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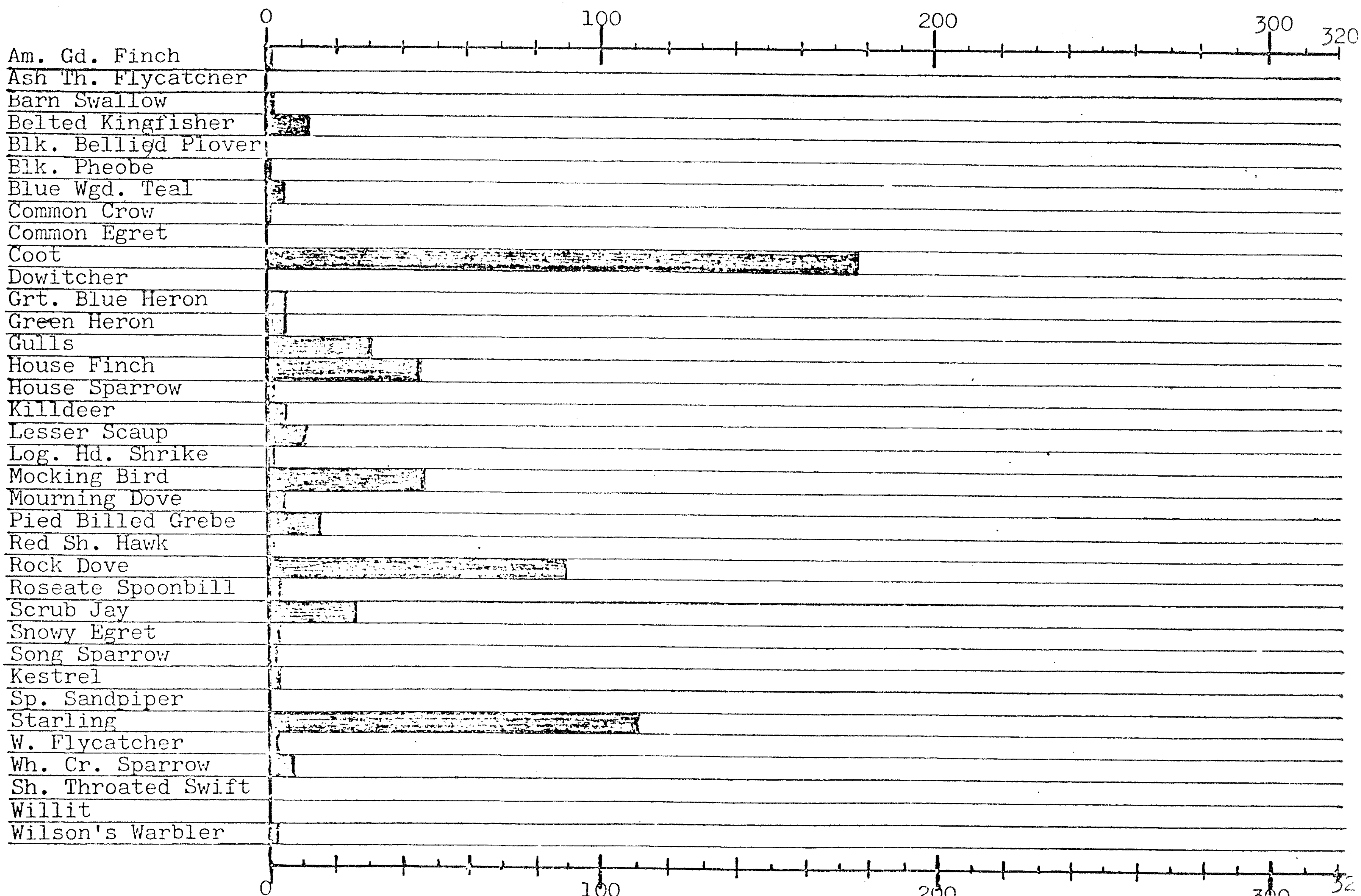


FIGURE 1 BIRDS OBSERVED IN THE MORNING - AVERAGE NUMBER

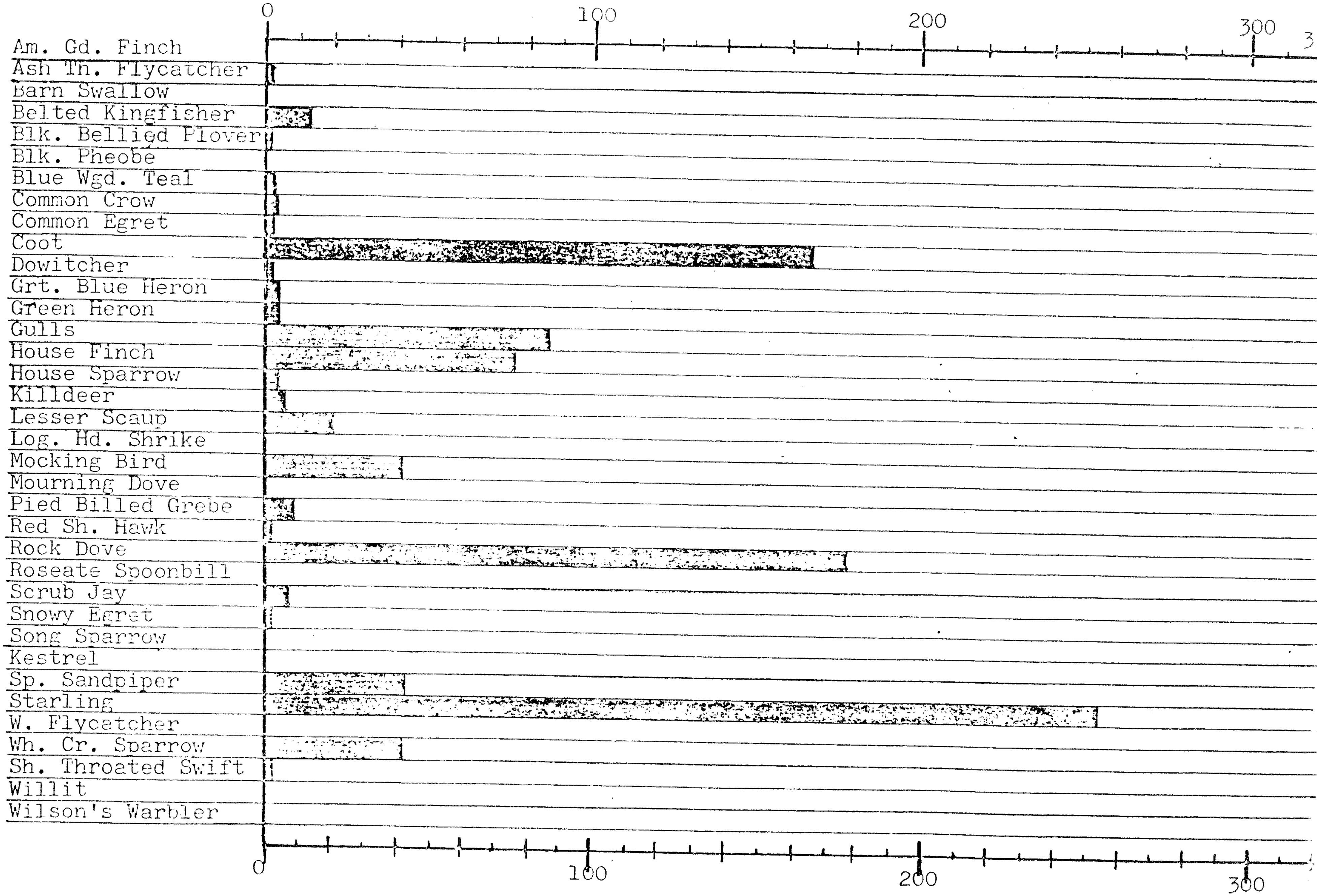


FIGURE 2 BIRDS OBSERVED IN THE AFTERNOON - AVERAGE NUMBER

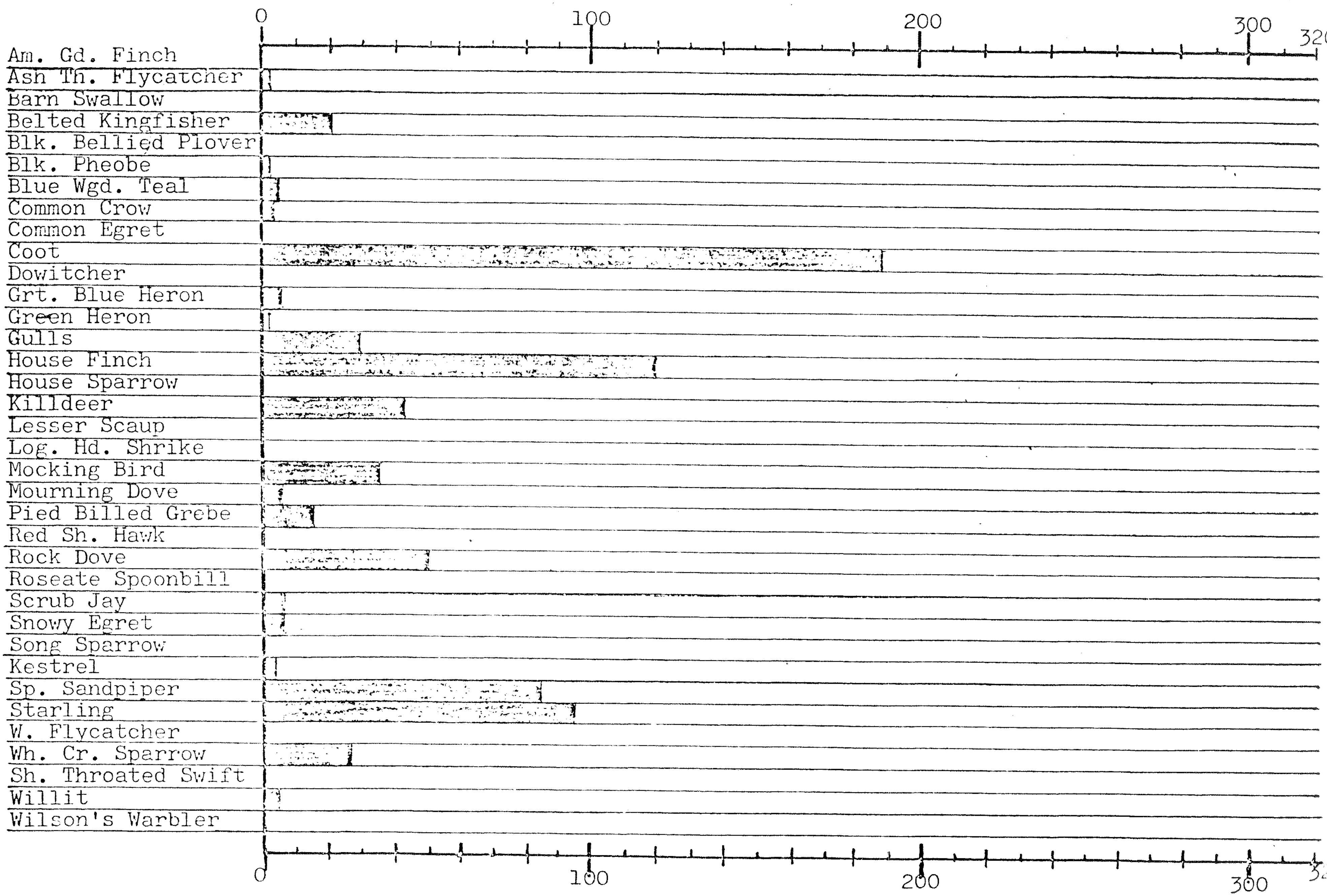


FIGURE 3 BIRDS OBSERVED IN THE EVENING - AVERAGE NUMBER

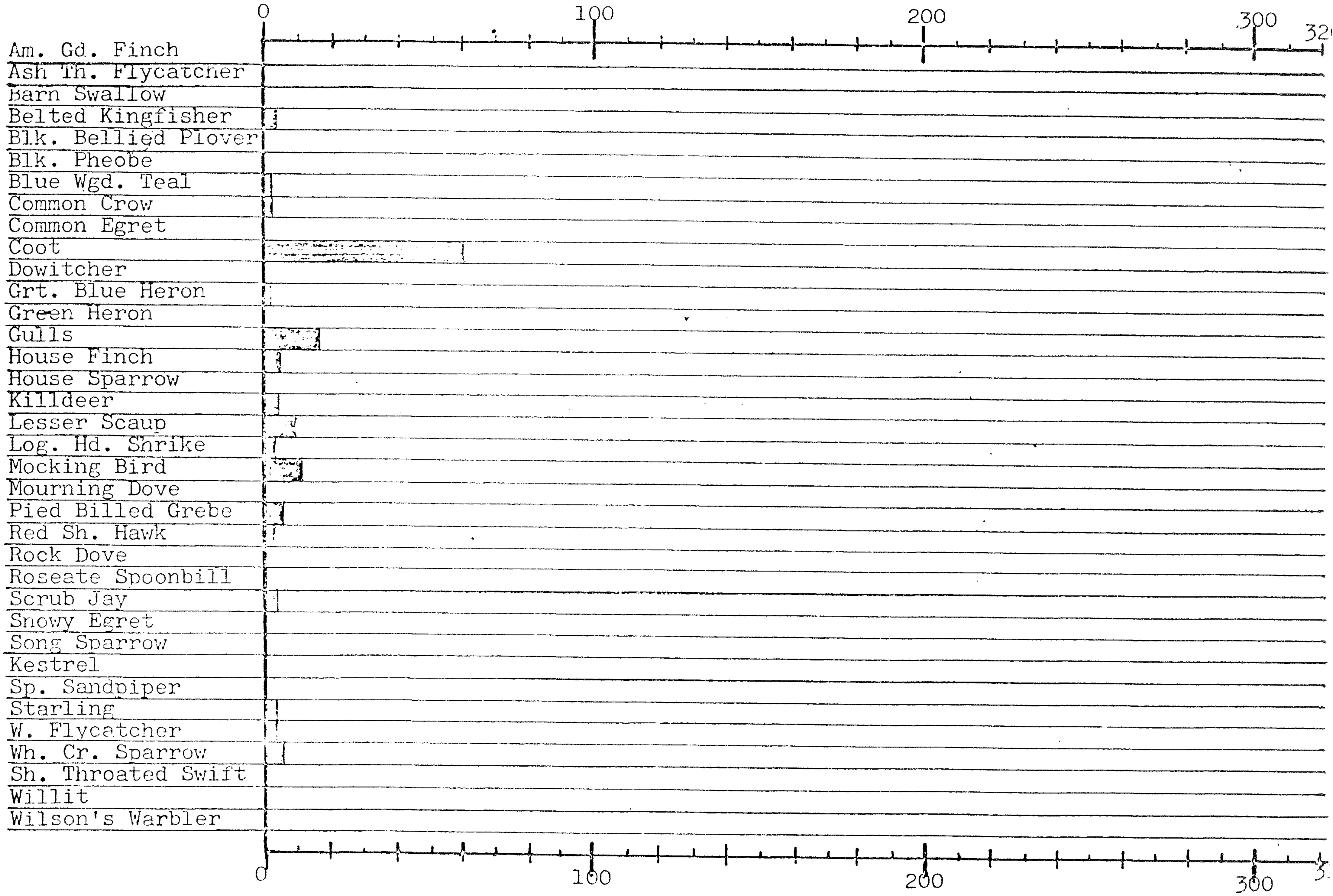
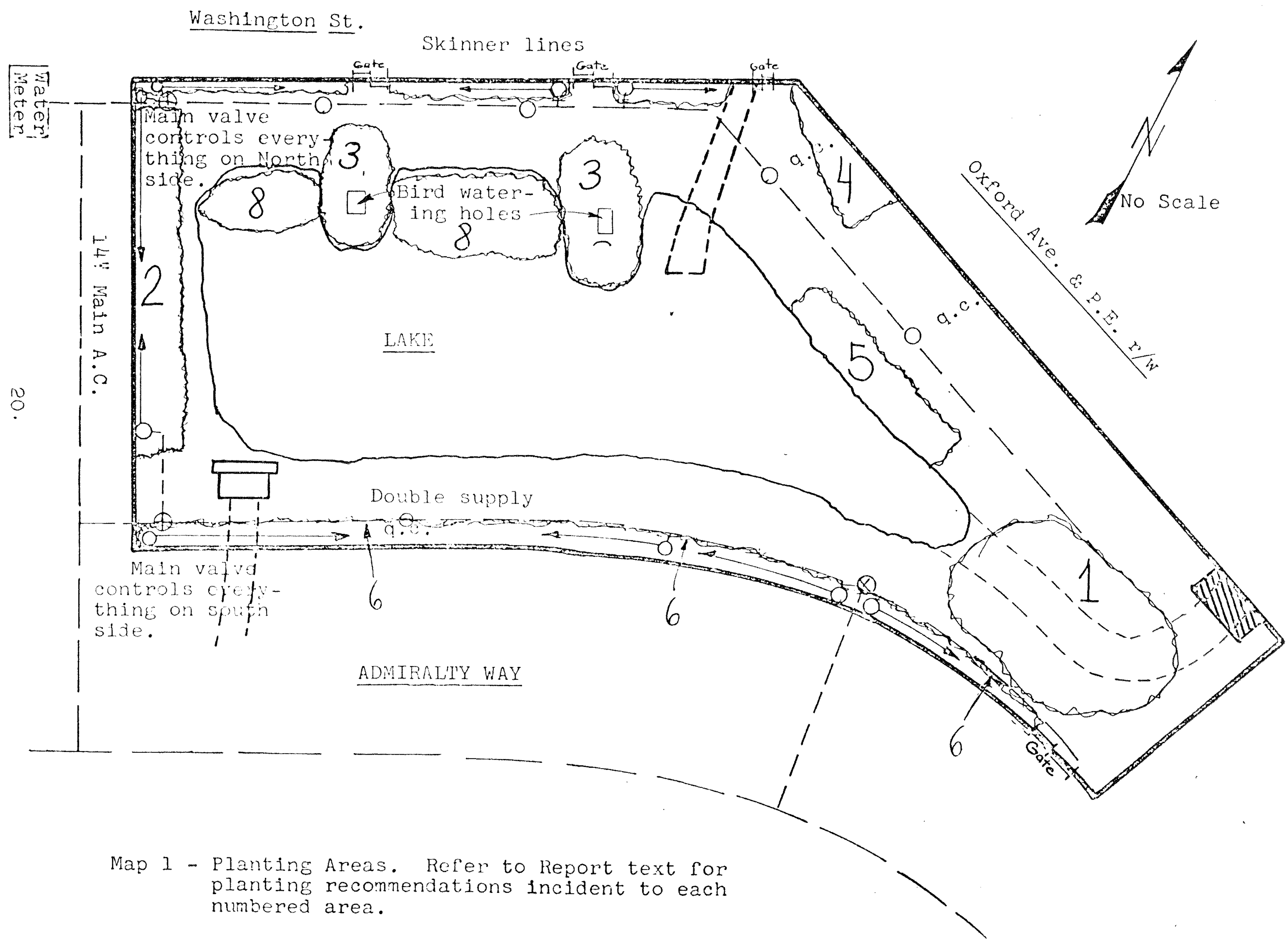


FIGURE 4 BIRDS OBSERVED ON RAINY DAYS - AVERAGE NUMBER



Map 1 - Planting Areas. Refer to Report text for planting recommendations incident to each numbered area.

ATTACHMENT E: JURISDICTIONAL DELINEATION

Wetland Delineation of the
Oxford Basin
Marina Del Rey, Los Angeles County, California

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October 1, 2010

1.0 INTRODUCTION

1.1 Site Description

Oxford Retention Basin (Oxford Basin) is located in the Marina Del Rey Harbor, Los Angeles County, California. It is located approximately 1 mile east of Venice Beach, and 600 feet north of the Marina del Rey Harbor (Figure 1-1). It is south of Washington Boulevard, north of Admiralty Way, east of an existing public parking lot, and west of Yvonne B. Burke park (Figure 1-2). The property occurs on the Venice 7.5' U.S.G.S. topographic map and is generally located at the following UTM coordinates: 11S 03 65 584m E × 37 61 458mN. Oxford Basin occurs in an area that was historically part of the Venice Marshes (see Appendix A).

Water flows into Oxford Basin from culverts beneath Washington Boulevards and Admiralty Way, and from a pump station at the eastern end of the basin. There is also a tidal gate at the southwest corner of the basin, which connects with the end of Basin E in Marina del Rey Harbor. This gate allows for tidal fluctuations to occur in the Basin and the drainage of flood flows that come into Oxford Basin from the surrounding neighborhood. Recently, low flows (urban runoff) from Admiralty Way culvert were diverted out of Oxford Basin, through a low flow diversion structure that was developed to improve Oxford Basin's water quality.

The presence of the tidal gate means that the tidal prism within the basin (the volume of water in the basin between mean high tide and mean low tide, or the volume of water leaving the basin at ebb tide) does not completely correspond to the tidal fluctuations that occur within Marina del Rey Harbor. In addition, the gates may be closed and the basin pumped out before the rainfall events, so the tidal fluctuations may be interrupted for short periods during the winter months or for various operations conducted within the basin during other seasons of the year. In general, the basin maintains tidal fluctuations for most of the year, and the levels of the tidal prism define the locality of wetlands found within Oxford Basin.

This wetland delineation was completed as part of advanced planning by the County Department of Public Works, which seeks to increase Oxford Basin's effectiveness as a flood control facility and to improve its aesthetics and passive recreation opportunities.

Figure 1-1. Oxford Basin is located on the northern boundary of Marina del Rey, Los Angeles County, California.

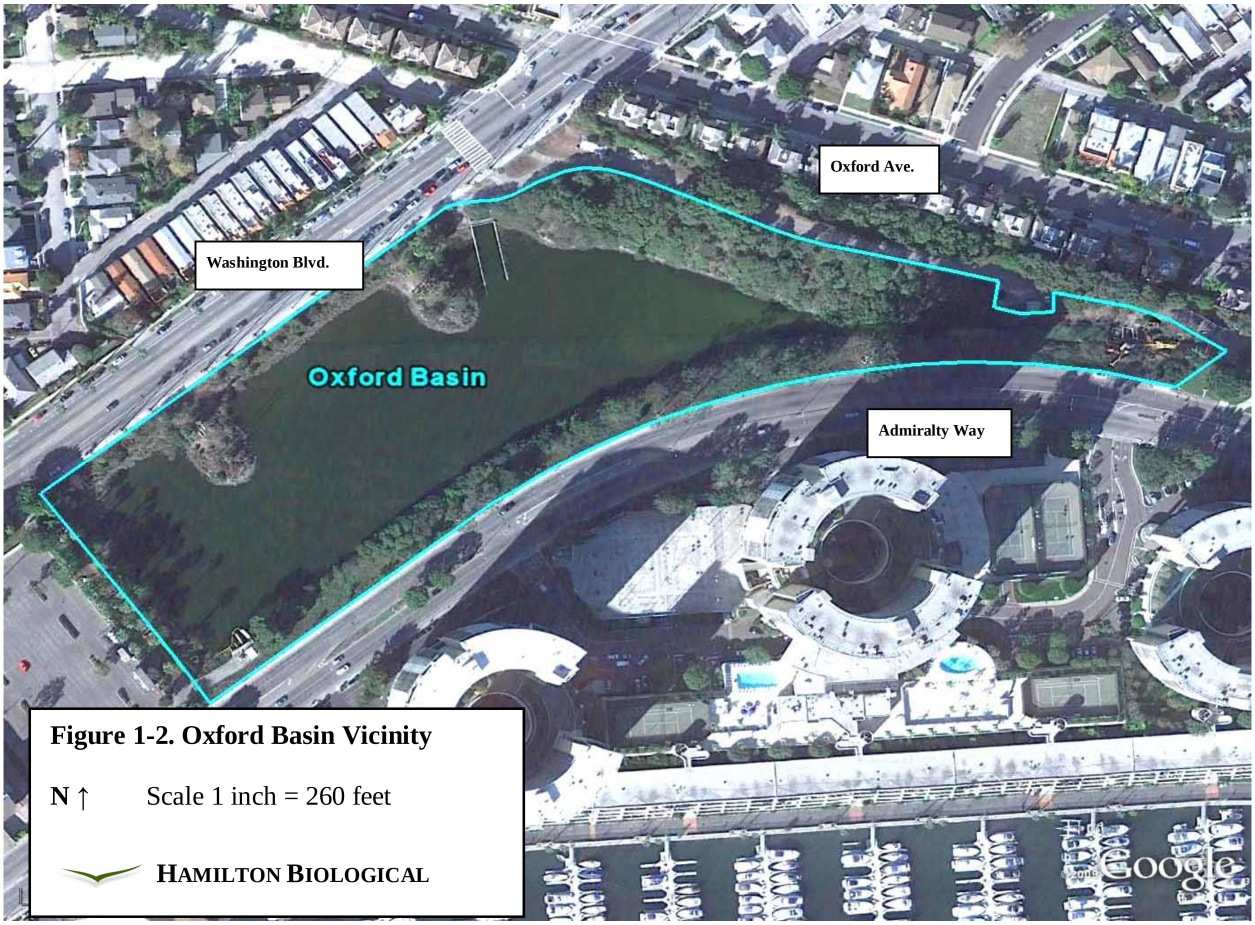


Figure 1-2. Oxford Basin is bounded on the north by Washington Boulevard and Oxford Avenue, and on the south by Admiralty Way.

1.2 Regulatory Overview

1.2.1 U.S. Army Corps of Engineers (Corps)

1.2.1.1 Clean Water Act

The Corps regulates discharges of dredged or fill material into Waters of the United States under the provisions of Section 404 of the Clean Water Act. Waters of the United States (Waters) includes wetlands and nonwetland habitats, including oceans, bays, ponds, lakes, rivers, and streams, which may be used for interstate commerce. It also includes tidal areas, mudflats, sandflats, tributaries of Waters, along with wetland and adjacent wetland areas. Wetlands are a type of the Waters of the United States, and are defined as those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, under normal circumstances, a prevalence of vegetation adapted to saturated soil conditions.

The determination of those wetland sites under the Corps jurisdiction is determined by the presence of wetland vegetation, hydric soils, and suitable hydrology, using the methodology defined in the arid west region supplement to the 1987 Corps wetland delineation manual (Wetland Training Institute 1991, U. S. Army Corps of Engineers 2008).

1.2.1.2 Rivers and Harbors Act (Section 10)

The Corps also regulates any obstruction or alteration to Navigable Waters of the United States. The jurisdiction for these Waters extends to the high tide line, including spring high tides or other high tides that occur with regular frequency, and to the ordinary high water mark in non tidal waters. Navigable Waters are typically within the same boundaries as the Waters of the United States, but wetlands are not typically found within Navigable Waters, with the exception of some tidal marshes.

1.2.2 California Coastal Commission

The California Coastal Commission regulates the filling, dredging or diking of wetlands within the coastal zone. Generally the 1981 Statewide interpretive guidelines for wetlands and other wet environmentally sensitive habitats are used to determine the presence of wetlands within the coastal zone. These guidelines provide a definition of a wetland and note that the presence of hydrophytes and/or hydric soils are useful to identify wetlands, but that the Commission will take into account all relevant information in making wetland determinations. Typically, a single wetland parameter is all that is required to define a wetland under these guidelines.

The Coastal Commission (1981) considers most wetlands to be Environmentally Sensitive Habitat Areas (ESHAs), but man-made flood-control facilities like Oxford Basin are not typically called out as ESHAs; no ESHAs are identified in the Marina Del Rey Local Coastal Plan (County of Los Angeles 1996).

1.2.3 Regional Water Quality Control Board (RWQCB)

The RWQCB is responsible for implementing Section 401 of the Clean Water Act, which typically refers to the same jurisdictional area recognized by the Corps. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit system controls potential water pollution by regulating point sources that discharge into Waters of the United States. The RWQCB is also responsible for regulatory waste discharge under the Porter-Cologne Act.

Currently, the County of Los Angeles has a NPDES permit for the discharge of storm waters into the ocean. The RWQCB is currently under a federal consent decree for developing targeted compliance for storm water pollutants. In Marina Del Rey Harbor, this includes a targets for complying with total maximum daily loads (TMDL) of bacteria in dry and wet conditions (effective as of March 2004) and TMDL of toxic materials (effective as of 18 March 2006).

1.2.4 California Department of Fish and Game (CDFG)

Sections 1600–1603 of the California Fish and Game Code empower CDFG to issue agreements that regulate the alteration of any river, stream, or lake, where fish and wildlife resources may be affected. Jurisdictional determination of wetlands are not generally conducted for CDFG agreements, since the boundary of the jurisdictional area is generally the banks of the stream or shoreline of the lake. However, CDFG also extends jurisdiction to the riparian habitat along the stream course, or along the lake shore, so the jurisdictional area can extend beyond the bank or shoreline and beyond the defined Corps jurisdictional wetland areas.

2.0 METHODOLOGY

An initial step was to conduct a literature review on the current regulations, information on the wetland parameters, and any documentation on the distribution of wetlands in the study area. This included the procedural information in the arid lands supplement (Corps 2008) along with the 1987 Corps wetland delineation manual (Wetland Training Institute 1991), and regulatory information on the Corps jurisdiction of Waters of the U.S. (Cylinder 1995, 2004).

Background information on the three wetland parameters in the area were evaluated for this project. There were no published soil surveys for this portion of Los Angeles County and information on the distribution of soils in this area is not generally available. Descriptions of the plant communities and species within the Basin have recently been developed by Bramlet (2010).

Current National Wetlands Inventory maps (U.S. Fish and Wildlife Service 2010) were reviewed to evaluate any previous description of the wetlands within this facility. The inventory erroneously mapped Oxford Basin as "palustrine wetlands" (referring to freshwater marshes or bogs), apparently assuming no tidal connection to the harbor.

The Local Coastal Plan for Marina del Rey (County of Los Angeles 1996) and associated information from the California Coastal Commission (2002) were also examined for this study, principally to determine any special status or conditions on the Oxford Basin that is noted within the LCP for this area.

Reviews of historic topographic maps and older aerial photos were conducted to determine the potential vegetation types occurring on the project site, before construction of the Basin. Reviews of historic topographic maps (USGS 1924, 1934, 1942) and aerial photos from 1952 and 1972 (www. historicaerials.com) were conducted to establish the previous land use and possibly historical vegetation within the area of the Basin (see Appendix A).

During January, March, April and May of 2010, surveys were conducted throughout the fenced area around the Basin in order (1) to document and catalog the plant species occurring in this area, and (2) to map and describe the plant communities present in this area (Bramlet 2010).

The wetland delineation was conducted on 12 June 2010 by David Bramlet and Rick Riefner. The study employed the three-criteria delineation methodology currently defined by the arid lands supplement. Please refer to Appendix B for the wetland determination field forms and a map of the sample sites.

At each sample site a soil pit was dug, soils were examined, hydrologic indicators were evaluated, and an assessment of each plant species layer was conducted. Samples consisted of a single sampling locality if the wetland boundary was clearly definable, or a series of two or more sampling localities in areas where further evaluation was required to determine the Corps jurisdictional boundaries. The location of each sample site was recorded on an aerial photo of the site and also documented using a Garmin 60 CSX GPS receiver.

The Corps jurisdiction boundaries, along with the California Coastal Commission wetland boundaries, were delineated on an aerial photo at scale 1 inch equals 100 feet. On this photo, vegetative canopy obscured the rather narrow bands of wetland vegetation in some parts of the Basin, and in those areas the mapping of wetland boundaries were estimated in the field. As the wetlands in these areas occur in a narrow, regular band along the edge of the Basin, their boundaries could be estimated in the field with no substantial loss of accuracy.

The wetland status of the plant species at each sampling point generally follows the *National List of Plant Species that Occur in Wetlands: California (Region O)* (Reed 1988). However, since some species are not included in the 1988 list, the draft 1996 list of *Vascular Species that Occur in Wetlands* (USFWS 1996) was used to provide the information on the wetland status of these plants in California. The indicator status for wetlands plants includes: Obligate wetland plants (Obl) – Plants that occur almost always in wetlands (>99%), under natural conditions; Facultative wetland plants (FacW) – Plants that usually occur in wetlands (67-99%), but also occur in nonwetlands; Facultative plants (Fac) – plants with a similar likely hood of occurring

(33-67%) in wetlands as nonwetlands; Facultative Upland plants (FacUp) – Plants that sometimes occur in wetlands (1-33%), but occur more often in uplands; and Upland plants (Up) – Plants that occur almost never in wetlands (< 1%).

3.0 RESULTS

3.1 Introduction

The field surveys resulted in delineation of Corps jurisdictional wetlands, Waters of the United States, and Coastal Commission wetlands within Oxford Basin. The extent of the jurisdictional wetlands found on the project site is depicted in Figures 3-1b and 3-1b. Following these figures are descriptions of the jurisdictional wetlands and Waters found on the project site, and documentation of the historic wetland conditions for the general locality of Oxford Basin. Photos of some of the wetlands found on the project site are located in Appendix C.

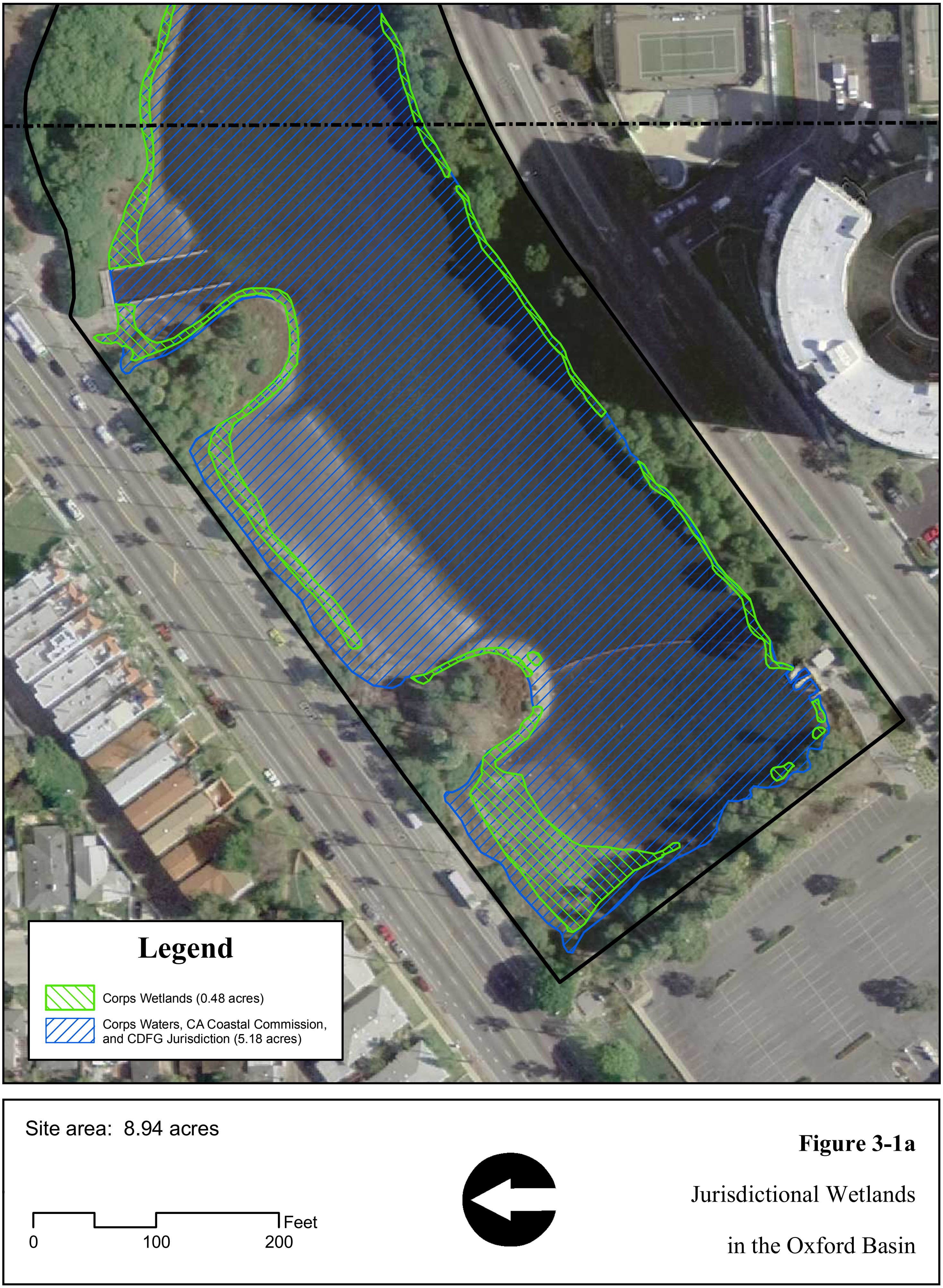
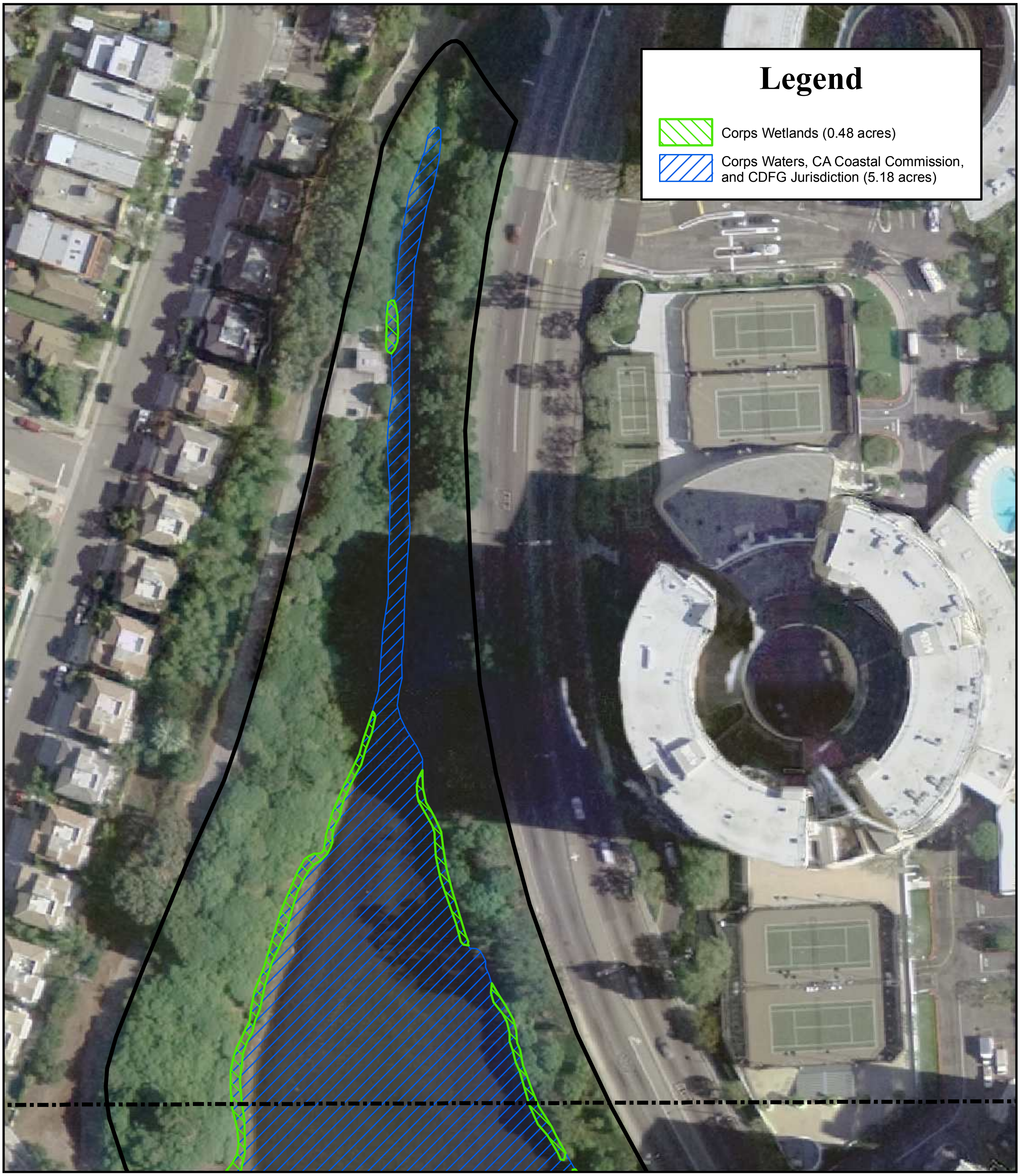


Figure 3-1a

Jurisdictional Wetlands

in the Oxford Basin



Site area: 8.94 acres

0 100 200 Feet

Figure 3-1b

Jurisdictional Wetlands

in the Oxford Basin

3.2 Corps of Engineers Jurisdictional Wetlands and Waters of the United States

3.2.1 Historical Conditions

An assessment of historical conditions at the current Oxford Basin was conducted involving review of historic topographic maps and aerial photographs (see Appendix A). This review shows that Oxford Basin was originally part of the greater Ballona Marsh.

A 1942 topographic map (USGS 1942) shows structures in the area of the marsh adjacent to Basin's current location. It is likely that the marshlands in this area were drained during this period.

During the early 1950s, the current Basin location was generally disturbed and apparently was part of a landfill site. An aerial photograph from 1952 shows that the marsh had been drained in the Basin's current location. Some structures and remnants of vegetation are visible in this photo.

The Basin, in its current form, was constructed starting in 1960 (County of Los Angeles Dept. of Small Craft Harbors 1976).

3.2.2 Wetlands

3.2.2.1 Soils

No information on the soils in the Oxford Basin study area was located in the literature review for this study. The Natural Resources Conservation Service did not publish a soil survey for this area of Los Angeles County. A study by Glenn Lukos Associates (2006) mentioned a published soil map for the region, but this could not be located in the material examined for this project.

Overall, the soils in the areas above the Basin tend to be sandy loams, commonly observed in southern California. The Basin itself has been filled with a silty clay and areas of loamy sands.

The observations from the soil pits, conducted at each sample point, noted strong indicators of hydric soils within the tidal zone. These included extensive mottling, low chroma, stratified layers, and gleyed matrix within these soils. Depleted matrix conditions with oxidized rhizospheres or less extensive mottling, along with some low chroma soils, were observed in the soils found near the margin of the mean high tide elevation. Hydric soils were not found in areas that apparently are inundated by occasional very high tides or winter flooding events, as evidenced by drift deposits.

3.2.2.2 Hydrology

The hydrology in Oxford Basin was clearly defined, due to the trash and debris in the basin, which provided well defined drift lines within the study area. Extremely high tides and storm events had left higher drift lines of debris, but these were clearly older, and did not correspond with soil mottling, water marks or other indicators of wetland hydrology.

In general, what is assumed to be the high tide elevation defines the extent of the wetland hydrology within Oxford Basin. This generally correspond with the observed hydric soil indicators, described previously. It generally appears that tidal fluctuations within the basin, as mediated by operation of the tide-gates, represent the predominant factor for the wetland hydrology, rather than the periodic floods that inundate the Basin for short periods.

3.2.2.3 Vegetation

The plant communities found within Oxford Basin were described by Bramlet (2010). The wetland vegetation found within this study consisted of the Salicornia marsh and "beach" communities/mapping unit found within the Basin. The predominant wetland species is the common woody pickleweed (*Salicornia virginica*), Obl (see page 10 for an explanation of the wetland indicator status for these plant species), which forms a "ring" of vegetation along the lower edge of the basin and ranges from 6 to 22 feet wide. At least one of the mapped "beach" areas has sufficient cover of common woody pickleweed seedlings to meet the criteria for hydrophytic vegetation. Other species found the designated hydrophytic vegetation of the Salicornia marsh included: rabbit's foot grass (*Polypogon monspeliensis*), FacW; saltmarsh sand spurry (*Spergularia marina*) Obl; spearscale (*Atriplex prostrata*), FacW; and, uncommonly, yellow sweet clover (*Melilotus indicus*) Fac. At least one disturbed wetland site also had hydrophytic vegetation and this locality contained water bentgrass (*Agrostis viridis*) Obl; crab grass (*Digitaria sanguinalis*) FacUp; Mexican fan palm seedlings (*Washingtonia robusta*) FacW; salt marsh sand spurry; yellow sweet clover; and Boccone's sand spurry (*Spergularia bocconei*) Fac.

3.2.3 Waters of the United States

Within Oxford Basin, Corps jurisdiction over Waters of the United States extends as high as the mean "high tide" line. This designation includes wetland areas that lack of one or more of the three wetland parameters, such as "beach" areas or exposed tidal flat areas, which are often exposed in the Basin, and tidal flats that are generally inundated and exposed on a daily basis. Depending on the slope of the Basin, Waters of the United States extended from zero to 16 feet above the delineated Corps wetland areas. Along much of the Basin's north shore, Waters of the United States extend 6–8 feet above the areas delineated as Corps wetlands.

3.3 California Coastal Commission Wetlands

In Oxford Basin, wetlands satisfying the one-parameter methodology of the California Coastal Commission extend to mean "high tide" line. These wetland areas had hydric soils and wetland hydrology, but were generally dominated by Perez's sea lavender (*Limonium perezii*). Since this species was considered a Facultative upland species, these localities were not determined to have hydrophytic vegetation. Therefore these areas were not delineated as jurisdictional wetlands under the Corps' three-parameter methodology, but were delineated as wetlands under the Coastal Commission's one-parameter methodology. Other species found in these wetlands included rabbit's foot grass (FacW); salt marsh sand spurry (Obl); spearscale (FacW); alkali heliotrope (*Heliotropium curassavicum*) Obl; Boccone's sand spurry (Fac), Mexican tea (*Dysphania ambrosioides*) Fac; yellow sweet clover (Fac); garden beet (*Beta vulgaris*) FacUp; and myoporum (*Myoporum laetum*) FacUp. The Coastal Commission wetland areas also include sparsely vegetated or non-vegetated "beach" areas that are infrequently tidally inundated, as well as tidal flat areas that are inundated on a daily basis.

Depending on the slope of the Basin, the Coastal Commission wetlands extended from zero to 16 feet above the delineated Corps wetland areas. Along much of the Basin's north shore, Coastal Commission wetlands extend from 6 to 8 feet above the Corps delineated wetland areas.

3.4 California Dept. of Fish and Game (CDFG) Jurisdictional Areas

The CDFG 1601 jurisdictional area extends to the mean "high tide" line. No other riparian or isolated wetland habitat occurs within Oxford Basin and the inlet channels are all developed storm drains.

4.0 RECOMMENDATIONS

The following recommendations are provided for improving the ecological functions and values of Oxford Basin's wetland communities:

- Investigate the feasibility of increasing the total area of the tidal prism at differing elevational levels. The principal function of Oxford Basin is to maintain maximum flood control capacity, and this may require a uniform upper elevational level. However, if sediment is to be removed from the basin, the potential of having differing elevational levels within the basin should be evaluated. This would allow for a greater diversity of native salt marsh "habitats" (e.g. mid-marsh, high marsh) and species that could potentially be introduced into the basin.

- Investigate the feasibility of establishing vascular aquatic plant species, such as eel grass (*Zostera marina*) within the mud flats of Oxford Basin. These could be placed in artificial submerged structures, that would allow "harvesting" of the eel grass. These plants would be grown more to enhance water quality and reduce the algal blooms, than to enhance the habitat found within the mudflats. Another alternative would be to create areas of sandy habitat within the basin, to provide substrate for this or other suitable species.

- Consider the feasibility of enhancing the salt marsh community found at Oxford Basin. This would include plans for the removal of non-native Perez's sea lavender (*Limonium perezii*), which has low habitat value for native wildlife, and replacing it with a more diverse group of native salt marsh species. Some of these species could include California marsh rosemary (*Limonium californicum*), alkali heath (*Frankenia salina*), saltgrass (*Distichlis spicata*), jaumea (*Jaumea carnosa*), shore grass (*Monanthochole littoralis*), and American saltwort (*Batis maritima*). The plan would need to determine the suitability of the existing habitats for these species, and potential procedures that could allow for develop different marsh habitats within the basin. Planting plans would then need to be developed with the different palettes for the salt marsh plantings, along with detailed procedures for preparing the sites for planting/seeding and long term maintenance of the marsh enhancement areas.

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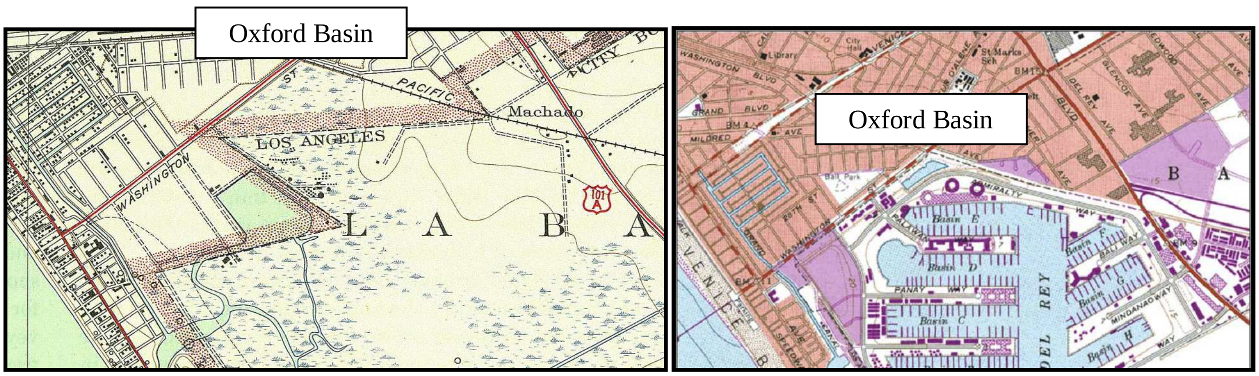
APPENDIX A
HISTORICAL DOCUMENTION
OF THE
PROJECT SITE



Historical topography showing in red the future location of Oxford Basin in 1942 (left) and the basin as it existed (and still exists) in 1964 (right). Source: USGS Venice 7.5’ topographic quadrangles.

Following page: Comparison of aerial photos from 1952 (pre-Marina del Rey) and 1972 (post-Marina del Rey). These photos show that the marshlands in question had been cleared some time before 1952. In 1952, the locality was generally disturbed and appeared to be used as a materials extraction site.

OXFORD BASIN, HISTORIC AERIAL PHOTOS

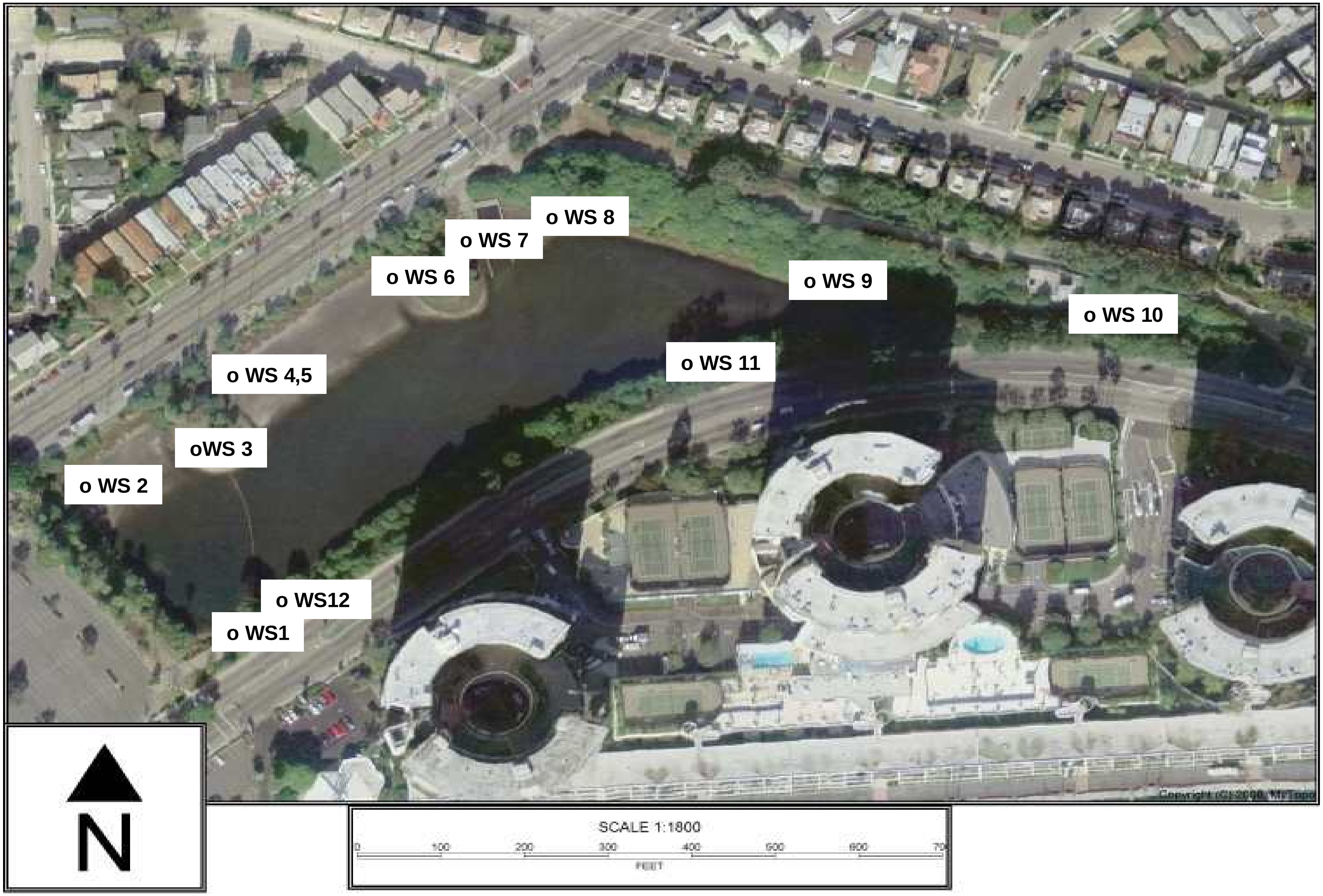
Oxford Basin Area, 1952

Oxford Basin Area, 1972

Source: Historicaerials.com

APPENDIX B
WETLAND FIELD FORMS

OXFORD BASIN WETLAND DELINEATION SAMPLING SITES



WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Ox ford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County State: CA Sampling Point: 1

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Slope of Basin Local relief (concave, convex, none): Convex Slope (%): 25%

Subregion (LRR): ______ Lat: 33° 59' 04" Long: 118° 27' 22" Datum: NAD83

Soil Map Unit Name: NA NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	Is the Sampled Area within a Wetland? Yes X No ______
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes X No ______	

Remarks:

Wetland area ~ 8 ft wide

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Salicornia virginica	95	Y	Obl
2. Polypogon monspeliensis	2	N	Facw
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	97		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	95	x 1 = 95
FACW species	2	x 2 = 4
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	97 (A)	99 (B)

Prevalence Index = B/A = 1.02

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
4"	10YR 3/2		2.5YR5/6	720	C	M	Sandy clay	Mottles thin

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- X Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Stratified Sand over lay Clayey Sediments

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Barnacles on rocks.

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- X High Water Table (A2)
- __ Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 1"

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Normal high tide w/in the basin will inundate this area

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/1[illegible]
Applicant/Owner: LA County Flood Control State: CA Sampling Point: 2 - A
Investigator(s): Bramlet Riefner Section, Township, Range: ____
Landform (hillslope, terrace, etc.): Mud flat Local relief (concave, convex, none): ____ Slope (%): Ø
Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ____)			
1. Salicornia virginica	75	Y	Obl
2. Atriplex prostrata	3	N	Facw
3. Spergularia marina	5	Y	OBL
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	3	x 2 =	6
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	23 (A)		26 (B)

Prevalence Index = B/A = 1.13

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: Z - A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 2/1		5YR 5/6	10	C	M	Siltyclay	
5	Cley 5N							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- X Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY Algal mats, snail shells Small channels So

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- X Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- X Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/16

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 2B

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Mudflat Local relief (concave, convex, none): ______ Slope (%): Ø

Subregion (LRR): ______ Lat: 33° 59' 04" Long: 118° 27' 23 Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

16 ft wetland 2.1 + 2.2

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Salicornia virginica	50	Y	Obl
2. Atriplex prostrata	40	Y	Facw
3. Polypogon monspeliens	4	Y	Facw
4. Spergularia marina	6	Y	Obl
5.			
6.			
7.			
8.			
= Total Cover	100		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	56	x 1 = 56
FACW species	44	x 2 = 88
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	100 (A)	144 (B)

Prevalence Index = B/A = 1.44

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
2	10YR 5/1		2.5Y 5/6	20	C	M	Silty clay	
6	10YR 2/1		2.5Y 5/6	40	C	M	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- X Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Shells

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- X Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): ___________

Water Table Present? Yes _____ No X Depth (inches): ___________

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): ___________

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Ox ford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 2 C

Investigator(s): D Bramlet R Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Slope of Basin Local relief (concave, convex, none): Convex Slope (%): 6%

Subregion (LRR): ______ Lat: 33° 59 04 Long: 118 27 23 Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No ______	**Is the Sampled Area within a Wetland?**	Yes ______ No X
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:

Driftline Veg 4 ft above this sample point

Area 18ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Salicornia virginica	10	Y	Obl
2. Limonium perezii	80	Y	Facup
3. Polypogon monspeliensis	3	N	Facw
4. Spergularia marina	2	N	Obl
5. Heliotropium curassavicum	2	N	Obl
6. Atriplex prostrata	1	N	Facw
7.			
8.			
= Total Cover	98		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	10	x 1 = 10
FACW species		x 2 =
FAC species		x 3 =
FACU species	80	x 4 = 320
UPL species		x 5 =
Column Totals:	90 (A)	330 (B)

Prevalence Index = B/A = 3.6

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50% No
- ___ Prevalence Index is ≤3.0[1] No
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No X

Remarks:

oxidated rhizospheres

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 4/1		5YR 5/6	20	C	P	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

oxidated rhizospheres

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 3a

Investigator(s): D Bramlet R Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Slope of basin Local relief (concave, convex, none): Convex Slope (%): 10%

Subregion (LRR): ______ Lat: 33 59 05 Long: 118 27 23 Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

Salicornia ~ 6 ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Salicornia virginica	70	Y	Obl
2. Atriplex prostrata	15	Y	Facw
3. Polypogon monspeliensis	3	N	Facw
4. Spergalaria marina	2	N	Obl
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	70	x 1 = 70
FACW species	15	x 2 = 30
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	85 (A)	100 (B)

Prevalence Index = B/A = 1.18

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
4"	10YR4/2		5YR 5/8	50	C	M	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 3b

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Slope of Basin Local relief (concave, convex, none): Convex Slope (%): 20%

Subregion (LRR): ______ Lat: 33°59'05" Long: 118°27'23" Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?	✓	

Is the Sampled Area within a Wetland? Yes ___ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Limonium perezii	70	Y	Facu
2. Spergularia marina	5	Y	obl
3. Salicornia virginica	5	Y	obl
4. Polypogon monspeliensis	5	Y	Facw
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	5	x 2 =	10
FAC species		x 3 =	
FACU species	70	x 4 =	280
UPL species		x 5 =	
Column Totals:	85 (A)		300 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1] No

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	10Y 4/2		No mottles				Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___________

Water Table Present? Yes ___ No ✓ Depth (inches): ___________

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___________

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: ______ Sampling Point: 4

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Mudflat + Basinslope Local relief (concave, convex, none): None Slope (%): 5%

Subregion (LRR): ______ Lat: 33 59 07 Long: 118 27 224 Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No X
Hydric Soil Present?	Yes ______	No X
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? Yes ______ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. Atriplex prostrata	10	Y	FacW
2. Conyza floribunda	5	Y	Upl
3. Limonium perezii	20	Y	FacUp
4. Polypogon monspeliensis	12	Y	FacW
5. Beta vulgaris	20	Y	FacUp
6. Spergularia bocconii	8	Y	Fac
7. Chenopodium ambrosioides	12	Y	Fac
8. Atriplex suberecta	10	Y	Upl
Melilotus indica	3	N	Fac
		= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	22	x 2 = 44
FAC species	20	x 3 = 60
FACU species	40	x 4 = 160
UPL species	15	x 5 = 75
Column Totals:	100 (A)	339 (B)

Prevalence Index = B/A = 339

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50% No

___ Prevalence Index is ≤3.0[1] No

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No X

Remarks:

SOIL

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
	10YR 4/2		no mottles				Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: ____ State: CA Sampling Point: 5

Investigator(s): Bramlet Riefner Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Upper basin Local relief (concave, convex, none): Convex Slope (%): 3%

Subregion (LRR): ____ Lat: 33 59 734 Long: 118 27 225 Datum: NAD83

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ____, or Hydrology ____ significantly disturbed? Yes Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____	**Is the Sampled Area within a Wetland?**	Yes ✓ No ____
Hydric Soil Present? Yes ✓ No ____		
Wetland Hydrology Present? Yes ✓ No ____		

Remarks:

10ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: ____)			
1. Digitaria sanguinalis	20	Y	Facup
2. Agrostis viridis	10	Y	Obl
3. Portulaca oleracea	3	N	Fac
4. Melilotus indica	2	N	Fac
5. Washingtonia robusta	17	Y	FacW
6. Spergularia marina	10	Y	Obl
7. Spergularia bocconii	15	Y	Fac
8. Eragrostis cilianensis	5	Y	Facup
Plantago lanceolata	3	N	Fac
	85 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	20	x 1 = 20
FACW species	17	x 2 = 34
FAC species	23	x 3 = 69
FACU species	25	x 4 = 100
UPL species		x 5 =
Column Totals:	85 (A)	223 (B)

Prevalence Index = B/A = 2.62

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
	10YR4/2		7.5YR5/6	20	C	M	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? Yes X No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): ____________

Water Table Present? Yes _____ No X Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): ____________

Wetland Hydrology Present? Yes X No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 6

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Convex Slope (%): 30%

Subregion (LRR): ______ Lat: 33 59 04.7 Long: 118 27 20.23 Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Salicornia virginica	70	Y	Obl
2. Atriplex prostrata	20	Y	FacW
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70	x 1 =	70
FACW species	20	x 2 =	40
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	90 (A)		110 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	2.5Y 4/1		7.5YR 5/6	60	C	M	Clayey	Sandy loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes X No ______

Remarks:

HYDROLOGY

Algal Crusts

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ____________

Water Table Present? Yes ______ No X Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ____________

Wetland Hydrology Present? Yes X No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/06
Applicant/Owner: LA County Flood Control State: CA Sampling Point: 7a
Investigator(s): Bramlet Riefner Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Upper Basin Local relief (concave, convex, none): Convex Slope (%): 3-6
Subregion (LRR): ______ Lat: 33 59 9.13 Long: 118 27 19.43 Datum: NAD 83
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:
Salicornia zone
12ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Salicornia virginica	45	Y	obl
2. Atriplex prostrata	10	Y	facw
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	45	x 1 =	45
FACW species	10	x 2 =	20
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	55 (A)		65 (B)

Prevalence Index = B/A = 1.18

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Saturated

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 4/1						Sandy silt	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- X Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Oxidized root channels

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- X Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ______ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes X No ______ Depth (inches): ____________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 7b

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Upper basin Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): ______ Lat: 33 59 9.18 Long: 118 27 19.54 Datum: NAD 83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ___	Is the Sampled Area within a Wetland?	Yes X No ___
Hydric Soil Present? Yes ✓ No ___		
Wetland Hydrology Present? Yes ✓ No ___		

Remarks:

10 ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. Schinus molle	40	Y	Up
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Atriplex triangularis	90	Y	FacW
2. Salicornia triangularis	10	Y	obl
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	10	x 1 = 10
FACW species	90	x 2 = 180
FAC species		x 3 =
FACU species		x 4 =
UPL species	40	x 5 = 200
Column Totals:	140 (A)	390 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ___

Remarks:

SOIL

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 2/1		No mottles				Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Oxidized root channel

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ______ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 7C

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 8

Subregion (LRR): ______ Lat: 33 59 9.22 Long: 118 27 19.77 Datum: NAD 83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?		X
Wetland Hydrology Present?		X
Is the Sampled Area within a Wetland?		X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. Schinus molle	30		Up
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Salicornia virginica	80	Y	Obl
2. Beta vulgaris	10	Y	Fac Up
3. Bromus diandrus	5	Y	Up
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species		x 2 =	
FAC species		x 3 =	
FACU species	10	x 4 =	40
UPL species	35	x 5 =	175
Column Totals:	125 (A)		295 (B)

Prevalence Index = B/A = 2.36

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50% No
- X Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
	10YR 4/2		no mottle				Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 8

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Basin + Basin slope Local relief (concave, convex, none): Convex Slope (%): 4%

Subregion (LRR): ______ Lat: 33 59 9.4 Long: 118 27 18.46 Datum: NAD 83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. Myoporum laetum	20	Y	NI
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Salicornia virginica	85	Y	Obl
2. Atriplex prostrata	10	Y	FacW
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	85	x 1 = 85
FACW species	10	x 2 = 20
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	95 (A)	105 (B)

Prevalence Index = B/A = 1.1

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

NI species not considered in dominance test & or prevalence index

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
6	10YR 4/2		none				Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________________

Depth (inches): ___________________

Hydric Soil Present? Yes X No ______

Remarks: oxidized rhizospheres

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ___________

Water Table Present? Yes _____ No ✓ Depth (inches): ___________

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ___________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 9

Investigator(s): Bramlet Riefner Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Slope of Basin Local relief (concave, convex, none): Convex Slope (%): 20

Subregion (LRR): ____ Lat: 33 59 8.48 Long: 118 27 14.49 Datum: NAD83

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:

Atriplex band ~8ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Myoporum laetum	20	Y	~~Facu~~ NI
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: prostrate)			
1. Atriplex ~~triangularis~~ prostrata	85	Y	Facw
2. Limonium perezii	10	Y	Facup
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	85	x 2 = 170
FAC species		x 3 =
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	95 (A)	210 (B)

Prevalence Index = B/A = 2.2

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50% No
- X Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

NI species not evaluated in dominance test or prevalence index

SOIL

Moist / Mottles 2030

Sampling Point: ___

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	7.5Y3.1		7.5 YR5/8	3%	C	M	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 10

Investigator(s): Bramlet Riefner Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Basin slope Local relief (concave, convex, none): Convex Slope (%): 15%

Subregion (LRR): ____ Lat: 33 59 8.19 Long: 118 27 10.43 Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:

Salicornia band ~ 6ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Myoporum laetum	15	Y	NI
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ____)			
1. Salicornia virginica	75	Y	Obl
2. Atriplex prostrata	15	Y	Facw
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	75	x 1 = 75
FACW species	15	x 2 = 30
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	90 (A)	105 (B)

Prevalence Index = B/A = 1.2

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

NI species not included dominance test or prevelance index

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 2/1		5YR 5/4	20	C	M	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) Algal crust

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

S side

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: OX ford Basin City/County: LA County Sampling Date: 6/12/10

Applicant/Owner: LA County Flood Control State: CA Sampling Point: 11

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Basin Slope Local relief (concave, convex, none): Convex Slope (%): 25%

Subregion (LRR): ______ Lat: 33 59 7.32 Long: 118 27 16.09 Datum: NAD 83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes ___ No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:
Salicornia/Limonium band ~ 10ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. Myoporum laetum	30	Y	NI
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Salicornia virginica	85	Y	Obl
2. Limonium perezii	10	Y	Facup
3. Polypogon monspeliensis	5	Y	Facw
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	85	x 1 = 85
FACW species	5	x 2 = 10
FAC species		x 3 =
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	100 (A)	135 (B)

Prevalence Index = B/A = 1.35

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:
NI species not included in dominance test or prevalence index

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 2/1						Sandyloam	
6	Gley1 6/N							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- _✓_ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- _✓_ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes _✓_ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) Moist soils

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- _✓_ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _X_ Depth (inches): ___________

Water Table Present? Yes _____ No _X_ Depth (inches): ___________

Saturation Present? (includes capillary fringe) Yes _____ No _X_ Depth (inches): ___________

Wetland Hydrology Present? Yes _✓_ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/10
Applicant/Owner: LA County Flood Control State: CA Sampling Point: 12a
Investigator(s): Bramlet Riefner Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Basin Slope Local relief (concave, convex, none): Convex Slope (%): 20%
Subregion (LRR): ______ Lat: 33 59 4.19 Long: 118 27 22.14 Datum: NAD83
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks: Salicornia band ~10 ft wide

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Salicornia virginica	85	Y	obl
2. Spergularia marina	10	Y	obl
3. Polypogon monspeliensis	3	N	facw
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	95	x 1 = 95
FACW species	3	x 2 = 6
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	98 (A)	111 (B)

Prevalence Index = B/A = 1.13

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 4/2		5YR 6/6	20%	M	C	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- _✓_ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____________________

Depth (inches): ____________________

Hydric Soil Present? **Yes** _✓_ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- _✓_ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- _X_ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _✓_ Depth (inches): __________

Water Table Present? Yes _____ No _✓_ Depth (inches): __________

Saturation Present? (includes capillary fringe) Yes _____ No _✓_ Depth (inches): __________

Wetland Hydrology Present? **Yes** _X_ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Oxford Basin City/County: LA County Sampling Date: 6/12/6

Applicant/Owner: ______ State: CA Sampling Point: 126

Investigator(s): Bramlet Riefner Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Basin Slope Local relief (concave, convex, none): Convex Slope (%): 20%

Subregion (LRR): ______ Lat: 33 59 4.18 Long: 118 27 22.14 Datum: NAD83

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. Limonium perezii	80	Y	FacUp
2. Melilotus indica	5	Y	Fac
3. Bromus diandrus	3	N	UP
4. Salicornia virginica	5	Y	Obl
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species		x 2 =
FAC species	5	x 3 = 15
FACU species	80	x 4 = 320
UPL species		x 5 =
Column Totals:	90 (A)	341 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1] No

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ___

Remarks:

SOIL

Sampling Point: ____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
6	10YR 4/2		no mottles				Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C
PHOTO DOCUMENTATION
OF PROJECT SITE WETLANDS

Sample Site 1: Corps Jurisdictional Wetland Area — Vegetation and Soils

Sample Site 2A: Corps Jurisdictional Wetland Area — Vegetation and Soils

Sample Site 2C: Coastal Commission Jurisdictional Wetland Area — Vegetation and Soils

Sample Site 3: Corps Jurisdictional Wetland Area — Vegetation and Soils

Sample Site 6: Corps Jurisdictional Wetland Area — Vegetation and Soils

Sample Site 7c: Corps Jurisdictional Wetland Area — Vegetation and Soils

Sample Site 11a: Corps Jurisdictional Wetland Area — Vegetation and Soils

ATTACHMENT F: CURRICULA VITAE

Robert A. Hamilton

President, Hamilton Biological, Inc.

Expertise

Endangered Species Surveys
General Biological Surveys
CEQA Analysis
Population Monitoring
Bird Banding
Vegetation Mapping
Noise Monitoring
Open Space Planning
Natural Lands Management

Education

1988. Bachelor of Science degree in Biological Sciences, University of California, Irvine

Professional Experience

1994 to Present. Independent Biological Consultant, Hamilton Biological, Inc.

1988 to 1994. Biologist, LSA Associates, Inc.

