



Organochlorine Compounds TMDLs

Upper and Lower Newport Bay

Rhine Channel

San Diego Creek

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Context of these TMDLs

- TMDLs for Toxic Pollutants – San Diego Creek and Newport Bay, CA
 - Promulgated by USEPA in June 2002
 - Included the following constituents:
 - OP Pesticides – Diazinon, chlorpyrifos
 - BPA adopted by RB 2003 (R8-2003-0039)
 - Organochlorine Compounds
 - Selenium
 - Metals
 - Chromium and mercury in Rhine Channel



Outline

- CEQA Scoping
- History of the TMDLs
- Technical TMDLs (with staff's proposed revisions) and Allocations
- Proposed Implementation Plan



California Environmental Quality Act (CEQA)

- Basin planning process is subject to CEQA requirements
- State Board's water quality planning process has been certified as "functionally equivalent" to the requirements of CEQA
 - Exempt from requirement to prepare an Environmental Impact Report or Negative Declaration and Initial Study (CCR Title 14, §15251(g))

CEQA (cont'd)

- Environmental documents required for basin planning actions are:
 - A written report
 - A draft of the Basin Plan Amendment
 - A completed Environmental Checklist

CEQA (cont'd)

- Economic Considerations
 - Must be evaluated when rules are adopted that require the installation of pollution control equipment or establish a performance standard or treatment requirement
 - Must be evaluated prior to implementation of any agricultural water quality control program
 - Total cost of program
 - Identification of potential sources of financing

