKANNU: In addition for clarification, add the underlying text to Part 2.1, adding the term "except as provided in part 2.5 below." These are the changes to the substance -- to the text of the permit.

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DR. SWAMIKANNU: For the proposed action before the Los Angeles Water Board staff has provided multiple opportunity for comment.

The first opportunity for comment was when the item was scheduled for consideration by this Board in mid-July. Our response to those comments was sent out on August 4th and posted on the Board's website as well.

The next opportunity was at the staff workshop held on July 21 to solicit input on the approach for inclusion of the waste-load allocation in NPDES or federal permits.

Additionally, the comment period for this Board hearing ended on September 4. Our response to comments received until September 4 and comments submitted at the staff workshop are included in the agenda package that was delivered to you on September 12th. These were also posted on September 9th on the Water Board's website.

Since July 13th, in addition to the 20 comment letters received from permittees, their legal counsel and consultants, we received more than 1,200 support e-mail and form letters in support of the proposed amendment.

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DR. SWAMIKANNU: Staff has been responsive to comments submitted and has made appropriate changes. For example, in part 1.B, Discharge Prohibitions, what you see before you is quite different from that which was first proposed in July. The version before you is also slightly different from that which was circulated with the public notice for this Board hearing. The reason change clarifies the limited scope of the proposed action to Santa Monica Bay.

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DR. SWAMIKANNU: I will now briefly go over the legal and regulatory basis for the proposed action.

The 1987 amendments to the Federal Clean Water Act for the first time required that storm-water discharges from municipal separate storm sewer systems be regulated as a point source under the federal NPDES regulatory framework. Municipal storm-water permits are to include provisions to effectively prohibit non-storm-water discharges into the system.

Second, municipal storm-water permits are to include provisions that require controls to reduce pollutants in storm-water discharges to the maximum extent practicable and any other provisions that the permitting authority deems appropriate.

Notably, the 1987 amendments did not alter the existing regulatory regime for non-storm-water discharges from the municipal separate storm sewer system that caused to contribute to the exceedances of water quality standards.

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DR. SWAMIKANNU: Next, when permit provisions have been clarified for NPDES permits, those limitations, numeric or some other, must be consistent with any available waste-load allocation for the discharge that has been approved by the U.S. EPA. The Santa Monica Bay bacteria TMDL waste-load allocation was approved by the U.S. EPA in June 2003.

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DR. SWAMIKANNU: Several permittees have argued that the proposed amendments are inconsistent with the U.S. EPA's TMDL storm-water policy memorandum issued in 2002. A close reading of that memorandum clearly indicates that the guidance is for storm-water discharges, including MS-4 discharges. It does not address non-storm water.

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DR. SWAMIKANNU: Similarly, the U.S. EPA storm-water permitting policy memorandum issued in 1996, which discusses the iterative adaptive approach to the regulation of storm-water discharges, is meant for storm water. It says nothing about the regulation of non-storm water from municipal separate storm sewer systems.

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DR. SWAMIKANNU: Non-storm-water discharges and, in the present case, summer dry weather flows containing bacteria are subject to the strict compliance provisions of federal NPDES regulations and not the maximum extent practicable standard which applies to storm-water discharges.

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DR. SWAMIKANNU: Next I will briefly discuss the significant comments received that remain unresolved for the commenters and the staff response.

Comment 1: Await permit renewal. The deadline for the summer dry weather bacterial waste-load allocation has passed and the Water Board is obligated to make the waste-load allocation enforceable.

The second comment: Use a memorandum of understanding to incorporate the TMDL. A memorandum of understanding is not a federally authorized and enforceable document under the NPDES regulatory framework and it's not consistent with the bacteria TMDL waste-load allocation that was approved by you and the U.S. EPA.

Comment 3: Require changes to the Storm Water Quality Management Program through the iterative approach. Summer dry weather flows are not subject to U.S. EPA's iterative approach, which is applicable only to storm-water discharges. And this is not consistent with the bacteria TMDL.

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DR. SWAMIKANNU: Next comment: Some cities express concern about including numerical limits in a storm-water permit rather than using maximum extent practicable criteria.

Respond is: Summer dry weather bacteria waste-load allocation is enforced as a discharge prohibition and receiving water limitations, not a numerical end-of-pipe effluent limit. The maximum extent practicable standard is only for storm-water discharges.

Comment 5: The proposed action is inconsistent with Malibu Creek and Ballona Creek bacteria TMDLs. MS-4 discharges in the Ballona Creek and Malibu Creek are subject to their respective TMDL compliance schedules, which are different than those for Santa Monica Bay.

In addition, I would like you to note that several editorial and text clarifications have been made to findings in response to comments received from the environmental community and other interested parties as well as permittees too. These can be found in your agenda package.

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DR. SWAMIKANNU: So, finally, the proposed

CHAIRPERSON NAHAI: Thank you.

And please add to Ms. Egoscue's time.

MS. EGOSCUE: So Mark Gold's resume is entered into the record.

Dr. Gold, what, if any, expert opinion do you have regarding the water quality of the Santa Monica Bay beaches?

DR. GOLD: This is an issue that I've worked on a great deal in my career at Heal the Bay as well as in my academic career. My dissertation was at UCLA, my Doctorate in Environmental Science and Engineering from UCLA was actually on this exact topic of beach water quality, specifically fecal bacteria densities and human interent viruses in urban runoff discharging to Santa Monica Bay beaches, as well as an assessment of the health risks on -- related to exposure to polluted runoff. I also was one of the coauthors of the Santa Monica Bay epidemiology study on people exposed to urban runoff contaminated waters.

In addition to that, I was the creator of the Heal the Bay California Beach Report Card, which grades more than 450 beaches based on fecal bacteria densities. And we do that weekly throughout the entire State of California.

I've also helped author Assembly Bill 411, which is the California Beach Water Quality Act, which set the standards for beach water quality within the State of California.

I also sit on numerous task forces, including the Clean Beach Initiative Task Force, which has allocated over $100 million to clean up California's most polluted beaches.

So those are just some of the areas in which I feel I have expertise in this.

MS. EGOSCUE: What opinion do you have regarding the water quality of the beaches?

DR. GOLD: Opinion is very broad. Focusing on Santa Monica Bay beaches during dry weather, there's been poor water -- wet weather is much worse in water quality than dry weather. But there are a number of beaches throughout Santa Monica Bay that have had chronically poor water quality. Most of them are associated with a couple of different sources of pollution:

Runoff coming from storm drains even during the dry season is a major source of fecal bacteria to beaches.

Also creeks and streams is another major source.

And then a little bit more on the non-point-source arena, large piers, like Santa Monica Pier and Redondo Pier.

So those are some of the larger sources of fecal bacteria to the surf zone where people are swimming at beaches.

MS. EGOSCUE: Dr. Gold, what is an example of the evidence that you rely on in formulating this opinion?

DR. GOLD: Probably one of the best examples, of which there are many, would be Heal the Bay's Beach Report Card. We've developed longstanding working relationships with all the monitoring agencies that monitor fecal bacteria throughout the State of California along the coast, well more than 20 agencies. And we receive that data from most of these agencies on at least a weekly basis. That includes the City of Los Angeles and the County Health Department and the Los Angeles County Sanitation Districts and the City of Long Beach, which are the four monitoring agencies that monitor beach water quality along L.A. County's shores.

Anyway, so that's as good a source as any.

MS. EGOSCUE: Dr. Gold, will you please tell me what it is that I just handed you.

DR. GOLD: You just handed me a copy of the 2005-2006 Heal the Bay Annual Beach Report Card, which comes out the Wednesday before Memorial Day every year. We've been doing that for 16 years now. And it grades water quality on an A to F basis to make it user friendly for the public. People understand that an F is poor water quality, an A is good water quality.

MS. EGOSCUE: Dr. Gold, what is the source of data for the report card?

DR. GOLD: The monitoring agencies, as I've stated before, would be -- for Santa Monica Bay would be City of Los Angeles, County Health Department and the Los Angeles County Sanitation Districts.

MS. EGOSCUE: What conclusions have you in your professional opinion drawn from the report card?

DR. GOLD: The conclusions are that, although water quality during the dry weather months, the AB 411 months from April through October, is much better than one sees during wet weather, there still are some chronically polluted beaches along Santa Monica Bay. And there's been some improvement in the last year or two based largely on very significant funding from the State of California on a wide variety of dry weather runoff diversions and runoff treatment facility projects working closely with the cities and the County. But, by and large, there's still a good number of beaches that still have chronic beach water quality problems.

MS. EGOSCUE: Dr. Gold, in response to the data that you have looked at through the report card, is there a distinction of open-ocean beaches versus runoff-impacted beaches? Can you briefly explain that?

DR. GOLD: Yes. Very briefly, in our annual beach report card we take a look at open-ocean beaches versus beaches that are exposed to polluted runoff, whether it's from a storm drain or from a river or creek. And what we find is that the open-ocean beaches where there are no visible sources of fecal bacteria pollution, that the letter grades are extremely good.

So, for example, in 2003, 96 percent of beaches looked at received an A grade on the beach report card that were open-ocean beaches and only 4 percent got B's. So no C's, D's or F's on open ocean.

Yet to give you for a comparison, runoff-impacted beaches, only 75 percent of the beaches got A's, 13 percent B's, 7 percent C's, 3 percent D's, and 2 percent F's.

So it demonstrates quite clearly that polluted runoff coming from storm drains and coming from creeks is a significant source of fecal bacteria that's causing lower letter grades on the beach report card.

MS. EGOSCUE: Dr. Gold, were you in the hearing room when you heard testimony from Mr. Lafferty of the County regarding the evidence that bacteria exceedances have gone down?

DR. GOLD: Yes, I was.

MS. EGOSCUE: And can you briefly explain to this hearing and this body of your experience in that regard?

DR. GOLD: Yes. Last summer, for example, was a very poor beach water quality year for Santa Monica Bay. And obviously that was the first summer prior to the July 15th deadline.

And this year -- and, again, I think I referred to this earlier -- largely due to a big program, the Clean Beach Initiative, as well as the Santa Monica Bay Restoration Commission's funding, those two major funding sources, we've seen some major significant improvements at a wide number of beaches along Santa Monica Bay. And so there has been great progress in this area in the last year.

MS. EGOSCUE: Dr. Gold, are there still exceedances at beaches?

DR. GOLD: Yes. To date, since July 15th -- and this is just looking at a subset of the more than 65 beaches that are monitored on a regular basis, so looking at about 50 of those beaches, there's been around 23 beaches that have exceeded the water quality standard since July 15th. Of those, there's 5 that have exceeded more than ten times and 2 that have exceeded more than five times, and then the remainder of the 23 have exceeded only one or two times.

MS. EGOSCUE: Dr. Gold, I just handed you something that I do not believe that this Board has seen. Is that correct?

DR. GOLD: Yes, that's the case.

MS. EGOSCUE: It does not appear in the record to date. What is this, Dr. Gold, that I just handed you?

DR. GOLD: This is a summary of beach water quality data put together by Heal the Bay data management staff on -- that puts together our beach report card on a regular basis. And what it is is the number of exceedances of the beach water quality standards that have occurred on a monthly basis since late 2004 all the way through August 2006. And it breaks it down by the city and the county health department, and geometric mean as well as single sample exceedances.

MS. EGOSCUE: Dr. Gold, did you personally review the data that you see in front of you?

DR. GOLD: I reviewed this data, but I do not review Heal the Bay's data for the beach report card on a regular basis. That's the responsibility of other staff members at Heal the Bay.

MS. EGOSCUE: So to reiterate, because you were a little bit nonresponsive. Did you review this data that you see in front of you?

DR. GOLD: Yes, I did.

MS. EGOSCUE: And this data in front of you supports the testimony that we just heard regarding exceedances; is that correct?

DR. GOLD: Yes, it does. And it also tells quite a different story than I think was up there earlier on where -- I think there were two or three graphs that were put up by the County that gave a much bleaker compliance picture on water quality. And from my best professional judgment, the reason why that is the case is that it appeared that Mr. Lafferty was looking at the data from April through September rather than the actual compliance date of July through today.

And what we've definitely seen is there's been a significant improvement in water quality subsequent to the July 15th deadline.

MS. EGOSCUE: By the Chair's leave, I would like to offer this data into evidence. It's not part of the record. And under the regulations, that part of this hearing is to bring forth evidence for the Board that does not appear in the record. I apologize. I have not brought copies for the entire Board. I have copies for the Chair and for the County.

CHAIRPERSON NAHAI: Well, I want to seek our counsel's viewpoint on that.

SENIOR STAFF COUNSEL LEVY: You know what, we don't really object to anything we've seen so far. The

County's exhibits 3, 4, 12 and 13 were not before us, and we have no objections. We haven't reviewed that data, nor have we reviewed the County's exhibits 12 and 13. And we -- let it come in as far as we're concerned and give it the weight it's entitled.

CHAIRPERSON NAHAI: All right. So in the interests of consistency, since we let the County's materials in, we'll let this in.

Okay. Let's proceed.

MS. EGOSCUE: Dr. Gold, what do you base your opinion regarding storm drains and creeks as sources of fecal indicator bacteria on Santa Monica Bay beaches, very briefly?

DR. GOLD: There's a number of different things on -- one of which I alluded to earlier, which was the open ocean versus runoff comparison in the beach report card. Again, some examples of open-ocean beaches locally, being Venice and TopSail, Dockweiler, Hyperion and Santa Monica Beach, a strand where you don't have a pollution source. And so I already went through that data. I Won't do that again.

Another thing is my doctoral dissertation at UCLA, one of the things that I focused on working with the City of Los Angeles and the L.A. County Sanitation Districts under the auspices of the Santa Monica Bay

Restoration Project was the fate and transport of the runoff plume in Santa Monica Bay waters. And during that study we demonstrated quite clearly how fecal bacteria densities dropped off from what you see in the storm drain, what you see in the wave wash at point zero directly in front of the storm drain, and how that drops off both at distance from the storm drain as well as at depth, meaning the difference between ankle depth and chest depth.

In addition to that, one of our staff scientists, who I think most of the Board knows, Dr. Mitzi Taggert, also completed her dissertation working with SCCWRP on the fate and transport of fecal bacteria from two different storm drains to Santa Monica Bay, looking at a wide variety of different factors that impacted fate and transport.

But, again, both of those dissertations clearly demonstrate that polluted runoff coming from storm drains, coming from creeks and streams is a very significant and major source of fecal bacteria at the beach.

MS. EGOSCUE: Dr. Gold, does this fecal bacteria cause human illness, to the best of your professional opinion?

DR. GOLD: Fecal bacteria can cause human illness. But it's better known for being an indicator of health risk. I think that's one thing that needs to be explained a little bit to the Board.

If you look at epidemiological work including the Santa Monica Bay epidemiology study, of which I was a coauthor, and numerous other epidemiology studies, what that does is it looks at what are the associations of a wide variety of different factors with the incidence of illness and is there a strong correlation or association between any of those factors and illness?

And so in the case of fecal indicators, meaning total coliform, fecal coliform and enterococcus bacteria, yes, they can be the actual pathogens that cause illness. For example, there are different strains of E. coli. And I'm sure you've read about in the news, there was a front-page article in the California section just last week about a strain of E. coli posing a wide variety of gastroenteritis and worse sorts of health risks in lettuce from the Salinas Valley. I mean we've all heard about E. coli outbreaks in a number of water amusement parks and those sorts of things. But those are not necessarily the pathogens of concern that are most likely to cause gastroenteritis.

I know that was a long-winded explanation. But the thing about indicators themselves is: Do they have an association with health risk? Which in the case of enterococcus has been proven time and time again in -- obviously it's supported by EPA and the World Health Organization quite strongly, that association.

And then also: Are they easy to measure? Are they found in high densities in sources that we'd be concerned about, like human sewage, for example? Are they quick to measure, easy to measure? Those sorts of issues are important in deciding on what the most appropriate indicator would be.

MS. EGOSCUE: Thank you.

Dr. Gold, when you were talking about the epidemiological study, were you talking about the health effects of swimming in ocean water contaminated by storm drain runoff, of which you are a coauthor?

DR. GOLD: Yes, I was.

MS. EGOSCUE: Will you please let the record reflect that I have handed Dr. Gold's dissertation, Mitzi Taggert's dissertation and a copy of the article to counsel for the County. And I would like to offer it again for the record just to forestall any objections to Dr. Gold's testimony.

You heard testimony earlier, Dr. Gold, from Mr. Ken Schiff regarding Mission Bay. And very briefly, will you please for the purposes of the Santa Monica Bay beaches TMDL differentiate, if at all possible, from

Mission Bay?

DR. GOLD: Sure. I think for context purposes it might be good though to talk about how the results from the Santa Monica epidemiology study were pretty consistent with epidemiology studies that had been performed globally, and how Mission Bay was really different in comparison to those.

And so there have been a number of different papers that have been written, literature reviews. I'm sure you're aware of that sort of journal article. One done by Dr. Pruce for the World Health Organization; another one done by Tim Wade, who's now at EPA, who is actually one of the coauthors of the Mission Bay Study; that really surveyed what are the health -- what are the health risk issues associated with swimming in fecal bacteria polluted waters. And they looked at -- I'm sort of combining the results of both of these, but they looked at over 30 studies, of which 22 had a lot of similarities between them. And in those cases they found in the vast majority of those studies that there was a strong association between enterococcus densities and the incidence of adverse health effects, and most notably gastroenteritis or stomach flu. And that's really the basis, I'm sure you know, for the EPA in 1986 criteria for enterococcus as well as a very strong basis for the ocean plan numbers as well as the AB 411 numbers.

Now, what was interesting about the Mission Bay Study -- and I can say this because I had the fortune of sitting on the technical advisory committee for the Mission Bay Study. So I met with Ken and his colleagues and Jack Colwell and Steve Weisberg and others for the year plus leading up to the study, during the study, and after the study as it was getting written.

What was very interesting about this study in comparison to, say, what we're talking about here at Santa Monica Bay is that Mission Bay is an enclosed bay. So it's an enclosed beach. None of the beaches that we're talking about here today for the Santa Monica Bay beach bacteria TMDL are enclosed beaches. So that makes it an unusual circumstance on its own. Why does that matter? Because enclosed beaches have their own specific problems with extremely poor water circulation. So if you -- you can have a fecal bacteria pollution problem that can stay in an enclosed bay for quite some time, weeks on end. Whereas alongside -- a beach along something like Santa Monica Bay, the wave action, the currents, all those other different factors, would cause major changes in bacterial densities over time.

The other thing that's interesting about Mission Bay is that this study occurred very shortly after really an incredible effort by the City of San Diego. And Weston, who I think you heard from earlier, actually did a lot of the work leading up to this and helped and really was consulting for the City of San Diego in doing this -- was they spent millions and millions of dollars doing a series of studies, source identification efforts, making sure that the dry weather runoff diversions were working properly, doing source investigation, literally walking every potential storm drain along Mission Bay to try to make sure that there were no nuisance flow discharges during dry weather.

And so because of that, the Mission Bay was really sort of one of a kind where you had fecal bac -- high fecal bacteria counts on occasion at those beaches, but you didn't have a constant source of runoff pollution going to those beaches. And so very, very interesting in that regard. That's why you heard from Ken earlier how you couldn't really extrapolate the results to other beaches, because it's so unique in comparison to say what we're talking about here today in Santa Monica Bay.

MS. EGOSCUE: Thank you.

I'm going to divert a bit and speak to funding issues.

What, if any, source of funding for water quality improvements are available for Santa Monica Bay?

EXHIBIT G

The Fiscal Impact of Beaches in California

A Report Commissioned by The California Department of Boating and Waterways

by Philip King, Ph.D

Public Research Institute
San Francisco State University
September 1999

Acknowledgements:
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Contents

Executive Summary

- In 1998, California's beaches generated $14 billion dollars of direct revenue. When the indirect and induced benefits of this spending are added, California's beaches total contribution to the national economy is $73 billion.
- The federal tax revenues generated by this beach activity are substantial. The direct federal tax revenues generated are $2.6 billion; however, the total federal tax revenues generated are much higher: $14 billion.
- California's beaches generated 883,000 jobs across the U.S.
- California receives less than one tenth as much in federal appropriations as New York and New Jersey, which have much smaller coastlines and fewer miles of beaches.
- California ranks eighth in terms of federal appropriations for shoreline protection, just ahead of Delaware. It receives just under $12,000 per mile of coastline, compared with well over $800,000 per mile for New York and New Jersey.
- While California receives twice as much in federal shoreline protection appropriations as Delaware (the ninth largest recipient of federal funds) its beaches generate twenty times more economic activity for the national economy and roughly twenty times more tax revenues than Delaware's beaches. In other words, California generates ten times more federal tax dollars, per dollar of shoreline appropriation, than Delaware.
- Our study of Huntington Beach indicates that much of the federal and state tax revenues generated by local beach communities do not go back to local communities. In our survey in Huntington Beach, one-half of all spending on beach activities occurred outside the city. Furthermore, many of the tax dollars generated within the city go to state and federal authorities. Overall, Huntington Beach's beaches generated $135 million in federal tax revenues and $25 million in state sales tax revenues compared to only $4.8 million in local revenues from sales taxes and parking fees.

Introduction

Beaches are an important destination for tourists in California. They generate very large revenues for local, state and federal governments. The purpose of this report is to estimate these revenues. In particular, this study will provide data on the total economic impact that beach visits have on the national economy and the total federal revenues that are generated by this activity. The study also seeks to compare the amount of economic activity generated in California relative to another state which ranks just behind California in overall federal spending for shoreline preservation: Delaware.

The study also seeks to examine the economic impact at the local level by studying one particular beach city: Huntington Beach. One often-made claim is that local beach communities benefit substantially from beach tourism, so that little assistance from state or federal authorities is required. The case study examines federal tax revenues as well as state sales tax revenues generated in Huntington Beach. We find in fact that the revenues generated from these tax sources are substantial.