Permits

Federal Permit No. TE-799557 to survey for the Coastal California Gnatcatcher and Southwestern Willow Flycatcher (expires 3/5/12)

Federal Bird Banding Subpermit No. 20431 (expires 1/31/11)

MOUs with the California Dept. of Fish and Game to survey for the San Diego Cactus Wren (expires 12/31/11), and the Coastal California Gnatcatcher and SW Willow Flycatcher (expires 5/31/12)

California Scientific Collecting Permit No. SC-001107 (expires 11/5/11)

Robert A. Hamilton has been providing biological consulting services in southern California since 1988. He spent the formative years of his career at the firm of LSA Associates in Irvine, where he was a staff biologist and project manager. He has worked as a full-time independent consultant since 1994, incorporating the enterprise as Hamilton Biological, Inc., in 2009. His consultancy specializes in the practical application of environmental policies and regulations to land management and land use decisions in southern California.

A recognized authority on the status, distribution, and identification of birds in California, Mr. Hamilton is the lead author of two standard references describing aspects of the state's avifauna: *The Birds of Orange County: Status & Distribution* and *Rare Birds of California*. Mr. Hamilton has also conducted extensive studies in Baja California, and for seven years edited the Baja California Peninsula regional reports for the journal *North American Birds*. He served ten years on the editorial board of *Western Birds* and regularly publishes in peer-reviewed journals. He is a founding member of the Coastal Cactus Wren Working Group and is presently updating the Cactus Wren species account for *The Birds of North America Online*. Mr. Hamilton's expertise includes floral identification and vegetation mapping. He served for a decade as Conservation Chair for the Orange County chapter of the California Native Plant Society and has a working knowledge of native plant restoration. He is a current member of the Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC).

Mr. Hamilton conducts general and focused biological surveys of small and large properties as necessary to obtain various local, state, and federal permits, agreements, and clearances. He also conducts landscape-level surveys needed by land managers to monitor songbird populations. Mr. Hamilton holds the federal and state permits and MOUs listed to the left, and he is recognized by federal and state resource agencies as being highly qualified to survey for the Least Bell's Vireo. He also provides nest-monitoring services in compliance with the federal Migratory Bird Treaty Act and California Fish & Game Code Sections 3503, 3503.5 and 3513. Mr. Hamilton has the capability of monitoring noise as it relates to nesting or roosting birds using an advanced Quest SoundPro unit that can provide second-by-second logging of noise levels at the nest; this allows documentation of the varying sound pressure levels that nesting birds are exposed to during construction and evaluation of any effects associated with different levels. He is also an expert photographer, and typically provides photo-documentation and/or video documentation as part of his services.

Drawing upon a robust, multidisciplinary understanding of the natural history and ecology of his home region, Mr. Hamilton works with private and public land owners, as well as governmental agencies and interested third parties, to apply the local, state, and federal land use policies and regulations applicable to each particular situation. Mr. Hamilton has amassed extensive experience in the preparation and critical review of CEQA documents, from relatively simple Negative Declarations to complex supplemental and recirculated Environmental Impact Reports. In addition to his knowledge of CEQA and its Guidelines, Mr. Hamilton understands how each Lead Agency brings its own interpretive variations to the CEQA review process.

Representative Project Experience

From 2007 to present, have reviewed biological resources sections of CEQA documents submitted to the County of Los Angeles Department of Regional Planning. Work includes evaluating the accuracy and adequacy of consultants' biological reports, developing impact analyses and mitigation measures, and recommending findings of significance. Under the same contract, prepared a list of drought-tolerant native plants, hyperlinked to web-based information, for use in landscaping in Los Angeles County. The County later revised the list, with some loss of information, but the original list and accompanying map of seven planting zones in the county are available here and here.

In 2009, under contract to the Palos Verdes Peninsula Land Conservancy, surveyed for the California Gnatcatcher and Cactus Wren across nine habitat reserves that constitute nearly all of the Portuguese Bend Natural Preserve in coastal Los Angeles County. The services provided included mapping and classifying all cactus scrub resources in the areas surveyed.

Board Memberships, Advisory Positions, Etc.

Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC) (2010–present)

Coastal Cactus Wren Working Group (2008–present)

American Birding Association: Baja Calif. Peninsula Regional Editor, *North American Birds* (2000–2006)

Western Field Ornithologists: Associate Editor of *Western Birds* (1999–2008)

California Bird Records Committee (1998–2001)

Nature Reserve of Orange County: Technical Advisory Committee (1996–2001)

California Native Plant Society, Orange County Chapter: Conservation Chair (1992–2003)

Professional Affiliations

American Ornithologists' Union

Cooper Ornithological Society

Institute for Bird Populations

California Native Plant Society

Southern California Academy of Sciences

Western Foundation of Vertebrate Zoology

Insurance

$3,000,000 professional liability policy (Axis)

$2,000,000 general liability policy (The Hartford)

$1,000,000 auto liability policy (State Farm)

Other Relevant Experience

Field Ornithologist, San Diego Natural History Museum Scientific Collecting Expedition to Central and Southern Baja California, October/November 1997 and November 2003.

Field Ornithologist, Island Conservation and Ecology Group Expedition to the Tres Marías Islands, Nayarit, Mexico, 23 January to 8 February 2002.

Field Ornithologist, Algalita Marine Research Foundation neustonic plastic research voyages in the Pacific Ocean, 15 August to 4 September 1999 and 14 to 28 July 2000.

Field Assistant, Bird Banding Study, Río Ñambí Reserve, Colombia, January to March 1997.

References

Provided upon request.

Under contract to the Conservation Biology Institute in San Diego County, conducted 2008 reconnaissance of those portions of the San Dieguito River Valley that were unburned or only partially burned during the massive Witch Fire, which consumed nearly 200,000 acres in October 2007. Three-pass surveys conducted at 14 sites between Lake Hodges and the San Pasqual Valley determined the presence or absence of Cactus Wrens and California Gnatcatchers. Work products included maps of all unburned and partially burned scrub communities, maps of weed infestations, and complete lists documenting the numbers of each vertebrate wildlife species detected during the surveys.

Under contract to the City of Orange, prepared the Biological Resources section of a hybrid Supplemental EIR/Draft EIR for the 6,900-acre Santiago Hills II/East Orange Planned Community project in central Orange County. This complicated document covered one proposed development area that already had CEQA clearance, but that required updating for alterations to the previously approved plan, and a much larger area that was covered under an existing Natural Communities Conservation Plan (NCCP). The SEIR/EIR was certified in November 2005.

During the 1990s and 2000s, worked with study-design specialists and resource agency representatives to develop the long-term passerine bird monitoring program for the 37,000-acre Nature Reserve of Orange County, and directed its implementation from 1996 to 2001 with additional contract work since then. Tasks have included 1) annual monitoring of 40 California Gnatcatcher and Cactus Wren study sites, 2) oversight of up to 10 constant-effort bird banding stations from 1998 to 2003 under the Monitoring Avian Productivity and Survivorship (MAPS) program, and 3) focused surveys for the Cactus Wren, and detailed mapping of cactus scrub habitat, across the NROC's coastal reserve in 2006 and 2007.

Third-Party CEQA Review

Under contract to cities, conservation groups, homeowners' associations, and other interested parties, have reviewed EIRs and other project documentation for the following projects:

- The Ranch Plan (residential/commercial, County of Orange)

- Southern Orange County Transportation Infrastructure Improvement Project (Foothill South Toll Road, County of Orange)
- Sunset Ridge Park (proposed city park, City of Newport Beach)
- Gregory Canyon Landfill Restoration Plan (proposed mitigation, County of San Diego)
- Montebello Hills Specific Plan EIR (residential, City of Montebello)
- Cabrillo Mobile Home Park Violations (illegal wetland filling, City of Huntington Beach)
- Newport Hyatt Regency (timeshare conversion project, City of Newport Beach)
- Lower San Diego Creek "Emergency Repair Project" (flood control, County of Orange)
- Tonner Hills (residential, City of Brea)
- The Bridges at Santa Fe Units 6 and 7 (residential, County of San Diego)
- Villages of La Costa Master Plan (residential/commercial, City of Carlsbad)
- Whispering Hills (residential, City of San Juan Capistrano)
- Santiago Hills II (residential/commercial, City of Orange)
- Rancho Potrero Leadership Academy (youth detention facility/road, County of Orange)
- Saddle Creek/Saddle Crest (residential, County of Orange)
- Frank G. Bonelli Regional County Park Master Plan (County of Los Angeles)

Contact Information

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562-433-5292 fax
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http://hamiltonbiological.com

Selected Presentations

Hamilton, R. A., and Cooper, D. S. 2009-2010. Conservation & Management Plan for Marina del Rey. Twenty-minute Powerpoint presentation given to different governmental agencies and interest groups.

Hamilton, R. A. 2008. Cactus Wren Conservation Issues, Nature Reserve of Orange County. One-hour Powerpoint presentation for Sea & Sage Audubon Society, Irvine, California, 25 November 2008.

Hamilton, R. A., Miller, W. B., Mitrovich, M. J. 2008. Cactus Wren Study, Nature Reserve of Orange County. Twenty-minute Powerpoint presentation given at the Nature Reserve of Orange County's Cactus Wren Symposium, Irvine, California, 30 April 2008.

Hamilton, R. A. and K. Messer. 1999-2004 Results of Annual California Gnatcatcher and Cactus Wren Monitoring in the Nature Reserve of Orange County. Twenty-minute Powerpoint presentation given at the Partners In Flight meeting: Conservation and Management of Coastal Scrub and Chaparral Birds and Habitats, Starr Ranch Audubon Sanctuary, 21 August 2004; and at the Nature Reserve of Orange County 10th Anniversary Symposium, Irvine, California, 21 November 2006.

Hamilton, R.A. Preliminary results of reserve-wide monitoring of California Gnatcatchers in the Nature Reserve of Orange County. Twenty-minute Powerpoint presentation given at the Southern California Academy of Sciences annual meeting at California State University, Los Angeles, 5 May 2001.

Publications

Hamilton, R. A. 2008. Cactus Wrens in central & coastal Orange County: How will a worst-case scenario play out under the NCCP? *Western Tanager* 75:2–7.

Erickson, R. A., R. A. Hamilton, R. Carmona, G. Ruiz-Campos, and Z. A. Henderson. 2008. Value of perennial archiving of data received through the North American Birds regional reporting system: Examples from the Baja California Peninsula. *North American Birds* 62:2–9.

Erickson, R. A., R. A. Hamilton, and S. G. Mlodinow. 2008. Status review of Belding's Yellowthroat *Geothlypis beldingi*, and implications for its conservation. Bird Conservation International 18:219–228.

Hamilton, R. A. 2008. Fulvous Whistling-Duck (*Dendrocygna bicolor*). Pp. 68-73 *in* Shuford, W. D. and T. Gardali, eds. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

California Bird Records Committee (R. A. Hamilton, M. A. Patten, and R. A. Erickson, editors.). 2007. Rare Birds of California. Western Field Ornithologists, Camarillo, CA.

Hamilton, R. A., R. A. Erickson, E. Palacios, and R. Carmona. 2001–2007. *North American Birds* quarterly reports for the Baja California Peninsula Region, Fall 2000 through Winter 2006/2007.

Hamilton, R. A. and P. A. Gaede. 2005. Pink-sided × Gray-headed Juncos. *Western Birds* 36:150–152.

Mlodinow, S. G. and R. A. Hamilton. 2005. Vagrancy of Painted Bunting (*Passerina ciris*) in the United States, Canada, and Bermuda. *North American Birds* 59:172–183.

Erickson, R. A., R. A. Hamilton, S. González-Guzmán, G. Ruiz-Campos. 2002. Primeros registros de anidación del Pato Friso (*Anas strepera*) en México. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 73(1): 67–71.

Hamilton, R. A. and J. L. Dunn. 2002. Red-naped and Red-breasted sapsuckers. *Western Birds* 33:128–130.

Hamilton, R. A. and S. N. G. Howell. 2002. Gnatcatcher sympatry near San Felipe, Baja California, with notes on other species. *Western Birds* 33:123–124.

Hamilton, R. A. 2001. Book review: The Sibley Guide to Birds. *Western Birds* 32:95–96.

Hamilton, R. A. and R. A. Erickson. 2001. Noteworthy breeding bird records from the Vizcaíno Desert, Baja California Peninsula. Pp. 102-105 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Hamilton, R. A. 2001. Log of bird record documentation from the Baja California Peninsula archived at the San Diego Natural History Museum. Pp. 242–253 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Hamilton, R. A. 2001. Records of caged birds in Baja California. Pp. 254–257 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Erickson, R. A., R. A. Hamilton, and S. N. G. Howell. 2001. New information on migrant birds in northern and central portions of the Baja California Peninsula, including species new to Mexico. Pp. 112–170 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Howell, S. N. G., R. A. Erickson, R. A. Hamilton, and M. A. Patten. 2001. An annotated checklist of the birds of Baja California and Baja California Sur. Pp. 171–203 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Ruiz-Campos, G., González-Guzmán, S., Erickson, R. A., and Hamilton, R. A. 2001. Notable bird specimen records from the Baja California Peninsula. Pp. 238–241 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Wurster, T. E., R. A. Erickson, R. A. Hamilton, and S. N. G. Howell. 2001. Database of selected observations: an augment to new information on migrant birds in northern and central portions of the Baja California Peninsula. Pp. 204–237 *in* Monographs in Field Ornithology No. 3. American Birding Association, Colorado Springs, CO.

Erickson, R. A. and R. A. Hamilton, 2001. Report of the California Bird Records Committee: 1998 records. *Western Birds* 32:13–49.

Hamilton, R. A., J. E. Pike, T. E. Wurster, and K. Radamaker. 2000. First record of an Olive-backed Pipit in Mexico. *Western Birds* 31:117–119.

Hamilton, R. A. and N. J. Schmitt. 2000. Identification of Taiga and Black Merlins. *Western Birds* 31:65–67.

Hamilton, R. A. 1998. Book review: Atlas of Breeding Birds, Orange County, California. *Western Birds* 29:129–130.

Hamilton, R. A. and D. R. Willick. 1996. The Birds of Orange County, California: Status and Distribution. Sea & Sage Press, Sea & Sage Audubon Society, Irvine.

Hamilton, R. A. 1996–98. Photo Quizzes. *Birding* 27(4):298-301, 28(1):46-50, 28(4):309-313, 29(1): 59-64, 30(1):55–59.

Erickson, R. A., and Hamilton, R. A. 1995. Geographic distribution: *Lampropeltis getula californiae* (California Kingsnake) in Baja California Sur. Herpetological Review 26(4):210.

Bontrager, D. R., R. A. Erickson, and R. A. Hamilton. 1995. Impacts of the October 1993 Laguna fire on California Gnatcatchers and Cactus Wrens. *in* J. E. Keeley and T. A. Scott (editors). Wildfires in California Brushlands: Ecology and Resource Management. International Association of Wildland Fire, Fairfield, Washington.

Erickson, R. A., R. A. Hamilton, S. N. G. Howell, M. A. Patten, and P. Pyle. 1995. First record of Marbled Murrelet and third record of Ancient Murrelet for Mexico. *Western Birds* 26: 39–45.

Erickson, R. A., and R. A. Hamilton. 1993. Additional summer bird records for southern Mexico. *Euphonia* 2(4): 81–91.

Erickson, R. A., A. D. Barron, and R. A. Hamilton. 1992. A recent Black Rail record for Baja California. *Euphonia* 1(1): 19–21.

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EDUCATION

B.S., Zoology (cum laude), California State Polytechnic University, Pomona, 1976.
Graduate Studies, Biology, California State University, Long Beach, Fall Semester 1976
Graduate Studies, Ecology, California State Polytechnic University, Pomona, 54 Units completed. 1977-1979.

Federal Wetland Delineation Training, 1989, 1994.

CDFG Plant Voucher Collecting Permit No. 08051

CONSULTING EXPERIENCE

April 1988 to Present
Independent Consulting Biologist
Prepare biological assessments, develop the terrestrial biology sections of EIRs and assist with the permitting requirements for several larger environmental consulting firms and for individual clients. Recent projects include:

o CH2MHill, Highway 79 Re-alignment Project
Conducted field botanical surveys for a proposed the proposed highway 79 re-alignment project, west of Hemet. Field botanical surveys were preformed to document the special status plant species found in alkali grassland, alkali playa, and vernal pool habitats over a two year period. Following the data collection, assistance was provided in reviewing the GIS maps and with developing and reviewing the draft technical report for this study

o LSA, Greenspot Botanical Surveys
Field botanist on surveys for special status plant species on a 1,650 acre parcel in the City of Highland. Surveys concentrated on areas of alluvial fan sage scrub in the Santa Ana and Mill Creek washes and in areas of Riversidian sage scrub and chaparral.

o BonTerra Consulting, Whittier Hills Vegetation Mapping and Community Classification
Prepared a vegetation map for the 3,800 acre Puente Hills Habitat Authority. A vegetation classification system was developed, and plant communities mapped within the reserve. Surveys for special status plant species were also conducted for this project.

o Keane Biological Consulting, Big Canyon Creek Restoration Project.
Described and mapped the plant communities found within the watershed of Big Canyon Creek in Upper Newport Bay. Inventoried special status plant species found in the study area, especially the salt marsh bird's beak.

o Donna O'Neill Land Conservancy, Floristic Inventory and Special Status Species Study
In association with Fred Roberts a floristic inventory of the Donna O'Neill land conservancy was performed. This project attempted to document all of the plant species found within this reserve with a herbarium specimen. In addition, a study documenting the special status plant species was also conducted within the conservancy boundaries.

o Santa Ana River, SBKR Habitat Relationships, MEC Analytical Systems.
Conducted point intercept vegetation sampling to describe SBKR habitat in alluvial fan sage scrub and other plant communities in the Santa Ana River wash.

o Recovery Plan for three southern California plant species, U.S. Fish and Wildlife Service.
Co-authored a draft recovery plan for the Munz's onion, San Jacinto Valley crownscale, and thread-leaved brodiaea. Conducted literature reviews to determine the current status of these species, and developed an action plan for the recovery of these federally listed species.

Other examples of past projects include:

o Botanical surveys in the Angeles National Forest, to document the presence of sensitive plant species within proposed project sites.

o Monitoring of plant populations of two sensitive plant species in the Angeles National Forest.

o Botanical field crew member on a project to re-locate carbonate endemic plant species in the San Bernardino National Forest.

o Special status plant species studies within a proposed SKR study corridor on the Camp Pendleton Marine Corps Base.

o Special status plant species studies within the proposed Lovell Unit wetlands development at the San Jacinto Widlife Area.

o Special status plant species studies for the MWD Inland Feeder pipeline project, Riverside and San Bernardino Counties.

o Developed a classification system for the plant communities within Orange County and assisted in mapping the plant communities found within the County. Also developed lists of special status plant species and communities in the region.

o Conducted or supervised the completion of 150 line transects within coastal sage scrub series found within Orange County. This information was used to characterized habitat for a number of sensitive animal species restricted to this community.

o Conducted botanical field surveys for special status plant species for the Eastside Reservoir in western Riverside County.

o Performed field surveys for sensitive plant surveys on tailings from old tunnel construction in the Cabazon area.

o Prepared a map of plant communities and conducted surveys for special status plant species at the Prima Deshecha landfill in Orange County.

o Conducted field botanical surveys, to supplement previous biological studies on a proposed recreational facility in the Hill Canyon area of Thousand Oaks, Ventura County.

o Field monitoring of a new trail at Lake Skinner County Park. Conducted vegetation transects, and special status species monitoring, to determine the impacts of the new trail system.

o Supplemental botanical surveys for special status plant species within the southern portion of Lake Mathews.

o Mapped alluvial fan sage scrub and upland plant communities in the Deer-Day Canyon washes. Completed a vegetation map and described the plant communities, as part of an experiment to remotely map vegetation communities using ADAR.

Wetland Delineations

o Biological Resources and Wetland Assessment, Carbon Creek Channel, Orange County
Performed wetland delineations and determined Corps and CDFG jurisdictional areas along the earthen Carbon Creek channel.

o El Sobrante Landfill Expansion, Western Riverside County
Conducted jurisdictional determinations of ephemeral and perennial drainages within the area of the landfill expansion. Described riparian plant communities

Environmental Impact Reports

o El Sobrante Landfill Expansion DEIR, Western Riverside County
Conducted supplemental botanical surveys, to update previous studies within the project site. Prepared the biological resources section and determined the potential impacts of implementing the proposed landfill expansion.

o Old Webster Quarry EIR, San Bernardino County
Conducted field surveys to describe the existing alluvial sage scrub vegetation and developed the biological resources section of the DEIR. Significant issues included

potential impacts to the Santa Ana woolly-star and slender-horned spineflower which were determined from the applicant's survey data.

o Natural Environmental Study and Biological Assessment on the I-215 improvement project, western Riverside and San Bernardino Counties.
Conducted botanical and wetland surveys to document the existing biological resources within the study corridor. Assisted in developing the potential impacts and mitigation measures of the proposed highway project.

Revegetation Planning

o Bee Canyon Landfill, County of Orange.
Developed a revegetation plan and conducted installation monitoring on a 15 acre riparian revegetation project, as part of the mitigation for the Bee Canyon Landfill in Orange County.

o Calmat San Bernardino, Sand and Gravel Mine, San Bernardino County.
Assisted in the development of two revegetation plans in the Cajon Wash and Lytle Creek. Provided information on the composition of the existing alluvial fan sage scrub communities and recommended plant species to be used in the revegetation effort. Conducted quadrat counts of shrub seedlings in the revegetated areas, to establish the success of revegetation effort.

o Upper Newport Bay Regional Park, County of Orange.
Assisted in developing the proposed planting materials for the revegetation of eroded drainages and bluffs within the park. Reviewed planting lists and conducted limited field surveys to assist the development of the revegetation program.

November 1984 to April 1988
Staff Biologist-Harmsworth Associates (formerly VTN Environmental)
Responsible for the implementation and coordination of terrestrial biology projects. Conducted or managed field studies to assess existing animal and/or plant populations. Categories of experience and projects include:

Environmental Impact Reports and Assessments

Completed the terrestrial biology sections on the following projects:

- o Rialto Cactus Basin EIR
- o Ontario UPS Cargo Handling Facility EIR
- o Walnut Canyon Erosion Control Project EIR, Anaheim Hills
- o Catalina Airport EA
- o Hunt Canyon Detention Basin EIR, Pearblossom

Technical Reviews

Conducted issues scoping, review of ERs, proposals and DEIRs/DEISs of the terrestrial biology sections of fourteen oil development projects in Santa Barbara County. Assisted in the development of permit conditions to be required for each of these proposed projects. Reviewed the revegetation, erosion control and spill contingency plans on four of these projects.

November 1978 to October 1984

Staff Botanist - VTN Consolidated, Inc., Irvine CA

Responsible for botanical and plant ecology projects. Conducted vegetative mapping and inventories, sensitive species surveys and community classifications. Examples of experience include:

Baseline Surveys

Conducted field studies, including quantitative transects, to describe the existing vegetation on the following projects:

- Quartz Hill Molybdenum Mine, southeast Alaska
- Paraho Oil Shale Development, Uintah County, Utah
- Geokinetics Oil Shale Development, Uintah County, Utah
- Sohio Tar Sand Development, Uintah County, Utah
- IRI Nahcolite Solution Mine, Rio Blanco, Colorado

EIRs, EISs and EAs

Developed the vegetation sections of the following environmental reports:

- Second Border Crossing, San Diego County, EIR/EIS
- Nashua-Hudson Circumferential Highway, New Hampshire, EIS
- Quartz Hill Molybdenum Mine, Southeast Alaska, EA

Stream Surveys

Performed ocular instream habitat and channel stability surveys in the San Bernardino National Forest, California and the Malheur National Forest, Northeast Oregon.

Conducted stream flow measurements, field water quality sampling and salinity measurements, as part of long term hydrology studies for a proposed mining project in southeast Alaska.

OTHER EXPERIENCE

March 1980 to June 1984

Independent Consulting Biologist

Conducted botanical surveys for the technical appendices of four EIRs in Los Angeles (including the Cities of: Claremont and Rancho Cucamonga) and San Diego Counties. Conducted field surveys, described the existing vegetation and determined potential impacts of the proposed development projects.

April 1977 to June 1979

Lecturer, Teaching Assistant. California Polytechnic University, Pomona.

Taught laboratories for General Biology, Invertebrate Zoology and Immature Insect Identification.

PAPERS PRESENTED/PUBLISHED

Developing Requirements for Native Plant Revegetation Programs. Paper presented at the second Native Plant Revegetation Symposium, 1987.

Riversidian Alluvial Fan Sage Scrub Revegetation, San Bernardino, California. Paper presented with Martha Blane at the Society of Ecological Restoration's Fifth Annual Conference, 1993.

Boyd, S., T.S. Ross, O. Mistretta and D. Bramlet. 1995. Vascular flora of the San Mateo Canyon Wilderness Area, Cleveland National Forest, California. Aliso 14(2): 109-139.
Developed the maps of riparian plant communities and assisted with the plant community descriptions for this project.

Roberts, F.M., S.D. White, A.C. Sanders, D.E. Bramlet, and S.D. Boyd. 2004. The vascular plants of western Riverside County: An annotated checklist. F.M. Roberts Publications, San Luis Rey, California.
Assisted with the editing the checklist, modifying the introduction, and with reviewing the references for this book.

Roberts, F.M. and D.E. Bramlet. 2007a. Vascular plants of the Donna O'Neill Land Conservancy, Rancho Mission Viejo, California. Crossosoma 33(1) 2-38.

Roberts, F.M., S.D. White, A.C. Sanders, D.E. Bramlet, and S.D. Boyd. 2007b. Additions to the Flora of western Riverside County, California. Crossosoma 33(2) 55-69.

Status and proposed conservation measures for the San Jacinto Valley crownscale (*Atriplex coronata* var. *notatior*) in western Riverside County, California. Paper presented at the CNPS Conservation Conference, 2009

COLLECTING PERMITS, MOU'S

CDFG MOU for the collection of listed plant species valid to 2008.

PROFESSIONAL AFFILIATIONS

California Native Plant Society
Ecological Society of America
Society for Ecological Restoration
Southern California Botanists
California Botanical Society
Rancho Santa Ana Botanic Garden, Research Associate

Daniel S. Cooper

President, Cooper Ecological Monitoring, Inc.

Overview

Daniel S. Cooper is an authority on California bird ecology, identification and distribution, and has a strong background in southern California ecology and natural history. Specific areas of expertise include the Ballona Wetlands, eastern Santa Monica Mountains, Santa Clara River, Puente-Chino Hills, and remnant habitat patches on the floor of the Los Angeles Basin. Mr. Cooper has designed and managed numerous field-based research projects and assessments for a wide variety of clients, including public agencies and municipalities, large consulting firms, private landowners, and nonprofit environmental organizations. He is the author of Important Bird Areas of California (Audubon California 2004), and he continues to publish in peer-reviewed journals.

Mr. Cooper is permitted by the U.S. Fish and Wildlife Service to perform protocol surveys for the federally-threatened California gnatcatcher, and brings more than ten years of professional experience surveying for and observing special-status species throughout California. Mr. Cooper has held a Master Station Bird Banding permit from the U.S. Geological Survey, and has completed the requirements for a scientific collecting permit for the California Dept. of Fish and Game (anticipated summer 2009). Since the mid-1990s, Mr. Cooper has also conducted original research on bird distribution in Central and northern South America, primarily for private landowners.

Areas of Expertise

- Project Management
- Environmental Compliance (CEQA/NEPA) and Monitoring
- Bird and Wildlife Surveys
- Biological Assessments
- Protocol Surveys for the California Gnatcatcher and other special-status bird species

Years of Experience

CEM, Inc.: 4 years
Audubon California: 5 years

Education

MSc. (Biogeography)/1999/UC Riverside
BA/1995/Harvard University

Certification

U.S. Fish and Wildlife Permit No. TE-100008-0 (California Gnatcatcher).
USGS Master Station Banding Permit (#23049) (2001-2004)
CDFG Scientific Collecting Permit (in review)

Project Management Experience

Griffith Park Natural History Survey and Postfire Bio-monitoring. Researched and co-authored Griffith Park Wildlife Management Plan. Supervised development of website (www.griffithparkwildlife.org; with Cartifact, Inc.). Designed and carried out first-ever study of wildlife of Griffith Park, focusing on the 2007 burn area, including breeding/wintering birds, reptiles/amphibians, and bats with two subcontractors. Coordinated survey effort of reptiles/amphibians with USGS San Diego Field Station (Dr. Robert Fisher). Wildlife Management Plan submitted to City of Los Angeles, Dept. of Recreation and Parks on January 22, 2009; other technical reports submitted include those on bats (February 20, 2009) and birds (March 2, 2009).

Coastal Cactus Wren Survey, Los Angeles County. Organized and supervise a team of more than 20 volunteers for The Nature Conservancy (ongoing), the first-ever effort to document the actual range of this bird in the County.

Puente Hills Landfill Native Habitat Preservation Authority, Whittier, CA. As the staff ecologist, I managed $2M of restoration contracts in coastal sage scrub, oak/walnut woodland, and riparian habitats in western Puente Hills. I also developed and reviewed plant palettes and restoration design, and oversaw bio-monitoring of restoration sites (2007-08).

Audubon Christmas Bird Count. Organizer and compiler for two Los Angeles-area Christmas Counts: Los Angeles (since 2008) and Santa Clarita (since 2003). These are annual events that involve coordinating assignments and processing data sheets for 50+ volunteers, part of a worldwide effort to census birds each winter.

CoffeeReserve Program. Developed in 2006 with California-based coffee importer Rogers Family Co., this program has organized bird and wildlife surveys on supplier-farms in Chiapas, Mexico and Nicaragua, developed species lists and hiking maps for several properties, and pilot-testing an ecotourism internship program at a lodge/farm complex in northern Nicaragua in 2008.

Kingston Wildlife Research Station, Kingston, RI. Managed bird-banding station for Univ. of Rhode Island; other responsibilities included training volunteers, writing grants (obtained $10,000 for habitat management), bird/amphibian surveys of local natural areas (2005-06).

California Important Bird Area Project. From 2001-2004, researched, wrote and published the Important Bird Areas of California (Audubon California 2004), a compendium of 150 sites considered most critical for bird conservation in the state. This project involved convening a team of dozens of advisors and local experts from around the state, numerous site visits, and working with photographers, a layout designer, printer, and distribution company. This book now forms a cornerstone of Audubon's conservation work in California.

CEQA/NEPA Compliance

Marina del Rey Dredging and Sand-Separation Project, Los Angeles, CA. Designed survey protocol and carried out surveys and construction monitoring for wintering population of federally-threatened western snowy plover at Dockweiler State Beach. Attend weekly construction meetings with US Army Corps of Engineering and County of Los Angeles staff and contractors (ongoing).

Vista Canyon Ranch, Santa Clarita, CA. Conducted field visits, provided consultation on special-status plant and wildlife species as part of preparation of biological assessment of large parcel along the Santa Clara River (with Forde Biological Consultants and The River Project). Attend design meetings with developer, architect and consultants (ongoing).

Landmark Village, Newhall Ranch, Santa Clarita, CA. Provided analysis of and re-wrote special-status species accounts in Biological Resources section of EIR for large residential and commercial development along Santa Clara River for Audubon California (2007) and Pacific Coast Conservation Alliance (2008).

Broad Beach, Malibu, CA. Conducted field visits and helped prepare the Biological Assessment (with Robert A. Hamilton) for Malibu Bay Company development at Broad Beach. Analyzed impacts to potential ESHA (Environmentally Sensitive Habitat Area) at site (2008).

San Gabriel River Discovery Center, South El Monte, CA. Conducted bird surveys and habitat assessment and provided mitigation recommendations for proposed nature center and office/conference facility in the Whittier Narrows Recreation Area. Final reports submitted to the Los Angeles and San Gabriel Rivers and Mountains Conservancy November 7, 2008.

Faunal/Floral Surveys (clients listed in parentheses)

Bird surveys and analysis, incl. mist-netting, point-counts, spot-mapping, and/or walking transects:

- Playa Vista Riparian Corridor, Los Angeles, CA (ongoing, for E Read Consulting, Inc.)
- Ballona Wetlands Ecological Reserve, Playa del Rey, CA (ongoing; Friends of Ballona Wetlands)
- Ballona Freshwater Marsh, Los Angeles, CA (Center for Natural Lands Management)
- Ballona Outdoor Learning and Discovery site, Playa del Rey, CA (Ballona Wetlands Foundation)
- Malibu Lagoon, Malibu, CA (Resource Conservation District of the Santa Monica Mountains)
- Nicholas Creek mouth, Malibu, CA (Wishtoyo Foundation)

Miscellaneous bird surveys:

- Kern River Preserve, Weldon, CA (incl. MAPS Station; Kern River Research Center)
- Audubon Center in Debs Park, Los Angeles (incl. MAPS Station; Audubon California)
- Western Riverside Co. (UCR/Western Riverside County Multi-Species Habitat Conservation Plan; Dartmouth College)
- Audubon Sanctuaries in Central MA (Massachusetts Audubon Society)
- Kingston Wildlife Research Station, Kingston, RI (Univ. of Rhode Island)
- Angelus Oaks Transect, San Bernardino Mountains, CA (USGS Breeding Bird Survey)
- Pasoh Forest Reserve, Malayisa (Univ. of Malaysia)
- Chequamagon National Forest, Wisconsin (Univ. of Missouri)
- Private forest reserves in Guatemala, Costa Rica, Panama and Venezuela (various owners)

Biological assessments (multi-taxa):

- Cahuenga Peak, Los Angeles, CA (ongoing; The Trust for Public Land)
- Sanford-Avalon Community Garden, Watts, CA. Conduct (ongoing; Los Angeles Community Garden Council)
- Open space parcels in Northeastern Los Angeles, CA (Mountains Recreation and Conservation Authority)
- Mission Creek, South El Monte, CA (Los Angeles Conservation Corps)
- Elephant Hill, Montecito Heights (Los Angeles), CA (Committee to Save Elephant Hill)

Experience with Special-status Species

Coastal California gnatcatcher *Polioptila californica californica*
    More than 50 hours of experience conducting protocol surveys for this species in Los Angeles and Riverside counties; Discovered previously-unknown populations in western Puente Hills and northern Chino Hills (both Los Angeles Co.).
Western snowy plover *Charadrius alexandrinus nivosus*
    Surveyed for and monitored this species at Dockweiler State Beach, Los Angeles; volunteer for a countywide survey in Los Angeles County (Surfrider Foundation, Pacific Coast Conservation Alliance)
Western burrowing owl *Athene cunicularia hypugaea*
    Volunteered (Antelope Valley, Los Angeles Co., CA) on a statewide breeding population census for Institute for Bird Populations.
Mountain plover *Charadrius montanus*
Long-billed curlew *Numenius americanus*
    Volunteered in surveys for both grassland species in agricultural fields in the Imperial Valley, CA, with researchers from the Los Angeles Co. Museum of Natural History.
Coastal cactus wren *Campylorhynchus brunneicapillus sandiegensis*
    Organizing Los Angeles County portion of region-wide survey for The Nature Conservancy.
Least Bell's Vireo *Vireo bellii pusillis*
    Assessed potential breeding habitat at several sites in Los Angeles and Riverside counties.
Belding's savannah sparrow *Passerculus sandwichensis beldingi*
    Surveyed for this and other coastal wetland species at Ballona Freshwater Marsh and adjacent Ballona Wetlands.

Survey experience with the following additional special-status species:

BIRDS

Brant *Branta bernicla*
Cackling Canada goose *B. hutchinsii leucopareia*
Ruffed grouse *Bonasa umbellus*
California brown pelican *Pelecanus occidentalis californicus*
Double-crested cormorant *Phalacrocorax auritus*
Great egret *Ardea alba*
Great blue heron *Ardea herodias*
American bittern *Botaurus lentiginosus*
Snowy egret *Egretta thula*
Least bittern *Ixobrychus exilis*
Black-crowned night-heron *Nycticorax nycticorax*
Cooper's hawk *Accipiter cooperii*
White-tailed kite *Elanus leucurus*
Merlin *Falco columbarius*
Peregrine falcon *F. peregrinus*
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*
Southwestern willow flycatcher *Empidonax traillii extimus*
Brown-crested flycatcher *Myiarchus tyrannulus*
Loggerhead shrike *Lanius ludovicianus* (incl. *mearnsi*)
Least bell's vireo *Vireo bellii pusillus*
California horned lark *Eremophila alpestris actia*
Yellow warbler *Dendroica petechia*
Yellow-breasted chat *Icteria virens*
Southern California rufous-crowned sparrow *Aimophila ruficeps canescens*

Grasshopper sparrow *Ammodramus savannarum*
Bell's sage sparrow *Amphispiza belli belli*
Black-chinned sparrow *Spizella atrogularis*
Summer tanager *Piranga rubra*
Kern red-winged blackbird *Agelaius phoeniceus aciculatus*
Tricolored blackbird *Agelaius tricolor*
Yellow-headed blackbird *Xanthocephalus xanthocephalus*

OTHER WILDLIFE
Coast horned lizard *Phrynosoma coronatum*
Orange-throated whiptail *Aspidoscelis hyperythra*
Coastal western whiptail *Aspidoscelis tigris stejnegeri*
Ringneck snake *Diadophis punctatus*
Northern red-diamond rattlesnake *Crotalus ruber ruber*
San Diego black-tailed jackrabbit *Lepus californicus bennettii*

PLANTS
Southern California black walnut *Juglans californicus*
Hubby's Phacelia *Phacelia cicutaria* var. *hubbyi*
Catalina mariposa-lily *Calochortus catalinae*
Slender mariposa-lily *Calochortus clavatus*
Plummer's mariposa-lily *Calochortus plummerae*
Humboldt lily *Lilium humboldti*

Expert Witness/Declaration

Expert witness deposition regarding the ecological function of eucalyptus trees in the Malibu/Santa Monica Mountains area, Sidley vs. Thurman (settled out-of-court Oct. 2008).

Declaration in support of plaintiffs' motion for summary judgment in NEPA case involving stream-filling, Wishtoyo Foundation/Ventura Coastkeeper et al. vs. Francis J. Harvey, Secretary of the Army et al. and Pardee Homes. U.S. District Court, Central Coast of California (Nov. 2007).

Teaching

University of California, Los Angeles. *Instructor, UCLA Extension School*: Developed courses on conservation biology and bird monitoring, 2001 - 2003.

University of California, Riverside. *Graduate Teaching Assistant*: Geomorphology, Natural Disasters, and Astronomy, 1998-1999.

Boards/Committees

Griffith Park Postfire Recovery Team. Wildlife Team Leader, 2007-2008
California Department of Water Resources. Salton Sea Restoration Advisory Committee, 2003-2005
California Partners-in-Flight. Executive Steering Committee, 2003-2005
Los Angeles and San Gabriel Rivers and Mountains Conservancy. Tech. Advisory Board, 2002- 2005
Central Valley Habitat Joint Venture. Executive Steering Committee, 2001-2003
Friends of the Los Angeles River. Technical Advisory Board, 1989-2001

Professional Societies/Affiliations

Western Field Ornithologists
Neotropical Bird Club
Southern California Academy of Sciences
Southern California Botanists

Awards

Semifinalist honor, Interactive Media. International Science & Engineering Visualization Challenge (National Science Foundation/*Science*), for the website "Griffith Park Wildlife Management Plan", online at: www.griffithparkwildlife.org 2008.

Certificate of Appreciation, "In recognition of outstanding citizenship and activities enhancing community betterment" (City of Los Angeles), for service to the Griffith Park Postfire Recovery Team, 2008.

Audubon "ACE" Award, Debs Park Audubon Center planning team (National Audubon Society), 2001.

Education Project Award - University of California, Riverside (American Planning Association, Inland Empire Section), for the website "Understanding the Plants and Animals of the Western Riverside County Multiple Species Habitat Conservation Plan", online at www.ecoregion.ucr.edu, 2001.

Winner, Great Texas Birding Classic ("Team Wildbird", sponsored by Wildbird magazine), 1999.

Chronology

1995 - 1996	Research Associate, Kern River Research Center
1997 - 1999	Graduate Research Associate, Univ. of California, Riverside
1999 - 2001	Biologist, National Audubon Society
2001 - 2005	Dir. of Bird Conservation (California), National Audubon Soc.
2005 - 2006	Manager, Kingston Wildlife Research Station
2005 -	President, Cooper Ecological Monitoring, Inc.

Contact Information

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5850 W. 3rd St., #167
Los Angeles, CA 90036
Cell: 323.397.3562
Email: dan@cooperecological.com
Website: www.cooperecological.com

Publications

Books

Cooper, D.S. 2004. Important Bird Areas of California. Audubon California, Pasadena. 286 pp.

Book sections

Cooper, D.S. 2007. "Playa del Rey/Ballona Freshwater Marsh", p. 336, *In*: A Birder's Guide to Southern California, Schram, B., American Birding Association, Colorado Springs, CO.

---------------- 2005. "Ernest E. Debs Regional Park & Audubon Center", pp. 16-17, *In:* Birding Guide to the Greater Pasadena Area, Pasadena Audubon Soc., Pasadena, CA.

Peer-reviewed papers

Mathewson, P., S. Spehar and D.S. Cooper. 2008. A preliminary large mammal survey of Griffith Park, Los Angeles, California. Bull. So. Calif. Acad. Sci. 107:57-67.

Cooper, D.S. 2008. The use of historical data in the restoration of the avifauna of the Ballona Wetlands, Los Angeles County, California. Natural Areas Journal 28:83-90.

---------------- 2006. Annotated checklist of extirpated, reestablished, and newly-colonized avian taxa of the Ballona Valley, Los Angeles County, California. Bull. So. Calif. Acad. Sci. 105:91-112.

---------------- 2006. Shorebird use of a novel habitat: the lower Los Angeles River channel. Western Birds 37:1-6.

Cooper, D.S, R. Carmona, and R.A. Erickson. 2004. State of the Region: Baja California Peninsula. North American Birds 58:605-606.

Cooper, D.S. 2003. New distributional and ecological information on birds in southwestern Guatemala. Cotinga 19:61-64.

---------------- 2002. Geographical associations of breeding bird distribution in an urban open space. Biological Conservation 104:205-210.

---------------- 2000. Breeding landbirds of a highly-threatened open space: The Puente-Chino Hills, California. Western Birds 31:213-234.

---------------- 1999. Notes on the birds of Isla Popa, western Bocas del Toro, Panama. Cotinga 11:23-26.

Cooper, D.S. and C.M. Francis. 1998. Nest predation in a lowland Malaysian rainforest. Biological Conservation 85:199-202.

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Professional reports

<u>Ballona Wetlands</u>

Cooper, D.S. 2008. Quarterly bird survey, Fall 2008. Playa Vista Riparian Corridor, Los Angeles, California. Prepared for E Read and Associates, Orange, California, Oct. 27, 2008.

---------------- 2008 Breeding bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for E Read and Associates, Orange, California, July 2, 2008.

---------------- 2008. 2007-08 Winter bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for E Read and Associates, Orange, California, Jan. 12, 2007.

---------------- 2007. 2007 Fall bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for E Read and Associates, Orange, California, Oct. 8, 2007.

---------------- 2007. 2007 Breeding bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, July 13, 2007.

---------------- 2007. Chapter 6: Birds of the BOLD Project Site. In: J.H. Dorsey and S. Bergquist (Eds.), "A baseline survey of the Ballona Outdoor Learning & Discovery (BOLD) Area, Ballona Wetlands, Los Angeles County, California". Report submitted to The California Coastal Conservancy and Santa Monica Bay Restoration Commission by the Ballona Wetlands Foundation, April, 2007.

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---------------- 2006. 2006 Fall bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, Oct. 23, 2006.

---------------- 2006. 2006 Breeding bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, July 14, 2006.

---------------- 2006. 2005-06 Winter bird survey. Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, Jan. 7, 2006.

---------------- 2005. 2005 Fall bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, Nov. 8, 2005.

---------------- 2005. 2005 Breeding bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, July 11, 2005.

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---------------- 2004. 2004 Breeding bird survey, Ballona Freshwater Marsh at Playa Vista, Playa del Rey, California. Prepared for the Center for Natural Lands Management, Fallbrook, California, July 25, 2004.

---------------- 2004. Ballona Wetlands Training Manual, Audubon Ballona Wetlands Program. 54 pp.

<u>Misc. Los Angeles area</u>

Cooper, D.S. 2008. Ecological assessment of open space remnants in northeastern Los Angeles. Prepared for Mountains Recreation and Conservation Authority (MRCA), Los Angeles, Calif. Nov. 15, 2008.

---------------- 2008. Summer bird survey for San Gabriel River Discovery Center. Prepared for Los Angeles and San Gabriel Rivers and Mountains Conservancy (RMC), Azusa, Calif. Nov. 7, 2008.

---------------- 2008. Habitat Assessment for Whittier Narrows Natural Area (eastern portion). Prepared for Los Angeles and San Gabriel Rivers and Mountains Conservancy (RMC), Azusa, Calif. Nov. 7, 2008.

---------------- 2008. Biota report for La Habra Heights reservoir relocation project, La Habra Heights, Los Angeles Co., California. Prepared for Civiltec Engineering, Inc., Monrovia, California. Oct. 3, 2008.

Forde, A.M. and E. Read, with D.S. Cooper, D. Crawford, I.P. Swift and R. Francis, Jr. 2008. Biological Assessment, Vista Canyon Ranch, Los Angeles Co., California. Prepared for Vista Canyon Ranch, LLC (Valencia, Calif.) and The River Project (Studio City, Calif.), August 27, 2008.

Cooper, D.S. 2008. Protocol survey for California Gnatcatcher *Polioptila californica* at "Terraces at Hidden Hills" in Calabasas, Los Angeles County, California. Prepared for Impact Sciences, Camarillo, California. June 12, 2008.

---------------- 2008. Protocol survey for California Gnatcatcher *Polioptila californica* at "KRLA site" near Walnut/Covina, Los Angeles County, California. Prepared for Impact Sciences, Camarillo, California. June 12, 2008.

---------------- 2008. Initial Biological Assessment: Mission Creek. Prepared for Los Angeles Conservation Corps. March 31, 2008.

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---------------- 2007. Protocol survey for California Gnatcatcher *Polioptila californica* at the "pit", a former quarry site adjacent to Claremont College (Los Angeles/San Bernardino counties), Spring 2007. Prepared for Impact Sciences, Camarillo, California. June 22, 2007.

---------------- 2006. Birds of Malibu Lagoon: Final Report, 2006. Prepared for the Resource Conservation District of the Santa Monica Mountains, Topanga, California, August 8, 2006.

---------------- 2005. Breeding bird survey, Nicholas Creek mouth, Malibu, California. Prepared for the Wishtoyo Foundation, Oxnard, California, June 10, 2005.

---------------- 2005. Debs Park Teacher-Naturalist Training Manual, Audubon Center at Debs Park, 45 pp.

---------------- 2004. Rapid Biological Assessment of Elephant Hill (Los Angeles/South Pasadena, CA). May 25, 2004.

---------------- 1999. Debs Park Habitat Management Plan. Audubon Center at Debs Park, 24 pp.

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Latin America

Cooper, D.S. 2007. Ecological assessment of five coffee farms in north-central Nicaragua. Prepared for Rogers Family Companies, Apr. 28, 2007.

---------------- 2006. Ecological assessment of seven coffee farms in the Soconusco region of Chiapas, Mexico. Prepared for Rogers Family Companies, Dec. 1, 2006.

Popular articles

Los Angeles County Sensitive Bird Species Working Group (incl. Daniel S. Cooper). 2008. Los Angeles County's Sensitive Bird Species. *Western Tanager* (newsletter of Los Angeles Audubon Society) 75:E1-E11.

Cooper, D.S. 2007. Wildlife response to the Griffith Park fire. *Water Wise* (newsletter of the Los Angeles and San Gabriel Rivers Watershed Council) 11(1):10-11. Fall 2007.

---------------- 2005. A duck club in L.A.?: The near-death and slow recovery of the Ballona Wetlands. *California Waterfowl*. June/July 2005.

---------------- 2005. Birding the Ballona Wetlands. *Winging It* (newsletter of American Birding Association). 17(2):1-4.

---------------- 2000. Rediscovering the lower Arroyo Seco. *Western Tanager* 67:1-3.

---------------- 2000. ("Off the beaten path") The Huntington Library. *Western Tanager* 66:6-7.

---------------- 1999. From the front lines: a birding tour leader offers his perspective. *Wildbird*. October, 1999.

Conference Presentations

Cooper, D.S. Cactus Wrens of the Puente-Chino Hills: 1998 - 2008 (presentation). *Coastal Cactus Wren Symposium*. April 1, 2008. Irvine Ranch Water District, Irvine, CA.

---------------- Rethinking "Shade-grown" (presentation, in Spanish). *Annual meeting of Rogers Family Company coffee suppliers* (c. 50 growers from throughout Latin America). August 2, 2007. Selva Negra Lodge, Matagalpa, Nicaragua.

---------------- Wildlife of Griffith Park (presentation). *Los Angeles and San Gabriel Rivers Watershed Council Symposium*. June 20, 2007. The Autry National Center in Griffith Park, Los Angeles, CA.

---------------- Avian extirpation and colonization at the Ballona Wetlands, Los Angeles County, California (presentation). *Southern California Academy of Sciences Annual Meeting*, May 20-21, 2005, Loyola Marymount University, Los Angeles, CA.

---------------- Important Bird Areas of California (presentation). *California All-Bird Conservation Workshop*. November 15-16, 2004, Sacramento, CA.

Cooper, D.S. and E. Galicia (co-moderators). Community participation, birding trails and birding festivals – tools for IBA outreach and implementation. *Important Bird Areas Conference*, August 14, 2004. Sierra Vista, AZ.

Cooper, D.S. An exploration of the importance of the Salton Sea and associated ecosystems to birds (presentation). *California Water Dialogue*, Sept. 16, 2003. San Diego, CA.

---------------- Fall migration of shorebirds along the lower Los Angeles River (poster). *27th Annual Meeting of the Western Field Ornithologists*. October 10-13, 2002. Irvine, CA.

---------------- The use of riparian bird species as indicators of restoration success in the Los Angeles area (presentation). *Southern California Academy of Sciences Annual Meeting*, May 19-20, 2000, University of Southern California, Los Angeles, CA.

Cooper, D. and T. Scott. Patterns of breeding bird distribution in a large urban open space reserve (presentation). *4th International Urban Wildlife Conservation Symposium*. May 1-5, 1999. University of Arizona. Tucson, AZ.

Wehtje, W. and D.S. Cooper. Range expansion in the Great-tailed Grackle (poster). *North American Ornithological Conference*. April 6-12, 1998. St. Louis, MO.

Cooper, D.S. Southern California's camouflaged national parks: military reservations (presentation). *Nature's Workshop: Environmental Change in 20th Century Southern California*. Sept. 18-20, 1997. California State University, Northridge, CA.

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RECENT EMPLOYMENT & EXPERIENCE

2002-present **President**, *InnoVeyda-BioVeyda Consulting. Torrance, CA., USA*
Performing projects, and providing advice, regarding taxonomy, biodiversity assessments, research, project management, and data processing. Most recently completed project: Family-level Invertebrate Inventory of the Santa Monica Mountains Recreation Area, for the National Park Service. Pending project: Invertebrate Survey of the Madrona Marsh Preserve in Torrance, California, for the City of Torrance and the Friends of Madrona Marsh.

2002-present **Docent and Photographer**, *Friends of Madrona Marsh. Torrance, CA., USA*
Researching and photo-documenting the biodiversity at the Madrona Marsh Preserve. Educating youth on ecosystems, as well as on environmental issues in general. Planning, coordinating, and leading educational tours of one of the last remaining vernal marsh eco-systems in L.A. County.

2000-present **Docent**, *Children's Nature Institute. Los Angeles, CA., USA*
Introducing inner city and at-risk children to nature by leading hands-on educational field trips in the Santa Monica Mountains National Recreation Area and other natural areas in L.A. County.

2003-2006 **Vice-President of the Board of Directors**, *Friends of Madrona Marsh. Torrance, CA., USA*
Organizing and presiding board meetings, planning and coordination of restoration efforts, and curriculum and policy development and implementation.

2002 **Visiting Professor**, *Computer Science Department, Lamar University. Beaumont, TX., USA*
Taught graduate courses in Pattern Recognition, Image Processing, and Machine Learning.

1998-2001 **Director**, *Advanced Signal and Image Processing, IOS. Torrance, CA., USA*
Scientific research, as well as team and project management.

EDUCATION

1991 Ph.D. degree in Computer Science
minor in Mathematics, *University of Alabama in Huntsville, Huntsville, AL, USA*

1986 M.Sc. and B.Sc. equivalents in Information Science
minor in Biology with focus on Zoology and Ecology, *University of Amsterdam, The Netherlands*

SUPPLEMENTAL EDUCATION

- Environmental Restoration, *California State University, Dominguez Hills and El Camino College,* Fall 2003
- Environmental Interpretation, *California State University, Dominguez Hills and El Camino Coll.,* Spring 2004
- Wilderness Training Course, *The Los Angeles Chapter of the Sierra Club,* Winter 2006

OTHER PROFESSIONAL ACTIVITIES

- Performed thousands of taxonomic identifications, predominantly of Southern Californian invertebrates
- Taught *Entomology*, as part of the Pasadena City College course: *Zoology*, Pasadena, 2007
- Taught *Insects & other Invertebrates and their Habitats*, for the California State University, Dominguez Hills and El Camino College joint course on Environmental Restoration, September 2007
- Invited speaker and lecturer for scientific panels and short courses
- Reviewed and edited publications in a range of scientific disciplines
- Author of more than sixty scientific publications and two pending patents

LANGUAGE SKILLS

English, Dutch, German, basic French, and a dash of Hindi

Camm Churchill Swift, Ph.D.

SENIOR PROJECT BIOLOGIST

DISCIPLINE/SPECIALTY

- Ichthyology
- Fishery Biology
- Estuarine Biology

EDUCATION

- Ph.D., Department of Biology, Florida State University, Tallahassee, 1970
- M.A., Department of Zoology, University of Michigan, Ann Arbor, 1965
- A.B., Department of Zoology, University of California, Berkeley, 1963

TRAINING/CERTIFICATIONS

- California Department of Fish and Game-Resident Scientific Collecting Permit No. 801056-01 with Memoranda of Understanding covering federally listed tidewater goby, Santa Ana sucker, unarmored threespine stickleback, southern steelhead & incidental take of redlegged frog and Species of special concern arroyo chub and speckled dace.
- USFWS U. S. Fish and Wildlife Service Scientific Collecting Permit (10A) No. TE793644-5 for tidewater goby, Santa Ana sucker and unarmored three-spined stickleback
- NOAA Fisheries project specific southern steelhead handling permit

SUMMARY OF QUALIFICATIONS

Dr. Swift is one of the leading authorities on the biology, management, and conservation of the fresh and brackish water fishes of coastal southern California. He served on the Recovery Teams for the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) and tidewater goby (*Eucyclogobius newberryi*), both federally endangered species, and was an author for the recovery plans for both fish. He currently serves on the Technical Recovery Teams for tidewater goby (U. S. Fish and Wildlife Service) and southern steelhead (National Marine Fisheries Service). Dr. Swift is a member of the Desert Fishes Council.

With over 30 years of experience working in the field, Dr. Swift is one of the most knowledgeable persons in the state on the status and distribution of freshwater fishes of coastal southern California. He has a strong understanding of their biology, requirements for recovery, and habitat restoration needs to improve their conservation status. He has worked with a wide variety of public and private agencies to conserve these species and advise on habitat restoration for their benefit.

Dr. Swift also has major expeditionary experience in the fresh and estuarine waters of the southeastern United States, marine shore fishes of Pacific coastal Mexico and Costa Rica (including Cocos Island), the Indus River Delta, Pakistan, and Amazonian Peru. He has done extensive fieldwork, led field crews, conducted literature searches, and written several comprehensive reports and peer reviewed publications. He serves as an expert witness in fishery conservation issues. He also has considerable experience in identification and analysis of archaeological and fossil fish bones from the southeastern United States, southern California, and coastal Pakistan.

RELEVANT EXPERIENCE

RESEARCH EXPERTISE

Dr. Swift is a recognized expert in the biology, conservation, and paleontology of freshwater and estuarine fishes in coastal southern California, including the federally endangered brackish water species, the tidewater goby, *Eucyclogobius newberryi*, the migratory (anadromous) and federally listed steelhead (*Oncorhynchus mykiss*), and the federally threatened Santa Ana sucker (*Catostomus santaanae*). Of approximately eight species of freshwater fishes native to the Los Angeles Basin, the Santa Ana sucker, Santa Ana speckled dace (*Rhinichthys csculus ssp*.), and arroyo chub (*Gila orcutti*) are endemic in this region and have been highly impacted by man. The severe alteration of freshwater and estuarine habitat in much of California has led to most of the freshwater and brackish water species having special conservation status.

Estuarine Fishes of Ballona Marsh, Los Angeles County, California

Dr. Swift is coauthor of "Estuarine Fish Communities of Ballona Marsh [Los Angeles County]", In: Ralph Schrieber, Ed., Biota of the Ballona Region, Los Angeles County. Suppl. No. 1, Marina del Rey/Ballona Local Coastal Plan, Los Angeles Co. Dept. Regional Planning. This one year study sampled fishes monthly at 13 stations in the marsh and provided the most comprehensive study of the fish communities of the marsh to date. It continues to be followed to monitor changes to the fish community. Currently Dr. Swift serves on the Scientific Advisory Committee for the Ballona Marsh Restoration.

Study of Santa Ana Sucker Biology on the Middle Santa Ana River, Riverside, California

As part of the Santa Ana Sucker Conservation program on the Santa Ana River, Dr. Swift participated in a long-term study to assess the population size and distribution of Santa Ana Suckers in the Santa Ana River near the city of Riverside, California. The program was administered by the multi agency Santa Ana Water Projects Authority (SAWPA) in Riverside. Survey protocols included annual summer surveys employing electrofishing using three pass depletion transects at locations in the mainstem Santa Ana River near the city of Riverside. Santa Ana suckers were measured, weighed, and tagged with PIT tags if over about 80 mm standard length. Dr. Swift holds federal permits for capture, handling and PIT tagging of the suckers. In addition to the mainstem river sites, electrofishing efforts were conducted at sites in the mainstem and tributaries of the river to detect tagged suckers. Dr. Swift participated in the program from 1999-2003, which formed the beginning of a long term annual survey of population size, movements and distribution of the Santa Ana sucker in the river.

U.S. Geological Survey, National Water-Quality Assessment Program, Santa Ana River, California

Dr. Swift participated in the USGS NAWQA program, a nationwide river monitoring and quality assessment designed to assess the status and trends in the quality of freshwater streams and aquifers, and to provide a sound understanding of the natural and human factors that affect the quality of these resources. The program included a three year survey of Santa Ana suckers on the Santa Ana River. Survey protocols required electrofishing of a total of one kilometer of river in 100-meter increments at two localities on the Santa Ana River. The goal of this assessment was to characterize, in a nationally consistent manner, the broad-scale geographic and seasonal variations of water-quality related to major contaminant sources and background conditions.

California Department of Fish and Game Native Fish Surveys, San Gabriel River, California

The California Department of Fish and Game periodically assesses the status of wild trout, Santa Ana sucker, speckled dace, and arroyo chubs in the San Gabriel River system. Dr. Swift participated in four of these sampling efforts in the early 1990s. Survey protocols included electrofishing with three pass depletion of 100 meter transects in the West Fork of the San Gabriel River and its tributary Bear Creek. Fish were identified, measured and released back to the stream.

Restoration of the Santa Maria River Estuary, Santa Barbara County, California

Dr. Swift prepared a historical analysis of coastal estuaries, habitat change, and restoration options for the estuary at the mouth of the Santa Maria River, Santa Barbara County, California for California Department of Fish and Game Oil Response Team, for its contribution to the Trustees of Guadalupe Site, through Hagler-Bailly Inc., Boulder, Co. Fieldwork. In addition, Swift collaborated with ENTRIX biologists in surveying the estuary for tidewater gobies and preparing a report on their current status at the site.

Big Tujunga Mitigation and Restoration, Sunland, California

On behalf of the Los Angeles County Department of Public works, Dr. Camm Swift, with Dan Holland, designed and implemented the exotic removal program at Big Tujunga Wash from 2000 to 2004. Work included extensive trapping for crayfish, gill netting and snorkeling for bass, removal of bullfrog egg masses, and monitoring of the three native fish species in Haines Creek. Dr. Swift was instrumental in making recommendations with respect to the refinement of methods, equipment needs and sampling design and strategy. Effectiveness monitoring of the eradication efforts included periodic surveys of the native fishes in the streams at randomly selected transects along the 1.7 km of stream in the mitigation area.

Expert Witness Testimony Big Tujunga Wash, California

In support of the California Department of Fish and Game's Community Arbitration with Foothill Golf and Development in California State Superior Court, Los Angeles, Dr. Swift provided extensive and detailed information on the biology of Southern California Coastal Minnow and Santa Ana Sucker to support the Department's position of the extreme importance of the wash habitat for the continued existence of the native fishes and other native species in this surviving remnant fish community consisting of the Santa Ana sucker (federally threatened) and Santa Ana speckled dace and arroyo chub, both California species of special concern.

Exotic Predators on Tidewater Gobies on Marine Corps Base Camp Pendleton

Dr. Swift, working with Mr. Holland, used their extensive experience on the Base to prepare a management plan for exotic fishes and other species on Marine Corps Base Camp Pendleton. Many of these prey on tidewater gobies and this plan included methods for removal of exotics and for prevention or minimizing their impact on native aquatic species. Since 1998, Dr. Swift has led teams of biologists to implement the exotic species removal plan at San Mateo Lagoon on the Base.

San Juan Creek Native Fish Survey – La Novia Bridge, San Juan Capistrano, California

Dr. Swift provided biological support and pre-construction monitoring for a project involving widening of the La Novia Street Bridge over San Juan Creek. The project included field surveys and monitoring, developing best management practices for fish avoidance and developing mitigation measures for post-construction planning. Species of concern included migrating southern steelhead, unarmored three-spine stickleback and arroyo chub.

Tidewater Gobies on Vandenberg Air Force Base

Cooperative Agreement between National Biological Service (now part of USGS) and Loyola Marymount University for study of the biology of the federally endangered tidewater goby on Vandenberg Air Force Base, Santa Barbara County. Included three to four paid undergraduate research assistants at Loyola Marymount University. This contract extended for two years and comprehensively studied the biology and distribution of the tidewater gobies at five sites on Vandenberg Air Force Base. A comprehensive report detailed many aspects of needs for restoration of habitats on the Base.

Bixby Ranch Steelhead, Tidewater Goby and California Red-Legged Frog Baseline Habitat Assessment, Santa Barbara, California

Dr. Swift conducted a baseline biological assessment of the Bixby Ranch in Santa Barbara, California. The focus of this assessment was to assess aquatic habitat conditions as it pertains to steelhead, tidewater goby, California red-legged frog, and southwestern pond turtle. Terrestrial habitat was also assessed but was limited by access constraints. New populations of tidewater gobies were discovered during this assessment.

Tidewater Gobies on Marine Corps Base Camp Pendleton

Dr. Swift, working with Mr. Dan Holland, did multiple surveys from 1991 to 2000 for the tidewater gobies and other members of the estuarine fish community at seven estuaries and lagoons on Marine Corps Base Camp Pendleton, coastal southern California. They provided the first descriptions of the estuarine fish communities for several of these sites and provided recommendations for maintenance and improvement of habitat for the species on the Base. With Dan Holland, Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California for Marine Corps Base Camp Pendleton

SURVEYS OF FRESHWATER FISHES OF SOUTHERN CALIFORNIA

Dr. Swift has extensive experience surveying, researching and studying freshwater species of special concern. A representative sample of these surveys includes:

- Advised a Six Agency committee of southern California water and power purveyors, including Metropolitan Water District of Southern California] on the quality and rationale for U.S. Fish and Wildlife Service Critical Habitat designations for endangered big river fishes of the Colorado River, southwestern United States. Responsibilities included expert testimony, literature research and report writing.
- Supervised crews of three to six graduate students surveying the estuarine and freshwaters of southern California for fishes for four months and prepared report for the California Department of Fish and Game on the status and distribution of these fishes, at Natural History Museum of Los Angeles County.
- Evaluated the status of the native freshwater fishes of southern California, including the status of the estuarine tidewater goby, *Eucyclogobius newberryi*, with recommendations for preserves to maintain their existence. California Department of Fish and Game Contract FG-7455, one year. Compiled data bases on fish records collaborating with Peter Moyle, U. C. Davis, to incorporate data into the California Department of Fish and Game's Natural Heritage Data Base, at Natural History Museum of Los Angeles County.
- Participated in a Cooperative Agreement between National Biological Service (now part of USGS) and Loyola Marymount University for study of the biology of the federally endangered tidewater goby on Vandenberg Air Force Base, Santa Barbara County. Included three to four paid undergraduate research assistants at Loyola Marymount University.

- Analyzed bottom samples from Delta Mendota Canal, central California, for invertebrate densities of the Asiatic clam, *Corbicula fluminea*, as a research assistant Zoology Department, University of California, Berkeley.
- Identified freshwater and coastal fish habitats to determine Significant Ecological Areas for Regional Planning Department, Los Angeles County, via contract to Natural History Museum of Los Angeles County.
- Co-author, U.S. Fish and Wildlife Service Recovery Plan for Endangered Unarmored Threespine Stickleback, as member of Unarmored Threespine Stickleback Endangered Species Recovery Team.
- Author, Estuarine Fish Communities of Ballona Marsh [Los Angeles County], In: Ralph Schrieber, Ed., Biota of the Ballona Region, Los Angeles County. Suppl. No. 1, Marina del Rey/Ballona Local Coastal Plan, Los Angeles Co. Dept. Regional Planning.
- Served on an expert panel, habitat suitability criteria and curves for three native cyprinoid fishes (state species of special concern) of the Santa Ana River, southern Calif., EA Engineering and Technology (Lafayette, California) for Southern California Edison Company.
- Surveyed for freshwater fishes of the Los Angeles River. Field work and report writing, as part of contract from the California Department of Fish and Game to the Natural History Museum of Los Angeles County, to assess the fauna and flora of the river.
- Monitored populations of native federally endangered fish species during streambed alterations in the Santa Clara River, southern. Performed both field work and report writing.
- Surveyed for the proposed endangered fish, the tidewater goby, in coastal estuaries of Camp Pendleton Marine Base, southern California. Performed both field work and report preparation.
- Surveyed for the federally endangered tidewater goby in the estuarine Shuman Lagoon, Vandenberg Air Force Base, Santa Barbara County, California for U.S. Fish and Wildlife Service, Ventura Field Office,
- Analyzed diet of the endangered bird, the least tern, with Patricia Baird, Department of Biology, California State University, Long Beach. Under U.S. Navy contract (to P. Baird) at Long Beach, with three undergraduate research participants at Loyola Marymount University.
- Prepared draft recovery plan for tidewater goby as a member of the Tidewater Goby Technical Recovery Team, with U. S. Fish and Wildlife Service, Ecological Services, Ventura California.
- Prepared historical analysis of coastal estuaries, habitat change, and restoration options for the estuary at the mouth of the Santa Maria River, Santa Barbara County, California for California Department of Fish and Game Oil Response Team, for its contribution to the Trustees of Guadalupe Site. Performed field work, research and report writing in collaboration with ENTRIX, Inc., retained by UNOCAL Corporation.
- Surveyed for the endangered fish species, the tidewater goby on Marine Corps Base Camp Pendleton, coastal southern California, and provide recommendations for maintenance and improvement of habitat for the species on the Base. With Dan Holland, Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California for Marine Corps Base Camp Pendleton.
- Prepared management plan for exotic fishes on Marine Corps Base Camp Pendleton, including methods for removal of exotics and for prevention or minimizing their impact on native aquatic species. With Dan Holland (Principal Investigator), Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California.
- Surveyed for native and introduced freshwater fishes in the middle Santa Ana River in the Prado Dam vicinity with special reference to Santa Ana sucker and arroyo chub. For U. S. Army Corps of Engineers, Los Angeles California.
- Surveyed, downstream trapping, and analysis of habitat quality for the three endangered fishes (southern steelhead, tidewater goby, and unarmored threespine stickleback) in San Antonio Creek, Santa Barbara County for Vandenberg Air Force Base.

- Surveyed, downstream trapping, and food habit studies of Santa Ana suckers in the Santa Ana River to document movements into diversions and impact of exotic species on suckers. Phase II for Santa Ana Water Project Authority, Riverside, California.
- Expert witness on Southern California Minnow/sucker community for California Department of Fish and Game in their arbitration with Foothill Golf and Development, State Superior Court, Los Angeles, No. 99-0600-DW (This fish community consists of Santa Ana sucker, Santa Ana speckled dace, and arroyo chub).
- Prepared preliminary assessment of impacts of shore dredging on the fisheries of Big Bear Lake, for Big Bear Municipal Water District.
- Surveyed and estimate population sizes of endangered unarmored threespine stickleback and tidewater goby, and analyze steelhead habitat on several drainages on Vandenberg Air Force.
- Monitored population of tidewater goby in San Luis Obispo Creek Lagoon in relation to Avila Beach clean up site. For Unocal through Essex Environmental, San Luis Obispo.
- Surveyed for tidewater gobies in Santa Clara River Lagoon, Ventura County. For City of Ventura California.
- Surveyed for populations of sensitive native freshwater fish in the Santa Ana River near Colton and Loma Linda, California.
- Surveyed for populations of native fishes in the Santa Ana River in the vicinity of the Interstate 210 crossing, for Cal Trans, California.
- Monitored for Santa Ana suckers and assess effects of bridge maintenance, sand mining, and alternative bridge design on this fish. For Riverside County Transportation Department.
- Surveyed for the federally endangered tidewater goby in lower San Luis Rey River, California. with Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California.
- Surveyed and monitored for the federally endangered tidewater goby in San Mateo Lagoon, Camp Pendleton Marine Corps Base with recommendations for restoration and recovery..
- Interaction of native and exotic freshwater fishes during El Nino disturbance in the Santa Margarita River, southern California. With USGS Laboratory, San Diego State University with partial support of the Nature Conservancy.
- Determined possible effects on steelhead of UNOCAL remediation of soil contamination in the vicinity of the lower Santa Maria River.
- Reviewed and assessed mitigation features for Seven Oaks Dam on the Santa Ana River in relation to populations of Santa Ana sucker downstream. For the U. S. Army Corps of Engineers.
- Review and assess mitigation plans and Biological Assessments for tidewater goby and steelhead in relation to Lower Mission Flood Control Project of U. S. Army Corps of Engineers. For City of Santa Barbara, California.
- Survey for fishes and assess possible impacts of the construction of a pipeline crossing over Dominguez Channel in Wilmington.
- Directed surveys for Santa Ana speckled dace in lower Fremont, Blackstar, and Silverado canyons, Orange County.
- Survey for native freshwater fishes and advise on mitigation for quarry operations at the mouth of Fish Canyon, near Azusa, California.
- Implement eradication plan for exotic fishes in Los Angeles County Public Works mitigation area of lower Big Tujunga Canyon-Haines Creek area. With Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California, for Los Angeles County Department of Public Works.
- Identify freshwater fossil fish remains from a variety of late Pleistocene freshwater sites in Riverside County.