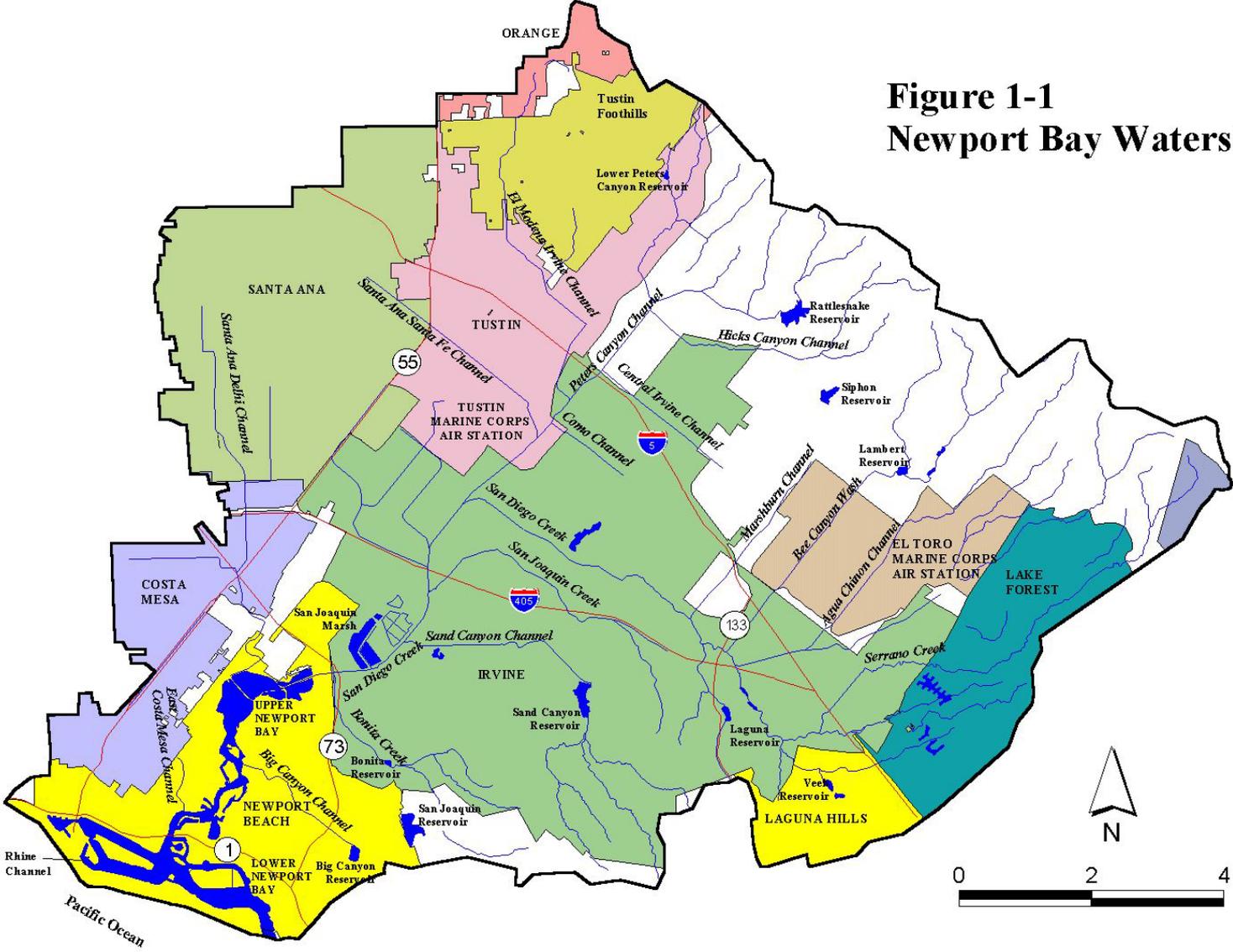


Watershed Characteristics

- 154 square miles
- Cities include Orange, Tustin, Santa Ana, Irvine, Lake Forest, Laguna Hills, Costa Mesa, and Newport Beach
- Average rainfall \approx 13 inches per year
- Hydrology has been greatly altered compared to historic conditions
- San Diego Creek is main freshwater drainage
- Upper Newport Bay estuary contains an important state ecological reserve



**Figure 1-1
Newport Bay Watershed**



Land Use Data Provide by Orange County, March 2002

	Land Use	San Diego Creek Watershed		Newport Bay Watershed	
		Acres	Percent	Acres	Percent
	Vacant	21,910	28.5	23,462	23.9
	Residential	11,668	15.2	19,420	19.7
	Education/Religion/Recreation	15,811	20.6	17,393	17.7
	Roads	10,295	13.4	15,774	16.0
	Commercial	6,381	8.3	9,641	9.8
	Industrial	3,965	5.2	5,263	5.4
	Agriculture	5,092	6.6	5,147	5.2
	Transportation	1,177	1.5	1,326	1.3
	No code	440	0.6	936	0.9
	Total	76,739	100	98,362	99.9



Background

- San Diego Creek and Newport Bay listed as impaired in early 1990s
- Pollutants of concern were:
 - Pesticides, metals, sediments, nutrients, toxicity for San Diego Creek
 - Nutrients, pathogens, sediments, pesticides for Upper Newport Bay
 - Metals and PCBs for Rhine Channel
 - Chlordane, DDT, chlorpyrifos, endosulfan, other pesticides, nutrients, algae, pathogens for Lower Bay

Background (cont'd)

- Regional Board (RB) staff began TMDL development for sediments, nutrients, and pathogens
 - Sediment TMDLs for SD Creek and Newport Bay
 - BPA adopted 1998, Order 98-101
 - Nutrient TMDLs for SD Creek and Newport Bay
 - Order 98-9 as amended by Resolution 98-100
 - Fecal Coliform TMDL for Newport Bay
 - BPA adopted 1999, Order 99-10

Background (cont'd)

- Consent decree entered into between USEPA and Defend the Bay, October 1997
 - Defend the Bay, Inc. v. Marcus (N.D. Cal. No. C97-3997 MMC)
 - Defined a schedule of completion for TMDLs; schedule based on RB staff's projected timeline for TMDL development

Background (cont'd)

- 303(d) listings for “toxics” and “pesticides,” for the most part, did not identify specific toxicants – needed further evaluation
- RB Staff completed Final Problem Statement for Toxic Substances - December 2000

Background (cont'd)

- Consent Decree deadline for USEPA's completion of Toxics TMDLs was January 2002; extended to June 2002
- Technical TMDLs for Toxic Substances promulgated by USEPA June 2002
 - Technical TMDLs do not include implementation plan