This study was commissioned by the California Department of Boating and Waterways (DBW) to examine the economic and tax impact of California's beaches. The study is an outgrowth of a previous study performed for DBW in 1995. This study is divided into three sections: **Chapter 1** updates the data from the 1995 study. **Chapter 2** compares the fiscal impact of California's beaches to another state: Delaware. Finally, **Chapter 3** provides a case study of a one-beach community, Huntington Beach, and examines the fiscal impact of the state and city beaches.

1. The Economic Impact of California's Beaches: 1998

During the fall of 1995, the Public Research Institute (PRI) at San Francisco State University conducted a telephone survey under a contract with the California Department of Boating and Waterways. Over 600 residents throughout the state were randomly selected and asked a series of questions regarding their beach-going activities during the previous year. The results of this survey were published and they have been widely disseminated throughout the state and on the World Wide Web. Results from the survey were used to calculate the total economic impact of California's beaches on the state and national economies.[1]

Although the study is still relatively recent, the tremendous growth in California's economy in the late nineties coupled with a substantial increase in the growth of population of the state and moderate inflation mean that the 1995 statistics now significantly underestimate the economic impact of California's beaches. In addition, the figures provided in this study develop the analysis of the impact California's beaches have on federal tax revenues. As in the 1995 study, the impact has been analyzed using IMPLAN software; we have used the latest available data to ensure the accuracy of the results. IMPLAN uses data provided by federal, state and local governments and uses the same methodology (input-output matrices) used by the U.S. Bureau of Economic Analysis. IMPLAN's software has become the standard methodology for conducting this type of analysis. It is used by academics and applied economists all over the United States.[2]

Since conducting an entirely new survey would be prohibitively expensive and it is very unlikely that peoples' basic preferences for beaches has changed significantly, the data here has been updated from the 1995 data. The 1995 survey determined average household spending for one-day trips and for overnight trips by state residents. Tables 1.1 to 1.4 update the old study in several ways. First while inflation has been low, it has not been nonexistent and three years of inflation compounded has a significant effect on the overall impact. Using monthly Consumer Price Index (CPI) data for Western consumers from the Bureau of Labor Statistics (BLS), the total cumulative change in prices is 9.4%.

In addition, California's population has grown significantly. The number of households in California has increased from 10.8 million to an (estimated) 11.45 million (data from California Statistical Abstract). In the previous report, all spending was computed at the household level and then multiplied by the number of households. Since the number of households has now increased, the corresponding state numbers should increase proportionately. As in the previous report, spending was broken down into day-trip spending by Californians, overnight spending by Californians, and spending by tourists from out of state including foreign visitors. Except for the changes mentioned above, the methodology employed is the same as in the 1995 study.

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[1] King, Philip and Michael Potepan, *The Economic Value of California's Beaches*, Public Reseach Institute Report Commision by the California Department of Boating and Waterways, May 1997.
[2] For more information on IMPLAN software see www.implan.com.

Table 1.1 Average Number of and Average Expenditure on Beach Trips by California Households: A Summary of Survey Responses

Based on 9.47% inflation from 1995 to 1998

Total Number of Households Responding to Survey	641 Households	
A. Households Taking Day Trips		
Total Number of Households Taking Day Trips	409 Households (63.8%)	
Mean Number of Day Trips per Year	15.24 Day Trips	
Mean Number of Persons on Typical Day Trip	4.0 Persons	
Mean Expenditures Per Household on Typical Day Trip	1995 Dollars	1998 Dollars
Gas & Auto	$11.05	$12.10
Parking & Entrance Fees	$3.15	$3.45
Food & Drinks from stores	$15.04	$16.46
Restaurants	$15.78	$17.27
Equipment Rental	$2.53	$2.77
Beach Sporting Goods	$2.35	$2.57
Incidentals	$4.97	$5.44
All Items	$54.87	$60.07
B. Households Taking Overnight Trips		
Total Number of Households Taking Overnight Trips	234 Households (36.5%)	
Mean Number of Overnight Trips per Year	4.6 Overnight Trips	
Mean Number of Days of Typical Overnight Trip	2.65 Days	
Mean Number of Persons on Typical Overnight Trip	4.34 Persons	
Mean Expenditures Per Household on Typical Overnight Trip	1995 Dollars	1998 Dollars
Gas & Auto	$35.28	$38.62
Beach Related Lodging	$90.47	$99.04
Parking & Entrance Fees	$4.63	$5.07
Food & Drinks from stores	$39.45	$43.19
Restaurants	$53.39	$58.45
Equipment Rental	$9.11	$9.97
Beach Sporting Goods	$2.34	$2.56
Incidentals	$11.11	$12.16
All Items	$246.83	$269.06

Table 1.2 Estimates of Beach Attendance and Spending for California Households on Day Trips to the Beach

	1995		1998	
	Sub-Sample of 409 Taking Day Trips	Full Sample of 641 Total Households Surveyed	Sub-Sample of 409 Taking Day Trips	Full Sample of 641 Total Households Surveyed
A. Attendance Days from Survey				
Mean Number of Day Trips	15.24	10.13		
Mean Number of Persons Per Day Trip	4	2.66		
Mean Annual Person Attendance Days	48.14	32.02		
B. Spending From Survey				
Mean Household Spending Per Trip	$54.87	$36.49	$60.07	$39.95
Mean Per Person Spending Per Trip	$16.45	$10.94	$18.01	$11.98
Mean Annual Household Spending	$518.40	$344.75	$567.51	$377.41
Mean Annual Per Person Spending	$171.57	$114.10	$187.82	$124.91
C. Statewide Attendance Projections				
Mean Annual Person Attendance Days per Household		32.02		32.02
Total California Households (millions)		10.8		11.45
Total Person Attendance Days (millions)		345.78		366.63
D. Total Direct Statewide Spending on Day Trips				
Mean Annual Spending Per Household		344.75		382.84
Total CA Households (millions)		10.8		11.45
Total Statewide Spending (millions)		$3,723.34		$4,383.52

Table 1.3 Estimates of Beach Attendance and Spending for California Households on Overnight Trips to the Beach

	1995		1998	
	Sub-Sample of 409 Taking Day Trips	Full Sample of 641 Total Households Surveyed	Sub-Sample of 409 Taking Day Trips	Full Sample of 641 Total Households Surveyed
A. Attendance Days from Survey				
Mean Number of Overnight Trips	4.6	1.75		
Mean Number of Days per Trip	2.65	1.01		
Mean Number of Persons Per Trip	4.34	1.65		
Mean Annual Person Attendance Days	33.1	12.59		
B. Spending From Survey				
Mean Household Spending Per Trip	$246.83	$93.92	$270.21	$102.82
Mean Per Person Spending Per Trip	$82.09	$31.24	$89.87	$34.20
Mean Annual Household Spending	$907.79	$345.40	$993.79	$378.12
Mean Annual Per Person Spending	$345.24	$131.36	$377.95	$143.80
C. Statewide Attendance Projections				
Mean Annual Person Attendance Days per Household		12.59		12.59
Total California Households (millions)		10.8		11.45
Total Person Attendance Days (millions)		135.97		144.16
D. Total Direct Statewide Spending on Overnight Trips				
Mean Annual Spending Per Household		345.4		383.57
Total CA Households (millions)		10.8		11.45
Total Spending (millions)		$3,730.32		$4,391.88

Table 1.4 Estimates of Beach Attendance and Spending for Out-of-State Tourists Taking Trips to California's Beaches

A. Statewide Attendance Estimates		
Total Attendance Days (Tourists 15% of Total)	566.76	
California Residents' Total Attendance Person Days	481.75	
Out-of-State Tourist Person Attendance Days (millions)	85.01	
B. Converting Attendance Days to Out-of-State Tourist Trips		
Out-of-State Tourist Attendance Days	85.01	
Mean Trip Length for Out-of-State Tourists (days)	2.65	
Out-of-State Tourists Visiting State's Beaches (millions)	32.08	
Total Out-of-State Tourist Trips to the Beach (millions)	12.83	
C. Statewide Spending Projections		
	1995	1998
Household Spending Per Trip (3)	$246.83	$270.21
Out of State Tourist Trips (millions)	12.83	12.83
Total Statewide Spending (millions)	$3,166.87	$3,466.84

Tables 1.5 to 1.8 provide the "Economic Impact" numbers using the data provided in Tables 1.1–1.4. As one can see, total direct statewide spending on California's beaches is just over $12 billion dollars, a significant increase from 1995, when it was just over $10 billion. However, one must also take into account the indirect and induced effects of state spending on beaches since this spending provides jobs and income for California and non-California residents, who in turn spend their added income. Since the numbers provided here are national figures, this indirect and induced effect is much larger than the effects formerly calculated for the state. This is because more of the spillover effect of adding new jobs is captured at the national level. As a result, the employment generated by California's beaches has a substantial impact on the national economy, generating $63 billion in revenue when all effects are taken into account.

The primary purpose of this investigation is to examine the impact of California's beaches on federal tax revenues. Tables 1.6 and 1.7 provide this information. If one just looks at the direct expenditures, California's beaches provide $2.3 billion in tax revenues for the federal government. If one includes indirect and induced effects, the number rises to $12 billion. Finally, Table 1.8 estimates the number of jobs created by California's beaches in 1998. The direct effect is 273,000 jobs; the total effect is 883,000 jobs.

Table 1.5 Total National Economic Impact of Beach Spending in California in 1998: Expenditures Updated for Inflation and Population

A.	Spending by California Households on Day Trips	$4,321,537,219
	Spending by California Households on Overnight Trips	$4,311,359,394
	Spending by Out-of-State Tourists	$3,452,096,522
	Total Direct Statewide Spending	$12,084,993,135
B.	Indirect Spending	$6,582,000,000
	Induced Spending	$44,698,000,000
C.	Combined National Economic Impact of Beach Spending	$63,364,993,135

Table 1.6 Impact of California Beach Direct Expenditure on Federal Tax Receipts, Updated Updated for Inflation and Population

Ratios of Tax Receipts to GDP are average values from 1995-1997

	Estimated 1998 California Beach Direct Expenditure: Updated using Inflation	$ 12,084,993,135
A.	Ratio of Income Tax Receipts to GDP	0.0861
	Estimated 1998 Federal Income Tax Revenue Generated By Direct California Beach Spending	$ 1,041,065,831
B.	Ratio of Corporate Tax Receipts to GDP	0.0222
	Estimated 1998 Federal Corporate Tax Revenue Generated By Direct California Beach Spending	$ 268,541,360
C.	Ratio of Excise Tax Receipts to GDP	0.0073
	Estimated 1998 Federal Corporate Tax Revenue Generated By Direct California Beach Spending	$ 88,734,893
D.	Ratio of Total Tax Receipts to GDP	0.1906
	Estimated 1998 Federal Tax Revenue Generated By Direct California Beach Spending	**$ 2,303,116,875**

Table 1.7 Total Impact of California Beach Spending on Federal Tax Receipts: Expenditures Updated for Inflation and Population

Ratios of Tax Receipts to GDP are average values from 1995-1997

	Estimated 1998 National Economic Impact of California Beach Spending : Updated using Inflation	$ 63,364,993,135
A.	Ratio of Income Tax Receipts to GDP	0.0861
	Estimated 1998 Federal Income Tax Revenue Generated By California Beach Spending	$ 5,458,598,815
B.	Ratio of Corporate Tax Receipts to GDP	0.0222
	Estimated 1998 Federal Corporate Tax Revenue Generated By California Beach Spending	$ 1,408,037,328
C.	Ratio of Excise Tax Receipts to GDP	0.0073
	Estimated 1998 Federal Corporate Tax Revenue Generated By California Beach Spending	$ 465,261,821
D.	Ratio of Tax Receipts from Other Sources* to GDP	0.0749
	Estimated 1998 Federal Tax Revenue From Other Sources Generated by California Beach Spending	$ 4,743,986,842
E.	Ratio of Total Tax Receipts to GDP	0.1906
	Estimated 1998 Federal Tax Revenue Generated By California Beach Spending	$ 12,075,884,806

*Comprised primarily of social insurance and retirement receipts.

Table 1.8 Total National Employment Impact of 1998 California Beach Spending: Expenditures Updated for Inflation and Population

A.	Total Direct National Employment	278,180
B.	Indirect and Induced National Employment	
	Indirect Employment	68,296
	Induced Employment	537,067
	Total Induced and Indirect Spending	605,363
C.	The Combined National Employment Impact	883,543

In addition to changes in the overall price level and population, California has also experienced significant growth in income per capita, particularly given the recent boom in technology spending. *The numbers calculated in tables 1.1 to 1.8 do not take the increase in household income into account.* Further, economists also have found that spending on beaches and other recreational activities is highly sensitive to changes in income. In economic parlance, a 5% increase in income will not necessarily reflect a 5% increase in spending. To correct for the change in income properly, one must use data on the income elasticity of demand.[3] Tables 1.9 to 1.13 are analogous to tables 1.5 to 1.8 except that they take into account the effect of an increase in Californian's income. As one can see, when this effect is taken into account, **total direct spending at California's beaches increases to $14 billion and direct federal tax revenues increase to $2.6 billion. The combined national impact is $73 billion and the total federal tax impact is just over $14 billion.**

Table 1.9 Total 1998 California Beach Spending by Expenditure Category Updated for Income

Category	Estimated 1998 Total CA Day Trip Spending (adjusted for pop growth ($mil)	Estimated 1998 Total CA Overnight Trip Spending (adjusted for pop growth ($mil)	Estimated 1998 Out-of-State Beach Spending ($mil)	Total 1998 CA Direct Beach Spending ($mil)
Gas & Auto	$944.11	$671.36	$655.19	$2,270.66
Beach Related Lodging	$0.00	$1,583.05	$1,558.93	$3,141.97
Parking & Entrance Fees	$253.65	$83.04	$81.55	$418.23
Food & Drinks from Stores	$1,271.61	$742.88	$725.78	$2,740.27
Restaurants	$1,391.15	$1,048.32	$1,019.81	$3,459.28
Equip Rental	$279.71	$224.32	$213.78	$717.81
Beach Sporting Goods	$259.81	$57.62	$54.91	$372.34
Incidentals	$466.58	$232.30	$224.60	$923.48
TOTALS	$4,866.63	$4,642.88	$4,534.54	$14,044.05

[3] The data used here was obtained from Falvey, Rodney and Gemmell, Norman "Are Services Income-Elastic? Some New Evidence", *Review of Income and Wealth*, 42, No 3, 1996.

Table 1.10 Impact of California Beach Direct Expenditure on Federal Tax Receipts, Updated for Income

Ratios of Tax Receipts to GDP are average values from 1995-1997

	Estimated 1998 California Beach Direct Expenditure: Updated using Elasticities	$	14,044,049,092
A.	Ratio of Income Tax Receipts to GDP		0.0861
	Estimated 1998 Federal Income Tax Revenue Generated By Direct California Beach Spending	$	1,209,829,370
B.	Ratio of Corporate Tax Receipts to GDP		0.0222
	Estimated 1998 Federal Corporate Tax Revenue Generated By Direct California Beach Spending	$	312,073,661
C.	Ratio of Excise Tax Receipts to GDP		0.0073
	Estimated 1998 Federal Corporate Tax Revenue Generated By Direct California Beach Spending	$	103,119,396
D.	Ratio of Total Tax Receipts to GDP		0.1906
	Estimated 1998 Federal Tax Revenue Generated By Direct California Beach Spending	**$**	**2,676,467,094**

Table 1.11 Total National Economic Impact of Beach Spending in California in 1998: Updated for Income

A.	Spending by California Households on Day Trips	$	4,866,630,047
	Spending by California Households on Overnight Trips	$	4,642,877,898
	Spending by Out-of-State Tourists	$	4,534,541,147
	Total Direct Statewide Spending	$	14,044,049,092
B.	Indirect Spending	$	7,718,000,000
	Induced Spending	$	51,786,000,000
C.	Combined National Economic Impact of Beach Spending	$	73,548,000,000

Table 1.12 Total Impact of California Beach Spending on Federal Tax Receipts: Updated for Income

	Ratios of Tax Receipts to GDP are average values from 1995-1997		
	Estimated 1998 National Economic Impact of California Beach Spending : Updated using Income Elasticities	$	73,548,000,000
A.	Ratio of Income Tax Receipts to GDP		0.0861
	Estimated 1998 Federal Income Tax Revenue Generated By California Beach Spending	$	6,335,817,394
B.	Ratio of Corporate Tax Receipts to GDP		0.0222
	Estimated 1998 Federal Corporate Tax Revenue Generated By California Beach Spending	$	1,634,314,537
C.	Ratio of Excise Tax Receipts to GDP		0.0073
	Estimated 1998 Federal Corporate Tax Revenue Generated By California Beach Spending	$	540,031,249
D.	Ratio of Tax Receipts From Other Sources* to GDP		0.0749
	Estimated 1998 Federal Tax Revenue From Other Sources Generated By California Beach Spending	$	5,506,364,430
E.	Ratio of Total Tax Receipts to GDP		0.1906
	Estimated 1998 Federal Tax Revenue Generated By California Beach Spending	**$**	**14,016,527,609**

* Comprised primarily of social insurance and retirement receipts.

Table 1.13 Total National Employment Impact of 1998 California Beach Spending; Updated for Income

A.	Total Direct National Employment	321,647 jobs
B.	Indirect and Induced National Employment	
	Indirect Employment	79,793
	Induced Employment	622,264
	Total Induced and Indirect Spending	702,057
C.	The Combined National Employment Impact	1,023,704 jobs

2. How does Delaware compare to California?

As shown in Table 2.1, although California has the longest coastline of the twelve states receiving funds and the second longest shoreline (after Florida), it ranks eight overall in federal appropriations for shoreline protection. In terms of overall spending per mile of shoreline, California again ranks second to last. If one includes only coastline, the comparison is even starker. California receives just under $12,000 per mile of coastline compared to over $800,000 for New York and New Jersey. In other words, New York and New Jersey receive over 75 times more federal dollars per mile of coastline than California.

Given the substantial revenues generated by California's beaches, a useful point of comparison might be another state that receives substantial assistance from the federal government. To make an accurate comparison, we chose a state that has performed a similar study to the one completed in Section 1. The most comprehensive study has been performed by the state of Delaware, prepared by Jack Faucett Associates.[4] Although at first glance Delaware, a small state, might seem to be a strange comparison with California, in terms of federal funding, the two states rank eighth and ninth, as one can see from Table 2.1. The two states also rank tenth and eleventh in terms of federal appropriations per mile of shoreline.

Table 2.1 Federal Appropriations for Shoreline Protection by State

State	Total Federal Appropriations FY 95-99 (millions of $)	Coastline*	Shoreline*	Appropriations per mile of Coastline	Appropriations per mile of Shoreline
New Jersey	111	130	1792	$ 853,846.15	$ 61,941.96
New York	104	127	1850	$ 818,897.64	$ 56,216.22
Florida	90	770	5095	$ 116,883.12	$ 17,664.38
South Carolina	46	187	2876	$ 245,989.30	$ 15,994.44
Virginia	45	112	3315	$ 401,785.71	$ 13,574.66
Illinois	30	0		N.A	N.A.
North Carolina	18	301	3375	$ 59,800.66	$ 5,333.33
California	10	840	3427	$ 11,904.76	$ 2,918.00
Delaware	5	28	381	$ 178,571.43	$ 13,123.36
Pennsylvania	2	0	89	N.A.	$ 22,471.91
Maryland	2	31	3190	$ 64,516.13	$ 626.96

* Source: National oceanographic and Atmospheric Atministration; U.S. Department of Commerce

[4] Jack Faucett Associates, "The Economic Effects of a Five Year Nourishment Program for the Ocean Beaches of Delaware", Final report, March 1998.

The survey data contained in the Delaware study was remarkably similar in scope and methodology to the one conducted through PRI. Consequently, it was relatively straightforward to update the data. As in Section 1, the data was updated for changes in the price level, in incomes and in population. The national impact figures were calculated using IMPLAN software and the same methodology used as in Section 1. In short, the comparison of the economic impacts in the two states should be quite appropriate given that the same methodologies were applied. Tables 2.2 to 2.5 provide information on spending in Delaware comparable to the tables in Section 1. In all cases, we have updated for inflation, for population increases and for increases in income as we did in Section 1. Table 2.6 provides a breakdown of out-of-state spending at Delaware's beaches.

As one can see, the differences are quite dramatic, reflecting the differences in the size of the state. While California receives only twice as much in shoreline protection as Delaware, the total direct spending by beach visitors in Delaware is $652 million, compared to $14 billion in California. If one accounts for indirect and induced effects, Delaware's beaches contribute $3.7 billion to the national economy, but California's total impact is over $73 billion. The revenue impact tells the same story: Delaware's total economic impact from beach tourism contributed $715 million in federal tax revenues, while California contributed $14 billion.

In sum, California's beaches contribute roughly twenty times more to the national economy and to federal tax revenues than Delaware Beaches, while receiving only twice as much from the federal government in shore protection appropriations. Another way of thinking about this difference is: California's beaches generate approximately 10 times the federal tax benefit per dollar spent by the federal government in shore protection.

