



California Regional Water Quality Control Board

Los Angeles Region



Alan C. Lloyd, Ph.D.
Agency Secretary

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: <http://www.waterboards.ca.gov/losangeles>

Arnold Schwarzenegger
Governor

TO: Calleguas Creek Watershed Management Plan

FROM: Elizabeth Erickson
Associate Engineering Geologist

Samuel Unger
Senior Water Resources Control Engineer, TMDL Unit #2
LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

DATE: February 11, 2005

SUBJECT: TECHNICAL COMPONENTS OF A DUCK POND AGRICULTURAL DRAIN/MUGU DRAIN/ OXNARD DRAIN #2 OC PESTICIDE, TOXICITY AND SEDIMENT TOXICITY TMDL FOR CALLEGUAS CREEK

1. Introduction

This memorandum addresses impairments of the Duck Pond/Mugu/Oxnard Drain #2 (Duck Pond/Drain #2) by pesticides, toxicity and sediment toxicity, which are part of Analytical Units #2 and #5 in the March, 1999, consent decree for Heal the Bay Inc., et al. v. Browner, Case No. 98-4825SBA. Most of the listings in Unit #5 were analyzed by the Calleguas Creek Watershed Management Plan (CCWMP), in collaboration with the US Environmental Protection Agency (EPA) and the Regional Board. However, the Duck Pond/Drain #2 TMDLs in both units were not developed by the CCWMP. This memorandum addresses these listings and is organized according to the major TMDL elements. The Regional Board staff will present this analysis to the CCWMP and other stakeholders, and will address the comments received.

2. Problem Statement

2.1 Overview

Mugu Lagoon is located entirely within the Point Mugu Naval Base, which was established shortly after WWII. Historically, a wetlands/marsh/delta surrounded Mugu Lagoon, portions of which were drained for agricultural and recreational purposes during the last century. Pesticide use by farmers, combined with Naval Base activities, increased contamination in the water and sediments, and led to elevated levels of pesticides in fish tissue. Several water segments were first listed on the EPA 1994 303(d) list for pesticides and sedimentation and remained on the 2002 303(d) list for Chem A,¹ DDT, chlordane, toxaphene, toxicity and sediment toxicity. The

¹ According to the National Academy of Sciences, the definition of Chem A is aldrin, dieldrin, endrin, heptachlor, heptachlor epoxide, total chlordane, hexachlorocyclohexane (including lindane), total endosulfan and toxaphene. These constituents cannot exceed the recommended guidelines either individually or in combination.

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1999 consent decree established a timetable for the development of TMDLs, including two for the Duck Pond/Drain #2 within Unit #5, and one within Unit #2, both due by March, 2005.

2.2 Water Quality Standards

There are twelve existing and potential beneficial uses for Mugu Lagoon, which are impaired due to elevated levels of pesticides and unknown toxicity. The Duck Ponds/Drain #2 share these uses through the Tributary Rule, which assigns the beneficial uses of major rivers to their tributaries. Existing beneficial uses include the preservation of biological habitats (BIOL), the preservation of estuarine, wetland and marine habitats (EST, WET, MAR), and the enhancement of habitats for wildlife (WILD) and for rare, threatened or endangered species (RARE). Additional beneficial uses include the migration of aquatic organisms (MIGR), the preservation of habitat for spawning (SPWN), the use of water for non-contact activities (REC2), commercial and sport fishing (COMM), and the navigation of vessels (NAV). Use of water for contact activities (REC-1) is a potential impairment.

The Basin Plan (Section 3) contains the following applicable water quality objectives:

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.

Under Toxicity, the Basin Plan also determined compliance with this objective “by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the State or Regional Board.” Separate tests for acute and chronic toxicity are also specified.

3. Current Conditions

The large number of drainage ditches across the Oxnard plain has lead to confusion about the names of the waterways and which waterways were impaired. Correct locations of the Duck Ponds, Oxnard Drain #2, Mugu Lagoon, Revolon Slough and Calleguas Creek are labeled in Figure 1. For the purposes of this TMDL, Drain #2 is assumed to be contiguous, connected by culverts underneath the Naval Base runway.²

² The segment connecting Drainage #2 to Mugu Lagoon is labeled on the EPA Enviromapper as Oxnard Drain #3.