TMDL Constituent Comparison

	Regional Board Staff	Consent Decree	USEPA*
San Diego Creek	PCBs, DDT, Toxaphene	Endosulfan, DDT, PCBs, Toxaphene	<i>Chlordane, Dieldrin, DDT, PCBs, Toxaphene</i>
Upper Newport Bay	PCBs, DDT	Endosulfan, DDT	<i>Chlordane, DDT, PCBs</i>
Lower Newport Bay	PCBs, DDT	Chlorbenseide, Chlordane, Dieldrin, Endosulfan, DDT, PCBs, Toxaphene	<i>Chlordane, Dieldrin, DDT, PCBs</i>
Rhine Channel	PCBs, DDT		<i>Chlordane, Dieldrin, DDT, PCBs</i>

* Technical TMDLs include 16 waterbody-pollutant combinations.



Where We are Now

- RWQCB must incorporate TMDLs for Toxic Substances, with implementation plans, into the Basin Plan, including:
 - USEPA Technical TMDLs with some revisions proposed by RB staff
 - Implementation Plan developed by RB Staff



Anticipated Schedule for Completion

- Public meeting/CEQA scoping 6/22/05
- Presentation to the Regional Board – 6/24/05
- Peer Review 9/1/05
- 1st Public Workshop 9/30/05
- Regional Board consideration of adoption of Basin Plan Amendment 1/06

Identification of TMDLs

Water Bodies	TMDL Constituents
San Diego Creek	Chlordane, Dieldrin, DDT, PCBs, Toxaphene
Upper Newport Bay	Chlordane, DDT, PCBs
Lower Newport Bay	Chlordane, Dieldrin, DDT, PCBs
Rhine Channel	Chlordane, Dieldrin, DDT, PCBs



Pollutant Properties

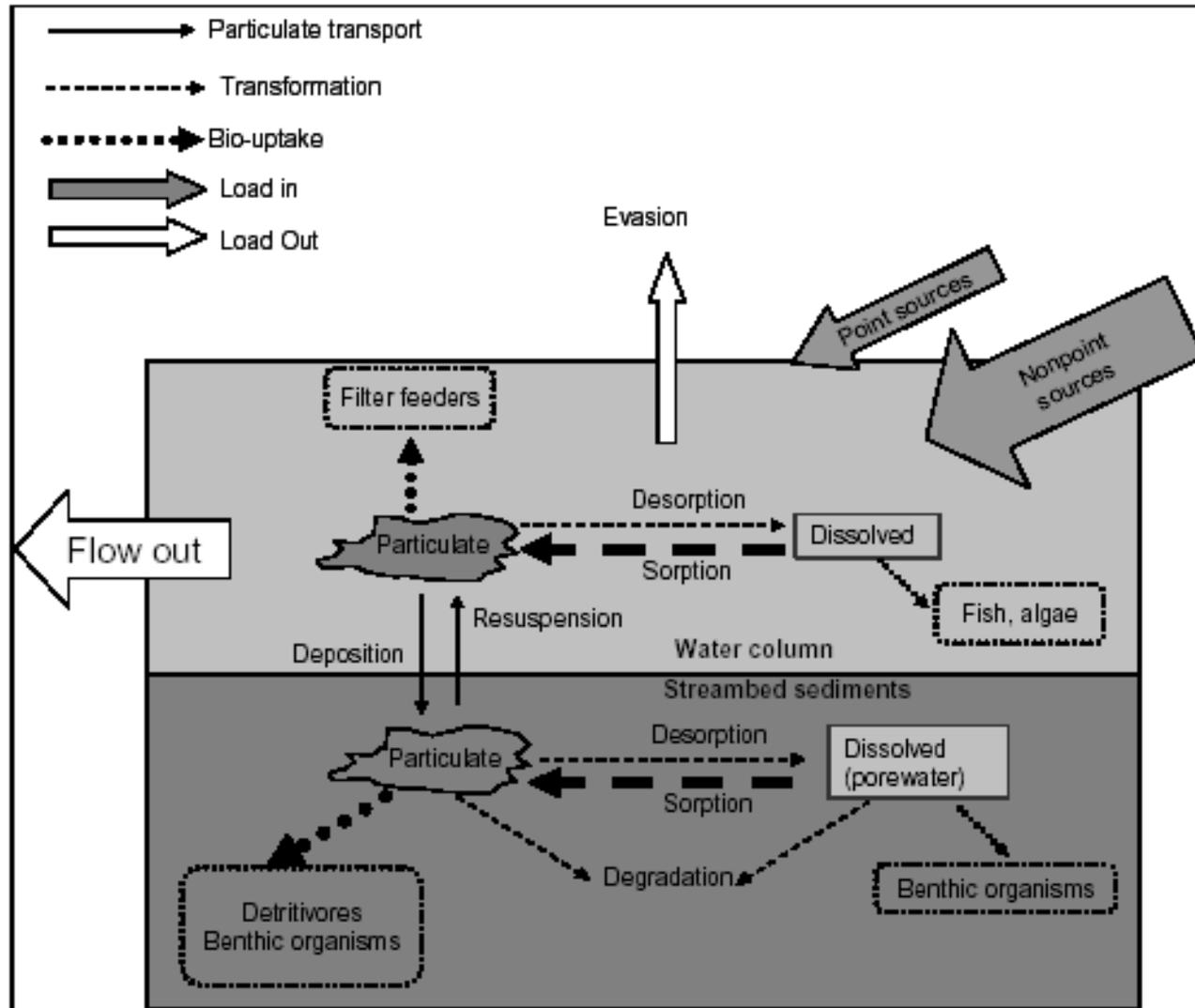
- Legacy pesticides historically used on agricultural crops and in urban areas
- PCBs used in transformers and as lubricants
- Uses banned in the U.S. for one or more decades
- Strongly persistent in the environment; associated with the organic fraction of fine sediments
- Low solubility in water