Table 2.2 Delaware Overnight Trip Beach Expenditures by Category Updated for Income and Population Growth

Category	1996 Expenditure per Overnight Trip by Category	Total 1996 Expenditure on Overnight Trips	Income Elasticities	Estimated 1998 Expenditures on Overnight Trips
Lodging	$179.37	$167,616,555.35	0.7115	$183,805,410.58
Restaurants	$106.20	$99,236,114.47	1.6126	$117,872,448.27
Entertainment	$59.00	$55,131,174.70	2.1498	$68,482,665.62
Food Shopping	$45.30	$42,326,514.77	1.2735	$48,822,448.95
Non Food Shopping	$68.18	$63,712,075.28	3.7162	$89,243,926.39
Transportation	$17.65	$16,494,891.79	1.3572	$19,166,151.16
Totals	$475.69	$444,517,326.36		$527,393,050.98

Table 2.3 Delaware Day Trip Beach Expenditures by Category Updated for Income and Population Growth

Category	1996 Expenditure per Day Trip by Category	Total 1996 Expenditure on Day Trips	Income Elasticities	Estimated 1998 Expenditures on Overnight Trips
Lodging	$0.00	$0.00	0.7115	$0.00
Restaurants	$19.95	$ 36,621,044.43	1.6126	$ 43,498,399.63
Entertainment	$9.28	$ 17,036,634.86	2.1498	$ 21,162,512.40
Food Shopping	$11.74	$ 21,553,144.56	1.2735	$ 24,860,948.40
Non Food Shopping	$22.69	$ 41,652,256.08	3.7162	$ 58,343,898.85
Transportation	$6.44	$ 11,825,277.52	1.3572	$ 13,740,317.88
Totals	**$70.11**	**$128,688,357.45**		**$161,606,077.17**

Table 2.4 National Impact of 1998 Delaware Beach Spending

A. National Spending Impacts	
Direct Spending	$ 652,030,302.00
Indirect Spending	$ 381,424,442.00
Induced Spending	$ 2,722,655,693.00
Total Impact	**$ 3,756,110,438.00**
B. National Employment Impacts	
Direct Employment	17,060
Indirect Employment	4,046
Induced Employment	32,716
Total Employment	**53,821**

Table 2.5 Total Impact of Delaware Beach Spending on Federal Tax Receipts

Ratios of Tax Receipts to GDP are average values from 1995-1997

	Estimated 1998 National Economic Impact of Delaware Beach Spending : Updated using Inflation	$3,756,110,438
A.	Ratio of Income Tax Receipts to GDP	0.0861
	Estimated 1998 Federal Income Tax Revenue Generated By Delaware Beach Spending	323,571,407
B.	Ratio of Corporate Tax Receipts to GDP	0.0222
	Estimated 1998 Federal Corporate Tax Revenue Generated By Delaware Beach Spending	83,464,756
C.	Ratio of Excise Tax Receipts to GDP	0.0073
	Estimated 1998 Federal Corporate Tax Revenue Generated By Delaware Beach Spending	27,579,499
D.	Ratio of Total Tax Receipts to GDP	0.1906
	Estimated 1998 Federal Tax Revenue Generated By Delaware Beach Spending	**$715,826,748**

Table 2.6 Estimated 1998 Expenditures on Overnight Trips to Delaware Beaches by State of Residence of Beach Visitors

State of Residence	Percent of All Visitors	Estimated 1998 Number of Overnight Trips by State of Origin	Estimated 1998 Overnight Trip Direct Expenditure by State of Origin
Maryland	22.6	2,930,994	$ 119,190,830
Pennsylvania	19.59	2,540,627	$ 103,316,299
New Jersey	19.28	2,500,423	$ 101,681,380
New York	9.71	1,259,290	$ 51,209,865
Virginia	8.3	1,076,427	$ 43,773,623
Delaware	8.24	1,068,646	$ 43,457,187
Connecticut	1.93	250,302	$ 10,178,686
Massachusetts	1.53	198,426	$ 8,069,114
Florida	1.05	136,175	$ 5,537,627
West Virginia	1.04	134,878	$ 5,484,888
Other	6.73	872,814	$ 35,493,552
		12,969,000	$ **527,393,051**

3. A Case Study of Huntington Beach

In many ways, Huntington Beach is a typical beach community in Southern California. Huntington Beach is a small to medium sized city (population about 190,000) city just 35 miles southeast of Los Angeles. One issue of concern to many policy makers is the extent to which tax revenues generated by local governments benefit the locality itself, as opposed to the state or the federal government. This case study examines the revenues generated by federal taxes, by state sales taxes and by parking revenues (some go to the state and some go to the city). The purpose is to estimate the tax revenue impact of beach spending from one specific community. Although Huntington Beach represents only one community, it is quite likely that spending patterns in other Southern California beach communities will be similar, so that the relative ratios between state, local and federal tax dollars generated will likely be similar.

The data used for this study was obtained from several sources. Information on total beach attendance was obtained from the City of Huntington Beach, which maintains monthly and yearly statistics on beach attendance at its state and city beaches. In addition a survey of beach visitors was undertaken by Kim Sterret and Philip King on July 9, 1999. Care was taken to get a full, representative sample throughout all portions of both the city and state beaches. A Friday was chosen as the most representative day since it on the cusp between a weekday and a weekend day. Respondents were given a brief survey about their spending habits, in particular how much they spent and *where* the money was spent. As one can see in the tables below, a substantial amount of the beach spending occurred in inland communities—not at Huntington Beach. In addition, visitors were asked how far away from Huntington Beach they lived (including out-of-state and foreign visitors). Overall, the spending percentages conformed closely to those in our survey from 1995, and the relative spending percentages from this study were used with one exception; parking was a significantly larger proportion of overall expenses for day-trippers in our July 9th survey than in the 1995 telephone survey. This result is not surprising since Huntington Beach requires visitors to pay for parking and some other beaches do not.

The results of the survey are presented in Table 3.1. The overall breakdown of visitors is also consistent with the percentage breakdown provided by the City of Huntington Beach from their records of people needing medical attention at the beach. For a more detailed breakdown of survey results, the reader may consult the appendix.

Table 3.1 Results of the Huntington Beach Survey

Category	Number of Parties	Number of People	Percent of Total Number of People	Avg. Daily Expenditure per Party	Avg. Daily Expenditure per Person	Avg. Percent of Expenditure in Huntington Beach
Local	18	53	12%	$ 11.93	$ 4.05	68.33%
Less Than 60 Miles	54	274	60%	$ 54.46	$ 10.73	42.43%
In-State, > 60 Miles	10	39	8%	$ 102.30	$ 26.23	48.30%
Out of State	23	86	19%	$ 109.61	$ 29.31	61.39%
Out of Country	4	8	2%	$ 70.75	$ 35.38	62.00%
Totals	109	460	100%	$ 64.06	$ 15.18	49.80%*

*Average, w eighted by number of people in each category.

Please note that only about half (49.80%) of all spending that results from trips to Huntington Beach actually occurs in Huntington Beach. Most of the other spending occurs within a 60-mile radius of Huntington Beach. For example, note that by far the largest category of beach attendees come from Orange county and neighboring counties, but do not reside in Huntington Beach. A substantial portion of their spending occurs outside of the city. In addition, many people visiting Southern California (e.g., Disneyland) plan to attend Huntington Beach for a day, but the majority of their expenditures for that day lie outside city limits.

Given the information from Table 3.1, it is possible to estimate the total impact of beach spending generated at Huntington Beach. This is presented in Table 3.2. The total direct yearly expenditure by all visitors is estimated to be $139 million.

Table 3.2 Estimated 1998 Direct Beach Expenditure Generated by Huntington Beach Tourists

Category	Percent	1998 Estimated Attendance	Avg. Daily Expenditure per Person	Total 1998 Direct Exp.
Local	11.5	1,055,109	$4.05	$4,276,176
Less Than 60 Miles	59.6	5,454,713	$10.73	$58,548,578
In-State, > 60 Miles	8.5	776,401	$26.23	$20,365,588
Out of State	18.7	1,712,063	$29.31	$50,187,339
Out of Country	1.7	159,262	$35.38	$5,633,882
Totals	**100**	**9,157,547**		**$139,011,563**

Tables 3.3 and 3.4 estimate the national impact of these expenditures using the same methodology applied in Sections 1 and 2. As before, the indirect and induced effect implies that the total national impact is substantially greater than the direct impact. In this case, the total national impact is $711 million. The total amount of federal taxes generated by this activity is $135 million.

Table 3.3 National Impact of 1998 Huntington Beach Expenditures

Direct Expenditure	$	130,391,325
Indirect Expenditure	$	73,785,749
Induced Expenditure	$	507,158,111
Total	**$**	**711,335,183**

Table 3.4 Impact of 1998 Huntington Beach Direct, Indirect and Induced Expenditure on Federal Tax Receipts

Ratios of Tax Receipts to GDP are average values from 1995-1997

	Estimated 1998 Huntington Beach Total Expenditure	$	711,335,183
A.	Ratio of Income Tax Receipts to GDP		0.0861
	Estimated 1998 Federal Income Tax Revenue Generated By Total Huntington Beach Spending	$	61,278,210
B.	Ratio of Corporate Tax Receipts to GDP		0.0222
	Estimated 1998 Federal Corporate Tax Revenue Generated By Total Huntington Beach Spending	$	15,806,622
C.	Ratio of Excise Tax Receipts to GDP		0.0073
	Estimated 1998 Federal Corporate Tax Revenue Generated By Total Huntington Beach Spending	$	5,223,028
D.	Ratio of Total Tax Receipts to GDP		0.1906
	Estimated 1998 Federal Tax Revenue Generated By Total Huntington Beach Spending	**$**	**135,563,839**

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Since the state economy is smaller than the national economy, the total effect of Huntington Beach spending is smaller. Nevertheless, the total impact on California's economy of Huntington Beach tourism is $329 million as shown in Table 3.5.

Table 3.5 Impact of 1998 Beach Expenditures at Huntington Beach on the CA Economy

Direct Expenditure	$	139,939,222
Indirect Expenditure	$	38,956,845
Induced Expenditure	$	160,895,602
Total	**$**	**329,791,669**

Tables 3.6 and 3.7 estimate the total sales tax impact from the direct spending ($10 million) as well as the total sales tax effect ($25.5 million).

Table 3.6 CA Sales Taxes Generated by Total Huntington Beach Spending

Jurisdiction	Rate	Revenue Generated	
State (General Fund)	5.00%	$	16,489,583.45
State (Local Revenue Fund)	0.50%	$	1,648,958.35
State (Local Public Safety Fund)	0.50%	$	1,648,958.35
Local (City and County Operations)	1.00%	$	3,297,916.69
Local (County Transportation Funds)	0.25%	$	824,479.17
Orange County (Transportation)	0.50%	$	1,648,958.35
Total	**7.75%**	**$**	**25,558,854.35**

Table 3.7 CA Sales Taxes Generated by Direct Huntington Beach Expenditure

Jurisdiction	Rate	Revenue Generated	
State (General Fund)	5.00%	$	6,698,488.58
State (Local Revenue Fund)	0.50%	$	669,848.86
State (Local Public Safety Fund)	0.50%	$	669,848.86
Local (City and County Operations)	1.00%	$	1,339,697.72
Local (County Transportation Funds)	0.25%	$	334,924.43
Orange County (Transportation)	0.50%	$	669,848.86
Total	**7.75%**	**$**	**10,382,657.29**

As one can see in Table 3.7 the total sales tax revenue generated from direct spending is $7.7 million.[5] However, most of the revenue goes to the State of California, not to local authorities. Table 3.8 gives a detailed breakdown of where the money is allocated by the State of California's Board of Equalization (BOE). In fact, according to the BOE, only just over $1 million goes directly to Huntington Beach. Another $1.7 million is distributed to Orange County; some of this is distributed to Huntington Beach. *In all, we estimate that only $1.1 million in sales tax revenues generated from beach activity goes back to the City of Huntington Beach.*

Table 3.8 California Sales Tax Revenue From Direct Expenditure

Jurisdiction	Rate		Revenue Generated*
1. State (General Fund)	5%	$	5,014,142
2. State (Local Revenue Fund, Disbursed to county)	0.50%	$	501,414
3. State (Local Public Safety Fund, Disbursed to county)	0.50%	$	501,414
4. Orange County (Transportation)	0.50%	$	501,414
5. Local (County Transportation Funds)	0.25%	$	250,707
6. Local (City and County Operations, Disbursed to incorporated city	1%	$	1,002,828
Total	**7.75%**	**$**	**7,771,921**

*Revenues are calculated by multiplying direct expenditures subject to sale taxes by the various tax rates. Revenue from Items 2 and 3 are earmarked for indigent healthcare and general public safety, and are disbursed at the county level. Item 4 is a special district tax imposed and allocated to Orange County. Items 5 and 6 form the Bradley-Burns Uniform Local Sales and Use Tax. Revenues from Item 6 are distributed to the location of sale if the transaction took place in an incorporated city, or, otherwise, to the county level.

[5] Not all of the direct expenditures are subject to sales tax; for example, some food items are exempt. Our survey results were used to estimate the total expeditures subject to sales tax.

Finally, tables 3.9 and 3.10 show the estimated local tax benefits from Huntington Beach tourism. As one can see, the numbers are quite modest compared to the state and national totals, and parking fees (on valuable property) generate most of the local revenues. This result occurs for two main reasons: (1) half of all spending on beach activities occurs outside of the city, (2) as shown in table 3.9, most of the sales tax revenues go to the state, not to local governments. Including parking fees, the city receives $3.2 million in revenues. If indirect and induced effects are added, the number increases to $4.8 million.

Table 3.9 Local Revenues From Direct Expenditures

Direct Sales Tax Revenue to Orange County	$	1,754,950
Huntington Beach Population as a Percentage of Orange County		x 0.07
Estimated Sales Tax Revenue to Huntington Beach disbursed by the county	$	122,846
Direct Sales Tax Revenue to Huntington Beach	$	1,002,828
Revenue from Parking and Entrance Fees	$	2,076,679
Total Local Revenue from Direct Expenditures	**$**	**3,202,354**

Table 3.10 Local Revenues From Total (Direct and Indirect) Expenditures

Total CA Sales Tax Revenue from Direct and Indirect Expenditures	$	18,702,111
Percent of Sales Tax Revenue to County Level		x 0.226
Total Sales Tax Revenue to Orange County	$	4,223,057
Huntington Beach Population as a Percentage of Orange County		x 0.07
Estimated Sales Tax Revenue to Huntington Beach Disbursed from County Level	$	295,614
Proportion of Sales Tax Revenue Allocated to City		x 0.129
Huntington Beach Sales Tax Revenue	$	2,413,176
Revenue from Parking and Entrance Fees	$	2,076,679
Total Local Revenue from Direct and Indirect Expenditures	**$**	**4,785,469**

4. Conclusion

Our study indicates that the impact that California's beaches has on the state and national economy, which was substantial in 1995, has grown significantly. California's beaches contribute $73 billion to the national economy and generate $14 billion in tax revenues for the federal government. In comparison, California only received $10 million in shore protection appropriations from fiscal year 1995-1999. In terms of overall federal spending for shoreline preservation, California ranks eighth out of eleven states receiving funds. When compared with Delaware, a state ranking just behind California in overall federal funding, California generates twenty times more economic activity per federal dollar appropriated than Delaware. When compared to New York or New Jersey, the largest recipients of federal shoreline funding, California receives roughly 75 times *fewer* dollars per mile of coastline than New York or New Jersey.

Our study of Huntington Beach indicates that much of the federal and state tax revenues generated by local beach communities does not go back to local communities. In our survey in Huntington Beach, one-half of all spending on beach activities occurred outside the city. Further, many of the tax dollars generated within the city go to state and federal authorities. Overall, Huntington Beach's beaches generated $135 million in federal tax revenues and $25 million in sales tax revenues compared to only $4.8 million in local revenues from sales taxes and parking fees.

Appendix 1: Detailed Results from the Huntington Beach Survey

Table A.1 Huntington Beach Pier

Category	Number of Parties	Number of People	Percent of Total	Avg. Daily Expenditure per Party	Avg. Daily Expenditure per Person	Avg. Percent of Expenditure in Huntington Beach
Local	5	10	20%	$5.20	$2.60	80%
Less Than 60 Miles	4	15	31%	$16.25	$4.33	95%
In-State, > 60 Miles	3	9	18%	$36.00	$12.00	77%
Out of State	7	14	29%	$68.29	$34.15	100%
Out of Country	1	1	2%	$18.00	$18.00	80%
Totals	20	49	100%	$34.75	$14.18	89.76%*

Table A.2 City Beach

Category	Number of Parties	Number of People	Percent of Total	Avg. Daily Expenditure per Party	Avg. Daily Expenditure per Person	Avg. Percent of Expenditure in Huntington Beach
Local	5	12	11%	$22.50	$9.38	57.50%
Less Than 60 Miles	12	50	48%	$56.33	$13.52	64.58%
In-State, > 60 Miles	3	12	11%	$198.33	$49.58	68.33%
Out of State	8	27	26%	$103.13	$30.56	48.75%
Out of Country	2	4	4%	$125.00	$62.50	34.00%
Totals	30	105	100%	$81.95	$23.41	58.97%*

Table A.3 North of Pier

Category	Number of Parties	Number of People	Percent of Total	Avg. Daily Expenditure per Party	Avg. Daily Expenditure per Person	Avg. Percent of Expenditure in Huntington Beach
Local	3	6	11%	$10.00	$5.00	33.33%
Less Than 60 Miles	10	30	53%	$15.60	$5.20	34.50%
In-State, > 60 Miles	2	13	23%	$55.00	$8.46	20.00%
Out of State	3	5	9%	$56.67	$34.00	36.00%
Out of Country	1	3	5%	$15.00	$5.00	100.00%
Totals	19	57	100%	$25.32	$8.44	34.65%*

Table A.4 Huntington State Beach

Category	Number of Parties	Number of People	Percent of Total	Avg. Daily Expenditure per Party	Avg. Daily Expenditure per Person	Avg. Percent of Expenditure in Huntington Beach
Local	1	2	1%	$20.00	$10.00	100.00%
Less Than 60 Miles	14	105	73%	$49.00	$6.53	10.43%
In-State, > 60 Miles	2	5	3%	$105.00	$42.00	4.00%
Out of State	3	31	22%	$326.00	$31.55	36.67%
Out of Country	0	0	0%	$ -	$ -	0.00%
Totals	20	143	100%	$94.70	$13.24	17.14%*

Table A.5 City Beach, South End

Category	Number of Parties	Number of People	Percent of Total People	Avg. Daily Expenditure per Party	Avg. Daily Expenditure per Person	Avg. Percent of Expenditure in Huntington Beach
Local	4	23	22%	$12.20	$2.12	100.00%
Less Than 60 Miles	14	74	70%	$35.23	$6.67	46.07%
In-State, > 60 Miles	0	0	0%	$ -	$ -	0.00%
Out of State	2	9	8%	$35.00	$7.78	52.00%
Out of Country	0	0	0%	$ -	$ -	0.00%
Totals	20	106	100%	$30.60	$5.77	58.28%*

Appendix 2 : Distribution of Funds Generated by Sales and Use Taxes in Orange County

The sales tax rate in Orange County is 7.75%, which can be broken down into its components of the standard statewide sales tax rate of 7.25%, and the Orange County special district transactions and use tax of 0.5%.

The standard statewide tax can be further decomposed into the sales and use tax portion (6%), and the Bradley-Burns Uniform Local Sales and Use Tax (1.25%). The destination of the funds generated by these components are given in the table below.

Orange County Sales and Use Tax Revenue Distribution		
Sales and Use Tax	5%	General Fund
	0.5%	Local Revenue Fund
	0.5%	Local Public Safety Fund
Bradley-Burns	1%	County and Incorporated City General Fund
	0.25%	County Transportation Funds
District Transactions and Use Tax	0.5%	Orange County Local Transportation Authority
Total	**7.75%**	
Sources:	California State Board of Equalization Annual Report 1998, Appendix Table 2. CA Board of Equalization, California City and County Sales and Use Tax Rates, April 1999.	

References:

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EXHIBIT H

State of California
California Regional Water Quality Control Board, Los Angeles Region

RESOLUTION NO. 02-004
January 24, 2002

Amendment to the Water Quality Control Plan (Basin Plan) for the Los Angeles Region to Incorporate a Dry Weather Total Maximum Daily Load for Bacteria at Santa Monica Bay Beaches

WHEREAS, the California Regional Water Quality Control Board, Los Angeles Region, finds that:

1. The federal Clean Water Act (CWA) requires the California Regional Water Quality Control Board, Los Angeles Region (Regional Board) to develop water quality objectives which are sufficient to protect beneficial uses for each water body found within its region.

2. A consent decree between the U.S. Environmental Protection Agency (USEPA), Heal the Bay, Inc. and BayKeeper, Inc. was approved on March 22, 1999. This court order directs the USEPA to complete Total Maximum Daily Loads (TMDLs) for all the Los Angeles Region's impaired waters within 13 years. A schedule was established in the consent decree for the completion of 29 TMDLs within 7 years, including completion of a TMDL to reduce bacteria at Santa Monica Bay beaches by March 2002. The remaining TMDLs will be scheduled by Regional Board staff within the 13-year period.

3. The elements of a TMDL are described in 40 CFR 130.2 and 130.7 and section 303(d) of the CWA, as well as in USEPA guidance documents (e.g., USEPA, 1991). A TMDL is defined as "the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background" (40 CFR 130.2). Regulations further stipulate that TMDLs must be set at "levels necessary to attain and maintain the applicable narrative and numeric water quality standards with seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality" (40 CFR 130.7(c)(1)). The provisions in 40 CFR 130.7 also state that TMDLs shall take into account critical conditions for stream flow, loading and water quality parameters.

4. Upon establishment of TMDLs by the State or USEPA, the State is required to incorporate the TMDLs along with appropriate implementation measures into the State Water Quality Management Plan (40 CFR 130.6(c)(1), 130.7). The Water Quality Control Plan for the Los Angeles Region (Basin Plan), and applicable statewide plans, serve as the State Water Quality Management Plans governing the watersheds under the jurisdiction of the Regional Board.

5. Santa Monica Bay is located in Los Angeles County, California. The proposed TMDL addresses documented bacteriological water quality impairments at 44 beaches from the Los Angeles/Ventura County line, to the northwest, to Outer Cabrillo Beach, just south of the Palos Verdes Peninsula.

6. The Regional Board's goal in establishing the above-mentioned TMDL is to reduce the risk of illness associated with swimming in marine waters contaminated with human sewage and

other sources of bacteria. Local and national epidemiological studies compel the conclusion that there is a causal relationship between adverse health effects, such as gastroenteritis, and recreational water quality, as measured by bacteria indicator densities.

7. Interested persons and the public have had reasonable opportunity to participate in review of the amendment to the Basin Plan. Efforts to solicit public review and comment include staff presentations to the Santa Monica Bay Restoration Project's Bay Watershed Council and Technical Advisory Committee between May 1999 and October 2001 and creation of a Steering Committee in July 1999 to provide input on scientific and technical components of the TMDL with participation by the Southern California Coastal Water Research Project, City of Los Angeles, County of Los Angeles Department of Public Works, County Sanitation Districts of Los Angeles County, Heal the Bay, and Santa Monica Bay Restoration Project. In addition, a draft of the TMDL for bacteria at Santa Monica Bay beaches was released for public comment on November 9, 2001; a Notice of Hearing and Notice of Filing were published and circulated 45 days preceding Board action; Regional Board staff responded to oral and written comments received from the public; and the Regional Board held a public hearing on January 24, 2002 to consider adoption of the TMDL.