- Monitor, rescue, and transfer federally threatened Santa Ana suckers from diversion of Santa Ana River, Orange County. For U. S. Corps of Engineers
- Provide assessment of impacts of changes in water flow from San Bernardino Infiltration and Extraction Wastewater Treatment Facility (RIX) on populations of Santa Ana sucker. For City of San Bernardino.
- Survey for native fishes in relation to highway crossing of streams at Temecula Creek, San Diego County and Chino Creek, San Bernardino County for CalTrans.
- Provide assessment of impacts and mitigation possibilities for native sensitive fish species in lower San Juan Capistrano Creek, Orange County and lower San Mateo Creek, northern San Diego County for various alternatives of the proposed new highways. For Foothill/Eastern Transportation Corridor Agency.
- Provide expertise and fieldwork to study steelhead in Topanga Creek including snorkel surveys, habitat assessment, and up and downstream migrant trapping. With Resource Conservation District of the Santa Monica Mountains, Topanga, California.
- Prepare draft Recovery Plan for combined South Central Coast Steelhead (federally threatened) and South Coast Steelhead (federally endangered) as member of NOAA Technical Recovery Team for Southern Steelhead.

PROFESSIONAL AFFILIATIONS AND HONORS

Dr Swift has held various elected and appointive positions in the California-Nevada Chapter of the American Fisheries Society, Southern California Academy of Sciences, and American Society of Ichthyologists and Herpetologists. Secretary, Vice-president, and President of the Academy; elected President-elect, and proceeded to President, and past President of California Nevada Chapter, 1997-1999. Served on host committees for Los Angeles meetings of the American Society of Ichthyologists and Herpetologists (twice), Society of Vertebrate Paleontology, California-Nevada Chapter of the AFS, and the Southern California Academy of Sciences (three times).

Dr. Swift served as a member of the Unarmored Threespine Stickleback Endangered Species Recovery Team (1972-1995). He currently serves on the Technical Recovery Team for the Tidewater Goby (2003-present), both for U.S. Fish and Wildlife Service, and is a member of the Southern Steelhead Technical Recovery Team (2003-present) for the National Marine Fisheries Service.

Dr. Swift was elected Fellow of the Southern California Academy of Sciences in 1991 and named Emeritus Associate Curator of Fishes, Natural History Museum of Los Angeles County in 1993. He received the Award of Excellence from California Nevada Chapter of the American Fisheries Society in 1997.

Dr. Swift is an active member in numerous professional associations including: American Fisheries Society, including California Nevada Chapter, Estuarine Research Foundation, American Society of Ichthyologists and Herpetologists, Desert Fishes Council, Southeastern Fishes Council, Society of Vertebrate Paleontology, Sigma Xi (Loyola Marymount University Chapter), American Association for the Advancement of Science, Southern California Academy of Sciences, Society for Conservation Biology, Society of Systematic Biology, Biological Society of Washington, Japanese Ichthyological Society, Western Field Ornithologists, and California Native Plant Society

EMPLOYMENT HISTORY

- ENTRIX, Inc., Senior Project Scientist, Ventura, California, September, 2003 - present
- Emeritus Associate Curator, Natural History Museum of Los Angeles County, January, 1993 - present
- Part-time instructor, Mount San Antonio College, 1993 - 1994
- Visiting Assistant Professor of Biology, Loyola Marymount University, Los Angeles, 1994 - 1998
- Part-time instructor, East Los Angeles, Rio Hondo, and Valley colleges, 1993-1994, 1998 - 1999

- Associate Curator of Fishes, Natural History Museum of Los Angles County; and Adjunct Assistant Professor of Biology, University of Southern California, 1970 - 1993

PUBLICATIONS

PUBLICATIONS: 1993-PRESENT

- Swift, T. H. Haglund, M. Ruiz, and R. Fisher, 1993. Status and distribution of the freshwater fishes of southern California. *Bulletin Southern California Academy of Science*, 92(3):101-168.
- Swift, C.C., 1996, Chapter 30, Distribution and migration, Pp. 595-630, (excluding literature cited in single collection at end of book). In: Carl Bond, *Biology of Fishes*, (textbook) Second Edition, Harcort, Brace, and Co., Philadelphia.
- Lafferty, K., R. Swenson, and C. C. Swift, 1996, Tidewater Goby; Endangered Species Profile, *Environmental Biology of Fishes*, 46:254.
- Swift, C.C., 1998. The fish fauna of Ballona Marsh, an urban estuary on the western Los Angeles Basin, p. 1427 (Abst), In: Orville T. Magoon, et al. Eds, *California and the World Ocean '97*, 2 vols. American Society Civil Engineers, Reston, VA
- K. Lafferty, C. C. Swift and R. Ambrose. 1999. Postflood persistence and recolonization of endangered tidewater goby populations, *North American Journal of Fisheries Management*, 19(2):618-622.
- K. Lafferty, C. C. Swift and R. Ambrose, 1999, Extirpation and recolonization in a metapopulation of an endangered fish, the tidewater goby, *Conservation Biology*, 13(6):1447-1453.
- Swift, K. Hieb, and R. Swenson, 2002, Family Gobiidae, pp. 7-9. IN: William S. Leet, Christopher M. Dewees, Richard Klingbeil, and Eric J. Larson (editors), *California's Living Marine Resources: A status report*. The Errata. California Department of Fish and Game, Sacramento, California (December, 2001) (www.dfg.ca.gov/mrd) [The larger work appeared in hard copy in earliest 2002 minus this Gobies article later added to an electronic Errata on the web site for inclusion in the Section on Bay and Estuarine Finfish Resources]
- M. N. Dawson, K. D. Louie, M. Barlow, D. K. Jacobs, and C. C. Swift, 2002, Comparative phylogeography of sympatric sister species, *Clevelandia ios* And *Eucyclogobius newberryi* (Teleostei, Gobiidae), across the California Transition Zone, *Molecular Ecology*, 11, 1065-1075.
- Swift and D. C. Holland, 2002, "Exotic Fish Species and Their Impacts On Small Costal Lagoons In Southern California," (Abst.) *Bulletin Southern California Academy of Science*, 101(2), Supplement, p. 32
- Swift, C.C., 2002. Interaction between native fish, habitat,and exotic fish species in the middle Santa Ana River, Southern California, (Abst.) *Bulletin Southern California Academy of Science*, 101(2), Supplement, p. 32.
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- Feeney, R. and C. C. Swift. 2008. Description and ecology of larvae and juveniles of three native cypriniforms of coastal southern California. Ichthyological Research, 55(1):65-77.
- Buth, D. G., J. Sim, and C. C. Swift. 2008. 64. Genetic confirmation of hybridization between *Catostomus fumeiventris* and *Catosotmus santaanae* (Cypriniformes: Catostomidae) in the Santa Clara drainage. Bulletin of the Southern California Academy of Sciences, 107(2):121-122. (Abstract)
- Swift, C. C., S. L. Drill, and L. McAdams. 2008. Section 1. Study overview, native species, and value of non-native fishes in the Los Angeles River. pp. 2-22. IN: Shelly Backlar, Lewis McAdams, Ramona Marks, Alicia Katano, and Jonathan Brooks (Editors). State of the River 2 The Fish Study. Friends of the Los Angeles River (FOLAR), Los Angeles, CA

- C. C. Swift and S. Howard. 2009. Status of Pacific lamprey, *Entosphenus tridentata*, south of Pt. Conception. IN: Symposium Volume. Lampreys of the Pacific Coast of North America. American Fisheries Society, Bethesda, MD (In Press)
- Thompson, A. R., J. N. Baskin, C. C. Swift, and T. R. Haglund. 2009. Influence of Substrate Dynamics on the Distribution and Abundance of the Federally Threatened Santa Ana Sucker, *Catostomus santaanae*, in the Santa Ana River. MS Submited to journal Envionmental Biology of Fishes, March, 2009.

  Earl, D. A., K. D. Louie, C. Bardeleben, C. C. Swift, and D. K. Jacobs. 2009. Rangewide microsatellite survey and phylogeography of the endangered Tidewater Goby, *Eucyclogobius newberryi* (Teleostei: Gobionellidae), a genetically subdivided coastal fish. Molecular Ecology and Evolution, (MS Submitted, June, 2009).

  Swift, C. C., L. T. Findley, R. Ellingson, and D. K. Jacobs. 2009. The Delta Mudsucker, *Gillichthys detrusus*, a valid species (Teleostei: Gobiidae) from the Colorado River Delta, northernmost Gulf of California. MS submitted to Copeia, July, 2009).

  Drill, S. L. and C. Swift. 2009. Fishes and fishing in the Los Angeles River. Bulletin of the Southern California Academy of Sciences, 108(2):90-91 (Abst.)

  Chabot, C., D. Buth, C. Swift, J. Sim, T. Dowling, and L. Allen. 2009. Introgression of mitochondrial DNA between *Catostomus fumeiventris* and *Catostomus santaanae* (Cyprniformes: Catostomidae) in the Santa Clara drainage. Bulletin of the Southern California Academy of Sciences, 105(2):105. (Abst.)

PRESENTATIONS: (1999 TO PRESENT)

- The disappearing fishes of southern California. In: Swimming Upstream: Restoring California's rivers and streams for salmon, steelhead and other species. Educational Workshop sponsored by the Sierra Club and California Trout, 12 June 1999, Los Angeles Zoo, Los Angeles, California
- Biodiversity and conservation of the freshwater fishes of southern California. (with Jonathan Baskin) In: Planning for Biodiversity: Bringing research and management together. A symposium sponsored by the USDA Forest Service and USGS Western Ecological Research Center. California State Polytechnic University, Pomona, 29 February-2 March 2000.
- Dramatic effects of rainfall on species distributions in the Santa Margarita River. (with Manna Warburton [presenter] and Robert N. Fisher), California-Nevada Chapter, American Fisheries Society, 34th Annual Meeting, Ventura, California 31 March-1 April 2000.
- Freshwater fishes of the Los Angeles River, southern California. (with Jeffrey Seigel and Dan Holland), and Fish population fluctuations 1997-2000 in small lagoons on Marine Corps Base Camp Pendleton. (with Dan Holland), Annual Meeting, Southern California Academy of Sciences, University of Southern California, Los Angeles, California 19-20 May 2000.
- El Nino effects on the native and exotic fish populations of the Santa Margarita River southern California. (with Robert N. Fisher [presenter] and Manna Warburton). Society for Conservation Biology Annual Meeting, Hilo Hawaii, 29 July-Aug. 1, 2001.
- El Nino effects on estuarine fish populations associated with the southernmost populations of tidewater goby, 1990-2001 (with Dan Holland), and The federally threatened Santa Ana sucker in the Santa Ana River-Distribution, habitat, and exotic predators. Ann. Meeting, California Nevada Chapter American Fisheries Society, Tahoe City, California April 19-20, 2002
- Exotic fish species and their impacts on small coastal lagoons in southern California (with Dan Holland, presenter), and Interaction between native fish, habitat, and exotic fish species in the middle Santa Ana River, southern California. Annual. Meeting, Southern California Academy of Sciences, Claremont, California June 7-8, 2002.

- Fish populations of small coastal lagoons in southern California. California Estuarine Research Society, Inaugural Meeting, Hubbs Sea World Research Institute, San Diego, California, April 14, 2003
- Status of and prognosis for the freshwater fishes of coastal southern California. Swift [presenter], Jonathan N. Baskin, Robert Fisher, and Thomas Haglund; Status, Habitat, and restoration of southern Steelhead in Topanga Creek and State Park, just south of Malibu Creek. Rosi Dagit [presenter] and Swift; Visual Display of stream habitat survey profiles using GIS: An example from Topanga Creek, coastal Southern California. Kevin Reagan [presenter], Rosi Dagit, and Swift; and a Poster: Genetic structure in the staghorn sculpin from Alaska to southern California. Kristina D. Louie [presenter], K. P. Kloepfli, D. K. Jacobs, and Swift. Western Division/Cal-Neva Chapter of American Fisheries Society, Joint Annual Meeting, San Diego, April 14-17, 2003. In addition Swift organized two days of symposia on the freshwater fish, amphibian, and aquatic reptile fauna of coastal southern California.
- Organized one day Symposium on Tidewater Gobies for California Nevada Chapter of the American Fisheries Society Meeting, San Luis Obispo, March 30, 2006. Chaired session and presented "Annual and seasonal variations in fish populations of San Mateo Lagoon, San Diego County, California" with Dan Holland, Melissa Booker, Brian Lohstroh, and Eric Bailey.
- Status and distribution of freshwater fishes of coastal southern California. In symposium on Aquatic Vertebrates of Southern California. Southern California Academy of Sciences Meeting, Pepperdine University, Malibu, 13,14 May 2006.
- Expanding distributions of invasive fishes in coastal southern California estuaries and freshwaters. Presentation at the California Nevada Chapter of the American Fisheries Society Meeting, Lake Tahoe, Nevada, April 2008.
- Chabot, C., D. Buth, C. Swift, J. Sim, T. Dowling, and L.Allen. 2009. Introgression of mitochondrial DNA between *Catostomus fumeiventris* and *Catostomus santaanae* (Cypriniformes: Catostomidae) in the Santa Clara drainage. Poster 41, Southern California Academy of Sciences Meetings, Marymount College, Rancho Palos Verdes, CA, May 29, 2009.
- Drill, S. L. and C.. C. Swift. 2009. Fishes and fishing in the Los Angeles River. Presentation by Drill, Southern California Academy of Sciences Meetings, Marymount College, Rancho Palos Verdes, CA, May 30, 2009.

ATTACHMENT M. TMDLs IN THE SANTA MONICA BAY WATERSHED MANAGEMENT AREA

A. Santa Monica Bay Beaches Bacteria TMDL

1. Permittees subject to the provisions below are identified in Attachment K, Table K-2.
2. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Santa Monica Bay during dry weather as of the effective date of this Order and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

3. Section A.2 above shall not be applicable upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (Attachment A of Resolution No. R12-007). Upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Santa Monica Bay during dry weather as of the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each individual monitoring location, calculated as defined in the revised Santa Monica Bay Beaches Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

4. Receiving Water Limitations

a. Permittees in each defined jurisdictional group shall comply with the interim single sample bacteria receiving water limitations for shoreline monitoring stations within their jurisdictional area during wet weather, per the schedule below:

Deadline	**Cumulative percentage reduction from the total exceedance day reductions required for each jurisdictional group as identified in Table M-1**
July 15, 2013	25%
July 15, 2018	50%

b. Section A.4.a above shall not be applicable upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (Attachment A of Resolution No. R12-007). Upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL, Permittees in each defined jurisdictional group shall comply with the interim single sample bacteria receiving water limitations for shoreline monitoring stations within their jurisdictional area during wet weather, per the schedule below:

Deadline	**Cumulative percentage reduction from the total wet weather exceedance day reductions required for each jurisdictional group as identified in Table M-2**
July 15, 2013	25%
July 15, 2018	50%

Table M-1: Interim Single Sample Bacteria Receiving Water Limitations by Jurisdictional Group

Jurisdiction Group	Primary Jurisdiction	Additional Responsible Jurisdictions & Agencies	Subwatershed(s)	Monitoring Site(s)	Interim Single Sample Bacteria Receiving Water Limitations as Maximum Allowable Exceedance Days during Wet Weather		
					10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
1	County of Los Angeles	Malibu City of Los Angeles (Topanga only) Calabasas (Topanga only)	Arroyo Sequit	SMB 1-1	221	212	197
			Carbon Canyon	SMB 1-13			
			Corral Canyon	SMB 1-11, SMB 1-12			
			Encinal Canyon	SMB 1-3			
			Escondido Canyon	SMB 1-8			
			Las Flores Canyon	SMB 1-14			
			Latigo Canyon	SMB 1-9			
			Los Alisos Canyon	SMB 1-2			
			Pena Canyon	SMB 1-16			
			Piedra Gorda Canyon	SMB 1-15			
			Ramirez Canyon	SMB 1-6, SMB 1-7			
			Solstice Canyon	SMB 1-10			
			Topanga Canyon	SMB 1-18			
			Trancas Canyon	SMB 1-4			
			Tuna Canyon	SMB 1-17			
			Zuma Canyon	SMB 1-5			

Jurisdiction Group	Primary Jurisdiction	Additional Responsible Jurisdictions & Agencies	Subwatershed(s)	Monitoring Site(s)	Interim Single Sample Bacteria Receiving Water Limitations as Maximum Allowable Exceedance Days during Wet Weather		
					10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
2	City of Los Angeles	County of Los Angeles El Segundo (Dockweiler only) Santa Monica	Castlerock	SMB 2-1	342	324	294
			Dockweiler	SMB 2-10, SMB 2-11, SMB 2-12, SMB 2-13, SMB 2-14, SMB 2-15			
			Venice Beach	SMB 2-8, SMB 2-9			
			Pulga Canyon	SMB 2-4, SMB 2-5			
			Santa Monica Canyon	SMB 2-7			
			Santa Ynez Canyon	SMB 2-2, SMB 2-3, SMB 2-6			
3	Santa Monica	City of Los Angeles County of Los Angeles	Santa Monica	SMB 3-1, SMB 3-2, SMB 3-3, SMB 3-4, SMB 3-5, SMB 3-6 SMB 3-7, SMB 3-8# SMB 3-9	257	237	203
4	Malibu	County of Los Angeles	Nicholas Canyon	SMB 4-1#	14	14	14
5	Manhattan Beach	El Segundo Hermosa Beach Redondo Beach County of Los Angeles	Hermosa	SMB 5-1#, SMB 5-2, SMB 5-3#, SMB 5-4#, SMB 5-5#	29	29	29

Jurisdiction Group	Primary Jurisdiction	Additional Responsible Jurisdictions & Agencies	Subwatershed(s)	Monitoring Site(s)	Interim Single Sample Bacteria Receiving Water Limitations as Maximum Allowable Exceedance Days during Wet Weather		
					10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
6	Redondo Beach	Hermosa Beach Manhattan Beach Torrance County of Los Angeles	Redondo	SMB 6-1, SMB 6-2#, SMB 6-3, SMB 6-4, SMB 6-5#, SMB 6-6#	58	57	56
7	Rancho Palos Verdes	City of Los Angeles Palos Verdes Estates Rolling Hills Rolling Hills Estates County of Los Angeles	Palos Verdes Peninsula	SMB 7-1#, SMB 7-2#, SMB 7-3#, SMB 7-4#, SMB 7-5#, SMB 7-6#, SMB 7-7, SMB 7-8#, SMB 7-9#	36	36	36

For those beach monitoring locations subject to the antidegradation implementation provision in the TMDL, there shall be no increase in exceedance days during the implementation period above that estimated for the beach monitoring location in the critical year as identified in Table M-3.

* The California Department of Transportation (Caltrans) is a responsible agency in each Jurisdiction Group, except for Jurisdiction 7, and is jointly responsible for complying with the allowable number of exceedance days. Caltrans is separately regulated under the Statewide Storm Water Permit for State of California Department of Transportation (NPDES No. CAS000003).

Table M-2: Interim Wet Weather Single Sample Bacteria Receiving Water Limitations by Jurisdictional Group

Jurisdiction Group	Primary Jurisdiction	Additional Responsible Jurisdictions & Agencies	Subwatershed(s)	Monitoring Site(s)	Interim Single Sample Bacteria Receiving Water Limitations as Maximum Exceedance Days Beyond those Allowed during Wet Weather		
					10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
1	County of Los Angeles	Malibu City of Los Angeles (Topanga only) Calabasas (Topanga only)	Arroyo Sequit	SMB 1-1	393	327	218
			Carbon Canyon	SMB 1-13			
			Corral Canyon	SMB 1-11, SMB 1-12, SMB O-2#			
			Encinal Canyon	SMB 1-3#			
			Escondido Canyon	SMB 1-8			
			Las Flores Canyon	SMB 1-14			
			Latigo Canyon	SMB 1-9			
			Los Alisos Canyon	SMB 1-2#			
			Pena Canyon	SMB 1-16#			
			Piedra Gorda Canyon	SMB 1-15			
			Ramirez Canyon	SMB 1-6, SMB 1-7, SMB O-1#			
			Solstice Canyon	SMB 1-10			
			Topanga Canyon	SMB 1-18			
			Trancas Canyon	SMB 1-4			
			Tuna Canyon	SMB 1-17#			
			Zuma Canyon	SMB 1-5			

Jurisdiction Group	Primary Jurisdiction	Additional Responsible Jurisdictions & Agencies	Subwatershed(s)	Monitoring Site(s)	Interim Single Sample Bacteria Receiving Water Limitations as Maximum Exceedance Days Beyond those Allowed during Wet Weather		
					10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
2	City of Los Angeles	County of Los Angeles El Segundo (Dockweiler only) Santa Monica	Castlerock	SMB 2-1	382	318	212
			Dockweiler	SMB 2-10, SMB 2-11, SMB 2-12, SMB 2-13, SMB 2-14, SMB 2-15			
			Venice Beach	SMB 2-8, SMB 2-9			
			Pulga Canyon	SMB 2-4, SMB 2-5			
			Santa Monica Canyon	SMB 2-7			
			Santa Ynez Canyon	SMB 2-2, SMB 2-3, SMB 2-6			
3	Santa Monica	City of Los Angeles County of Los Angeles	Santa Monica	SMB 3-1, SMB 3-2, SMB 3-3, SMB 3-4, SMB 3-5, SMB 3-6, SMB 3-7, SMB 3-8, SMB 3-9	219	183	122
4	Malibu	County of Los Angeles	Nicholas Canyon	SMB 4-1[#]	15	12	8

Jurisdiction Group	Primary Jurisdiction	Additional Responsible Jurisdictions & Agencies	Subwatershed(s)	Monitoring Site(s)	Interim Single Sample Bacteria Receiving Water Limitations as Maximum Exceedance Days Beyond those Allowed during Wet Weather		
					10% Reduction Milestone	25% Reduction Milestone	50% Reduction Milestone
5	Manhattan Beach	El Segundo Hermosa Beach Redondo Beach County of Los Angeles	Hermosa	SMB 5-1#, SMB 5-2, SMB 5-3#, SMB 5-4#, SMB 5-5#	63	52	35
6	Redondo Beach	Hermosa Beach Manhattan Beach Torrance County of Los Angeles	Redondo	SMB 6-1, SMB 6-2#, SMB 6-3, SMB 6-4, SMB 6-5#, SMB 6-6#	62	51	34
7	Rancho Palos Verdes	City of Los Angeles Palos Verdes Estates Rolling Hills Rolling Hills Estates County of Los Angeles	Palos Verdes Peninsula	SMB 7-1#, SMB 7-2#, SMB 7-3#, SMB 7-4#, SMB 7-5#, SMB 7-6#, SMB 7-7, SMB 7-8#, SMB 7-9#	88	73	49

For those beach monitoring locations subject to the antidegradation implementation provision in the TMDL, there shall be no increase in exceedance days during the implementation period above that estimated for the beach monitoring location in the critical year as identified in Table M-4.

* The California Department of Transportation (Caltrans) is a responsible agency in each Jurisdiction Group, except for Jurisdiction 7, and is jointly responsible for complying with the allowable number of exceedance days. Caltrans is separately regulated under the Statewide Storm Water Permit for State of California Department of Transportation (NPDES No. CAS000003).

c. Permittees shall comply with the following grouped[1] final single sample bacteria receiving water limitations for all shoreline monitoring stations along Santa Monica Bay beaches, except for those monitoring stations subject to the antidegradation implementation provision as established in the TMDL and identified in subpart e. below, during dry weather as of the effective date of this Order and during wet weather no later than July 15, 2021:

Time Period	**Annual Allowable Exceedance Days of the Single Sample Objective (days)**	
	Daily Sampling	**Weekly Sampling**
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	3	1
Wet Weather[2] (Year-round)	17	3

d. Section A.4.c above shall not be applicable upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (Attachment A of Resolution No. R12-007). Upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL, Permittees shall comply with the following grouped[3] final single sample bacteria receiving water limitations for all shoreline monitoring stations along Santa Monica Bay beaches, except for those monitoring stations subject to the antidegradation implementation provision as established in the TMDL and identified in subpart f. below, during dry weather as of the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL and during wet weather no later than July 15, 2021:

Time Period	**Annual Allowable Exceedance Days of the Single Sample Objective (days)**	
	Daily Sampling	**Weekly Sampling**
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	9	2
Wet Weather[4] (Year-round)	17	3

[1] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the sub-drainage area to each beach monitoring location.
[2] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.
[3] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the sub-drainage area to each beach monitoring location.
[4] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.

e. Permittees shall comply with the following grouped[5] final single sample bacteria receiving water limitations for shoreline monitoring stations along Santa Monica Bay beaches subject to the antidegradation implementation provision in the TMDL as of the effective date of this Order:

Table M-3: Allowable Number of Days that may Exceed any Single Sample Bacteria Receiving Water Limitations

		Annual Allowable Exceedance Days of the Single Sample Objective (days)					
		Summer Dry Weather (April 1 – October 31)		Winter Dry Weather (November 1 – March 31)		Wet Weather (Year-round)	
Station ID	Beach Monitoring Location	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
SMB 1-4	Trancas Creek at Broad Beach	0	0	0	0	17	3
SMB 1-5	Zuma Creek at Zuma Beach	0	0	0	0	17	3
SMB 2-13	Imperial Highway storm drain	0	0	2	1	17	3
SMB 3-8	Windward Ave. storm drain at Venice Pavilion	0	0	2	1	13	2
SMB 4-1	San Nicholas Canyon Creek at Nicholas Beach	0	0	0	0	14	2
SMB 5-1	Manhattan Beach at 40th Street	0	0	1	1	4	1
SMB 5-3	Manhattan Beach Pier, southern drain	0	0	1	1	5	1
SMB 5-4	Hermosa City Beach at 26th St.	0	0	3	1	12	2
SMB 5-5	Hermosa Beach Pier	0	0	2	1	8	2
SMB 6-2	Redondo Municipal Pier- 100 yards south	0	0	3	1	14	2
SMB 6-5	Avenue I storm drain at Redondo Beach	0	0	3	1	6	1
SMB 6-6	Malaga Cove, Palos Verdes Estates	0	0	1	1	3	1

[5] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the sub-drainage area to each beach monitoring location.

		Annual Allowable Exceedance Days of the Single Sample Objective (days)					
Station ID	Beach Monitoring Location	Summer Dry Weather (April 1 – October 31)		Winter Dry Weather (November 1 – March 31)		Wet Weather (Year-round)	
		Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
SMB 7-1	Malaga Cove, Palos Verdes Estates	0	0	1	1	14	2
SMB 7-2	Bluff Cove, Palos Verdes Estates	0	0	1	1	0	0
SMB 7-3	Long Point, Rancho Palos Verdes	0	0	1	1	5	1
SMB 7-4	Abalone Cove, Rancho Palos Verdes	0	0	0	0	1	1
SMB 7-5	Portuguese Bend Cove, Rancho Palos Verdes	0	0	1	1	2	1
SMB 7-6	White’s Point, Royal Palms County Beach	0	0	1	1	6	1
SMB 7-8	Point Fermin/Wilder Annex, San Pedro	0	0	1	1	2	1
SMB 7-9	Outer Cabrillo Beach	0	0	1	1	3	1

f. Section A.4.e above shall not be applicable upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (Attachment A of Resolution No. R12-007). Upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL, Permittees shall comply with the following grouped6 final single sample bacteria receiving water limitations for shoreline monitoring stations along Santa Monica Bay beaches subject to the antidegradation implementation provision in the TMDL as of the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL:

Table M-4: Allowable Number of Days that may Exceed any Single Sample Bacteria Receiving Water Limitations

		Annual Allowable Exceedance Days of the Single Sample Objective (days)					
Station ID	Beach Monitoring Location	Summer Dry Weather (April 1 – October 31)		Winter Dry Weather (November 1 – March 31)		Wet Weather (Year-round)	
		Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
SMB 1-2	El Pescador State Beach	0	0	1	1	5	1
SMB 1-3	El Matador State Beach	0	0	1	1	3	1
SMB O-1	Paradise Cove	0	0	9	2	15	3
SMB 1-10	Solstice Creek	0	0	5	1	17	3
SMB O-2	Puerco Canyon Storm Drain	0	0	0	0	6	1
SMB 1-14	Las Flores Creek	0	0	6	1	17	3
SMB 1-16	Pena Creek	0	0	3	1	14	2
SMB 1-17	Tuna Canyon Creek	0	0	7	1	12	2
SMB 2-11	North Westchester Storm Drain	0	0	0	0	17	3
SMB 2-13	Imperial Highway Storm Drain	0	0	4	1	17	3
SMB 3-6	Rose Avenue Storm Drain at Venice Beach	0	0	6	1	17	3
SMB 4-1	San Nicholas Canyon Creek	0	0	4	1	14	2
SMB 5-1	Manhattan State Beach at 40th Street	0	0	1	1	4	1

6 The final receiving water limitations are group-based and shared among all MS4 Permittees located within the sub-drainage area to each beach monitoring location.

		Annual Allowable Exceedance Days of the Single Sample Objective (days)					
Station ID	Beach Monitoring Location	Summer Dry Weather (April 1 – October 31)		Winter Dry Weather (November 1 – March 31)		Wet Weather (Year-round)	
		Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
SMB 5-3	Manhattan Beach Pier, southern drain	0	0	3	1	6	1
SMB 5-4	Hermosa Beach at 26th Street	0	0	3	1	12	2
SMB 5-5	Hermosa Beach Pier	0	0	2	1	8	2
SMB 6-2	Redondo Municipal Pier- 100 yards south at Redondo Beach	0	0	3	1	14	2
SMB 6-3	Sapphire Street Storm Drain at Redondo Beach	0	0	5	1	17	3
SMB 6-5	Avenue I Storm Drain at Redondo Beach	0	0	4	1	11	2
SMB 6-6	Malaga Cove, Palos Verdes Estates	0	0	1	1	3	1
SMB 7-1	Malaga Cove	0	0	1	1	14	2
SMB 7-2	Bluff Cove	0	0	1	1	0	0
SMB 7-3	Long Point	0	0	1	1	5	1
SMB 7-4	Abalone Cove	0	0	0	0	1	1
SMB 7-5	Portuguese Bend Cove	0	0	1	1	2	1
SMB 7-6	Royal Palms County Beach	0	0	1	1	6	1
SMB 7-8	Wilder Annex	0	0	1	1	2	1
SMB 7-9	Outer Cabrillo Beach	0	0	1	1	3	1

g. Permittees shall comply with the following geometric mean receiving water limitations for all shoreline monitoring stations along Santa Monica Bay beaches during dry weather as of the effective date of this Order and during wet weather no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

h. Section A.4.g above shall not be applicable upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL (Attachment A of Resolution No. R12-007). Upon the effective date of the revised Santa Monica Bay Beaches Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitations for all shoreline monitoring stations along Santa Monica Bay beaches, calculated as defined in the revised Santa Monica Bay Beaches Bacteria TMDL, no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

B. Santa Monica Bay Nearshore and Offshore Debris TMDL

1. Permittees subject to the provisions below are identified in Attachment K, Table K-2.
2. Permittees shall comply with the final water quality-based effluent limitation of zero trash discharged into water bodies within the Santa Monica Bay WMA and then into Santa Monica Bay or on the shoreline of Santa Monica Bay no later than March 20, 2020[7], and every year thereafter.
3. Permittees shall comply with interim and final water quality-based effluent limitations for trash discharged into Santa Monica Bay or on the shoreline of Santa Monica Bay, per the schedule below:

[7] If a Permittee by November 4, 2013, adopts local ordinances to ban plastic bags, smoking in public places and single use expanded polystyrene food packaging then the final compliance date will be extended until March 20, 2023.

Permittees	Baseline[8]	Mar 20, 2016 (80%)	Mar 20, 2017 (60%)	Mar 20, 2018 (40%)	Mar 20, 2019 (20%)	Mar 20, 2020[9] (0%)
		Annual Trash Discharge (gals/yr)				
Agoura Hills[10]	1,044	835	626	418	209	0
Calabasas[10]	1,656	1,325	994	663	331	0
Culver City	52	42	31	21	10	0
El Segundo	2,732	2,186	1,639	1,093	546	0
Hermosa Beach	1,117	894	670	447	223	0
Los Angeles, City of	25,112	20,090	15,067	10,045	5,022	0
Los Angeles, County of	5,138	4,110	3,083	2,055	1,028	0
Malibu	5,809	4,648	3,486	2,324	1,162	0
Manhattan Beach	2,501	2,001	1,501	1,001	500	0
Palos Verdes Estates	3,346	2,677	2,007	1,338	669	0
Rancho Palos Verdes	7,254	5,803	4,353	2,902	1,451	0
Redondo Beach	3,197	2,558	1,918	1,279	639	0
Rolling Hills	515	412	309	206	103	0
Rolling Hills Estates	365	292	219	146	73	0
Santa Monica	5,672	4,537	3,403	2,269	1,134	0
Torrance	2,484	1,987	1,490	993	497	0
Westlake Village[10]	3,131	2,505	1,879	1,252	626	0

4. Permittees shall comply with the interim and final water quality-based effluent limitations for trash in B.2 and B.3 above per the provisions in Part VI.E.5.

C. **Santa Monica Bay TMDL for DDTs and PCBs** (USEPA established)

1. Permittees subject to the provisions below are identified in Attachment K, Table K-2.
2. Permittees shall comply with the following WLAs, expressed as an annual loading of pollutants from the sediment discharged to Santa Monica Bay, per the provisions in Part VI.E.3:

Constituent	Annual Mass-Based WLA (g/yr)
DDT	27.08
PCBs	140.25

8 If a Permittee elects not to use the default baseline, then the Permittee shall include a plan to establish a site specific trash baseline in their Trash Monitoring and Reporting Plan.

9 Permittees shall achieve their final effluent limitation of zero trash discharge for the 2019-2020 storm year and every year thereafter.

10 Permittees shall be deemed in compliance with the water quality-based effluent limitation for trash established to implement the Santa Monica Bay Nearshore and Offshore Debris TMDL, if the Permittee is in compliance with the water quality-based effluent limitations established to implement the Malibu Creek Watershed Trash TMDL.

3. Compliance shall be determined based on a three-year averaging period.

D. TMDLs in the Malibu Creek Subwatershed

1. Malibu Creek and Lagoon Bacteria TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-2.

b. Water Quality-Based Effluent Limitations

i. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Malibu Lagoon during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

ii. Section D.1.b.i above shall not be applicable upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL (Attachment A of Resolution No. R12-009). Upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Malibu Lagoon during dry weather as of the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Malibu Creek and Lagoon Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

iii. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Malibu Creek and its tributaries during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	235/100 mL	126/100 mL

iv. Section D.1.b.iii above shall not be applicable upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL (Attachment A of Resolution No. R12-009). Upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Malibu Creek and its tributaries during dry weather as of the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Malibu Creek and Lagoon Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	235/100 mL	126/100 mL

c. Receiving Water Limitations

i. Permittees shall comply with the following grouped[11] final single sample bacteria receiving water limitations for Malibu Creek, its tributaries, and Malibu Lagoon during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective (days)	
	Daily Sampling	Weekly Sampling
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	3	1
Wet Weather[12] (Year-round)	17	3

ii. Section D.1.c.i above shall not be applicable upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL (Attachment A of Resolution No. R12-009). Upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL, Permittees shall comply with the following grouped[13] final single sample bacteria receiving water limitations for each monitoring location within Malibu Creek and its tributaries during

[11] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area to the receiving water.
[12] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.
[13] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area to the receiving water.

dry weather as of the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL and during wet weather no later than July 15, 2021:

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective (days)	
	Daily Sampling	Weekly Sampling
Dry-Weather (Year-round)	5	1
Wet Weather[14] (Year-round)	15	2

iii. Section D.1.c.i above shall not be applicable upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL (Attachment A of Resolution No. R12-009). Upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL, Permittees shall comply with the following grouped[15] final single sample bacteria receiving water limitations for each monitoring location within Malibu Lagoon during dry weather as of the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL and during wet weather no later than July 15, 2021:

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective (days)	
	Daily Sampling	Weekly Sampling
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	9	2
Wet Weather[16] (Year-round)	17	3

iv. Permittees shall comply with the following geometric mean receiving water limitations for discharges to Malibu Lagoon during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

v. Section D.1.c.iv above shall not be applicable upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL (Attachment A of

14 Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.
15 The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area to the receiving water.
16 Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.

Resolution No. R12-009). Upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitations for discharges to Malibu Lagoon, calculated as defined in the revised Malibu Creek and Lagoon Bacteria TMDL, no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

vi. Permittees shall comply with the following geometric mean receiving water limitation for discharges to Malibu Creek and its tributaries during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
E. coli	126/100 mL

vii. Section D.1.c.vi above shall not be applicable upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL (Attachment A of Resolution No. R12-009). Upon the effective date of the revised Malibu Creek and Lagoon Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitations for discharges to Malibu Creek and its tributaries, calculated as defined in the revised Malibu Creek and Lagoon Bacteria TMDL, no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
E. coli	126/100 mL

2. Malibu Creek Watershed Trash TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-2.

b. Permittees shall comply with the final water quality-based effluent limitation of zero trash discharged to Malibu Creek from Malibu Lagoon to Malibou Lake, Malibu Lagoon, Malibou Lake, Medea Creek, Lindero Creek, Lake Lindero, and Las Virgenes Creek in the Malibu Creek Watershed no later than July 7, 2017 and every year thereafter.

c. Permittees shall comply with interim and final water quality-based effluent limitations for trash discharged to the Malibu Creek, per the schedule below:

Permittees	Baseline	July 7, 2013 (80%)	July 7, 2014 (60%)	July 7, 2015 (40%)	July 7, 2016 (20%)	July 7, 2017 (0%)
	Annual Trash Discharge (gals/yr)					
Agoura Hills	1810	1448	1086	724	362	0
Calabasas	673	539	404	269	135	0
Hidden Hills	71	57	43	28	14	0
Los Angeles County	1117	894	670	447	223	0
Malibu	226	181	136	91	45	0
Westlake Village	143	114	86	57	29	0

d. Permittees shall comply with the interim and final water quality-based effluent limitations for trash in D.2.b and D.2.c above per the provisions in Part VI.E.5.

3. Malibu Creek Watershed Nutrients TMDL (*USEPA established*)

a. Permittees subject to the provisions below are identified in Attachment K, Table K-2.

b. Permittees shall comply with the following grouped[17] WLAs per the provisions in Part VI.E.3 for discharges to Westlake Lake, Lake Lindero, Lindero Creek, Las Virgenes Creek, Medea Creek, Malibou Lake, Malibu Creek and Malibu Lagoon and its tributaries. Tributaries to Malibu Creek and Lagoon, include the following upstream water bodies; Triunfo Creek, Palo Comado Creek, Cheesebro Creek, Strokes Creek and Cold Creek.

Time Period	WLA	
	Nitrate as Nitrogen plus Nitrite as Nitrogen	Total Phosphorus
	Daily Maximum	Daily Maximum
Summer (April 15 to November 15)[18]	8 lbs/day	0.8 lbs/day
Winter (November 16 to April 14)	8 mg/L	n/a

E. TMDLs in the Ballona Creek Subwatershed

1. Ballona Creek Trash TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

[17] USEPA was unable to specifically distinguish the amounts of pollutant loads from allocation categories associated with areas regulated by the storm water permits. Therefore, allocations for storm water permits are grouped.

[18] The mass-based summer WLAs are calculated as the sum of the allocations for “runoff from developed areas” and “dry weather urban runoff.”

b. Permittees shall comply with the final water quality-based effluent limitation of zero trash discharged to Ballona Creek no later than September 30, 2015 and every year thereafter.

c. Permittees shall comply with the interim and final water quality-based effluent limitations for trash discharged to Ballona Creek, per the schedule below:

Ballona Creek Subwatershed Trash Effluent Limitations per Storm Year[19] (pounds of drip-dry trash)

Permittees	Baseline	Sept 30, 2012 (20%)	Sept 30, 2013 (10%)	Sept 30, 2014 (3.3%)	Sept 30, 2015[20] (0%)
		Annual Trash Discharge (pounds of trash)			
Beverly Hills	70,712	14,142	7,071	2,333	0
Culver City	37,271	7,454	3,727	1,230	0
Inglewood	22,324	4,465	2,232	737	0
Los Angeles, City of	942,720	188,544	94,272	31,110	0
Los Angeles, County of	52,693	10,539	5,269	1,739	0
Santa Monica	2,579	516	258	85	0
West Hollywood	13,411	2,682	1,341	443	0

Ballona Creek Subwatershed Trash Effluent Limitations per Storm Year[19] (gallons of uncompressed trash)

Permittees	Baseline	Sept 30, 2012 (20%)	Sept 30, 2013 (10%)	Sept 30, 2014 (3.3%)	Sept 30, 2015[20] (0%)
		Annual Trash Discharge (gallons of uncompressed trash)			
Beverly Hills	45,336	9,067	4,534	1,496	0
Culver City	25,081	5,016	2,508	828	0
Inglewood	14,717	2,943	1,472	486	0
Los Angeles, City of	602,068	120,414	60,207	19,868	0
Los Angeles, County of	32,679	6,536	3,268	1,078	0
Santa Monica	1,749	350	175	58	0
West Hollywood	9,360	1,872	936	309	0

d. Permittees shall comply with the interim and final water quality-based effluent limitations for trash in E.1.b and E.1.c above per the provisions in Part VI.E.5.

[19] For purposes of the provisions in this subpart, a storm year is defined as October 1 to September 30.
[20] Permittees shall achieve their final water quality-based effluent limitation of zero trash discharged for the 2014-2015 storm year and every year thereafter.

2. Ballona Creek Estuary Toxic Pollutants TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

b. Permittees shall comply with the following final water quality-based effluent limitations no later than January 11, 2021, expressed as an annual loading of sediment-bound pollutants deposited to Ballona Creek Estuary:

Constituent	**Effluent Limitations**	
	Annual	**Units**
Cadmium	8.0	kg/yr
Copper	227.3	kg/yr
Lead	312.3	kg/yr
Silver	6.69	kg/yr
Zinc	1003	kg/yr
Chlordane	3.34	g/yr
DDTs	10.56	g/yr
Total PCBs	152	g/yr
Total PAHs	26,900	g/yr

c. Permittees shall comply with interim and final water quality-based effluent limitations for sediment-bound pollutant loads deposited to Ballona Creek Estuary, per the schedule below:

Deadline	**Total Drainage Area Served by the MS4 required to meet the water quality-based effluent limitations (%)**
January 11, 2013	25
January 11, 2015	50
January 11, 2017	75
January 11, 2021	100

d. Permittees shall be deemed in compliance with the water quality-based effluent limitations in Part E.2.b by demonstrating any one of the following:

i. Final water quality-based effluent limitations for sediment-bound pollutants deposited to Ballona Creek Estuary are met; or

ii. The sediment numeric targets as defined in the TMDL are met in bed sediments; or

iii. Concentrations of sediments discharged meet the numeric targets for sediment as defined in the TMDL.

3. Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

b. Water Quality-Based Effluent Limitations

i. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Ballona Creek Estuary during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

ii. Section E.3.b.i above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Ballona Creek Estuary during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

iii. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Sepulveda Channel during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	235/100 mL	126/100 mL

iv. Section E.3.b.iii above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria

TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Sepulveda Channel during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	235/100 mL	126/100 mL

v. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Ballona Creek Reach 2 during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	576/100 mL	126/100 mL

vi. Section E.3.b.v above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Ballona Creek Reach 2 during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
E. coli	576/100 mL	126/100 mL

vii. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Ballona Creek Reach 1 during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
Fecal coliform	4000/100 mL	2000/100 mL

viii. Section E.3.b.vii above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Ballona Creek Reach 1 during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
Fecal coliform	4000/100 mL	2000/100 mL

c. Receiving Water Limitations

i. Permittees shall comply with the following grouped[21] single sample bacteria receiving water limitations for Ballona Creek Estuary; Ballona Creek Reach 2 at the confluence with Ballona Creek Estuary; Centinela Creek at the confluence with Ballona Creek Estuary; Ballona Creek Reach 2; Ballona Creek Reach 1 at the confluence with Reach 2; Benedict Canyon Channel at the confluence with Ballona Creek Reach 2; and Sepulveda Channel:

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective*		Deadline
	Daily Sampling	Weekly Sampling	
Summer Dry-Weather (April 1 to October 31)	0	0	April 27, 2013
Winter Dry-Weather (November 1 to March 31)	3	1	April 27, 2013
Wet Weather[22] (Year-round)	17**	3	July 15, 2021

* Exceedance days for Ballona Creek Estuary and at the confluence with Ballona Creek Estuary based on REC-1 marine water single sample bacteria water quality objectives (WQO). Exceedance days for Ballona Creek Reach 2 and at the confluence with Ballona Creek Reach 2 based on LREC-1 freshwater single sample bacteria WQO. Exceedance days for Sepulveda Channel based on REC-1 freshwater single sample bacteria WQO.

** In Ballona Creek Reach 2 and at the confluence with Reach 2, the greater of the allowable exceedance days under the reference system approach or high flow suspension shall apply.

ii. Section E.3.c.i above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria

[21] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.

[22] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.

TMDL, Permittees shall comply with the following grouped[23] single sample bacteria receiving water limitations for Ballona Creek Estuary; Ballona Creek Reach 2 at the confluence with Ballona Creek Estuary; and Centinela Creek at the confluence with Ballona Creek Estuary:

Time Period	Annual Allowable Exceedance Days of the REC-1 Marine Water Single Sample Bacteria Water Quality Objectives		Deadline
	Daily Sampling	Weekly Sampling	
Summer Dry-Weather (April 1 to October 31)	0	0	April 27, 2013
Winter Dry-Weather (November 1 to March 31)	9	2	April 27, 2013
Wet Weather[24] (Year-round)	17	3	July 15, 2021

iii. Section E.3.c.i above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following grouped[25] single sample bacteria receiving water limitations for Sepulveda Channel:

Time Period	Annual Allowable Exceedance Days of the REC-1 Fresh Water Single Sample Bacteria Water Quality Objectives		Deadline
	Daily Sampling	Weekly Sampling	
Dry-Weather	5	1	April 27, 2013
Wet Weather[26]	15	2	July 15, 2021

iv. Section E.3.c.i above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following grouped[27] single sample bacteria receiving water limitations for Ballona Creek Reach 2; Ballona Creek Reach 1 at the confluence with Reach 2; and Benedict Canyon Channel at the confluence with Ballona Creek Reach 2:

[23] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.
[24] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.
[25] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.
[26] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.
[27] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.

Time Period	Annual Allowable Exceedance Days of the LREC-1 Fresh Water Single Sample Bacteria Water Quality Objectives		Deadline
	Daily Sampling	Weekly Sampling	
Dry-Weather	5	1	April 27, 2013
Wet Weather[28]	15*	2	July 15, 2021

* In Ballona Creek Reach 2 and at the confluence with Reach 2, the greater of the allowable exceedance days under the reference system approach or high flow suspension shall apply.

v. Permittees shall not exceed the single sample bacteria objective of 4000/100 ml in more than 10% of the samples collected from Ballona Creek Reach 1 during any 30-day period. Permittees shall achieve compliance with this receiving water limitation during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021.

vi. Permittees shall comply with the following geometric mean receiving water limitations for discharges to Ballona Creek Estuary; Ballona Creek Reach 2 at the confluence with Ballona Creek Estuary; and Centinela Creek at the confluence with Ballona Creek Estuary during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

vii. Section E.3.c.vi above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitations for discharges to Ballona Creek Estuary; Ballona Creek Reach 2 at the confluence with Ballona Creek Estuary; and Centinela Creek at the confluence with Ballona Creek Estuary, calculated as defined in the revised TMDL, no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

viii. Permittees shall comply with the following geometric mean receiving water limitation for discharges to Ballona Creek Reach 2; Ballona Creek Reach 1 at

[28] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.

the confluence with Ballona Creek Reach 2; Benedict Canyon Channel at the confluence with Ballona Creek Reach 2; and Sepulveda Channel during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
E. coli	126/100 mL

ix. Section E.3.c.viii above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitation for discharges to Ballona Creek Reach 2; Ballona Creek Reach 1 at the confluence with Ballona Creek Reach 2; Benedict Canyon Channel at the confluence with Ballona Creek Reach 2; and Sepulveda Channel, calculated as defined in the revised TMDL, no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
E. coli	126/100 mL

x. Permittees shall comply with the following geometric mean receiving water limitation for discharges to Ballona Creek Reach 1 during dry weather no later than April 27, 2013, and during wet weather no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
Fecal coliform	2000/100 mL

xi. Section E.3.c.x above shall not be applicable upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL (Attachment A of Resolution No. R12-008). Upon the effective date of the revised Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitation for discharges to Ballona Creek Reach 1, calculated as defined in the revised TMDL, no later than July 15, 2021:

Constituent	Geometric Mean (MPN or cfu)
Fecal coliform	2000/100 mL

4. Ballona Creek Metals TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

b. Final Water Quality-Based Effluent Limitations

i. Permittees shall comply with the following dry weather[29] water quality-based effluent limitations no later than January 11, 2016, expressed as total recoverable metals discharged to Ballona Creek and Sepulveda Channel:

Constituent	Effluent Limitation Daily Maximum (g/day)	
	Ballona Creek	Sepulveda Channel
Copper	807.7	365.6
Lead	432.6	196.1
Selenium	169	76
Zinc	10,273.1	4,646.4

ii. In lieu of calculating loads, Permittees may demonstrate compliance with the following concentration-based water quality-based effluent limitations during dry weather[30] no later than January 11, 2016, expressed as total recoverable metals discharged to Ballona Creek and Sepulveda Channel:

Constituent	Effluent Limitation Daily Maximum (µg/L)
Copper	24
Lead	13
Selenium	5
Zinc	304

iii. Permittees shall comply with the following wet weather[31] water quality-based effluent limitations no later than January 11, 2021, expressed as total recoverable metals discharged to Ballona Creek and its tributaries:

Constituent	Effluent Limitation Daily Maximum (g/day)
Copper	1.70×10^{-5} x daily storm volume (L)
Lead	5.58×10^{-5} x daily storm volume (L)
Selenium	4.73×10^{-6} x daily storm volume (L)
Zinc	1.13×10^{-4} x daily storm volume (L)

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29 Dry weather is defined as any day when the maximum daily flow in Ballona Creek is less than 40 cubic feet per second (cfs) measured at Sawtelle Avenue.
30 Ibid.
31 Wet weather is defined as any day when the maximum daily flow in Ballona Creek is equal to or greater than 40 cfs measured at Sawtelle Avenue.

c. Permittees shall comply with interim and final water quality-based effluent limitations for metals discharged to Ballona Creek and its tributaries, per the schedule below:

Deadline	Total Drainage Area Served by the MS4 required to meet the water quality-based effluent limitations (%)	
	Dry weather	Wet weather
January 11, 2012	50	25
January 11, 2014	75	--
January 11, 2016	100	50
January 11, 2021	100	100

5. Ballona Creek Wetlands TMDL for Sediment and Invasive Exotic Vegetation *(USEPA established)*

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

b. Permittees shall comply with the following grouped[32] WLA per the provisions in Part VI.E.3 for discharges of sediment into Ballona Creek Wetlands:

Constituent	Annual WLA[33] (m^3/yr)
Total Sediment (suspended sediment plus sediment bed load)	44,615

F. TMDLs in Marina del Rey Subwatershed

1. Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

b. Permittees shall comply with the following final water quality-based effluent limitations for discharges to Marina del Rey Harbor Beach and Back Basins D, E, and F during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

32 The WLA is group-based and shared among all MS4 Permittees located within the drainage area.
33 The WLA is applied as a 3-year average.

c. Section F.1.b above shall not be applicable upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (Attachment B of Resolution No. R12-007). Upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, Permittees shall comply with the following daily maximum final water quality-based effluent limitations for discharges to Marina del Rey Harbor Beach and Back Basins D, E, and F during dry weather as of the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL and during wet weather no later than July 15, 2021. Permittees shall comply with the following geometric mean final water quality-based effluent limitations for each monitoring location, calculated as defined in the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, no later than July 15, 2021.

Constituent	Effluent Limitations (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform*	10,000/100 mL	1,000/100 mL
Fecal coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

* Total coliform density shall not exceed a daily maximum of 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.

d. Receiving Water Limitations

i. Permittees shall comply with the following grouped[34] final single sample bacteria receiving water limitations for all monitoring stations at Marina Beach and Basins D, E, and F, except for those monitoring stations subject to the antidegradation implementation provision in the TMDL and identified in subpart iii. below, during dry weather as of the effective date of this Order and during wet weather no later than July 15, 2021.

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective (days)	
	Daily Sampling	Weekly Sampling
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	3	1
Wet Weather[35] (Year-round)	17	3

ii. Section F.1.d.i above shall not be applicable upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (Attachment B of Resolution No. R12-007). Upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria

[34] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.
[35] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.

TMDL, Permittees shall comply with the following grouped[36] final single sample bacteria receiving water limitations for all monitoring stations at Marina Beach and Basins D, E, and F, except for those monitoring stations subject to the antidegradation implementation provision in the TMDL and identified in subpart iv. below, during dry weather as of the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL and during wet weather no later than July 15, 2021.

Time Period	**Annual Allowable Exceedance Days of the Single Sample Objective (days)**	
	Daily Sampling	**Weekly Sampling**
Summer Dry-Weather (April 1 to October 31)	0	0
Winter Dry-Weather (November 1 to March 31)	9	2
Wet Weather[37] (Year-round)	17	3

iii. Permittees shall comply with the following grouped[38] final single sample bacteria receiving water limitations for monitoring stations in Marina del Rey subject to the antidegradation implementation provision in the TMDL as of the effective date of this Order:

		Annual Allowable Exceedance Days of the Single Sample Objective (days)					
Station ID	Monitoring Location	Summer Dry-Weather (April 1 to October 31)		Winter Dry Weather (November 1 – March 31)		Wet Weather (Year-round)	
		Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
MdRH-9	Basin F, center of basin	0	0	3	1	8	1

iv. Section F.1.d.iii above shall not be applicable upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (Attachment B of Resolution No. R12-007). Upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, Permittees shall comply with the following grouped[39] final single sample bacteria receiving water limitations for monitoring stations in Marina del Rey subject to the antidegradation implementation provision in the TMDL as of the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL:

[36] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.
[37] Wet weather is defined as days with 0.1 inch of rain or greater and the three days following the rain event.
[38] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.
[39] The final receiving water limitations are group-based and shared among all MS4 Permittees located within the drainage area.

		Annual Allowable Exceedance Days of the Single Sample Objective (days)					
Station ID	Monitoring Location	Summer Dry-Weather (April 1 to October 31)		Winter Dry Weather (November 1 – March 31)		Wet Weather (Year-round)	
		Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
MdRH-9	Basin F, center of basin	0	0	9	2	8	1

v. Permittees shall comply with the following geometric mean receiving water limitations for monitoring stations at Marina Beach and Basins D, E, and F during dry weather as of the effective date of this Order, and during wet weather no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

vi. Section F.1.d.v above shall not be applicable upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (Attachment B of Resolution No. R12-007). Upon the effective date of the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, Permittees shall comply with the following geometric mean receiving water limitations for monitoring stations at Marina Beach and Basins D, E, and F, calculated as defined in the revised Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, no later than July 15, 2021:

Constituent	**Geometric Mean (MPN or cfu)**
Total coliform	1,000/100 mL
Fecal coliform	200/100 mL
Enterococcus	35/100 mL

2. Marina del Rey Harbor Toxic Pollutants TMDL

a. Permittees subject to the provisions below are identified in Attachment K, Table K-3.

b. Permittees shall comply with the following final water quality-based effluent limitations no later than March 22, 2016[40], expressed as an annual loading of pollutants associated with total suspended solids (TSS) discharged to Marina del Rey Harbor Back Basins D, E, and F:

[40] If an Integrated Water Resources Approach is approved by the Regional Water Board and implemented then the Permittees shall comply with the final water quality-based effluent limitations no later than March 22, 2021.

Constituent	Effluent Limitations	
	Annual	**Units**
Copper	2.01	kg/yr
Lead	2.75	kg/yr
Zinc	8.85	kg/yr
Chlordane	0.0295	g/yr
Total PCBs	1.34	g/yr

c. Permittees shall comply with interim and final water quality-based effluent limitations for pollutant loads associated with TSS discharged to Marina del Rey Harbor Back Basins D, E, and F, per the schedule below:

Deadline	Total Drainage Area Served by the MS4 required to meet the effluent limitations (%)
March 22, 2014	50
March 22, 2016	100

d. If an approved Integrated Water Resources Approach is implemented, Permittees shall comply with interim and final water quality-based effluent limitations for pollutant loads associated with TSS discharged to Marina del Rey Harbor Back Basins D, E, and F, per the schedule below:

Deadline	Total Drainage Area Served by the MS4 required to meet the effluent limitations (%)
March 22, 2013	25
March 22, 2015	50
March 22, 2017	75
March 22, 2021	100

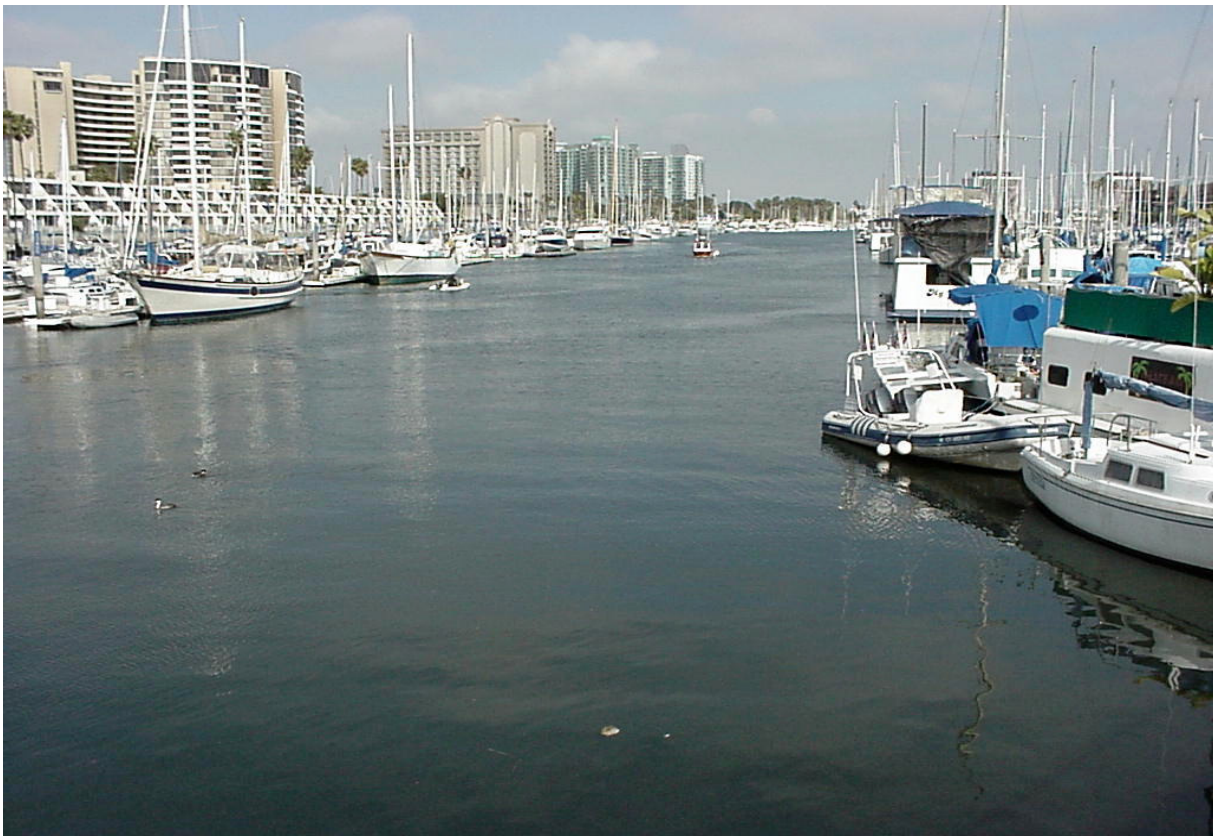
e. Permittees shall be deemed in compliance with the water quality-based effluent limitations in Part F.2.b by demonstrating any one of the following:

i. Final water quality-based effluent limitations for pollutants associated with TSS discharged to Marina del Rey Harbor Back Basins D, E, and F are met; or

ii. The sediment numeric targets as defined in the TMDL are met in bed sediments; or

iii. Pollutant concentrations associated with TSS discharged meet the numeric targets for sediment as defined in the TMDL.

TOTAL MAXIMUM DAILY LOAD FOR TOXIC POLLUTANTS IN MARINA DEL REY HARBOR



PREPARED BY
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
AND

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 9

FINAL REPORT: OCTOBER 6, 2005

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LIST OF ACRONYMS

µg/g	Micrograms per Gram
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
BMPs	Best Management Practices
BPTCP	Bay Protection and Toxic Cleanup Program
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
COMM	Commercial and Sport Fishing
CTR	California Toxics Rule
CWA	Clean Water Act
DL	Detection Limit
EMCs	Event Mean Concentrations
ERL	Effects Range-Low
+ERM	Effects Range-Median
EST	Estuarine Habitat
FHWA	Federal Highway Administration
FR	Federal Register
kg	Kilograms
LACDPW	Los Angeles County Department of Public Works
LARWQCB	Los Angeles Regional Water Quality Control Board
LACDBH	Los Angeles County Department OF Beaches and Harbors
MAR	Marine Habitat
MdRH	Marina del Rey Harbor
MGD	Million Gallons per Day
mg/kg	Milligrams per Kilogram
MS4	Municipal Separate Storm Sewer System
MTRL	Maximum Tissue Residue Level
NAV	Navigation
ng/L	Nanograms per Liter
NPDES	National Pollutant Discharge Elimination System
NPTN	National Pesticide Telecommunications Network
O&M	Operation and Maintenance
OEHHA	Office of Environmental Heath Hazard Assessment
PCBs	Polychlorinated biphenyls
PEL	Probable Effects Level
pg/L	Picograms per Liter
ppb	Parts per Billion
ppt	Parts per Thousand
RARE	Rare, Threatened, or Endangered Species
REC1	Water Contact Recreation
REC2	Non-Contact Water Recreation
SHELL	Shellfish Harvesting

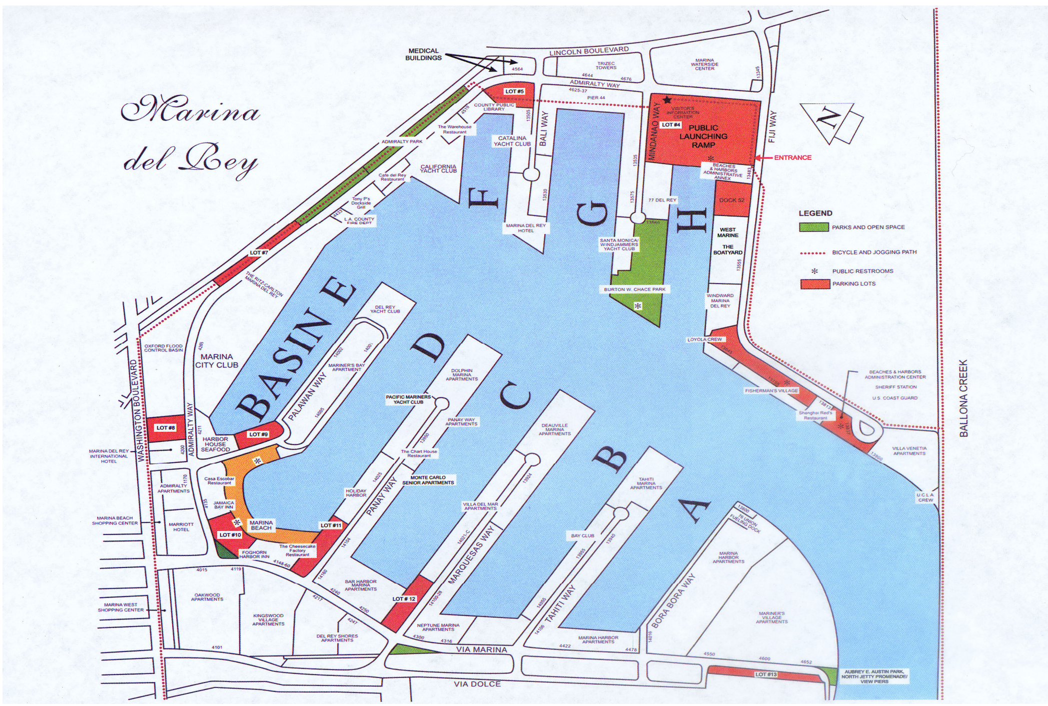
SIYB	Shelter Island Yatch Basin
SQGs	Sediment Quality Guidelines
SQOs	Sediment Quality Objectives
TEL	Threshold Effects Level
TMDL	Total Maximum Daily Load
TSMP	Toxic Substances Monitoring Program
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WDRs	Waste Discharge Requirements
WILD	Wildlife Habitat
WLAs	Waste Load Allocations
WQA	Water Quality Assessment
WQOs	Water Quality Objectives

1. INTRODUCTION

This report presents the required elements of the Total Maximum Daily Load (TMDL) for toxic pollutants in Marina del Rey's Back Basins (Basins D, E and F), and summarizes the technical analyses performed by the California Regional Water Quality Control Board, Los Angeles Region (Regional Board) and the United States Environmental Protection Agency, Region 9 (USEPA) to develop this TMDL.

The back basins of the Marina are listed for a variety of toxic pollutants, including metals, organic compounds and sediment toxicity (Table 1-1). These sections of Marina del Rey Harbor were included on the 1996, 1998 and 2002 California 303(d) list of impaired waterbodies (LARWQCB, 1996, 1998, 2002). The Clean Water Act (CWA) requires a TMDL be developed to restore the impaired waterbodies to their full beneficial uses.

Figure 1: Marina del Rey Harbor



This TMDL complies with 40 CFR 130.2 and 130.7, Section 303(d) of the CWA and USEPA guidance for developing TMDLs in California (USEPA, 2000a). In addition to the summary of the information used in its development, the TMDL includes an implementation plan and cost estimate to achieve the WLAs and attain water quality objectives (WQOs) in Marina del Rey's back basins. The California Water Code (Porter-Cologne Water Quality Control Act) requires that an implementation plan be developed to achieve water quality objectives. This TMDL addresses the impairments in Basins D, E, and F of Marina del Rey Harbor (Figure 1).

1.1 Regulatory Background

Section 303(d) of the CWA requires that each State "shall identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality objective applicable to such waters." The CWA also requires states to establish a priority ranking for waters on the 303(d) list of impaired waters and establish TMDLs for such waters. 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 the USEPA guidance (USEPA, 2000a). A TMDL is defined as the "sum of the individual waste load allocations for point sources and load allocations for non-point 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. A TMDL is also required to account for seasonal variations and include a margin of safety to address uncertainty in the analysis (USEPA, 2000a).

States must develop water quality management plans to implement the TMDL (40 CFR 130.6). The USEPA has oversight authority for the 303(d) program and is required to review and either approve or disapprove the TMDLs submitted by states. In California, the State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards are responsible for preparing lists of impaired waterbodies under the 303(d) program and for preparing TMDLs, both subject to USEPA approval. If USEPA does not approve a TMDL submitted by a state, USEPA is required to establish a TMDL for that waterbody. The Regional Boards also hold regulatory authority for many of the instruments used to implement the TMDLs, such as the National Pollutant Discharge Elimination System (NPDES) permits and state-specified Waste Discharge Requirements (WDRs).

As part of its 1996 and 1998 regional water quality assessments (WQAs), the Regional Board identified over 700 waterbody-pollutant combinations in the Los Angeles Region where TMDLs would be required (LARWQCB, 1996, 1998). These are referred to as "listed" or "303(d) listed" waterbodies or waterbody segments. A 13-year schedule for development of TMDLs in the Los Angeles Region was established in a consent decree that was approved on March 22, 1999 (Heal the Bay Inc., et al. v. Browner, et al. C 98-4825 SBA).

For the purpose of scheduling TMDL development, the consent decree combined the more than 700 waterbody-pollutant combinations into 92 TMDL analytical units. Analytical Unit 54 addresses the impairments in Marina del Rey back basins associated with organic pollutants (chlordane, dieldrin, DDT, PCBs, benthic community effects, fish consumption advisory and sediment toxicity) and Analytical Unit 56 addresses the impairments associated with metals (lead, copper, and zinc). In addition, the Tributyltin impairment is addressed under Analytical Unit 70. Table 1-1 presents the 1998 303(d) list of toxic impairments in the Marina del Rey back basins The consent decree also prescribed schedules for certain TMDLs, and according to this schedule, USEPA must either approve a state TMDL for Analytical Units 54 and 56 or establish its own, by March 22, 2006

Table 1-1: 1998 303(d) list of metal and organic compound impairments for Marina del Rey's back basins

Media	Pollutant		
	Analytical Unit 54	**Analytical Unit 56**	**Analytical Unit 70**
Sediment	DDT Chlordane Sediment toxicity	Lead (Pb) Copper (Cu) Zinc (Zn)	
Fish Tissue	DDT Chlordane PCBs Dieldrin Fish consumption advisory	Lead (Pb) Copper (Cu) Zinc (Zn)	Tributyltin (TBT)
Benthic infauna	Benthic community effects		

Paragraph 8 of the consent decree provides that TMDLs need not be completed for specific waterbody by pollutant combinations if the State or EPA determines that TMDLs are not needed for these combinations, consistent with the requirements of Section 303(d). The consent decree provides that this determination may be made either through a formal decision to remove a combination from the State Section 303(d) list or through a separate determination that the specific TMDLs are not needed. Paragraph 9 of the consent decree describes procedures for giving notice that TMDLs are not needed.

On the 2002 303(d) list, the Regional Board de-listed copper, lead, zinc and tributyltin in fish tissue. The tissue listings for these pollutants were removed because the elevated data levels upon which the 1998 listings were based no longer reflect valid assessment guidelines. DDT in sediment was de-listed since sediment concentrations have dropped below sediment quality guidelines. The benthic community degradation impairment was also de-listed since the benthic infauna was determined to be only moderately degraded. In addition, the Regional Board added a new listing for PCBs in sediment for the Marina del Rey back basins. Current listings are presented in Table 1-2.

Table 1-2. 2002 303(d) List of metal and organic compound impairments for Marina del Rey's back basins

Media	Pollutant
Sediment	Copper (Cu) Lead (Pb) Zinc (Zn) Chlordane PCBs Sediment toxicity
Fish Tissue	DDT Dieldrin Chlordane PCBs Fish consumption advisory

Pursuant to paragraph 8, the Regional Board determined that TMDLs are not required for chlordane, total DDT, and dieldrin in fish tissue. More recent data shows these pollutants to be below screening values. A more detailed discussion on these findings is provided in Section 2.2 Data Review. This constitutes the notice as provided for in paragraph 9 of the consent decree.

On May 6, 2003, the Regional Board held a California Environmental Quality Act (CEQA) scoping meeting to solicit input from the public and interested stakeholders in determining the scope, content and implementation options of the proposed TMDL for toxic pollutants in Marina del Rey's back basins. At the scoping meeting, the CEQA checklist of significant environmental issues and mitigation measures were discussed. This meeting fulfilled the requirements under CEQA (Public Resources Code, Section 21083.9).

This TMDL will address impairment of beneficial uses due to elevated concentrations of chlordane, copper, lead, and zinc in Marina del Rey Harbor sediments, and total PCBs in fish tissue. The sediment toxicity and fish advisory listing will be addressed by the TMDLs waste load allocations (WLAs) and load allocations (LAs) for these toxic pollutants. The TMDLs for nearby Ballona Creek required under Analytical Units # 55 and 57 have been addressed in a separate TMDL.