Figure 1: The location of the Duck Ponds and Oxnard Drain #2, in relation to Mugu Lagoon, Calleguas Creek, and Revolon Slough.



This TMDL addresses impairments in the Duck Ponds and Oxnard Drain #2. Less extensive water quality sampling occurred in these water segments, compared to Revolon Slough, which was included in watershed-wide sampling by the CWMP. Sampling of the Duck Pond/Drain #2 is included in the implementation plan for this TMDL, to verify similarities between the Drain #2 and Revolon Slough.

4. Numeric Targets and Allocations:

Numeric targets for the Duck Pond/Drain #2 are for sediments and water, for both known and unknown sources of toxicity. Targets are similar to those outlined for water segments in the Calleguas Watershed. Table 1 lists numeric targets for known sources, including ChemA, DDT, chlordane, and toxaphene. Targets are also set for DDD and DDE, since the parent constituent, DDT, degrades rapidly.

Table 1. Numeric targets for known sources of toxicity in water and fish tissue, which are used to derive targets for sediments, from Table 39 pg 50, Calleguas Creek Watershed OC Pesticide and PCBs TMDL (CCWMP, 1/31/05)

Constituent	CTR** Water Quality Targets (ug/L)		Fish Tissue Targets, TTRLs** (ug/Kg)	Sediment Guidelines (ug/dry Kg)	
	Freshwater	Marine		Freshwater TEL**	Marine TEL**
Aldrin	3.0*	1.3*	0.050	NA	NA
Dieldrin	0.056	0.0019	0.65	2.9	0.72
Endrin	0.036	0.0023	3200	2.7	NA
Heptachlor	0.0038	0.0036	2.4	NA	NA
Heptachlor Epoxide	0.0038	0.0036	1.2	0.6	NA
HCH (alpha-BHC)	NA	NA	1.7	NA	NA
HCH (beta-BHC)	NA	NA	6.0	NA	NA
HCH (delta-BHC)	NA	NA	NA	NA	NA
HCH (gamma BHC)	0.95*	0.16*	8.2	0.94	NA
Endosulfan	0.056	0.0087	65,000	NA	NA
DDD	NA	NA	45	3.5	1.2
DDE	NA	NA	32	1.4	2.07
DDT	.001	.001	32	NA	1.19
Chlordane	0.0043	0.0040	8.3	4.5	2.3
Toxaphene	.00020	.00020	9.8	NA	NA

*No chronic criteria exist; acute criteria (based on Criteria Maximum Concentration) are used instead.

** CTR=California Toxics Rule, TTRL= Tissue Threshold Residue Level, TEL=Threshold Effect Level

To address toxicity of unknown causes in water, the No-Observed-Effects Concentration (NOEC) is used, where NOEC is defined as the highest concentration of toxicant to which organisms are exposed, that causes no observable effect on survival and no observable effect on growth and reproduction. This means there is no significant difference between the test solution and the control, as determined by hypothesis testing.

To address toxicity of unknown causes in sediments, the sediment quality triad is recommended. This approach was used by the Water Resources Control Board Bay Protection and Toxics Cleanup program (BPTCP) (SWRCB, 1998). The State Water Resources Board has used this methodology to develop sediment quality objectives for enclosed bays and estuaries. As the name implies, this analysis is three-fold, and includes tests for sediment toxicity, sediment chemistry and a measure for the health of the biological community.³ Results are compared to a reference site, or to a clean control (the latter is more conservative).

³ For the BPTCP study, biological assessment focused on the benthic infaunal community, and was evaluated using a Relative Benthic Index (Ibid.)



Table 2. Numeric targets for unknown toxicity

Location	Substrate and Units	
Duck/Mugu/Ox#2	water	NOEC
Duck/Mugu/Ox#2	sediment	Use the sediment quality triad, and compare to reference site

5. Source Analysis6. Linkage Analysis

For Source Analysis and Linkage Analysis, please see Sections 5 and 6 in both of the following documents:

Larry Walker Associates. (2004). Interim Draft, Calleguas Creek Watershed Toxicity TMDL, December, 2004.