8. On October 25, 2001, the Regional Board adopted Resolution 2001-018 establishing revised bacteriological water quality objectives for the Water Contact Recreation (REC-1) beneficial use, and the TMDL is intended to accompany and to implement the revised water quality objectives. While the Regional Board has approved the water quality objective change, the change is not yet effective because the State Water Resources Control Board, the Office of Administrative Law, and the USEPA have not yet approved the revised water quality objective.

9. The amendment is consistent with the State Antidegradation Policy (State Board Resolution No. 68-16), in that the changes to water quality objectives (i) consider maximum benefits to the people of the state, (ii) will not unreasonably affect present and anticipated beneficial use of waters, and (iii) will not result in water quality less than that prescribed in policies. Likewise, the amendment is consistent with the federal Antidegradation Policy (40 CFR 131.12).

10. The basin planning process has been certified as functionally equivalent to the California Environmental Quality Act requirements for preparing environmental documents (Public Resources Code, Section 21000 et seq.) and as such, the required environmental documentation and CEQA environmental checklist have been prepared.

11. The proposed amendment results in no potential for adverse effect (de minimis finding), either individually or cumulatively, on wildlife.

12. The regulatory action meets the "Necessity" standard of the Administrative Procedures Act, Government Code, section 11353, subdivision (b).

13. The Basin Plan amendment incorporating a TMDL for bacteria at Santa Monica Bay beaches must be submitted for review and approval by the State Water Resources Control Board (State Board), the State Office of Administrative Law (OAL), and the USEPA. The Basin Plan amendment will become effective upon approval by OAL and USEPA. A Notice of Decision will be filed.

THEREFORE, be it resolved that pursuant to Section 13240 and 13242 of the Water Code, the Regional Board hereby amends the Basin Plan as follows:

1. Pursuant to sections 13240 and 13242 of the California Water Code, the Regional Board, after considering the entire record, including oral testimony at the hearing, hereby adopts the amendment to Chapter 7 the Water Quality Control Plan for the Los Angeles Region to incorporate the elements of the Santa Monica Bay Beaches Bacteria TMDL for dry weather as set forth in Attachment A hereto.

2. The Executive Officer is directed to forward copies of the Basin Plan amendment to the State Board in accordance with the requirements of section 13245 of the California Water Code.

3. The Regional Board requests that the State Board approve the Basin Plan amendment in accordance with the requirements of sections 13245 and 13246 of the California Water Code and forward it to OAL and the USEPA.

4. The Basin Plan amendment set forth in Attachment A shall only become effective if the water quality objectives revised by Regional Board Resolution 2001-018, or equivalent water quality objectives, have been approved by the State Board, OAL, and USEPA, and are consistent with the TMDL.

5. If during its approval process the State Board or OAL determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Board of any such changes.

6. The Executive Officer is authorized to sign a Certificate of Fee Exemption.

I, Dennis A. Dickerson, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Los Angeles Region, on January 24, 2002.

Original Signed By (01/24/2002)

Dennis A. Dickerson
Executive Officer

Attachment A to Resolution No. 02-004

Proposed Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Santa Monica Bay Beaches Bacteria TMDL

Proposed for adoption by the California Regional Water Quality Control Board, Los Angeles Region on January 24, 2002.

Amendments:

Table of Contents
Add:

List of Figures, Tables and Inserts
Add:

Chapter 7. Total Maximum Daily Loads (TMDLs) Summaries
Santa Monica Bay Beaches Bacteria TMDL (Dry Weather Only)*

This TMDL was adopted by:

The Regional Water Quality Control Board on January 24, 2002.
The State Water Resources Control Board on [Insert Date].
The Office of Administrative Law on [Insert Date].
The U.S. Environmental Protection Agency on [Insert Date].

The following table summarizes the key elements of this TMDL.

Table 7-4.1. Santa Monica Bay Beaches Bacteria TMDL (Dry Weather Only): Elements

Element	Key Findings and Regulatory Provisions
Problem Statement	Elevated bacterial indicator densities are causing impairment of the water contact recreation (REC-1) beneficial use at many Santa Monica Bay (SMB) beaches. Swimming in waters with elevated bacterial indicator densities has long been associated with adverse health effects. Specifically, local and national epidemiological studies compel the conclusion that there is a causal relationship between adverse health effects and recreational water quality, as measured by bacterial indicator densities.
Numeric Target *(Interpretation of the numeric water quality objective, used to calculate the waste load allocations)*	The TMDL has a multi-part numeric target based on the bacteriological water quality objectives for marine water to protect the water contact recreation use. These targets are the most appropriate indicators of public health risk in recreational waters. These bacteriological objectives are set forth in Chapter 3 of the Basin Plan, as amended by the Regional Board on October 25, 2001. The objectives are based on four bacterial indicators and include both geometric mean limits and single sample limits. The Basin Plan objectives are as follows: 1. <u>Rolling 30-day Geometric Mean Limits</u> a. Total coliform density shall not exceed 1,000/100 ml. b. Fecal coliform density shall not exceed 200/100 ml. c. Enterococcus density shall not exceed 35/100 ml. 2. <u>Single Sample Limits</u> a. Total coliform density shall not exceed 10,000/100 ml. b. Fecal coliform density shall not exceed 400/100 ml. c. Enterococcus density shall not exceed 104/100 ml. d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1. The targets apply throughout the year. The compliance point for the targets is the wave wash[1], where there is a freshwater outlet (i.e., storm drain or creek) to the beach, or at ankle depth at beaches without a freshwater outlet. The geometric mean targets may not be exceeded at any time. For the single sample targets, each existing shoreline monitoring site is assigned an allowable number of exceedance days for two time periods (summer dry weather and winter dry weather as defined in Table 7-4.2a). (A separate amendment will address the allowable number of wet weather exceedance days.) The allowable number of exceedance days is set such that (1) bacteriological water quality at any site is at least as good as at a designated reference site within the watershed and (2) there is no degradation of existing shoreline bacteriological water quality.
Source Analysis	With the exception of isolated sewage spills, dry weather urban runoff conveyed by storm drains and creeks is the primary source of elevated bacterial indicator densities to SMB beaches during dry weather. Limited natural runoff and groundwater may also potentially contribute to elevated bacterial indicator densities during winter dry weather. This

[1] The wave wash is defined as the point at which the storm drain or creek empties and the effluent from the storm drain initially mixes with the receiving ocean water.

	is supported by the finding that historical monitoring data from the reference beach indicate no exceedances of the single sample targets during summer dry weather and on average only three percent exceedance during winter dry weather.

Loading Capacity	Studies show that bacterial degradation and dilution during transport from the watershed to the beach do not significantly affect bacterial indicator densities at SMB beaches. Therefore, the loading capacity is defined in terms of bacterial indicator densities, which is the most appropriate for addressing public health risk, and is equivalent to the numeric targets, listed above.
Waste Load Allocations	Waste load allocations are expressed as the number of sample days at a shoreline monitoring site that may exceed the single sample targets identified under "Numeric Target." Waste load allocations are expressed as allowable exceedance days because the bacterial density and frequency of single sample exceedances are the most relevant to public health protection. For each shoreline monitoring site and corresponding subwatershed, the allowable number of exceedance days is set for two time periods. These two periods are: 1. summer dry weather (April 1 to October 31), and 2. winter dry weather (November 1 to March 31). The allowable number of exceedance days for a shoreline monitoring site for each time period is based on the lesser of two criteria (1) exceedance days in the designated reference system and (2) exceedance days based on historical bacteriological data at the monitoring site. This ensures that shoreline bacteriological water quality is at least as good as that of a largely undeveloped system and that there is no degradation of existing shoreline bacteriological water quality.[2] All responsible jurisdictions and responsible agencies[3] within a subwatershed are jointly responsible for complying with the allowable number of exceedance days for each associated shoreline monitoring site identified in Table 7-4.2a below. The three Publicly Owned Treatment Works (POTWs)[4] discharging to Santa Monica Bay are each given individual WLAs of zero (0) days of exceedance during both summer dry weather and winter dry weather.
Implementation	This TMDL will be implemented in two phases over a 6-year period. The regulatory mechanisms used to implement the TMDL will include primarily the Los Angeles County Municipal Storm Water NPDES Permit, the Caltrans Storm Water Permit, the three NPDES permits for the POTWs, and the authority vested in the Executive Officer via 13267 of the Porter-Cologne Water Quality Control Act. Within 3 years of the effective date of the TMDL, summer dry-weather allowable exceedance days and the rolling 30-day geometric mean

[2] In order to fully protect public health, no exceedances are permitted at any shoreline monitoring location during summer dry weather (April 1 to October 31). In addition to being consistent with the two criteria, waste load allocations of zero (0) exceedance days are further supported by the fact that the California Department of Health Services has established minimum protective bacteriological standards – the same as the numeric targets in this TMDL – which, when exceeded during the period April 1 to October 31, result in posting a beach with a health hazard warning (California Code of Regulations, title 17, section 7958).

[3] For the purposes of this TMDL, "responsible jurisdictions and responsible agencies" includes: (1) local agencies that are responsible for discharges from a publicly owned treatment works to the Santa Monica Bay watershed or directly to the Bay, (2) local agencies that are permittees or co-permittees on a municipal storm water permit, (3) local or state agencies that have jurisdiction over a beach adjacent to Santa Monica Bay, and (4) the California Department of Transportation pursuant to its storm water permit.

[4] Hyperion Wastewater Treatment Plant, Joint Water Pollution Control Plant, and Tapia Wastewater Reclamation Facility.

	targets must be achieved. Within 6 years of the effective date, winter dry-weather allowable exceedance days and the rolling 30-day geometric mean targets must be achieved.
Margin of Safety	WLAs of zero days of exceedance during the summer include an implicit margin of safety. The WLAs of a maximum of three days of exceedance during winter dry weather include an implicit margin of safety because the maximum allowable days of exceedance are based on samples collected 50 yards downcurrent of the freshwater outlet at the reference beach. Findings from a bacterial dispersion study of selected freshwater outlets show that there is typically significant dilution between the freshwater outlet, the wave wash (the compliance point), and a point 50 yards downcurrent.
Seasonal Variations and Critical Conditions	Seasonal variations are addressed by developing separate waste load allocations for two time periods (summer dry weather and winter dry weather) based on public health concerns and observed natural background levels of exceedance of bacterial indicators. The critical period for this dry weather bacteria TMDL is during winter months, when historic shoreline monitoring data for the reference beach indicate that the single sample bacteria objectives are exceeded on average 3% of the dry weather days sampled.

Note: The complete staff report for the TMDL is available for review upon request.

Table 7-4.3. Santa Monica Bay Beaches Bacteria TMDL (Dry Weather Only): Significant Dates

Date	Action
120 days after the effective date of the TMDL	Responsible jurisdictions and responsible agencies must submit coordinated shoreline monitoring plan(s), including a list of new sites or sites relocated to the wave wash at which time responsible jurisdictions and responsible agencies will select between daily and weekly shoreline sampling.
120 days after the effective date of the TMDL	Responsible jurisdictions and responsible agencies must identify and provide documentation on 342 potential discharges to Santa Monica Bay beaches listed in Appendix C of the TMDL Staff Report dated January 11, 2002. Documentation must include a Report of Waste Discharge (ROWD) where necessary. Responsible jurisdictions and responsible agencies must identify and provide documentation on potential discharges to the Area of Special Biological Significance (ASBS) in northern Santa Monica Bay from Latigo Point to the County line. Cessation of the discharges into the ASBS shall be required in conformance with the California Ocean Plan.
2 years after effective date of TMDL	Re-open TMDL to re-evaluate allowable winter dry weather exceedance days based on additional data on bacterial indicator densities in the wave wash, a re-evaluation of the reference system selected to set allowable exceedance levels, and a re-evaluation of the reference year used in the calculation of allowable exceedance days.
3 years after effective date of the TMDL	Achieve compliance with allowable exceedance days as set forth in Table 7-4.2a and rolling 30-day geometric mean targets during summer dry weather (April 1 to October 31).
6 years after effective date of the TMDL	Achieve compliance with allowable exceedance days as set forth in Table 7-4.2a and rolling 30-day geometric mean targets during winter dry weather (November 1 to March 31).

Table 7-4.2a: Santa Monica Bay Beaches Bacteria TMDL Implementation Schedule (Dry Weather Only): Allowable Number of Days that May Exceed Any Single Sample Bacterial Indicator Target for Existing Shoreline Monitoring Stations

Compliance Deadline			3 years after effective date		6 years after effective date	
			Summer Dry Weather^ Apr. 1-Oct. 31		Winter Dry Weather^* Nov. 1-Mar. 31	
Station ID	Location Name	Subwatershed	Daily sampling (No. days)	Weekly sampling (No. days)	Daily sampling (No. days)	Weekly sampling (No. days)
City of Los Angeles, Environmental Monitoring Division Sites						
S1	Surfrider Beach (breach point) - daily	Malibu Canyon	0	0	3	1
S2	Topanga State Beach	Topanga Canyon	0	0	3	1
S3	Pulga Canyon storm drain - 50 yards east (Will Rogers)	Pulga Canyon	0	0	3	1
S4	Santa Monica Canyon, Will Rogers State Beach	Santa Monica Canyon	0	0	3	1
S5	Santa Monica Municipal Pier - 50 yards southeast	Santa Monica	0	0	3	1
S6	Santa Monica Beach at Pico/Kenter storm drain	Santa Monica	0	0	3	1
S7	Ashland Av. storm drain - 50 yards south (Venice)	Santa Monica	0	0	3	1
S8	Venice City Beach at Windward Av. - 50 yards north	Ballona	0	0	2	1
S10	Ballona Creek entrance - 50 yards south (Dockweiler)	Dockweiler	0	0	3	1
S11	Dockweiler State Beach at Culver Bl.	Dockweiler	0	0	3	1
S12	Imperial Highway storm drain - 50 yards north (Dockweiler)	Dockweiler	0	0	2	1
S13	Manhattan State Beach at 40th Street	Hermosa	0	0	1	1
S14	Manhattan Beach Pier - 50 yards south	Hermosa	0	0	1	1
S15	Hermosa Beach Pier - 50 yards south	Hermosa	0	0	2	1
S16	Redondo Municipal Pier - 50 yards south	Redondo	0	0	3	1
S17	Redondo State Beach at Avenue I	Redondo	0	0	3	1
S18	Malaga Cove, Palos Verdes Estates - daily	Palos Verdes	0	0	1	1
Los Angeles County Department of Health Services Sites						
DHS (010)	**Leo Carillo Beach (REFERENCE BEACH)**	**Arroyo Sequit Canyon**	**0**	**0**	**3**	**1**
DHS (009)	Nicholas Beach	Nicholas Canyon	0	0	0	0
DHS (010a)	Broad Beach	Trancas Canyon	0	0	3	1
DHS (008)	Trancas Beach entrance	Trancas Canyon	0	0	0	0
DHS (007)	Westward Beach, SE end	Zuma Canyon	0	0	0	0
DHS (006)	Paradise Cove	Ramirez Canyon	0	0	3	1
DHS (005)	26610 Latigo Shore Drive	Latigo Canyon	0	0	3	1
DHS (005a)	Corral Beach	Latigo Canyon	0	0	3	1
DHS (004)	Puerco Beach	Corral Canyon	0	0	3	1
DHS (003)	Malibu Point, Malibu Colony Dr.	Malibu Canyon	0	0	3	1
DHS (003a)	Surfrider Beach, Malibu, 50 yds.	Malibu Canyon	0	0	3	1
DHS (002)	Malibu Pier	Malibu Canyon	0	0	3	1
DHS (001a)	Las Flores Beach	Las Flores Canyon	0	0	3	1
DHS (001)	Big Rock Beach	Piedra Gorda Canyon	0	0	3	1
DHS (101)	17200 Pacific Coast Hwy.	Santa Ynez Canyon	0	0	3	1
DHS (102)	Bel Air Bay Club, 16801 Pacific	Santa Ynez Canyon	0	0	3	1
DHS (103)	Temescal Storm Drain	Pulga Canyon	0	0	3	1
DHS (104a)	San Vicente Blvd. extended	Santa Monica	0	0	3	1
DHS (104)	Montana Ave. Storm Drain	Santa Monica	0	0	3	1
DHS (105)	Wilshire Blvd., Santa Monica	Santa Monice	0	0	3	1
DHS (106)	Strand Street extended	Santa Monica	0	0	3	1
DHS (106a)	Ashland Storm Drain	Santa Monica	0	0	3	1
DHS (107)	Venice City Beach at Brooks Av.	Ballona	0	0	3	1
DHS (108)	Venice Pier, Venice	Ballona	0	0	3	1
DHS (109)	Topsail Street extended	Ballona	0	0	3	1
DHS (110)	World Way extended	Dockweiler	0	0	3	1
DHS (111)	Opposite Hyperion Plant, 1 mile	Dockweiler	0	0	3	1
DHS (112)	Grand Avenue extended	Dockweiler	0	0	3	1
DHS (113)	26th Street extended	Hermosa	0	0	0	0
DHS (114)	Herondo Street extended	Hermosa	0	0	3	1
DHS (115)	Topaz Street extended	Redondo	0	0	3	1
County Sanitation Districts of Los Angeles County Sites						
LACSD1	Long Point	Palos Verdes	0	0	1	1
LACSD2	Abalone Cove	Palos Verdes	0	0	0	0
LACSD3	Portuguese Bend Cove	Palos Verdes	0	0	1	1
LACSD5	Royal Palms	Palos Verdes	0	0	1	1
LACSD6	Wilder Annex	Palos Verdes	0	0	1	1
LACSD7	Cabrillo Beach, oceanside	Palos Verdes	0	0	1	1
LACSDMC	Malaga Cove	Palos Verdes	0	0	1	1
LACSDBC	Bluff Cove	Palos Verdes	0	0	1	1

Notes: The allowable number of exceedance days during winter dry weather is calculated based on the 10th percentile year in terms of non-rain days at the LAX meteorological station. The number of allowable exceedances during winter dry weather is based on the lesser of (1) the reference system or (2) existing levels of exceedance based on historical shoreline data.
^Dry weather days are defined as those with <0.1 inch of rain and those days not less than 3 days after a rain day. Rain days are defined as those with >=0.1 inch of rain.
* A re-opener is scheduled for two years after the effective date of the TMDL in order to re-evaluate the allowable exceedance days during winter dry weather based on additional monitoring data.

Table 7-4.2b. Santa Monica Bay Beaches Bacteria TMDL Implementation Schedule (Dry Weather): Required Reduction in Number of Days Exceeding Single Sample Bacterial Indicator Targets for Existing Shoreline Monitoring Stations

Compliance Deadline		3 years after effective date	6 years after effective date
Location Name	Subwatershed	Summer Dry Weather (Apr. 1- Oct. 31)	Winter Dry Weather (Nov. 1- Mar. 31)*
City of Los Angeles, Environmental Monitoring Division Sites			
Surfrider Beach (breach point) - daily	Malibu Canyon	48	31
Topanga State Beach	Topanga Canyon	10	8
Pulga Canyon storm drain - 50 yards east (Will Rogers)	Pulga Canyon	4	6
Santa Monica Canyon, Will Rogers State Beach	Santa Monica Canyon	36	7
Santa Monica Municipal Pier - 50 yards southeast (Santa Monica)	Santa Monica	54	22
Santa Monica Beach at Pico/Kenter storm drain (Santa Monica)	Santa Monica	15	20
Ashland Av. storm drain - 50 yards south (Venice)	Santa Monica	16	6
Venice City Beach at Windward Av. - 50 yards north	Ballona	3	0
Ballona Creek entrance - 50 yards south (Dockweiler)	Dockweiler	7	3
Dockweiler State Beach at Culver Bl.	Dockweiler	6	1
Imperial Highway storm drain - 50 yards north (Dockweiler)	Dockweiler	7	0
Manhattan State Beach at 40th Street	Hermosa	1	0
Manhattan Beach Pier - 50 yards south	Hermosa	1	0
Hermosa Beach Pier - 50 yards south	Hermosa	2	0
Redondo Municipal Pier - 50 yards south	Redondo	16	9
Redondo State Beach at Avenue I	Redondo	2	0
Malaga Cove, Palos Verdes Estates - daily	Palos Verdes	1	0
Los Angeles County Department of Health Services Sites			
Leo Carillo Beach (REFERENCE BEACH)	**Arroyo Sequit Canyon**	**0**	**0**
Nicholas Beach	Nicholas Canyon	7	0
Broad Beach	Trancas Canyon	3	3
Trancas Beach entrance	Trancas Canyon	5	0
Westward Beach, SE end	Zuma Canyon	8	0
Paradise Cove	Ramirez Canyon	16	9
26610 Latigo Shore Drive	Latigo Canyon	11	13
Corral Beach	Latigo Canyon	3	5
Puerco Beach	Corral Canyon	0	7
Malibu Point, Malibu Colony Dr.	Malibu Canyon	23	6
Surfrider Beach, Malibu, 50 yds.	Malibu Canyon	58	25
Malibu Pier	Malibu Canyon	42	14
Las Flores Beach	Las Flores Canyon	18	7
Big Rock Beach	Piedra Gorda Canyon	32	20
17200 Pacific Coast Hwy.	Santa Ynez Canyon	3	9
Bel Air Bay Club, 16801 Pacific	Santa Ynez Canyon	14	5
Temescal Storm Drain	Pulga Canyon	17	0
San Vicente Blvd. extended	Santa Monica	7	0
Montana Ave. Storm Drain	Santa Monica	7	0
Wilshire Blvd., Santa Monica	Santa Monica	15	4
Strand Street extended	Santa Monica	8	6
Ashland Storm Drain	Santa Monica	24	2
Venice City Beach at Brooks Av.	Ballona	3	10
Venice Pier, Venice	Ballona	4	0
Topsail Street extended	Ballona	11	0
World Way extended	Dockweiler	5	1
Opposite Hyperion Plant, 1 mile	Dockweiler	3	4
Grand Avenue extended	Dockweiler	8	5
26th Street extended	Hermosa	5	0
Herondo Street extended	Hermosa	5	1
Topaz Street extended	Redondo	8	12
County Sanitation Districts of Los Angeles County Sites			
Long Point	Palos Verdes	1	0
Abalone Cove	Palos Verdes	1	0
Portuguese Bend Cove	Palos Verdes	1	0
Royal Palms	Palos Verdes	1	0
Wilder Annex	Palos Verdes	1	0
Cabrillo Beach, oceanside	Palos Verdes	1	0
Malaga Cove	Palos Verdes	2	0
Bluff Cove	Palos Verdes	0	0

* A re-opener is scheduled for two years after the effective date of the TMDL in order to re-evaluate the allowable exceedance days and necessary reductions during winter dry weather based on additional monitoring data.