1.2 Environmental Setting

The MdR watershed is approximately 2.9 square miles located in the Santa Monica Bay, California. It is south of Venice and north of Playa del Rey, and approximately 15 miles southwest of downtown Los Angeles. The watershed includes the City of Los Angeles, Culver City and unincorporated areas of Los Angeles County. The climate is warm and dry most of the year with intermittent wet weather events typically between November and March.

MdR Harbor (MdRH) was developed in the early 1960s on degraded wetlands that formed part of the estuary of Ballona Creek Wetlands. MdRH, which opens into Santa Monica Bay, was constructed by the Army Corps of Engineers and is the largest artificial small-craft harbor in the United States. MdRH harbors more than 6,000 wet berthed slips for privately owned pleasure craft, dry storage of approximately 3,000 boats, and launch facilities, which can accommodate approximately 240 trailered boats. The back basins (Basins D, E and F) house approximately 2,000 slips (Joseph Chesler, Los Angeles County Department of Beaches and Harbors, personal communication).

The Corps of Engineers maintains the harbor entrance channel and main channel for navigation by dredging. Since the late 1980's, the Corps of Engineers has not been able to use open water disposal for sediments dredged from the entrance channel due to the elevated levels of contaminants deposited from adjacent Ballona Creek. Based on Corps of Engineers' hydrodynamic numerical modeling (RMA4 model) results, the contaminant influence from Ballona Creek does not travel to nor affect the back basins (USACE 1999). Therefore, the back basins of the MdRH are assumed to be outside any significant influence from Ballona Creek.

The MdR watershed is highly developed with high-density single family residence (HDSFR), multiple family residence (MFR), and mixed residential comprising the primary land use in the watershed (46.6%) followed by retail, commercial, and general office representing the second largest land use (12.2%). The receiving waters of MdRH constitute 11.6% of the land area and marina facilities cover 9.2% of the land use. Open space and recreation represents 4.8% of the land use in the watershed. Light industrial and vacant/urban vacant each represent 4.7% of the land use. The remaining 6% of land area is covered by educational institutions (3.8%), under construction (1.2%), institutional and military installations (0.6%), transportation (0.3%), and mixed urban (0.2%).

For the purposes of this TMDL, the Regional Board has divided the watershed into five sub-watersheds based on the drainage patterns provided by the Los Angeles County Department of Public Works (LACDPW). Area 1A drains into the back basins (Basins D, E and F) of MdRH and Area 1B drains into the rest of the MdRH area (all other basins). Area 2 drains into Ballona Lagoon and then to the harbor entrance. Area 3 drains into the back basins via storm drains and Area 4 drains into the Oxford Flood Control Basin (OFCB) via storm drains and then into Basin E through a tidal gate. The sub-watersheds of the harbor are shown in Figure 1-2. See Table 1-3 for land use breakdowns by sub-watersheds.

Figure 1-2: Marina del Rey sub-watershed areas

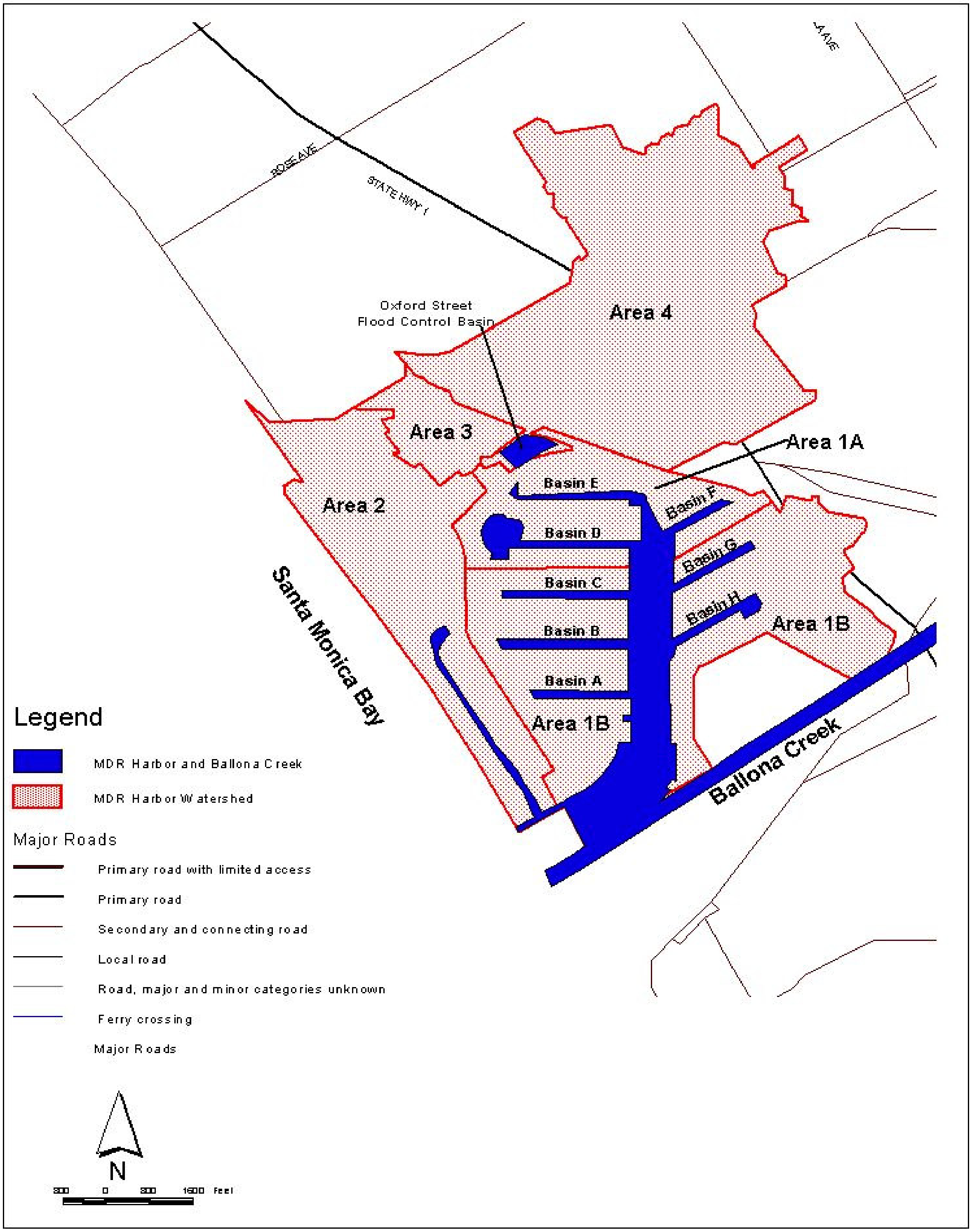


Table 1-3. Land Use by Sub-watershed Area for Marina del Rey Watershed

Land Use Type*	Marina del Rey Watershed (acres)				
	Area 1A	Area 1B**	Area 2**	Area 3	Area 4
Education			**3**		67
General Office	2	**17**			
HDSFR			**65**	38	304
Institutional	1	**9**			
Light Industrial				2	86
Marina Facilities	65	**106**			
MFR	32	**128**	**201**	14	50
Military Installations		**1**			
Mixed Residential			**1**	13	18
Mixed Urban					3
Open Space/Recreation	19	**65**	**2**		3
Other Commercial	16	**3**	**9**		2
Receiving Waters	44	**151**	**13**		8
Retail/Commercial	32	**30**	**21**		94
Transportation	4				2
Under Construction		**2**	**11**	4	6
Urban Vacant	2	**4**			29
Vacant		**53**			
Total	217	**569**	**326**	71	672

* Land use data was provided by the LACDPW on May 20, 2002 by Dr. T.J. Kim
** These sub-watershed areas do not drain to the back basins

1.3 Organization of this Document

Guidance from USEPA (1991) identifies seven elements of a TMDL. Sections 2 through 7 of this document present these elements, with the analysis and findings of this TMDL for that element. The required elements are as follows:

- **Section 2: Problem Identification.** This section describes the nature of the impairments addressed by this TMDL, and presents data to demonstrate the extent of impairment. Beneficial uses of the impaired water bodies and the relevant water quality objectives are also presented.
- **Section 3: Numeric Targets.** This section identifies the numeric targets established for the TMDLs and representing attainment of water quality objectives (WQOs) and beneficial uses.
- **Section 4: Source Assessment.** This section identifies the potential point sources and nonpoint sources of organic pollutants and metals to Marina del Rey Harbor
- **Section 5: Linkage Analysis, TMDL and Pollutant Allocations.** This section presents the analysis to evaluate the link between sources of toxic pollutants and the resulting conditions in the impaired waterbody. Each identifiable source is allocated a quantitative load or waste load allocations for the listed pollutants, representing the load that it can discharge while still ensuring that the receiving water meets the WQOs. Allocations are designed to protect the waterbody from conditions that exceed the applicable numeric target.
- **Section 6: Implementation.** This section describes the regulatory tools, plans and other mechanisms available to achieve the WLAs. The TMDL provides cost estimates to implement best management practices (BMPs) required throughout the Marina del Rey watershed to meet water quality objectives in the back basins of the harbor.
- **Section 7: Monitoring.** This TMDL describes the monitoring to ensure that the WQOs are attained. If the monitoring results demonstrate the TMDL has not resulted in attainment of WQOs, then revised allocations will be developed While the TMDL identifies the goals for a monitoring program, the Executive Officer will issue subsequent orders to identify the specific requirements and the specific entities that will develop and implement a monitoring program and submit technical reports.

2. PROBLEM IDENTIFICATION

The listings for Marina del Rey's back basins are based on concentrations of chlordane, dieldrin, DDT and PCBs in fish tissue and concentrations of copper, lead, zinc, chlordane, and PCBs in sediments. This section provides an overview of water quality criteria and guidelines applicable to Marina del Rey and reviews the fish tissue, and sediment and water quality data compiled for the purpose of this TMDL.

As a result of the data review conducted to prepare this section, the Regional Board concluded that some of the 303(d) listing decisions were no longer valid. Section 2.2 describes the basis for these conclusions. Pursuant to the consent decree, TMDLs are not required to address these listings and are therefore not developed.

2.1 Water Quality Standards

California state water quality standards consist of the following elements: 1) beneficial uses; 2) narrative and/or numeric WQOs; and 3) an anti-degradation policy. In California, the Regional Boards define beneficial uses in the Water Quality Control Plans (Basin Plans). Numeric and narrative objectives are specified in each region's Basin Plan. The objectives are set to be protective of the beneficial uses in each waterbody in the region and/or to protect against degradation. Numeric objectives for toxics can be found in the California Toxics Rule (40 CFR §131.38).

2.1.1 Beneficial Uses

The Basin Plan for the Los Angeles Regional Board (CRWQCB, 1994) defines 7 existing (E), beneficial uses for Marina del Rey Harbor (Table 2-1).

Table 2-1. Beneficial Uses of Marina del Rey Harbor (LARWQCB, 1994)

Coastal Feature	Hydro Unit #	NAV	REC1	REC2	COMM	MAR	WILD	SHELL
Marina del Rey Harbor	405.13	E	E	E	E	E	E	E

Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.
E: Existing beneficial use

There are existing designated uses to protect aquatic life that use the marine, and wildlife habitat (MAR and WILD). There are also beneficial uses associated with human use of the habor including recreational use for water contact (REC1), non-contact water recreation (REC2), navigation (NAV), commercial and sport fishing (COMM), and shellfish harvesting (SHELL).

Discharges of toxic pollutants to the harbor back basins may result in impairments of beneficial uses associated with aquatic life (MAR and WILD), and human use of these resources (COMM, SHELL, and REC-1).

2.1.2 Water Quality Objectives (WQOs)

As stated in the Basin Plan, water quality objectives (WQOs) are intended to protect the public health and welfare and to maintain or enhance water quality in relation to the designated existing and potential beneficial uses of the water. The Basin Plan specifies both narrative and numeric water quality objectives. The following narrative water quality objectives are the most pertinent to this TMDL. These narrative WQOs may be applied to both the water column and the sediments.

> Chemical Constituents: *Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use.*
>
> Bioaccumulation: *Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels, which are harmful to aquatic life or human health.*
>
> Pesticides: *No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.*
>
> Toxicity: *All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.*

The Regional Board's narrative toxicity objective reflects and implements national policy set by Congress. The Clean Water Act states that, "it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited." (33 U.S.C. 1251(a)(3).) In 2000, USEPA established numeric water quality objectives for several pollutants addressed in this TMDL in the California Toxics Rule (CTR) (USEPA, 2000b). The CTR establishes numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 92 priority toxic pollutants. These criteria are established to protect human health and the environment and are applicable to inland surface waters enclosed bays and estuaries.

For the protection of aquatic life, the CTR establishes short-term (acute) and long-term (chronic) criteria in both freshwater and saltwater. The acute criterion equals the highest concentration of a pollutant to which aquatic life can be exposed, for a short period of time, without deleterious effects. The chronic criterion equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. Freshwater criteria apply to waters in which the salinity is equal to or less than 1 part per thousand (ppt) 95 percent or more of the time. Saltwater criteria apply to waters in which salinity is equal to or greater than 10 ppt 95 percent or more of the time. For waters in which the salinity is between 1 and 10 ppt, the more stringent of the two criteria apply.

In the CTR, freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. These criteria were calculated based on methods in USEPA's *Summary of Revisions to Guidelines for Deriving Numerical*

National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses (50 FR 30792, July 29, 1985), developed under Section 304(a) of the CWA. This methodology is used to calculate the total recoverable fraction of metals in the water column and then appropriate conversion factors, included in the CTR are applied, to calculate the dissolved criteria for metals in the water column.

The human health criteria are established to protect the general population from priority toxic pollutants regulated as carcinogens (cancer-causing substances) and are based on the consumption of water and aquatic organisms or aquatic organisms only, assuming a typical consumption of 6.5 grams per day of fish and shellfish and drinking 2.0 liters per day of water. Table 2-2 summarizes the aquatic life, and human health criteria for metals and organic constituents, covered under this TMDL.

Table 2-2. Water quality objectives established in the CTR for metals and organic compounds

Pollutant	Criteria for the Protection of Aquatic Life		Criteria for the Protection of Human Health	
	Saltwater			
	Acute (µg/L)	Chronic (µg/L)	Water & Organisms (µg/L)	Organisms only (µg/L)
Chlordane	0.09	0.004	0.00057	0.00059
Total PCBs[1]	-	0.03	0.00017	0.00017
Copper (dissolved)	4.8	3.1	1300	-
Lead (dissolved)	210	8.1	-	-
Zinc (dissolved)	90	81	-	-

[1]Based on total PCBs, the sum of all congener or isomer or homolog or aroclor analyses.

For PCBs, the Basin Plan states that, "*Pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach water of the Region, are limited to 70 picograms per liter (pg/L) measured as a 30 day average for protection of human health and 14 nanograms per liter (ng/L) measured as a daily average and 30 ng/L measured as a daily average to protect aquatic life in inland fresh water and estuarine waters, respectively*." The 30-day average aquatic life value for PCBs in the Basin is the same as the 4-day average value in the CTR. However, the human health 30-day average value in the Basin Plan of 70 pg/L is more stringent the CTR value of 170 pg/L, which is also a 30-day average.

There are no numeric standards for fish tissue in the Basin Plan. The human health criteria in the CTR were developed to ensure that bioaccumulative substances do not concentrate in fish tissue at levels that could impact human health.

There are no water quality objectives for sediment in the Basin Plan. The Regional Board applied best professional judgment to define elevated values for metals in sediment during the water quality assessments conducted in 1996, 1998, and 2002. The State Board is in the process of developing sediment quality objectives (SQOs) for enclosed bays and estuaries, and expects to adopt these objectives and an implementation policy by February 28, 2007. The final objectives and implementation policy would be subject to review by the Office of Administrative Law before becoming effective. The Regional

Board will review the numeric targets in this TMDL for consistency with the final sediment quality objectives within six months after the effective date.

2.1.3 Antidegradation

State Board Resolution 68-16, "Statement of Policy with Respect to Maintaining High Quality Water" in California, known as the "Anti-degradation Policy," protects surface and ground waters from degradation. Any actions that can adversely affect water quality in all surface and ground waters must be consistent with the maximum benefit to the people of the state, must not unreasonably affect present and anticipated beneficial use of such water, and must not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to the federal Anti-degradation Policy (40 CFR 131.12).

2.2 Data Review

This section summarizes the data for Marina del Rey back basins for the listed toxic pollutants in water, fish and sediments. The summary includes water quality, fish tissue, and sediment quality data from different sources, for the period of 1993 to 2003.

2.2.1 Water Column

Although no water column impairments for Marina del Rey back basins were listed in the current CWA 303(d) list, this was due to a lack of data rather than an indication of no impairment. Some assessment of water quality is useful as sediment and fish tissue concentrations are ultimately impacted by water-borne inputs of contaminants. Conversely, high concentrations of contaminants in sediment have the potential to impact water quality through de-sorption of chemicals into water.

No data were available for assessing water column concentrations of metals and organic pollutants in Marina del Rey harbor at the onset of developing this TMDL. In order to bridge this data gap, the Los Angeles County Public Works (LACDPW) collected water column data for the listed contaminants in the summer of 2002 (June to July). The data collected represents the results of four sampling episodes during this period (see Table 2-3).

Table 2-3 Water column data for Basin E in Marina del Rey Harbor

Pollutant	Detection Limit	CTR chronic Target	6/6//02[1]	6/18/05[1]	7/1/02[1]	7/16/02	Average
Copper* (µg/L)	0.5	3.1	53	58	12.7	16.4	35
Lead* (µg/L)	0.5	8.1	n.d	n.d	n.d	0.52	-
Zinc* (µg/L)	1.0	81	55.2	39.4	96	43	58.4
Chlordane (µg/L)	0.05	0.004	n.d	n.d	n.d	n.d	n.d
DDT (µg/L)	0.1	0.001	n.d	n.d	n.d	n.d	n.d
Dieldrin (µg/L)	0.1	0.0019	n.d	n.d	n.d	n.d	n.d
PCB (µg/L)	0.5	0.03	n.d	n.d	n.d	n.d	n.d

*Values presented are dissolved metal concentrations, n.d: not detected.
[1]Uncertainty exists with respect to the analytical method used in obtaining this data.

Dissolved copper concentrations in Basin E ranged from 12.7 µg/L to 58 µg/L, exceeding both the CTR chronic criterion values of 3.1 µg/L, and the 4.8 µg/L acute criterion for salt water. Lead was not detected in three samples out of four and the only detectable concentration was below the acute and chronic criteria for saltwater. Only one sample exceeded the acute and chronic limits for zinc. Uncertainty exists with regard to the validity of the analytical methods with which results for the metals were obtained - the analytes were not removed from their salt matrix prior to analysis. Therefore, a finding of impairment for copper in the water column cannot be made at present. Further sample collection and analysis, using appropriate methods, will be required to make a final determination.

There is no indication that CTR standards are exceeded for any of the organic pollutants in Marina del Rey. However, this may be as a result of the use of analytical methods with detection limits that are above CTR standards. Further monitoring will be necessary to make a final determination of no impairment.

2.2.2 Fish and Shellfish Tissue

As discussed in section 2.2.1, there is limited data on water column concentrations to address the potential for bioaccumulation in fish. Analysis of fish tissue for chemical contaminants provides a more direct means for assessing impacts.

Maximum tissue residue levels (MTRLs) were developed by State Board by multiplying the human health CTR water quality objectives by the bioconcentration factor for each substance as recommended by USEPA (USEPA, 1991). These objectives represent levels that protect human health from consumption of fish and shellfish. The MTRLs are an assessment tool and do not constitute enforceable regulatory limits. MTRLs have value as alert levels indicating water bodies with potential human health concerns. However, the MTRLs are no longer used by the State to evaluate fish or shellfish tissue data for 303(d) listing purposes. Screening values have been developed by the Office of Environmental Health Hazard Assessment (OEHHA). These screening values relate human health endpoints to contaminant concentrations in fish based on an average consumption rate for fish and shellfish (California EPA OEHHA 1999).

To assess potential impairments associated with contaminant concentrations in fish tissue, we reviewed the 1996 WQA worksheets, which formed the basis for the 1998 303(d) list. Tissue data used in the assessment were data collected as part of the Toxic Substances Monitoring Program (TSMP) in 1993 and 1995 (Table 2-4).

Table 2-4. Fish tissue listing data from Toxic Substances Monitoring Program (ppb, wet weight).

Program	TSMP				SWRCB	OEHHA
Date	1993	1995	1995	1995	Maximum Tissue Residue Level (MTRL)	Screening Value (µg/kg)
Species	White Croaker	Round Stingray	Sargo	Yellow Croaker		
Number of individuals	1	1	1	1		
Chlordane	128		30.7		8.3	30
Dieldrin	5.6		5.3		0.7	2.0
Total DDTs	230		101	60	--	100
Total PCBs	490	255	59		5.3	20

The TSMP data represents the results from a single sample (White Croaker) in 1993, and three samples (Round Stingray, Sargo, and Yellow Croaker) in 1995 that were collected in Marina del Rey Harbor. The TSMP data indicate concentrations of chlordane, dieldrin, DDT, and PCBs that are above the MTRLs or OEHHA screening values.

More recent fish data was obtained for the Marina del Rey back basins during the Southern California Bight Regional Monitoring Project. Fish tissue samples were analyzed for chlordane, total DDTs, and total PCBs. In addition, the Los Angeles County Department of Beaches and Harbors (LACDBH) conducted fish tissue analyses at EPA's request in 2002. Chlordane, total DDTs, and dieldrin in whole fish were analyzed. Data from both sources are presented in Table 2-4.

Table 2-5. Fish tissue listing data from Toxic Substances Monitoring Program (ppb, wet weight).

Source/Date	**Bight 98**				**LACDBH 2002**	**OEHHA**
Location	MdR Basin D/E	MdR Basin H	MdR Main Channel - Entrance	MdR Main Channel - Center	MdR back basins	Screening Value (µg/kg)
Species	California Halibut	California Halibut	California Halibut	California Halibut	White Croaker	
Number of individuals	1	1	1	1	6	
Chlordane	0	0	0	2.4	<1	30
Dieldrin	n.a	n.a	n.a	n.a	<1	2.0
Total DDTs	7.4	8.8	18.6	35.2	74.4	100
Total PCBs	7	10.8	23	50.2	n.a	20

* 6 fish merged into one composite sample

The (Bight 98) data indicates that total DDT and chlordane are below the fish screening values at all locations in the harbor. Total PCB concentration in fish tissue exceeded the fish target in 2 of 4 samples in the harbor. Dieldrin was not measured for the Bight 98 studies. Additional data from the LACDBH 2002 analyses showed chlordane and dieldrin to be undetectable and total DDTs to be below screening values. These more recent data indicate that total PCBs are currently the only fish tissue impairment.

2.2.3 Sediment

Assessment of the extent of sediment impairment was based on data from the following sources:

Bay Protection and Toxic Cleanup Program Data (BPTCP): Sampling was conducted in January 93, February 94, June 96 and February 97 at different locations in the Marina del Rey Harbor. This assessment included three sampling locations in the back harbor (1 in Basin D and 2 in Basin E). The samples were analyzed for sediment chemistry and toxicity.

Los Angeles County Department of Beaches and Harbors (LACDBH 1996 –2004): This annual Marina del Rey Harbor sampling program is conducted by the Los Angeles County Department of Beaches and Harbors. The samples were taken from different locations throughout the harbor, including 4 stations in the back basins (1 in Basin D, 2 in Basin E, and 1 in Basin F). The samples were analyzed for sediment chemistry, benthic community index, water column general chemistry and physical parameters, and bacteria.

Southern California Bight Regional Monitoring Project (Bight 98): provides an integrated assessment of Southern California coastal estuaries. The samples were collected in summer of 1998 and were analyzed for sediment chemistry, toxicity (solid phase, elutriate test and enzyme induced), bioaccumulation in whole fish (juvenile California Halibut) and AVS/SEM for metals. The samples included three stations in the Marina del Rey back basin (Basin D and Basin E).

Data from these sources are presented and evaluated in Table 2-6 through 2-9.

Table 2.6: Summary of Sediment Quality Data for Marina del Rey's back basins (96-03).

Date	Location	Pollutants of Concern (metals in mg/Kg and organics in µg/Kg)				
	Basin D	**Cu**	**Pb**	**Zn**	**Chlordane**	**Total PCBs**
Jun-96	BPTCP (#48002)	320	52.2	520	11.15	130.2
Oct-95	LACDBH (#8)	367	81	387	<20	
Oct-96		210	57.2	213	<0.3	<20
Oct-97		300	92	320	<0.4	<20
Oct-98		242	62	238	<0.4	<20
Oct-99		312	91	320	<0.4	<20
Oct-00		307	76	320	<0.4	<20
Oct-01		354	79	293	<2	22.66
Oct-02		330	105	322	<2	<1
Oct-03		351	72	445	<2	<1
	Basin E					
Jan-93	BPTCP (#44014)	550	240	620	22.1	308.9
Feb-94		427	171	636	38.1	391.5
Jun-96		321	149	400	24.9	237.9
Jun-96	BPTCP (#48001)	266	206	496	14.87	165.3
Oct-95	LACDBH (#10)	299	177	455	110	
Oct-96		314	292	440	2	<20
Oct-97		380	210	480	3	<20
Oct-98		172	106	320	<1.4	<20
Oct-99		108	51	157	<0.3	<20
Oct-00		147	88	252	<0.4	<20
Oct-01		122	45	155	<2	50.06
Oct-02		241	89	335	<1	59.7
Oct-03		362	109	648	<2	<1
Oct-95	LACDBH (#11)	373	95	423	<20	
Oct-96		346	114	426	0.5	<20
Oct-97		390	120	390	<0.5	<20
Oct-98		312	113	390	<1.1	<20
Oct-99		450	128	450	<0.4	<20
Oct-00		420	103	390	<0.5	<20
Oct-01		359	106	339	<2	58.82
Oct-02		433	109	451	5.3	93.3
Oct-03		403	96	523	<2	<1
1998	Bight 98 (2443)	146.5	117.5			177.31
1998	Bight 98 (2444)	263	98.6			20.1
	Basin F					
Oct-95	LACDBH (#9)	380	115	419	<20	
Oct-96		346	141	382	0.6	<20
Oct-97		360	140	370	<0.5	<20
Oct-98		320	116	360	<1.2	<20
Oct-99		390	149	410	<0.5	<20
Oct-00		167	105	245	<0.5	<30
Oct-01		333	143	324	<2	137.12
Oct-02		368	187	396	<2.15	101.6
Oct-03		294	95	371	<2	<1

No. of samples	**43**	**43**	**41**	**41**	**39**
Average	**318**	**118**	**386**		
Min.	**108**	**45**	**155**	**<0.3**	**<1**
Max.	**550**	**292**	**648**	**110**	**391.5**

The sediment contaminants were evaluated relative to sediment quality guidelines (SQGs), specifically the values for Effects Range-Low (ERL), Effects Range-Median (ERM) (Long et al., 1995), Threshold Effects Level (TEL), and Probable Effects Level (PEL) (MacDonald, 1994). These SQGs are based on empirical data compiled from numerous field and laboratory studies performed in North America.

The National Oceanic Atmospheric Administration (Long et al., 1995) assembled data from throughout the country that correlated chemical concentrations in sediments with effects. These data included spiked bioassay results and field data of matched biological effects and chemistry. The product of the analysis is the identification of two concentrations for each substance evaluated. The ERL values were set at the 10th percentile of the ranked data and represent the point below which adverse biological effects are not expected to occur. The ERM values were set at the 50th percentile and are interpreted as the point above which adverse effects are expected.

The TEL and PEL values were developed by the State of Florida and were based on a biological effects empirical approach similar to the ERLs/ERMs. The development of the TELs and PELs differ from the development of the ERLs and ERMs in that data showing no effects were incorporated into the analysis. In the Florida weight-of-evidence approach, two databases were assembled: a "no-effects" database and an "effects" database. Taking the geometric mean of the 15th percentile value in the effects database and the 50th percentile value of the no-effects database generated the TEL values. The PEL values were generated by taking the geometric mean of the 50th percentile value in the effects database and the 85th percentile value of the no-effects database. By including the no-effect data in the analysis, a clearer picture of the chemical concentrations associated with the three ranges of concern (no effects, possible effects, and probable effects) can be established.

The ERLs and TELs are presumed to be non-toxic levels with a high degree of confidence of no potential threat. The ERMs and PELs identify pollutant concentrations that are more probably elevated due to toxic levels. In the "*Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) Lis*t," ERMs for copper, zinc, and chlordane, and the PEL value for lead, are identified as the guidelines most predictive of biological effects (SWRCB, 2004). The listing policy also identifies a consensus-based SQG for total PCBs as most predictive of biological effects. Table 2-7.summarizes these guidelines.

Table 2-7. Summary of marine sediment quality guidelines used in assessment of TMDL pollutants

Organics	ERL (µg/kg)	ERM (µg/kg)	TEL (µg/kg)	PEL (µg/kg)	Consensus-based SQG (µg/kg)
Chlordane	0.5	6*	2.26	4.79	
Total PCBs	22.7	180	21.6	189	400*
Metals	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
Copper	34	270*	18.7	108	
Lead	46.7	218	30.2	112*	
Zinc	150	410*	124	271	

*SQGs most predictive of biological effects (CSWRCB, 2004).

As shown in Table 2-6, several sediment samples had chlordane and total PCBs in concentrations at or below detection limits; and, in some cases, the detection limits were greater than the SQG. In Table 2-8, the detection limits were treated as the actual concentration when evaluating the sediment data.

Table 2-8. Evaluation of sediment data relative to sediment quality guidelines

Pollutant	Number of samples	# >DL	# > ERL	# > ERM	# > TEL	# > PEL	# > Other SQG
Copper	**43**	**43**	**43**	**32**	**43**	**42**	**n.a**
Lead	**43**	**43**	**42**	**2**	**40**	**19**	**n.a**
Zinc	**41**	**41**	**41**	**15**	**41**	**35**	**n.a**
Chlordane	**41**	**11**	**27**	**9**	**11**	**10**	**n.a**
PCBs	**39**	**14**	**13**	**3**	**14**	**3**	**0**

n.a not applicable

Organics in Sediments

Chlordane was detected in 11 out of 41 sediment samples used for this assessment. In 16 of the 41 samples the detection limit was above the SQGs. Based on the assumption that the detection limit is the actual concentration, 9 of 41 samples exceeded the ERM value. This number of exceedances of the ERM value indicates that chlordane remains an impairment in the harbor sediment.

Total PCBs were detected 14 out of 39 sediment samples. Concentrations ranged from <1 to 391.5 µg/kg (calculated as the sum of the congeners). Treating detection limits as true values, 3 out of the 39 samples had concentrations greater than ERM and no samples were greater than the consensus-based SQG value of 400 µg/Kg. While there are no exceedances of the SQG value for total PCBs, the elevated levels of this pollutant in fish tissue would make a determination of no impairment premature.

Metals in Sediments
Copper was detected in all sediment samples from Basins D, E, and F of Marina del Rey Harbor. Sediment concentrations ranged from 108 to 550 mg/kg. All 43 samples were above ERL guidelines, and 32 of 43 exceeded the ERM value. Copper remains at elevated concentrations within Marina del Rey's back basins.

All sediment samples had detectable lead concentrations. Lead in the sediments of Marina del Rey's back basins ranged from 45 to 292 mg/kg. Samples from Basins E and F exhibited higher lead levels than those from Basin D. The PEL guideline was exceeded in 19 of 43 samples, which indicates a continuing impairment in the sediments of the back basin.

Zinc concentrations in the sediment samples ranged from 155 to 648 mg/kg in Marina del Rey's back basins. All 41 samples exceeded the ERL values, and 15 of 41 samples exceeded the ERM guideline, confirming the zinc impairment.

Sediment Toxicity
Sediment toxicity data for the Marina del Rey back basins is presented in Table 2-9. These data were compiled from the Bay Protection and Toxic Cleanup Program (BPTCP) from 1993 to 1997 and the Southern California Bight 1998 Regional Monitoring Program (Bight 98). The reported data shows sediment toxicity in seven of nine samples.

Table 2-9 Sediment Toxicity Data for Marina del Rey's Back Basins – Amphipod Survival Rates

Source	Date	Location	Specie	Survival
BPTCP	1/14/93	Basin E (#44014)	Rhepoxynius	53% (T)
	2/15/94	Basin E (#48001)	Rhepoxynius	32% (T)
	2/15/94	Basin E (#48001)	Rhepoxynius	42% (T)
	2/15/94	Basin E (#48001)	Rhepoxynius	35% (T)
	6/19/96	Basin E (#44014)	Eohaustorius	92% (NT)
	2/5/97	Basin E (#48001)	Eohaustorius	49% (T)
	2/5/97	Basin D (#48002)	Eohaustorius	65% (T)
Bight 98	Summer 1998	Basin E (#2443)	Eohaustorius	66% (T)
	Summer 1998	Basin E (#2444)	Eohaustorius	79% (NT)

T – toxic, NT = non toxic

2.3 Summary and Findings concerning TMDLs Required

There is indication of water column impairment by dissolved copper in Marina del Rey Harbor. However due to the uncertainty involved with the method used for sample analysis, further monitoring is necessary to make a final determination. Sediment concentrations of copper, lead, zinc, and chlordane remain elevated, while total PCBs meet the State's de-listing criteria. However, more recent fish tissue data indicates that total PCB concentrations are above fish tissue targets; while fish tissue levels of chlordane, dieldrin and total DDTs are below the fish tissue targets.

This TMDL will be developed to reduce sediment impairment by copper, lead, zinc, and chlordane. In addition, the fish tissue impairment by total PCBs will be addressed. Based on the above assessment of available data, fish tissue impairment by chlordane, dieldrin and DDTs, do not require a TMDL. Sediment toxicity and the fish consumption advisory impairments will be mitigated through implementing TMDLs for the listed pollutants.

3 NUMERIC TARGETS

Numeric Targets for this TMDL are used to calculate waste load allocations for the impairing metals and organic compounds, and/or to indicate attainment of water quality objectives. Sediment quality guidelines are used to calculate the TMDLs for the copper, lead, zinc, and chlordane impairments in sediments. Water criteria, fish tissue and sediment quality guidelines are selected as numeric targets for the total PCB fish tissue impairment. The sediment target for total PCBs is the primary numeric target, which is used to calculate the TMDL and allocations. Water quality objectives and fish tissue guidelines for total PCBs are secondary targets that will provide additional means of assessing success in attaining water quality standards, including the narrative toxicity objective.

3.1 Sediment Numeric Targets

Numeric targets that are protective of aquatic life beneficial uses are developed for copper, lead, zinc, total PCBs and chlordane in sediments. While the PCB impairment occurs in fish tissue only, a sediment target is necessary as PCBs are directly associated with sediments which are the transport mechanism of these compounds from the Marina del Rey watershed to the harbor. As discussed in Section 2, the Basin Plan provides narrative objectives that can be applied to sediments but does not provide numeric WQOs for sediment quality. To develop the TMDLs, it is necessary to translate the narrative objectives into numeric targets that identify the measurable endpoint or goal of the TMDL and represent attainment of applicable numeric and narrative water quality standards.

Sediment quality guidelines compiled by National Oceanic and Atmospheric Administration (NOAA) are used in evaluating waterbodies within the Los Angeles Region for development of the 303(d) list. The sediment quality guidelines are applicable numeric targets because the impairments and the 303(d) listings are primarily based on sediment quality data. In addition, the pollutants being addressed have a high affinity for particles and the delivery of these pollutants is generally associated with the transport of suspended solids from the watershed or from sediments within the harbor.

The ERLs (Long et al., 1995) guidelines are established as the numeric targets for sediments in Marina del Rey's back basins, as summarized in Table 3-2. The State Board listing policy recommends the use of ERMs, PELs, and other SQGs as a threshold for listing. ERM and PEL values are interpreted as levels above which the adverse biological effects are expected, which makes them applicable in the determination of impairment. The ERL values, on the other hand, represent the levels below which adverse biological effects are not expected to occur, and are more applicable to the prevention of impairment. These SQGs are discussed in greater detail in Section 2.2.3. The goal of the TMDL is to remove impairment and restore beneficial uses; therefore, the ERLs are selected as numeric targets over the ERMs to limit adverse effects to aquatic life. The selection of the ERLs, which are lower than ERMs, provides an implicit margin of safety.

Table 3-1. Numeric targets for sediment quality in Marina del Rey's back basins

Organics	Numeric Target for Sediment
Chlordane	0.5 µg/kg
Total PCBs	22.7 µg/kg
Copper	34 mg/kg
Lead	46.7 mg/kg
Zinc	150 mg/kg

3.2 Water Quality Criteria

The California Toxics Rule (CTR) Criterion for the protection of human health from the consumption of aquatic organisms is selected as the final numeric target for total PCBs in the water column. However, given the inability of current analytical methods to detect concentrations at this low level, an interim numeric target will be applied. The CTR Chronic Criterion for the protection of aquatic life in saltwater is selected as the interim numeric target for the fish tissue impairment by PCBs. This numeric target will remain in effect until advances in technology allow for analysis of PCBs at lower detection limits. The interim and final numeric targets for total PCBs in the water column are provided in Table 3-2. As discussed in Section 3, this secondary target will serve as a means of gauging improvements in water quality, and not as a basis for calculating TMDL allocations.

Table 3-2: Numeric Targets for total PCBs in the water column

	Numeric Targets (µg/L)
Interim	0.03
Final	0.00017

3.3 Fish Tissue Target

The fish tissue target of 5.3 µg/Kg for total PCBs is derived from CTR human health criteria, which are adopted criteria for water designated to protect humans from consumption of contaminated fish or other aquatic organisms. The derived fish tissue target is referred to as the Threshold Tissue Residue Level (TTRL), in this document. Use of a fish tissue target is appropriate to account for uncertainties in the relationship between pollutant loadings and beneficial use effects (EPA, Newport Bay TMDL, 2002) and directly addresses human health impacts from consumption of contaminated fish or other aquatic organisms. While the detection limit for total PCBs in water is currently higher than the CTR criteria for the protection of human health, the TTRL numeric target is detectable with current technology; making compliance monitoring feasible. Thus, the TTRL provides an effective method for accurately quantifying achievement of the water quality objectives.

3.3.1. Deriviation of the Treshold Tissue Residue Level (TTRL)

The TTRL value of 5.3 μg/Kg for total PCBs is derived from the CTR human health criteria for consumption of organisms only (i.e. 0.00017 μg/L). CTR criteria were developed by determining pollutant concentrations in edible fish tissue that would pose a health risk to humans consuming 6.5 grams of fish per day. These fish tissue concentrations were converted to water column concentrations using a bioconcentration factor (BCF), which is the ratio of the chemical concentration in fish to the chemical concentration in water. The TTRL was derived by reverting back to the original fish tissue concentration upon which the human health criteria are based (see equation 3-1). This was the same approach used in the Calleguas Creek OC Pesticides and PCBs TMDL (LARWQCB, 2005a).

$$\text{TTRL} = \text{CTR criterion} \times \text{BCF} \qquad \text{(equation 3-1)}$$

TTRL = Threshold Tissue Residue Level μg/Kg
CTR criterion = 0.00017 μg/L
BCF = Bioconcentration Factor = 31200 L/Kg

4 SOURCE ASSESSMENT

This section identifies the potential sources of metals and organochlorine compounds to Marina del Rey's back basins. The toxic pollutants can enter surface waters from both point and non-point sources. Point sources typically include discharges from a discrete human-engineered point. These types of discharges are regulated through the federal National Pollutant Discharge Elimination System (NPDES) program, which the Regional Boards have been delegated to implement through the issuance of Waste Discharge Requirements (WDRs). In Los Angeles County urban runoff to Marina del Rey is regulated under storm water NPDES permits, which are regulated as a point source discharge. Non-point sources, by definition, include pollutants that reach surface waters from a number of diffuse land uses and activities that are not regulated through NPDES permits. Examples of non-point sources in the Marina del Rey Watershed include atmospheric deposition and boat discharges.

4.1 Background on Toxic Pollutants

The following sections provide background information on the toxic pollutants addressed in this TMDL, including their properties and uses.

4.1.1 Organic Pollutants

Chlordane was used as a pesticide to control insects on agricultural crops, residential lawns and gardens, and in buildings, particularly for termite control. In 1988, all chlordane uses, except for fire ant control, were voluntarily cancelled in the United States (NPTN, [undated]). Chlordane can still be legally manufactured in the United States for sale or use by foreign countries. Although it is no longer used in the US, chlordane persists in the environment, adhering strongly to soil particles. It is assumed that the only source of chlordane in the watershed is storm water runoff carrying historically deposited chlordane most likely attached to eroded sediment particles.

Polychlorinated biphenyls (PCBs) are mixtures of up to 209 individual chlorinated compounds (known as congeners). They were used in a wide variety of applications, including dielectric fluids in transformers and capacitors, heat transfer fluids, and lubricants. In 1976, the manufacture of PCBs was prohibited because of evidence they build up in the environment and can cause harmful health effects. Although it is now illegal to manufacture, distribute, or use PCBs, these synthetic oils were used for many years as insulating fluids in electrical transformers and in other products such as cutting oils. Products made before 1977, which may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils. Historically, PCBs have been introduced into the environment through discharges from point sources and through spills and accidental releases. Although point source contributions are now controlled, non-point sources may still exist, for example, refuse sites and abandoned facilities may still contribute PCBs to the environment. Once in a waterbody, PCBs become associated with solid particles and typically enter sediments (USEPA, 2002).

4.1.2 Metals

Potential anthropogenic sources of copper include corrosion of brass and copper pipe be acidic waters, copper brake pads, the use of copper compounds as aquatic algaecides, sewage treatment plant effluents, runoff and groundwater contamination for agricultural uses of copper as fungicides and pesticides, and effluents from industrial sources. Major industrial sources include mining, smelting and refining industries, copper wire mills, coal burning industries and iron and steel producing industries (MacDonald, 1994). Boats are another source of copper in the in Marina del Rey harbor. Copper is leached constantly from the anti-fouling paints used on boats to effectively reduce fouling organisms. Underwater hull cleaning also contributes copper to the harbor.

The single largest use of lead is in the production of lead-zinc batteries. Lead and its compounds are used in electroplating, metallurgy, construction materials, coating and dyes, electronic equipment, plastics, veterinary medicines, fuels and radiation shielding. Lead is also used for ammunition, corrosive-liquid containers, paints, glassware, fabricating storage tank linings, transporting radioactive materials, solder, piping, cable sheathing, and roofing (MacDonald, 1994). Prior, to the phasing out of leaded gasoline, lead additives in gasoline was a significant source of lead in the environment. Since the phasing out of leaded gasoline, there has been a gradual decline of lead concentrations in the environment.

Zinc is primarily used as a coating on iron and steel to protect against corrosion, in alloys for die-casting, in brass, in dry batteries, in roofing and exterior fittings for buildings, and in some printing processes. The principal sources of zinc in the environment include smelting and refining activities, wood combustion, waste incineration, iron and steel production, and tire wear (MacDonald, 1994). A tire contains about half a pound of zinc, which is needed to cure the rubber (America Zinc Association). In Marina del Rey harbor, the use of sacrificial zinc anodes to prevent corrosion on boats, is a potential source of zinc.

4.2 Point Sources

A point source, according to 40 CFR 122.3, is defined as “any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged.” The NPDES Program, under CWA sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources.

The NPDES permits in the Marina del Rey Watershed include the MS4 and Caltrans Storm Water Permits, general construction storm water permits, general industrial storm water permits, and general NPDES permits (Table 4-1).

Table 4-1. NPDES Permits in the Marina del Rey Watershed

Type of NPDES Permit	Number of Permits
Municipal Storm Water	1
California Department of Transportation Storm Water	1
General Construction Storm Water Tradewind Apartments Marina Point III Apartments Marina Waterside	3
General Industrial Storm Water Fed Ex Windward Yatch & Repair Seamark Boatyard	3
Total	**8**

4.2.1 Stormwater Runofff

Storm water runoff in the Marina del Rey watershed is regulated through a number of permits. The first is the municipal separate storm sewer system (MS4) permit issued to the County of Los Angeles and its co-permittees. The second is a separate statewide storm water permit specifically for the California Department of Transportation (Caltrans). The third is the statewide Construction Activities Storm Water General Permit and the fourth is the statewide Industrial Activities Storm Water General Permit. The permitting process defines these discharges as point sources because the storm water discharges from the end of a storm water conveyance system. Since the industrial and construction storm water discharges are enrolled under NPDES permits, these discharges are treated as point sources in this TMDL.

The Oxford Street Flood Control Basin (OSFCB) and the Washington Street (Palawan Way) drain are two major stormwater conduits with direct drainage into the back basin E. OSFCB is a sump for street drainage, from the community north and east of the marina, draining into Basin E through a tide gate. The Washington Street conduit drains an area north west of the Marina. The runoff carries relatively high contaminant concentration into sheltered, low energy areas such as Basin E and F. The OSFCB serves as a settling basin and detention basin for the major stormwater inflows to the back harbor. Many studies suggested that the OSFCB may be a significant contributor of contaminants in the back basins based on the high contamination levels in the drainage basin and the correlation between back harbor and OSFCB concentrations during storm events (Soule et al. studies 1977, 1984, Los Angeles County Department of Beaches and Harbors 1996-2004).

A GIS based Pollutant Loading Model (PLOAD) was used to calculate stormwater pollutant loads for total recoverable and dissolved copper, lead and zinc for Marina del Rey's sub-watersheds (Table 4-2). The detailed calculations are included in Appendix A The loadings for metals were calculated based on the stormwater event mean concentrations (EMCs) analyzed by the Los Angeles County Department Public Works

(LADPW) from 1994 to 2000 for eight land use types. EMCs values for organochlorine pesticides and PCBs were not available due to non-detectable levels in stormwater.

Table 4-2. Annual Loading from Stormwater Water Runoff for Metals (lb/year)

Sub-watershed	Total Suspended Solids	Total Copper	Dissolved Copper	Total Lead	Dissolved Lead	Total Zinc	Dissolved Zinc
Average Rain Year							
Area 1A	21,933	9.9	4.4	3.3	0.0	71	47.9
Area 3	7,788	1.4	0.8	0.8	0	13	7.6
Area 4	111,742	23	12.4	9.8	0	218	153.7
TOTAL	**141,463**	**34.3**	**17.6**	**13.9**	**0**	**302**	**209**
Dry Rain Year							
Area 1A	10,231	4.6	2.0	1.5	0.0	33.2	22.4
Area 3	3,633.	0.7	0.4	0.4	0	5.8	3.6
Area 4	52,127	10.7	5.8	4.6	0	101.8	71.7
TOTAL	**65,992**	**16**	**11.5**	**9.2**	**0**	**199**	**136**
Wet Rain Year							
Area 1A	38,153	17.3	7.6	5.8	0.0	124.0	83.4
Area 3	13,547	2.4	1.4	1.3	0	21.7	13.3
Area 4	194,378	39.9	21.5	17	0	379.6	267.4
TOTAL	**246,078**	**59.6**	**30.5**	**24.1**	**0**	**525**	**364**

4.2.2 Summary Point Sources

Urban storm water has been recognized as a substantial source of metals (Characklis and Wiesner 1997, Davis et al. 2001, Buffleben et al. 2002) and organic pollutants (Suffet and Stenstrom, 1997). This is reflected in routine storm water monitoring performed by LACDPW under the MS4 permit (LACDPW, 2002). Studies have also shown that dry-weather pollutant loadings are not insignificant (McPherson et al., 2002).

The Oxford Street Flood Control Basin (OSFCB) and the Washington Street (Palawan way) drain are two major stormwater conduits with direct drainage into the back basin E. In the Marina del Rey Watershed storm water discharges are regulated under the MS4 permit, the Caltrans permit, the general industrial storm water permit and the general construction storm water permit. There are also two non-storm water general permits with low potential to contribute significant loadings to the system.

The most prevalent metals in urban storm water (i.e., copper, lead and zinc) are consistently associated with the suspended solids (Sansalone and Buchberger 1997, Davis et al. 2001). These metals are typically associated with fine particles in storm water runoff (Characklis and Wiesner 1997, Liebens 2001), and have the potential to accumulate in estuarine sediments posing a risk of toxicity (Williamson and Morrisey, 2000). The organic contaminants in storm water are also associated with suspended solids and the particulate fraction.

A major contributor of associated metals, and organic compounds to Marina del Rey Harbor is assumed to be wet-weather runoff discharged from the storm water conveyance system. While the loadings of metals are attributable to ongoing activities in the watershed, the loadings of chlordane and PCBs, reflect historic uses. Although the uses of these compounds are banned, these legacy pollutants continue to be detected in sediments at elevated levels.

4.3 Nonpoint Sources

Marina activities and atmospheric deposition are the major non-point sources of contaminants in the Marina del Rey watershed.

4.3.1. Marina Activities

Elevated metal concentrations occur in the middle and back basins of Marina del Rey Harbor. The numerous boats that utilize the Marina are a likely contributor to the metals impairment in this area. Boats have metal components and engines that constantly corrode from salt water and air. Anti-fouling paints contain heavy metals such as copper that are designed to constantly ablate or leach out (passive leaching) to effectively reduce fouling organisms. Lead and zinc concentrations were also found in high amounts in the back harbor sediments. These metals might have originated from the historical industrial land uses of the Marina or have been derived from boating activity, including copper and lead in the boat paints, and zinc in the anodes of boat engines.

4.3.1.1 Copper Loading from Recreational Boats

Copper inputs from recreational boats to Marina del Rey back basins were estimated based on information obtained from the Dissolved Copper TMDL for Shelter Island Yacht Basin (SIYB), which was developed by the San Diego Regional Water Quality Control Board (SDRWQCB, 2005). The San Diego TMDL, adopted on March 9, 2005 , provides dissolved copper loading equations for both passive leaching from wetted hull surfaces, and from underwater hull cleaning (i.e. wiping down the wetted surface to remove marine growth). Local conditions (number of moored boats) were applied for Marina del Rey. Parameters such as mean boat length and wetted surface area were assumed to be the same as in the SIYB. Passive leaching and hull cleaning were estimated to contribute approximately 3,693-lb/year and 47.6 lbs lb/year of dissolved copper, respectively to the Marina del Rey back harbor. Details of these calculations are provided in the Appendix B.

Copper in the water column can accumulate in sediment through adsorption or by partitioning in pore water. In this way, sediment acts as a “sink” for copper in the water column, and concentration levels can build up and persist over time. The rate of contamination of sediment is dependent on a variety of factors including sediment type and quality, organic matter content and the degree of contamination in the water column and associated sediment (SIYB TMDL, 2005). The poor flushing in the harbor’s back basins increases the likelihood of dissolved copper partitioning to the sediment. However, there is insufficient information available to quantify copper loading to the sediment from boat discharges. This TMDL will require a study designed to estimate copper partitioning between the water column and sediment.

4.3.2 Atmospheric Deposition

Direct deposition of airborne particles to the water surface may be responsible for contributing copper, lead and zinc to the Marina del Rey back basins. Indirect deposition from air to land and subsequent wash into the back basins is accounted for in the stormwater runoff estimates. Indirect and direct deposition of metals to surface water was estimated from dry deposition fluxes in the Los Angeles coastal region presented in Sabin et al., (2004). Table 4-3 shows that the direct air deposition is a relatively small source for the metals impairment.

Table 4-3. Estimate of Atmospheric Deposition of Metals to Surface Water

Metals	Direct Deposition (kg/yr)	Indirect Deposition (kg/yr)
Copper	0.14	29
Lead	0.09	22
Zinc	0.46	144

5 LINKAGE ANALYSIS, TMDL AND POLLUTANT ALLOCATION

The linkage analysis is used to identify the assimilative capacity of the receiving water for the pollutant of concern by linking the source loading information to the water quality target. The TMDL is then divided among existing pollutant sources through the calculation of load and waste load allocations. This section discusses the linkage analysis used for Marina del Rey's back basins and identifies the resulting pollutant allocations.

The goals of the Marina del Rey Toxics TMDL is to reduce pollutant loads of copper, lead, zinc, chlordane, and PCBs from the Marina del Rey watershed to the sediments back basins of its harbor. The TMDL is also intended to reduce elevated levels PCBs in fish tissue.

The impairing contaminants in sediment are associated with fine-grained particles that are delivered to the sediments through suspended solids in stormwater. It is expected that reductions in loadings of these pollutants will lead to reductions in sediment concentrations over time. The existing contaminants in surface sediments will be removed over time as sediments are scoured during storms or removed in dredging operations. For the legacy pollutants (chlordane and PCBs), some loss will also occur through the slow decay and breakdown of these organic compounds. Concentrations in surface sediments will be reduced through mixing with cleaner sediments. Attenuation of pollutant concentration levels in sediment is expected to translate to reductions in fish tissue contaminant levels. Also see Section 3.1 herein.

5.1 Loading Capacity

The loading capacity of the sediments was estimated from the annual average total suspended solids (TSS) loading to the back basins of Marina del Rey Harbor, as estimated from the PLOAD model (Table 5-1). While the TSS load may not represent the total sediment loading to the harbor, it represents the finer material with which pollutants are more readily associated.

Table 5-1. Average Annual Total Suspended Solids (TSS) Loading to Marina del Rey

Subwatershed	TSS (lbs/year)	TSS (kg/year)
Area 1A	21933	9,948
Area 3	7,788	3,533
Area 4	111,742	50,685
Total	**141,463**	**64166**

Assuming fine sediments carried by stormwater to be the main source of contaminated sediments to the back basins, pollutant specific loading capacity was calculated by multiplying the average annual total suspended solids load 64,166 kg/yr discharged to the harbor by the numeric sediment targets (Table 3-2). The resultant numbers are presented in Table 5-2. The TMDL for sediment is set equal to the loading capacity.

Table 5-2. Sediment Loading Capacity Expressed as Mass per Year

Metals	Numeric Target ERL (mg/kg)	TMDL (kg/year)
Copper	34	2.18
Lead	46.7	3.0
Zinc	150	9.6
Organics	**ERL (µg/kg)**	**TMDL(g/year)**
Chlordane	0.5	0.03
PCBs	22.7	1.46

5.1.1 Critical Conditions

The amount of total suspended solids in stormwater run-off is a function of the storms, which are highly variable between years. The TMDL is based on a TSS load derived from long-term average rainfall over a 52-year period from 1948 to 2000. This time period contains a wide range of storms in the Marina del Rey watershed. Use of the average condition for the TMDL is appropriate because issues of sediment effects on benthic communities and potential for bioaccumulation to higher trophic levels occurs over long time periods.

5.1.2 Margin of Safety

TMDLs must include a margin of safety to account for any uncertainty concerning the relationships between sources, and water and sediment quality. An implicit margin of safety is applied through the use of more protective SQG values. The ERLs were selected over the higher ERMs as the numeric targets.

5.2 Allocations

Contaminated sediment generated in the watershed is transported to Marina del Rey's back basins through the storm water conveyance system. These are regulated directly in the NPDES process through storm water permits or indirectly through the issuance of NPDES permits for discharges to the storm water system. A mass-based load allocation was developed for direct atmospheric deposition. A grouped mass-based waste load allocation was developed for storm water permittees (Los Angeles County MS4, Caltrans, General Industrial and General Construction) by subtracting the mass-based load allocations from the total loading capacity according to the following equation:

TMDL = Direct Atmospheric Deposition + Combined Storm Water Sources (5-1)

Concentration-based sediment waste load allocations are developed for other point sources in the watershed. These other point sources have intermittent flows and should discharge little to no sediment. These sources will have a minor impact on sediment loading if they are limited by concentration to the applicable ERL-based waste load allocations.

5.2.1 Load Allocations

A mass-based load allocation is developed for direct atmospheric deposition. An estimate of direct atmospheric deposition was developed based on the percent area of surface water, within the watershed area of the back basins, which is approximately 52 acres or 5.4% of the total watershed area. The load allocation for atmospheric deposition is calculated by multiplying this percentage by the total loading capacity, according to the following equation:

Direct Atmospheric Deposition = 0.054 x TMDL (5-2)

The loadings associated with indirect atmospheric deposition are included in the stormwater waste load allocations.

There will be no load allocations assigned to boat discharges at this time, as contribution from water column concentrations to sediment loading cannot be quantified. Upon completion of a study designed to obtain such information, the TMDL will be revised as necessary.

5.2.2 Waste Load Allocation for Storm Water

A mass-based waste load allocation, for the impairing pollutants in sediment, is developed for the storm water permittees according to the following equation:

Combined Storm Water Sources = TMDL - Direct Atmospheric Deposition (5-3)

Since, the direct atmospheric deposition is calculated as a percentage of the total loading capacity equation 5-3 becomes:

Combined Storm Water Sources = TMDL – 0. 054 TMDL (5-4)

Combined Storm Water Sources = 0.946 x TMDL (5-5)

For accounting purposes, it is assumed that Caltrans and the general stormwater permittees discharge entirely to the MS4 system. This assumption has been supported though review of the permits. The resulting allocations are presented in Table 5-3.

Table 5-3. Mass-based Allocations

Metals	**Direct Air (kg/yr)**	**Stormwater (kg/yr)**
Copper	0.12	2.06
Lead	0.16	2.83
Zinc	0.52	9.11
Organics	**Direct Air (g/yr)**	**Stormwater (g/yr)**
Chlordane	0.002	0.03
PCBs	0.079	1.38

USEPA requires that waste load allocations be developed for NPDES-regulated storm water discharges. Allocations for NPDES-regulated storm water discharges from multiple point sources may be expressed as a single categorical waste load allocation when data and information are insufficient to assign each source or outfall individual allocations. The combined storm water waste load allocation is divided among the four storm water permittees (MS4, Caltrans, general industrial and general construction) based on an estimate of the percentage of land area covered under each permit (Table 5-4).

Table 5-4. Areal extent of watershed and percent area covered under storm water permits

Category	Area in acres	Percent area
MS4 Permit	880	91.9
Caltrans Storm Water Permit	9.58	1
General Construction Storm Water Permit	14.5	1.5
General Industrial Storm Water Permit	2	0.2
Water (LA for direct atmospheric deposition)	52	5.4
Total	**958**	**100**

Based on these areas, the waste load allocations for each storm water permittee are presented in Table 5-5. In the storm water permits, permit writers may translate the numeric waste load allocations to BMPs, based on BMP performance data. It is anticipated that reductions will be achieved either through pollutant control measures or sediment control measures.

Table 5-5. Combined storm water allocation apportioned based on percent of watershed.

Metals	General Construction permittees (kg/yr)	General Industrial permittees (kg/yr)	Caltrans (kg/yr)	MS4 Permittees (kg/yr)
Copper	0.033	0.004	0.022	2.01
Lead	0.045	0.006	0.030	2.75
Zinc	0.144	0.018	0.096	8.85
Organics	**General Construction permittees (g/yr)**	**General Industrial permittees (g/yr)**	**Caltrans (g/yr)**	**MS4 Permittees (g/yr)**
Chlordane	0.0005	0.0001	0.0003	0.0295
PCBs	0.0219	0.0029	0.015	1.34

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive individual waste load allocations on a per acre basis, based on the acreage of their facility as presented in Table 5-6.

Table 5-6. Per acre waste load allocation for an individual general construction or industrial storm water permittee (g/day/ac).

Metals	Individual General Construction or Individual General Industrial Permittee (g/yr/ac)
Copper	2.3
Lead	3.1
Zinc	10
Organics	**(mg/yr/ac)**
Chlordane	0.03
PCBs	1.5

5.2.3 Waste Load Allocation for other NPDES Permits

Concentration-based sediment waste load allocations have been developed for the minor NPDES permits and general non-storm water NPDES permits that discharge to Marina del Rey Harbor to ensure that these do not contribute significant loadings to the system. The concentration-based waste load allocations are equal to the sediment numeric targets. All minor NPDES permittees and general non-storm water NPDES permittees shall not discharge sediments with concentrations greater than the ERLs as listed in Table 5-7. Monitoring requirements will be placed on these discharges as appropriate in their respective NPDES permits. Any future minor NPDES permits or enrollees under a general non-storm water NPDES permit will also be subject to the concentration-based waste load allocations.

Table 5-7. Concentration-based waste load allocation for sediment discharged to Marina del Rey Harbor.

Metals	Waste Load Allocation for Sediment
Copper	34 mg/kg
Lead	46.7 mg/kg
Zinc	150 mg/kg
Organics	**Waste Load Allocation for Sediment**
Chlordane	0.5 µg/kg
Total PCBs	22.7 µg/kg

5.2.4 Contaminated Inplace Sediment

The waste load allocations and load allocations have been developed to achieve the numeric targets in the back basins of Marina del Rey Harbor by the end of the compliance period. However, the Regional Board is aware of toxic pollutants bound up in *insitu* sediment. To the extent that the Regional Board or another responsible jurisdiction or agency determines that toxic pollutants bound in *insitu* sediments are ~~still~~ preventing the attainment of numeric targets, the Regional Board will issue appropriate investigatory orders or cleanup and abatement orders to achieve attainment of the numeric targets.

5.3 Summary of TMDL

The TMDL is based on pollutant loadings to the sediments of Marina del Rey's back basins. The sediment loading capacity is based on an estimate of the annual pollutant loads that can be delivered to the sediments and still meet the sediment targets. A margin of safety is provided through the use of ERLs. A grouped waste load allocation for sediment has been developed for the storm water permittees (MS4, Caltrans, general industrial and construction storm water permittees). Load allocations have been developed for direct atmospheric deposition. Concentration-based waste load allocations apply to all other non-storm water NPDES permittees. It is anticipated that implementation will be based on BMPs which address pollution prevention and/or sediment reduction. Compliance with the TMDL will be determined through the sediment and water quality monitoring program.

6 IMPLEMENTATION

Because of the high value of the Marina del Rey for commercial and recreational uses and its important biological function as a shallow coastal water habitat, it should be targeted for an intensive, marina specific, contaminant management effort designed to reduce the amount of pollution in urban runoff, and other discharges to the harbor The County of Los Angeles, City of Los Angeles, and Culver City are jointly responsible for meeting the mass-based waste load allocations for the MS4 permittees. Caltrans is responsible for meeting their mass-based waste load allocations, however, they may choose to work with the MS4 permittees. Since, MdRH is located in an unincorporated area of the County of Los Angeles, the County of Los Angeles is the primary jurisdiction. Additional studies and monitoring should assist municipalities in focusing their implementation efforts on key land uses, critical sources and/or storm periods.

The City of Los Angeles, County of Los Angeles, Culver City, and Caltrans may jointly decide how to achieve the necessary reductions in organics and metals loading by employing one or more of the implementation strategies discussed below or any other viable strategy. The Porter Cologne Water Quality Control Act prohibits the Regional Board from prescribing the method of achieving compliance with water quality standards, and likewise TMDLs. Below staff have identified some potential implementation strategies; however, there is no requirement to follow the particular strategies proposed herein as long as the allowable organics and metals loading are not exceeded.

6.1 Regulation by the Regional Board

The Porter-Cologne Water Quality Control Act provides that “All discharges of waste into the waters of the State are privileges, not rights.”[1] Furthermore, all discharges are subject to regulation under the Porter-Cologne Act including both point and non-point source discharges.[2] In obligating the State Board and Regional Boards to address all discharges of waste that can affect water quality, the legislature provided the State Board and Regional Boards with authority in the form of administrative tools (waste discharge requirements (WDRs), waivers of WDRs, and Basin Plan waste discharge prohibitions) to address ongoing and proposed waste discharges. Hence, all current and proposed discharges must be regulated under WDRs, waivers of WDRs, or a prohibition, or some combination of these administrative tools. Since the USEPA delegated responsibility to the State and Regional Boards for implementation of the National Pollutant Discharge Elimination System (NPDES) program, WDRs for discharges to surface waters also serve as NPDES permits.

[1] See CWC section 13263(g).

[2] See CWC sections 13260 and 13376.

6.1.1 Stormwater Discharges

As required by the federal Clean Water Act, discharges of pollutants to Marina del Rey Harbor from municipal storm water conveyances are prohibited, unless the discharges are in compliance with a NPDES permit. In December 2001, the Los Angeles County Municipal NPDES Storm Water Permit was re-issued jointly to Los Angeles County and 84 cities as co-permittees. The regulatory mechanisms used to implement the TMDL will include the Los Angeles County MS4 storm water permit, the Caltrans storm water permit, general industrial storm water permits, general construction storm water permits, minor NPDES permits, and general NPDES permits. Each NPDES permit assigned a WLA shall be reopened or amended at re-issuance, in accordance with applicable laws, to address implementation and monitoring of this TMDL and to be consistent with the waste load allocations of this TMDL.

The concentration-based waste load allocations for the minor NPDES permits and general non-storm water NPDES permits will be implemented through NPDES permit conditions. Permit writers for the non-storm water permits may translate applicable waste load allocations into effluent limits for the minor and general NPDES permits by applying applicable engineering practices. The minor and existing general non-storm water NPDES permittees are allowed up to seven years from the effective date of the TMDL to achieve the waste load allocations.

The mass-based waste load allocations for the general construction and industrial storm water permittees (Table 5-6) will be incorporated into watershed specific general permits. Concentration-based permit limits may be set to achieve the mass-based waste load allocations. These concentration-based limits would be equal to the concentration-based waste load allocations assigned to the other NPDES permits (Table 5-7). It is expected that permit writers will translate the waste load allocations into BMPs, based on BMP performance data. However, the permit writers must provide adequate justification and documentation to demonstrate that specified BMPs are expected to result in attainment of the numeric waste load allocations.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs. All general construction permittees must implement the approved BMPs within seven years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction and industrial storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

The general industrial storm water permit shall contain a model monitoring and reporting program to evaluate BMP effectiveness. A permittee enrolled under the general industrial stormwater permit shall have the choice of conducting individual monitoring based on the model program or participating in a group monitoring effort. A group monitoring effort will not only assess individual compliance, but will also assess the effectiveness of chosen BMPs to reduce pollutant loading on an industry-wide or permit category basis. MS4 permittees are encouraged to take the lead in group monitoring efforts for industrial facilities within their jurisdiction because compliance with waste load allocations by these facilities will translate to reductions in contaminate loads to the MS4 system.

The MS4 and Caltrans permittees shall be allowed a phased implementation schedule to achieve the waste load allocations. A phased implementation approach, using a combination of non-structural and structural BMPs could be used to achieve compliance with the waste load allocations. The administrative record and the fact sheets for the MS4 and Caltrans storm water permits must provide reasonable assurance that the BMPs selected will be sufficient to implement the WLAs in the TMDL.

We expect that reductions to be achieved by each BMP will be documented and that sufficient monitoring will be put in place to verify that the desired reductions are achieved. The permits should also provide a mechanism to make adjustments to the required BMPs as necessary to ensure their adequate performance. If non-structural BMPs alone adequately implement the waste load allocations then additional controls are not necessary. Alternatively, if the non-structural BMPs selected prove to be inadequate then structural BMPs or additional controls may be required.

Each municipality and permittee will be required to meet the WLAs at the designated assessment locations as defined in the TMDL effectiveness monitoring plan, not necessarily an allocation for their jurisdiction or for specific land uses. Therefore, the focus should be on developed areas where the contribution of metals, historic pesticides, and PCBs are highest and areas where activities occur that contribute significant loading of these toxic pollutants (e.g., high-density residential, industrial areas, boating, and highways). Flexibility will be allowed in determining how to reduce these toxic pollutants as long as the WLAs are achieved.

To achieve the necessary reductions to meet the allowable waste load allocations, permittees will need to balance short-term capital investments directed to addressing this and other TMDLs in the Marina del Rey watershed with long-term planning activities for storm water management in the region as a whole. It should be emphasized that the potential implementation strategies discussed below may contribute to the implementation of other TMDLs for Marina del Rey. Likewise, implementation of other TMDLs in the Marina del Rey Watershed may contribute to the implementation of this TMDL.

6.2 Potential Implementation Strategies

The implementation strategy selected will need to control the loading of contaminated sediments to Marina del Rey Harbor during wet weather, since, metals, historic pesticides, and PCBs are predominately bound to sediment, which are transported with storm runoff. Municipalities may employ a variety of implementation strategies to meet the required waste load allocations such as non-structural and structural best management practices (BMPs). The implementation strategies discussed below incorporate implementation approaches presented in the Ballona Creek Metals and Toxics TMDLs, which focus on source control and sediment control (LARWQCB, 2005b). Specific projects, which may have a significant impact, would be subject to a separate environmental review. The lead agency for subsequent projects would be obligated to mitigate any impacts they identify, for example by mitigating potential flooding impacts by designing the BMPs with adequate margins of safety.

6.2.1 Non-Structural Best Management Practices

The non-structural BMPs are based on the premise that specific land uses or critical sources can be targeted to achieve the TMDL waste load allocations. Non-structural BMPs provide several advantages over structural BMPs. Non-structural BMPs can typically be implemented in a relatively short period of time. The capital investment required to implement non-structural BMPs is generally less than for structural BMPs. However, the labor costs associated with non-structural BMPs may be higher, therefore, in the long-term the non-structural BMPs may be more costly. Examples of non-structural controls include better sediment control at construction sites and improved street cleaning by upgrading to vacuum type sweepers.

6.2.2 Structural Best Management Practices

Structural BMPs may include placement of storm water treatment devices specifically designed to reduce sediment loading such as infiltration trenches or filters at critical points in the storm water conveyance system. During storm events, when flow rates are high these types of filters may require surge control, such as underground storage vaults or detention basins to avoid bypassing of the treatment unit.

6.3 Implementation Cost Analysis and CEQA considerations

This section takes into account a reasonable range of economic factors in estimating potential costs associated with this TMDL. This analysis, together with the other sections of this staff report, CEQA checklist, response to comments Basin Plan amendment and supporting documents, were completed in fulfillment of the applicable provisions of the California Environmental Quality Act (Public Resources Code Section 21159.) [3]

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[3] Because this TMDL implements existing water quality objectives it does not “establish” water quality objectives and no further analysis of the factors identified in Water Code section 13241 is required. However, the staff notes that its CEQA analysis provides the necessary information to properly “consider” the factors specified in Water Code section 13241. As a result, the section 13241 analysis would at best be redundant.

6.3.1 Implementation Cost Analysis

This cost analysis focuses on achieving the grouped waste load allocation by the MS4 and Caltrans storm water permittees in the urbanized portion of the watershed[4]. The BMPs and potential compliance approaches analyzed here could apply to the general industrial and construction storm water permittees as well. An evaluation of the costs of implementing this TMDL amounts to evaluating the costs of preventing contaminated sediments from entering storm drains and/or reaching the Marina del Rey Harbor. Most permittees would likely implement a combination of the structural and non-structural BMPs to achieve their waste load allocations. This analysis considers a potential strategy combining structural and non-structural BMPs through a phased implementation approach and estimates the costs for this strategy. It will also be important to document any possible reductions in sediment loading that may concurrently be achieved via BMPs implemented under the Bacteria TMDL.

6.3.1.1 Phased Implementation

Under a phased implementation approach, it is assumed that compliance with the grouped waste load allocation could be achieved in 30% of the urbanized portion of the watershed through various iterations of non-structural BMPs. Compliance with the remaining 70% of the urbanized portion of the watershed could be achieved through structural BMPs.