Biomagnification



All OCs pollutants bioaccumulate in plants and fatty tissues of fish, birds, and mammals. DDT linked to reproductive failure in bald eagle; also adverse effects to peregrine falcon, brown pelican and osprey

System Complexity



What is a TMDL?

- **Total Maximum Daily Load:** The maximum amount of a pollutant that can a waterbody can receive and still attain water quality standards (i.e., meet applicable water quality objectives and support all beneficial uses)
- TMDL development triggered by placement on CWA 303(d) list of impaired waterbodies; development of OCs TMDLs considered a high priority
- $TMDL = WLA + LA + MOS$



TMDL Elements

- Problem Statement
- Numeric Targets
- Source Analysis
- Loading Capacity/Linkage Analysis
- TMDL and Allocations
- Seasonal Variation/Critical Conditions
- Margin of Safety
- Implementation Plan



Problem Statement

- In the early 1990s, Newport Bay and San Diego Creek were placed on the CWA Section 303(d) list due to violations, or threatened violations, of Basin Plan narrative water quality objectives for toxic substances.
- Note that there were no numeric water quality objectives for toxic pollutants until CTR criteria were promulgated in 2000.



Water Quality Objectives for Toxic Substances

- (1) Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health; and
- (2) The concentration of toxic substances in the water column, sediment, or biota shall not adversely affect beneficial uses.

Water Body	Beneficial Use															WILD	RARE	SPWN	MAR	SHEL	EST
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL							
Lower Bay	+					X		X	X	X						X	X	X	X	X	
Upper Bay	+							X	X	X				X	X	X	X	X	X	X	X
San Diego Creek Reach 1	+							X	X		X					X					
San Diego Creek Reach 2	+																				
Other tributaries	+																				