** Required reductions are besed on the assumption of daily sampling.

R104574

EXHIBIT I

Environ. Sci. Technol. **2006**, *40*, 4851–4858

Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches

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We present estimates of annual public health impacts, both illnesses and cost of illness, attributable to excess gastrointestinal illnesses caused by swimming in contaminated coastal waters at beaches in southern California. Beach-specific enterococci densities are used as inputs to two epidemiological dose–response models to predict the risk of gastrointestinal illness at 28 beaches spanning 160 km of coastline in Los Angeles and Orange Counties. We use attendance data along with the health cost of gastrointestinal illness to estimate the number of illnesses among swimmers and their likely economic impact. We estimate that between 627,800 and 1,479,200 excess gastrointestinal illnesses occur at beaches in Los Angeles and Orange Counties each year. Using a conservative health cost of gastroenteritis, this corresponds to an annual economic loss of $21 or $51 million depending upon the underlying epidemiological model used (in year 2000 dollars). Results demonstrate that improving coastal water quality could result in a reduction of gastrointestinal illnesses locally and a concurrent savings in expenditures on related health care costs.

Introduction

Each year between 150 million and nearly 400 million visits are made to California (CA) beaches generating billions of dollars in expenditures, by tourists and local swimmers, and nonmarket values enjoyed mostly by local area residents (*1*, *2*). Nonmarket benefits represent the value society places on resources, such as beaches, beyond what people have to pay to enjoy these resources (see Pendleton and Kildow (*1*) for a review of the nonmarket value of CA beaches). In an effort to protect the health of beach swimmers, the CA State Legislature passed Assembly Bill 411 (AB411) in 1997 with formal guidance and regulations for beach water quality which are formally codified as a state statute (*3*). AB411 requires monitoring of bathing waters for fecal indicator bacteria (FIB, including total coliform (TC), fecal coliform (FC), and enterococcci (ENT)) on at least a weekly basis during the dry season (1 April through 31 October) if the beach is visited by over 50,000 people annually or is located adjacent to a flowing storm drain. Beaches can be posted with health warnings if single-sample or geometric mean standards for TC, FC, and ENT exceed prescribed levels (see Supporting Information (SI) for standards).

Based on AB411 water quality criteria and their professional judgment, CA county health officials posted or closed beaches 3,985 days during 2004 (*4*). Sixty percent (2,408 beach-days) of these occurred at Los Angeles and Orange County (LAOC) beaches (*4*), and nearly all (93%) of the LAOC advisories and closures were caused by unknown sources of FIB. The number of beach closures and advisories in CA (and the country as a whole) rises each year as counties monitor more beaches (*4*). Needless to say, public awareness of coastal contamination issues is growing, and in some cases strongly influencing the development of programs to improve coastal water quality. For example, public pressure on the Orange County Sanitation District (OCSD) prevented them from reapplying for a waiver from the USEPA to release partially treated sewage to the coastal ocean. Instead, OCSD plans to implement a costly upgrade to their sewage treatment plant. New stormwater permits issued by CA Regional Water Boards require counties and municipalities to implement prevention and control programs to meet coastal water quality criteria. The cost of such mitigation measures is difficult to determine, yet cost has been used as an argument in court challenges to the permits (*4*). In 2004 elections, voters in the city of Los Angeles approved a measure to spend $500 million on stormwater mitigation (*5*).

To understand the potential public health benefits of cleaning up coastal waters, we need a better idea of the magnitude of health costs associated with illnesses that are due to coastal water contamination. Several previous studies address the potential economic impacts of swimming-related illnesses. Rabinovici et al. (*6*) and Hou et al. (*7*) focused on the economic and policy implications of varying beach closure and advisory policies at Lake Michigan and Huntington Beach, CA, respectively. Dwight et al. (*8*) estimated the per case medical costs associated with illnesses at two beaches in southern California and used this to make estimates of public health costs at two Orange County beaches. Our study is novel in that it provides the first regional estimates of the public health costs of coastal water quality impairment.

While many different illnesses are associated with swimming in contaminated marine waters, we focus our analysis on gastrointestinal illness (GI) because this is the most frequent adverse health outcome associated with exposure to FIB in coastal waters (*9*, *10*). We estimate daily excess GI based on attendance data, beach-specific water quality monitoring data, and two separate epidemiological models developed by Kay et al. (*11*) and Cabelli et al. (*12*) that model GI based on exposure to fecal streptococci and ENT, respectively. Finally, we provide estimates of the potential annual economic impact of GI associated with swimming at study beaches.

We conduct our analysis using data from 28 LAOC beaches during the year 2000. Together, these beaches span 160 km of coastline (Figure 1, Table S1). We limit our analysis to these beaches and the year 2000 in particular because we were able to obtain relatively complete daily and weekly attendance and water quality data for these beaches during

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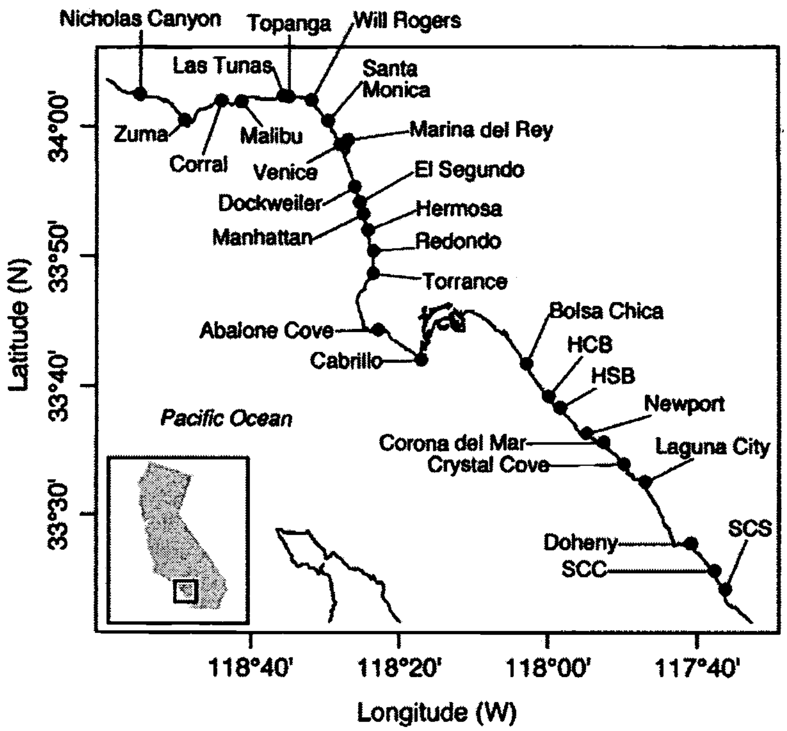

FIGURE 1. The 28 beaches considered in this study. HSB = Huntington State Beach, HCB= Huntington City Beach, SCC = San Clemente City Beach, and SCS = San Clemente State Beach.

this year. The 28 beaches represent a large, but incomplete, subset of the total beach shoreline in LAOC. Large stretches of relatively inaccessible beaches (e.g., portions of Laguna Beach, much of Malibu, and Broad Beach) were omitted from the analysis as were several large public beaches (e.g., Seal Beach and Long Beach) because of paucity of attendance and/or water quality data. The 1999–2000 and 2000–2001 winter rainy seasons were typical for southern CA (*13*), so 2000 was not particularly unique with respect to rainfall. A comparison of inter-annual water quality at a subset of beaches suggests that pollution levels in 2000 were moderate (data not shown). Thus, the estimates we provide can be viewed as typical for the region.

Methods

Number of Swimmers. Morton and Pendleton (*2*) compiled daily attendance data from lifeguards' records and beach management agencies. When data were missing, attendance was estimated using corresponding monthly median weekday or weekend values from previous years. (Table S1 shows the number of days in 2000 when data are available—for most beaches, this number approaches 366.) Because these data are based on actual counts, we do not need to factor in effects due to the issuance of advisories at a particular beach. Only a fraction of beach visitors enter the water. This fraction varies by month in southern CA from 9.56 to 43.62% (Table S2) (*14*). We applied the appropriate fraction to the attendance data to determine the number of individual swimmers exposed to coastal waters. Although research suggests the presence of FIB in sand in the study area (*15, 16*), we do not consider the potential health risk that may arise from sand exposure because it has not been evaluated.

Water Quality Data. ENT data were obtained from the local monitoring agencies and are publicly available. Local monitoring agencies sample coastal waters at ankle depth in the early morning in sterile containers. Samples are returned to the lab and analyzed for ENT using USEPA methods. When ENT values are reported as being below or above the detection limit of the ENT assay, we assume that ENT densities were equal to the detection limit.

During 2000, monitoring rarely occurred on a daily basis; ENT densities were measured 14–100% of the 366 days in 2000, depending on monitoring site (Table S1). For example, Zuma beach was monitored once per week during the study period, while Cabrillo beach was monitored daily. To estimate ENT densities on unsampled days, we used a Monte Carlo technique. Normalized cumulative frequency distributions of observed ENT densities at each monitoring site were constructed for the 1999–2000 wet season (Nov 1, 1999 through Mar 31, 2000), 2000 dry season (April 1, 2000 through Oct 31, 2000), and the 2000–2001 wet season (Nov 1, 2000 through Mar 31, 2001). ENT densities on unsampled days during 2000 were estimated by randomly sampling from the appropriate seasonal distribution. Because day-to-day ENT concentrations at marine beaches are weakly correlated and variable (*17*), we chose not to follow the estimation method of Turbow et al. (*18*) who assumed a linear relationship between day-to-day ENT densities at two CA beaches. Comparisons between the Monte Carlo method and a method that simply used the monthly arithmetic average ENT density indicated the two provided similar results (data not shown).

The beaches in our study area (Figure 1) are of variable sizes; each beach may include 1–7 monitoring sites (Table S1). If more than one monitoring site exists within the boundaries of a beach, the arithmetic mean of ENT at the sites was used as a single estimate for ENT concentrations within the beach (*19*). There is considerable evidence that ENT densities at a beach vary rapidly over as little as 10 minutes (*17, 20*). Therefore, even though we used up to 7 measurements or estimates to determine ENT at a beach on a given day, there is still uncertainty associated with our estimate because sampling is conducted at a single time each day.

Dose–Response. Of all the illnesses considered in the literature, GI is most commonly associated with exposure to polluted water (*10–12, 21–26*). To estimate the risk of GI

TABLE 1. Dose–Response Models for Predicting GI[a]

name	original model	model converted to excess risk
model C (*12*)	$1000(P - P_0) = 24.2 \log_{10}(\text{ENT}) - 5.1$	$(P - P_0) = (24.2 \log_{10}(\text{ENT}) - 5.1)/1000$
model K (*11*)	$X = \text{Ln}(P/(1 - P)) = 0.201\ (\text{FS} - 32)^{1/2} - 2.36$	$(P - P_0) = (e^X/(1 + e^X)) - P_0$

[a] ENT = enterococci, FS = fecal streptococci. Both ENT and FS are in units of CFU or MPN per 100 mL water. P is the risk of GI for swimmers, P_0 is the background risk of GI.

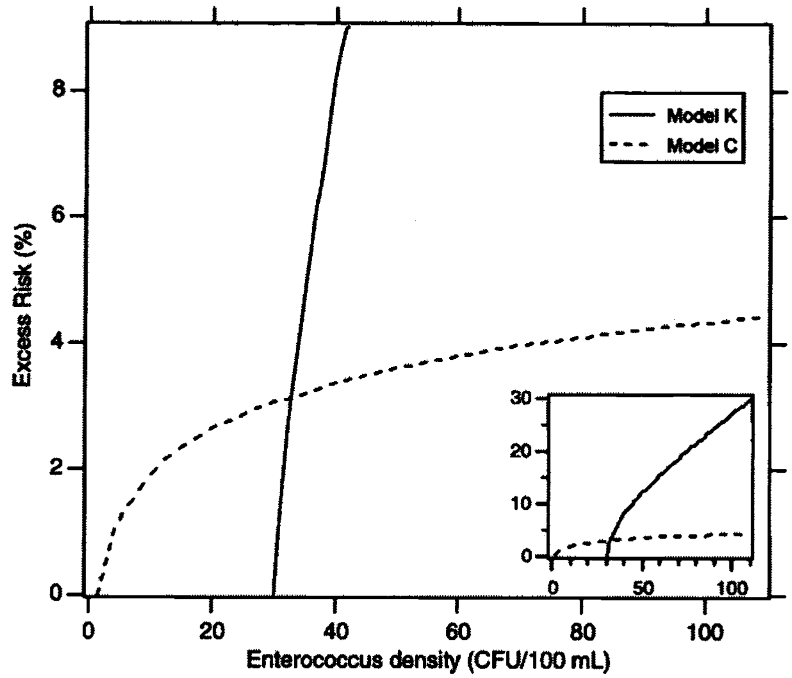

FIGURE 2. Dose–response relationships for the two epidemiological models. Excess risk of GI is shown as a function of ENT density. The inset more clearly shows the differences between the relationship for the randomized trial study (model K (*11*)) and the cohort study (model C (*12*)).

from swimming in contaminated marine waters in southern CA, we utilized two dose–response models (*11, 12*) (Table 1) developed in epidemiology studies conducted elsewhere (in marine waters of the East U.S. coast and United Kingdom) (*18, 27*). A local dose–response model for GI would be preferable, but does not exist. Haile et al. (*28*) conducted an epidemiology study at Los Angeles beaches and found that skin rash, eye and ear infections, significant respiratory disease, and GI were associated with swimming in waters with elevated FIB or near storm drains; however, they did not report dose–response models for illness and bacterial densities.

The two dose–response models (hereafter referred to as models C (*12*) and K (*11*)) are fundamentally different in that model C was derived from a prospective cohort study while model K was developed using a randomized trial study. Model C has been scrutinized in the literature (*20, 26, 29–31*). Among the criticisms are lack of ENT measurement precision and inappropriate pooling of data from marine and brackish waters. World Health Organization (WHO) experts (*10*) suggest that epidemiology studies that apply a randomized trial design, such as model K, offer a more precise dose–response relationship because they allow for better control over confounding variables and exposure (*26*). Thus, the WHO has embraced model K over cohort studies such as model C for assessing risk. We report GI estimates obtained from both models C and K in our study because they have both been applied in the literature (*8, 18*), and form the basis for water quality criteria worldwide.

Models C and K were developed in waters suspected to be polluted with wastewater. The source of pollution at our study site during the dry season is largely unknown (*4*), although human viruses have been identified in LAOC coastal creeks and rivers (*32–36*) and an ENT source tracking study at one beach suggests sewage is a source (*37*). During the wet season, stormwater is a major source of FIB to coastal waters and Ahn et al. (*38*) detected human viruses in LAOC stormwater. Because we cannot confirm that all the ENT at our study site was from wastewater, there may be errors associated with the application of models C and K. In addition, there is evidence that dose–response relationships may be site specific (*30*). The results presented in our study should be interpreted in light of these limitations.

We converted incidence and odds, the dependent variables reported for model C and K, respectively, into risk of GI (P) (Table 1). P represents total risk of GI to the swimmer, and includes risk due to water exposure plus the background GI rate (P_0). Excess risk was calculated by subtracting the background risk from risk ($P - P_0$). While ENT is the independent variable for model C, model K requires fecal streptococci (FS), the larger bacterial group of which ENT are a subset, as the independent variable. We assumed that FS and ENT represent the same bacteria, following guidance from the WHO (*9*).

Models C and K provide different functional relationships between ENT and excess GI risk (Figure 2). Model C predicts relatively low, constant risks across moderate to high ENT densities relative to model K. At ENT less than 32 CFU/100 mL, model K predicts no excess risk; model C, however, does predict nonzero risks even at these low levels of contamination. The data range upon which each model was built varies considerably. Model C is based on measurements ranging from 1.2–711 CFU/100 mL and model K is based on measurements from 0–35 to 158 CFU/100 mL. We extrapolated models C and K when ENT densities were outside the epidemiology study data ranges. Given the lack of epidemiological data on illness outside the ranges, extrapolation of the models represents a reasonable method of estimating excess GI.

Excess Illness Due To Swimming. The excess incidence of GI on day i at beach j ($GI_{i,j}$) is given by the following expression:

$$GI_{i,j} = A_{i,j} f_i (P_{i,j} - P_o) \tag{1}$$

$P_{i,j} - P_o$ is the excess risk of GI on day i at beach j as estimated from models C or K (Table 1), $A_{i,j}$ is the number of beach visitors, and f_i is the fraction of swimmers on day i (*14*). We assume P_o is 0.06—the background risk for stomach pain as reported by Haile et al. (*28*) for beaches within Santa Monica Bay, CA. Daily values were summed across the year or season to estimate the number of excess GI per beach. Seasonal comparisons are useful in this region because of distinct differences between attendance and water quality between seasons. The wet season is defined as November through March and the dry season is defined as April through October. Note that the dry season corresponds to the season when state law mandates beach monitoring (*3*).

Public Health Costs of Coastal Water Pollution. GI can result in loss of time at work, a visit to the doctor, expenditures on medicine, and even significant nonmarket impacts that represent the "willingness-to-pay" of swimmers to avoid getting sick (sometimes referred to as psychic costs). Because there is a lack of information on the costs of waterborne GI, Rabinovici et al. (*6*) used the cost of a case of food-borne GI, $280 (year 2000 dollars) per illness from Mauskopf and French (*39*), as a proxy for the cost of water-borne GI for swimmers in the Great Lakes. The $280 per illness represents the willingness-to-pay to avoid GI and includes both market and nonmarket costs (*6*). Dwight et al. (*8*) conducted a cost of illness study for water-borne GI for two beaches in southern California (Huntington State Beach and Newport Beach) and determined the cost as $36.58 per illness in 2004 dollars based on lost work and medical costs. Discounting for inflation, this amount is equivalent to $33.35 in the year 2000 dollars. This value does not include lost recreational values or the willingness-to-pay to avoid getting sick from swimming. We use the more conservative estimate of Dwight et al. (*8*) to calculate the health costs of excess GI at LAOC beaches. However, we also provide more inclusive estimates of the cost of illness using Mauskopf and French's $280 willingness-to-pay value (*39*). Unless otherwise stated, all costs are reported in year 2000 dollars.

Results

Attendance and Swimmers. Beach attendance was higher during the dry season (from May through October) than in the wet season (November through April) (Figure 3). We estimate that the annual visitation to Los Angeles and Orange County (LAOC) beaches for the year 2000 approached 80 million visits.

Water Quality. Water quality (measured in terms of ENT concentration) varies widely across the beaches in the study. (Figure S1 shows the log-mean of ENT observations at each beach during the dry and wet seasons.) In general ENT densities are higher during the wet season compared to the dry. Water quality problems at a beach may exist chronically over the course of the year or may be confined to particularly wet days when precipitation washes bacteria into storm drains and into the sea. The most serious, acute water quality impairments can result in the issuance of a beach advisory or beach closure. According to CA state law, water quality

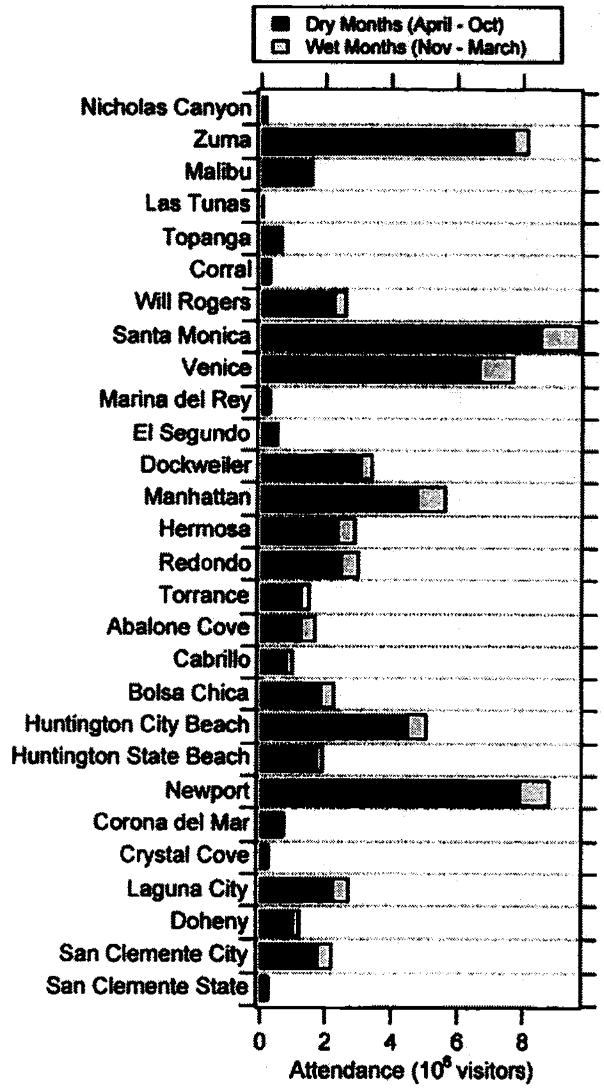

FIGURE 3. Beach attendance during wet and dry seasons 2000.

exceeds safe levels for swimming if a single beach water sample has a concentration of ENT greater than 104 CFU/100 mL. Figure 4 illustrates the percentage of the days for which daily estimated ENT concentrations were in excess of the state single sample standard. Exceedances during the wet months generally outnumber exceedances during the dry months. The exceptions are Corral, Bolsa Chica, and Crystal Cove, which are all relatively clean beaches, even in the wet season. Doheny, Malibu, Marina Del Rey, Cabrillo, and Las Tunas had the worst water quality with over 33% of the daily estimates in 2000 greater than 104 CFU/100 mL, while Newport, Hermosa, Abalone Cove, Manhattan, Torrance, and Bolsa Chica had the best water quality with less than 5% of daily estimates under the standard.