The first step of the potential phased approach would include the implementation of non-structural BMPs by permittees, such as increasing the frequency and efficiency of street sweeping. In their National Menu of Best Management Practices for Stormwater – Phase II, USEPA reports that conventional mechanical street sweepers can reduce non-point source pollution by 5 to 30% (USEPA, 1999a). The removal efficiencies of sediment for conventional sweepers are dependent on the size of particles. Conventional sweepers, including mechanical broom sweepers and vacuum-assisted wet sweepers, have removal efficiencies of approximately 15 to 50% for particles less than 500 micrometers and up to approximately 65% for larger particles (Walker and Wong, 1999). USEPA reports that vacuum-assisted dry street sweeping can remove significantly more pollution, including fine sediment and metals, before the pollutants are mobilized by rainwater. USEPA reports a 50 to 88% overall reduction in annual sediment loading for residential areas by vacuum-assisted dry street sweepers. As reported by Walker and Wong in a 1999 study of the effectiveness of street sweeping for stormwater pollution control, Sutherland and Jelen (1997) showed a total removal efficiency of 70% for fine particles and up to 96% for larger particles by vacuum – assisted dry sweepers (also known as small-micron surface sweepers). Upgrading to vacuum-assisted dry sweeping would translate to a significant reduction of sediments. In their 1999 Preliminary Data Summary of Urban

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[4] This TMDL only addresses 1.5 square miles of the 2.9 square mile Marina del Rey watershed. Water comprises 0.08 square miles of the area. It is not expected that the MS4 and Caltrans permittees will need to address areas of open water to meet the waste load allocations. Therefore, areas of water are not considered in the calculation of the cost analysis. The remaining 1.42 square miles is considered the portion of the watershed that may require BMPs and therefore, used in the cost analysis for the purposes of this TMDL.

Stormwater Best Management Practices, USEPA estimated cost data for both standard mechanical and vacuum-assisted dry sweepers as shown in Table 6-1.

Table 6-1. Estimated costs for two types of street sweepers. (Source: USEPA, 1999b.)

Sweeper Type	Life (Years)	Purchase Price ($)	Annual O&M Cost ($/curb mile)
Mechanical	5	75,000	30
Vacuum-assisted	8	150,000	15

Table 6-1 illustrates that while the purchase price of vacuum-assisted dry sweepers is higher, the operation and maintenance costs are lower than for standard sweepers. Based on this information, USEPA determined the total annualized cost of operating street sweepers per curb mile, for a variety of frequencies (Table 6-2). In their estimates, USEPA assumed that one sweeper serves 8,160 curb miles during a year and assumed an annual interest rate of 8 percent (USEPA, 1999b). According to Table 6-2, permittees would save money in the long-term by switching to vacuum-assisted dry sweepers.

Table 6-2. Annualized sweeper costs, including purchase price and operation and maintenance costs ($/curb mile/year).

Sweeper Type	**Sweeping Frequency**					
	Weekly	**Bi-weekly**	**Monthly**	**Quarterly**	**Twice per year**	**Annually**
Mechanical	1,680	840	388	129	65	32
Vacuum-Assisted	946	473	218	73	36	18

Under a phased implementation approach, the permittees could monitor effectiveness using flow-weighted composite sampling of runoff throughout representative storms to determine the effectiveness of this first step of implementing non-structural BMPs. If monitoring showed ineffectiveness, permittees could adapt their approach by increasing frequency of street sweeping or incorporating other non-structural BMPs.

If the WLAs can not be achieved through non-structural BMPs, permittees could incorporate structural BMPs. Two potential structural BMPs were analyzed in this cost analysis:

1. Infiltration trenches
2. Sand filters

These approaches are specifically designed to treat urban runoff and to accommodate high-density areas. They were chosen for this analysis because in addition to addressing sediment loadings to the creek, they have the additional positive impact of addressing the effects of development and increased impervious surfaces in the watershed. Both approaches can be designed to capture and treat 0.5 to 1 inch of runoff. When flow exceeds the design capacity of each device, untreated runoff is allowed to bypass the device and enter the storm drain.

Both infiltration trenches and sand filters must be used in conjunction with some type of pretreatment device such as a biofiltration strip or gross solids removal system to remove sediment and trash in order to increase their efficiency and service life. This analysis provides an estimate of the costs associated with installing sand filters or infiltration trenches.

In addition, both infiltration trenches and sand filters are efficient in removing bacteria and could be used to achieve the WLAs in the adopted bacteria TMDL for Marina del Rey Harbor. USEPA reports that sand filters have a 76% removal rate and infiltration trenches have a 90% removal rate for fecal coliform (USEPA, 1999c).

As stated previously, it is assumed that 70% of the urbanized portion of the watershed would need to be treated by structural BMPs. In this cost analysis, it was assumed that infiltration trenches would treat 35% of the watershed and sand filters would treat the other 35%. Costs were estimated using data provided by USEPA (USEPA, 1999a and 1999c) and the Federal Highway Administration (FHWA, 2003). USEPA cost data were reported in 1997 dollars. FHWA costs were reported in 1996 dollars for infiltration trenches and 1994 dollars for sand filters. Where costs were reported as ranges, the highest reported cost was assumed. These costs were then compared to costs determined by Caltrans in their BMP Retrofit Pilot Program (Caltrans, 2004). Caltrans costs were reported in 1999 dollars. To estimate land acquisition cots for individual projects in this cost analysis would be purely speculative.

Infiltration trenches. Infiltration trenches store and slowly filter runoff through the bottom of rock-filled trenches and then through the soil. Infiltration trenches can be designed to treat any amount of runoff, but are ideal for treating small urban drainage areas less than five to ten acres. Soils and topography are limiting factors in design and siting, as soils must have high percolation rates and groundwater must be of adequate depth. Potential impacts to groundwater by infiltration trenches could be avoided by proper design and siting. Infiltration trenches are reported to achieve 75 to 90% suspended solids removal and 75 to 90% metals removal by USEPA and FHWA. In their BMP Retrofit Pilot Program, Caltrans assumed that constituent removal was 100 percent for storm events less than the design storm, because all runoff would be infiltrated.

Table 6-3 presents estimated costs for infiltration trenches designed to treat 0.5 inches of runoff over a five-acre drainage area with a runoff coefficient equal to one. Staff determined that 130 devices, designed to treat five acres each, would be required to treat 35% of the land area of the watershed.

Table 6-3. Estimated Costs for Infiltration Trenches.

	Construction Costs ($ million)	Maintenance Costs ($ million/year)
Based on USEPA estimate (1997 dollars)	2.88	0.58
Based on FHWA estimate (1996 dollars)	2.75	Not reported

Sand Filters. Sand filters work by a combination of sedimentation and filtration. Runoff is temporarily stored in a pretreatment chamber or sedimentation basin, and then flows by gravity or is pumped into a sand filter chamber. The filtered runoff is then discharged to a storm drain or natural channel. The costs of two types of sand filters were analyzed: 1) the Delaware sand filter, which is installed underground and suited to treat drainage areas of approximately one acre and 2) the Austin sand filter, which is installed at-grade and suited to larger drainage areas up to 50 acres. The underground sand filter is especially well adapted for applications with limited land area and is independent of soil conditions and depth to groundwater. However, both types of sand filters must consider the imperviousness of the drainage areas in their design.

USEPA estimated a 70% removal of total suspended solids and 45% removal of lead and zinc for both types of sand filters. FHWA reported high sediment, zinc and lead removal, but low copper removal for Austin sand filters and high sediment and moderate to high metals removal for Delaware sand filters. Caltrans reported a 50% reduction in total copper, a 7% reduction in dissolved copper, an 87% reduction in total lead, a 40% reduction in dissolved lead, an 80% reduction in total zinc and a 61% reduction in dissolved zinc by the Austin sand filters they tested. Caltrans reported a 66% reduction in total copper, a 40% reduction in dissolved copper, an 85% reduction in total lead, a 31% reduction in dissolved lead, a 92% reduction in total zinc and a 94% reduction in dissolved zinc by the Delaware sand filter they tested.

USEPA and FHWA reported costs per acre for 0.5 inches of runoff. Total costs were calculated by multiplying the per-acre cost by the total acreage of the urbanized portion of the watershed not addressed through an integrated resources plan or non-structural BMPs. Estimated costs are presented in Table 6-4. There are significant economies of scale for Austin filters. USEPA reported that costs per acre decrease with increasing drainage area. FHWA reported two separate costs based on drainage area served. Economies of scale are not a factor for Delaware filters, as they are limited to drainage areas of about one acre.

Table 6-4. Estimated Costs for Austin and Delaware Sand Filters

	Austin Sand Filter Construction Costs ($ million)	**Austin Sand Filter Maintenance Costs ($ million/year)**	**Delaware Sand Filter Construction Costs ($ million)**	**Delaware Sand Filter Maintenance Costs ($ million/year)**
Based on USEPA estimate (1997 dollars)	2.93	0.15	1.74	0.09
Based on FHWA estimate* (1994 dollars)	0.54	Not reported	2.22	Not reported

*FHWA cost estimate for Austin filter was calculated assuming a drainage area greater than five acres. The costs would be $4.6 million for Austin filters designed for a drainage area of less than two acres.

Based on the adaptive management approach, and some assumptions about the efficiencies of each stage of the approach, the cost analysis arrived at the total costs for achieving the WLAs in the Toxic Pollutants TMDL as shown in Table 6-5. The total costs do not include the cost savings associated with switching to vacuum-assisted street sweepers. As stated previously, the costs associated with this adaptive management approach could be applied towards the cost of achieving the WLAs in the Metals TMDLs and the adopted Bacteria TMDL.

Table 6-5. Total Estimated costs of structural BMP approach for stormwater discharges.

	Total Construction ($ million)	Total Maintenance ($ million/year)
Based on USEPA estimate(1997 dollars)	7.6	0.8
Based on FHWA estimate(1994/1996 dollars)	5.5	Not reported

6.3.1.2 Comparison of Costs Estimates with Caltrans Reported Costs

Estimated costs for structural BMPs were compared to costs reported by Caltrans in their BMP Retrofit Pilot Program (Caltrans, 2004). Caltrans sited five Austin sand filters and one Delaware sand filter as part of their study. The five Austin sand filters served an average area of 2 acres and the Delaware sand filter served an area of 0.7 acres. Caltrans sited two infiltration trench/biofiltration strip combinations as part of their study. Each trench and biofiltration strip used in combination served an area of 1.7 acres. Based on these drainage areas, the average adjusted cost of the Austin sand filters in the Caltrans study was $156,600 per acre, the adjusted cost of the Delaware filter was $310,455 per acre and the average adjusted cost of the infiltration trench/biofiltration strips was $84,495 per acre. These costs are approximately an order of magnitude greater than the costs determined using estimates provided by USEPA and FHWA. It should be noted that costs calculated using EPA and FHWA estimates were based on infiltration trench and sand filter designs that would treat 0.5 inches of runoff, while the Caltrans study costs were based on an infiltration trench design that would treat 1 inch of runoff and sand filter designs that would treat 0.56 to 1 inches of runoff. This could explain some of the differences in costs.

The differences in costs can also be explained by a third party review of the Caltrans study, conducted by Holmes & Narver, Inc. and Glenrose Engineering (Caltrans, 2001). Holmes & Narver, Inc. and Glenrose Engineering (Caltrans, 2001). The review compared adjusted Caltrans costs with costs of implementing BMPs by other state transportation agencies and public entities. The adjusted costs exclude costs associated with the unique pilot program and ancillary costs such as improvements to access roads, landscaping or erosion control, and non-BMP related facilities. For the comparison, all costs were adjusted for differences in regional economies. The third party review determined that the median costs reported by Caltrans were higher than the median costs reported by the other agencies for almost every BMP considered, including sand filters and infiltration BMPs. The review attributed the higher Caltrans costs to the small scale and accelerated nature of the pilot program. The third party review then gave recommendations for construction cost reductions based on input from other state agencies. These included simplifying design and material components, combining retrofit work with ongoing construction projects, changing methods used to select and work with construction contractors, allowing for a longer planing horizon, constructing a larger number of BMPs at once, and implementing BMPs over a larger drainage area.

6.3.2 Results of a Region-wide Cost Study

In their report entitled "Alternative Approaches to Storm Water Quality Control, Prepared for the Los Angeles Regional Water Quality Board," Devinny et al. estimated the total costs for compliance with Regional Board storm water quality regulations as ranging from $2.8 billion, using entirely non-structural systems, to between $5.7 billion and $7.4 billion, using regional treatment or infiltration systems. The report stated that final costs would likely fall somewhere within this range. Table 6-6 presents the report's estimated costs for the various types of structural and non-structural systems that could be used to achieve compliance with municipal storm water requirements throughout the Region.

Table 6-6. Estimated costs of structural and non-structural compliance measures for the entire Los Angeles Region. (Source: Devinny et al.)

Compliance Approach	Estimated Costs
Enforcement of litter ordinances	$9 million/year
Public Education	$5 million/year
Increased storm drain cleaning	$27 million/year
Installation of catch basin screens, enforcing litter laws, improving street cleaning	$600 million
Low –flow diversion	$28 million
Improved street cleaning	$7.5 million/year
On-site BMPs for individual facilities	$240 million
Structural BMPs – 1st estimation method	$5.7 billion
Structural BMPs – 2nd estimation method	$4.0 billion

The Devinny et al. study calculates costs for the entire Los Angeles Region, which is 3,100 square miles, while the Marina del Rey watershed is 2.9 square miles. When compared on a per square mile basis, the costs estimated in section 6.5.1 are within the range calculated by Devinny et al. (Table 6-7).

Table 6-7. Comparison of costs for storm water compliance on a per square mile basis.

	Construction Costs ($ million/square mile)
Based on U.S. EPA estimate	2.62
Based on FHWA estimate	1.91
Maximum cost calculated by Devinny et al.	1.84 –2.39

The Devinny et al. study also estimated benefits associated with storm water compliance. It was determined that the Region-wide benefits of a non-structural compliance program would equal approximately $5.6 billion while the benefits of non-structural and regional measures would equal approximately $18 billion. Region-wide estimated benefits included:

- Flood control savings due to increased pervious surfaces of about $400 million,
- Property value increase due to additional green space of about $5 billion,
- Additional groundwater supplies due to increased infiltration worth about $7.2 billion,
- Willingness to pay to avoid storm water pollution worth about $2.5 billion,

- Cleaner streets worth about $950 million,
- Improved beach tourism worth about $100 million
- Improved nutrient recycling and atmospheric maintenance in coastal zones worth about $2 billion,
- Savings from reduction of sedimentation in Regional harbors equal to about $330 million, and
- Unquantifiable health benefits of reducing exposure to fine particles from streets.

7 MONITORING

There are three objectives of monitoring associated with the TMDL. The first is to collect additional water, and fish tissue quality data to evaluate the extent of impairment in these media. The second is to assess the effectiveness of the TMDL and ultimately achieving the waste load allocations. The third is to conduct special studies to address the uncertainties in the TMDL and to assist in the design and sizing of BMPs. To achieve these objectives, a monitoring program will need to be developed for the TMDL that consists of three components: (1) ambient monitoring, (2) effectiveness monitoring and (3) special studies.

The monitoring program and any required technical reports will be established pursuant to a subsequent order issued by the Executive Officer. As a planning document, the TMDL identifies the type of information necessary to refine and update it, and to assess its effectiveness. The Executive Officer will comply with any necessary legal requirements in developing the monitoring program, requiring technical reports, and establishing special studies.

7.1 Ambient Component

A monitoring program is necessary to assess water quality throughout Marina del Rey Harbor and to assess fish tissue and sediment quality in the harbor's back basins. Data on background water quality for copper will help refine the numeric targets and waste load allocations and assist in the effective placement of BMPs. In addition, fish tissue data is required in Marina del Rey's back basins to confirm continued impairment.

Water quality samples shall be collected monthly from the back basins and analyzed for chlordane and total PCBs at detection limits that are at or below the minimum levels until the TMDL is reconsidered in the sixth year. The minimum levels are those published by the State Water Resources Control Board in Appendix 4 of the Policy for the Implementation of Toxic Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California, March 2, 2000. Special emphasis should be placed on achieving detection limits that will allow evaluation relative to the CTR standards. If these can not be achieved with conventional techniques, then a special study should be proposed to evaluate concentrations of organics.

Water quality samples shall also be collected monthly from the back basins and analyzed for total recoverable and dissolved copper, lead, and zinc until the TMDL is reconsidered in the sixth year. For total recoverable and dissolved copper analyses, monthly samples will be collected throughout the harbor. For metals water column analysis, methods that allow for (1) the removal of salt matrix to reduce interference and avoid inaccurate results prior to the analysis; and (2) the use of trace metal clean sampling techniques, should be applied. Examples of such methods include EPA Method 1669 for sample collection and handling, and EPA Method 1640 for sample preparation and analysis.

Storm water monitoring shall be conducted for total recoverable and dissolved metals (copper, lead, and zinc) and organics (chlordane and total PCBs) to provide assessment of water quality during wet-weather conditions and loading estimates from the watershed to the harbor. Special emphasis should be placed on achieving lower detection limits for organochlorine compounds.

The MS4 and Caltrans storm water permittees are jointly responsible for conducting bioaccumulation testing of fish within the harbor. The permittees are required to submit, for approval of the Executive Officer, a monitoring plan that will provide the data needed to confirm or challenge continued impairment of the 303(d) listed pollutants.

Representative sediment sampling shall be conducted quarterly within the back basins of the harbor for copper, lead, zinc, chlordane, and total PCBs at detection limits that are lower than the ERLs. Sediment samples shall also be analyzed for total organic carbon, grain size and sediment toxicity. Initial sediment toxicity monitoring should be conducted quarterly in the first year of the TMDL to define the baseline and semi-annually, thereafter, to evaluate effectiveness of the BMPs until the TMDL is reconsidered in the sixth year. The sediment toxicity testing shall include testing of multiple species, a minimum of three, for lethal and non-lethal endpoints. Toxicity testing may include: the 28-day and 10-day amphipod mortality test; the sea urchin fertilization testing of sediment pore water; and the bivalve embryo testing of the sediment/water interface. The chronic 28-day and shorter-term 10-day amphipod tests may be conducted in the initial year of quarterly testing and the results compared. If there is no significant difference in the tests, then the less expensive 10-day test can be used throughout the rest of the monitoring, with some periodic 28-day testing.

7.2 Effectiveness Component

The water quality samples collected during wet weather, shall be analyzed for total dissolved solids, settleable solids and total suspended solids if not already part of the sampling program. Sampling shall be designed to collect sufficient volumes of settleable and suspended solids to allow for analysis of copper, lead, zinc, chlordane, total PCBs, and total organic carbon in the sediment.

Monthly representative sediment sampling shall be conducted at existing monitoring locations within the back basins of the harbor, and analyzed for copper, lead, zinc, chlordane, and total PCBs at detection limits that are lower than the ERLs. The, sediment samples shall also be analyzed for total organic carbon and grain size. Sediment toxicity testing shall be conducted semi-annually, and shall include testing of multiple species (a minimum of three) for lethal and non-lethal endpoints. Toxicity testing may include: the 28-day or 10-day amphipod mortality test; the sea urchin fertilization testing of sediment pore water; and the bivalve embryo testing of the sediment/water interface.

Toxicity shall be indicated by an amphipod survival rate of 70% or less in a single test, in conjunction with a statistically significant decrease in amphipod survival relative to control organisms (significance determined by T-test, a=0.05). Accelerated monitoring may be conducted to confirm toxicity at stations identified as toxic. Accelerated monitoring shall consist of six additional tests, approximately every two weeks, over a 12-week period. If the results of any two of the six accelerated tests are less than 90% survival, then the MS4 and Caltrans permittees shall conduct a Toxicity Identification Evaluation (TIE). Alternatively, responsible parties have the option of foregoing accelerated toxicity testing and conducting a TIE directly following an indication of toxicity. The TIE shall include reasonable steps to identify the sources of toxicity and steps to reduce the toxicity The Phase I TIE shall include the following treatments and corresponding blanks: baseline toxicity; particle removal by centrifugation; solid phase extraction of the centrifuged sample using C8, C18, or another approved media; complexation of metals using ethylenediaminetetraacetic acid (EDTA) addition to the raw sample; neutralization of oxidants/metals using sodium thiosulfate addition to the raw sample; and inhibition of organo-phosphate (OP) pesticide activation using piperonyl butoxide addition to the raw sample (crustacean toxicity tests only).

Bioaccumulation monitoring of fish and mussel tissue within the harbor shall be conducted annually. The permittees are required to submit for approval of the Executive Officer a monitoring plan that will provide the data needed to assess the effectiveness of the TMDL The general industrial storm water permit shall contain a model monitoring and reporting program to evaluate BMP effectiveness. A permittee enrolled under the general industrial permit shall have the choice of conducting individual monitoring based on the model program or participating in a group monitoring effort. MS4 permittees are encouraged to take the lead in group monitoring efforts for industrial facilities within their jurisdiction because compliance with waste load allocations by these facilities will in many cases translate to reductions in contaminate loads to the MS4 system.

7.3 Special Studies

Special studies are necessary to refine source assessments, to provide better estimates of loading capacity, and to optimize implementation efforts. The Regional Board will re-consider the TMDL in the sixth year after the effective date in light of the findings of these studies.

Studies required for this TMDL include:

- Evaluate partitioning coefficients between water column and sediment to assess the contribution of water column discharges to sediment concentrations in the harbor, and
- Evaluate the use of low detection level techniques to determine water quality concentrations for those contaminants where standard detection limits cannot be used to assess compliance for CTR standards or are not sufficient for estimating source loadings from tributaries and storm water.

Studies recommended for this TMDL include:

- Develop and implement a monitoring program to collect the data necessary to apply a multiple lines of evidence approach;
- Refine the relationship between pollutants and suspended solids aimed at better understanding of the delivery of pollutants to the watershed, and
- Evaluate the effectiveness of BMPs to address pollutants and/or sediments.

8. FINAL TMDL MILESTONES AND IMPLEMENTATION SCHEDULE

The TMDL milestones and implementation schedule are summarized in Table 8-1. The schedule allows time for dischargers to perform special studies and to develop implementation plans before any waste load reductions are required.

8.1 Final TMDL Milestones

The Regional Board intends to reconsider this TMDL six years after the effective date of the TMDL to re-evaluate the waste load allocations and the implementation schedule based on the additional data obtained from the special studies. The Regional Board will consider extending the implementation schedule from 10 years up to 15 years if an IRP approach is pursued. Until the TMDL is revised, the waste load allocations will remain as presented in Section 5. Revising the TMDL will not create a conflict, since the total contaminated sediment reductions are not required until 10-15 years after the effective date.

8.2 Implementation Schedule

The implementation schedule for all NPDES permittees is summarized in Table 8-1. The municipalities and Caltrans are encourage to work together to meet the waste load allocations. For the MS4 and Caltrans storm water permittees the proposed implementation schedule consists of a phased approach, with compliance to be achieved in incremental percentages of the watershed, with total compliance achieved within 10 years. This schedule is based on a combination of structural and non-structural strategies designed specifically to reduce toxic pollutant loading to Marina del Rey Harbor. However, should the responsible jurisdictions and agencies pursue an integrated water resources approach that includes beneficial re-use of storm water, the Regional Board will consider extending the allowable time to 15 years, in recognition of the additional planning and time needed for this approach (see Table 8.1).

Table 8-1. Implementation Schedule

Date	Action
Effective date of the TMDL	Regional Board permit writers shall incorporate the waste load allocations for sediment into the NPDES permits. Waste load allocations will be implemented through NPDES permit limits in accordance with the implementation schedule contained herein, at the time of permit issuance, renewal or re-opener.
On-going	The Executive Officer shall promptly issue appropriate investigatory and clean up and abatement orders to address any toxicity hotspots within sediments identified as a result of data submitted pursuant to this TMDL, any U.S. Army Corps of Engineer dredging activity, or any other investigation.
Within 6 months after the effective date of the State Board adopted sediment quality objectives and implementation policy	The Regional Board will re-assess the numeric targets and waste load allocations for consistency with the State Board adopted sediment quality objectives.
5 years after effective date of the TMDL	Responsible jurisdictions and agencies shall provide to the Regional Board result of any special studies.
6 years after effective date of the TMDL	The Regional Board shall reconsider this TMDL to re-evaluate the waste load allocations and the implementation schedule.
NON-STORM WATER NPDES PERMITS (INCLUDING MINOR AND GENERAL PERMITS)	
7 years after effective date of the TMDL	The non-storm water NPDES permittees shall achieve the concentration-based waste load allocations for sediment per provisions allowed for in NPDES permits.
GENERAL INDUSTRIAL STORM WATER PERMITS	
7 years after effective date of the TMDL	The general industrial storm water permittees shall achieve the mass-based waste load allocations for sediment per provisions allowed for in NPDES permits. Permits shall allow an iterative BMP process including BMP effectiveness monitoring to achieve compliance with permit requirements.
GENERAL CONSTRUCTION STORM WATER PERMITS	
7 years from the effective date of the TMDL	The construction industry will submit the results of the BMP effectiveness studies to the Regional Board for consideration. In the event that no effectiveness studies are conducted and no BMPs are approved, permittees shall be subject to site-specific BMPs and monitoring to demonstrate BMP effectiveness.

Date	Action
8 years from the effective date of the TMDL	The Regional Board will consider results of the BMP effectiveness studies and consider approval of BMPs no later than eight years from the effective date of the TMDL.
9 years from the effective date of the TMDL	All general construction storm water permittees shall implement Regional Board-approved BMPs.
MS4 AND CALTRANS STORM WATER PERMITS	
12 months after the effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees must submit a coordinated monitoring plan, to be approved by the Executive Officer, which includes both ambient monitoring and TMDL effectiveness monitoring. Once the coordinated monitoring plan is approved by the Executive Officer, monitoring shall commence within 6 months. The draft monitoring report shall be made available for public comment and the Executive Officer shall accept public comments for at least 30 days.
5 years after effective date of TMDL (Draft Report) 5 ½ years after effective date of TMDL (Final Report)	The MS4 and Caltrans storm water NPDES permittees shall provide a written report to the Regional Board outlining how they will achieve the waste load allocations for sediment to Marina del Rey Harbor. The report shall include implementation methods, an implementation schedule, proposed milestones, and any applicable revisions to the TMDL effectiveness monitoring plan. The draft report shall be made available for public comment and the Executive Officer shall accept public comments for at least 30 days.
Schedule for MS4 and Caltrans Permittees if Pursuing a TMDL Specific Implementation Plan	
8 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 50% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
10 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 100% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
Schedule for MS4 and Caltrans Permittees if Pursuing an Integrated Resources Approach, per Regional Board Approval	
7 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 25% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
9 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 50% of the total drainage area served by the MS4 system is effectively meeting the waste load

Date	Action
	allocations for sediment.
11 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 75% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
15 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 100% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.

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State of California
California Regional Water Quality Control Board, Los Angeles Region

RESOLUTION NO. 2005-012
October 6, 2005

Amendment to the *Water Quality Control Plan for the Los Angeles Region* to Incorporate a Total Maximum Daily Load for Toxic Pollutants in Marina del Rey Harbor

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 Angles Region (Regional Board) to develop water quality objectives, which are sufficient to protect beneficial uses for each water body found within its region. Water bodies that do not meet water quality objectives or support beneficial uses are considered impaired.

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 impaired waters within 13 years. A schedule was established in the consent decree for the completion of the first 29 TMDLs within 7 years, including completion of a TMDL to reduce metals and organic compounds in Marina del Rey Harbor by March 22, 2006. 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 (Report No. EPA/440/4-91/001). A TMDL is defined as the sum of the individual waste load allocations for point sources, 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 regulations in 40 CFR 130.7 also state that TMDLs shall take into account critical conditions for stream flow, loading and water quality parameters.

4. The numeric targets in this TMDL are not water quality objectives and do not create new bases for enforcement against dischargers apart from the existing water quality standards they translate. The targets merely establish the bases through which load allocations (LAs) and waste load allocations (WLAs) are calculated. WLAs are only enforced for a discharger's own discharges, and then only in the context of its National Pollutant Discharge Elimination System (NPDES) permit, which must be consistent with the assumptions and requirements of the WLA. (40 C.F.R. 122.44(d)(vii)(B)). The Regional Board will develop permit requirements through subsequent permit actions that will allow all interested persons, including but not limited to municipal storm water dischargers, to provide comments on how the WLA will be translated into permit requirements.

5. As envisioned by Water Code section 13242, the TMDL contains a "description of surveillance to be undertaken to determine compliance with objectives." The Compliance Monitoring and Special Studies elements of the TMDL recognize that monitoring will be necessary to assess the on-going condition of Marina del Rey Harbor and to assess the on-going effectiveness of efforts by dischargers to reduce toxic pollutant loading to the harbor. Special studies may also be appropriate to provide further information about new data, new or alternative sources, and revised scientific assumptions. The TMDL does not establish the requirements for these monitoring programs or reports, although it does recognize the type of information that will be necessary to secure. The Regional Board's Executive Officer will issue orders to appropriate entities to develop and to submit monitoring programs and technical reports. The Executive Officer will determine the scope of these programs and reports, taking into account any legal requirements, and issue the orders to the appropriate entities.

6. 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). This Water Quality Control Plan for the Los Angeles Region (Basin Plan), and applicable statewide plans, serves as the State Water Quality Management Plans governing the watersheds under the jurisdiction of the Regional Board. Attachment A to this resolution contains the Basin Planning language for this TMDL.

7. The Marina del Rey watershed area is approximately 2.9 square miles located in Santa Monica Bay, California. It is south of Venice and north of Playa del Rey, and approximately 15 miles southwest of downtown Los Angeles. The watershed includes City of Los Angeles, Culver City and some unincorporated areas of Los Angeles County. The proposed TMDL addresses impairments of fish tissue and sediment quality caused by metals, and organic compounds in the back basins of Marina del Rey Harbor.

8. "[I]t is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited." (33 U.S.C. 1251(a)(3)). Water quality standards reflect this express national policy of Congress. When a pollutant is present in the water column at levels in excess of the California Toxics Rule, then the pollutant is present in toxic amounts. Discharges of toxic pollutants can also accumulate in sediments and fish tissue. This TMDL addresses the accumulation of toxic pollutants in sediments and fish tissue and attempts to implement express Congressional policy.

9. The Regional Board's goal in establishing the Marina del Rey Harbor Toxic Pollutants TMDL is to protect the aquatic life and wildlife beneficial uses of Marina del Rey Harbor and to achieve sediment quality to protect these beneficial uses.

10. Regional Board staff have prepared a detailed technical document that analyzes and describes the specific necessity and rationale for the development of this TMDL. The technical document entitled "Total Maximum Daily Load for Toxic Pollutants in Marina del Rey Harbor" is an integral part of this Regional Board action and was reviewed, considered, and accepted by the Regional Board before acting. Further, the technical document provides the detailed factual basis and analysis supporting the problem statement, numeric targets (interpretation of the narrative and numeric water quality objectives, used to calculate the pollutant allocations), source analysis, linkage analysis, waste load allocations (for point sources), load allocation (for nonpoint sources), margin of safety, and seasonal variations and critical conditions of this TMDL.

11. On October 6, 2005, prior to the Board's action on this resolution, public hearings were conducted on the Marina del Rey Toxics TMDL. Notice of the hearings were sent to all known interested persons and published in the Los Angeles Times on August 3, 2005 in accordance with the requirements of Water Code Section 13244.

12. The public has had reasonable opportunity to participate in review of the amendment to the Basin Plan. A draft of the Marina del Rey Toxics TMDL was released for public comment on August 3, 2005. A Notice of Hearing and Notice of Filing were published and circulated 45 days preceding Board action, and Regional Board staff responded to oral and written comments received from the public. The Regional Board held a public hearing on October 6, 2005 to consider adoption of the TMDL.

13. In amending the Basin Plan, the Regional Board considered the applicable requirements set forth in Sections 13240 and 13242 of the California Water Code. These state requirements are considered in light of the unqualified requirement of section 303(d)(1)(C) of the Clean Water Act that the TMDL shall be established at a level necessary to implement the applicable water quality standards.

14. The amendment is consistent with the State Antidegradation Policy (State Board Resolution No. 68-16), in that it does not authorize any lowering of water quality and is designed to implement existing water quality objectives. Likewise, the amendment is consistent with the federal Antidegradation Policy (40 CFR 131.12).

15. Because the TMDL implements existing water quality objectives, the Regional Board has consistently maintained (along with the State Water Resources Control Board) that adopting a TMDL does not require the water boards to consider the factors of Water Code section 13241. The consideration of the Water Code section 13241 factors, by section 13241's express terms, only applies "in establishing water quality objectives." Here the Regional Board is not establishing water quality objectives, but as required by section 303(d)(1)(C) of the Clean Water Act is adopting a TMDL that will implement the previously established objectives that have not been achieved. To the extent there is any conflict between Water Code section 13241, if it were applicable, and section 303(d)(1)(C) of the Clean Water Act, state law would yield to supreme federal law.

16. While the Regional Board is not required to consider the factors of Water Code section 13241, it, nonetheless, has developed and received significant information pertaining to the Water Code section 13241 factors and considered that information in developing and adopting this TMDL. The past, present, and probable future beneficial uses of water have been considered in that Marina del Rey Harbor is designated for a multitude of beneficial uses in the Basin Plan. Various living organisms (including vegetation, fish, invertebrates, and wildlife) are present in, transient through, and will be present in Marina del Rey Harbor. The environmental characteristics of Marina del Rey Harbor are spelled out at length in the Basin Plan and in the technical documents supporting this Basin Plan amendment, and have been considered in developing this TMDL. Water and sediment quality conditions that reasonably could be achieved through the coordinated control of all factors which affect water and sediment quality in the area have been considered via the discussion of likely means of compliance, and studies indicating that a mix of best management practices (BMPs), rather than advanced treatment plants, would achieve the TMDL. Authorizing certain storm water dischargers to rely on BMPs in the first instances reflects the reasonableness of the action in terms of the ability to implement the requirements, as well as a belief that the water and sediment quality conditions can reasonably be achieved in any

event. Establishing a plan that will ensure Marina del Rey Harbor sediments are not toxic is a reasonable water quality condition. However, to the extent that there would be any conflict between the consideration of the factor in Water Code section 13241 subdivision (c), if the consideration were required, and the Clean Water Act, the Clean Water Act would prevail. Notably, national policy established by Congress prohibits the discharge of toxic pollutants in toxic amounts. Economic considerations were considered throughout the development of the TMDL. Some of these economic considerations arise in the context of Public Resources Code section 21159 and are equally applicable here. The TMDL maps out a 10 to 15-year approach to implementing national policy prohibiting toxic pollutants in toxic amounts. This implementation program recognizes the economic limitations on achieving immediate compliance - especially for municipal storm water dischargers. The TMDL also authorizes the use of BMPs, to the extent authorized by law, for various storm water dischargers. Again, these recognize the economic limitations on certain storm water dischargers, while remaining faithful to the requirement to implement existing water quality standards and national policy. As part of this economic consideration, the Regional Board considered several studies pertaining to the cost of attaining water quality standards for storm water discharges. While section 13241 of the Water Code does not require a balancing of the costs and benefits, the Devinny et al. (2004) study concludes that any costs would be outweighed by the societal and economic benefits to Los Angeles' coastal economy. Again, these "economic considerations" were all considered and are reflected in an implementation program that is flexible and allows 10 to 15 years to comply with the final WLAs. The need for housing within the region has been considered, but this TMDL is unlikely to affect housing needs. Whatever housing impacts could materialize are ameliorated by the flexible nature of this TMDL and the 10 to 15-year implementation period. Finally, the TMDL is likely to facilitate the use of recycled water, as demonstrated by the City of Los Angeles' Integrated Resources Plan.

17. Pursuant to Public Resources Code section 21080.5, the Resources Agency has approved the Regional Water Boards' basin planning process as a "certified regulatory program" that adequately satisfies the California Environmental Quality Act (CEQA) (Public Resources Code, Section 21000 et seq.) requirements for preparing environmental documents. (14 Cal. Code Regs. § 15251(g); 23 Cal. Code Regs. § 3782.) As such, the Regional Water Board's basin planning documents together with an Environmental Checklist, are the "substitute documents" that contain the required environmental documentation under CEQA. (23 Cal Code Regs. § 3777.) The detailed technical report entitled "Total Maximum Daily Load for Toxic Pollutants in Marina del Rey Harbor," responses prepared by staff to address comments raised during the development of the TMDL, this resolution, and the Environmental Checklist serve as the substitute documents for this project. The project itself is the establishment of a TMDL for toxic pollutants in Marina del Rey Harbor. While the Regional Board has no discretion to not establish a TMDL (the TMDL is required by federal law) or for determining the water quality standard to be applied, the Board does exercise discretion in assigning waste load allocations and load allocations, determining the program of implementation, and setting various milestones in achieving the waste load allocations.

18. A CEQA Scoping hearing was conducted on May 6, 2003 at the Los Angeles Regional Water Quality Control Board, 320 W. 4th Street, Los Angeles, CA 90013. A notice of the CEQA Scoping hearing was sent to interested parties including cities and/or counties with jurisdiction in or bordering the Marina del Rey watershed.

19. The lengthy implementation period allowed by the TMDL will allow many compliance approaches to be pursued. In preparing the accompanying CEQA substitute documents, the

Regional Board has considered the requirements of Public Resources Code section 21159 and California Code of Regulations, title 14, section 15187, and intends the substitute documents to serve as a tier 1 environmental review. Nearly all of the compliance obligations will be undertaken by public agencies that will have their own obligations under CEQA. Project level impacts will need to be considered in any subsequent environmental analysis performed by other public agencies, pursuant to Public Resources Code section 21159.2. If not properly mitigated at the project level, there could be adverse environmental impacts. The substitute documents for this TMDL, and in particular the checklist and staff's responses to comments, identify broad mitigation approaches that should be considered at the project level. Consistent with CEQA, the substitute documents do not engage in speculation or conjecture and only consider the reasonably foreseeable environmental impacts of the methods of compliance, the reasonably foreseeable feasible mitigation measures, and the reasonably foreseeable alternative means of compliance, which would avoid or eliminate the identified impacts.

20. The proposed amendment could have a significant adverse effect on the environment. However, there are feasible alternatives, feasible mitigation measures, or both that would substantially lessen any significant adverse impact. The public agencies responsible for those parts of the project can and should incorporate such alternatives and mitigation into any subsequent projects or project approvals. Possible alternatives and mitigation are described in the CEQA substitute documents, specifically the TMDL technical report and the Environmental Checklist. To the extent the alternatives, mitigation measures, or both are not deemed feasible by those agencies, the necessity of implementing the federally required metals TMDL and removing the toxicity impairment from Marina del Rey Harbor (an action required to achieve the express, national policy of the Clean Water Act) outweigh the unavoidable adverse environmental effects.

21. The regulatory action meets the "Necessity" standard of the Administrative Procedures Act, Government Code, Section 11353, Subdivision (b). As specified above, federal regulations require that TMDLs be incorporated into the water quality management plan. The Regional Board's Basin Plan is the Regional Board's component of the water quality management plan, and the Basin Plan is how the Regional Board takes quasi-legislative, planning actions. Moreover, the TMDL is a program of implementation for existing water quality objectives, and is, therefore, appropriately a component of the Basin Plan under Water Code section 13242. The necessity of developing a TMDL is established in the TMDL staff report, the section 303(d) list, and the data contained in the administrative record documenting the toxicity impairments of Marina del Rey Harbor.

22. The Basin Plan amendment incorporating a TMDL for toxic pollutants in Marina del Rey Harbor 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 USEPA. A Notice of Decision will be filed with the Resources Agency.

THEREFORE, be it resolved that pursuant to sections 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 amendments to Chapter 7 of the Water Quality Control Plan for the Los Angeles Region, as set forth in Attachment A hereto, to incorporate the elements of the Marina del Rey Toxic Pollutants TMDL.

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. If during its approval process Regional Board staff, 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.

5. The Executive Officer is authorized to sign a Certificate of Fee Exemption.

I, Jonathan Bishop, 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 October 6, 2005.

Chief Deputy E.O.
for
Jonathan Bishop
Executive Officer

11-14-05
Date

Attachment A to Resolution No. 2005-012

Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Marina del Rey Harbor Toxic Pollutants TMDL

Adopted by the California Regional Water Quality Control Board, Los Angeles Region on October 6, 2005.

Amendments:

Table of Contents
Add:

List of Tables, Figures and Inserts
Add:

Chapter 7. Total Maximum Daily Loads (TMDLs) Summaries, Section 7-18 (Marina del Rey Harbor Toxic Pollutants TMDL)

This TMDL was adopted by the Regional Water Quality Control Board on October 6, 2005.

This TMDL was approved by:

The State Water Resources Control Board on January 13, 2006.
The Office of Administrative Law on March 13, 2006.
The U.S. Environmental Protection Agency on March 16, 2006.

The following tables include the elements of this TMDL.

Table 7-18.1. Marina del Rey Harbor Toxic Pollutants TMDL: Elements

Element	Key Findings and Regulatory Provisions
Problem Statement	The back basins of Marina del Rey Harbor are on the Clean Water Act Section 303(d) list of impaired waterbodies for chlordane, copper, lead, zinc, PCBs, DDT, dieldrin, sediment toxicity and a fish consumption advisory. Review of available data during the development of this TMDL indicated that dieldrin and DDT are no longer causes of impairment. The following designated beneficial uses are impaired by chlordane, copper, lead, zinc, PCBs, and toxicity: water contact recreation (REC1); marine habitat (MAR); wildlife habitat (WILD); commercial and sport fishing (COMM); and shellfish harvesting (SHELL).
Numeric Target *(Interpretation of the narrative and numeric water quality objective, used to calculate the allocations)*	Numeric targets for the harbor sediments are based on the sediment quality guidelines compiled by the National Oceanic and Atmospheric Administration, which are used in evaluating waterbodies within the Los Angeles Region for development of the 303(d) list. The Effects Range-Low (ERLs) guidelines are established as the numeric targets for sediments in Marina del Rey Harbor. **Numeric Targets for Metals in Sediment (mg/kg)** Copper: 34; Lead: 46.7; Zinc: 150 **Numeric Targets for Organic Compounds in Sediment (µg/kg)** Chlordane: 0.5; Total PCBs: 22.7 In addition to the sediment numeric target, water column and fish tissue targets are set for the PCB impairment in fish tissue. The California Toxics Rule (CTR) Criterion for the protection of human health from the consumption of aquatic organisms is selected as the final numeric target for total PCBs in the water column. However, given the inability of current analytical methods to detect concentrations at this low level, an interim numeric target will be applied. The CTR Chronic Criterion for the protection of aquatic life in saltwater is selected as the interim numeric target for the fish tissue impairment by PCBs. This numeric target will remain in effect until advances in technology allow for analysis of PCBs at lower detection limits. **Interim Target for total PCBs in the Water Column:** 0.03µg/L **Final Target for total PCBs in the Water Column:** 0.00017 µg/L The numeric Target for PCBs in fish tissue is the Threshold Tissue Residue Level that is derived from CTR human health criteria, which are adopted criteria for water designated to protect humans from consumption of contaminated fish or other aquatic organisms. **Numeric Target for total PCBs in Fish Tissue:** 5.3 µg/Kg

<table>
<tr><th>Element</th><th>Key Findings and Regulatory Provisions</th></tr>
<tr><td>Source Analysis</td><td>Urban storm water has been recognized as a substantial source of metals. Numerous researchers have documented that the most prevalent metals in urban storm water (i.e., copper, lead, and zinc) are consistently associated with suspended solids. Because metals are typically associated with fine particles in storm water runoff, they have the potential to accumulate in marine sediments where they may pose a risk of toxicity. Similar to metals, the majority of organic constituents in storm water are associated with particulates.

Passive leaching of copper-based anti-fouling paints is a potential source of copper loading to the sediment. However, there is insufficient information available to quantify the contribution of boat discharges to the sediment pollutant load. This TMDL requires a study designed to estimate copper partitioning between the water column and sediment in Marina del Rey harbor, in order to determine the impact of passive leaching on the marine sediment.

Direct deposition of airborne particles to the water surface may be responsible for contributing copper, lead and zinc to the Marina del Rey back basins. The estimated contribution from this source is minor. Indirect atmospheric deposition reflects the process by which metals deposited on the land surface may be washed off during storm events and delivered to Marina del Rey Harbor. The loading of metals associated with indirect atmospheric deposition are accounted for in the storm water runoff.</td></tr>
<tr><td>Loading Capacity</td><td>TMDLs are developed for copper, lead, zinc, chlordane, and PCBs within the sediments of Marina del Rey Harbor's back basins.

The loading capacity for Marina del Rey Harbor is calculated by multiplying the numeric targets by the average annual total suspended solids (TSS) loading to the harbor sediment. The average annual TSS discharged to the back basins of the harbor is 64,166 kilograms per year (kg/yr). The TMDL is set equal to the loading capacity.

<u>Metals Loading Capacity (kilograms/year)</u><table><tr><th>Copper</th><th>Lead</th><th>Zinc</th></tr><tr><td>2.18</td><td>3.0</td><td>9.6</td></tr></table>
<u>Organics Loading Capacity (grams/year)</u><table><tr><th>Chlordane</th><th>Total PCBs</th></tr><tr><td>0.03</td><td>1.46</td></tr></table></td></tr>
<tr><td>Load Allocations (for nonpoint sources)</td><td>Load allocations (LA) are developed for nonpoint sources in Marina del Rey Harbor, which includes direct atmospheric deposition. The load allocations are not assigned to a particular nonpoint source or group of nonpoint sources.

The mass-based load allocation for direct atmospheric deposition is equal to the percentage of the watershed covered by water (5.4%) multiplied by the total loading capacity.</td></tr>
</table>

<table>
<tr><th>Element</th><th>Key Findings and Regulatory Provisions</th></tr>
<tr><td></td><td>

Metals Load Allocations for Direct Atmospheric Deposition (kg/yr)

Copper	Lead	Zinc
0.12	0.16	0.52

Organics Load Allocations for Direct Atmospheric Deposition(g/yr)

Chlordane	Total PCBs
0.002	0.079

</td></tr>
<tr><td>

Waste Load Allocations *(for point sources)*

</td><td>

Waste load allocations (WLA) are assigned to point sources for the Marina del Rey watershed. A grouped mass-based waste load allocation is developed for the storm water permittees (Los Angeles County MS4, Caltrans, General Construction and General Industrial) by subtracting the load allocations from the total loading capacity. Concentration-based waste load allocations are developed for other point sources in the watershed.

Metals Waste Load Allocations for Storm Water (kg/yr)

Copper	Lead	Zinc
2.06	2.83	9.11

Organics Waste Load Allocations for Storm Water (g/yr)

Chlordane	Total PCBs
0.03	1.38

The storm water waste load allocations are apportioned between the MS4 permittees, Caltrans, the general construction and the general industrial storm water permits based on an estimate of the percentage of land area covered under each permit.

Metals Storm Water WLAs Apportioned between Permits (kg/yr)

	Copper	Lead	Zinc
MS4 Permittees	2.01	2.75	8.85
Caltrans	0.022	0.03	0.096
General Construction	0.033	0.045	0.144
General Industrial	0.004	0.006	0.018

Organics Storm Water WLAs Apportioned between Permits (g/yr)

	Chlordane	Total PCBs
MS4 Permittees	0.0295	1.34
Caltrans	0.0003	0.015
General Construction	0.0005	0.022
General Industrial	0.0001	0.003

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

</td></tr>
</table>

<table>
<tr><th>Element</th><th>Key Findings and Regulatory Provisions</th></tr>
<tr><td></td><td>
Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)
<table><tr><th>Copper</th><th>Lead</th><th>Zinc</th></tr><tr><td>2.3</td><td>3.1</td><td>10</td></tr></table>

Organics per acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)
<table><tr><th>Chlordane</th><th>Total PCBs</th></tr><tr><td>0.03</td><td>1.5</td></tr></table>

Concentration-based waste load allocations are assigned to the minor NPDES permits and general non-storm water NPDES permits that discharge to Marina del Rey Harbor. Any future minor NPDES permits or enrollees under a general non-storm water NPDES permit will also be subject to the concentration-based waste load allocations.

Metals Concentration-based Waste Load Allocations (mg/kg)
<table><tr><th>Copper</th><th>Lead</th><th>Zinc</th></tr><tr><td>34</td><td>46.7</td><td>150</td></tr></table>

Organic Concentration-based Waste Load Allocations (µg/kg)
<table><tr><th>Chlordane</th><th>Total PCBs</th></tr><tr><td>0.5</td><td>22.7</td></tr></table>
</td></tr>
<tr><td>Margin of Safety</td><td>An implicit margin of safety is applied through the use of the more protective sediment quality guideline values. The ERLs were selected over the higher ERMs as the numeric targets.</td></tr>
<tr><td>Implementation</td><td>The regulatory mechanisms used to implement the TMDL will include the Los Angeles County Municipal Storm Water NPDES Permit (MS4), the State of California Department of Transportation (Caltrans) Storm Water Permit, minor NPDES permits, general NPDES permits, general industrial storm water NPDES permits, general construction storm water NPDES permits. Nonpoint sources will be regulated through the authority contained in sections 13263 and 13269 of the Water Code, in conformance with the State Water Resources Control Board's Nonpoint Source Implementation and Enforcement Policy (May 2004). Each NPDES permit assigned a WLA shall be reopened or amended at re-issuance, in accordance with applicable laws, to incorporate the applicable WLAs as a permit requirement.

The Regional Board shall reconsider this TMDL in six years after the effective date of the TMDL based on additional data obtained from special studies. Table 7-18.2 presents the implementation schedule for the responsible permittees.</td></tr>
</table>

Element	Key Findings and Regulatory Provisions
	Minor NPDES Permits and General Non-Storm Water NPDES Permits: The concentration-based waste load allocations for the minor NPDES permits and general non-storm water NPDES permits will be implemented through NPDES permit limits. Permit writers may translate applicable waste load allocations into effluent limits for the minor and general NPDES permits by applying applicable engineering practices authorized under federal regulations. The minor and existing general non-storm water NPDES permittees are allowed up to seven years from the effective date of the TMDL to achieve the waste load allocations. **General Industrial Storm Water Permit:** The Regional Board will develop a watershed specific general industrial storm water permit to incorporate waste load allocations. Concentration-based permit limits may be set to achieve the mass-based waste load allocations. These concentration-based limits would be equal to the concentration-based waste load allocations assigned to the other NPDES permits. It is expected that permit writers will translate the waste load allocations into BMPs, based on BMP performance data. However, the permit writers must provide adequate justification and documentation to demonstrate that specified BMPs are expected to result in attainment of the numeric waste load allocations. The general industrial storm water permittees are allowed up to seven years from the effective date of the TMDL to achieve the waste load allocations. **General Construction Storm Water Permit:** Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board. Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs. All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Element	Key Findings and Regulatory Provisions
	MS4 and Caltrans Storm Water Permits: The County of Los Angeles, City of Los Angeles, and Culver City are jointly responsible for meeting the mass-based waste load allocations for the MS4 permittees. Caltrans is responsible for meeting their mass-based waste load allocations, however, they may choose to work with the MS4 permittees. The primary jurisdiction for the Marina del Rey Harbor watershed is the County of Los Angeles. Each municipality and permittee will be required to meet the waste load allocations at the designated TMDL effectiveness monitoring points. A phased implementation approach, using a combination of non-structural and structural BMPs may be used to achieve compliance with the waste load allocations. The administrative record and the fact sheets for the MS4 and Caltrans storm water permits must provide reasonable assurance that the BMPs selected will be sufficient to implement the numeric waste load allocations. We expect that reductions to be achieved by each BMP will be documented and that sufficient monitoring will be put in place to verify that the desired reductions are achieved. The permits should also provide a mechanism to adjust the required BMPs as necessary to ensure their adequate performance. The implementation schedule for the MS4 and Caltrans permittees consists of a phased approach, with compliance to be achieved in prescribed percentages of the watershed, with total compliance to be achieved within 10 years. However, the Regional Board may extend the implementation period up to 15 years if an integrated water resources approach is employed. The waste load allocations and load allocations have been developed to achieve the numeric targets in the back basins of Marina del Rey Harbor by the end of the compliance period. However, the Regional Board is aware of toxic pollutants bound up in sediment. To the extent that the Regional Board or another responsible jurisdiction or agency determines that toxic pollutants bound in sediments are still preventing the attainment of numeric targets, the Regional Board will issue appropriate investigatory orders or cleanup and abatement orders to achieve attainment of the numeric targets.
Seasonal Variations and Critical Conditions	There is a high degree of inter- and intra-annual variability in total suspended solids discharged to Marina del Rey Harbor. This is a function of the storms, which are highly variable between years. The TMDL is based on a TSS load derived from long-term average rainfall over a 52-year period from 1948 to 2000. This time period contains a wide range of storm conditions and drain discharges to Marina del Rey Harbor. Use of the average condition for the TMDL is appropriate because issues of sediment effects on benthic communities and potential for bioaccumulation to higher trophic levels occurs over long time periods.
Monitoring	Effective monitoring will be required to assess the condition of Marina del Rey Harbor and to assess the on-going effectiveness of efforts by

Element	Key Findings and Regulatory Provisions
	dischargers to reduce toxic pollutants loading from the Marina del Rey Watershed. Special studies may also be appropriate to provide further information about new data, new or alternative sources, and revised scientific assumptions. Below the Regional Board identifies the various goals of monitoring efforts and studies that shall be developed in a coordinated manner. The programs, reports, and studies will be developed in response to subsequent orders issued by the Executive Officer. **Ambient Component** A monitoring program is necessary to assess water quality throughout Marina del Rey Harbor and to assess fish tissue and sediment quality in the harbor's back basins. Data on background water quality for copper will help refine the numeric targets and waste load allocations and assist in the effective placement of BMPs. In addition, fish tissue data is required in Marina del Rey's back basins to confirm continued impairment. Water quality samples shall be collected monthly and analyzed for chlordane and total PCBs at detection limits that are at or below the minimum levels until the TMDL is reconsidered in the sixth year. The minimum levels are those published by the State Water Resources Control Board in Appendix 4 of the Policy for the Implementation of Toxic Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California, March 2, 2000. Special emphasis should be placed on achieving detection limits that will allow evaluation relative to the CTR standards. If these can not be achieved with conventional techniques, then a special study should be proposed to evaluate concentrations of organics. Water quality samples shall also be collected monthly and analyzed for copper, lead, and zinc until the TMDL is reconsidered in the sixth year. For metals water column analysis, methods that allow for (1) the removal of salt matrix to reduce interference and avoid inaccurate results prior to the analysis; and (2) the use of trace metal clean sampling techniques, should be applied. Examples of such methods include EPA Method 1669 for sample collection and handling, and EPA Method 1640 for sample preparation and analysis. Storm water monitoring shall be conducted for metals (copper, lead. and zinc) and organics (chlordane and total PCBs) to provide assessment of water quality during wet-weather conditions and loading estimates from the watershed to the harbor. Special emphasis should be placed on achieving lower detection limits for organochlorine compounds. The MS4 and Caltrans storm water permittees are jointly responsible for conducting bioaccumulation testing of fish and mussel tissue within the Harbor. The permittees are required to submit for approval of the Executive Officer a monitoring plan that will provide the data needed to

Element	Key Findings and Regulatory Provisions
	confirm the 303(d) listing or de-listing, as applicable. Representative sediment sampling shall be conducted quarterly within the back basins of the harbor for copper, lead, zinc, chlordane, and total PCBs at detection limits that are lower than the ERLs. Sediment samples shall also be analyzed for total organic carbon, grain size and sediment toxicity. Initial sediment toxicity monitoring should be conducted quarterly in the first year of the TMDL to define the baseline and semi-annually, thereafter, to evaluate effectiveness of the BMPs until the TMDL is reconsidered in the sixth year. The sediment toxicity testing shall include testing of multiple species, a minimum of three, for lethal and non-lethal endpoints. Toxicity testing may include: the 28-day and 10-day amphipod mortality test; the sea urchin fertilization testing of sediment pore water; and the bivalve embryo testing of the sediment/water interface. The chronic 28-day and shorter-term 10-day amphipod tests may be conducted in the initial year of quarterly testing and the results compared. If there is no significant difference in the tests, then the less expensive 10-day test can be used throughout the rest of the monitoring, with some periodic 28-day testing. **Effectiveness Component** The water quality samples collected during wet weather, defined as rainfall of 0.1 inch or more plus the 3 days following the rain event, shall be analyzed for total dissolved solids, settleable solids and total suspended solids if not already part of the sampling program. Sampling shall be designed to collect sufficient volumes of settable and suspended solids to allow for analysis of copper, lead, zinc, chlordane, total PCBs, and total organic carbon in the sediment. Monthly representative sediment sampling shall be conducted at existing monitoring locations throughout the harbor, and analyzed for copper, lead, zinc, chlordane, and total PCBs at detection limits that are lower than the ERLs. The, sediment samples shall also be analyzed for total organic carbon and grain size. Sediment toxicity testing shall be conducted semi-annually, and shall include testing of multiple species (a minimum of three) for lethal and non-lethal endpoints. Toxicity testing may include: the 28-day or10-day amphipod mortality test; the sea urchin fertilization testing of sediment pore water; and the bivalve embryo testing of the sediment/water interface. Toxicity shall be indicated by an amphipod survival rate of 70% or less in a single test, in conjunction with a statistically significant decrease in amphipod survival relative to control organisms (significance determined by T-test, a=0.05). Accelerated monitoring maybe conducted to confirm toxicity at stations identified as toxic. Accelerated monitoring shall consist of six additional tests, approximately every two weeks, over a 12-week period. If the results of any two of the six accelerated tests are less than 90% survival, then the MS4 and Caltrans permittees shall conduct a Toxicity Identification Evaluation (TIE).

Element	Key Findings and Regulatory Provisions
	Alternatively, responsible parties have the option of foregoing accelerated toxicity testing and conducting a TIE directly following an indication of toxicity. The TIE shall include reasonable steps to identify the sources of toxicity and steps to reduce the toxicity The Phase I TIE shall include the following treatments and corresponding blanks: baseline toxicity; particle removal by centrifugation; solid phase extraction of the centrifuged sample using C8, C18, or another media; complexation of metals using ethylenediaminetetraacetic acid (EDTA) addition to the raw sample; neutralization of oxidants/metals using sodium thiosulfate addition to the raw sample; and inhibition of organo-phosphate (OP) pesticide activation using piperonyl butoxide addition to the raw sample (crustacean toxicity tests only). Bioaccumulation monitoring of fish and mussel tissue within the Harbor shall be conducted annually. The permittees are required to submit for approval of the Executive Officer a monitoring plan that will provide the data needed to assess the effectiveness of the TMDL. The general industrial storm water permit shall contain a model monitoring and reporting program to evaluate BMP effectiveness. A permittee enrolled under the general industrial permit shall have the choice of conducting individual monitoring based on the model program or participating in a group monitoring effort. MS4 permittees are encouraged to take the lead in group monitoring efforts for industrial facilities within their jurisdiction because compliance with waste load allocations by these facilities will in many cases translate to reductions in contaminate loads to the MS4 system. **Special Studies** Special studies are necessary to refine source assessments, to provide better estimates of loading capacity, and to optimize implementation efforts. The Regional Board will re-consider the TMDL in the sixth year after the effective date in light of the findings of these studies. Studies required for this TMDL include: • Evaluate partitioning coefficients between water column and sediment to assess the contribution of water column discharges to sediment concentrations in the harbor, and • Evaluate the use of low detection level techniques to determine water quality concentrations for those contaminants where standard detection limits cannot be used to assess compliance for CTR standards or are not sufficient for estimating source loadings from tributaries and storm water. Studies recommended for this TMDL include: • Develop and implement a monitoring program to collect the data necessary to apply a multiple lines of evidence approach; • Refine the relationship between pollutants and suspended solids aimed at better understanding of the delivery of pollutants to the

Element	Key Findings and Regulatory Provisions
	watershed, and • Evaluate the effectiveness of BMPs to address pollutants and/or sediments.

Table 7-18.2. Marina del Rey Harbor Toxic Pollutants TMDL: Implementation Schedule

Date	Action
Effective date of the TMDL	Regional Board permit writers shall incorporate the waste load allocations for sediment into the NPDES permits. Waste load allocations will be implemented through NPDES permit limits in accordance with the implementation schedule contained herein, at the time of permit issuance, renewal or re-opener.
On-going	The Executive Officer shall promptly issue appropriate investigatory and clean up and abatement orders to address any toxicity hotspots within sediments identified as a result of data submitted pursuant to this TMDL, any U.S. Army Corps of Engineer dredging activity, or any other investigation.
Within 6 months after the effective date of the State Board adopted sediment quality objectives and implementation policy	The Regional Board will re-assess the numeric targets and waste load allocations for consistency with the State Board adopted sediment quality objectives.
5 years after effective date of the TMDL	Responsible jurisdictions and agencies shall provide to the Regional Board result of any special studies.
6 years after effective date of the TMDL	The Regional Board shall reconsider this TMDL to re-evaluate the waste load allocations and the implementation schedule.
MINOR NPDES PERMITS AND GENERAL NON-STORM WATER NPDES PERMITS	
7 years after effective date of the TMDL	The non-storm water NPDES permits shall achieve the concentration-based waste load allocations for sediment per provisions allowed for in NPDES permits.
GENERAL INDUSTRIAL STORM WATER PERMIT	
7 years after effective date of the TMDL	The general industrial storm water permits shall achieve the mass-based waste load allocations for sediment per provisions allowed for in NPDES permits. Permits shall allow an iterative BMP process including BMP effectiveness monitoring to achieve compliance with permit requirements.
GENERAL CONSTRUCTION STORM WATER PERMIT	
7 years from the effective date of the TMDL	The construction industry will submit the results of the BMP effectiveness studies to the Regional Board for consideration. In the event that no effectiveness studies are conducted and no BMPs are approved, permittees shall be subject to site-specific BMPs and monitoring to demonstrate BMP effectiveness.

Date	Action
8 years from the effective date of the TMDL	The Regional Board will consider results of the BMP effectiveness studies and consider approval of BMPs no later than eight years from the effective date of the TMDL.
9 years from the effective date of the TMDL	All general construction storm water permittees shall implement Regional Board-approved BMPs.
MS4 AND CALTRANS STORM WATER PERMITS	
12 months after the effective date of the TMDL	In response to an order issued by the Executive Officer, the MS4 and Caltrans storm water NPDES permittees must submit a coordinated monitoring plan, to be approved by the Executive Officer, which includes both ambient monitoring and TMDL effectiveness monitoring. Once the coordinated monitoring plan is approved by the Executive Officer, monitoring shall commence within 6 months. The draft monitoring report shall be made available for public comment and the Executive Officer shall accept public comments for at least 30 days.
5 years after effective date of TMDL (Draft Report) 5 ½ years after effective date of TMDL (Final Report)	The MS4 and Caltrans storm water NPDES permittees shall provide a written report to the Regional Board outlining how they will achieve the waste load allocations for sediment to Marina del Rey Harbor. The report shall include implementation methods, an implementation schedule, proposed milestones, and any applicable revisions to the TMDL effectiveness monitoring plan. The draft report shall be made available for public comment and the Executive Officer shall accept public comments for at least 30 days.
Schedule for MS4 and Caltrans Permittees if Pursuing a TMDL Specific Implementation Plan	
8 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 50% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
10 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 100% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
Schedule for MS4 and Caltrans Permittees if Pursuing an Integrated Resources Approach, per Regional Board Approval	
7 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 25% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
9 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 50% of the total drainage area served by the MS4

Date	Action
	system is effectively meeting the waste load allocations for sediment.
11 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 75% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.
15 years after effective date of the TMDL	The MS4 and Caltrans storm water NPDES permittees shall demonstrate that 100% of the total drainage area served by the MS4 system is effectively meeting the waste load allocations for sediment.

State of California
California Regional Water Quality Control Board, Los Angeles Region

RESOLUTION NO. 2006-009
April 6, 2006

Statement of support for the efforts of responsible jurisdictions and agencies in the Marina del Rey Watershed to utilize an integrated water resources approach to achieve full compliance with the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL in the shortest possible timeframe and no later than 2021

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 standards, which include beneficial use designations and criteria to protect beneficial uses for each water body found within its region.

2. The Regional Board carries out its CWA responsibilities through California's Porter-Cologne Water Quality Control Act and establishes water quality objectives designed to protect beneficial uses contained in the Water Quality Control Plan for the Los Angeles Region (Basin Plan).

3. Section 303(d) of the CWA requires states to identify and to prepare a list of water bodies that do not meet water quality standards and then to establish load and waste load allocations, or a total maximum daily load (TMDL), for each water body that will ensure attainment of water quality standards and then to incorporate those allocations into their water quality control plans.

4. Marina del Rey Harbor (MdRH) Mothers' Beach and Back Basins were listed on California's 1998 section 303(d) List, due to impairments for coliform or for beach closures associated with bacteria generally. Mothers' beach and back basins of MdRH appeared on the 303(d) List because the elevated bacteria and beach closures prevented full support of the beaches' designated use for water contact recreation (REC-1).

5. A consent decree between the U.S. Environmental Protection Agency (USEPA), Heal the Bay, Inc. and Santa Monica BayKeeper, Inc. was approved on March 22, 1999. This court order required completion of a TMDL to reduce bacteria at Marina del Rey Harbor Mothers' Beach and back basins by March 2004.

6. The Regional Board adopted a TMDL to address bacteriological water quality impairments for Mothers' Beach and back basins of MdRH located in Los Angeles County, California. The Regional Board adopted a TMDL to address water quality impairments during dry and wet weather on August 7, 2003 (Resolution 2003-012).

7. The Regional Board incorporated the TMDL along with appropriate implementation measures into its Basin Plan as required (40 CFR 130.6(c)(1), 130.7). The Basin Plan and applicable statewide plans serve as the State Water Quality Management Plans governing the watersheds under the jurisdiction of the Regional Board.

8. The Regional Board established the above-mentioned TMDL to preserve and enhance the water quality at Santa Monica Bay (SMB) including MdRH and for the benefit of the 55 million beachgoers, on average, that visit the Santa Monica Bay beaches each year. At stake is the health of swimmers and surfers and associated health costs as well as sizeable revenues to the local and state economy. Estimates are that visitors to Santa Monica Bay beaches spend approximately $1.7 billion annually.

9. The Regional Board's goal in establishing the above-mentioned TMDLs is to reduce the risk of illness associated with swimming in marine waters contaminated with bacteria. Local and national epidemiological studies compel the conclusion that there is a causal relationship between adverse health effects, such as gastroenteritis and upper respiratory illness, and recreational water quality, as measured by bacteria indicator densities. The water quality objectives on which the TMDL numeric targets are based will ensure that the risk of illness to the public from swimming at MdRH Mothers' Beach generally will be no greater than 19 illnesses per 1,000 swimmers, which is defined by the USEPA as an "acceptable health risk" in marine recreational waters.

10. The County of Los Angeles, Cities of Los Angeles and Culver City and California Department of Transportation (Caltrans) are the responsible jurisdictions and agencies for the Marina del Rey Watershed. The County of Los Angeles is the primary jurisdiction since they own and operate MdRH. The primary jurisdiction is responsible for submitting an implementation plan per the requirements of the TMDL.

11. During the adoption of the TMDL, the Regional Board recognized two broad approaches to implementing the TMDL. One possible approach is an integrated water resources approach that takes a holistic view of regional water resources management by integrating planning for future wastewater, storm water, recycled water, and potable water needs and systems; focuses on beneficial re-use of storm water, including groundwater infiltration, at multiple points throughout a watershed; and addresses multiple pollutants for which Marina del Rey Harbor or its watershed are listed on the CWA section 303(d) List as impaired. The other possible approach is a non-integrated water resources approach in which implementation is achieved by focusing on narrowly tailored, end-of-the-pipe solutions to improve bacteriological water quality without incorporating other environmental and public goals.

12. The Regional Board recognized that an integrated water resources approach not only provides water quality benefits to the people of the Los Angeles Region, but also that the responsible jurisdictions implementing this TMDL can serve a variety of public purposes by adopting an integrated water resources approach. An integrated water resources approach will address multiple pollutants, and as a result, responsible jurisdictions can recognize cost-savings because capital expenses for the integrated approach will implement several TMDLs that address pollutants in storm water. In addition, jurisdictions serve multiple roles for their citizenry, and an integrated approach allows for the incorporation and enhancement of other public goals such as water supply, recycling and storage; environmental justice; parks, greenways and open space; and active and passive recreational and environmental education opportunities.

13. The Regional Board acknowledged that a longer timeframe is reasonable for an integrated water resources approach because it requires more complicated planning and implementation such as identifying markets for the water and efficiently siting storage and transmission infrastructure within the watershed to realize the multiple benefits of such an approach.

Therefore, after considering testimony, the Regional Board revised the implementation provisions of the TMDL to allow for a longer implementation schedule (*up to* 18 years) if the responsible jurisdictions and agencies clearly demonstrate their intention to undertake an integrated water resources approach and justify the need for a longer implementation schedule. In contrast, the Regional Board required a shorter implementation schedule (*up to* 10 years) for non-integrated approaches because the level of planning is not as complicated.

14. The Regional Board has the authority to authorize compliance schedules through the basin planning process. In the TMDL, adopted by the Regional Board, the Regional Board established dual schedules for implementation that afford the responsible jurisdictions and agencies up to ten or eighteen years, depending on the implementation approaches pursued, to implement the TMDL.

15. The implementation provisions in Table 7-5.1 of the TMDL state that, "Within ten years of the effective date of the TMDL, compliance with the allowable number of wet-weather exceedance days and rolling 30-day geometric mean targets must be achieved, unless an Integrated Water Resources Approach is implemented (in which case compliance must be achieved in the shortest time possible but not to exceed 18 years from the effective date of the Santa Monica Bay Beaches Bacteria TMDL)" (Resolution 2003-012, Attachment A).

16. The final implementation schedule for the TMDL will be determined on the basis of the implementation plan. If the responsible jurisdictions and agencies prefer an integrated approach, the implementation plan must clearly demonstrate the need for the longer implementation schedule. Otherwise, at most a 10-year implementation timeframe will be allotted by the Regional Board, depending upon a clear demonstration of the time needed in the implementation plan.

17. Per the requirements set forth in the TMDL, responsible jurisdictions and agencies submitted a draft Implementation Plan to the Regional Board on March 30, 2005. Regional Board staff met with the responsible jurisdictions and agencies on May 9, 2005 to review and provide comments on the draft Implementation Plan. Regional Board staff also provided written comments to the responsible jurisdictions and agencies in a letter dated August 5, 2005. The responsible jurisdictions and agencies submitted a final Implementation Plan to the Regional Board on October 31, 2005.

18. The Implementation Plan submitted lays out a four-phase, iterative-adaptive program in which the responsible jurisdictions and agencies have made explicit commitments in the early stages of implementation to conduct focused public information and participation program, institutional and source control activities as well as specific structural best management practices (BMPs) at publicly-owned facilities.

19. The Implementation Plan incorporates the principles of an integrated water resources approach by implementing subregional solutions that integrate planning for future wastewater, storm water, recycled water and potable water needs and systems; address multiple pollutants; focus on beneficial re-use of stormwater; and incorporate other public goals.