Larry Walker Associates. (2005). Draft, Calleguas Creek Watershed OC Pesticides and PCBs TMDL, Jan. 31, 2005.

7. TMDL and Allocations

Sources for most pesticides and contaminants in the Duck Pond/Drain #2 include agricultural and urban runoff. Allocations are provided for each, which are comparable to those applied to Revolon Slough (see Table 3). Phased and final allocations are used, to account for natural attenuation and implementation efforts. There are no POTWs near the Duck Pond/Drain #2; therefore, there are no separate allocations for POTWs. Also, there are no sediment allocations for some of the ChemA constituents, which were listed as "Category-2" in the TMDL (pg 29, Ibid.). Due to the low or non-detect levels found during the watershed-wide sampling, these constituents do not cause impairment of beneficial uses, and only water and fish tissue targets were assigned (pg. 99, Ibid.).

Table 3. Wasteload allocations for agricultural and urban runoff for pesticides in sediments (ug/g). (Table 66, 69 pg. 101, 104 OC Pesticide and PCBs TMDL, 1/31/2005)

Constituent	Chlordane	DDD	DDE	DDT	Dieldrin	Toxaphene
	Phased Final	Phased Final	Phased Final	Phased Final	Phased Final	Phased Final
Duck/Mugu/Ox#2	.048 .0009	.399 .0012	1.595 .0014	.685 .0003	.00057 .0001	.7852 .0010

Table 4. Final water and fish tissue load allocations for agriculture and urban runoff for Category-2 constituents. (Table 67, 70 pg. 102, 105 OC Pesticide and PCBs TMDL, 1/31/2005)

Constituent	Aldrin	Endosulfan	Endrin	HCH (gamma BHC)	Heptachlor	Heptachlor epoxide
Final Annual Avg. Water (ug/L)	3*	NA	0.036	0.95	0.0038	0.0038



Final Annual Avg. Fish Tissue (ug/Kg)	0.05	NA	3220	8.2	2.4	1.2
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* No chronic criteria exist, so criteria for acute criteria are used.

Table 5. Wasteload allocations for agricultural and urban runoff for unknown toxicity in water and sediments.

Location	Substrate and Units	
Duck/Mugu/Ox#2	water	NOEC
Duck/Mugu/Ox#2	sediment	Use the sediment quality triad, and compare to reference site

8. Implementation Plan

(1) Year 1:

Monitoring: The monitoring plan outlined in the Calleguas Creek OC Pesticide and PCBs TMDL will be extended to include the Duck Ponds, and the results will be compared to conditions in Revolon Slough. Monitoring plans described in the Conditional Waiver for Irrigated Lands, the MS4 urban runoff permit for Oxnard and stormwater monitoring by the Ventura County Watershed Protection District (VCWPD), will be expanded to include this assessment.

Sediment Toxicity and Habitat study support: The assessment of sediment toxicity will be completed in the Duck Ponds by either the CMWP, Oxnard MS4 or VCWPD, to evaluate impairments. Results from the Mugu Lagoon habitat assessment will be combined with these results on the Duck Ponds to determine whether impairments are sufficiently addressed.

(2) Years 2-5:

Linkage Assessment: If monitoring results reveal differences between the Duck Ponds and Revolon Slough, a recommendation to review the TMDL numeric targets, allocations and implementation plan will be presented to the Regional Board.

(3) Year 5

Objective Attainment Assessment: If monitoring results do not show improvement, a recommendation/work plan will be prepared for the Regional Board demonstrating how standards may be achieved within the following year.

(4) Year 6

Attainment of Water Quality Objectives in Duck Pond Agricultural Drain/Mugu Drain/Oxnard Drain #2



References

California State Water Resources Control Board (SWRCB), California Los Angeles Regional Water Quality Control Board, California Department of Fish and Game, University of California, Santa Cruz, San Jose State University. (1998). Sediment Chemistry, Toxicity, and Benthic Community Conditions in Selected Water Bodies of the Los Angeles Region. August, 1998.

Larry Walker Associates. (2004). Interim Draft, Calleguas Creek Watershed Toxicity TMDL, December, 2004.

Larry Walker Associates. (2005). Draft, Calleguas Creek Watershed OC Pesticides and PCBs TMDL, Jan. 31, 2005.