Estimates of Excess GI and Associated Public Health Costs due to Swimming. Figure 5 illustrates estimated annual excess GI at beaches based on models C and K; results are given for dry and wet months. Models C and K both indicate that Santa Monica, the beach with the highest attendance (Figure 3), has the highest excess GI of all beaches during wet and dry seasons. Both models predict that the three beaches with the lowest excess GI were San Clemente State, Nicholas Canyon, and Las Tunas, a direct result of these beaches being among the smallest and least visited in our study area (Figure 3).

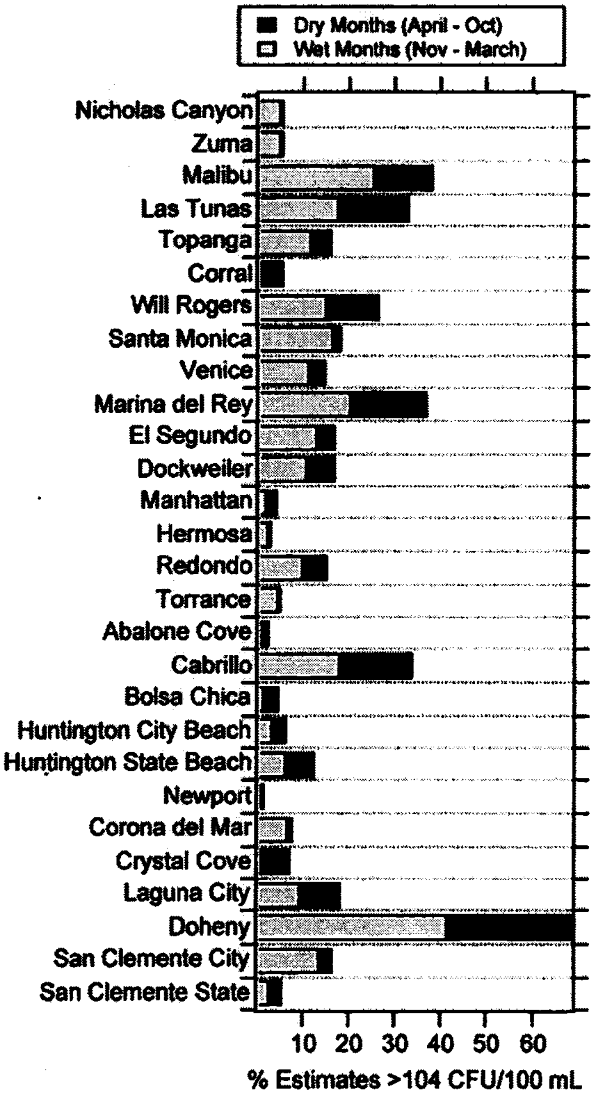

FIGURE 4. Percentage of days on which daily ENT estimates were greater than the CA Department of Health single-sample ENT standard of 104 CFU/100 mL.

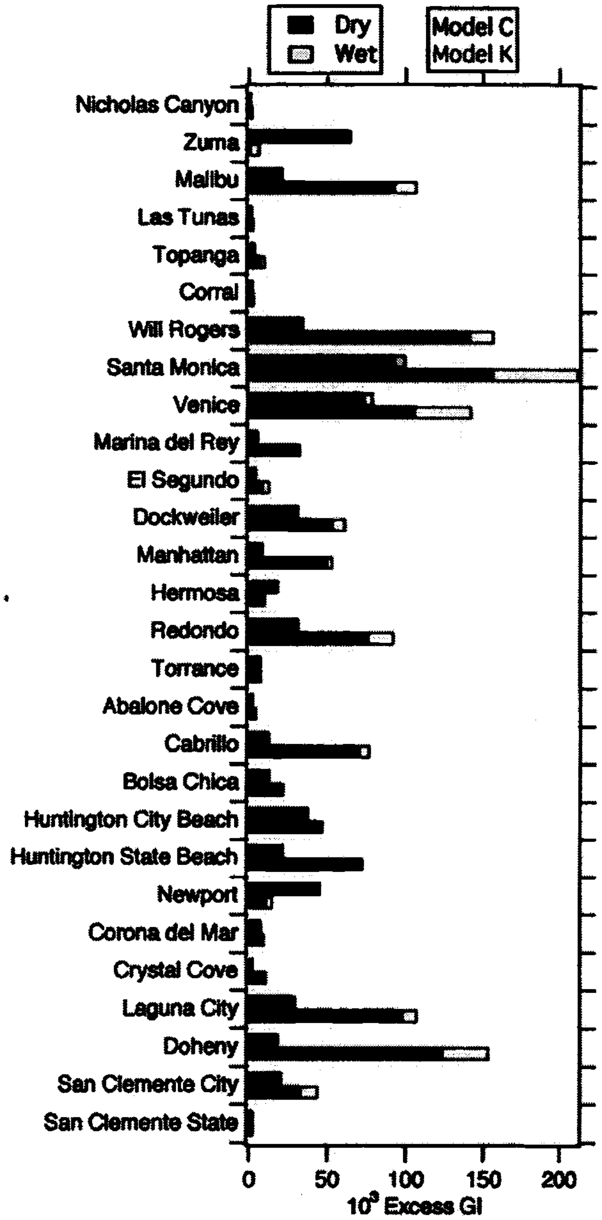

FIGURE 5. Excess GI by beach and season for models C and K.

There are marked seasonal differences between excess GI predictions. Although water quality is typically worse during the wet season compared to the dry (Figures 4 and S1), more excess GI are predicted for the dry season for most beaches. This result is driven by seasonal variation in attendance (Figure 3). The exceptions are model K predictions for Zuma that indicate 0 and 6647 excess GI during the dry and wet seasons, respectively. Zuma had no ENT densities greater than 32 CFU/100 mL during the dry season, hence the prediction of 0 excess GI.

Numerical predictions of excess GI for the entire year from model C and model K vary markedly between beaches. At 24 beaches, model K predicts between 18% and 700% greater excess GI than model C. The greatest difference in the estimated GI is at Doheny beach where models C and K predict 18,000 and 153,000 excess GI, respectively. At 4 beaches (Zuma, Hermosa, Torrance, and Newport), model K predicts between 1 and 90% lower incidence of GI than model C. These beaches are generally clean with ENT densities below the model K threshold of 32 CFU/100 mL for excess risk.

The public health burden of coastal contamination depends on both attendance and water quality. Figure 6 illustrates how excess GI, based on predictions from models C and K, varies as a function of water quality (percent of daily ENT estimates in exceedance of standard) and attendance. Red, yellow, and green symbols indicate beaches with increasing numbers of GI. If reduction of public health burden is a goal of local health care agencies, then beaches with a red symbol are candidates for immediate action. Nearly all beaches are categorized as high priority during the dry season based on model K (panels A and B). Model C indicates that dry weather mitigation measures at Venice, Zuma, Santa Monica, and Newport, some of the most visited beaches, would significantly reduce the public health burden (panel C), more so than wet weather mitigation measures (panel D).

Another way of prioritizing beach remediation is to examine the risk of GI relative to the USEPA guideline of 19 illnesses per 1000 swimmers (Figure S2). Model K indicates that at 19 and 15 of the 28 LAOC beaches during the wet and dry seasons, respectively, risk is greater than twice the EPA acceptable risk. Model C, on the other hand, indicates that only two beaches (Marina del Rey and Doheny) during the

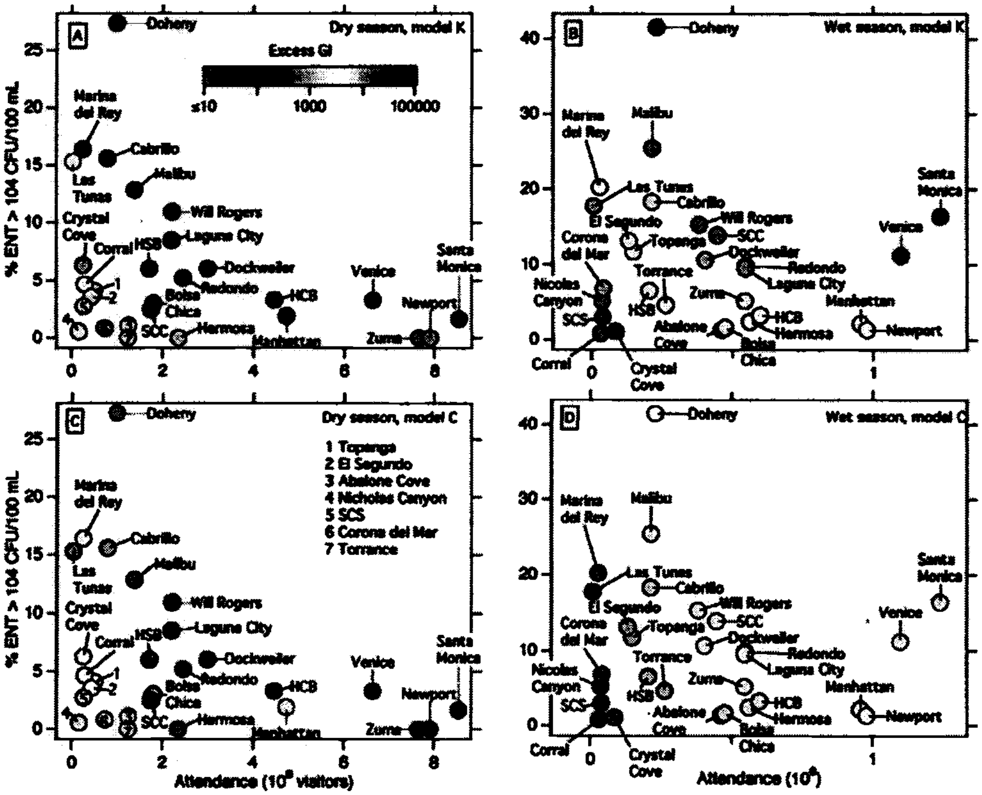

FIGURE 6. Excess GI at each beach as a function of % ENT in exceedance of the single sample standard and attendance. Results for the dry (panels A and C) and wet (panels B and D) seasons are shown for Models K (panels A and B) and C (panels C and D). Beaches are labeled; SCC is San Clemente City Beach, SCS is San Clemente State, HSB is Huntington State Beach, and HCB is Huntington City Beach. In panels A and C, numbers on symbols correspond to beaches, as indicated in the upper right corner of panel C. The color scale in panel A applies to all panels.

TABLE 2. Countywide Public Health Impacts and Costs for Wet and Dry Months (2000)

county/ region	season	GI cases model C	GI cases model K	health costs model C	health costs model K
Los Angeles					
	dry	394,000	804,000	$13,100,000	$28,800,000
	wet	33,800	189,000	$1,130,000	$6,310,000
	total	427,800	993,000	$14,230,000	$35,110,000
Orange					
	dry	185,000	420,000	$6,180,000	$14,000,000
	wet	15,000	66,200	$500,000	$2,210,000
	total	200,000	486,200	$6,680,000	$16,210,000
region total					
	dry	579,000	1,224,000	$19,280,000	$40,800,000
	wet	48,800	255,200	$1,630,000	$8,520,000
	total	627,800	1,479,200	$20,910,000	$51,320,000

dry season, and six (Marina del Rey, Doheny, Santa Monica, Las Tunas, Will Rogers, and Malibu) in the wet season fall into this "high" risk category.

Public Health Costs of Coastal Water Pollution. Table 2 summarizes the number of excess GI and associated public health costs during wet and dry periods by county and season. Based on the conservative cost of illness given by Dwight et al. (*8*), the estimated health costs of GI based on models C and K is over $21 million and $50 million, respectively. If we follow Rabinovici et al. (*6*) and use $280 per GI, the estimated public health impacts are $176 million based on model C and $414 million based on model K. For both LA and OC beaches, county-wide costs obtained using model K yield higher results than those obtained from model C, a direct result of the difference in GI estimates (Figures 5 and 6). Health costs are greater in the dry season compared to the wet suggesting that money may be well spent on dry-weather diversions.

Discussion

A significant public health burden, in terms of both numbers of GI and the costs of GI, is likely to result from beach water quality contamination in southern CA. The corollary to this finding is that water quality improvements in the region would result in public health benefits. Specifically, we make three key findings: (1) removing fecal contamination from coastal water in LAOC beaches could result in the prevention of between 627,800 and 1,479,200 GI and a public health cost of between $21 and $51 million (depending upon the epidemiological model used) each year in the region using the most conservative cost estimates and as much as $176 million or $414 million if we use the larger estimate of health costs (*6, 39*); (2) even beaches within the same region differ significantly in the degree to which swimming poses a public health impact; and (3) public health risks differ between seasons. Findings (2) and (3) are not surprising given spatio-temporal variation in water quality (*17, 40*) and attendance within the study site.

A previous study by Turbow et al. (*18*) estimated 36,778 excess HCGI (highly credible GI) per year from swimming at Newport and Huntington State beaches (*8*). Our estimates for the same stretch of shoreline are higher (68,011 and 87,513 excess GI based on models C and K, respectively). Not only did we use a different measure of illness (GI vs. HCGI) we also used a Monte Carlo scheme to estimate ENT on unsampled days whereas Turbow et al. (*18*) used linear interpolation, and we used higher, empirically determined

(*14*) measures of the percent of beach goers that swim. Dwight et al. (*8*) used Turbow et al.'s (*18*) estimate to determine that the health costs of excess GI at the same beaches were $1.2 million. Our health cost estimates are higher ($2.3 and $2.9 million for models C and K, respectively), due to the higher incidence of ilness predicted by our models.

Beaches with chronic water quality problems are obvious candidates for immediate contamination mitigation. Many beaches in LAOC, however, are relatively clean and meet water quality standards on most days. Clean beaches with moderate to low levels of attendance do not represent a significant public health burden (Figure 6). Nevertheless, public health impacts are still substantial at heavily visited beaches (for instance those with over 6,000,000 visitors per year) even when water quality is good (e.g., Manhattan Beach) (Figure 6). Generally speaking, it will be more difficult to reduce contaminant levels at cleaner beaches. At beaches with high attendance and generally good water quality (like Newport Beach and Zuma), policy managers should continue dry weather source reduction efforts (e.g., education campaigns and watershed management), but should also recognize that the cost of eliminating all beach contamination may outweigh the marginal public health benefits of doing so.

Our estimates of the potential health benefits that might result from removing bacterial contamination from coastal water in LAOC beaches have limitations. First, we focus on a lower bound estimate of the health cost of GI that does not consider the amount a beach goer is willing to pay to avoid getting sick (estimates using higher, but less scientifically conservative estimates also are provided). Second, while we focus on the public health impacts from GI. Exposure to microbial pollution at beaches also increases the chance of suffering from various symptoms and illnesses (*28, 41*). For instance, Haile et al. (*28*) and Fleisher et al. (*41*) document associations between water quality and respiratory illnesses, acute febrile illness, fever, diarrhea with blood, nausea, and vomiting, and earaches. Third, if the public believes swimming is associated with an increased risk of illness, they may be discouraged from going to the beach, resulting in a loss of beach-related expenditures to local businesses and recreational benefits to swimmers in addition to the loss in health benefits described here. Fourth, we consider GI occurring at a subset of LAOC beaches for which water quality and attendance data were available (Figure 1). Fifth, implicit in our analysis is the assumption that models C and K can be applied to LAOC beaches. Despite these limitations, the results reported here represent the best estimates possible in light of imperfect information. Future studies that establish dose−response relationships for the LAOC region or confirm incidence of swimming GI medically would improve estimates of public health burden and costs.

Acknowledgments

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Note Added after ASAP Publication

The Model C discussion in the Methods section published ASAP July 15, 2006 has been revised. The corrected version was published July 26, 2006.

Supporting Information Available

Tables S1 and S2, Figures S1 and S2, and the California state water quality standards. This material is available free of charge via the Internet at http://pubs.acs.org.

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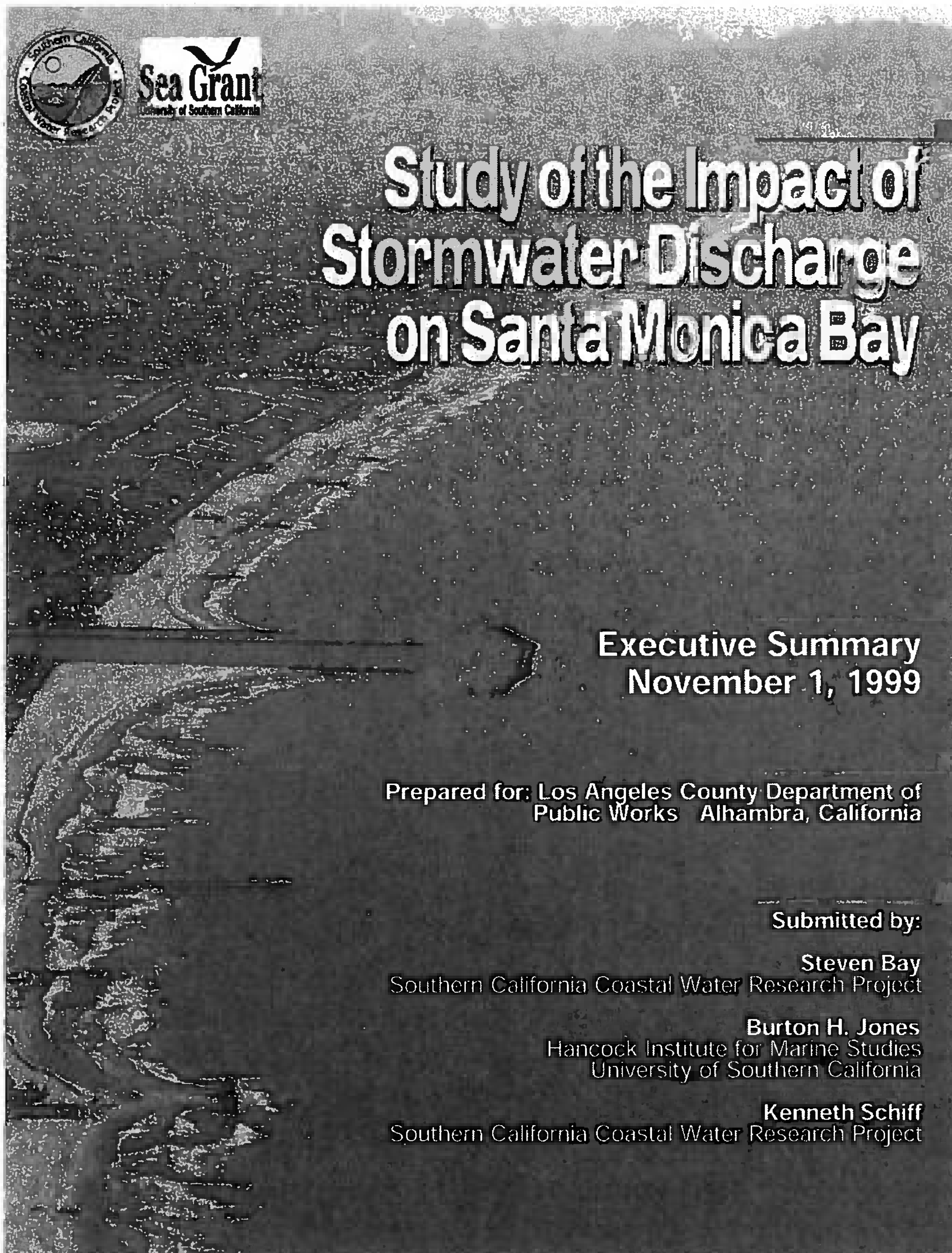
EXHIBIT J



Study of the Impact of Stormwater Discharge on Santa Monica Bay

Executive Summary
November 1, 1999

Prepared for: Los Angeles County Department of Public Works Alhambra, California

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The conclusions presented in this document are the views of the authors and do not necessarily represent positions of the Los Angeles County Department of Public Works, the Natural Resources Defense Council, or other collaborating agencies.

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University of Southern California

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INTRODUCTION

Urban stormwater runoff is now regarded as one of the largest sources of pollution to the coastal waters of the United States. In Southern California, point source control and advanced sewage treatment have greatly reduced the emissions of contaminants from sewage treatment plant and industrial discharges into the ocean. As a consequence, mass emissions from stormwater runoff now constitute a much larger portion of the constituent inputs to receiving waters and may represent the dominant source of some contaminants such as lead and zinc.

Stormwater runoff is widely believed to be one of the largest sources of contaminants to coastal waters.

While stormwater runoff can produce impacts in both freshwater and seawater environments, effects on the ocean are of greatest concern in urban Southern California. Our coastal waters provide many beneficial uses, including recreation, aesthetic enjoyment, fishing, marine habitat, fish reproduction, industrial water supply, and navigation. Ocean-dependent activities contribute approximately $9 billion annually to the economies of coastal communities in Southern California.

Substantial resources are spent monitoring the chemical constituents in stormwater runoff, yet little is known about the effects of these inputs once they enter the ocean. Of greatest concern to the public are whether impairments are occurring to the beneficial uses that relate to human health (safety of swimming and seafood consumption) or ecosystem health (presence of a natural balance of species). Stormwater discharge has the potential to impair these beneficial uses through: 1) contamination of recreational waters or seafood with disease-causing microbes, 2) aesthetic degradation from trash and reduced water clarity, and 3) ecosystem degradation from contaminants or other stormwater constituents.

Current water quality monitoring programs do not assess the effects of stormwater runoff on the environment.