20. The implementation schedule is phased over 16 years with a final compliance date of 2021 (18 years after the effective date of the SMB Beaches Bacteria Wet Weather TMDL). The Implementation Plan is divided into four phases. The first phase extends from July 2005 to June 2007; the second phase extends from July 2007 to June 2012; the third phase extends

from July 2012 to June 2017; and the fourth phase extends from July 2017 to final compliance in July 2021. Phase one and two emphasizes public information and participation programs and institutional and source control programs (nonstructural) and subregional runoff management solutions (structural) to reduce the contribution of bacteria and other pollutants of concern from storm water runoff. The phase one and two programs and projects focus on discharges of non-storm water and storm water directly into the back basins (Basins D, E, and F), that contribute to the greatest risk of exceedances of bacterial objectives. The third and fourth phases emphasizes refinement of institutional and subregional structural solutions based on performance evaluations conducted during Phases I and II. Feasibility analysis of regional control strategy will be initiated in Phase I.

21. The responsible jurisdictions and agencies have committed to implement two subregional structural projects by 2010 and to evaluate five additional projects by 2021. These seven projects along with commitments to implement 13 aggressive institutional programs are expected to achieve reductions in wet-weather exceedance days so as to meet the allowable wet-weather exceedance days set forth in the TMDL.

22. Regional solutions are a secondary resort in managing runoff and reducing bacteria loading at Mothers' Beach and the back basins of MdRH. However, due to scientific uncertainties it is not possible to guarantee that the implementation actions outlined in the Implementation Plan will achieve the necessary reductions in exceedance days as required by the TMDL. Therefore, it is essential to start the feasibility and conceptual analyses for regional solutions early in the implementation schedule, as proposed, in order to identify potential land requirements, physical limitations, and implementation issues. Because these regional solutions require a significant amount of time to plan and implement, beginning the feasibility analyses early will provide the responsible jurisdictions and agencies sufficient time to make changes and other arrangements and still keep to the implementation schedule.

23. Interested persons and the public have had reasonable opportunity to participate in the development and review of the Implementation Plan. The responsible jurisdictions and agencies held monthly meetings beginning in April 2004 to develop the Implementation Plan.

24. The final Implementation Plan submitted by the responsible jurisdictions and agencies to the Regional Board was posted on the Regional Board's website in advance of the April 6, 2006 Board hearing. A Notice of Hearing was published and circulated 30 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 April 6, 2006 to consider support for the Implementation Plan.

THEREFORE, be it resolved that pursuant to Regional Board Resolution 2003-012, Attachment A, Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate Implementation Provisions for the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, Table 7-5.1, "Implementation", adopted by the Regional Board on August 7, 2003 and effective on March 18, 2004:

1. The Regional Board hereby acknowledges the submission of a draft Implementation Plan and final Implementation Plan dated October 31, 2005 by responsible jurisdictions and agencies in the Marina del Rey Watershed, including the County of Los Angeles, Cities of Los Angeles and Culver City, and California Department of Transportation, per requirements of the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL as set forth in Resolution 2003-012, Attachment A, Table 7-5.3.

2. The Regional Board hereby determines that to receive approval for its integrated water resource approach, the responsible jurisdictions and agencies in the Marina del Rey Watershed as identified in (1) shall submit to the Executive Officer information that the Implementation Plan that they intend to pursue is an integrated water resources approach as defined in the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, Table 7-5.1.

3. The Regional Board hereby determines that assuming the responsible jurisdictions and agencies in the Marina del Rey Watershed as identified in (1) adequately comply with the terms of this resolution, they will have demonstrated based on their conceptual plan the need for the longer implementation schedule as outlined in the final Implementation Plan dated October 31, 2005, which commits to a final compliance date of July 2021.

4. Given the conceptual commitments to an integrated water resources approach and to achieving final compliance by July 2021 outlined in the Implementation Plan, the Regional Board strongly supports and encourages the efforts of the responsible jurisdictions and agencies to (1) prior to the TMDL reconsideration clearly commit to specific actions to be conducted, (2) aggressively implement these actions as outlined in the Implementation Plan and (3) make timely adjustments and refinements to the Implementation Plan to ensure that bacteriological water quality impairments at Mothers' Beach and the back basins of Marina del Rey Harbor are resolved in the shortest possible timeframe.

5. The Regional Board encourages an integrated water resources approach and recognizes that additional time may be necessary to pursue such an approach to TMDL implementation. In order to clearly justify an extended implementation schedule beyond 10 years and up to 18 years from the effective date of the Santa Monica Bay Beaches Wet-Weather Bacteria TMDL, the responsible jurisdictions and agencies are required to submit additional quantifiable analyses as described below to demonstrate (1) the proposed plans will meet the waste load allocations (WLAs) and (2) the proposed implementation actions will achieve multiple water quality benefits and other public goals.

   The Regional Board strongly encourages responsible jurisdictions and agencies pursing an integrated water resources approach to employ natural methods as opposed to end-of-pipe, whenever it would be effective and feasible.

6. Per the provisions of the TMDL, the Regional Board will determine, when the TMDL is reconsidered in 2007, if a longer implementation schedule (up to 18 years from the effective date of the Santa Monica Bay Beaches Wet-Weather Bacteria TMDL) shall be granted if there is a clear demonstration that an integrated water resources approach will be pursued.

   The types of approaches proposed coupled with quantifiable estimates of the integrated water resources benefits of the proposed structural and non-structural BMPs included in the Implementation Plan would provide the obligatory demonstration that an integrated water resources approach is being pursued. This demonstration shall provide numeric estimates of the benefits, including reductions in other pollutants, groundwater recharged, acres of multi-use projects and water (e.g. stormwater, runoff, wastewater) beneficially reused among other integrated water resources criteria outlined in the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL. Responsible jurisdictions and agencies should submit to the Regional Board technically defensible quantifiable estimates of integrated benefits for actions to be implemented during Phase I (July 2005 to June 2007) and Phase II (July 2007 to June

2012) of the wet-weather implementation schedule. This information must be submitted within 9 months to allow sufficient time for staff analyses prior to the Board's reassessment of the TMDL, scheduled for July 2007.

7. The Regional Board recognizes that it is critical to establish a technically defensible quantitative linkage to the final WLAs to measure progress toward achieving the WLAs. The linkage should include target reductions in stormwater runoff and/or total coliform, fecal coliform and enterococcus using the 90th percentile year for each individual subwatershed.

   The Regional Board also recognizes that it is essential to establish quantitative estimates of the water quality benefits provided by the proposed structural and non-structural BMPs to be implemented during Phase I of the wet-weather implementation schedule, and preliminary estimates of the benefits provided by the proposed BMPs to be implemented during Phase II of the wet-weather implementation schedule. These estimates, including a quantitative analysis of their linkage to the WLAs, are necessary to provide assurance that the compliance deadline will be achieved given the uncertainties involved in an integrated water resources approach. Estimates should address reductions in exceedance days, bacteria concentration and loading, and flow in the drain and at each compliance monitoring location. Responsible jurisdictions and agencies should submit such information to the Regional Board within 9 months so that the Regional Board staff will have time to assess the information in time for the reconsideration of the TMDL.

8. The Regional Board hereby directs staff to develop draft language for Board consideration that incorporates into the Los Angeles County Municipal Separate Storm Sewer System (MS4) NPDES permit at reissuance explicit requirements for responsible jurisdictions and agencies to submit regular reports to the Board on progress toward achieving the required reductions set forth in the TMDL. The regular reports may be submitted as part of the Los Angeles County MS4 Annual Program and Annual Monitoring reports. Reports on progress toward compliance with the TMDL shall include data and information on (1) water quality improvements in the receiving water; (2) the effectiveness of BMPs implemented as part of the Implementation Plan measured in terms of water quality improvement and quantity of wet weather runoff reduced, captured, treated, or infiltrated; and (3) the performance of other programmatic solutions, source identification activities and source control measures. Data on water quality improvements may include for example reductions in exceedance days compared to historical data and proposed milestones, where appropriate; the proportion of wet-weather days that exceed the water quality objectives by storm year as defined in the TMDL; and corresponding rainfall data as set forth in the Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Monitoring Plan submitted by responsible jurisdictions and agencies.

   Given the iterative approach outlined in the Implementation Plan, reports shall also include documentation on changes and refinements to the Implementation Plan based on the results of monitoring data, data on BMP effectiveness, and evaluations of pilot projects and other implementation actions under consideration. Such updates to the Implementation Plan shall include revised quantitative estimates of the water quality benefits of the proposed BMPs and the linkage to the waste load allocations identified pursuant to (7) above.

9. The Regional Board hereby further directs staff to develop draft language for Board consideration that incorporates into the Los Angeles County MS4 NPDES permit at reissuance specific provisions to reopen the TMDL section of the permit and incorporate, after providing the opportunity for public comment, TMDL-related provisions as well as

additional implementation actions, including but not limited to institutional controls, source identification and control, and structural and treatment controls if adequate progress is not being made to achieve compliance with the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL.

10. The Regional Board anticipates that the California Department of Transportation (Caltrans), as a responsible agency, will work cooperatively with the responsible jurisdictions and agencies under the Los Angeles County MS4 NPDES permit to achieve compliance with the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL, including requirements as set forth pursuant to (8) and (9) above. In the event that Caltrans decides to proceed independently to address compliance with the TMDL, Caltrans will be required to achieve compliance with the wet-weather allowable exceedance days by March 2014.

11. The Regional Board hereby encourages responsible jurisdictions and agencies to begin feasibility studies and planning for regional solutions to managing wet weather runoff and bacteria loading early in the implementation schedule to ensure sufficient time to redirect implementation activities if necessary to include regional solutions and still achieve the final compliance deadline of July 2021.

I, Jonathan Bishop, 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 April 6, 2006.

Jonathan S. Bishop
Executive Officer

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Acronyms and Abbreviations

AMS	Asset Management Strategy
BID	Business Improvement District
BMP	Best Management Practice
BOS	Bureau of Sanitation, City of Los Angeles
Caltrans	California Department of Transportation
CCTV	Closed-Circuit Television
CCC	California Coastal Commission
CMP	Coordinated Compliance Monitoring Plan
CRA	California Restaurant Association
IC/ID	Illicit Connection/Illicit Discharge
IPM	Implementation Project Manager
IRP	Integrated Resources Planning
IWRA	Integrated Water Resources Approach
LACDBH	County of Los Angeles Department of Beaches and Harbors
LACDHS	County of Los Angeles Department of Health Services
LACFCD	County of Los Angeles Flood Control District
LARWQCB	California Regional Water Quality Control Board, Los Angeles Region
LAUSD	Los Angeles Unified School District
LA-1	Lincoln Boulevard (Caltrans' State Highway)
LA-187	Venice Boulevard (Caltrans' State Highway)
LAX	Los Angeles International Airport
LCP	Local Coastal Program
LFD	Low Flow Diversion
LID	Low Impact Development
MdRH	Marina del Rey Harbor
MDRWRA	Marina del Rey Watershed Responsible Agencies
MPN	Most Probable Number. Refers to bacterial indicator density #/l
MS4	Municipal Separate Storm Sewer Systems
MSMD	Marina Sewer Maintenance District
NGO	Non-Governmental Organization
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
PIPP	Public Information and Participation Program
PPP	Pollution Prevention Partner
Public Works	County of Los Angeles Department of Public Works
RV	Recreational Vehicle
SCCWRP	Southern California Coastal Waters Research Project
SUSMP	Standard Urban Stormwater Mitigation Plan
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
VNR	Video News Release
WLAs	Waste Load Allocations
WQMP	Water Quality Management Plan

This implementation plan is being submitted to the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) as a requirement of the Marina del Rey Harbor Marina Beach and Back Basins Bacteria Total Maximum Daily Load (TMDL) Resolution No. 2003-012 dated September 4, 2003.

This implementation plan presents the plans developed by the Marina del Rey Watershed responsible agencies (MDRWRA) to meet the current bacterial indicator standards for dry-and wet-weather and to address pollutants such as metals and toxics that are anticipated to be in the future TMDLs. This implementation plan embraces the iterative adaptive approach, addresses multiple pollutants, and incorporates beneficial water reuse. This implementation plan was put together by the MDRWRA (County of Los Angeles, Cities of Los Angeles and Culver City, and California Department of Transportation) through a collaborative effort with interested stakeholders, the LARWQCB and the Santa Monica BayKeeper. The MDRWRA and the interested stakeholders met on a monthly basis starting in April 2004.

Since the Santa Monica Bay Beaches Bacteria TMDL was adopted earlier, some of the approaches used in this implementation plan, such as the Integrated Water Resources (IWR) approach and the iterative adaptive approach, are consistent with the compliance approaches developed by the Santa Monica Bay Beaches TMDL Jurisdictional Group 2 and 3. The Santa Monica Bay Beaches TMDL Jurisdictional Group 2 and 3 is led by the Cities of Los Angeles and Santa Monica.

It should be noted that many of the proposed actions suggested in this implementation plan are specifically tailored for the Marina del Rey Watershed and may not be appropriate for areas outside of Marina del Rey Watershed due to different characteristics, issues, pollutants of concern, and responsible agencies involvement.

ES-1.0 Introduction

The purpose of this implementation plan is to document and establish the procedures and actions of the Marina del Rey Watershed responsible agencies (MDRWRA) to comply with the California Regional Water Quality Control Board Los Angeles Region's (LARWQCB's) Resolution No. 2003-012 Total Maximum Daily Load (TMDL) to Reduce Bacterial Indicator Densities at Marina del Rey Harbor Mothers' Beach and Back Basins dated September 4, 2003.

The implementation plan addresses both the dry-and wet-weather compliance for Back Basins D (including Marina Beach, also commonly known as Mothers' Beach), E, and F. The implementation plan describes methods, mechanisms, and timeframes to achieve this TMDL regulatory compliance.

The following is a summary of the key TMDL milestones:

- March 18, 2007, for dry-weather compliance
- From March 18, 2014, to March 18, 2022, for wet-weather compliance

The following is a summary of deadlines for the action items in the TMDL based on the effective date of March 18, 2004:

Date	Action	Status
July 16, 2004	Compliance Monitoring Plan	Submitted on July 15, 2004 and awaiting approval
July 16, 2004	Small Drain Study	Submitted on July 16, 2004
July 16, 2004	Beaches and Harbors Discharge Report	Submitted on July 16, 2004
Draft-March 30, 2005 Final-July 30/October 31, 2005	Implementation Plan	Submitted draft on March 30, 2005
March 18, 2007	Non-point Source Study	Will be submitted on March 18, 2007

ES-2.0 Background

ES-2.1 Regulatory Background

The 1972 Clean Water Act established regulations and mechanisms to clean up the Nation's polluted waterways. Included were provisions for Total Maximum Daily Loads to address pollution. In 1987, stormwater runoff was also recognized as a significant contributor to pollution in lakes, rivers, streams, and oceans.

The California Water Resources Control Board assigns beneficial uses for California's water bodies. Beneficial uses may include drinking water supply, swimming, fishing, habitat, to name just a few. When a water body becomes polluted, it is designated as impaired. The Clean Water Act required impaired water bodies to be placed on a list (subsequently called the 303(d) List), a TMDL issued, and cleanup efforts to result.

Litigation and a resulting consent decree between the United States Environmental Protection Agency (USEPA) and environmental groups have caused a legal deadline to be established for the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL. Another deadline has also been established for the Marina del Rey Metals and Toxics TMDL, which is expected to be approved by the State within a year.

On March 18, 2004, the LARWQCB promulgated the TMDL for bacteria in Marina del Rey Harbor (MdRH) for the back basins (Basins D, E, and F) and Marina Beach.

ES-2.2 Compliance Targets and Wasteload Allocations

The TMDL established bacterial compliance targets and Waste Load Allocations (WLAs). The TMDL's WLAs are expressed as allowable exceedance days or the maximum number of days where sampling results can surpass the established Assembly Bill 411 standards without exceeding the limits in the TMDL. The allowable exceedance days concept grew out of research, using a local reference system, Arroyo Sequit, located near the Los Angeles and Ventura County borderline, showing that even a watershed with minimal human impact will contribute significant bacterial loading to the receiving water body, especially during a storm event. Therefore, by employing the allowable exceedance days approach in establishing the WLAs, the LARWQCB accounts for bacteria loading from non-anthropogenic sources.

The TMDL bacterial indicator standards are as follows:

1. 30-Day Geometric Mean Limits
a. Total coliform density shall not exceed 1,000 /100ml.
b. Fecal coliform density shall not exceed 200/100ml.
c. Enterococcus density shall not exceed 35/100ml.

2. Single Sample Limits
a. Total coliform density shall not exceed 10,000/ 100ml.
b. Fecal coliform density shall not exceed 400/100ml.
c. Enterococcus density shall not exceed 104/100ml.

ES-2.3 TMDL Responsible Agencies

The LARWQCB designated the County of Los Angeles as the lead of the MDRWRA. The County of Los Angeles Department of Public Works (Public Works), Department of Beaches and Harbors (LACDBH), and Department of Sheriff/Harbormaster primarily represent the County. The other agencies responsible for compliance with the TMDL are the Cities of Los Angeles and Culver City, and California Department of Transportation (Caltrans)

The MDRWRA first met in April 2004 along with the LARWQCB, two key environmental groups (Heal the Bay and Santa Monica BayKeeper), and representatives from the Marina del Rey Lessees Association. Together with the stakeholders, the MDRWRA have created this implementation plan. The MDRWRA met monthly.

ES-2.4 Watershed Description and Land Use

The Marina del Rey Watershed is comprised of five subwatersheds, but only Subwatersheds 1A, 3 and 4 are tributary directly to the impaired back basins (Basins D, E and F).

The Marina del Rey Watershed can be characterized by three main parts:

- ✓ The Harbor water area, including the docks, back basins, Marina Beach, and Oxford Retention Basin (Oxford Basin).
- ✓ The land adjacent to the Harbor back basins is the Los Angeles County unincorporated area, which includes individual parcels, streets, and other facilities.
- ✓ The land outside the Los Angeles County unincorporated area draining into the Harbor waters, including the Cities of Los Angeles and Culver City, and Caltrans right of ways.

Marina del Rey Harbor is open to the Santa Monica Bay through the Main Channel and it shares a common breakwater with Ballona Creek. The Harbor consists of the Main Channel and eight back basins (A-H). Marina Beach is located in the west end of Basin D.

Oxford Basin is situated at the north end of Marina del Rey Harbor and drains to Basin E through two slide gates and a culvert system. Oxford Basin serves as a retention basin for the surrounding watershed and the slide gates control tidal influence on its water level. County of Los Angeles Flood Control District (LACFCD) storm drain Project No. 5243[1] drains into the northeast corner of Oxford Basin and Project No. 3872 drains into the east side of Oxford Basin via Oxford Pump Plant. Project No. 3874 drains into Basin E via the Boone-Olive Pump Plant.

The Small Drain Study[2] identified over 720 other smaller drainage systems draining into the Harbor. Most of these systems serve the individual parcels and mole roads between basins. The remaining drains serves the Marina del Rey's streets surrounding the basins.

[1] This follows the County of Los Angeles Flood Control District's naming convention for storm drain facilities
[2] Marina del Rey Small Drain Study, 2004, Los Angeles County, Department of Public Works, Watershed Management Division

The Marina del Rey Watershed was developed in two general stages. The area surrounding the Harbor was developed from the late 1800's into the early 1900's, and the Marina was constructed in the early 1960s from the remnants of the Ballona Creek Wetlands and Estuary. Marina del Rey was subsequently developed with a variety of different uses and facilities including housing, restaurants, commercial/retail, office, and marine/boating.

The Marina del Rey Watershed is approximately 1,855 acres (2.9 square miles) in size and lies within the City of Los Angeles (53%), County unincorporated (44%), City of Culver City (2%), and Caltrans (1%). The predominant land uses are residential (46.6%), commercial/office (12.2%), receiving waters of MdRH (11.6%), marina facilities (9.2%), open space/recreational (4.8%), light industrial/vacant (4.7%), and educational/transportation/other (10.9%).

ES-3.0 Implementation Strategies and Actions

ES-3.1 Implementation Strategy

The key feature of this implementation plan is establishing a process that has the flexibility to provide multiple benefits, address multiple pollutants, and have a methodology/process to adapt itself as the plan is implemented and effectiveness is evaluated. This process follows the Integrated Water Resources Approach (IWR) by using an iterative adaptive approach. This process will also establish a cost tracking system so that a cost/effectiveness/efficiency analysis can be performed for each selected implementation action. Cost/effectiveness/efficiency analysis results can be evaluated to select implementation actions with the "most bang for the buck" in subsequent iterations.

The iterative adaptive approach is characterized by several principal features:

- ✓ Baseline - Establish current conditions with existing data or new monitoring.
- ✓ Proposed possible action items - Establish performance criteria and expected results.
- ✓ Implement action - Continue current practices and perform proposed actions.
- ✓ Evaluate performance - Use compliance or source identification monitoring, Best Management Practices monitoring, etc., to evaluate progress in meeting compliance goals.
- ✓ Adapt action - If successful, do more, if not, correct action, or abandon action.
- ✓ Iterate process - Repeat until desired results are obtained.

ES-3.2 Monitoring and Reporting

Monitoring and reporting are expected to be a key component of the implementation plan because it provides the MDRWRA with the information to successfully meet the water quality objectives of the TMDL. The monitoring data and the resulting analysis will form one part of the basis for the iterative adaptive approach and the decisions made to revise the selected implementation measures.

ES-3.3 Cost Tracking

Another important part of the iterative adaptive approach is program cost tracking, reporting, and analysis. Along with program performance, cost will be a factor that the MDRWRA use in evaluating implementation performance. Unexpected excessive costs due to low BMP efficiency or maintenance difficulties may require a change in the implementation approach. The MDRWRA are encouraged to establish uniform cost accounting procedures to assist in the iterative adaptive process.

ES-3.4 Implementation Approach

The MDRWRA considered three different compliance approaches, chose the best features from each, incorporated the iterative adaptive process, and developed the Hybrid approach. This approach is based on the compliance approach developed by the Santa Monica Bay Beaches Bacteria TMDL Jurisdictional Groups 2 and 3[1]. The following three approaches were considered:

- ✓ Low Cost
- ✓ Low Risk
- ✓ Maximum Beneficial Reuse

The Low Cost approach considers actions and philosophies designed to minimize costs, and generally these are institutional controls. This approach assumes a higher level of non-compliance risk. Control Programs are structured in phases in an iterative adaptive approach, where they are evaluated for effectiveness and modified/adapted accordingly. Sub-regional control associated with this approach generally may not stress beneficial reuse unless it is the low cost option at that site. Since only a few programs are implemented at a time, the costs are lower.

The Low Risk approach considers implementing the Control Programs designed to ensure compliance with less emphasis on costs and beneficial reuse. This approach treats the most runoff volume and incorporates the institutional controls of the Low Cost approach, but substitutes regional control for the sub-regional control. Regional control consists of large-scale and costly water quality treatment plants. Oxford Basin was identified as a potential location for a regional control opportunity, if needed.

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[1]Santa Monica Bay Beaches Bacteria Total Maximum Daily Loads Draft Implementation Plan, Jurisdiction 2 and 3, Section 3.7, March 2005

The Maximum Beneficial Reuse approach considers managing as much runoff as possible and reusing it. This approach uses the same Control Programs as the Low Risk approach, but includes additional features to beneficially reuse the treated runoff. Treated water from the Oxford Basin could be reused to irrigate the landscaping in street medians, parks, and other public and private properties vegetation. A new dedicated distribution system would be required. The cost of this approach is expected to be considerably higher than the Low Risk approach due to the additional infrastructure required to reuse the treated runoff.

Each of the three approaches has its advantages and disadvantages. The MDRWRA evaluated each of these options, discussed the process used by the Santa Monica Bay Beaches TMDL Jurisdictional Group 2 and 3, and decided to pursue the Hybrid approach.

This approach combines the best features of the three and results in a better, more balanced plan as discussed below.

- Cost - The Hybrid approach acknowledges cost as a significant consideration by building in a cost/benefit/effectiveness analysis as part of the iterative adaptive approach, which allows the MDRWRA flexibility in choosing measures with varying levels of risk and cost.
- Low Risk - The Hybrid approach acknowledges risk as a significant consideration by using a multiple Control Programs to lower risk. Each of these programs accomplishes implementation through different mechanisms and provides concurrent benefits.
- Maximum Beneficial Reuse - The Hybrid approach acknowledges Maximum Beneficial Reuse as a significant consideration by incorporating reuse in sub-regional controls.

The Hybrid approach uses the iterative adaptive process, addresses multiple pollutants, and has beneficial reuse components. This approach features the following Control Programs:

✓ Public Information and Participation Program
✓ Institutional Control Program
✓ Structural BMPs Program

The three programs are further divided into sub-categories as follows:

❖ **Public Information and Participation Program**
- Inter-Agency Coordination
- Industry-Specific BMP Outreach
- Advertising
- Media Relations
- Pollutant-Specific Outreach

- School Outreach
- Adopt-A-Highway Program

- **Institutional Control Program**
  - Storm Drain System Management
  - Proper Pet Waste Disposal
  - Sanitary Sewer Management Program
  - Illicit Connections/Illicit Discharges
  - Street Infrastructure Management
  - Recreational and Other Public Facilities Management
  - Public Parking Facilities Management
  - Boating Facilities Management
  - Development Planning
  - Industrial/Commercial Facilities Control Program
  - Code and Ordinance Review Program
  - Special/Holiday Events
  - Business Improvement Districts

- **Structural BMPs Program**
  - Non-Storm Water Discharge Controls
    - ✓ Low-Flow Storm Drain Diversion Program
    - ✓ Marina Beach Water Quality Improvement Project (Increase Basin D Circulation)
    - ✓ Marina Source Identification and Control Program
  - Storm Water Discharge Controls
    - ✓ Sub-Regional Structural BMP Program
    - ✓ Marina Beach Water Quality Improvement Project (Increase Basin D Circulation and Sheet Flow Diversion)
    - ✓ Regional Structural BMP Program (if feasible)

ES-3.5 TMDL Implementation Cost

The total implementation plan cost is estimated to be between $53M and $60M broken down as follows:

- Non-Storm Water Discharge Controls: $9M
- Institutional Control Program: $8M to $9M
- Public Information and Participation Program: $4M to $5M
- Sub-Regional Structural BMP Program: $10M to $15M
- Regional Structural BMP Program: $22M

ES-4.0 Implementation Schedule

The dry-weather implementation will be carried out in one phase and the wet-weather implementation will be carried out in four phases.

- Proposed Dry-Weather TMDL Implementation Schedule
  - Low-Flow Storm Drain Diversion Program, 2004 - March 18, 2007
  - Marina Beach Water Quality Improvement Project (Increase Basin D Circulation), 2003 - December 2005
  - Marina Source Identification and Control Program, 2005 – March 18, 2007

- Proposed Wet-Weather TMDL Implementation Schedule
  - Institutional Control Program, Public Information and Participation Program, Marina Beach Water Quality Improvement Project (Sheet Flow Diversion), and Sub-Regional Structural BMP Program
    - Phase I: FY 2005 -06 – FY 2006-07
    - Phase II: FY 2007-08 – FY 2011-12
    - Phase III: FY 2012-13 – FY 2016-17
    - Phase IV: FY 2017-18 – FY 2021-22
  - Regional Structural BMP Program (will initiate investigation in Phase I)

ES-5.0 Studies and Research

The implementation strategies proposed in this plan are based on a limited understanding of bacteria sources and BMP effectiveness. Research into these and other pertinent areas may yield more efficient and cost effective solutions.

The MDRWRA have compiled a list of suggested studies and research that may be helpful over the TMDL implementation timeframe to address several areas where information is lacking or where science and technology are rapidly evolving. The suggested studies do not necessarily need to be undertaken by the MDRWRA, but could be performed by others.

In recent years, there have been several key studies on bacterial indicators in receiving waters and the affects on human health. Recent studies using DNA technology have raised the possibility that traditional bacterial indicators may not necessarily correlate as well to the presence of human pathogens.

Existing indicators are widely used because they have several advantages: economical, easy to analyze, and repeatable. They have several limitations: do not necessarily indicate underlying human pathogens and cannot identify the source (human, animal, fish). A new ideal indicator would have the economic advantages of the current indicators, correlate well with human pathogens, and identify the source. Southern California Coastal Waters Research Project (SCCWRP) is currently studying new methods of bacterial source identification. While we are waiting for an approved method to be established, an epidemiological study can be initiated to assess the health effects of non-human bacteria and pathogens at Southern California beaches where human sources have been eliminated.

Structural BMPs are experiencing rapid growth as public agencies install more of them and vendors are developing/refining more products. While many BMPs have performance criteria available for the user, there is not a standard testing procedure so that these products can be designed and maintained.

The following is a list of the required and/or suggested studies:

- Non-Point Source Study
- Additional Optional Bacteriological Studies
  - Human Health Risk Alternative Indictors
  - Disinfection and By-Products Study
  - Fate of the Pollutant Bacteria Study
  - Marina del Rey Seasonal Variation
- BMP Studies
- Reference System Study
- Epidemiological Study For Beaches Not Impacted By Sewage Contamination
- Marina del Rey Watershed Boundary
- Other

1.1 TMDL Development History


Marina del Rey Sunset

The 1972 Clean Water Act and subsequent amendments established requirements for achieving water quality of the Nation's rivers, lakes, and water bodies. Water pollution was becoming a growing concern due to discharges from sewage treatment plants and industrial sources. It was also recognized in 1987 that stormwater runoff was also contributing to the overall decline in water quality of some water bodies. The Clean Water Act contained provisions for Total Maximum Daily Loads (TMDLs) to be developed as a way to address water quality impairments. It also contained a mechanism to categorize and list which water bodies are impaired (Section 303 (d)) based on the designated beneficial uses. A TMDL specifies the maximum amount of a pollutant that a water body can receive without harming beneficial uses and exceed the associated water quality standards.

In the current 2002 303(d) List, Marina del Rey Harbor (MdRH) – back basins (Basins D, E, and F) and Marina Beach (also commonly known as Mothers' Beach), is listed as impaired due to bacteria, metals, and toxics.

Litigation and a resulting consent decree between the United States Environmental Protection Agency (USEPA) and environmental groups have caused a legal deadline to be established for the development of the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL. Other deadlines have also been established for the Marina del Rey Harbor Metals and Toxics TMDL, which is expected to be approved by the State within a year.

1.2 Marina del Rey Watershed Responsible Agencies

The County of Los Angeles, Cities of Los Angeles and Culver City, and California Department of Transportation (Caltrans) were named the responsible jurisdictions and responsible agencies of the Marina del Rey Watershed in this TMDL. Furthermore, the County of Los Angeles was named the primary jurisdiction among the responsible agencies. The County of Los Angeles Department of Public Works (Public Works), Department of Beaches and Harbors (LACDBH), and Department of Sheriff/Harbormaster primarily represent the County in the Marina del Rey Watershed. The Marina del Rey Watershed responsible agencies (MDRWRA) are jointly responsible for achieving the Bacteria TMDL regulation compliance for the MdRH.

Even though Caltrans' goal is to participate jointly with other responsible agencies in developing a watershed-wide approach for addressing bacteria as well as other listed pollutants, Caltrans reserves the right to proceed independently to address the TMDL goals depending on the specific costs and implementation measures identified during the implementation process.

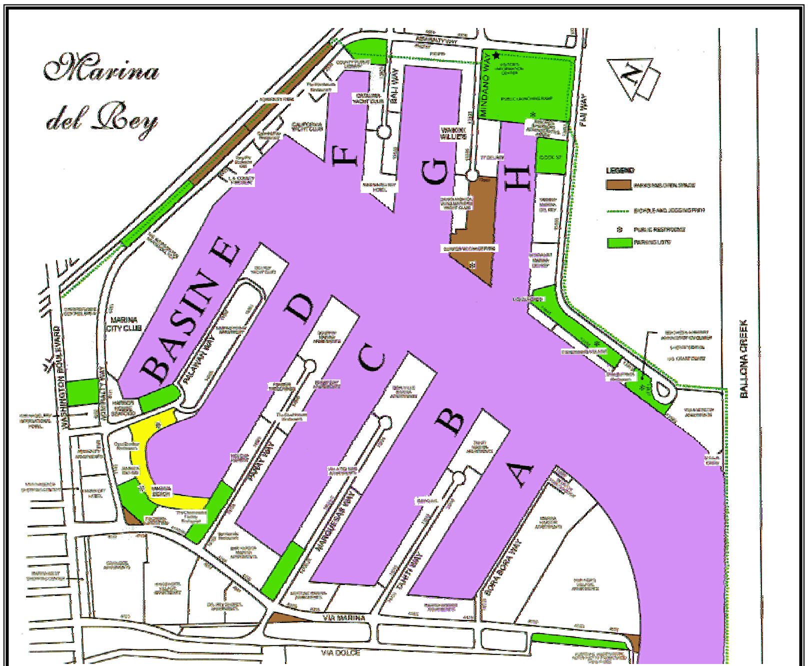
The MDRWRA first met in April 2004 with interested stakeholders such as the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB), Heal the Bay, Santa Monica BayKeeper, and representatives from the Marina del Rey Lessees Association. With the interested stakeholders, the MDRWRA has created this implementation plan to achieve the TMDL regulatory compliance.

1.3 Implementation Plan Objectives

The purpose of this implementation plan is to describe implementation methods and mechanisms to achieve the TMDL regulatory compliance. The implementation strategies include three Control Programs (Public Information and Participation Program, Institutional Control Program, and Structural Best Management Practices Program) the MDRWRA will use to comply with the Bacteria TMDL. The implementation plan addresses both dry-and wet-weather compliance.

The MDRWRA is required to achieve dry-weather compliance by March 18, 2007 and wet-weather compliance no later than March 18, 2022, depending on the implementation strategy employed. In this implementation plan, the MDRWRA proposed to use a multi-purpose or an Integrated Water Resources (IWR) approach in the implementation, and the TMDL allows up to 18 years for compliance if such approach is used.

2.1 TMDL Summary



Marina del Rey Basins: Largest artificial small-craft harbor

On March 18, 2004, the USEPA promulgated the TMDL for bacteria at Marina del Rey Harbor - Marina Beach and back basins (Basins D, E, and F). The TMDL requires the MDRWRA to submit a draft implementation plan to the LARWQCB by March 30, 2005, for review and a revised final implementation plan for approval by July 30, 2005.

The California Water Quality Control Plan, Los Angeles Region (Basin Plan) sets beneficial uses and water quality standards for water bodies in the region. Marina Beach and the back basins (Basins D, E, and F) were given a REC-1 beneficial use, which is defined as recreational water activities (swimming, wading, water-skiing, skin and scuba diving) involving body contact where ingestion of water is reasonably possible. Total coliform, fecal coliform, fecal-to-total coliform ratio, enterococcus are used in the Basin Plan as bacteria indicators of the likely presence of disease-causing pathogens in marine waters. The goal of this TMDL is to reduce these bacteria indicator levels at Marina Beach and the back basins.

Section Four of the TMDL Staff Report, "Assessing Sources", identifies the following possible sources of bacteria:

- ✓ Sanitary sewer leaks and spills
- ✓ Illicit connections of sanitary lines to the storm drain system
- ✓ Runoff from homeless encampments
- ✓ Pet waste
- ✓ Illegal discharges from recreational vehicle holding tanks
- ✓ Direct illegal discharges from boats
- ✓ Illicit discharges from private drains such as restaurants
- ✓ Swimmer "wash-off"
- ✓ Fecal matter from animals and birds
- ✓ Vegetation and food waste

Also in the TMDL Staff Report, the LARWQCB suggested three potential implementation strategies:

- ❖ Low flow diversions and other end-of-pipe structural controls
- ❖ Circulation improvement
- ❖ Non-structural or institutional controls

The USEPA has oversight authority and is required to review and approve each TMDL developed. This TMDL does not currently have an enforcement mechanism. The TMDL becomes legally enforceable when the LARWQCB incorporates it into the Los Angeles County Municipal Storm Water National Pollution Discharge Elimination System (NPDES) Permit and the Caltrans Statewide Storm Water NPDES Permit.

2.1.1 Compliance Targets and Allocations

The TMDL's Waste-Load-Allocations (WLAs) are expressed as allowable exceedance days which are the maximum number of days where sampling results at a particular compliance monitoring site can surpass the established Assembly Bill 411 health standards without violating the TMDL. The allowable exceedance days concept grew out of research, using a local reference system located near the Los Angeles and Ventura County border (Arroyo Sequit Canyon). The Reference System concept is that even a natural watershed with minimal human impact will contribute a certain base-level of bacterial loading to the receiving water body. This approach accounts for bacterial indicator contributions from non-anthropogenic sources.

The TMDL's allowable exceedance days are not straightforward; in fact, they can vary greatly depending on sampling location, sampling frequency, and time of year. Consequently, the allowable exceedance days and where they are measured will not be known until a compliance monitoring program (submitted to the LARWQCB on July 16, 2004) is approved by the LARWQCB. Nevertheless, the MDRWRA do know that both the summer and winter dry-weather WLAs must be met by March 18, 2007, whatever these allocations may be. This deadline may be extended by no more than one year if the sewer system is found to be under-capacity precluding urban runoff from being diverted to the Hyperion Treatment Plant owned and operated by City of Los Angeles. Depending on the implementation strategy employed, the MDRWRA must achieve compliance with the wet-weather WLAs within 10 or 18 years depending on whether a single-purpose engineering approach or a multi-purpose IWR approach is employed.

The TMDL’s Numeric Targets are same as the AB411 health standards:

<u>*1. 30-Day Geometric Mean Limits*</u>

d. Total coliform density shall not exceed 1,000 /100ml.
e. Fecal coliform density shall not exceed 200/100ml.
f. Enterococcus density shall not exceed 35/100ml.

<u>*2. Single Sample Limits*</u>

c. Total coliform density shall not exceed 10,000/ 100ml.
d. Fecal coliform density shall not exceed 400/100ml.
e. *Enterococcus density shall not exceed 104/100ml.*

2.1.2 Compliance Monitoring

The TMDL requires the MDRWRA to create and submit a Coordinated Compliance Monitoring Plan (CMP) for LARWQCB review and approval within 120 days of the TMDL's effective date. Over a six-month period in 2004, the MDRWRA jointly drafted the CMP. Representatives from Heal the Bay and Santa Monica BayKeeper also provided valuable input. The CMP was submitted to the LARWQCB on July 15, 2004, and has not been approved as of late October, 2005.

The CMP proposes weekly sampling at eight locations at Marina Beach and the back basins to measure compliance with the TMDL's WLAs. Consistent with the TMDL's requirement, two samples, one at the surface and the other at depth, will be collected at some sites. Accelerated monitoring is required at a compliance monitoring sites should at least one of the bacterial indicators be exceeded.

In addition to the compliance monitoring sites, the CMP also proposes five ambient water quality monitoring sites in the non-303(d) listed Marina del Rey Harbor Basins. The ambient monitoring sites provide a regular snapshot of the water quality with respect to bacterial indicators at these non-listed water bodies. The ambient samples are collected at the center of each basin to best characterize the general water quality. Monthly sampling at the ambient monitoring sites is proposed until the TMDL's reopener, which is scheduled for March 18, 2008.

2.1.3 Compliance Schedule

The TMDL's Numeric Targets must be met by:

- March 18, 2007, for dry-weather compliance
- From March 18, 2014, to March 18, 2022, for wet-weather compliance

The following is a summary of deadlines for the action items in the TMDL based on the effective date of March 18, 2004:

Date	Action	Status
July 16, 2004	Compliance Monitoring Plan	Submitted on July 15, 2004 and awaiting approval
July 16, 2004	Small Drain Study	Submitted on July 16, 2004
July 16, 2004	Beaches and Harbors Discharge Report	Submitted on July 16, 2004
Draft-March 30, 2005 Final-July 30/October 31, 2005	Implementation Plan	Submitted draft on March 30, 2005
March 18, 2007	Non-point Source Study	Will be submitted on March 18, 2007

2.2 Marina del Rey Watershed

2.2.1 Watershed Description

Marina del Rey

The Marina del Rey Watershed is comprised of five subwatersheds (see Figure 2.1 for watershed boundary), but only subwatersheds 1A, 3 and 4 are tributary directly to the impaired back basins (Basins D, E, and F). The Control Programs proposed in this implementation plan are focus in these three priority subwatersheds.

The Marina del Rey Watershed can be characterized by three main parts:

- ✓ The Harbor water area, including the docks, back basins, Marina Beach, and Oxford Retention Basin (Oxford Basin).
- ✓ The land adjacent to the Harbor back basins is the Los Angeles County unincorporated area, which includes individual parcels, streets, and other facilities.
- ✓ The land outside the Los Angeles County unincorporated area draining into the Harbor waters, including the Cities of Los Angeles and Culver City, and Caltrans right of ways.

Marina del Rey Harbor is open to the Santa Monica Bay through the Main Channel and it shares a common breakwater with Ballona Creek. The Harbor consists of the Main Channel and eight back basins (A-H). Marina Beach is located in the west end of Basin D.

Oxford Basin is situated at the north end of Marina del Rey Harbor and drains to Basin E through two slide gates and a culvert system. Oxford Basin serves as a retention basin for the surrounding watershed and the slide gates control tidal influence on its water level. County of Los Angeles Flood Control District (LACFCD) storm drain Project No. 5243[1] drains into the northeast corner of Oxford Basin and Project No. 3872 drains into the east side of Oxford Basin via Oxford Pump Plant. Project No. 3874 drains into Basin E via the Boone-Olive Pump Plant.

[1] This follows the County of Los Angeles Flood Control District's naming convention for storm drain facilities

The Small Drain Study[1] identified over 720 other smaller drainage systems draining into the Harbor. Most of these systems serve the individual parcels and mole roads between basins. The remaining drains serves the Marina del Rey's streets surrounding the basins.

2.2.2 Land Use

The Marina del Rey Watershed was developed in two general stages. The area surrounding the Harbor was developed from the late 1800's into the early 1900's and Marina del Rey was constructed in the early 1960s from the remnants of the Ballona Creek Wetlands and Estuary. Marina del Rey was subsequently developed with a variety of different uses and facilities including housing, restaurants, commercial/retail, office, and marine/boating.

Oxford Retention Basin

The Marina del Rey Watershed is approximately 1,855 acres (2.9 square miles) in size and lies within the City of Los Angeles (53%), County unincorporated (44%), City of Culver City (2%), and Caltrans (1%). (See Figure 2.1 for jurisdictional boundary.) The predominant land uses are residential (46.6%), commercial/office (12.2%), receiving waters of MdRH (11.6%), marina facilities (9.2%), open space/recreational (4.8%), light industrial/vacant (4.7%), and educational/transportation/other (10.9%). (See Figure 2.2 for the watershed Land Use.)

[1] Marina del Rey Small Drain Study, 2004, Los Angeles County, Department of Public Works, Watershed Management Division

Figure 2.1
Marina del Rey Watershed

DEPARTMENT OF PUBLIC WORKS

RITA L. ROBINSON DIRECTOR					SHAHRAM KHARAGHANI PROGRAM MANAGER
FILE-LOC	DRAWN BY:	CHECKED BY:	DATE	DATE REVISED	This map shall not be copied or reproduced, all or any part thereof, whether for distribution or resale, without the proper written permission of the Dept. of Public Works, City of Los Angeles
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DEPARTMENT OF PUBLIC WORKS

WATERSHED PROTECTION
CITY OF LOS ANGELES
BUREAU OF SANITATION

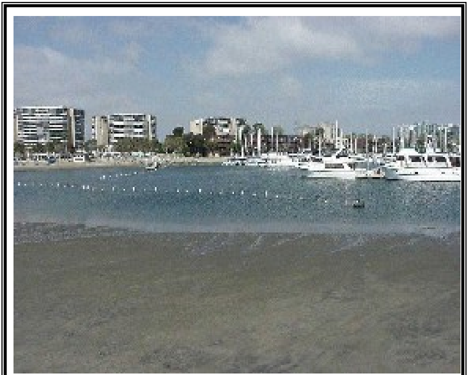
Figure 2.2
Marina del Rey Watershed Landuse

DEPARTMENT OF PUBLIC WORKS

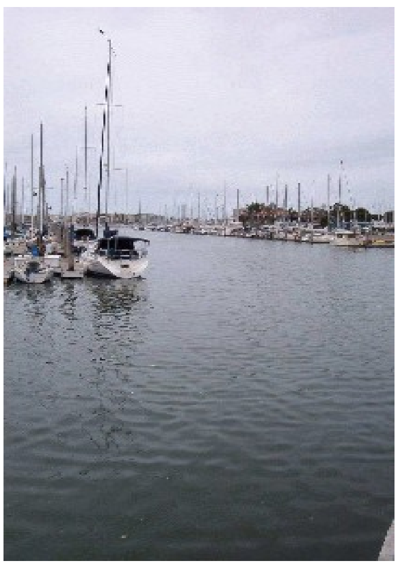
DEPARTMENT OF PUBLIC WORKS	RITA L. ROBINSON DIRECTOR				SHAHRAM KHARAGHANI PROGRAM MANAGER		WATERSHED PROTECTION CITY OF LOS ANGELES BUREAU OF SANITATION
	FILE-LOC MS	DRAWN BY: MS	CHECKED BY: WT	DATE XX/XX/04	DATE REVISED X	This map shall not be copied or reproduced, all or any part thereof, whether for distribution or resale, without the proper written permission of the Dept. of Public Works, City of Los Angeles. Thomas Bros Data reproduces with permission granted by THOMAS BROS MAP.	

2.2.3 Water Quality Issues

Marina del Rey has both similar and unique water quality problems compared to the rest of the Santa Monica Bay. Tidal influences, Main Channel configuration, back basin location and configuration, and discharge points all affect the Harbor's water quality. Basins D, E, and F generally have the poorest circulation and tidal flushing. Poor water circulation is thought to influence water quality, particularly at Marina Beach.



Basin D



Basin F

Urban runoff enters the Marina del Rey Harbor water from the surrounding storm drains and culverts, Oxford Basin, streets, parks, open space, and individual parcels adjoining the back basins. The Harbor water itself has many potential sources of pollution from human activities and uses and from natural sources. Recreational activities, such as boating, fishing, wading, etc., can be significant sources of bacterial indicators and other pollution. Natural sources include fish, birds, mammals, marine life, and geomorphology.

Marina Beach is heavily used by families and children during the summer months. The beach had been closed on numerous occasions due to high bacterial indicator densities. It is currently believed that poor tidal circulation and nearby parcel runoff may be causing these high levels.

Basin E has several bacterial indicator issues depending on the season. Oxford Basin exchanges low flow urban runoff, stormwater, and tidal exchange through a culvert near the back of Basin E. The Boone-Olive Pump Plant discharges both low flow urban runoff and stormwater in the back of Basin E as well. Poor tidal circulation is also believed to play a role in elevated bacterial indicator densities.

Basin E

Basin F has similar poor tidal circulation issues and receives some urban runoff from adjoining land areas.

3.1 Iterative Adaptive Approach


Marina del Rey Sunset

The key feature of this implementation plan is establishing a process that has the flexibility to provide multiple benefits, address multiple pollutants, and have a methodology/process to adapt itself as the plan is implemented and effectiveness is evaluated. This process follows the IWR approach by using an iterative adaptive approach. This process will also establish a cost tracking system so that a cost/effectiveness/efficiency analysis can be performed for each selected implementation action. Cost/effectiveness/efficiency analysis results can be evaluated to select implementation actions with the "most bang for the buck" in subsequent iterations.

This iterative adaptive approach is characterized by several principal features:

- ✓ Baseline - Establish current conditions with existing data or new monitoring.
- ✓ Proposed possible action items - Establish performance criteria and expected results.
- ✓ Implement action - Continue current practices and perform proposed actions.
- ✓ Evaluate performance - Use compliance or source identification monitoring, BMP monitoring, etc., to evaluate progress in meeting compliance goals .
- ✓ Adapt action - If successful, do more, if not, correct action, or abandon action.
- ✓ Iterate Process - Repeat until desired results are obtained.

The dry-and wet-weather TMDL implementation will use the iterative adaptive approach. The dry-weather implementation will be carried out in one phase and the wet-weather implementation will be carried out in four phases.

- ❖ Proposed Dry-Weather TMDL Implementation Schedule
  - ❑ Low-Flow Storm Drain Diversion Program, 2004 - March 18, 2007
  - ❑ Marina Beach Water Quality Improvement Project (Increase Basin D Circulation), 2003 - December 2005
  - ❑ Marina Source Identification and Control Program, 2005 – March 18, 2007

- Proposed Wet-Weather TMDL Implementation Schedule
  - Institutional Control Program, Public Information and Participation Program, Marina Beach Water Quality Improvement Project (Sheet Flow Diversion), and Sub-Regional Structural BMP Program
    - Phase I: FY 2005 -06 – FY 2006-07
    - Phase II: FY 2007-08 – FY 2011-12
    - Phase III: FY 2012-13 – FY 2016-17
    - Phase IV: FY 2017-18 – FY 2021-22
  - Regional Structural BMP Program (will initiate investigation in Phase I)

3.2 Effectiveness Monitoring Analysis and Results

Results from the routine CMP will show how the MDRWRA have been at reducing the exceedances to those allowed in the TMDL. Results from source tracking/monitoring and BMP effectiveness monitoring will also assist each responsible agency's implementation program manager (IPM) to implement projects that will address "hot-spots". The MDRWRA will work together to produce consistent monitoring methodologies and analysis, and share their results with each other to ensure effective compliance.

3.3 Cost Tracking and Analysis

As noted above, cost is a significant factor in the iterative adaptive process. Given that the MDRWRA's resources are limited, cost is expected to be the second factor in selecting and modifying implementation actions. Unexpected excessive costs due to low BMP efficiency or maintenance difficulties may require a change in the implementation approach. Each responsible agency is encouraged to track and record costs associated with implementation measures.

Cost accounting and reporting is critical in providing timely information to IPM's. Each responsible agency will need cost information for their yearly budgeting process, long-term capital improvement program, and to assess/revise revenues. Failure to provide accurate cost accounting causes unavoidable delays in budgeting process and the resultant mitigation of bacterial levels. It will also make the iterative and adaptive process difficult since one of the considerations is cost-effectiveness.

3.4 Consistent Reporting Procedures

The MDRWRA are encouraged to use consistent reporting procedures so that each responsible agency can use data/analysis of mutual interest.

3.5 Cost/Effectiveness/Efficiency Ratio Analysis

The cost/effectiveness/efficiency analysis is a valuable tool for each IPM to decide the next step in the iterative adaptive process. The IPM may use the cost/effectiveness/efficiency ratio to evaluate each selected implementation action and decide what the next action should be.

The most obvious example is that if two implementation actions result in equivalent effectiveness, the responsible agency should choose the least expensive one. Less clear, is when non equivalent results are obtained. In some cases, to keep implementation moving forward and improving water quality, responsible agencies may choose to implement actions that are easy and quick, even though it may be less effective.

3.6 Revising Control Programs

The iterative adaptive process is an on-going feature that allows this plan to be effective in the future. It is expected that the Control Programs listed in this plan will change over time. The flexibility built in to this plan is what is expected to make it effective. There will be logical points in time where the MDRWRA may ask the LARWQCB to re-evaluate the phases and Control Programs and provide feedback on how the MDRWRA should proceed.

A Water Fountain in Chace Park

4.1 General Compliance Approach

The MDRWRA considered three different compliance approaches, chose the best features from each, incorporated the iterative adaptive process, and developed the Hybrid approach. This approach is based on the compliance approach developed by the Santa Monica Bay Beaches Bacteria TMDL Jurisdictional Groups 2 and 3[1]. The following three approaches were considered:

Marina Beach

- ✓ Low Cost
- ✓ Low Risk
- ✓ Maximum Beneficial Reuse

The Low Cost approach considers actions and philosophies designed to minimize costs, and generally these are institutional controls. This approach assumes a higher level of non-compliance risk. Control Programs are structured in phases in an iterative adaptive approach, where they are evaluated for effectiveness and modified/adapted accordingly. Sub-regional control associated with this approach generally may not stress beneficial reuse unless it is the low cost option at that site. Since only a few programs are implemented at a time, the costs are lower.

The Low Risk approach considers implementing the Control Programs designed to ensure compliance with less emphasis on costs and beneficial reuse. This approach treats the most runoff volume and incorporates the institutional controls of the Low Cost approach, but substitutes regional control for the sub-regional control. Regional control consists of large-scale and costly water quality treatment plants. Oxford Basin was identified as a potential location for a regional control opportunity, if needed.

The Maximum Beneficial Reuse approach considers managing as much runoff as possible and reusing it. This approach uses the same Control Programs as the Low Risk approach, but includes additional features to beneficially reuse the treated runoff. Treated water from the Oxford Basin could be reused to irrigate the landscaping in street medians, parks, and other public and private properties vegetation. A new dedicated distribution system would be required. The cost of this approach is expected to be considerably higher than the Low Risk approach due to the additional infrastructure required to reuse the treated runoff.

[1]Santa Monica Bay Beaches Bacteria Total Maximum Daily Loads Draft Implementation Plan, Jurisdiction 2 and 3, Section 3.7, March 2005

4.1.1 The Hybrid Approach

Each of the three approaches has its advantages and disadvantages. The MDRWRA evaluated each of these options, discussed the process used by the Santa Monica Bay Beaches Jurisdictional Group 2 and 3, and decided to pursue the Hybrid approach. The Hybrid approach uses the iterative adaptive process and features the following Control Programs:

- ✓ Public Information and Participation Program
- ✓ Institutional Control Program
- ✓ Structural BMPs Program

This approach combines the best features of the three and results in a better, more balanced plan because:

- ❖ Cost - The Hybrid approach acknowledges cost as a significant consideration by building in a cost/benefit/effectiveness analysis as part of the iterative adaptive approach, which allows the MDRWRA flexibility in choosing measures with varying levels of risk and cost.
- ❖ Low Risk - The Hybrid approach acknowledges risk as a significant consideration by using a multiple Control Programs to lower risk. Each of these programs accomplishes implementation through different mechanisms and provides concurrent benefits.
- ❖ Maximum Beneficial Reuse - The Hybrid approach acknowledges Maximum Beneficial Reuse as a significant consideration by incorporating reuse in sub-regional controls.

As discussed in Section 3, these three Control Programs will be implemented in four phases. The proposed actions in the three Control Programs will address multiple pollutants. The Structural BMPs Program includes the Low-Flow Storm Drain Diversion Program, the Marina Beach Water Quality Improvement Project, the Marina Source Identification and Control Program, the Sub-Regional Structural Program, and the Regional Control Program.

4.2 Public Information and Participation Program

Under the 2001 Los Angeles County Municipal Stormwater NPDES Permit, the County is required to implement a comprehensive Public Information and Participation Program (PIPP) on behalf of its 84 co-permittee cities to increase the knowledge of stormwater pollution and urban runoff among targeted groups of Los Angeles County residents and to measurably change their polluting behaviors. The Municipal Stormwater NPDES Permit also requires the County to develop and implement outreach to ethnic communities and businesses through culturally effective methods.

The multifaceted PIPP strategy developed by the County is the result of comprehensive social marketing research and input from the County's NPDES Advisory Public Education Committee which includes municipal, environmental and non-governmental organization (NGO) stakeholders. Marina residents, recreational users and others are all exposed to the County's countywide general market campaign and/or Spanish language campaign through various forms of outreach. These efforts and related public education enhancements are outlined within the following sections. The MDRWRA recommend that all TMDL efforts be coordinated with the existing PIPP in terms of graphics, messages, and the Pollution Prevention Partner (PPP) logo. Further, the MDRWRA recommend that specific materials and strategies developed for the Marina del Rey Harbor Bacteria TMDL be implemented in a consistent manner by all jurisdictions.

Caltrans is responsible for stormwater pollution controls along the State Highways in the Marina del Rey Watershed, including Lincoln Boulevard (LA-1) and Venice Boulevard (LA-187). As part of its storm water management activities, Caltrans uses a variety of methods to educate the public about the importance of managing storm water. The general approach of Caltrans' Public Education Program is to:

- ✓ Inform the public regarding the storm water quality issues that pertain to Caltrans properties, facilities and activities; and
- ✓ Encourage public behavior changes regarding the release of potential pollutants (e.g., litter, spilled loads and oil leaks).

Caltrans' storm water outreach program consists of a variety of written materials, monthly and quarterly bulletins, a website, workshops, storm drain stenciling, anti-litter signs, a statewide Adopt-a-Highway Program, along with many local municipality partnerships. "Pathogens in Storm Drain Discharges Brochure" is an example of written materials that is most directly related to bacteria.

The Marina del Rey Watershed is in the jurisdiction of District 7 of Caltrans. In District 7, "No Dumping" and "Litter Fee" signs were installed at selected locations on highways and freeways. Warnings were stenciled at the drain inlets to prohibit discharges into drainage systems in the park-and-ride lots, rest areas, vista points, and other areas with pedestrian traffic."

4.2.1 Inter-Agency Coordination

Protecting water quality and preserving the image of the Marina as an attractive residential, tourist and recreational destination is of vital economic interest to local municipal and regulatory agencies; environmental NGOs; trade, industrial and homeowner associations; and sport and lifestyle clubs and organizations. Partnerships and increased coordination with these stakeholders would greatly increase the efficacy of the County's stormwater public information and participation campaign, allowing stakeholders to build upon existing efforts and combine resources for cost-effective outreach.

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Coordinate among the responsible agencies in outreach through Marina parks, special events (i.e. summer concert series), youth and beach programs, permitting offices, and various other points-of-service (e.g. the senior parking pass program).

- Coordinate with the California Coastal Commission on messages and integrate related public outreach and social marketing materials—also known as social marketing collateral—for its DockWalkers program and with the Santa Monica Bay Restoration Commission for its direct outreach efforts.

- Collaborate among the responsible agencies to develop bilingual stormwater point-of-service collateral for dissemination at bait and tackle shops and fishing license counters.

Admiralty Park

- Coordinate between the MDRWRA and the Marina stakeholders to communicate with their audiences through newsletters and other media and at service desks, points-of-purchase, etc.

- Consider recruiting lifeguards as stormwater spokespersons.

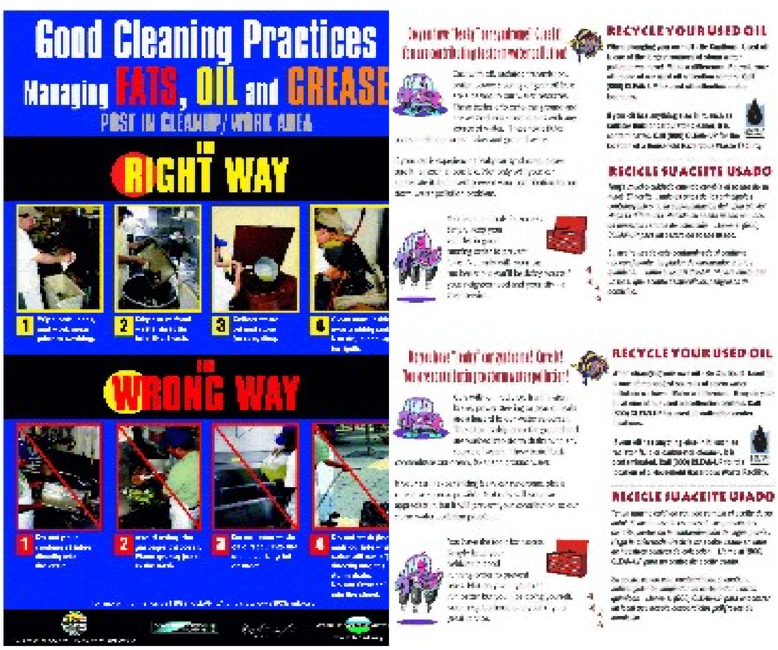
- Coordinate with the Westchester/LAX/Marina del Rey Chamber of Commerce, Marina del Rey Convention and Visitors Bureau, and California Restaurant

Association (CRA) to develop a business-led stormwater voluntary compliance pilot project targeting the hosing down of parking lots and driveways.

4.2.2 Industry-Specific BMP Outreach

The LARWQCB cites dry weather urban runoff and stormwater conveyed by storm drains as the primary sources of high bacteria levels in Marina del Rey's back basin area. Within that finding, food service establishments are identified as among the primary non-point source polluters.

In June 2004, the County offered a comprehensive, industry-specific training program targeting employees who work in the food service industry within the unincorporated areas of the County. The program consisted of a partnership with the California Restaurant Association to conduct outreach to its membership, interactive workshops and ongoing reinforcement of Best Management Practices. Key elements of this training module include a PowerPoint presentation, hands-on exercises, role-playing, and other activities that impart key stormwater education messages and industry BMPs.



BMP Posters

The program's ongoing reinforcement component, known as the Pollution Prevention Partners Program, entails a workshop follow-up package that is mailed to all attendees, an order form for additional BMP items and the incentive program package. The order form features photos of the workshop items, including BMP posters, tip cards and other program collateral. The incentive program includes pledge forms that managers and employees are asked to sign to reinforce their commitment to implementing a pollution prevention plan and becoming a "Pollution Prevention Partner." The pledge form is an instrumental tool for instilling a sense of responsibility within individual employees and in reinforcing their commitment to non-polluting behaviors. Managers receive a Pollution Prevention Partner window decal to be prominently displayed in their establishment. Prior to launching the incentive program, calls are placed to each of the workshop attendees to assess the number of current employees at each business. This information is used to set pledge form goals for each establishment (every establishment is required to return pledge forms from at least 75% of their employees to be eligible for program premiums, which will be identified later).

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Coordinate with the Marina del Rey Lessee Association, Westchester/LAX/Marina del Rey Chamber of Commerce, Marina del Rey Convention and Visitors Bureau, and CRA to develop and promote on-site restaurant BMP workshops. Partners to collaborate on program premiums for workers and managers who complete BMP training or participate in the BMP sustainability program.

- Customize, if necessary, the BMP training module based on mitigating food service industry behaviors that contribute to high bacteria levels in the Marina del Rey Harbor.

- Partner with the Westchester/LAX/Marina del Rey Chamber of Commerce, CRA, Marina del Rey Convention and Visitors Bureau and local media outlets to publicly recognize restaurants that participate in Pollution Prevention Partners program.

- Highlight economic benefits of stormwater pollution prevention and TMDL compliance in business outreach.

- Consider increasing access to industry-specific BMP materials and technical support by posting resources to their respective Web sites as appropriate.

- Conduct pre- and post-training inspections to gauge program effectiveness.

- Partner with homeowner associations and the Westchester/LAX/Marina del Rey Chamber of Commerce to target service industries that may contribute to non-point stormwater pollution (i.e. pool and carpet cleaners, maid services).

4.2.3 Advertising

Paid advertising is a key component of the PIPP in reaching Los Angeles County's vast and diverse populations. Complementing the earned media exposure garnered through the County's Stormwater/Urban Runoff Pilot Programs, the *Can It!* and Spanish-language counterpart, *¡MantenLA Limpia!,* paid advertising campaign results in absolute control over placement and message content to ensure that target audiences receive the most direct and effective behavior-changing messages with maximum exposure.

In addition, the City of Los Angeles works with local radio and television stations to advertise and make the public aware that they can help reduce pollution by disposing of trash in receptacles and that the storm drains do lead to the ocean. Additional outreach material is also made available to reach the public by working with the local advertising agencies to get free space to post educational material at bus stops and billboards.

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Identify media outlets that reach targeted populations within Marina del Rey Watershed.
- Develop a targeted media campaign.
- Consider exploring media partnerships, cross-promotions and nontraditional media tools (i.e. trash can wraps through Beaches and Harbors, out-of-home advertising on Marina del Rey Coast link Water Shuttle).

4.2.4 Media Relations

Media relations is a key tactic in the implementation of the PIPP. Working with media outlets to communicate relevant, newsworthy pollution prevention messages allows the County to maximize its outreach through a cost-effective and credible source. Elements of the County's media relations plan include media kits, Video News Releases (VNRs), a database of current media contacts, B-roll footage of pollution-causing and -prevention behaviors, spokesperson training, trash net tours, and media events.

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Identify additional media mix for outreach, such as newsletters, bulletins and local access cable.
- Provide media covering the Marina and nearby areas with relevant stories and campaign resources that accurately depict campaign messages.

4.2.5 Pollutant-Specific Outreach


Used Oil Recycling Center in the Marina

Pet waste is a well-recognized cause of indicator bacteria. In addition to media messages that specifically address proper pet waste disposal, the County provides tip cards and pet waste bags to co-permittees and to the general public through a variety of special events. Other non-polluting behaviors reinforced by County public outreach efforts include proper disposal of cigarette butts, used motor oil recycling, SmartGardening, and the proper disposal of Household Hazardous Waste and E-waste.

Marina del Rey has a self-service tank operated by the County for the disposal of uncontaminated used oil. The City of Los Angeles operates a permanent Household Hazardous Waste and E-Waste collection center at the Hyperion Treatment Plant in Playa del Rey that is accessible to Marina residents.

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Partner with Permittee's Stormwater Program to expand existing pet waste outreach to pet owners, pet caretakers (dog walkers, pet sitters, etc.) and pet service and supply operations that service the Marina.
- Update campaign materials to target Marina-specific TMDLs.
- Partner with the Marina del Rey stakeholders and businesses for placement of campaign materials at locations that relate to TMDLs (restaurants, boating supply facilities and boat-owners associations, etc.)
- Enhance outreach efforts related to used oil recycling by partnering with other agencies and organizations (e.g. LACDBH, yacht clubs, the


A Household Hazardous Waste Event

Westchester/LAX/Marina Chamber of Commerce, organizers of the annual boat show) recommended.

- Promote Countywide programs for smart gardening, Household Hazardous Waste and E-waste, and recycling efforts.

4.2.6 School Outreach

The County's environmental education programs reach approximately 375,000 students attending public and private elementary and secondary schools within the County each year. Programs include assembly presentations, service-learning projects, teacher development workshops, technical assistance, and competitions.

School Outreach

Additionally, the City of Los Angeles' Stormwater Public Education Program has determined that the most effective method to outreach to elementary school-aged youth is while they are at school. Consequently, the City designed a four-pronged solution:

1. Inform students directly with an easy to understand stormwater message.
2. Involve people who influence children in disseminating the message.
3. Reinforce and expand the stormwater message with youths on different occasions.
4. Engage students in actively accomplishing the goals of the stormwater message within the community.

Since the program's inception in 1994, well over half a million Los Angeles Unified School District (LAUSD) students have participated in an assembly program sponsored by the Stormwater Program.

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Make targeted phone calls to all public and private K-12 schools within the Marina del Rey Watershed to notify them of the availability of environmental education programs offered by the County of Los Angeles and City of Los Angeles, emphasizing to school administrators that these programs comply with State curriculum standards and provide opportunities to fulfill service-learning requirements.

4.2.7 Adopt-A-Highway Program

The Adopt-A-Highway program, which began in 1989, is one of the state's most prevalent examples of a successful government-volunteer partnership. Since 1989 more than 120,000 Californians have kept over 15,000 shoulder-miles of roadside clean. Participation can include removing litter, planting and establishing trees, or wildflowers, removing graffiti, controlling vegetation.

Adoptions usually span a two-mile stretch of roadside and permits are issued for five-year periods. Individuals, organizations, businesses, and city, county, state, and federal agencies can adopt sections of State highway roadside. Participants may perform the work themselves or hire a service contractor to perform the work on their behalf.

Action Items (Refer to Table 4.1 for each agency's responsibilities of each action item)

- Partner with the Westchester/LAX/Marina Chamber of Commerce and Convention and Visitors Bureau to encourage adoption of highways within the Marina del Rey Watershed.

Table 4.1 Agency Commitment and Implementation Schedule for the Public Information and Participation Program

Section Number	Study Category	Action Items	Implementation Schedule [1]	County of Los Angeles			City of Los Angeles			City of Culver City			Caltrans		
				Initiate[2]	Pilot/ Test[3]	Evaluate[4]	Initiate	Pilot/ Test	Evaluate	Initiate	Pilot/ Test	Evaluate	Initiate	Pilot/ Test	Evaluate
4.2.1	Inter-Agency Coordination	Coordinate among the responsible agencies in outreach through Marina parks, special events (i.e. summer concert series), youth and beach programs, permitting offices, and various other points-of-service (i.e. the senior parking pass program).	Phase II	X			X			X					
		Coordinate with the California Coastal Commission on messages and integrate related public outreach and social marketing materials—also known as social marketing collateral—for its DockWalkers program and with the Santa Monica Bay Restoration Commission for its direct outreach efforts.	Phase II		X			X			X				
		Collaborate among the responsible agencies to develop bilingual stormwater point-of-service collateral for dissemination at bait and tackle shops and fishing license counters.	Phase II	X			X			X					
		Coordinate between the MDRWRA and the Marina stakeholders to communicate with their audiences through newsletters and other media and at service desks, points-of-purchase, etc.	Phase II	X			X			X					
		Consider recruiting lifeguards as stormwater spokespersons.	Phase II			X									
		Coordinate with the Westchester/LAX/Marina del Rey Chamber of Commerce, Marina del Rey Convention and Visitors Bureau, and California Restaurant Association (CRA) to develop a business-led stormwater voluntary compliance pilot project targeting the hosing down of parking lots and driveways.	Phase II			X			X			X			
4.2.2	Industry-Specific BMP Outreach	Coordinate with the Marina del Rey Lessee Association, Westchester/LAX/Marina del Rey Chamber of Commerce, Marina del Rey Convention and Visitors Bureau, and CRA to develop and promote on-site restaurant BMP workshops. Partners to collaborate on program premiums for workers and managers who complete BMP training or participate in the BMP sustainability program.	Phase II		X			X				X			
		Customize, if necessary, the BMP training module based on mitigating food service industry behaviors that contribute to high bacteria levels in the Marina del Rey Harbor.	Phase II		X			X				X			
		Partner with the Westchester/LAX/Marina del Rey Chamber of Commerce, CRA, Marina del Rey Convention and Visitors Bureau and local media outlets to publicly recognize restaurants that participate in Pollution Prevention Partners program.	Phase II		X			X				X			
		Highlight economic benefits of stormwater pollution prevention and TMDL compliance in business outreach.	Phase II			X			X			X			
		Consider increasing access to industry-specific BMP materials and technical support by posting resources to their respective Web sites as appropriate.	Phase II			X			X			X			
		Conduct pre- and post-training inspections to gauge program effectiveness.	Phase II		X			X				X			
		Partner with homeowner associations and the Westchester/LAX/Marina del Rey Chamber of Commerce to target service industries that may contribute to non-point stormwater pollution (i.e. pool and carpet cleaners, maid services).	Phase II			X			X			X			
4.2.3	Advertising	Identify media outlets that reach targeted populations within Marina del Rey Watershed.	Phase I	X			X			X					
		Develop a targeted media campaign.	Phase I	X			X			X					
		Consider exploring media partnerships, cross-promotions and nontraditional media tools (i.e. trash can wraps through Beaches and Harbors, out-of-home advertising on Marina del Rey Coastlink Water Shuttle).	Phase I			X			X			X			
4.2.4	Media Relations	Identify additional media mix for outreach, such as newsletters, bulletins and local access cable.	Phase I	X			X			X					
		Provide media covering the Marina and nearby areas with relevant stories and campaign resources that accurately depict campaign messages.	Phase I			X			X			X			
4.2.5	Pollutant-Specific Outreach	Partner with Permittee's Stormwater Program to expand existing pet waste outreach to pet owners, pet caretakers (dog walkers, pet sitters, etc.) and pet service and supply operations that service the Marina.	Phase II	X			X			X					
		Update campaign materials to target Marina-specific TMDLs.	Phase I	X			X			X					
		Partner with the Marina del Rey stakeholders and businesses for placement of campaign materials at locations that relate to TMDLs (restaurants, boating supply facilities and boat-owners associations, etc.)	Phase I		X			X			X				
		Enhance outreach efforts related to used oil recycling by partnering with other agencies and organizations (e.g. LACDBH, yacht clubs, the Westchester/LAX/Marina Chamber of Commerce, organizers of the annual boat show) recommended.	Phase I		X			X			X				
		Promote Countywide programs for smart gardening, Household Hazardous Waste and E-waste, and recycling efforts.	Phase I	X			X			X					
4.2.6	School Outreach	Make targeted phone calls to all public and private K-12 schools within the Marina del Rey Watershed to notify them of the availability of environmental education programs offered by the County of Los Angeles and City of Los Angeles, emphasizing to school administrators that these programs comply with State curriculum standards and provide opportunities to fulfill service-learning requirements.	Phase I	X			X								
4.2.7	Adopt-A-Highway Program	Partner with the Westchester/LAX/Marina Chamber of Commerce and Convention and Visitors Bureau to encourage adoption of highways within the Marina del Rey Watershed.	Phase I												X

Notes:

1. Implementation schedule:
   Phase I - FY 2005-06 – FY 2006-07
   Phase II - FY 2007-08 – FY 2011-12
   Phase III - FY 2012-13 – FY 2016-17
   Phase IV - FY2017-18 - FY 2021-22
2. Initiate - The MDRWRA will immediately take action to initiate the program or project. While not all programs or projects will be ready at the beginning of implementation, the commitment to full implementation of the project or program exists and will be actively pursued.
3. Pilot/Test - The MDRWRA will take action to pilot the program or actions and evaluate the success. This pilot/test will last a finite amount of time at which an analysis will occur to determine if the program or project may remain or spread to the entire watershed.
4. Evaluate - The JG/agency will consider the viability of the program or project. No further action may be taken. The evaluation will include cost/benefit analysis, constructability reviews, program implementation assessment, etc. to determine if a project is ready to be piloted or implemented. A further project may or may not arise after the evaluation is complete.