Understanding the effects of stormwater on beneficial uses is essential. Information about the extent and type of adverse impacts is useful to guide and refine management actions to improve water quality. The monitoring programs of various agencies collect information that is useful for assessing some beneficial use impairments, primarily those related to human health. For example, public health and sanitation agencies regularly conduct shoreline microbiological monitoring near storm drain discharges, which indicates impacts to swimming and shellfish consumption. However, very little information is available to assess the impacts of urban stormwater on ecosystem health. Studies of impacts to freshwater systems (particularly in the west) are rare; impacts to the coastal ocean have never been assessed.

This report summarizes a three-year study funded by the Los Angeles County Department of Public Works, Southern California Coastal Water Research Project (SCCWRP), and University of Southern California (USC) Sea Grant Program.

This study is one of the first to assess stormwater impacts on the marine ecosystem.

This study examined plume characteristics, water column and seafloor biology.

The purpose of the study was to assess the impacts of urban stormwater runoff to the receiving waters of Santa Monica Bay. The goal of this study was to examine impacts that were relevant to ecosystem health, rather than impacts related to human health or recreation issues. This effort was conducted by an interdisciplinary team of scientists from SCCWRP, the University of Southern California, and the University of California at Santa Barbara.

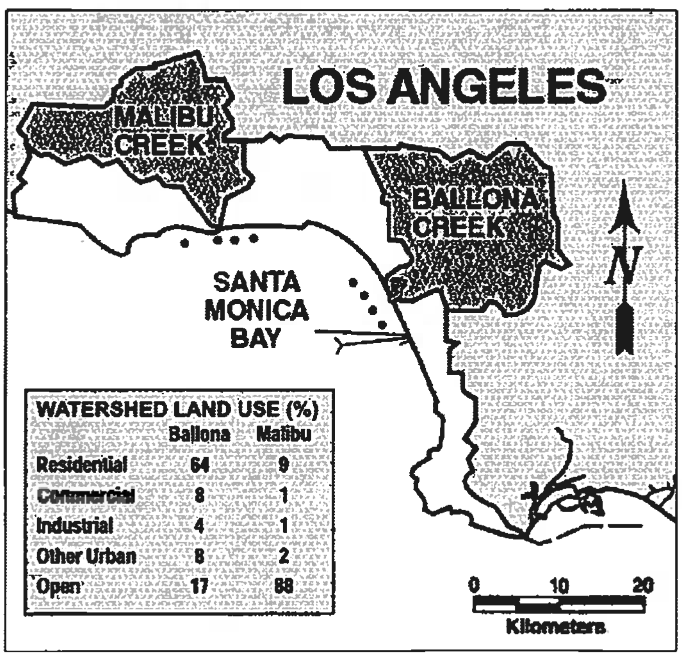
The Santa Monica Bay Receiving Waters Study incorporated four design elements. The first element used physical and optical oceanographic instruments to characterize the size, composition, and mixing of stormwater plumes, providing information on the impacts to beneficial uses that are associated with water clarity. The second element used toxicity tests to assess the biological effects of runoff on water column biota and to identify the responsible toxicants. The third element examined seafloor biota and chemistry in order to assess the long-term effects of storm-discharged particles with their associated contaminants.

Comparisons between Ballona and Malibu Creeks evaluated effects of different watershed types.

The fourth element of the study design was a comparison of stormwater impacts from different watershed types. Land use patterns and development within a watershed are thought to influence the composition and quantity of stormwater runoff. The influence of watershed type was investigated by comparing stormwater impacts in the receiving water offshore of the highly urbanized Ballona Creek watershed with impacts in the receiving water offshore of the less-urbanized Malibu Creek watershed (Figure 1).

Sampling and analysis were conducted over three wet seasons (1995/96 to 1997/98). This document provides a summary of the study and focuses on major concepts and important findings. For the detailed results and raw data, we encourage readers to consult the Annual Progress Reports, available through USC Sea Grant.

FIGURE 1



Locations of Ballona Creek and Malibu Creek sub-watersheds and the offshore sampling stations for sediment measurement. Other portions of the Santa Monica Bay watershed are shown in white.

STORMWATER PLUME CHARACTERIZATION

The impact of stormwater on the coastal ocean is determined by the composition of the stormwater and the dynamics (mixing, transport, and persistence) of the stormwater plume once it enters the coastal ocean. These dynamics influence the location, duration, and magnitude of impacts from stormwater.

The low salinity and high turbidity of stormwater provide markers that allow plumes to be mapped in the ocean.

The research team mapped the three-dimensional distribution of the stormwater plumes resulting from several winter storm events during 1996-1998. Mapping was performed using a towyo system, which carried sensors to measure temperature, salinity, light transmission (turbidity), chlorophyll fluorescence (plant biomass), and ambient visible light. The towyo was towed through the water in a vertical zigzag pattern that enabled us to map the horizontal and vertical distributions of the measured parameters. In addition, surface water was pumped to similar sensors on the boat so that the distribution of these parameters at the water's surface could be mapped. Maps were constructed for two regions of Santa Monica Bay, the receiving waters offshore of Ballona Creek and those offshore of Malibu Creek.

The characteristics of stormwater discharged into Santa Monica Bay from the two watersheds were similar in several respects. The most obvious and important physical characteristic was that the stormwater, being primarily composed of freshwater, had very little salinity. This low salinity enabled us to trace the stormwater plume in the ocean and differentiate it from the ambient seawater, which was not directly influenced by stormwater discharge. The stormwater also contained high concentrations of suspended particulate material, derived from various sources such as land erosion, street dust, aerial deposition, and litter. Suspended particulate material increased the turbidity of water by scattering and absorbing light. The turbidity and salinity together allowed the differentiation of seawater influenced by stormwater discharge from seawater containing freshwater from direct rainfall input.

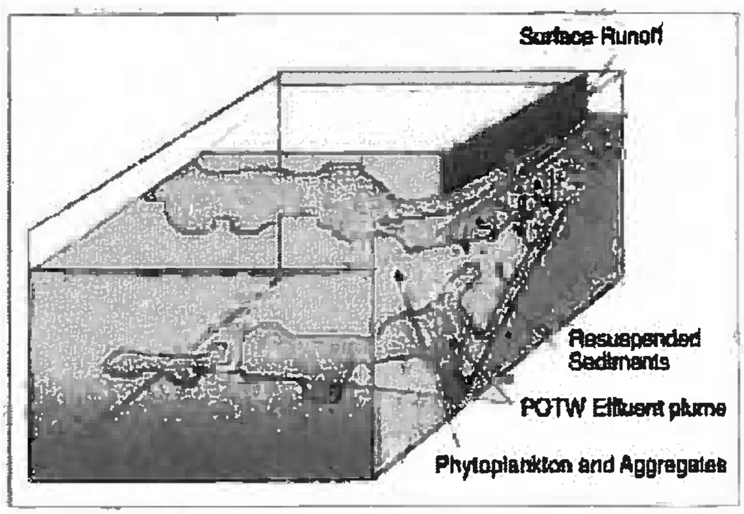


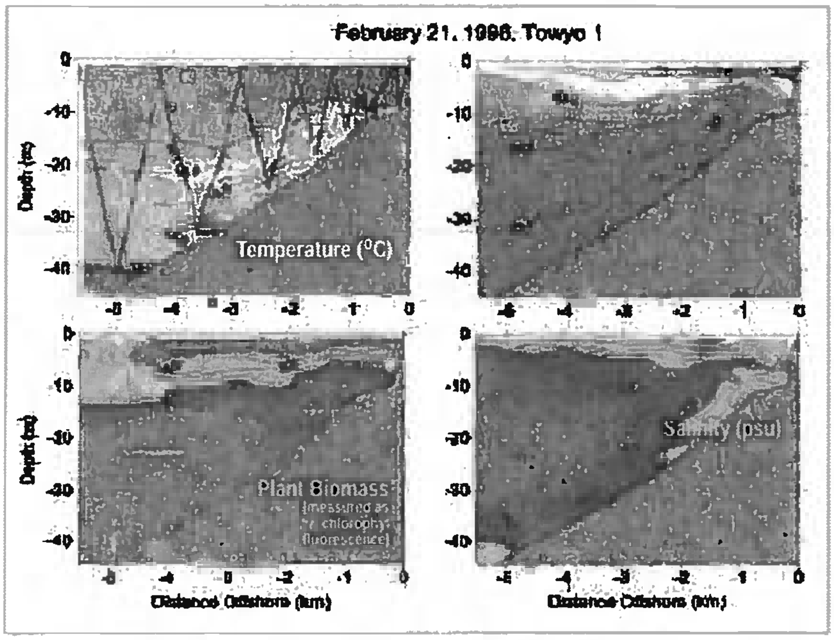
FIGURE 2

Schematic of coastal ocean with several sources of suspended particulate matter. Sources include surface runoff, Publicly Owned Treatment Works (POTW) discharge, bottom resuspension, and naturally occurring phytoplankton and detritus.

The stormwater plume was most concentrated in the surface layer.

Understanding the dispersion and fate of stormwater plumes is a complex task. The distribution of dissolved components such as nutrients and small particles is dependent upon the amount of rainfall, the coastal currents, and the winds, which can drive currents and cause vertical mixing (Figure 2). Large stormwater particles often have a different fate; they settle out of the low salinity plume, become incorporated into bottom sediments, and may be redistributed later by wave resuspension and transport. As the plume disperses, the components of stormwater mix with other sources of suspended particles, nutrients, and freshwater in the receiving water. These sources include bottom resuspension, phytoplankton growth, and wastewater discharge.

FIGURE 3



Vertical cross-shelf sections of the Ballona Creek discharge plume following a storm event in February, 1996. The maps shown were generated using a towyo system, which carried sensors for temperature, salinity, turbidity (beam attenuation), and plant biomass (chlorophyll fluorescence). The zigzag pattern on the temperature section indicates the path of the towyo. The stormwater plume is indicated by water with a salinity less than 33.0 practical salinity units (psu).

Stormwater plumes usually formed relatively thin layers at the surface of the ocean that are 2-10 m deep (Figure 3). The depth of penetration increased with time as winds mixed the upper layer vertically. The horizontal scales of the plumes studied in Santa Monica Bay were variable, with plumes extending from 1 to 6 miles cross-shelf (offshore) for storms of 1- to 2-year frequencies (0.8 to 4 in. of rainfall). During the February 19-21, 1996 storm (4 in. of rainfall), the plume spread approximately 4 miles offshore of Ballona Creek (Figure 4).

The speed and direction of coastal currents determine the cross-shelf scale of the plume. The Coriolis force (an apparent force that acts on oceans and lakes) also has an influence on the distribution of stormwater plumes. This force is due to the rotation of the earth and its motion through space, resulting in a tendency for currents to turn toward the right in the Northern Hemisphere. If the plume is carried to the north when it enters the ocean, it will be more likely to remain near the coast due to the influence of the Coriolis force.

The distribution of stormwater plumes along the coast depended upon the tidal variations in the currents, the presence of additional runoff sources, and the amount of runoff. Longshore distances of up to 6 miles were measured for plumes within Santa Monica Bay.

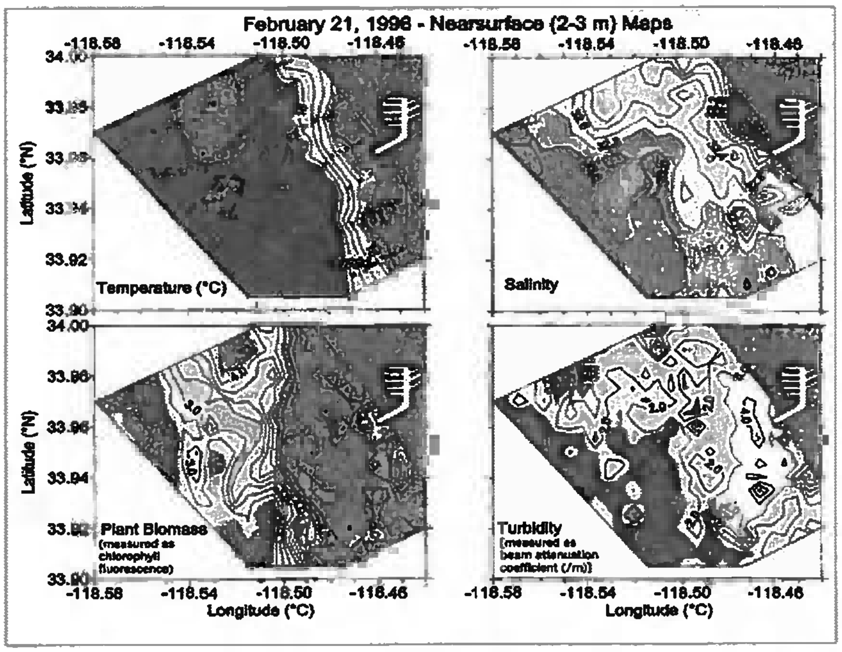
Stormwater plumes reduced surface water clarity and persisted for several days after a storm.

Spatial gradients in the dissolved and particulate components of the plume occurred as it was diluted through mixing with the receiving water. Although larger stormwater particles tended to settle out from the plume rapidly, smaller, lighter particles remained in suspension near the surface (Figures 3 and 4), where they can reduce the amount of light available for photosynthesis by marine plants. Measures of primary production were not part of this study, so adverse effects on phytoplankton in Santa Monica Bay resulting from turbid stormwater plumes were not determined.

The duration of stormwater plumes depends upon the rate of plume dispersion and particle sinking. Stormwater plumes were observed to persist in Santa Monica Bay for at least three days, even for the smallest storm sampled (0.8 in. rainfall). The maximum duration of stormwater plumes could not be assessed in this study because measurements did not extend more than three days after a storm.

High concentrations of the plant pigment chlorophyll were present in the surface layer during some storm events, indicating the presence of increased phytoplankton populations. Phytoplankton growth may have been stimulated by stormwater discharge due to the addition of nutrients to the surface layer, where light is readily available. Dense patches of phytoplankton were observed off of Malibu Creek on the boundary of stormwater plumes 1-2 days after rain events. Off of Ballona Creek, we observed increased phytoplankton in the plume even while a large proportion of suspended particulate material was still present in the surface water. The ecological effects of these changes in phytoplankton density were not determined in this study.

FIGURE 4



Near surface map of the February, 1996 stormwater plume from a 2-year storm off of Ballona Creek. The plume (surface water with a salinity less than 33.0 psu) extended approximately 4 miles offshore.

WATER COLUMN BIOLOGY

The initial and most concentrated exposure to stormwater occurs in the upper few meters of the water column. A diversity of organisms occupies this habitat, ranging from mobile fish and mammals to drifting microscopic plants and animals (plankton). Plankton have a relatively high potential to be affected by stormwater toxicants because they have a limited ability to avoid the plume and are often more sensitive to contaminants than larger animals. Changes in the abundance and type of plankton present can have important consequences for the marine ecosystem. This group of organisms constitutes the base of the food chain for most marine life, so changes in plankton numbers may affect populations of other species. The larvae of many fish and other animals such as sea urchins, clams, and shrimp occur in the plankton, providing the potential for diminished reproductive success if their survival is reduced by water column toxicity.

Water column effects were measured using toxicity tests.

Toxicity tests were used to determine whether stormwater plumes contained harmful concentrations of dissolved constituents. Surface water samples were collected offshore of the two study sites in conjunction with measurements of the plume characteristics so that the data could be related to the concentration of the stormwater discharge plume. Samples of stormwater collected from Ballona Creek were also measured for comparison. The toxicity tests used sensitive stages of marine species that occur in Southern California. Most samples were measured using the sea urchin fertilization test, in which the effect of the sample on the ability of sea urchin sperm to fertilize eggs is measured. Sea urchin sperm are highly sensitive to some types of dissolved metals. The fertilization test is appropriate for stormwater monitoring because it is rapid (40 min exposure) and uses an organism which spends a portion of its life cycle in the water column of Santa Monica Bay. All tests were adjusted to the appropriate salinity prior to exposure so only the effect of chemical constituents were evaluated.

Virtually every sample of Ballona Creek stormwater tested was toxic.

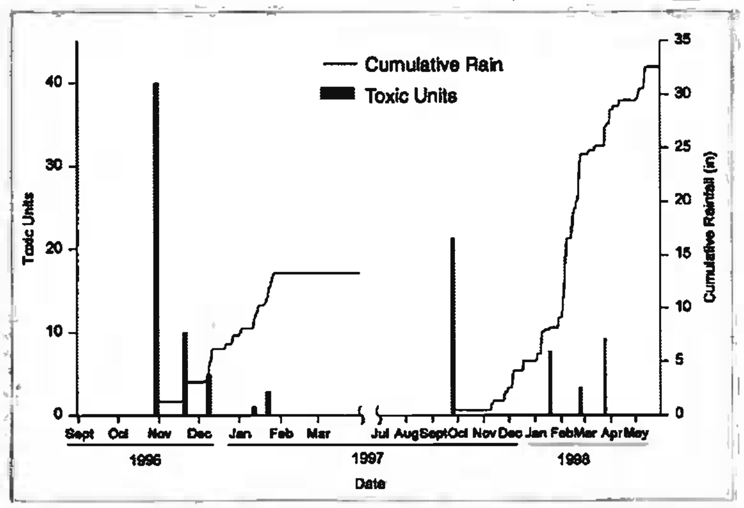
Undiluted samples of urban stormwater collected from drainage channels (before discharge into the ocean) usually contained toxic concentrations of constituents. Toxicity was detected in virtually every sample obtained from Ballona Creek and this toxicity was often present even after the sample was diluted 10-fold in the laboratory. The results indicated that even though a large portion of the constituents present in stormwater may be bound to particles, the dissolved concentrations of some materials are high enough to cause toxicity. Prior research by SCCWRP and others has detected toxicity in stormwater from other watersheds in Los Angeles, Orange, and San Diego Counties.

The first storms of the year produced the most toxic stormwater.

The results showed that time of year was an important variable influencing stormwater toxicity (Figure 5). Samples of Ballona Creek stormwater, obtained from the first storm of the season, were between two and ten times more toxic than samples from later storms. These data indicated that the first storms of the year provide the most concentrated inputs of toxicants to the environment.

Toxicity was frequently detected in surface water within the stormwater plume offshore of Ballona Creek, indicating that the initial dilution of stormwater discharge from this watershed was not sufficient to reduce the concentrations of stormwater toxicants below levels that are harmful to marine organisms. The magnitude of toxicity was greatest in the portion of the plume nearest the mouth of Ballona Creek (Figure 6), where the highest concentrations of stormwater were present. Within the plumes studied, toxicity was usually present whenever stormwater concentrations above 10% were present. The duration of toxicity in surface waters was not specifically addressed in this study, but can be expected to be determined by the rate of plume dispersion. In this study, toxicity was detected in surface water near the mouth of Ballona Creek two days after a storm event.

FIGURE 5

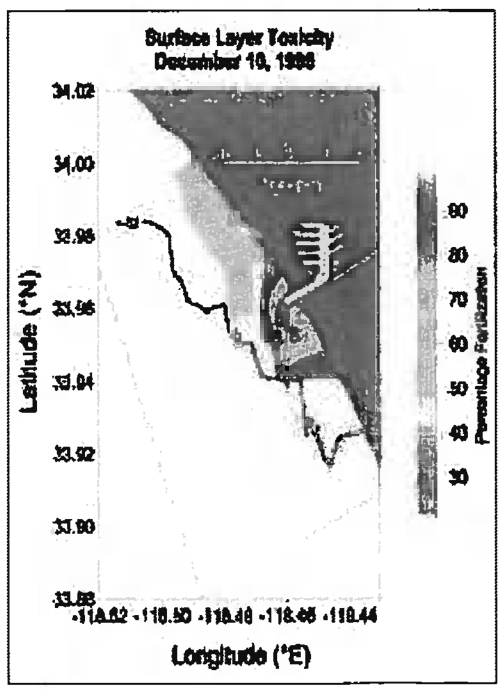


Seasonal changes in the toxicity of Ballona Creek stormwater over two storm seasons. Toxicity was measured using the sea urchin fertilization test. The greatest toxicity was observed in stormwater obtained from the first storm of each year.

Toxic portions of the stormwater plume were variable in size, extending from 1/4 to 2 miles offshore of Ballona Creek.

The spatial extent of surface water toxicity varied between storms, and was influenced by the amount of storm flow, the degree of toxicity of the stormwater, and the amount of mixing that occurred upon discharge. The greatest offshore extent of toxicity was measured following a storm on February 21, 1996, a two-year event, when toxicity was detected 2 miles offshore of Ballona Creek. For other storms, the toxic portion of the plume extended ¼-1 mile offshore. The distribution of toxicity along the shoreline was not determined in this study. The boundaries of stormwater plumes can be described using a number of parameters (i.e., salinity, turbidity, and toxicity) each with different thresholds of detection. Because a relatively high concentration of stormwater is

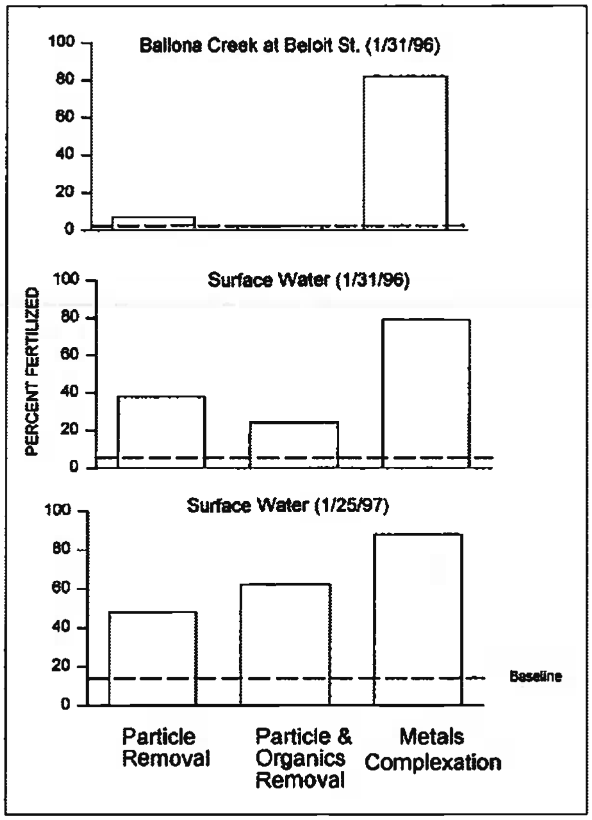
FIGURE 6



Map of surface layer toxicity (effect on sea urchin fertilization) from Ballona Creek stormwater discharge following a 2-year storm in December, 1996 (3.1 in. rainfall). Expected toxicity was calculated from measurements of salinity (indicates concentration of stormwater) and the concentration dose-response curve for the effects of stormwater on sea urchin fertilization. The greatest toxicity (lower fertilization percentage) was present closest to the point of discharge. The area of toxicity was smaller than the physical extent of the plume, as indicated by the solid line showing a salinity of 33 psu. This figure illustrates the relative size of the toxic portion of the plume for a single storm, but does not represent the largest plume offshore for other storms.

Surface water toxicity caused by unidentified sources was frequently encountered during dry weather.

FIGURE 7



Effect of toxicity identification evaluation treatments on the toxicity of Ballona Creek stormwater and two samples of surface water collected within the Ballona Creek discharge plume. Complexation of metals by addition of EDTA usually eliminated toxicity, as shown by the large increase in sea urchin fertilization above the untreated (baseline) value. Other treatments, removal of particles by filtration and removal of organic compounds, were of limited effectiveness. Similar results were found for other samples of stormwater and surface water.

needed to produce toxicity, the area of potential biological impact within a plume will be smaller than the region defined by physical characteristics such as salinity (Figure 6).

An unexpected result of this study was the detection of toxicity in receiving waters that appeared to be due to sources other than urban runoff. An average of 53% of the surface water samples collected offshore of Ballona and Malibu Creeks during periods of dry weather were found to be toxic. The location of the toxic samples was variable and there was no relationship between toxicity and the amount of freshwater in the samples, indicating that dry weather urban runoff was not the cause. Additional sources of receiving water toxicity were also indicated during the wet weather sampling, as some water samples were more toxic than could be accounted for by the amount of stormwater present.

The dry weather toxicity results suggest that factors other than stormwater discharge have a major influence on surface water quality in Santa Monica Bay. While the cause of dry weather toxicity was not determined, its frequent detection indicates that impaired surface water quality in Santa Monica Bay extends beyond the spatial and seasonal boundaries associated with stormwater discharge. Potential sources of dry weather toxicity include the deposition of contaminants from the atmosphere, biological events such as red tides, and inputs from boating activities.

Dissolved metals in stormwater were identified as important contributors to impaired water quality in Ballona Creek stormwater plumes. This conclusion was the result of experiments that combined chemical treatments designed to remove specific types of constituents in water samples with sea urchin toxicity tests, a process known as Toxicity Identification Evaluation (TIE). The toxicity of Ballona Creek stormwater and receiving water samples was usually eliminated when treatments were applied that neutralized toxic trace metals by complexation (Figure 7). Chemical analysis confirmed that dissolved concentrations of zinc, and occasionally copper, were at toxic levels in undiluted stormwater. The dissolved concentrations of other metals were below toxic levels for the sea urchin test. Measurements of receiving water also detected elevated concentrations of zinc (but not copper) in the stormwater plume offshore of Ballona Creek.

Chemical analysis were unable to attribute all of the toxicity measured to zinc and copper, indicating that additional constituents may contribute to the toxicity of stormwater discharged into Santa Monica Bay. The measured concentrations of zinc and copper in Ballona Creek stormwater were estimated to account for only 5-44% of the observed toxicity. Zinc concentrations in the toxic portion of the discharge plume were usually below levels shown to cause toxicity in the laboratory. The unaccounted-for toxicity may be due to synergistic interactions between toxic metals, variability in the chemical analysis, or the influence of other toxic chemicals, such as pesticides. Additional research is needed before these alternatives can be evaluated. TIE studies have not been completed for other stormwater discharges into the Bay, so we do not know if the pattern demonstrated for Ballona Creek is representative of other sites.

Zinc was the most important toxic constituent identified in stormwater. Copper and other unidentified constituents may also be responsible for some of the toxicity measured.

SEAFLOOR BIOLOGY

Much of the natural diversity and many of the commercially important species in the ocean occur on the seafloor. Clams and shrimp live in this environment, as well as worms and starfish, all of which serve as food for fish. This is also the location where stormwater particles, and associated contaminants, eventually settle. Unlike the water column, where a stormwater plume eventually mixes and disperses, the sediments on the seafloor can accumulate runoff inputs over an entire storm, over several storms, or over several seasons. These inputs can alter the seafloor biology by either changing the habitat, such as altering sediment grain size, or by the build-up of pollutants. The potential for impacts to seafloor organisms is great because they are not mobile and are therefore subjected to the accumulated stormwater inputs for long periods of time. Typically, these seafloor organisms are relatively sensitive and changes to the number or types of organisms may result in changes to fish populations.

The deposition of stormwater particles influences the physical and chemical characteristics of the seafloor.

We estimated impacts of stormwater runoff discharges on the seafloor by collecting samples from the ocean bottom between one and two weeks following large storm events, after the stormwater plumes had dispersed and particles had time to settle, and then again during dry weather. Seafloor samples were collected directly offshore of Ballona and Malibu Creeks at 75 ft. depth in the heart of the stormwater plumes, along intervals upcoast and downcoast representing gradients of plume impact, and then outside the area of the plume. The top 2 cm (< 1 inch) of these seafloor samples, which represented the most recent seafloor accumulations, were collected for contaminant analysis and toxicity testing. Sediment samples were analyzed for contaminants including trace metals, chlorinated hydrocarbons (DDTs and PCBs), and petroleum hydrocarbons (PAHs). The toxicity tests included survival of crustaceans (an amphipod) and sea urchins, fertilization success and development of sea urchin embryos, and bioaccumulation of contaminants from seafloor mud in adult sea urchins. A second sediment sample was collected, sieved through a fine mesh screen, and the organisms were enumerated to determine the abundance and diversity of the native seafloor fauna.

An increase in sediment constituents was present on the seafloor offshore Ballona Creek.

TABLE 1

		Sediment Concentration	
		Ballona Ck (n=8)	Malibu Ck (n=7)
Fines	% dry	31.6	$\boxed{53.1}$
TOC	% dry	0.594	$\boxed{0.963}$
Aluminum	µg/dry g	11492	$\boxed{17280}$
Arsenic	µg /dry g	5.1	5.6
Cadmium	µg /dry g	0.5	0.7
Chromium	µg /dry g	40.7	$\boxed{52.6}$
Copper	µg /dry g	12	13
Iron	µg /dry g	14997	$\boxed{21720}$
Lead	µg /dry g	$\boxed{26.1}$	10.3
Mercury	µg /dry g	$\boxed{0.18}$	0.08
Nickel	µg /dry g	14.29	$\boxed{27.76}$
Silver	µg /dry g	$\boxed{0.95}$	0.31
Zinc	µg /dry g	54	56
Total DDTs	ng/dry g	$\boxed{25.6}$	15.5
Total PCBs	ng/dry g	$\boxed{21.5}$	3.0
Total PAHs	ng/dry g	$\boxed{240.6}$	56.2

Average concentrations of sediment constituents offshore (75 ft. depth) of creek mouths in Santa Monica Bay following storm events between 1995 and 1997. Boxed numbers indicate significantly higher concentrations. Sediment offshore of the less urbanized watershed (Malibu Creek) had higher levels of naturally occurring constituents such as aluminum and iron. Higher concentrations of anthropogenic constituents such as lead and PAHs were present offshore of the more urbanized watershed (Ballona Creek).

Alterations to the seafloor habitat and sediment constituent concentrations had occurred offshore of the Ballona Creek watershed (Table 1). The sediments offshore of Malibu Creek generally had higher concentrations of naturally abundant constituents including fine-grained particles, organic carbon, and trace metals such as chromium. In contrast, the sediments offshore of Ballona Creek generally had higher concentrations of urban contaminants including common stormwater constituents such as lead and zinc, as well as other rarely detected constituents in routine stormwater monitoring programs, such as DDTs, PCBs, and PAHs. Moreover, sediments offshore of Ballona Creek showed evidence of stormwater impacts over a large area. Concentrations of copper, lead, zinc, DDTs, PCBs, and PAHs were highest directly offshore of the creek mouth and then decreased in both the upcoast and downcoast directions at distances up to 3 miles away (Figure 8). The increased sediment contamination was also observed more than 1 mile offshore, where water depths reached over 100 feet.

Biological communities offshore of Ballona Creek were similar to those offshore of Malibu Creek (Table 2). Both areas had comparable abundance and similar species composition. Seventeen of the 19 most commonly found taxa offshore of Ballona Creek were present offshore of Malibu Creek, and both watersheds had a low abundance of so-called "pollution indicator" organisms. Both areas had healthy benthic communities, as measured by the Benthic Response Index, which is a tool for assessing the relative importance of pollution indicator species at a site. Species richness and diversity were statistically higher near Malibu Creek than Ballona Creek.

Biological communities offshore of Ballona and Malibu Creeks were also similar to background reference conditions established in previous studies of Southern California (Table 2). The mean abundance, mean number of taxa per sample, and mean diversity at the creek sites were comparable to reference sites located in waters of similar depth, but distant from river and creek mouths. The present study was limited to the area offshore of the Ballona Creek jetty; previous studies by other scientists have shown impacts to benthic communities and the presence of pollution indicator organisms inside of the jetty (adjacent to Marina del Rey).

The seafloor biology results were consistent with the results from sediment toxicity tests. Seafloor sediments offshore of Ballona Creek did not kill amphipods or impair the fertilization success or normal embryo development of sea urchins. However, seafloor sediments were found to be a potential source of contaminants that bioaccumulate in seafloor organisms such as adult sea urchins. Concentrations of lead, DDTs, and PCBs were three to ten times higher in sea urchins exposed to sediments collected offshore of Ballona Creek than in sea urchins living on sediments from our reference location. While the effect of this bioaccumulation on the sea urchin is not known, it does represent a mechanism by which sediment- associated pollutants can enter the food chain and biomagnify within fish.

The fate of most stormwater constituents is unknown.

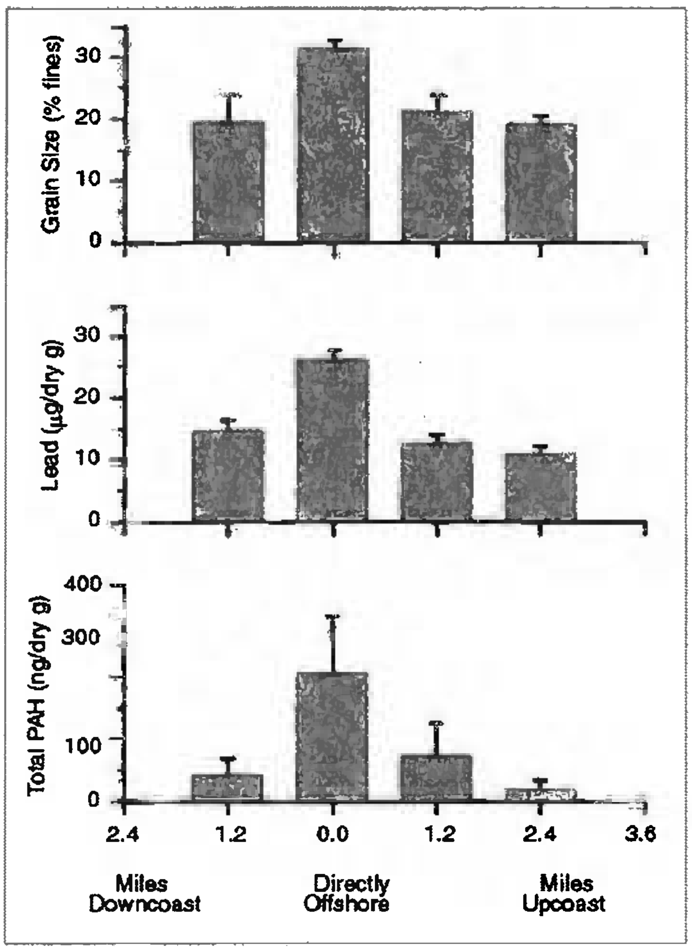
One significant finding of this study was that the fate of most stormwater constituents discharged to Santa Monica Bay is unknown. Although we documented the accumulation of contaminants on the seafloor offshore of Ballona Creek, these amounts were not permanent and represent only a fraction of the total mass emissions discharged. Further, reductions in constituent concentrations were observed at some locations that may have resulted from the resuspension and transport of sediments by waves and currents. Until the location where this material eventually settles is known, we cannot be certain that we have examined the seafloor areas having the greatest influence from stormwater or dry weather discharges. An additional concern is that constituents from other sources may have similar transport and fate mechanisms, producing enhanced impacts from the cumulative effects of multiple sources.

TABLE 2

	Ballona (n=8)	Malibu (n=7)	Reference (n=29)
Abundance (No. organisms/0.1 m²)	238 (±51)	316 (±55)	276 (±61)
No. Species (No. taxa/0.1 m²)	75 (±6)	91 (±8)	71 (±9)
Diversity (Shannon-Wiener H')	1.65 (±0.02)	1.73 (±0.04)	1.55 (±0.15)
Benthic Response Index (BRI units)	24.0 (±1.7)	1.65 (±0.7)	3.0 – 30.6

Biological community parameters offshore of a highly urbanized watershed (Ballona Creek), a less urbanized watershed (Malibu Creek), and other reference areas in near-coastal waters of Southern California at similar depths (30 to 75 feet). Values are the mean (±95% confidence limits).

FIGURE 8



Grain size and contaminant concentrations in surface sediments across the gradient of stormwater influence offshore of Ballona Creek. Sampling stations were located 1.5 miles offshore (75 ft. depth) and at various distances upcoast or downcoast of the creek. Each value represents the mean (±95% confidence interval) of eight samples, each collected after a storm event. The influence of stormwater particle deposition is shown by the elevated values directly offshore of Ballona Creek.

EFFECTS OF WATERSHED TYPE

The comparison of receiving water impacts from different watersheds is a powerful tool to distinguish between natural and man-made effects. Although the Ballona Creek and Malibu Creek watersheds are similar in size and discharge into the same body of water (Santa Monica Bay), they differ in their degree of urbanization (Figure 1). The measurement of similar parameters in each receiving water area provides the information needed to distinguish between natural processes and impairment due to man-made factors. This approach also identifies which monitoring methods are most useful for detecting man-made impacts.

Different impacts to Santa Monica Bay were produced by an urbanized and an unurbanized watershed.

The characteristics and impacts of stormwater from the Ballona Creek and Malibu Creek watersheds were found to differ in a number of respects (Table 3). The impacts observed were the result of the interaction of three key factors: land use, flow characteristics, and receiving water conditions. Receiving water impacts were less near Malibu Creek and were related to the discharge of less toxic stormwater and lower peak flows.

Ballona Creek watershed is highly urbanized. Stormwater entering the concrete channel is rapidly transported to the ocean, with little opportunity for dilution.

Malibu Creek drains a mostly undeveloped watershed. Stormwater flow and particle inputs into the ocean are moderated by the presence of a natural creekbed and coastal lagoon.

TABLE 3

	Ballona Creek	Malibu Creek
Watershed Characteristics	The largest watershed draining to Santa Monica Bay, 83% of its 130 square miles is developed. The principal land use is residential.	Similar in size to Ballona Creek (110 square miles), 88% of this watershed is undeveloped.
Flow Characteristics	The largely impermeable surface area (41% overall) and concrete channel drainage system results in rapid changes in flow following rainfall. Peak flows are relatively high and of shorter duration compared to other areas.	More permeable surface area (96% overall) absorbs early season rainfall and increases lag time between rainfall and peak flow. Discharges have relatively lower peak flows but duration can be days longer than concrete channelized systems. Discharge into Malibu Lagoon may reduce flows and particle loads to ocean.
Plume Characteristics	The stormwater plume in both areas consisted of a thin buoyant layer of low salinity water floating at the surface. The dissolved and particulate components of stormwater were most concentrated in the upper 2 m of the water column. Plumes extended up to 6 miles offshore and were widely distributed along the shore.	
	Higher flows and less mixing produced well-defined plumes that contained higher concentrations of stormwater near Ballona Creek.	Lower flows, more mixing, and discharges from adjacent canyons resulted in more complex and ill-defined plume boundaries near Malibu Creek.
Debris	Floating debris was often concentrated near the margins of the plume and contained many items of man-made origin, such as plastic.	Floating debris was dominated by organic materials of natural origin, such as twigs and charred wood.
Water Clarity	Less mixing of stormwater usually produced larger areas of reduced water clarity.	Stormwater inputs were often more turbid, but lower flows and greater dilution near the mouth resulted in better clarity.
Stormwater Toxicity	Samples from the creek were always toxic to sea urchins. Concentrations higher than 10% stormwater usually produced adverse effects in laboratory tests.	Samples were less toxic than Ballona Creek stormwater and occasionally nontoxic. High concentrations (>25%) usually needed to produce toxicity.

Characteristics of a highly urbanized watershed (Ballona Creek) and a less urbanized watershed (Malibu Creek) adjacent to Santa Monica Bay, California.

TABLE 3 Continued

	Ballona Creek	Malibu Creek
Receiving Water Toxicity	Surface water in most concentrated portion of plume was often toxic to sea urchins. Toxicity was detected in receiving waters up to 2 miles from discharge.	Toxicity in water column was rarely present and was not related to plume concentration.
Cause of Toxicity	Zinc is responsible for a portion of the stormwater toxicity. The influence of pesticides and other organics is uncertain.	Metals are implicated but have not been confirmed as important toxicants.
Seafloor Habitat	Sediments were higher in urban stormwater associated contaminants, such as lead and zinc.	Higher concentrations of constituents were derived from natural sources, such as fine sediments and organic carbon.
Sediment Toxicity	Changes in sediment toxicity were minor and not related to stormwater discharges.	
Seafloor Biological Communities	Biological communities were similar among Malibu Creek, Ballona Creek, and background reference sites.	

RECOMMENDATIONS FOR FUTURE STUDIES

The Santa Monica Bay Receiving Waters Study produced the first integrated assessment of impacts from stormwater discharges into the Bay. The presence of well-developed plumes containing toxic materials demonstrates the need for continued studies of the impacts from urban stormwater runoff in Santa Monica Bay and elsewhere. Additional information regarding the sources, characteristics, and extent of the receiving water impacts should be determined in order to refine management actions.

A high priority should be placed upon locating sources of toxicity and contamination within the Ballona Creek watershed. Identification of the land uses or regions of the watershed that contribute most to the impacts will enable management actions to be targeted where they will have the greatest beneficial impact. Source identification studies should include sampling of systems tributary to Ballona Creek for measurement of toxicity and chemical constituents.

Additional receiving water studies are recommended for Santa Monica Bay to provide a more complete understanding of the nature and magnitude of stormwater impacts. Future studies should include constituents of concern that were not emphasized in this study, such as bacteria, nutrients, pesticides, and trash. These constituents should be incorporated into studies of plume persistence, cause of toxicity, and constituent fate.

Information on the duration, size, and cause of adverse impacts is needed to identify appropriate stormwater management actions.

Plume persistence information is needed to estimate the duration of exposure of: 1) swimmers to bacteria and 2) marine life to stormwater toxicants and nutrients. Improved information on plume persistence can be obtained by the use of moored sensors in the discharge area in combination with data from remote sensing instruments (e.g., satellites). A goal of these studies should be to develop plume dilution and/or tracking models of plume duration and magnitude. This information is valuable because different management responses may be appropriate for stormwater discharges that produce short- versus long-lived impacts.

A suite of species should be used to identify toxicants in stormwater.

Toxicity testing using multiple marine species is also needed to provide a more complete assessment of the causes of toxicity in stormwater discharged into Santa Monica Bay. Identification of zinc and copper as contaminants of concern was based primarily on studies with a single species (sea urchin). Because different species vary in their sensitivity to contaminants, tests with multiple species are needed to determine if other contaminants are present at toxic concentrations. Tests with crustaceans (e.g., shrimp) are especially recommended as they are likely to be sensitive to pesticides such as diazinon and chlorpyrifos, which have been found to be important factors in the toxicity of stormwater from other watersheds. These tests should include toxicity identification procedures so that potential constituents of concern (e.g., metals and pesticides) can be confirmed and others can be discounted. Toxicant identification is needed to prioritize chemical-specific management actions.

The fate of stormwater particles must be determined in order to assess seafloor impacts.

Chemical and oceanographic studies are needed to determine the fate of stormwater particles discharged into Santa Monica Bay. Although some of the particles in Santa Monica Bay stormwater plumes may be deposited near the mouth of an urban watershed, they do not necessarily persist there for long periods of time. Since the spatial extent of particle dispersal in Santa Monica Bay was not determined, there may be areas of significant accumulation that were not investigated. Studies of currents, sediment resuspension, and sediment transport, coupled with chemical source identification methods, should be conducted to determine whether stormwater discharge is a significant source of adverse sediment contamination within Santa Monica Bay. This information is needed to identify areas of the seafloor with the greatest potential for biological impacts from stormwater discharge.

Additional receiving water systems should be studied to identify impairments from other watersheds.

The impacts of stormwater runoff on other receiving water systems should also be studied. This is because differences in watershed size and land use patterns will likely result in different levels of risk to the receiving water beneficial uses. For example, changes in land use may contribute different toxicants, and changes in watershed size will influence the magnitude of the toxicant input. The nature of the receiving water environment is also important. Semi-enclosed water bodies, such as most bays and harbors, do not have the mixing and dilution capacity of the open coastal environment studied in Santa Monica Bay. The potential for impairment will be greater in these areas because organisms will have an increased exposure to the stormwater plume and more stormwater particles will settle nearby and influence sediment quality. Until the effects of variations in watershed or receiving water characteristics can be accurately predicted, additional integrated studies will be necessary to assess impacts to receiving waters in other areas.

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