Not applicable to the agency

4.3 Institutional Control Program

Institutional control measures are non-structural Best Management Practices designed to prevent or minimize pollutants of concern from entering urban runoff and stormwater and ending up in the Marina del Rey Harbor water.

These measures typically involve transforming/modifying behaviors or practices through regulations, programs, and public outreach. They are implemented by improving management of storm drain systems, sanitary systems, street maintenance activities, recreational and public facilities, public parking facilities, boating activities, industrial and commercial facilities, illicit connections and discharges, development planning activities, and so on. The public outreach component is discussed separately in Section 4.2.

This section discusses these systems, activities, and facilities within the Marina del Rey Watershed. Each of the following sub-sections concludes with proposed actions that the MDRWRA will consider implementing in an effort to meet the objectives of reducing bacteria indicator levels.

It should be noted that the proposed actions suggested in this section are specifically tailored for the Marina del Rey Watershed and may not be appropriate for other watersheds due to different characteristics, issues, pollutants of concern, and responsible agencies involvement.

4.3.1 Storm Drain System Management

The storm drain system is a potential source of pollutants contributing contaminants to the Marina del Rey Harbor water. Enhanced storm drain system maintenance and cleanout may reduce pollutant loading.

A parking lot drain that discharges directly to Basin D

Within the watershed, storm drain systems carry urban runoff and stormwater from the upper portion of the watershed into the back basins. These storm drains tributary to the back basins can be broken down into two primary systems:

- ✓ Major storm drains
- ✓ Parcel drains/Small drains

The Small Drain Study[1] conducted by Public Works looked at all the major storm drains and concluded that the Cities of Los Angeles and Culver City do not own any

[1] Marina del Rey Small Drain Study, 2004, Los Angeles County, Department of Public Works, Watershed Management Division

outlets that drain directly to the back basins. Furthermore, as of the submittal of this study, Caltrans does not appear to have drains that discharge directly into the Marina del Rey Harbor. The LACFCD owns 20 storm drain outlets that flow into the Marina del Rey Harbor and two storm drain inlets that flow into the Oxford Basin. Currently, there are four other storm drain outlets that flow to the Marina del Rey Harbor which are pending ownership identification. LACDBH owns approximately 700 parcel drains outlets that flow into the Marina del Rey Harbor, which are primarily from both the privately-leased and the publicly-operated parcel sites.

Table 4.2 below, lists the major storm drain outlets that discharge into the impaired back basins (Basins D, E, and F). There are approximately 264 catch basins associated with these systems.

Table 4.2 Storm Drain Outlets that Discharge to the Impaired Back Basins

Name of the Outlet	Point of Discharge
Outlet No. 7	Basin D
Outlet No. 10	Basin E
Outlet No. 11	Basin E
Outlet No. 12	Basin E
Outlet No. 13	Basin E
Outlet No. 28	Basin E
Outlet No. 16	Basin F
Outlet No. 29	Basin F

There are approximately 166 parcel drains within the perimeter promenade areas that outlet through the seawall and discharge into the back basins.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Identify high trash generating areas within the three priority subwatersheds (1A, 3, & 4). Retrofit all Priority catch basins to reduce or eliminate trash from entering storm drain system.

- Evaluate catch basin insert/screen retrofit implementation schedule, and develop adequate maintenance program and schedules for the retrofitted catch basins.

- Continue the existing emergency response practices regarding spills, accidents, and clean-up procedures.

- Assess the need for a maintenance and inspection program for lessee connections and discharges into the storm drain system.

4.3.2 Proper Pet Waste Disposal

Pet fecal matter laying on the ground and streets may contribute to elevated bacterial indicator densities when it washes into storm drains or straight to the Marina del Rey Harbor. It is believed the most common source of fecal matter is from dogs. Typically, dog owners walk their dogs along residential streets, in public parks, and sometimes in open areas at schools.

Within the watershed, there are four parks (Aubrey E. Austin Jr. Park, Fiji Park, Burton W. Chace Park and Admiralty Park) all owned and operated by LACDBH. Burton Chace Park is the only park that has a designated dog run. Dog owners utilize these parks and the surrounding residential neighborhoods to walk their pets.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Assess the existing pet waste programs within each agency's jurisdiction. Enhance measures (e.g. signs in public parks, provide doggie waste bags and receptacles), where needed.
- Analyze current "pooper-scooper" ordinances within the watershed. If deemed in need of modifications/revisions, assist in measures to possibly make amendments. Promote the "pooper-scooper" ordinance through various outreach venues to dog owners.
- Consider dog restriction at problematic areas and establish more doggie parks if deemed necessary and feasible.

People walking their dog in the Admiralty Park

4.3.3 Sanitary Sewer Management Program

Sewer system leakage or breakage can be a source of high bacteria discharge to the storm drain system and directly into the back basins. Sewage leaks can occur through the pipe joints and manholes. Untreated sewage contains high levels of fecal and enterococus coliform bacteria and viruses.

Within the watershed, the sewer system is owned and maintained by the Marina Sewer Maintenance District (MSMD) and the Cities of Culver City and Los Angeles. The MSMD's sewer lines serve the unincorporated areas that surround each of the back basins and Marina Beach. The flow in these sewer lines is either by gravity or by pumping to a nearby City of Los Angeles' sewer trunk line and then to Hyperion Treatment Plant. Culver City operates and maintains a few sewer lines for a small strip of the residential areas in the eastern portion of the upper watershed, and these sewer lines also pump to the nearby City of Los Angeles's sewer trunk lines. The City of Los

Angeles operates and maintains sewer lines for the residential areas in the northern and western portions of the watershed. In addition, the City of Los Angeles has completed a comprehensive assessment of the condition of all the secondary sewer lines and portions of the Venice areas are scheduled to be rehabilitated by the end of 2005.

To eliminate illegal connections and reduce the risk of future sewer spills during rainstorms, the City of Los Angeles conducted dye or smoke tests to verify whether or not there are any illegal connections from private properties connected to the City of Los Angeles' sewer system that should be connected to the City of Los Angeles' storm drain system. If storm drain connections to the City of Los Angeles' sewer system are found, private owners are notified to bring their property into proper compliance by disconnecting these drainage pipes and properly connecting them to the City of Los Angeles' storm drain system.

To assess the extent to which leaking sewage infrastructure may impact receiving water quality in the area of Marina Beach, the structural integrity of sewage lines in the area will be inspected by using a closed-circuit television (CCTV) camera in Task 2 of the Non-Point Source Study.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Study each agency's sewer maintenance history including their inspection and cleaning programs, emergency response procedures, and identify problem areas with leakages, overflows, or blockages. If necessary, the study would include recommendations to enhance the agency's sewer maintenance program to prevent future leakages, overflows, or blockages.

- Analyze the existing sewer system and determine if there is adequate capacity to serve the existing flows and the anticipated future flows.

- Evaluate the County's existing sewer lining programs and determine its effectiveness at eliminating infiltration and inflow. If necessary, make recommendations to reduce infiltration and inflow.

- Conduct a CCTV camera investigation to look for cracks, tree roots, sedimentation, and other evidence of integrity problems in sewer lines adjacent to Marina Beach. Where the CCTV investigation indicates problems further investigations may be conducted to determine the potential impact on the receiving waters at Marina Beach. (Task 2 of the Non-Point Source Study).

4.3.4 Illicit Connections/Illicit Discharges

Illicit connections and illicit discharges may impact stormwater quality through the release of industrial, commercial, residential, agricultural, sanitary, and other waste into the storm drain system which could increase bacteria indicator levels. The Municipal Stormwater NPDES Permit requires the identification and elimination of illicit connections and illicit discharges entering into the storm drain system. The Permit exempts certain discharges that do not constitute significant pollutants from the prohibition.

Illicit Connection

Under the 2001 Los Angeles County Municipal Stormwater NPDES Permit, the Permittees in the watershed collect illicit connection and illicit discharge information to identify and eliminate these discharges from entering into the storm drain system. This information also assists in properly permitting and/or eliminating these discharges. The Permittees submit their illicit connection and discharge information to the Principal Permittee, LACFCD. The Principal Permittee then uses this information to evaluate the patterns and trends to identify priority areas for elimination of illicit connection and illicit discharge.

Based on both the 2002-2003 and the 2003-2004 Los Angeles County Illicit Discharges and Illicit Connection Trends and Patterns Evaluation Reports, most of the illicit discharges and suspected illicit connections occurred in “High Density Single Family Residential” and “Retail/Commercial” land use categories. No incidents of illicit discharges and suspected illicit connections were reported in the Marina del Rey Watershed within a two-year period.

Action Items (Refer to Table 4.3 for each agency’s responsibilities of each action item)

- Research feasibility of developing an inter agency task force to ensure agency cooperation in the reduction and\or elimination of illegal and illicit connections and discharges.

4.3.5 Street Infrastructure Management

Street infrastructure provides the main path for pollutants entering the storm drain system. Trash, sediment, oil and grease, bacteria, metals, and organics are washed from the adjoining properties into the streets. The same pollution is deposited directly on the streets from vehicles and trash receptacle spills.

Streets are kept clean by street sweeping programs and placing trash receptacles at bus stops and along corridors where there is a high foot trafficed area. Trash cans encourage the public to dispose of their trash in a responsible manner.


Washington Boulevard

The watershed contains a wide variety of different street configurations. Typical types include major arterials, secondary streets, local/residential streets, alleys, and mole roads. The size, geometry, and configuration vary considerably. Major arterials and secondary streets may have decorative medians and street edges may have different treatment (curb and gutter, roll curb, none).

Streets are swept on a regular basis that varies by each responsible agency. There are different types of sweepers in service and the type of material picked up depends on the type of equipment used. Broom-type street sweepers generally pick up trash and small debris while the vacuum-type of street sweeper can also pick up sediment and fine particles.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Consider increasing street sweeping in high traffic area.
- Review the trash pick-up schedule with respect to the street sweeping schedule. Coordinate the street sweeping to occur within the "next day" of the trash pick-up services. Coordinate with Law Enforcement to enforce no parking during street sweeping days, if needed.
- Investigate maintenance routines for public alleys, within the watershed, for effectiveness and suggest enhancement, if needed.

4.3.6 Recreational and Other Public Facilities Management


Admiralty Park

Maintenance practices and operation activities at parks and recreational facilities and other public facilities have the potential to contribute pollutants to the storm drain system. Public facilities include certain public vehicle maintenance and/or material storage facilities/corporation yards.

The watershed has four parks (Burton W. Chace, Admiralty, Fiji, and Aubrey E. Austin, Jr. Parks) and Marina Beach owned and operated by LACDBH. The parks are heavily used by the public, especially on the weekends. These facilities have on-going maintenance and cleaning programs to keep them enjoyable for the public. The lawn and green areas require irrigation, fertilization, and routine care. Walkways and hardscape areas require cleaning and trash collection. At two of these facilities, there are catering areas and barbecue pits for public use. All of these activities may contribute bacterial indicators and other pollutants to the Marina.

Within the Marina, several public agencies have facilities including a shared LACDBH and Sheriff facility, a LACDBH maintenance yard, and a County of Los Angeles Fire Department building. These facilities have fleet vehicle and watercraft maintenance operations and various materials storage. These operations may also contribute bacterial indicators and other pollutants to the Marina del Rey Harbor waters.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Continue the current pollution prevention program.
- Evaluate the effectiveness and maintenance of the current bird deterrent devices present to reduce the presence of birds (decrease bird droppings) at parks, Mothers Beach, etc. In addition, evaluate the need for additional devices and consider a pilot study to install additional bird deterrent devices based on the evaluation.
- Evaluate placing signage and creating public informational brochures to discourage bird feeding in public areas.
- Evaluate different types of trash receptacles available and consider a replacement/retrofit program to reduce trash from being blown and/or leaking into the waterways.

4.3.7 Public Parking Facilities Management

Trash, debris, oil and grease build-up accumulates in parking lots and then is washed off into the storm drain system or directly into receiving waters. Currently, the Municipal Stormwater NPDES Permit requires that all Permittee owned parking lots with a surface area of 5,000 square feet or more, or with 25 or more parking spaces exposed to stormwater have a parking facilities management plan.

Within the watershed, LACDBH owns and operates eleven open area public parking lots. Of these public parking lots, four of them discharge directly into the back basins. Three out of these four public parking lots will be redeveloped within the next five years and appropriate BMPs will be incorporated. The fourth public parking lot (Lot UR) is being used by a library located at the back of Basin F. In addition, there are two parking lots located at a LACDBH administration building and at the Burton W. Chace Park used by LACDBH staff.

A public parking lot in the watershed

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Evaluate the need to increase maintenance of parking lots adjacent to Back Basins. Evaluate installing anti-bird devices on light standards to reduce bird droppings. Identify "hot spot" parking lots that have bird-dropping problem. Consider a pilot study to install anti-bird devices on light standards at the "hot spot" parking lots. Post signage at parking lots stating "no dumping/littering", if needed. (Based on the result of the Non-Point Source Study.)

- Evaluate the current level of Recreational Vehicle (RV) parking and usage.

- Consult local law-enforcement regarding increasing prohibition of overnight RV parking.

4.3.8 Boating Facilities Management

Recreational and commercial boating activities at Marina del Rey Harbor are a potential source contribution of bacterial indicators and pollutants. These activities include boat cleaning, boat waste disposal, boat pad launching, boat fueling, charter boat cruises (for fishing and entertainment), trash collection (for boaters and liveaboards), boat yards (for repair and maintenance), and boat shuttles.

Boats in Basin D

The MdRH has over 6,000 small crafts using its facilities. Many boats are moored long term at slips and many come and go at different times. There is also a transient boating population that uses the MdRH for refueling, supplies, and maintenance, and then moves on to their next destination. It is thought that some boaters may illegally dump their sewage and bilge water in the Marina del Rey Harbor waters. While this is difficult to prove and enforce, it remains a potential source of increased bacteria levels. Pump out stations used by boats to discharge their sewage within the Marina may be another potential source of bacteria.

The extent to which leaking boat holding tanks or illicit discharge of sewage from boats may impact the Marina del Rey Harbor receiving water quality will be assessed in Task 3 of the Non-Point Source Study. A monitoring study will be conducted to investigate the illicit boat discharge and the investigation will be carried out in Basin D, E, and F in and around the recreational and commercial boats in these areas. It is anticipated that several surveys will be conducted in and around the boats in Basins D, E, and F. The survey will likely be conducted at night when illicit discharge is most likely to occur.

Currently, the Santa Monica Bay Restoration Foundation's Boater Education Program, in conjunction with the California Coastal Commission, has launched various outreach and education programs tailored specifically to reach boat owners/operators and dock-users regarding proper boating practices and maintenance activities. Specific programs include Bilge Pad Exchange program, Dockwalker Program, in-water hull cleaning certification program, Clean Marina Recognition program, Clean Marina Guidebook, California Clean Boating Network's quarterly newsletter ("The Changing Tide"). Some of these programs are currently un-funded or have very limited funding.

Collectively, these and other existing programs help accomplish the following objectives:

- ✓ Enhance the capture and recycling of used oil from boats through the use of oil-absorbing bilge pads.
- ✓ Provide active outreach and education to boaters about illegal dumping and proper boat hull cleaning, boat owner painting, outboard motor cleaning and/or purging of saltwater, methods for liquid food waste disposal, boat launching at launch pads, disposal methods of cleaning agents for boat cleaning and marine accessory cleaning (trailers, motors, bait tanks), etc. in Marina del Rey.
- ✓ Provide a BMP manual for the use of individual lessee and dockmasters describing proper boat and dock maintenance and cleanliness.

Implementation of the following action items is necessary to help fill the potential gaps in outreach to boaters and relevant BMPs.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Coordinate with groups, such as the Coastal Commission's Dockwalker Program and the Santa Monica Bay Restoration Foundation's Clean Boating Network, that conduct public outreach to boaters about illegal dumping and/or proper boat hull cleaning.

- Evaluate, recommend and implement improvements, if needed, for cleaning practices of public docks, slips, and handrails.

- Investigate existing BMP manuals prepared by the above educational and outreach agencies, for the use of individual lessee and dockmasters describing proper boat and dock area maintenance and cleanliness. Work with these agencies on distribution of these manuals.

- Study the existence of liveaboards and determine the need of public education and/or the creation and enforcement of an inspection program (e.g dye tabs) of holding tanks and proper disposal practices.

- Investigate the current practices of pump out stations within the Marina and recommend improvements, if needed.

A pumpout station at Burton W. Chace Park

4.3.9 Development Planning

Land development can significantly alter the natural drainage patterns and contribute to polluted stormwater runoff. Runoff picks up pollutants as it flows over the ground or paved areas and carries these pollutants into the storm drain system.

As noted in Section 2, much of the watershed is developed with the exception of some of the parcels in the Marina. The remainder of the watershed is expected to follow each responsible agency's current General Plan for redevelopment. The Marina has its own long-term redevelopment plan.

Currently, LACDBH is in the process of renegotiating many of the Marina del Rey parcel leases. Consequently, a wave of renovation and redevelopment is on the horizon. Most of the Marina properties were developed more than forty years ago and reflect the planning and construction methods of that time. LACDBH and its consultants have prepared a Marina del Rey Asset Management Strategy that provides a framework for both short-term and long-term leasing and development issues, encourages redevelopment while ensuring quality maintenance of current properties, and creates a structure for the better integration of recreational and commercial/residential areas. With limited public space in Marina del Rey, LACDBH is pursuing a strategy for increased boater amenities through the redevelopment process. While the majority of the Marina leases will expire around 2020, the lease renegotiation, extension, and/or new lease process has already begun for many of these parcels.

Within the watershed, the anticipated redevelopment offers an opportunity to incorporate new practices and methods for treating and handling low flows and stormwater runoff. Existing practices, designs, and requirements can be modified and changed to manage water on-site and reduce the pollutant loading to on-site drainage systems and the Marina waters.

New development in Marina del Rey, which is permitted by County of Los Angeles Department of Public Works, must meet current Standard Urban Stormwater Mitigation Plan (SUSMP) requirements. Through this process, in consultation with the LACDBH, redevelopment projects are required to use appropriate post-construction Best Management Practices that help to minimize impacts from stormwater and urban runoff into the harbor.

Similarly, new development within the Marina del Rey Watershed incorporated area, which is permitted by City of Los Angeles Department of Public Works, must meet current SUSMP requirements. Through this process, redevelopment projects are required to use appropriate post-construction Best Management Practices (BMPs) that help to minimize impacts from stormwater and urban runoff into the harbor by utilizing the Low Impact Development (LID) approach.

To support this effort, the City prepared the *Development Best Management Practices Handbook – Part A: Planning Activities*, a handbook to guide private developers and contractors in the selection, design, and application of urban runoff BMPs (City of Los Angeles, 2002). City plan checking, engineering, and inspection staff has been trained in the requirements for construction activities. These requirements also apply to public projects. The City has a post development activity inspection program in place to monitor compliance with these requirements.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- As required under the current MS4 Permit, continue to diligently implement the existing post construction BMP requirements.

4.3.10 Industrial/Commercial Facilities Control Program

Industrial/commercial facilities can be critical sources of pollutants in stormwater.

The watershed has 12.2% of retail, commercial, and general office land use. Some of these retail and commercial facilities include restaurants, shopping centers, hotels, yacht clubs, boater support services, dry-dock storage, and auto repair/dealers. These facilities can contribute to increased bacterial indicator densities from their cleaning practices and operations. Restaurants are inspected under the existing Municipal Stormwater NPDES Permit Program.

The TMDL notes that currently there are seven individually permitted industrial/commercial facilities. These permits include the constituents of concern, allowable discharge concentrations, and other restrictions. These permitted discharges can have effects on downstream water quality, raising bacteria indicator levels at Marina Beach and the back basins.

The MDRWRA recommend that the LARWQCB re-evaluates its constituents of concern for existing discharge permits, and consider adding bacterial indicator densities (and other constituents of concern for future TMDLs) to assist the MDRWRA in meeting the TMDL requirements.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Recommend the LARWQCB to consider amending the point discharge permit's constituents requirements to include bacteria indicators and those listed in the 303(d) list for the which TMDL will be developed in the near future.

4.3.11 Code and Ordinance Review Program

All public agencies have various codes and ordinances pertaining to stormwater runoff and building development. These codes and ordinances regulate stormwater discharges and building development practices and affect how both low flow and stormwater runoff are managed.

A roof drain routed to the landscape planters

Currently, most agencies in the watershed require building gutter downspouts to be connected to on-site drainage or to be directed away from buildings. They also have standard details and practices and/or building codes to handle on-site drainage for single lot residential, multi-housing, and commercial developments. Public streets and highways are also designed with similar criteria to get water off the roadway and into ditches, channels, and pipes efficiently.

Changes in these codes, ordinances, and practices may allow developers and government agencies to manage low flow and stormwater runoff in a better manner.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Evaluate the impacts of the County and City ordinances requiring down spouts from rooftops to discharge into landscape planters, swales, dry wells, and cisterns.

4.3.12 Special/Holiday Events

Special and holiday events can be reasonably expected to generate substantial quantities of trash, litter, and liquid wastes.

Special and holiday events occur often within the watershed. Some of these special events include annual boat shows, farmers markets, canoe\boat races (in the Basins), 5K and 10K races, public radio outdoor events, community public\outdoor fundraisers, concerts, weddings, BBQ's, school trips to the Marina, etc. Holiday events include Christmas\holiday boat parades and\or street parades.

Surfing at the Marina

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Evaluate the existing BMP requirements for special/holiday events and suggest enhancement, if needed.

4.3.13 Business Improvement Districts

Business Improvement Districts (BIDs) provide services, activities and programs to a geographically defined area. Services may include advertising, routine cleaning and maintenance, and holiday decorations. This program measures target business with outreach programs through the BIDs and encourages businesses to form BIDs. Businesses will be provided with information about trash management, bacteria reducing BMPs, and runoff reduction techniques such as improving landscaping.

A Restaurant next to Basin E

Currently the City of Los Angeles' stormwater program currently has four BIDs in the downtown Los Angeles area. These BIDs have partnered to (1) establish a relationship with local businesses, (2) provide an information loop for businesses, and (3) disseminate educational information to local businesses. In addition, many of these BIDs have included routine sweeping and trash pick ups as part of their commitment to develop and retain both new and existing businesses, as well as to encourage tourism or increase and established customer base. Efforts such as these are expected to focus on problematic areas, which produce high amounts of bacteria.

Action Items (Refer to Table 4.3 for each agency's responsibilities of each action item)

- Investigate the potential of forming Business Improvement District's with groups of commercial, restaurants, and retail businesses. (see Figure 4.1 for potential Business Improvement District areas).

Figure 4.1
Areas Considered for Business Improvement Districts

N

DEPARTMENT OF PUBLIC WORKS

RITA L. ROBINSON DIRECTOR					SHAHRAM KHARAGHANI PROGRAM MANAGER
FILE-LOC MS	DRAWN BY: MS	CHECKED BY: WT	DATE XX/XX/04	DATE REVISED X	This map shall not be copied or reproduced, all or any part thereof, whether for distribution or resale, without the proper written permission of the Dept. of Public Works, City of Los Angeles Thomas Bros Data reproduces with permission granted by THOMAS BROS MAP

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DEPARTMENT OF PUBLIC WORKS

WATERSHED PROTECTION
CITY OF LOS ANGELES
BUREAU OF SANITATION

Table 4.3 Agency Responsibilities, Ratings of Potential Effectiveness, and Implementation schedule for the Institutional Solutions Action Items

Section Number	Institutional Control	Action Items	Potential Effectiveness [1]			Initiate Planning [2]	Initiate Implementation */2	County of Los Angeles			City of Los Angeles			City of Culver City			Caltrans		
			Low	Medium	High			Initiate[3]	Pilot/ Test[4]	Evaluate[5]	Initiate	Pilot/ Test	Evaluate	Initiate	Pilot/ Test	Evaluate	Initiate	Pilot/ Test	Evaluate
4.3.1	Storm Drain System Management	Identify high trash generating areas within the three priority subwatersheds (1A, 3, & 4). Retrofit all Priority catch basins to reduce or eliminate trash from entering storm drain system.			X	Phase I	Phase II*	X			X			X					X
		Evaluate catch basin insert/screen retrofit implementation schedule, and develop adequate maintenance program and schedule for the retrofitted catch basins.		X		Phase I	Phase I	X			X			X					6
		Continue the existing emergency response practices regarding spills, accidents, and clean-up procedures.	X			Phase I	Phase I	X			X			X					
		Assess the need for a maintenance and inspection program for lessee connections and discharges into the storm drain system.			X	Phase III	Phase IV*		X										
4.3.2	Proper Pet Waste Disposal	Assess the existing pet waste programs within each agency's jurisdiction. Enhance measures (e.g. signs in public parks, provide doggie waste bags and receptacles), where needed.			X	Phase I	Phase II*	X			X			X					
		Analyze current "pooper-scooper" ordinances within the watershed. If deemed in need of modifications/revisions, assist in measures to possibly make amendments. Promote the "pooper-scooper" ordinance through various outreach venues to dog owners.			X	Phase I	Phase II	X			X			X					
		Consider dog restriction at problematic areas and establish more doggie parks if deemed necessary and feasible.		X		Phase III	Phase IV*	X			X			X					
4.3.3	Sanitary Sewer Management Program	Study each agency's sewer maintenance history including their inspection and cleaning programs, emergency response procedures, and identify problem areas with leakages, overflows, or blockages. If necessary, the study would include recommendations to enhance the agency's sewer maintenance program to prevent future leakages, overflows, or blockages.			X	Phase I	Phase II*	X			X			X					
		Analyze the existing sewer system and determine if there is adequate capacity to serve the existing flows and the anticipated future flows.			X	Phase I	Phase II*	X			X			X					
		Evaluate the County's existing sewer lining programs and determine its effectiveness at eliminating infiltration and inflow. If necessary, make recommendations to reduce infiltration and inflow.			X	Phase II	Phase II*	X			X			X					
		Conduct a CCTV camera investigation to look for cracks, tree roots, sedimentation, and other evidence of integrity problems in sewer lines adjacent to Mothers' Beach. Where the CCTV investigation indicates problems further investigations may be conducted to determine the potential impact on the receiving waters at Mothers' Beach. (Task 2 of the Non-Point Source Study)			X	Phase I	Phase I	X			X			X					
4.3.4	Illicit Connections/Illicit Discharges	Research feasibility of developing an inter agency task force to ensure agency cooperation in the reduction and\or elimination of illegal and illicit connections and discharges.		X		Phase II	Phase II	X			X			X			X		
4.3.5	Street Infrastructure Management	Consider increasing street sweeping in high traffic area.		X		Phase I	Phase II*		X			X			X		7		
		Review the trash pick-up schedule with respect to the street sweeping schedule. Coordinate the street sweeping to occur within the "next day" of the trash pick-up services. Coordinate with Law Enforcement to enforce no parking during street sweeping days, if needed.		X		Phase I	Phase II*	X			X			X					
		Investigate maintenance routines for public alleys, within the Watershed, for effectiveness and suggest enhancement, if needed.		X		Phase II	Phase II*	X			X			X					
4.3.6	Recreational and Other Public Facilities Management	Continue the current pollution prevention program.		X		Phase I	Phase I	X			X			X					
		Evaluate the effectiveness and maintenance of the current bird deterrent devices present to reduce the presence of birds (decrease bird droppings) at parks, Mothers Beach, etc. In addition, evaluate the need for additional devices and consider a pilot study to install additional bird deterrent devices based on the evaluation.			X	Phase I	Phase II	X											
		Evaluate placing signage and creating public informational brochures to discourage bird feeding in public areas.			X	Phase I	Phase I		X										
		Evaluate different types of trash receptacles available and consider a replacement/retrofit program to reduce trash from being blown and/or leaking into the waterways.			X	Phase I	Phase I	X											

Section Number	Institutional Control	Action Items	Potential Effectiveness [1]			Initiate Planning [2]	Initiate Implementation [*/2]	County of Los Angeles			City of Los Angeles			City of Culver City			Caltrans		
			Low	Medium	High			Initiate[3]	Pilot/ Test[4]	Evaluate[5]	Initiate	Pilot/ Test	Evaluate	Initiate	Pilot/ Test	Evaluate	Initiate	Pilot/ Test	Evaluate
4.3.7	**Public Parking Facilities Management**	Evaluate the need to increase maintenance of parking lots adjacent to Back Basins. Evaluate installing anti-bird devices on light standards to reduce bird droppings. Identify "hot spot" parking lots that have bird-dropping problem. Consider a pilot study to install anti-bird devices on light standards at the "hot spot" parking lots. Post signage at parking lots stating "no dumping/littering", if needed. (Based on the result of the Non-Point Source Study.)			X	Phase I	Phase II*	X											
		Evaluate the current level of Recreational Vehicle (RV) parking and usage.			X	Phase II	Phase II	X						X					
		Consult local law-enforcement regarding increasing prohibition of overnight RV parking.		X		Phase III	Phase III			X			X			X			
4.3.8	**Boating Facilities Management**	Coordinate with groups, such as the Coastal Commission's Dockwalker Program and the Santa Monica Bay Restoration Foundation's Clean Boating Network, that conduct public outreach to boaters about illegal dumping and/or proper boat hull cleaning.			X	Phase I	Phase I	X											
		Evaluate, recommend and implement improvements, if needed, for cleaning practices of public docks, slips, and handrails.		X		Phase I	Phase II	X											
		Investigate existing BMP manuals prepared by the above educational and outreach agencies, for the use of individual lessee and dockmasters describing proper boat and dock area maintenance and cleanliness. Work with these agencies on distribution of these manuals.		X		Phase I	Phase II	X											
		Study the existence of liveaboards and determine the need of public education and/or the creation and enforcement of an inspection program (e.g dye tabs) of holding tanks and proper disposal practices.		X		Phase II	Phase III	X											
		Investigate the current practices of pump out stations within the Marina and recommend improvements, if needed.				Phase I	Phase II	X											
4.3.9	**Development Planning**	As required under the current MS4 Permit, continue to diligently implement the existing post construction BMPs requirements.		X		Phase I	Phase I	X			X			X					
4.3.10	**Industrial/Commercial Facilities Control Program**	Recommend the RWQCB to consider amending the point discharge permit's constituents requirements to include bacteria indicators and those listed in the 303(d) list for the which TMDL will be developed in the near future.			X	Phase II	Phase II	X			X			X					
4.3.11	**Code and Ordinance Review Program**	Evaluate the impacts of the County and City ordinances requiring down spouts from rooftops to discharge into landscape planters, swales, dry wells, and cisterns.		X		Phase II	Phase II	X			X			X					
4.3.12	**Special/Holiday Events**	Evaluate the existing BMP requirements for special/holiday events and suggest enhancement, if needed.		X		Phase I	Phase II*	X			X								
4.3.13	**Business Improvement Districts**	Investigate the potential of forming Business Improvement District's with groups of commercial, restaurants, and retail businesses.		X		Phase II	Phase III*	X			X			X					

Notes:

* If necessary

1: The ranking of the effectiveness of the each action item is based on individual agency's judgment

2. Implementation schedule:
   Phase I - FY 2005 –06 – FY 2006-07
   Phase II - FY 2007-08 – FY 2011-17
   Phase III - FY 2012-13 – FY 2016-17
   Phase IV - FY2017-18 – FY 2021-22

3. Initiate - The MDRWRA will immediately take action to initiate the program or project. While not all programs or projects will be ready at the beginning of implementation, the commitment to full implementation of the project or program exists and will be actively pursued.

4. Pilot/Test - The MDRWRA will take action to pilot the program or actions and evaluate the success. This pilot/test will last a finite amount of time at which an analysis will occur to determine if the program or project may remain or spread to the entire watershed.

5. Evaluate - The JG/agency will consider the viability of the program or project. No further action may be taken. The evaluation will include cost/benefit analysis, constructability reviews, program implementation assessment, etc. to determine if a project is ready to be piloted or implemented. A further project may or may not arise after the evaluation is complete.

6. Caltrans has a inlet insert/screen retrofit pilot program per a settlement

7. Caltrans completed a study for evaluating the effectiveness of their highway sweeping equipment

Not applicable to the agency

4.4 Structural BMP Program

The Marina del Rey Watershed has unique characteristics that must be taken into consideration when developing a Structural BMP Program to improve quality and/or to reduce quantity of dry-and wet-weather runoff. Characteristics and conditions include:

- High Groundwater Table
- Tidal Influence
- History of Flooding
- Limited Publicly Owned Parcels
- Redevelopment in the Marina

High Groundwater Table

Marina del Rey is located 2.5 mile away from Venice City Beach and is linked with the Santa Monica Bay via the Main Channel. The soils conditions around the Marina are considered to be coastal sands and loamy soils, which have the highest percolation rates (infiltration capacity). However, this approach may not be feasible option, due to the high ground water table located around the Marina. Although no recent large scale studies have been done to evaluate the quality or depth of ground water, the California Department of Conservancy, Division of Mines and Geology, evaluated the Marina area and determine historically shallow ground-water levels in the Venice Quadrangle. The evaluation relied heavily on turn-of-the-century water-well logs (Mendenhall, 1905) but also included water measurements from borehole logs collected for the study. The depths to first encountered water free of piezometric influences were plotted and contoured onto a map showing depths to historically shallowest ground water (see Figure 4.2). The map was compared to similar published maps for any discrepancies (Tinsley and others, 1985; Leighton and others, 1990).

Subsequently, the results from this study show that the ground water table around the Marina has an average depth of 5 feet, but may fluctuate depending on the season and tidal influences. Therefore, projects implemented within the watershed must consider the influence of ground water as part of the design considerations. High ground water table reduces the ability of an infiltration BMP to drain properly and affects the construction of any underground structural BMPs because de-watering is required during construction.

Tidal Influence

Due to the close proximity to Basin E, the Oxford Basin and connecting drainage network systems are subject to tidal influence. The Oxford Basin is the outlet basin for the two independent storm drains, Project No. 5243 and 3872. Both the non-storm water and storm water runoff from these storm drains conveys to the Oxford Basin for a total combined drainage areas of approximately 659 acres, and the runoff from the Oxford Basin outlets to Basin E via two existing discharge culverts each fitted with automated slide gates. Tidal water could flow into the Oxford Basin from Basin E when the two slide gates are opened, and could back flow further upstream of the two storm drains.

History of Flooding

Before construction of the Marina del Rey Harbor in 1965, the area around the Marina was a naturally occurring wetlands/marsh. Flood waters and runoff from upstream areas drained into the large undeveloped marsh area which helped form part of the estuary for the Ballona Creek Wetlands. Upon completion, the Marina Harbor area was transformed into the world's largest man-made, small-craft marina, and opened in April of 1965. However, because the natural topography of the area is a low-lying and generally flat area, a large portion of the area is susceptible to flooding. Development within and upstream of the Marina has increased the amount of runoff that flows around and into the Marina, periodically causing flooding during extreme storm conditions and unfavorable high tides.

Vicinity in the community of Venice and unincorporated community of Marina del Rey is a natural low-lying plain and has a history of flooding. Several projects have been constructed in the areas to address the flooding such as the Oxford Retention Pump Plant. Currently, Public Works is also conducting a comprehensive evaluation of the hydrologic and hydraulic conditions in the Oxford Basin area. A relief drain to alleviate the flooding problem in this low-lying area is proposed.

Limited Publicly Owned Parcels

The Marina del Rey Watershed area is made up of a very urbanized and developed area, with very little open space. Public parks, buildings, and parking lots with the responsible agencies right-of-way offer the greatest opportunity to implement on site storage and reuse projects. However, because of the highly developed area within the watershed, there is a limited amount of public land available to implement the larger scale projects that would be needed to capture and reuse runoff. Therefore, additional small scale BMPs will be needed to be implanted in series in order to meet compliance.

Redevelopment in the Marina

Primarily developed in the 1960s, Marina del Rey’s original ground leases enabled the County of Los Angeles to implement its vision for the world’s largest man-made small craft harbor through a series of projects including apartments, office towers and shopping centers, in addition to numerous small boat anchorages.

The County of Los Angeles Board of Supervisors approved the Marina del Rey Asset Management Strategy in 1997, which provides a framework for managing both short-term and long-term leasing and development issues, encouraging redevelopment, while at the same time ensuring quality maintenance of current properties. Since the late 1990s, roughly half of the leaseholds have proposed redevelopment plans, with some half dozen projects currently underway.

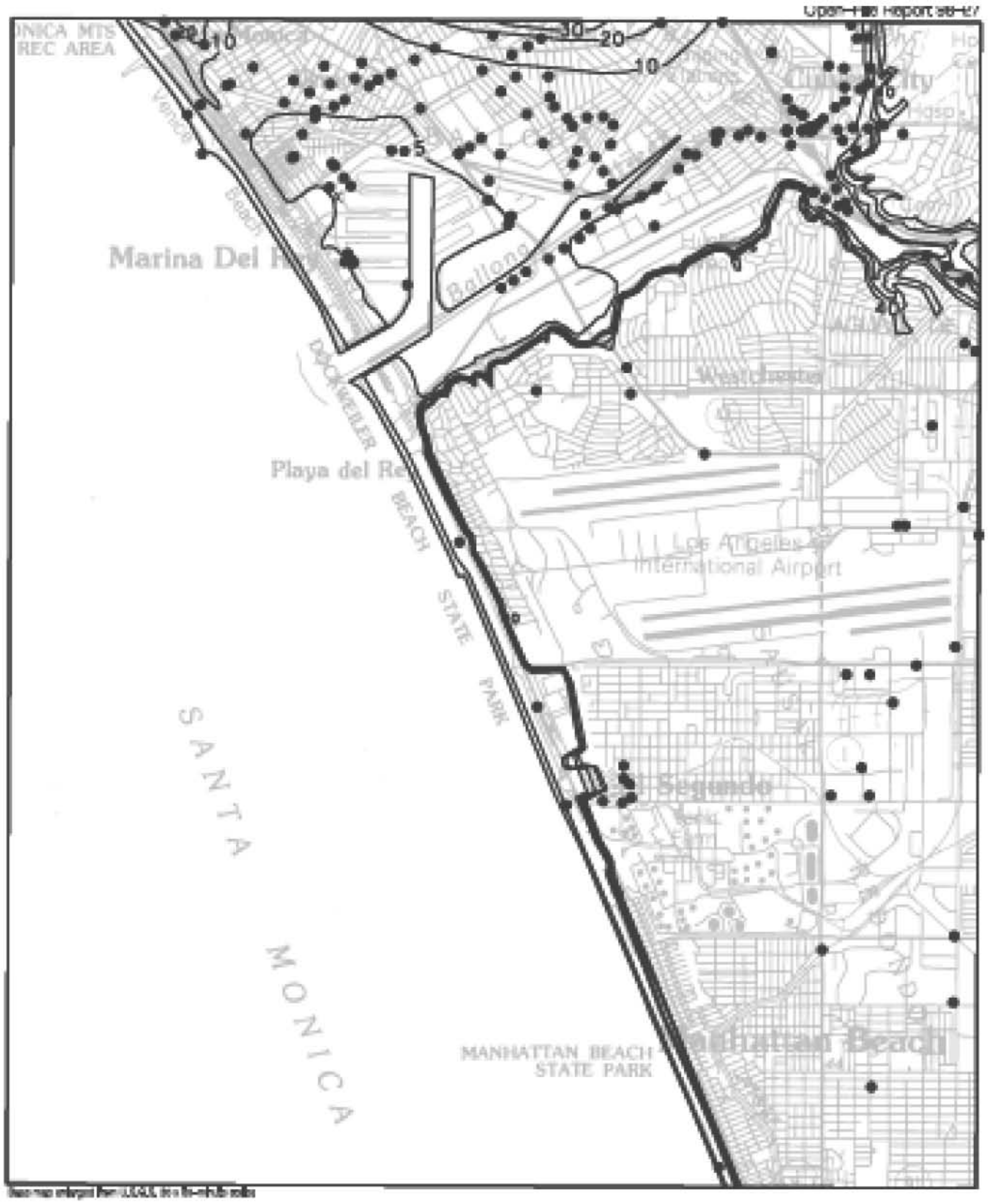
New development in the Marina as of 2005

As shown in Figure 4.3, a snapshot of the redevelopment status in as of late July 2005, many parcels in the Marina have or will be soon going through redevelopment. In the back basins, much of the surrounding development surrounding Basins D and E will change. Working with each lessee, through negotiations and the entitlement process, LACDBH expects the BMP's for on-site stormwater management incorporated into these projects to eliminate the majority of the runoff that currently sheet flows across surface parking lots and through the small drain parcel drainage systems, thereby improving water quality.

The Structural BMP Program consists of the following non-storm water discharge and storm water discharge control elements:

- Non-Storm Water Discharge Controls
  - Low-Flow Storm Drain Diversion Program
  - Marina Beach Water Quality Improvement Project (Increase Basin D Circulation)
  - Marina Source Identification and Source Control Program

- Storm Water Discharge Controls
  - Sub-Regional Structural BMP Program
  - Marina Beach Water Quality Improvement Project (Increase Basin D Circulation and Sheet Flow Diversion)
  - Regional Structural BMP Program



? Historically Highest Ground Water Contours and Borehole Log Data Locations, Venice Quadrangle.

● Borehole Site

30 Depth to ground water in feet

X Site of historical earthquake–generated liquefaction. See "Areas of Past Liquefaction" discussion in text.

ONE MILE

SCALE

Figure – 4.2
Average Ground Water Contours and Bore Log Data Locations, Venice Quadrangle

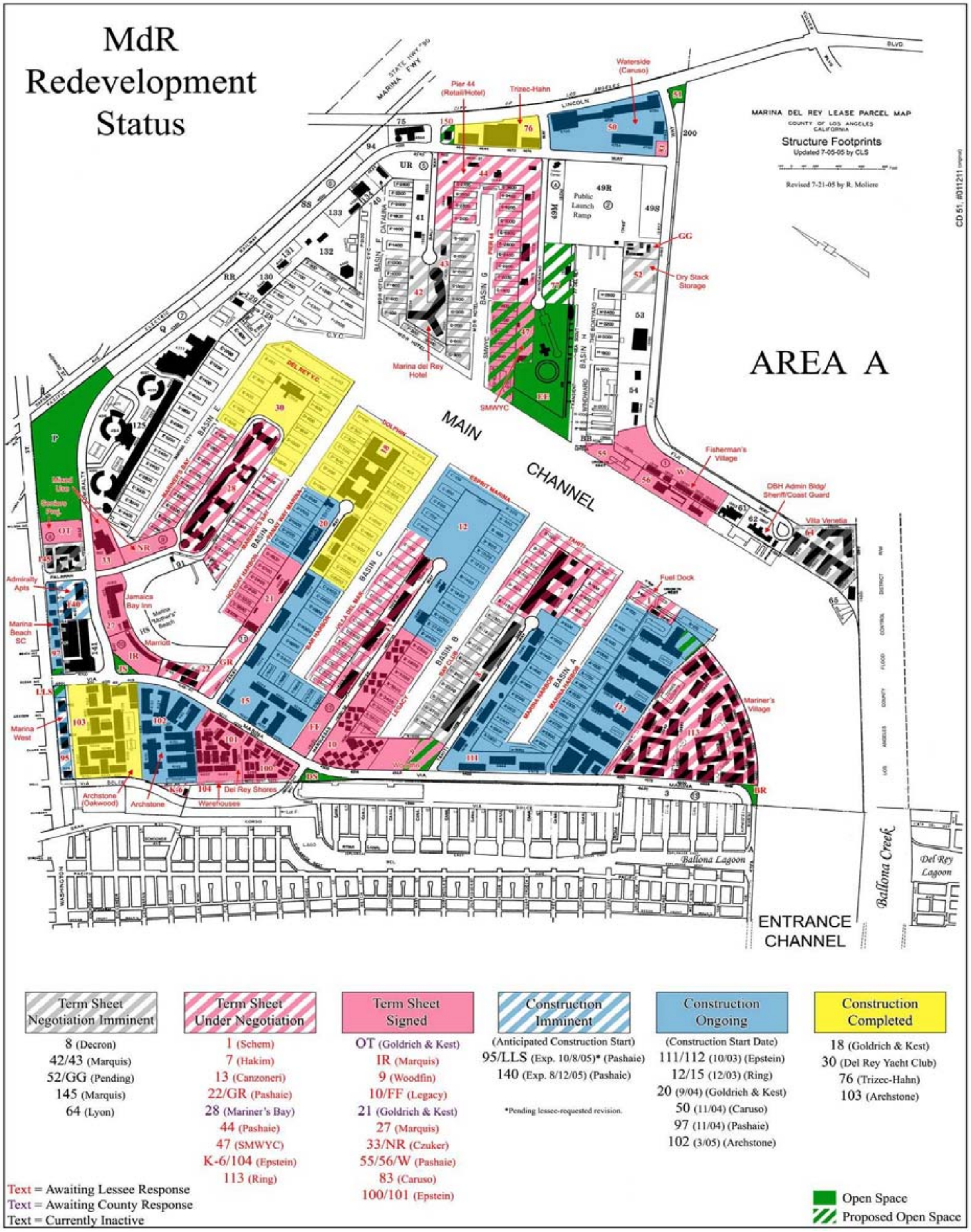


Figure 4. 3 Marina del Rey Redevelopment Status

4.4.1 Non-Storm Water Discharge Controls

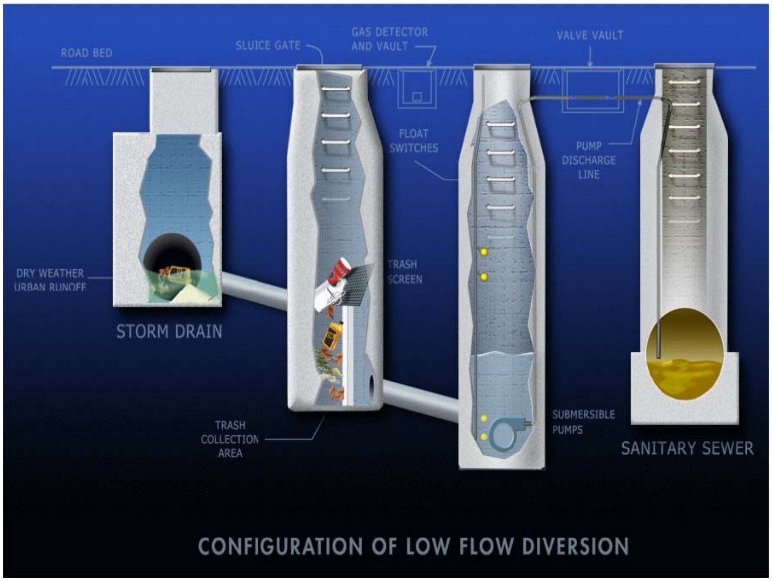
Potential non-storm water-related sources of bacteria include both direct input into the Marina (from sources such as illegal sewage dumping or leaks from boats, waste from sea mammals, fishes, and birds, etc.) and non-storm water runoff, which may result from over-irrigation, washing cars, driveways, sidewalks, and streets, permitted and illicit discharges, construction dewatering, and natural seepage, etc. Storm drains are the main conveyance systems that carry non-storm water runoff to receiving waterbodies. As stated in Section 2.2.1, implementation efforts will focus on the three priority subwatersheds 1A, 3, and 4, which are tributary directly to Basins D, E, and F. There are three major storm drains located within the Subwatersheds 3 and 4. Sub-watershed 1A does not have a major storm drain. Due to the fact that there is no storm drain system in Subwatershed 1A, the most probably flow path of non-storm water runoff is through sheet flow

The non-storm water discharge control strategy to reduce quantity and improve quality of runoff consists of a Low-Flow Storm Drain Diversion Program that will divert all the non-storm water runoff from the three major storm drains in the upper watershed, a Marina Beach Water Quality Improvement Project that will increase circulation in Basin D, and a Marina Source Identification and Source Control Program that will identify irregular activities and propose appropriate BMPs. This comprehensive non-storm water discharge control strategy will help the responsible agencies comply with the dry-weather bacteria TMDL, by effectively addressing the bacteria loads in non-storm water runoff as well as those that result from direct input into the Marina from various sources.

Table 4.4.1 Summary of Structural BMP Strategies for the Priority Tributary Areas (Non-Storm Water Discharge Controls)

Priority Tributary Area	Jurisdiction/Areas	Conveyance System	Constraints	Structural BMPs Strategy	Implementation Schedule
Subwatershed 4	Cities of Los Angeles and Culver City (Residential and commercial areas)	(Storm Drain) Project No. 5243 and 3872	• Tidal influence • High groundwater table	Low-flow diversion	Will be completed by March 18, 2007
Subwatershed 3	City of Los Angeles (Residential areas)	(Storm Drain) Project No. 3874	• Tidal influence • High groundwater table	Low-flow diversion	Will be completed by March 18, 2007
Subwatershed 1A	County Unincorporated (Marina)	Small parcel and road drains	• No major storm drains • High groundwater table	Source identification and control	The Non-Point Source Study Will be completed by March 18, 2007
	County Unincorporated (Marina Beach)	None	• No major storm drains	Increase circulation in Basin D	Will be completed by December 2005

4.4.1.1 Low-Flow Storm Drain Diversion Program



Within the Marina del Rey Watershed, as described in Section 2.2.1, there are three major storm drains, Project No. 3872, Project No. 5243, and Project No. 3874, that are located in the upper watershed and ultimately drain into Basin E. Currently, non-storm water runoff from Project No. 3872 and Project No. 5243 is being discharged directly into Oxford Basin, and Project No. 3874 directly outlets into the Boone-Olive Pump Station and is pumped to Basin E via Project No. 86.

Three low-flow diversion structures (see Figure 4.4 for low-flow diversion locations) are being proposed at these three storm drains. The diversions will divert the non-storm water runoff from these storm drains to nearby sewer lines and then to the Hyperion Treatment Plant for treatment.

As described at the beginning of this section, the Marina del Rey Watershed is under tidal influence. This constraint restricts the placement of the low-flow diversions along the storm drain line. The low-flow diversion structures have to be placed above the limit of the tidal influence to prevent salinity from mixing with the non-storm water runoff. Salinity is prohibited from being discharged to the sewer system. Due to this constraint, all of the non-storm water runoff from the two storm drains (Project No. 5243 and Project No. 3872) that outlet to the Oxford Basin cannot be fully captured. Various alternatives were investigated to address the stretch of the storm drains affected by tidal influence. Two different new technologies will be tested along the affected stretch of the storm drains in conjunction with two proposed low-flow diversions.

Below are preliminary design concepts of the proposed low-flow diversions.

<u>Low-Flow Diversion Project at Storm Drain Project No. 5243</u>

The proposed low-flow project consists of constructing a low-flow diversion system for Project No. 5243, Line A, at the intersection of Washington Boulevard and Thatcher Avenue. The proposed diversion system is located where the mainline is above the tidal influence and would capture an estimated 126 catch basins in the upper reach. For the remaining reaches below the intersection that are under tidal influence, a proprietary bioretention filter BMP will be installed as a pilot at 10 catch basins to test its effectiveness. If deemed effective through monitoring, the remaining 36 catch basins will be retrofitted in a subsequent phase. Project No. 5243 drains approximately 579 acres of land.

<u>Low-Flow Diversion Project at Boone-Olive Pump Station (Storm Drain Project No. 3874)</u>

The proposed project consists of installing a submersible pump in the existing Boone-Olive Pump Station control house to divert non-storm water runoff to a sewer line. Project No. 3874 collects non-storm water runoff through 22 catch basins and drains approximately 80 acres of residential land. Non-storm water runoff from the 22 catch basins will be captured in this low-flow diversion.

Boone-Olive Pump Plant

<u>Low-Flow Diversion Project at Storm Drain Project No. 3872</u>

To prevent salt-water intrusion into the wet well, the proposed low-flow diversion system will be located upstream of the tidal influence at the intersection of Stanford Avenue and Berkeley Drive. The low-flow diversion system will capture non-storm water runoff from 27 catch basins upstream of the system. The project also consists of modification of 28 catch basins where the storm drain invert is below the tidal influence and installation a separate drain line to divert the urban runoff from these 28 catch basins and outlets to the low-flow diversion system at Stanford Avenue. Project No. 3872 drains approximately 92 acres of land.

These preliminary design concepts are subject to change if they are deemed impractical after field investigation. The low-flow diversions will divert non-storm water runoff from the storm drain to the sanitary sewer for treatment at the Hyperion Treatment Plant. To ensure that the low-flow diversion structures are properly maintained, repaired, upgraded, and inspected, the County will develop an Operation and Maintenance Program.

Figure 4.4
Proposed Low Flow Diversions for Marina del Rey

DEPARTMENT OF PUBLIC WORKS	RITA L. ROBINSON DIRECTOR	DEPARTMENT OF PUBLIC WORKS			SHAHRAM KHARAGHANI PROGRAM MANAGER	WATERSHED PROTECTION CITY OF LOS ANGELES BUREAU OF SANITATION
	File-Loc: S:\Produced\Projects\tmdl\Marina del rey(3).apr	Drawn By: MS	Checked By: MS	Date: 7/25/05	Date Revised: X/XX/XX	This map shall not be copied or reproduced, all or any part therof, whether for distribution or resale, without written pression of the Dept. of Public Works, City of Los Angeles. Thomas Bros. Data reproduced with the permission granted by THOMAS BROS MAP.

4.4.1.2 Marina Beach Water Quality Improvement Project (Increase Basin D Circulation)

The second non-storm water discharge controls program is LACDBH's "Marina Beach Water Quality Improvement Project". This project has two major components:

Marina "Mothers" Beach and Basin D

- ✓ Storm water discharge control solution -- captures sheet flow from the properties adjacent to Basin D, near Marina Beach and redirects the flow through a storm drain discharging into Basin C (this solution is discussed at greater length in the following section on storm water controls).
- ✓ Non-storm water discharge control solution -- promotes water circulation and increase water mixing through a low speed propeller circulating system.

The non-storm water discharge controls portion of the Marina Beach Water Quality Improvement Project is aimed at improving the water circulation at Marina Beach, to help meet water quality standards in the TMDL. Two water circulators will be mounted on guide poles underneath the existing floating dock on the north side of the beach. The pumps have a large, slowly rotating "banana-blade" propeller, encased in a cage for safety, which will induce a gentle current along the beach face. Increased circulation is expected to result in more bacterial indicator exposure to ultra violet light (from sunlight) and promote rapid die-off and lowering bacteria levels to within TMDL water quality standards. Construction of the project will be completed by December 2005.

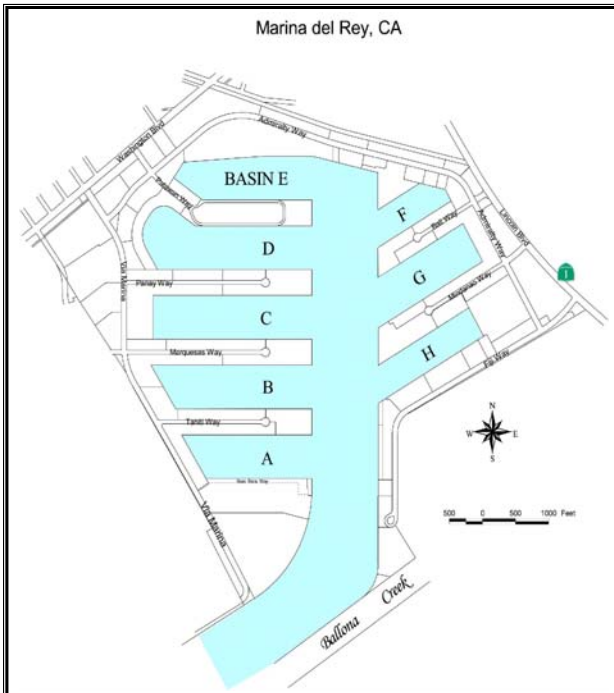
4.4.1.3 Marina Source Identification and Control Program

On August 7, 2003, LARWQCB adopted an amendment to the Water Quality Control Plan to incorporate the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (Attachment A of Resolution No. 2003-012 of the TMDL). The amendment states the following (page 3 under Source Analysis):

> "Dry weather urban runoff and stormwater conveyed by storm drains are the primary sources of elevated bacterial indicator densities to MdRH and Mothers' Beach back basins during dry and wet-weather."

There are no major storm drains within the Marina. However, there are small parcel drains and road drains. The majority of non-storm water runoff in the Marina is caused by over irrigation, spills, and washing of paved areas. These non-storm water runoffs flow to nearby streets or into parcel/road drains. The non-storm water runoffs do not occur on a consistent basis, and can be visually tracked and corrected with appropriate BMPs. The areas surrounding Basins D, E, and F are small and compact. Typical non-storm water associated with the land uses surrounding these basins is limited to residential, commercial, and recreational.

The most effective approach to address the non-storm water runoff within the Marina is through source identification and source control based on the characteristics discussed above. Source identification and source control will be conducted in a Non-Point Source Study required by the TMDL. The Study will identify and characterize the non-point sources of indicator bacteria that impact Marina Beach and Basins D, E, and F of the MdRH. The scope of work for the Study is summarized in Section 4.5.1.



County Unincorporated Marina del Rey

The Study proposes to conduct dry-and wet-weather spatial and temporal surveys, inspect sewerage infrastructure of the Marina Beach areas, investigate illicit boat discharges, assess the beach sand as a potential reservoir for bacteria, and perform additional, corroborative studies based upon preliminary data. The dry-and wet-weather spatial and temporal surveys include performing water quality sampling in the receiving waters, providing bird surveys, visual observation of potential bacteria sources, and developing a questionnaire to identify hard-to-find non-point sources of bacteria. Visual observations will include, but are not limited to, boating activities and practices that may attract wildlife, wildlife distribution patterns, accumulation and runoff of fecal material from parking lots or other areas, boat or dock wash down, small drain discharges, maintenance practices related to restaurants or other operations near the water, surface runoff, and visitor behavior. Spot samplings for bacteria analysis will be conducted in conjunction with the visual observations to quantify the bacteria loading from any observed sources. One of the Study's objectives is to recommend BMPs to address identified sources. The Study commenced in September 2005 and will be completed in October 2006.

The BMPs recommended by the Non-Point Source Study will be implemented at the identified sources to address and control both the non-storm water and storm water pollution sources.

4.4.2 Storm Water Discharge Controls

As stormwater runs across roofs, lawns, paved streets, driveways from residential, commercial and recreational sites, it picks up pollutants such as sediment, bacteria, nutrients, metals, pesticides, and trash. The sources of these pollutants are diffuse and difficult to measure. This sub-section describes the structural controls proposed to address the bacteria loads in stormwater runoffs (Non-structural controls, such as public outreach and institutional controls, are addressed under section 4.2 and 4.3). Structural BMPs are the most direct measure to help mitigate pollutants from stormwater runoff. The storm water discharge controls for Subwatersheds 1A, 3, and 4 consist of a Sub-Regional Control Program, a Marina Beach Water Quality Improvement Project (Sheet Flow Diversion), and a Regional Control Program. This element is expected to take place in four phases.

Table 4.4.2 Summary of Structural BMP Strategies for the Priority Tributary Areas (Storm Water Discharge Controls)

Priority Tributary Area	Jurisdiction/Areas	Conveyance System	Constraints	Structural BMPs Strategy	Implementation Schedule
Subwatershed 4	Cities of Los Angeles and Culver City (Residential and commercial areas)	(Storm Drain) Project No. 5243 and 3872	• No publicly owned parcels except school sites • High groundwater table	• Regional Solution • Sub-Regional Structural BMPs	Will initiate investigation in Phase I
Subwatershed 3	City of Los Angeles (Residential areas)	(Storm Drain) Project No. 3874	• No publicly owned parcels • High groundwater table	• Regional Solution	Will initiate investigation in Phase I
Subwatershed 1A	County Unincorporated (Marina)	Small parcel and road drains	• Limited publicly owned parcels • Most of the Marina will be redeveloped in the next 5-8 years • High groundwater table • No major storm drains	• Sub-Regional Structural BMPs	Will begin in Phase I
	County Unincorporated (Marina Beach)	None	• Limited publicly owned parcels • Most of the Marina will be redeveloped in the next 5-8 years • High groundwater table • No major storm drains	• Temporarily divert sheet flow from Basin D to Basin C • Increase Basin D circulation	Will begin in Phase I and will be completed by December 2005

4.4.2.1 Sub-Regional Structural Program

The Sub-Regional Structural Program will be implemented in selected areas tributary to the impaired back basins (Basins D, E, and F.) The sub-regional controls consist of a single or series of structural BMPs that primarily address flow from a particular defined site within a subwatershed. They are intended to treat only that site with minor contributions from adjoining streets and/or properties. Sub-regional controls generally have a beneficial reuse component as part of treatment train or single structural BMP.

Bioretention strip

Automatic retractable catch basin screens

Typical sub-regional structural BMPs are:

- ✓ Porous paving
- ✓ Grassy swales, retention grading
- ✓ Cisterns, rain barrels, gravel trenches, infiltration galleries/storage tanks, bio retention ponds
- ✓ Sunken street/parking lot medians, sidewalk/parking lot planters
- ✓ Catch basin inserts

By capturing and treating stormwater runoffs on site, bacterial densities are reduced as a contribution to the storm drain system, and the demand for potable water for landscape irrigation is reduced.

As discussed in further detail below, sub-regional solutions have been categorized into public sites, leased parcels, and private sites. Private sites are further broken down into commercial/industrial and residential categories.

Public Sites

Publicly owned parcels and facilities such as parking lots, libraries, and parks in the Marina del Rey Watershed were located using GIS (See Figure 4.5). Parcels within the Marina del Rey County unincorporated area are owned by County of Los Angeles and are broken down into long-term privately leased and LACDBH maintained public spaces. Other public parcels identified in the watershed are within City of Los Angeles' jurisdiction.


A street median in the Marina

Caltrans is currently evaluating the State Routes in the watershed to identify candidate locations for possible treatment BMPs or other types of sub-regional solutions. Caltrans will to solidify details during the initial phase of implementation.

Public spaces, such as parking lots and other public areas, publicly owned facilities, and public streets and driveways are considered good candidates for sub-regional controls. Table 4.4.3 is a list of public facilities identified as potential sites within the watershed for implementation of sub-regional structural BMPs. Following Table 4.4.3 are fact sheets on each of the potential sites.


Venice High School

Schools are generally considered good sites for sub-regional solutions because they typically have large open spaces consisting primarily of grassy fields and asphalt parking lots. There are four schools identified in the watershed, Venice High School, Mark Twain Middle School, Beethoven Street Elementary School, and Coeur Dalene Avenue Elementary School. These schools are located in the upper reach of the watershed and may provide future opportunities for water treatment and reuse. The schools are under the Jurisdiction of the Los Angeles Unified School District.

The school district was not listed among the responsible agencies for this TMDL, and has not been consulted on the development of this implementation plan. During the course of the implementation, the school district will be consulted to determine whether the implementation of BMPs within the school sites is feasible. The cooperation of the LARWQCB is needed and will be sought in bringing to the attention of the school district the importance and urgency of addressing surface water quality impairment through TMDL implementation, and the vital role of school districts (which are subject to Phase II NPDES storm water regulations) in cooperating with public agencies towards the common goal of surface water quality enhancement. When the commitment from the school district is obtained, schools may be included in the list of potential structural BMP sites listed in Table 4.4.3.

The implementation of public sub-regional controls is lengthy. A typical structural BMP project takes approximately four to five years for public agencies to complete. The following is an example of a structural BMP project delivery process for the County of Los Angeles, and the process is comprised of five phases:

- Feasibility Study (1 year)
- Project Design Concept (1 year)
- Design and Permitting (1 to 2 years)
- Construction Bid and Award (6 to 9 months)
- Construction (6 to 18 months)

A Feasibility Study is a detailed assessment of the project's alternatives. The objective of this assessment is to identify all viable options that could satisfy the established project needs. Such an assessment entails a thorough review of the project needs and conditions to assist the development and selection of the most feasible, beneficial, and cost effective alternatives for further development.

Upon selection and approval of the most feasible project alternative(s), a project design concept builds upon the Feasibility Study and is an in-depth development of the functional and operational requirements for each alternative. The objective of this phase is to gather sufficient information to assist in the selection of the most suitable alternative for design and construction.

Following the approval of the project design concept, the project goes into the Design phase. The objective of this phase is to prepare plans and specifications necessary to construct the project. This phase includes environmental clearance, permitting, and if needed, appropriate agency approval.

Upon completion of the Design phase, the project will go into advertising for construction, bid opening, and award of a construction contract to a private company. The objective of this phase is to obtain the services from a contractor to construct the project according to plan and specifications. The last phase is to construct the project.

Most of the public agencies have very similar structural BMP project delivery process as the County of Los Angeles.

Leased Parcels

The County of Los Angeles has granted long-term leases to developers on most of the properties in the Marina del Rey County unincorporated areas. The LACDBH duties include Marina lease administration and leasehold redevelopment, as well as premises maintenance inspections, to enhance public access and enjoyment while maximizing County revenue. The leased parcels include apartments, hotels, restaurants, commercial and retail businesses, docks and yacht clubs.


A shopping center near Villa Marina Marketplace

In 1995, the Marina del Rey Asset Management Strategy (AMS) was adopted by the County of Los Angeles Board of Supervisors. The AMS is a strategy designed to provide a framework for making short-term leasing and development decisions so that they remain consistent with longer-term redevelopment goals; provide programs to encourage redevelopment and refurbishment while ensuring quality maintenance of leasehold facilities during remaining lease terms; and, effect a strategy for the Marina's second-generation development that better integrates recreational and commercial/residential areas. Many of the parcels in the back basins, particularly around Basins D and E are slated for redevelopment under the AMS.

Redevelopment and new development in Marina del Rey must get project approvals from up to four of the following separate entities during the entitlement process, in addition to necessary demolition and construction permits from Public Works Building and Safety Division, Fire Department, etc.:

- ✓ Marina del Rey Design Control Board – reviews architectural design and landscaping
- ✓ County Regional Planning Commission – Approves Coastal Development Permits and Conditional Use Permits. Water quality provisions of the Local Coastal Program (LCP) are primarily implemented through the Municipal Stormwater NPDES Permit requirements in coastal permits.
- ✓ County Board of Supervisors – Approval required if the project requests an amendment to the LCP or is appealed from decision of the Regional Planning Commission

- ✓ California Coastal Commission – as lead agency responsible for carrying out the Coastal Act, the CCC must approve the overall LCP, approves projects in all cases involving slip demolition/construction or any other in-water construction, approves projects in all cases where an amendment to the LCP is needs, and approves projects in cases where a decision of the Regional Planning Commission is appealed by a member of the public or when the CCC, on its own motion, decides to review a proposed project.

Currently, the CCC is conducting a LCP Periodic Review of the Marina del Rey LCP. The recommendations in the review are meant to assist the County in continued implementation of the LCP in conformity with the policies of the Coastal Act. While these recommendations do not directly amend the certified LCP, they are suggested actions that could be carried out through policy and ordinance changes in future amendments to the LCP, changes in how the County implements the LCP in issuing coastal permits or through other County studies, educational efforts or programs. In the section on water quality of LCP Periodic Review, the CCC recommends the County continue to require that development incorporate non-structural and structural BMPs, where necessary, that minimize the volume, velocity and pollutant load of stormwater runoff, prior to discharge into stormwater conveyance systems, coastal waters, or the beach. They also recommend that any coastal development application shall include a Water Quality Management Plan that includes management measures and BMPs to avoid or minimize runoff during construction and post-construction from the property.

Private Sites

The privately owned sites are divided into three categories (commercial, industrial, and residential). Some of the sub-regional controls selected for the public sites could be used at the private sites. However, the MDRWRA would have to negotiate the feasibility of these sub-regional controls with private parties.

PUBLIC WORKS

FIGURE 4.5
MARINA DEL REY AREA

ALL PARCELS, PRIVATE AND PUBLIC

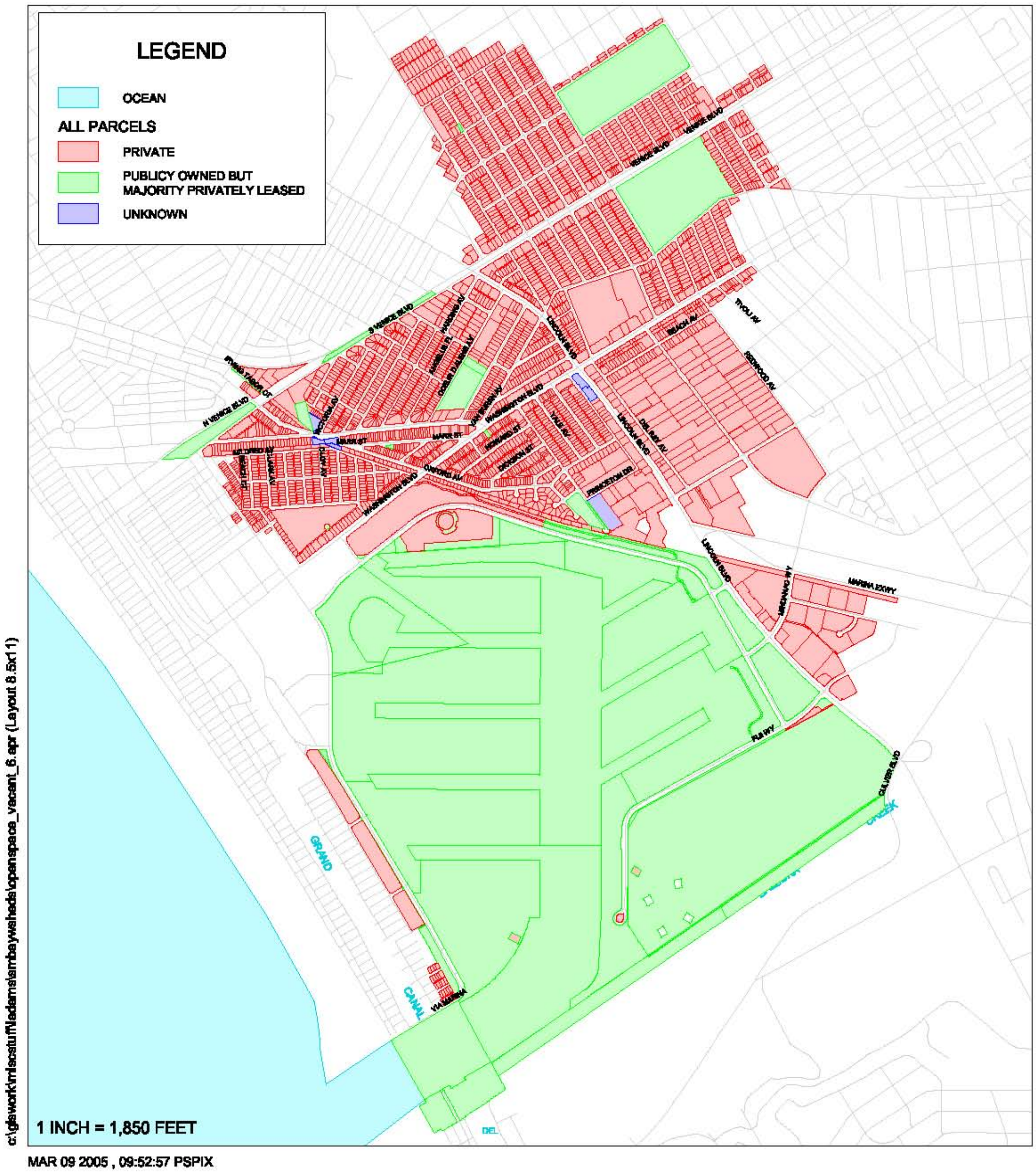


Table 4.4.3 Summary of Potential Structural BMP Projects at Public Sites

Site No.	Site Name	Site Type	Agency\Ownership	Proposed BMP(s)	Proposed Schedule [1]	Commitment Level [2,3]
1	DBH Parking Lot 5 (next to the Basin F)	Parking lot	LADBH \ LA County	Bioretention filter system	Phase I & II	Initiate
2	DBH Parking Lot 7 (next to Admiralty Park)	Parking lot	LADBH \ LA County	Cistern/rain barrel	Phase I & II	Initiate
3	Admiralty Park	Public Park	LADBH \ LA County	Cistern/rain barrel, grassy swale, retention grading	Phase II	Evaluate
4	Admiralty Way Widening	LA County Route	LA County	Cistern/rain barrel, grassy swale, retention grading	Phase II & III	Evaluate
5	LA County Fire Department (FS110)	Government Building	Fire Dept \ LA County	Bioretention filter system	Phase III	Evaluate
6	Marina del Rey Library	Public Library	Library \ LA County	Bioretention filter system	Phase III	Evaluate
7	Venice Boulevard	State Route	Caltrans	Biofiltration system	Phase IV	Evaluate

Notes:

1. Proposed Implementation Schedule:

   Phase I - FY 2005-06 – FY 2006-07

   Phase II - FY 2007-08 – FY 2011-12

   Phase III - FY 2012-13 – FY 2016-17

   Phase IV - FY2017-18 – FY 2021-22

2. Initiate - The MDRWRA will immediately take action to initiate the program or project. While not all programs or projects will be ready at the beginning of implementation, the commitment to full implementation of the project or program exists and will be actively pursued.
3. Evaluate - The JG/agency will consider the viability of the program or project. No further action may be taken. The evaluation will include cost/benefit analysis, constructability reviews, program implementation assessment, etc. to determine if a project is ready to be piloted or implemented. A further project may or may not arise after the evaluation is complete.

Table 4.4.4 Sub-Regional Structural BMP Program - Proposed Implementation Schedule

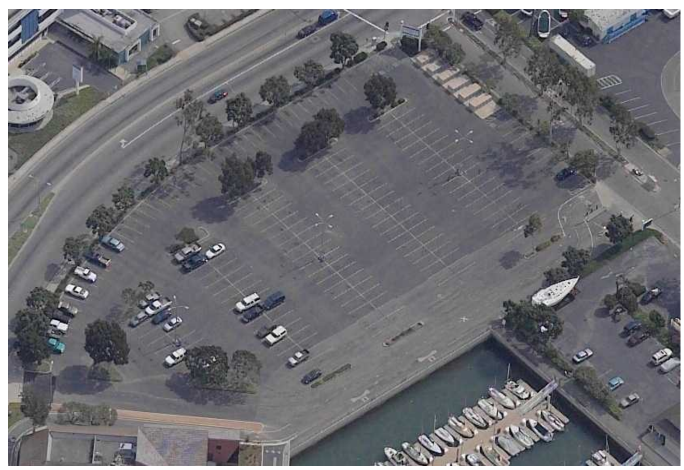
No.	Sub-regional Structural Project	FY05/06	FY06/07	FY07/08	FY08/09	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22
1	Beaches & Harbor Parking Lot 5 (next to the Basin F)																	
2	Beaches & Harbor Parking Lot 7 (next to Admiralty Park)																	
3	Admiralty Park																	
4	Admiralty Way Widening																	
5	LA County Fire Department																	
6	Marina del Rey Library																	
7	Venice Boulevard																	

Legend

- Feasibility Study
- Project Design Concept
- Design and Permitting
- Construction Bid and Award
- Construction
- Operation and Maintenance

Fact Sheet: Subregional Project	
Project Name	DBH Parking Lot 5
Jurisdictional Lead	County of Los Angeles
Project Location	Beaches and Harbors parking lot no. 5 right next to Basin F
Subwatershed	1A
Project Description/Characteristics	Bioretention filter system would be installed to capture sheet flow from the parking lot. This parking lot is right next to Basin F. Due to the high groundwater table in the area, appropriate structural BMPs are very limited. Infiltration BMPs such as porous pavement is not feasible because the soil is not deep enough to allow the process of infiltration. Typical pollutants such oil and grease from the parking lot would infiltrate into the groundwater and gradually seep out to Basin F.
Land Use(s) Targeted	Open Space/Agriculture
Estimated Drainage Area	TBD
Estimated Project Footprint	TBD
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Addresses multiple pollutants
Permitting/Environmental Issues	Coastal Commission
Commitment Level	Initiate
Tentative Start and End Date	Phase I through Phase II (FY 05-06 through FY 09-10)

Site Photos

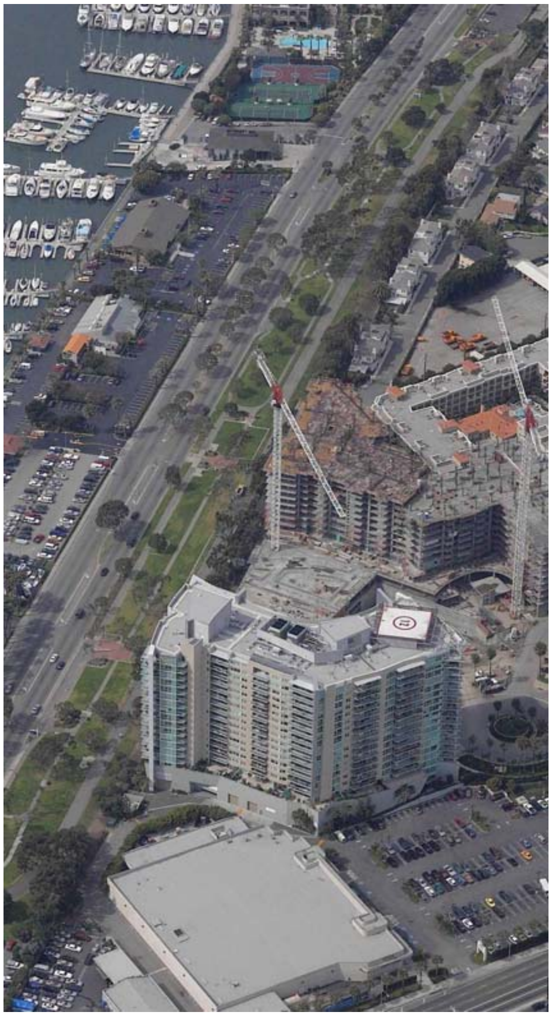


Fact Sheet: Subregional Project	
Project Name	DBH Parking Lot 7
Jurisdictional Lead	County of Los Angeles
Project Location	Beaches and Harbors parking lot no. 7 right next to the Admiralty Park
Subwatershed	1A
Project Description/Characteristics	Cistern/Rain barrel would be installed to store the stormwater runoff from the parking lot, treat it, and reuse it for the Admiralty Park irrigation
Land Use(s) Targeted	Open Space/Agriculture
Estimated Drainage Area	TBD
Estimated Project Footprint	TBD
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Addresses multiple pollutants and focus on beneficial re-use of stormwater
Permitting/Environmental Issues	TBD
Commitment Level	Initiate
Tentative Start and End Date	Phase I through Phase II (FY 05-06 through FY 09-10)

Site Photo

Fact Sheet: Subregional Project	
Project Name	Admiralty Park
Jurisdictional Lead	County of Los Angeles
Project Location	Admiralty Park
Subwatershed	1A
Project Description/ Characteristics	Cistern/Rain barrel would be installed to store stormwater runoff from the surrounding areas.
Land Use(s) Targeted	Open Space/Agriculture
Estimated Drainage Area	TBD
Estimated Project Footprint	TBD
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Addresses multiple pollutants and focus on beneficial re-use of stormwater
Permitting/Environmental Issues	TDB
Commitment Level	Evaluate
Tentative Start and End Date	Phase II (FY 07-08 through FY 11-12)

Site Photo



Fact Sheet: Subregional Project	
Project Name	Admiralty Way Widening
Jurisdictional Lead	County of Los Angeles
Project Location	Admiralty Way from Via Marina to Fiji Way
Subwatershed	1A
Project Description/ Characteristics	Cistern/Rain barrel, Grassy Swale, Retention Grading may be incorporated as part of the Admiralty Way widening project
Land Use(s) Targeted	Open Space, Commercial, Transportation/Utilities/Mixed, Multifamily
Estimated Drainage Area	TBD
Estimated Project Footprint	TBD
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Addresses multiple pollutants and focus on beneficial re-use of stormwater
Permitting/Environmental Issues	Caltrans, Coastal Commission, DBH
Commitment Level	Evaluate
Tentative Start and End Date	Phase II through III (FY 07-08 through FY 12-13)

Site Photo

Fact Sheet: Subregional Project	
Project Name	Los Angeles County Fire Department (FS110)
Jurisdictional Lead	County of Los Angeles
Project Location	4433 Admiralty Way, Marina Del Rey 90292-5415
Subwatershed	1A
Project Description/Characteristics	Bioretention filter system would be installed to capture sheet flow from the parking lot. This site is right next to the Main channel between Basin F and Basin E. Due to the high groundwater table in the area, appropriate structural BMPs are very limited. Infiltration BMPs such as porous pavement is not feasible because the soil is not deep enough to allow the process of infiltration. Typical pollutants such oil and grease from the parking lot would infiltrate into the groundwater and gradually seep out to Basin F.
Land Use(s) Targeted	Commercial
Estimated Drainage Area	TBD
Estimated Project Footprint	TBD
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Addresses multiple pollutants
Permitting/Environmental Issues	DBH, Coastal Commission
Commitment Level	Evaluate
Tentative Start and End Date	Phase III (FY 12-13 through FY 16-17)

Site Photo

Fact Sheet: Subregional Project	
Project Name	Marina del Rey Library
Jurisdictional Lead	County of Los Angeles
Project Location/Characteristics	4533 Admiralty Way, Marina Del Rey 90292-5415
Subwatershed	1A
Project Description	Bioretention filter system would be installed to capture sheet flow from the parking lot. This site is right next to the Main channel between Basin F and Basin E. Due to the high groundwater table in the area, appropriate structural BMPs are very limited. Infiltration BMPs such as porous pavement is not feasible because the soil is not deep enough to allow the process of infiltration. Typical pollutants such oil and grease from the parking lot would infiltrate into the groundwater and gradually seep out to Basin F.
Land Use(s) Targeted	Commercial
Estimated Drainage Area	TBD
Estimated Project Footprint	TBD
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Addresses multiple pollutants
Permitting/Environmental Issues	DBH, Coastal Commission
Committed Level	Evaluate
Tentative Start and End Date	Phase III (FY 12-13 through FY 16-17)

Site Photo

Fact Sheet: Subregional Project	
Project Name	Venice Boulevard
Jurisdictional Lead	Caltrans owns the roadway. City of Los Angeles maintains it per a delegated maintenance agreement. County of LA owns few drains in the proposed project area.
Project Location	Shoulder spaces on Venice Boulevard between Walgrove and May Street.
Subwatershed	4
Project Description/Characteristics	The wide shoulder spaces (15ft +-) along Venice Boulevard could be considered to implement structural BMPs such as biofiltration or other treatment technologies to treat runoff.
Land Use(s) Targeted	Single and multiple family dwellings, commercial, school, transportation, etc.
Estimated Drainage Area	5 acres for one side,10 acres for both sides
Estimated Project Footprint	15'X1500'
Estimated Runoff Managed	TBD
IWRA Criteria Achieved	Treat multiple pollutants
Permitting/Environmental Issues	The locations may be in the jurisdiction of Coastal Commission. There are long-term issues and concerns associated with activities of the Venice High School, existing businesses and residents adjacent to the project area, and impacts to the existing street trees.
Commitment Level	Evaluate
Tentative Start Date	Phase IV (FY 17-18 through FY 21-22)

Site Photos

4.4.2.2 Marina Beach Water Quality Improve Project (Sheet Flow Diversion)

Presently, there is a large parking lot and several restaurants draining directly to the back of Marina Beach. Capturing and redirecting low-flows and stormwater runoff away from the back of Marina Beach will eliminate bacterial indicator contributions from the adjacent parking lots and buildings and result in fewer beach closures. The storm water discharge control part of the Marina Beach Water Quality Improvement Project involves the construction of a stormwater collection system that would convey stormwater from the development surrounding the beach with an outfall in Basin C to the south. The proposed diversions are not expected to significantly degrade water quality in Basin C, which is not subject to compliance under the TMDL.

While this project will eliminate much of the stormwater that drains directly across the beach sand and into the beach waters, thereby reducing the amount of urban runoff entering the water from the surrounding parking lots and restaurants, this system is only an interim solution to stormwater management around Marina Beach. Most of the land around Marina Beach will be redeveloped over the next decade and the intensity of use will increase. These projects, including new hotels, restaurants and parking structures, must conform to current entitlement regulations, including coastal development permits and the need to meet SUSMP requirements through the County's building permit process. As this redevelopment unfolds and each parcel is responsible for meeting current storm water management requirements in dealing with their local runoff, the necessity of moving stormwater to the adjacent basin will diminish.

4.4.2.3 Regional Structural BMP Program

Regional solutions are generally considered "end-of-pipe" treatment and typically require large parcels of land. The most common type of regional control is a water quality centralized treatment facility sized and configured to treat multiple constituents. Smaller, expandable "package plants" are also used. Retrofits of this type are unique and a significant amount of time is needed to study site-specific limitations with respect to right-of-way, engineering, permitting, and other constraints. They are also the most expensive and most difficult to plan and construct.

Oxford Basin

Stormwater runoff entering Oxford Basin is channelized from Subwateshed 4. Currently, one sub-regional structural BMP is proposed for controlling bacteria waste loads associated with storm water discharges from this subwatershed, due to space and other constraints explained in section 4.4. Although non-structural controls are planned for this sub-watershed, the responsible agencies recognize the need for additional structural BMPs for this subwatershed. Feasibility analysis of a regional control strategy will be initiated in Phase I. One possible regional strategy is to construct a treatment plant in the vicinity of Oxford Basin. The preliminary concept of the regional strategy is to capture runoff from both Subwatershed 3 and 4. The treated runoff could then be beneficially reused for landscaping and irrigation. If none of these beneficial reuse options prove feasible, the treated water could be discharged to Basin E.

Depending on the results of the feasibility study, the regional control strategy may be refined, replaced, or supplemented with additional measures, and alternative regional and sub-regional control strategies will be investigated.

4.5 Studies and Research

The implementation strategies proposed in this plan are based on a limited understanding of bacteria sources and BMP effectiveness. Research into these and other pertinent areas may yield more efficient and cost effective solutions.

The MDRWRA have compiled a list of suggested studies and research that may be helpful over the TMDL implementation timeframe to address several areas where information is lacking or where science and technology are rapidly evolving. While much is known, much is yet to be done in the quest for "good science" in formulating and re-evaluating these TMDLs regulations and the implementation strategies/technologies.

The suggested studies do not necessarily need to be undertaken by the MDRWRA, but could be performed by others. Many of the suggested studies are applicable to the other agencies involved in the Santa Monica Bay Beaches Bacteria TMDL.

4.5.1 Non-Point Source Study

The Marina del Rey Non-Point Source Study is required by the TMDL to assess the non-point sources of indicator bacteria that impact Mothers' Beach and the back basins of MdRH. With input from the LARWQCB staff, Heal the Bay, and Santa Monica BayKeeper, Weston Solutions, Inc. and the responsible agencies completed the study work plan in June 2005. The study has three objectives:

1. Determine the relative loadings of indicator bacteria to the water bodies listed in the TMDL from sources including but not limited to storm drains, boats, birds, and other non-point sources;

2. Determine the host origin (human, bird, rodent, etc.) from the various sources;

3. Make recommendations on the best ways to reduce bacteria loading to achieve TMDL compliance.

The study objectives will be met through an adaptive, weight-of-evidence approach that involves a series of investigations in the back basins of MdRH to include spatial and temporal surveys, an inspection of sewage infrastructure, a beach sediment investigation, an illicit boat discharge survey, and additional studies.

1. Spatial and Temporal Surveys

   Five dry-weather surveys, two wet-weather surveys, library sampling to facilitate the ribotyping technique, and a questionnaire survey will be conducted to assess relative bacterial loading and determine host origin for sources that impact Marina Beach and the back basins of MdRH.

2. Inspection of Sewage Infrastructure

   A closed-circuit television camera investigation will be conducted to look for cracks, tree roots, sedimentation, and other evidence of structural integrity problems in sewerage lines adjacent to Marina Beach.

3. Illicit Boat Discharge Investigation

   Three boat surveys will be conducted to assess the extent to which boat holding tanks and/or illicit discharge of sewage from boats may impact receiving water quality.

4. Beach Sediment Investigation

   A dry-weather and a wet-weather sediment investigation will be conducted to assess the extent to which sediment may act as a reservoir of indicator bacteria at Marina Beach.

5. Additional Studies

   Based on data collected during Tasks 1 through 4, corroborative studies will be proposed and conducted to answer very specific questions about localized suspected sources resulting from the preliminary investigation. A separate sampling and analysis plan will be submitted for each additional study to the stakeholders for approval before sampling takes place.

   Another additional study is to study on the contribution of bacteria loads from various land uses and the storm water drain system. The purpose of this additional study is to help generate data that will shed some light on the specific land uses and storm water/drain-related problems contributing to the bacterial exceedances in Basin E. Data generated from this specific study will be evaluated in context of the findings of the rest of the Non-Point Source Study to meaningfully assess the magnitude and the seriousness of the contributions from the targeted sources. Based on the data, the MDRWRA will be able to develop a more refined BMP strategy and prioritize recommended solutions to the bacteria problem in the MdRH and the Back Basins.

The Non-Point Source Study commenced in September 2005 and will be completed by October 2006, and a schedule of the study can be found in the following table.

Activity	Initiation Date	Completion Date
Task 1 –Spatial and Temporal Surveys	September 1, 2005	June 30, 2006
Task 2 – Inspection of Sewage Infrastructure	September 15, 2005	December 15, 2005
Task 3 – Illicit Boat Discharge Investigation	September 1, 2005	June 30, 2006
Task 4 – Beach Sediment Investigation	July 1, 2005	April 30, 2006
Task 5 – Additional Studies	September 1, 2005	June 30, 2006
Task 6 – Data Analysis and Reporting	May 1, 2006	October 15, 2006
Final Report	October 1, 2006	October 15, 2006

4.5.2 Additional Optional Bacteriological Studies

In recent years, there have been several key studies on bacterial indicators in receiving waters and the effects on human health. The 1996 Santa Monica Bay Epidemiological Study is the most familiar and may set the tone for much of the recent regulations and bacteria TMDLs. More recently, studies conducted by Caltrans and the Southern California Coastal Water Research Project at Mission Bay in San Diego using DNA technology have raised the possibility that traditional bacterial indicators may not necessarily correlate as well to the presence of human pathogens.

Marina Beach facing Basin D

4.5.2.1 Human Health Risk Alternative Indicators

The existing bacterial indicator tests are widely used and have several advantages, along with limitations. Tests measuring total coliform, enterococcus, fecal coliform, and total and fecal coliform ratios have been used for years to predict human health risk associated with water contact. These tests are advantageous because they are easy to perform, economical, and were based on studies indicating a relationship between bacterial indicators and human health risks such as the Santa Monica Bay Epidemiological Study.

Current bacterial indicator tests have certain limitations. The tests are not rapid. It typically takes 24 to 48 hours to analyze a sample. By the time this occurs, the original bacterial spike incident may have passed. Conversely, testing may miss a potentially high bacterial spike if the sampling is performed on a weekly or longer basis. Both the Both the Caltrans and Mission Bay studies suggest that high levels of total coliform in areas with no sewage spills or leaks do not necessarily signal the presence of harmful pathogens. Coliform is present in decaying organic plant matter such as leaves and grasses, and other sources such as decaying milk and beer. The link between fecal coliform and pathogens was also not as strong as was widely believed. The studies sometimes did not find underlying pathogens in samples with high fecal coliform counts. Testing for fate of the pollutant is not conducted due to the cost and the multiple variables that impact the results.

There is a growing movement that is suggesting other ways to more accurately predict human health risks as science advances into DNA technology. The ideal indicator would be something easy to perform, economical, and provide rapid results. It would ideally be specific to a particular pathogen or could indicate several, and could identify the type of animal/fish producing the pathogen.

4.5.2.2 Disinfection and By-Product Study

One of the ways to reduce bacterial indicator loading into the storm drain system is to disinfect various contributory and delivery infrastructure. The current practices in other fields (such as drinking water supply and wastewater) usually use electro-chemical (Ultra Violet Light, chlorine, mercuric compounds, etc.), or biological (anaerobic/aerobic) processes. At this time, there are a few proprietary/non-proprietary technologies suitable for stormwater applications. Also, the by-products created from these processes may also affect water quality, but little study has been directed in this area.

4.5.2.3 Fate of the Pollutant Bacteria Study

The present bacterial indicator testing is a snap-shot in time of the densities obtained from the field sampling. The limitation is that bacterial indicators are not stationary, but are transitory in nature. Bacterial indicator densities vary over time and their growth and decay are influenced by many bio/chemical and environmental factors.

This study would investigate the fate of the pollutant by creating a site-specific growth/decay curve for bacterial indicator densities. The benefit of this study would be to ensure that contamination within the back basins does not extend outside of those basins.

4.5.2.4 Marina del Rey Bacteria Seasonal Variation Study

Bacterial indicator densities may be affected by variations in the time of year. Seasonal climatological variations in ocean temperature, length of daylight, and atmospheric conditions can affect bacterial indicator densities. Other factors include aquatic biological occurrences such as red tides, grunion runs, fish and bird migration, etc.

4.5.3 BMP Studies

Structural BMP technology is rapidly evolving from its infancy in the early 1990's and is expected to continue its advance over the next 20 years. As the technology matures both for proprietary and non-proprietary devices, there is a need for standardized testing and effectiveness protocols and procedures. This is critical because implementing agencies need to have an accurate measure of how a structural BMP is expected to perform so that water quality solutions can be properly designed. This will also help vendors in creating and improving their products. Many of the agency's standard plans and specifications will require modification and/or new versions incorporating structural BMPs. A common set of standards could be developed and used on a watershed-wide basis.

A pilot test on a catch basin retractable screen

There is also a need for operations, maintenance, upgrade, and replacement guidelines to assist agencies in maintaining the water quality improvements achieved with these structural BMPs. Continual inspection, monitoring, and cleaning are essential (at this point) for proper structural BMP effectiveness. Again, these procedures could be used by all the agencies within the watershed to provide consistency.

Public Works is currently conducting a study to evaluate how effectively some structural BMPs are at removing pollutants from storm runoff. Caltrans has completed a similar study. More studies of this nature are needed to advance the technology of storm water pollution control.

4.5.4 Reference System Study

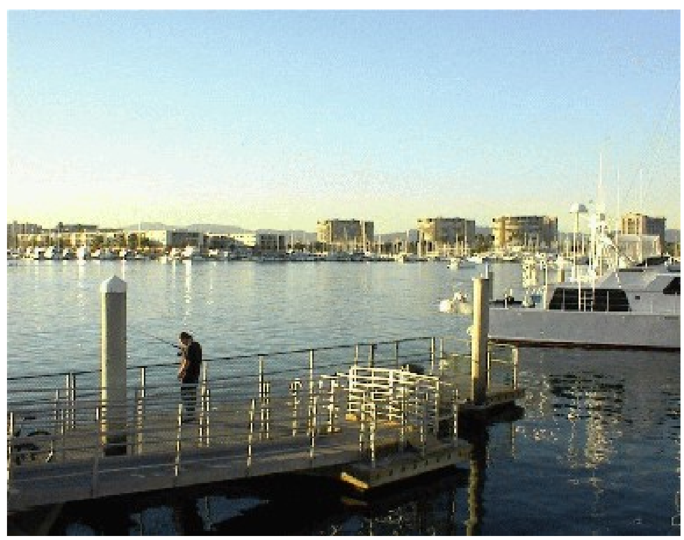
The TMDL used Leo Carrillo Beach/Arroyo Sequit Watershed as a reference system to compute allowable exceedances days. However, that reference system is most appropriate for an open beach, not an enclosed harbor. A recent survey by SCCWRP indicated that there are no suitable enclosed harbors available with no anthropogenic impact. An alternative procedure for computing exceedance days without a reference harbor has been proposed by the LARWQCB, called Natural Source Exclusion. In this procedure, any exceedances occurring after elimination of anthropogenic input would be allowed. LARWQCB should encourage SCCWRP to pursue studying this alternative method so that WLAs can be correctly calculated and applied.

4.5.5 Epidemiological Study For Beaches Not Impacted by Sewage Contamination

The recent study of Mission Bay indicated that there was no correlation between bacterial counts and illness of beachgoers. The difference between that study and the Santa Monica Bay Epidemiological Study was that there were no sewage spills or leaks discharging to Mission Bay, while Santa Monica Bay experienced input of sewage from spills or leaks. It would be extremely valuable to do a larger scale epidemiological study for Southern California beaches where there are no human inputs, in order to confirm that high coliform counts without the presence of sewage are not harmful to human health. A study of this type is extremely expensive, and would require cost sharing among all interested cities along the coast.

4.5.6 Marina del Rey Watershed Boundary Study

As noted during some of the MDRWRA meetings, there was some discussion on the official watershed boundaries from the LARWQCB. There seems to be some questions of the tributary area to the Marina Ditch. The Marina Ditch outlets into the south side back of Basin H. It is currently unclear if or how much of Ballona Wetlands and Marina Expressway are tributary to the Marina Ditch. A study should be performed using record information and new survey as necessary, to determine these contributory areas and adjust the watershed boundary accordingly.



Fishing dock at Burton W. Chace Park

4.5.7 Other

While the MDRWRA have attempted to describe the studies expected to be needed in the near future to achieve compliance, it is understood that several things may require additional studies beyond what is currently foreseen and what may arise out of the current efforts. Technology typically allows for easier, faster, and more cost-effective measurement and evaluation. Larger, more comprehensive studies may cause re-evaluation of current theory, thinking, and practices. Unforeseen factors may come into play.

4.6 Monitoring

Monitoring is expected to be a key component of the implementation plan because it provides the MDRWRA with the information to successfully meet the water quality objectives of the TMDL. The monitoring data and the resulting analysis will form one part of the basis for the iterative adaptive approach and the decisions made to revise the selected implementation measures.

4.6.1 Baseline and Effectiveness

The first step in evaluating water quality improvement program effectiveness is to establish a baseline. The procedure is generally to research the existing data and locations, determine the quality/usability, identify data gaps, and develop a program to obtain the additional data and/or resample existing locations.

There is existing water quality data for certain locations within the MdRH back basins and Marina Beach; these have been collected by the LACDBH over the last two decades. More data will be collected starting November 2005, when the MDRWRA begin implementing its CMP, which includes compliance and ambient water quality monitoring.

Once the baseline is established, then as implementation solutions are completed, the new data from compliance monitoring can be compared to analyze improvements effectiveness. This analysis, together with the cost analysis, is the two key tools in the iterative adaptive approach.

4.6.2 Analysis and Reporting

Large volumes of monitoring data are expected to be generated from compliance monitoring and ambient monitoring. Also, structural BMP performance evaluation may also generate significant data. Data need to be collected, analyzed, and reported in a consistent way so that all the MDRWRA can use it.

4.7 Estimated Implementation Costs

The estimate costs for the Low-Flow Storm Drain Diversion Program are easy to develop based on past experience and they are presented below. However, the costs associated with the remainder of the implementation plan are less easily quantified at this time, but cost range estimates are provided where possible. These costs will be refined and evaluated as the plan is implemented.

The cooperative aspect of the MDRWRA should allow flexibility in implementing and funding the different compliance programs. For example, if one of the responsible agencies is unable to implement an Institutional Controls Program, Sub-Regional Structural BMP Program, and/or PIPP, they may choose to contribute funding and/or in-kind services to the other responsible agencies.

The MDRWRA expect to expend significant funds to achieve TMDL compliance. These costs include:

- ✓ Analyzing data and prepare reports
- ✓ Developing more detailed plans for the Institutional Control and Sub-regional Structural BMP Programs
- ✓ Increasing Public Information and Participation Program
- ✓ Monitoring, including program effectiveness, research, and structural BMP effectiveness
- ✓ Costs for each control project, including design, permitting, environmental documentation, and construction/installation
- ✓ Operation, maintenance, replacement, and upgrade
- ✓ Other

The dollar figures presented in this section are in 2005 dollar value, and do not include inflation adjustment.

4.7.1 Non-Storm Water Discharge Controls

The Non-Storm Water Discharge Controls projects estimated costs are estimated to be approximately $6M as listed below:

Program	Estimated Cost Range (in million)
❖ Low-Flow Storm Drain Diversion Program	$2.76M (one time capital cost)
✓ *Sewer Service Charge**	*$0.035M per year for 16 years*
✓ *Operation and Maintenance*	*$0.1M per year for 16 years*
❖ Marina Beach Water Quality Improvement Project ✓ Increase Basin D Circulation	$2M (one time capital cost)
❖ *Marina Source ID and Control Program*	*$0.4M per year for 10 years*

*The dollar figure was provided by City of Los Angeles, based on JG2/3 LFD's.

4.7.2 Institutional Controls

The expected cost per responsible agency per year is unknown at this time. Costs are expected to be relatively modest for the responsible agencies that have small percentages of the watershed area (assuming that the cost sharing will be based on the percentage land each agency contributes) and much higher for the responsible agencies with large percentages of land area.

The MDRWRA are estimating an average range of $0.1M to $0.5M per year over the implementation phase. In the first few years of the plan implementation, costs are expected to be lower as the agencies evaluate the existing programs. Most of these initial costs are expected to be administrative. There are thirteen institutional control categories listed in Table 4.3. Each of these categories will require agency staff time to investigate and formulate enhancement recommendations to take to the implementation plan sub-group.

4.7.3 Public Information and Participation Program

The expected cost per responsible agency per year is unknown at this time. Costs are expected to be relatively modest for the responsible agencies that have small percentages of the watershed area (assuming that the cost sharing will be based on the percentage land each agency contributes) and much higher for the responsible agencies with large percentages of land area. The MDRWRA are initially estimating $0.25M per year.

The Public Information and Participation Program has many common elements and themes with the other implementation efforts for the Santa Monica Bay Beaches Bacteria TMDL implementation. MDRWRA recognize the efficiency associated with coordinating a Santa Monica Bay wide plan and may meet with the other implementation groups to combine resources. One possibility is a bay-wide or a county-wide plan for coordinated PIPP with each watershed having specific action items.

4.7.4 Sub-Regional Structural BMP Program

Currently, there are only a few examples of Sub-Regional Solutions on which to base cost estimates. The Open Charter School Project by the Los Angeles Unified School District/Tree People and Broadus Elementary School can be used for preliminary numbers. Based on these projects and the nature of the expected projects, the current estimate is between approximately $0.5 million and $1 million dollars per site. These figures can go up depending on the volume and constituents treated per site. There are seven potential sites currently identified to study for implementing the sub-regional controls. Costs include:

- ✓ Planning (5%)
- ✓ Permitting (5%)

- ✓ Environmental documents (10%)
- ✓ Design (20%)
- ✓ Construction, including construction contract administration (15%)
- ✓ Project management and administration (5%)

Costs in parentheses () are percentages of the construction costs.

Operation and maintenance costs are currently estimated to be approximately 5% of the construction cost per year, or $25K to $50K per site, per year.

4.7.5 Total Estimated Implementation Costs

The total estimated costs to implement the plan over the expected 16 years ranges from $53M to $60M and is broken down as follows:

Program	Estimated Cost Range (in million)
❖ Institutional Control Program	$0.1M to $0.5M per year
✓ 13 program elements	
❖ Public Information and Participation Program	$0.1M to $0.25M per year
❖ Non-Storm Water Discharge Controls Program (capital cost)	
✓ Low-Flow Storm Drain Diversion Program	$2.76M (one time capital cost)
✓ Marina WQ Improvement Project (Circulation)	$2M (one time capital cost)
✓ Marina Source ID and Control	$0.4M per year
❖ Storm Water Discharge Controls Program (capital cost)	
✓ Marina WQ Improvement Project (Diversion)	$1.2M (one time capital cost)
✓ Sub-regional Structural BMP Projects	$1M to $2M per site at 7 sites
✓ Regional Structural BMP Program	$20M

- Institutional Control Program: $8M to $9M
- Public Information and Participation Program: $4M to $5M
- Non-Storm Water Discharge Controls: $9M
- Sub-Regional Structural BMP Program: $10M to $15M
- Regional Structural BMP Program: $20M

Table 4.5 Summary of the Proposed Implementation Programs

Priority Sub-watershed	Impaired Back Basin	Programs	Responsible Agency				Commitment Level *			Proposed Implementation Schedule																
			LA County	LA City	Culver City	Caltrans	Initiate	Pilot/Test	Evaluate	FY05/06	FY06/07	FY07/08	FY08/09	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22
4	Basin E	**PIPP ****																								
		Inter-Agency Coordination	X	X	X		X																			
		Industry-Specific BMP Outreach	X	X	X		X																			
		Advertising	X	X	X		X																			
		Media Relations	X	X	X		X																			
		Pollutant-Specific Outreach	X	X	X		X																			
		School Outreach	X	X			X																			
		Adopt-a-Highway Program				X	X																			
		Institutional Control Program **																								
		Storm Drain System Management	X	X	X	X	X																			
		Proper Pet Waste Disposal	X	X	X		X																			
		Sanitary System Management Program	X	X	X		X																			
		Illicit Connection/Illicit Discharge	X	X	X	X	X																			
		Street Infrastructure Management	X	X	X		X																			
		Recreational and Other Public Facilities Management	X	X	X		X																			
		Public Parking Facilities Management	X	X	X		X																			
		Industry/Commercial Facilities Control Program	X	X	X		X																			
		Code and Ordinance Review Program	X	X	X		X																			
		Special/Holiday Events	X	X	X		X																			
		Business Improvement Districts	X	X	X		X																			
		Structural BMP Program																								
		Low-Flow Storm Drain Diversion Program	X				X																			
		Sub-regional Structural BMP Program																								
		Venice Boulevard				X			X																	
		Regional Solution	X	X	X	X			X																	
3	Basin E	**PIPP**																								
		Inter-Agency Coordination	X	X	X		X																			
		Industry-Specific BMP Outreach	X	X	X		X																			
		Advertising	X	X	X		X																			
		Media Relations	X	X	X		X																			
		Pollutant-Specific Outreach	X	X	X		X																			
		Adopt-a-Highway Program				X	X																			
		Institutional Control Program																								
		Storm Drain System Management	X	X	X	X	X																			
		Proper Pet Waste Disposal	X	X	X		X																			
		Sanitary System Management Program	X	X	X		X																			
		Illicit Connection/Illicit Discharge	X	X	X	X	X																			
		Street Infrastructure Management	X	X	X		X																			
		Recreational and Other Public Facilities Management	X	X	X		X																			
		Public Parking Facilities Management	X	X	X		X																			
		Industry/Commercial Facilities Control Program	X	X	X		X																			
		Code and Ordinance Review Program	X	X	X		X																			
		Special/Holiday Events	X	X	X		X																			
		Business Improvement Districts	X	X	X		X																			
		Structural BMP Program																								
		Low-Flow Storm Drain Diversion Program					X																			
		Regional Solution							X																	

Priority Sub-watershed	Impaired Back Basin	Programs	Responsible Agency				Commitment Level *			Proposed Implementation Schedule																
			LA County	LA City	Culver City	Caltrans	Initiate	Pilot/Test	Evaluate	FY05/06	FY06/07	FY07/08	FY08/09	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22
1A	Basin D, E, & F	**PIPP**																								
		Inter-Agency Coordination	X	X	X		X																			
		Industry-Specific BMP Outreach	X	X	X		X																			
		Advertising	X	X	X		X																			
		Media Relations	X	X	X		X																			
		Pollutant-Specific Outreach	X	X	X		X																			
		Adopt-a-Highway Program				X	X																			
		Institutional Control Program																								
		Storm Drain System Management	X	X	X	X	X																			
		Proper Pet Waste Disposal	X	X	X		X																			
		Sanitary System Management Program	X	X	X		X																			
		Illicit Connection/Illicit Discharge	X	X	X	X	X																			
		Street Infrastructure Management	X	X	X		X																			
		Recreational and Other Public Facilities Management	X	X	X		X																			
		Public Parking Facilities Management	X	X	X		X																			
		Boating Facilities Management	X				X																			
		Industry/Commercial Facilities Control Program	X	X	X		X																			
		Code and Ordinance Review Program	X	X	X		X																			
		Special/Holiday Events	X	X	X		X																			
		Business Improvement Districts	X	X	X		X																			
		Structural BMP Program																								
		Marina Source Identification and Control	X	X	X	X	X																			
		Marina Beach Water Quality Improvement Project	X				X																			
		Sub-regional Structural BMP Program					X																			
		Beaches & Harbor Parking Lot 5 (next to the Basin F)	X	X	X	X	X																			
		Beaches & Harbor Parking Lot 7 (next to Admiralty Park)	X	X	X	X	X																			
		Admiralty Park	X	X	X	X			X																	
		Admiralty Way Widening	X	X	X	X			X																	
		LA County Fire Station	X	X	X	X			X																	
		Marina del Rey Library	X	X	X	X			X																	

Note:

* The PIPP, the Institutional Control Program, and the Sub-regional Structural BMP Program are committed to initiated, pilot, or evaluate by some or all of the responsible agencies; however, the commitment level for each specific proposed action item in the three programs will be carried out differently by each responsible agency. Refer Table 4.1, 4.3, and 4.4.3 regarding each responsible agency's commitment level on the specific proposed action items in the three programs.

** Most of the PIPP and Institutional Control Program proposed categories will be initiated either in Phase I or Phase II and will be continued throughout the implementation cycle.

5.1 TMDL Schedules and Milestones

This section recaps the significant dates and deadlines from the TMDL and the implementation plan.

The required TMDL deliverables are:

Date	Deliverable
July 16, 2004	Compliance Monitoring Plan
July 16, 2004	Small Drain Study
July 16, 2004	Beaches and Harbors Discharge Report
Draft-March 30, 2005 Final-July 30/October 31, 2005	Implementation Plan
March 18, 2007	Non-point Source Study

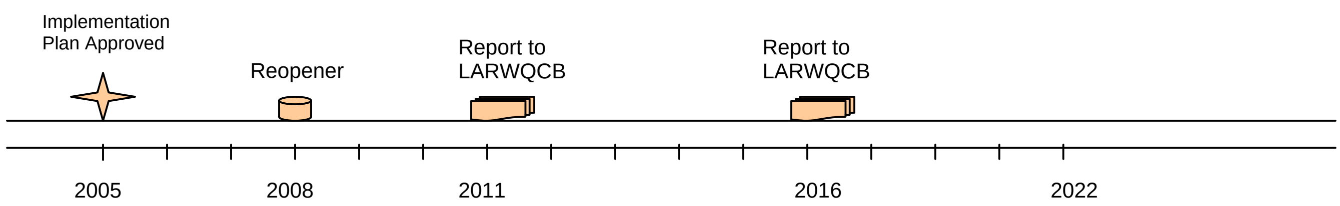
The following are the TMDL key milestone dates:

- ✓ TMDL effective date: March 18, 2004
- ✓ Dry-weather compliance: March 18, 2007
- ✓ TMDL reopener: March 18, 2008
- ✓ Wet-weather compliance: 10 or 18 years after the effective date (March 18, 2014, to March 18, 2022)

The proposed implementation schedule is as follows:

- ❖ Proposed Dry-Weather TMDL Implementation Schedule
  - ❑ Phase I
    - o Low-Flow Storm Drain Diversion Program, 2004 - March 18, 2007
    - o Marina Beach Water Quality Improvement Project (Increase Basin D Circulation), 2003 - December 2005
    - o Marina Source Identification and Control Program, 2005 – March 18, 2007

- ❖ Proposed Wet-Weather TMDL Implementation Schedule
  - ❑ Institutional Control Program, Public Information and Participation Program, Marina Beach Water Quality Improvement Project (Sheet Flow Diversion), and Sub-Regional Structural BMP Program
    - o Phase I: FY 2005 -06 – FY 2006-07
    - o Phase II: FY 2007-08 – FY 2011-12
    - o Phase III: FY 2012-13 – FY 2016-17
    - o Phase IV: FY 2017-18 – FY 2021-22



  - ❑ Regional Structural BMP Program (will initiate investigation in Phase I)

5.2 Natural Disasters, Human Acts, and Fiscal Crisis

Southern California is subject to periodic catastrophic/extraordinary events that cause significant damage to the infrastructure, economy, and human welfare. Examples of these are, but not limited to:

- ✓ Natural disasters such as fires, floods, earthquakes, tsunamis, landslides, etc.
- ✓ Human acts such as terrorism, riots, war.
- ✓ Fiscal crisis at the local, state, and federal levels.

It is recognized that these events are beyond the control of the MDRWRA. It is expected that the LARWQCB will work with the MDRWRA by allowing modifications of the timelines and actions in this plan to compensate for resource issues incurred by the MDRWRA responding to these catastrophic/extraordinary events.

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 Discharge Within the County of Los Angeles, and the Incorporated Cities therein, except the City of Long Beach," December 31, 2001.

California Regional Water Quality Control Board Los Angeles Region, "Total Maximum Daily Load to Reduce Bacteria Indicator Densities at Marina Del Rey Harbor Marina Beach and Back Basins," September 4, 2003

CH:CDM, "Santa Monica Bay Beaches Bacteria Total Maximum Daily Load Implementation Plan for Jurisdictional Groups 2 and 3," First Draft, February 1, 2005.

Edward D. Schroeder, W. Michanel Stallard, Donald E. Thompson, Frank J. Loge, Marc A. Deshussess, Huub H. J. Cox, Center for Environmental and Water Resources Engineering Department of Civil & Environmental Engineering University of California, Davis, "Management of Pathogens Associated with Storm Drain Discharge, A Report Prepared for the Division of Environmental Analysis California Department of Transportation Interagency Agreement No. 43A0073," May 2002.

City of San Diego, MEC Analytical Systems, "Mission Bay Clean Beaches Initiative Bacterial Source Identification Study", September 14, 2004.

City of Los Angeles, Meeting minutes from IRP Steering Group Workshop No. 6, July 24, 2003.

Allowable Exceedance Days: Number of days allowed to exceed the sample bacteria objectives.

Bacterial Indicators: Total coliform, fecal coliform, the fecal-to-total coliform ratio, and enterococcus are used in the Basin Plan as indicators of the likely presence of disease-causing pathogens in surface waters.

Baseline: The existing condition, existing level of, starting point

Basin Plan: The Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the LARWQCB on June 13, 1994 and subsequent amendments.

Beneficial Reuse: Multiuse projects that incorporate multiple benefits such as flood protection, aesthetics, habitat protection, parks, and open space.

Beneficial Uses: The existing or potential uses of receiving waters in the permit area as designated by the LARWQCB in the Basin Plan.

B-roll: Videotaped footage that is not included in the final edited version of a company's video news release (VNR). B-roll is given to television stations along with the VNR to give the stations the option of putting together their own version of the story, giving more time to aspects the station feels will be of particular interest to their viewers.

End-of-Pipe: Refers to the outlet of a drainage system. Usually associated with BMPs and/or large scale treatment plants.

Hot Spot: An area where high levels of a pollutant exist or are believed to exist.

Institutional Control Measures: Non-structural Best Management Practices design to prevent or minimize pollutants of concern from entering urban runoff and stormwater and ending up in the receiving water bodies.

Sub-Regional Structural BMPs: Structural Best Management Practices that intend to treat sites with only minor contributions from adjoining streets and/or property.

Low Flow Diversion: Installation of facilities to provide capture and storage of dry-weather runoff and divert the stored runoff to the wastewater collection system for treatment at the City of Los Angeles' Hyperion Treatment Plant during low flow conditions at the plant.

Main Channel: The Marina del Rey Harbor Main Entrance Channel from the Santa Monica Bay connecting the 8 main basins.

Manhole: A covered shaft in the ground to permit access to a storm drain or other underground structure.

Marketing collateral: The collection of social marketing media used to support the PIPP campaign.

Media outlet: The various mass media that can be employed to carry advertising messages to potential audiences or target markets for products, services, organizations, or ideas. These media include newspapers, magazines, direct mail advertising, Yellow Pages, radio, broadcast television, cable television, outdoor advertising, transit advertising, and specialty advertising.

Mole Road: The streets running the length of the land between the basins

Municipal Separate Storm Sewer System (MS4): 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.

Permittee(s): Agencies named in the MS4 NPDES Permit as being responsible for permit condition within its jurisdiction.

Premium: An item of value given as an additional incentive for a call to action.

Principal Permittee: The Los Angeles County Flood Control District is designated by the LARWQCB in the MS4 NPDES Permit as the Principal Permittee.

Receiving Waters: All surface water bodies in the Los Angeles Region that are identified in the Basin Plan.

Reopener: This TMDL is scheduled to be re-considered in four years from the effective date: to re-evaluate the allowable winter dry-weather and wet-weather exceedance days based on additional data on bacteria indicator densities in the wave wash; to re-evaluate the reference system selected to set allowable exceedance levels; and to re-evaluate year used in the calculation of allowable exceedance days.

Responsible Jurisdiction/Responsible Agencies: (1) Local agencies that are Permittees or Co-Permittees on the MS4 NPDES Pemrit, (2) Local or state agencies that have jurisdiction over Marina Beach or the back basins of MdRH, and (3) the California Department of Transportation pursuant to its storm water permit.

Role playing: Activity in which participants take on characteristics and/or perform actions according to directions for the activity, with the purpose of skill building, usually in the relational development area.

Sheet Flow: Any form of unconfined flow occurs over a broad area.

Social marketing: The application of commercial marketing concepts and tools to programs designed to influence voluntary behavior of target audiences where the primary objective is to improve the welfare of the target audiences and/or the society of which they are a part.

Structural BMP: Structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution.

Summer Dry Weather: Days from April 1 to October 31.

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

Training module: A unit of instruction, usually designed for the achievement of one learning objective. A lesson may be made up of a number of modules.

VNR: (Video News Release) A publicity device designed to look and sound like a television news story. The agency prepares a 60- to 90-second news release on videotape, which can then be used by television stations as is or after further editing.

Waste Load Allocations (WLAs): The TMDL's WLAs are expressed as allowable exceedance days or the maximum number of days where sampling results can surpass the established Assembly Bill 411 standards without exceeding the limits in the TMDL.

Wet Weather: Days with 0.1 inch or greater of rainfall and the three days following the rain event.

Winter Dry Weather: Dry days from November 1 to March 31.

Attachment A to Resolution No. 2003-012

Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL

Adopted by the California Regional Water Quality Control Board, Los Angeles Region on August 7, 2003.

Amendments:

Table of Contents
Add:

List of Figures, Tables and Inserts
Add:

Chapter 7. Total Maximum Daily Loads (TMDLs) Summaries, Section 7-5 (Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL)

This TMDL was adopted by the Regional Water Quality Control Board on August 7, 2003.

This TMDL was approved by:

The State Water Resources Control Board on November 19, 2003.
The Office of Administrative Law on January 30, 2004.
The U.S. Environmental Protection Agency on March 18, 2004.

The following table includes the elements of this TMDL.

Table 7-5.1. Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL: 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 Marina del Rey Harbor (MdRH) Mothers' Beach and back basins. Swimming in marine 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.[1] The objectives are based on four bacterial indicators and include both geometric mean limits and single sample limits. The Basin Plan objectives that serve as the numeric targets for this TMDL are: 1. Rolling 30-day Geometric Mean Limits 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. Single Sample Limits 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. These objectives are generally based on an acceptable health risk for marine recreational waters of 19 illnesses per 1,000 exposed individuals as set by the US EPA (US EPA, 1986). The targets apply throughout the year. The final compliance point for the targets is the point at which the effluent from a storm drain initially mixes with the receiving water where there is a freshwater outlet (i.e., publicly-owned storm drain) to the beach, or at ankle depth at beaches without a freshwater outlet, and at surface and depth throughout the Harbor. For Mothers' Beach the targets will apply at existing or new monitoring sites, with samples taken at ankle depth. For Basins D, E, and F the targets will also apply at existing or new monitoring sites with samples collected at surface and at depth.

[1] The bacteriological objectives were revised by a Basin Plan amendment adopted by the Regional Board on October 25, 2001, and subsequently approved by the State Water Resources Control Board, the Office of Administrative Law and finally by U.S. EPA on September 25, 2002.

Element	Key Findings and Regulatory Provisions
	Implementation of the above bacteria objectives and the associated TMDL numeric targets is achieved using a 'reference system/anti-degradation approach' rather than the alternative 'natural sources exclusion approach subject to antidegradation policies' or strict application of the single sample objectives. As required by the CWA and Porter-Cologne Water Quality Control Act, Basin Plans include beneficial uses of waters, water quality objectives to protect those uses, an anti-degradation policy, collectively referred to as water quality standards, and other plans and policies necessary to implement water quality standards. This TMDL and its associated waste load allocations, which shall be incorporated into relevant permits, and load allocations are the vehicles for implementation of the Region's standards. The 'reference system/anti-degradation approach' means that on the basis of historical exceedance levels at existing monitoring locations, including a local reference beach within Santa Monica Bay, a certain number of daily exceedances of the single sample bacteria objectives are permitted. 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 bacteriological water quality. This approach recognizes that there are natural sources of bacteria that may cause or contribute to exceedances of the single sample objectives and that it is not the intent of the Regional Board to require treatment or diversion of natural coastal creeks or to require treatment of natural sources of bacteria from undeveloped areas. The geometric mean targets may not be exceeded at any time. The rolling 30-day geometric means will be calculated on each day. If weekly sampling is conducted, the weekly sample result will be assigned to the remaining days of the week in order to calculate the daily rolling 30-day geometric mean. For the single sample targets, each existing monitoring site is assigned an allowable number of exceedance days for three time periods (1) summer dry-weather (April 1 to October 31), (2) winter dry-weather (November 1 to March 31), and (3) wet-weather (defined as days with 0.1 inch of rain or greater and the three days following the rain event.)
Source Analysis	Dry-weather urban runoff and storm water conveyed by storm drains are the primary sources of elevated bacterial indicator densities to MdRH Mothers' Beach and back basins during dry and wet-weather. As of December 2002, there were seven dischargers located within the Marina del Rey watershed. These dischargers were issued general NPDES permits, general industrial and/or general construction storm water permits. The bacteria loads associated with these discharges are largely unknown, since most do not monitor for bacteria. However, these discharges are not expected to be a significant source of bacteria.

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	Potential nonpoint sources of bacterial contamination at Mothers' Beach and the back basins of MdRH include marina activities such as waste disposal from boats, boat deck and slip washing, swimmer "wash-off", restaurant washouts and natural sources from birds, waterfowl and other wildlife. The bacteria loads associated with these nonpoint sources are unknown.
Loading Capacity	Studies show that bacterial degradation and dilution during transport from the watershed to the receiving water do not significantly affect bacterial indicator densities. 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. As the numeric targets must be met at the point where the effluent from storm drains initially mixes with the receiving water and back basins throughout the day, no degradation or dilution allowance is provided.
Waste Load Allocations *(for point sources)*	The Los Angeles County MS4 and CalTrans storm water permittees and co-permittees are assigned waste load allocations (WLAs) expressed as the number of daily or weekly sample days that may exceed the single sample targets identified under "Numeric Target" at a monitoring site. 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. The allowable number of exceedance days for a 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 bacteriological water quality is at least as good as that of a largely undeveloped system and that there is no degradation of existing water quality. For each monitoring site, allowable exceedance days are set on an annual basis as well as for three time periods. These three periods are: 1. summer dry-weather (April 1 to October 31) 2. winter dry-weather (November 1 to March 31) 3. wet-weather days (defined as days of 0.1 inch of rain or more plus three days following the rain event). The County of Los Angeles, City of Los Angeles, Culver City, and California Department of Transportation (CalTrans) are the responsible jurisdictions and responsible agencies[2] for the Marina del Rey Watershed. The County of Los Angeles is the primary jurisdiction

[2] For the purposes of this TMDL, "responsible jurisdictions and responsible agencies" are defined as (1) local agencies that are permittees or co-permittees on a municipal storm water permit, (2) local or state agencies that have jurisdiction over Mothers' Beach or the back basins of MdRH, and (3) the California Department of Transportation pursuant to its storm water permit.

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	because Marina del Rey Harbor is located in an unincorporated area of the County, the County is the lead Permittee in the Los Angeles County Municipal Storm Water NPDES Permit (MS4) stormwater permit, and the Marina is owned and operated by the County of Los Angeles. The responsible jurisdictions and responsible agencies within the Marina del Rey Watershed are jointly responsible for complying with the waste load allocation at monitoring locations impacted by MS4 stormwater discharges. All proposed WLAs for summer dry-weather are zero (0) days of allowable exceedances.[3] The proposed WLAs for winter dry-weather and wet-weather vary by monitoring location as identified in Table 7-5.2. The waste load allocation for the rolling 30-day geometric mean for the County of Los Angeles, City of Los Angeles, Culver City, and CalTrans is zero (0) days of allowable exceedances. As discussed in “Source Analysis”, discharges from general NPDES permits, general industrial storm water permits and general construction storm water permits are not expected to be a significant source of bacteria. Therefore, the WLAs for these discharges are zero (0) days of allowable exceedances for all three time periods and for the single sample limits and the rolling 30-day geometric mean. Any future enrollees under a general NPDES permit, general industrial storm water permit or general construction storm water permit within the MdR Watershed will also be subject to a WLA of zero days of allowable exceedances.
Load Allocations *(for nonpoint sources)*	Load allocations are expressed as the number of daily or weekly sample days that may exceed the single sample targets identified under “Numeric Target” at a monitoring site. 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. Since all storm water runoff to MdRH is regulated as a point source, load allocations of zero (0) days of allowable exceedances for nonpoint sources are set in this TMDL for each time period. The load allocation for the rolling 30-day geometric mean for nonpoint sources is zero (0) days of allowable exceedances. If a nonpoint source is directly impacting bacteriological quality and causing an exceedance of the numeric target(s), the permittee(s) under the Municipal Storm Water NPDES Permits are not responsible through these permits. However,

[3] In order to fully protect public health, no exceedances are permitted at any 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) days of allowable exceedances 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).

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	the jurisdiction or agency adjacent to the monitoring location may have further obligations to identify such sources, as described under "Compliance Monitoring" below.
Implementation	The regulatory mechanisms used to implement the TMDL will include the Los Angeles County Municipal Storm Water NPDES Permit (MS4), the CalTrans Storm Water Permit, general NPDES permits, general industrial storm water permits, general construction storm water permits, and the authority contained in Sections 13263 and 13267 of the Water Code. Each NPDES permit assigned a WLA shall be reopened or amended at reissuance, in accordance with applicable laws, to incorporate the applicable WLAs as a permit requirement. Load allocations for nonpoint sources will be implemented within the context of this TMDL. This TMDL will be implemented in three phases over a ten-year period (see Table 7-5.3), unless an Integrated Water Resources Approach is implemented (in which case compliance must be achieved in the shortest time possible but not to exceed 18 years from the effective date of the Santa Monica Bay Beaches Bacteria TMDL). Within three years of the effective date of the TMDL, there shall be no allowable exceedances of the single sample limits at any location during summer dry-weather (April 1 to October 31) or winter dry-weather (November 1 to March 31) and the rolling 30-day geometric mean targets must be achieved. The Executive Officer of the Regional Board may extend the compliance date no more than one year if he finds that there is insufficient capacity in the sewer line between Marina del Rey and the Hyperion Treatment Plant. Within ten years of the effective date of the TMDL, compliance with the allowable number of wet-weather exceedance days and rolling 30-day geometric mean targets must be achieved, unless an Integrated Water Resources Approach is implemented (in which case compliance must be achieved in the shortest time possible but not to exceed 18 years from the effective date of the Santa Monica Bay Beaches Bacteria TMDL). For those monitoring locations subject to the antidegradation provision, there shall be no increase in exceedance days during the implementation period above the estimated days for the monitoring location in the critical year as identified in Table 7-5.2. The responsible jurisdictions and the responsible agencies must submit a report to the Executive Officer by July 30, 2005 (see Table 7-5.3) describing how they intend to comply with the dry-weather and wet-weather WLAs. As the primary jurisdiction, the County of Los Angeles is responsible for submitting the implementation plan report described above. In addition, the County of Los Angeles Department of Beaches and Harbor must submit a report detailing its efforts to prohibit

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	discharges from boats in the Harbor (see Table 7-5.3). The Marina del Rey Harbor jurisdictional unit may change its primary jurisdiction by submitting a joint, written request, submitted by the current primary jurisdiction and the proposed primary jurisdiction, to the Executive Officer requesting reassignment of primary responsibility. The Regional Board intends to reconsider this TMDL, consistent with the scheduled reconsideration of the Santa Monica Bay (SMB) beaches TMDLs. The SMB beaches TMDLs are scheduled to be reconsidered in four years to re-evaluate the allowable winter dry-weather and wet-weather exceedance days based on additional data on bacterial indicator densities in the wave wash; to re-evaluate the reference system selected to set allowable exceedance levels; to re-evaluate the reference year used in the calculation of allowable exceedance days, and to re-evaluate the need for revision of the geometric mean implementation provision. The Regional Board intends to conduct a similar review of this TMDL within 4 years after the effective date. In addition, if a suitable reference watershed that is representative of an enclosed harbor has not been found by this time, the Regional Board may consider implementing a 'natural source exclusion approach subject to antidegradation policies' to the Marina del Rey Harbor in lieu of the 'reference watershed/antidegradation approach'.
Margin of Safety	A margin of safety has been implicitly included through several conservative assumptions, such as the assumption that no dilution takes place between the storm drain and where the effluent initially mixes with the receiving water, and that bacterial degradation rates are not fast enough to affect bacteria densities in the receiving water. In addition, an explicit margin of safety has been incorporated, as the load allocations will allow exceedances of the single sample targets no more than 5% of the time on an annual basis, based on the cumulative allocations proposed for dry and wet weather. Currently, the Regional Board concludes that there is water quality impairment if more than 10% of samples at a site exceed the single sample bacteria objectives annually.
Seasonal Variations and Critical Conditions	Seasonal variations are addressed by developing separate waste load allocations for three time periods (summer dry-weather, winter-dry weather, and wet-weather) based on public health concerns and observed natural background levels of exceedance of bacterial indicators. The critical condition for bacteria loading is during wet weather, when historic monitoring data for MdRH and the reference beach indicate greater exceedance probabilities of the single sample bacteria objectives then during dry-weather. To more specifically identify a critical condition within wet-weather, in order to set the allowable exceedance

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	days shown in Table 7-5.2, the 90th percentile 'storm year'[4] in terms of wet days[5] is used as the reference year. Selecting the 90th percentile year avoids a situation where the reference system is frequently out of compliance. It is expected that because responsible jurisdictions and agencies will be planning for this 'worst-case' scenario, there will be fewer exceedance days than the maximum allowed in drier years. Conversely, in the 10% of wetter years, it is expected that there may be more than the allowable number of exceedance days.
Compliance Monitoring	Responsible jurisdictions and agencies shall conduct daily or systematic weekly sampling at the initial point of mixing with the receiving water at all major drains[6], at existing monitoring stations and at other designated monitoring stations to determine compliance.[7] For Mothers' Beach the targets will also apply at existing or new monitoring sites, with samples taken at ankle depth. For Basins D, E, and F the targets will also apply at existing or new monitoring sites with samples collected at surface and at depth. Samples collected at ankle depth shall be taken on an incoming wave. At locations where there is a freshwater outlet, during wet weather, samples should be taken as close as possible to the initial point of mixing with the receiving water, and no further away than 10 meters down current of the storm drain or outlet.[8] At locations where there is a freshwater outlet, samples shall be taken when the freshwater outlet is flowing into the surf zone.[9] If the number of exceedance days is greater than the allowable number of exceedance days, the responsible jurisdictions and agencies shall be considered out of compliance with the TMDL. Responsible jurisdictions or agencies shall not be deemed out of compliance with the TMDL if the investigation described in the paragraph below demonstrates that bacterial sources originating within the jurisdiction of the responsible agency have not caused or contributed to the exceedance. If a single sample shows the discharge or contributing area to be out of compliance, the Regional Board may require, through permit

[4] For purposes of this TMDL, a 'storm year' means November 1 to October 31. The 90th percentile storm year was 1993 with 75 wet days at the LAX meteorological station.
[5] A wet day is defined as a day with rainfall of 0.1 inch or more plus the 3 days following the rain event.
[6] Major drains are those that are publicly owned and have measurable flow to the beach during dry weather.
[7] 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 by solving for the variable "X" in the following equation: (Number of wet-weather days or dry-weather days in 1993 / 365 days = X / 52 weeks), where the number of wet-weather days and dry-weather days are based on the historical rainfall record at the Los Angeles International Airport also known as "LAX".
[8] Safety considerations during wet weather may preclude taking a sample at the initial point of mixing with the receiving water.
[9] At some freshwater outlets and storm drains, during high tide conditions, the tide pushes the freshwater discharge back into the drain. As a result, sampling under these conditions is not representative of water quality conditions when the drain is flowing into the surf zone. The tide height at which this situation occurs will vary with the size, slope and configuration of the drain and the beach. Responsible agencies must ensure that samples are collected only when drains are flowing into the surf zone, not when the discharge is pushed back into the drain. Responsible agencies must submit a coordinated monitoring plan within 120 days of the effective date of the TMDL, in which this assurance should be included.

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	requirements or the authority contained in Water Code Section 13267, daily sampling where the effluent from the storm drain initially mixes with the receiving water or at the existing monitoring location (if it is not already) until all single sample events meet bacteria water quality objectives. Furthermore, if a location is out-of-compliance as determined in the previous paragraph, the Regional Board shall require responsible agencies to initiate an investigation, which at a minimum shall include daily sampling where the effluent from the storm drain initially mixes with the receiving water or at the existing monitoring location until all single sample events meet bacteria water quality objectives. If bacteriological water quality objectives are exceeded in any three weeks of a four-week period when weekly sampling is performed, or, for areas where testing is done more than once a week, 75% of testing days produce an exceedance of bacteria water quality objectives, the responsible agencies shall conduct a source investigation of the subwatershed(s) pursuant to protocols established under Water Code Section 13178. Responsible jurisdictions may wish to conduct compliance monitoring at key jurisdictional boundaries as part of this effort. If a location without a freshwater outlet is out-of-compliance or if the outlet is diverted or being treated, the adjacent municipality, County agency(s), or State or federal agency(s) shall be responsible for conducting the investigation and shall submit its findings to the Regional Board to facilitate the Regional Board exercising further authority to regulate the source of the exceedance in conformance with the Water Code. In addition, the MdR responsible jurisdictions and responsible agencies are required to conduct a study to determine the relative bacterial loading from sources including but not limited to storm drains, boats, birds, and other nonpoint sources.. Once this study is completed in three years, the Regional Board will adjust the WLAs, if appropriate, based on the study, during the scheduled review of this TMDL.

Note: The complete staff report for the TMDL is available for review upon request.

Table 7-5.2. Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL: Final Allowable Exceedance Days by Sampling Location

Compliance Deadline		3 years after effective date[1]		3 years after effective date[1]		10 years after effective date[2]	
		Summer Dry Weather ^		Winter Dry Weather ^*		Wet Weather ^*	
		April 1 - October 31		November 1 – March 31		November 1 - October 31	
Station ID	Location Name	Daily sampling (No. days)	Weekly sampling (No. days)	Daily sampling (No. days)	Weekly sampling (No. days)	Daily sampling (No. days)	Weekly sampling (No. days)
HYP (S9)	Mothers' Beach, at Lifeguard Tower	0	0	3	1	17	3
DHS (109a)	Mothers' Beach, at Playground Area	0	0	3	1	17	3
DHS (109b)	Mothers' Beach, between Lifeguard Tower and Boat Dock	0	0	3	1	17	3
DHS (109c)	Los Angeles County Fire Dock - end of main channel	0	0	3	1	17	3
DHB (MDR-8)	Mothers' Beach, near first slips outside swim area	0	0	3	1	17	3
DHB (MDR-18)	Mothers' Beach, 20 meters off of the wheel chair ramp	0	0	0	0	15	3
DHB (MDR-19)	Mothers' Beach, end of wheel chair ramp	0	0	3	1	17	3
DHB (MDR-9)	Basin F, innermost end	0	0	3	1	8	1
DHB (MDR-11)	End of Main Channel	0	0	3	1	17	3
DHB (MDR-10)	Basin E, near center of basin	0	0	3	1	17	3
DHB (MDR-20)	Basin E, in front of Tidegate from Oxford Basin	0	0	3	1	17	3

Notes: The number of allowable exceedances is based on the lesser of (1) the reference system or (2) existing levels of exceedance based on historical monitoring data.
The allowable number of exceedance days during winter dry-weather is calculated based on the 10th percentile storm year in terms of dry days at the LAX meteorological station
The allowable number of exceedance days during wet-weather is calculated based on the 90th percentile storm year in terms of wet days at the LAX meteorological station.

1. The Executive Officer of the Regional Board may extend the compliance date by no more than one year if he finds that there is insufficient capacity in the existing sewer line from Marina del Rey to the Hyperion Treatment Plant.
2. If an Integrated Water Resources Approach is implemented, the compliance period must be the shortest time possible but not to exceed 18 years from the effective date of the Santa Monica Bay Beaches Bacteria Wet-Weather TMDL.

^ A dry day is defined as a non-wet day. A wet day is defined as a day with a 0.1-inch or more of rain and the three days following the rain event.
* A revision of the TMDL is scheduled for four years after the effective date of the Santa Monica Bay Beaches TMDLs in order to re-evaluate the allowable exceedance days during winter dry-weather and wet-weather based on additional monitoring data and the results of the study of relative loading from sources including but not limited to storm drains, boats, birds and other nonpoint sources.

Table 7-5.3. Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL: Significant Dates

Date	**Action**
120 days after the effective date of the TMDL	Responsible jurisdictions and responsible agencies shall submit coordinated monitoring plan(s) to be approved by the Executive Officer. The monitoring plans shall including a list of new sites[2]* and/or sites relocated to include the point where the effluent from the storm drain initially mixes with the receiving water, at least three locations off of Mothers' Beach, and at least one location in each of the other Marina del Rey Basins (i.e., Basins A, B, C, E, F, G, and H). The plan shall include the responsible jurisdictions' and responsible agencies' recommended sampling frequency at each location. The Los Angeles County Department of Beaches and Harbors shall provide a written report to the Regional Board detailing efforts to control discharges from boats, including but not limited to the number of live-aboards and the number of pump-outs per month. The responsible jurisdictions and the responsible agencies must identify and provide documentation on small drains discharging to Mothers' Beach and the Marina del Rey Harbor. Documentation must include a report of waste discharge where necessary.
March 30, 2005 (Draft Report) July 30, 2005 (Final Report)	Responsible jurisdictions and responsible agencies shall provide a written report to the Regional Board outlining how each intends to cooperatively achieve compliance with the dry-weather and wet-weather TMDL Waste Load Allocations. The report shall include implementation methods, an implementation schedule, and proposed milestones.
3 years after effective date of the TMDL	Responsible jurisdictions and responsible agencies shall provide to the Regional Board results of the study conducted to determine the relative bacterial loading from sources including but not limited to storm drains, boats, birds and other nonpoint sources at the Oxford Flood Control Basin, Mothers' Beach, and the Harbor
3 years after effective date of the TMDL	Achieve compliance with the allowable exceedance days as set forth in Table 7-5.2 and rolling 30-day geometric mean targets during summer dry-weather (April 1 to October 31) and winter dry weather (November 1 to March 31). The Executive Officer of the Regional Board may extend the compliance date by no more than one year if he finds that there is insufficient capacity in the existing sewer line from Marina del Rey to the Hyperion Treatment Plant.
4 years after effective date of the TMDL	The Regional Board shall reconsider this TMDL to: (1) refine allowable winter dry-weather and wet-weather exceedance days based on additional data on bacterial indicator

[2] For those areas of the marina without an existing monitoring site, responsible jurisdictions and responsible agencies must establish a monitoring site if there is measurable flow from a publicly owned storm drain to the basin during dry weather.

Date	Action
	densities, an evaluation of site-specific variability in exceedance levels, and the results of the study of relative bacterial loading from sources including but not limited to storm drains, boats, birds, and other nonpoint sources, (2) re-evaluate the reference system selected to set allowable exceedance levels, including a reconsideration of whether the allowable number of exceedance days should be adjusted annually dependent on the rainfall conditions and an evaluation of natural variability in exceedance levels in the reference system(s), and if an appropriate reference system cannot be identified for this enclosed harbor, evaluate using the 'natural sources exclusion approach subject to antidegradation policies' rather than the 'reference system/antidegradation' approach , (3) re-evaluate the reference year used in the calculation of allowable exceedance days, and (4) re-evaluate whether there is a need for further clarification or revision of the geometric mean implementation provision.
10 years after effective date of the TMDL or, if an Integrated Water Resources Approach is implemented, in the shortest time possible but not to exceed 18 years from the effective date of the Santa Monica Bay Beaches Bacteria Wet-Weather TMDL	Achieve compliance with the allowable exceedance days as set forth in Table 7-5.2 and rolling 30-day geometric mean targets during wet-weather.