Data Sources

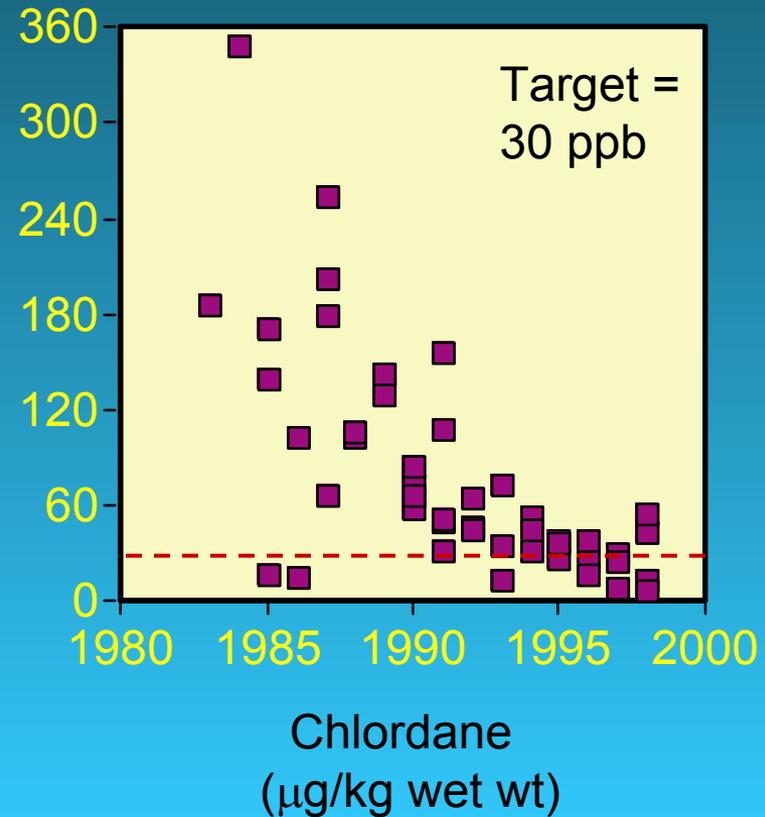
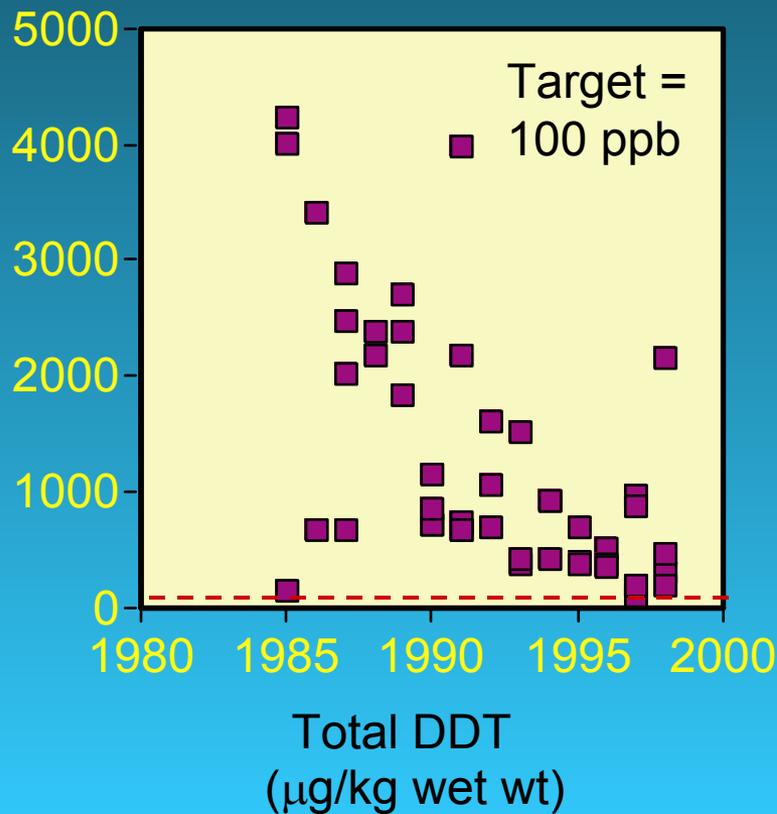
- State Mussel Watch Program (SMW)
- Toxic Substances Monitoring Program (TSMP)
- Bay Protection & Toxic Cleanup Program (BPTCP)
- Orange County RDMD
- Irvine Ranch Water District (IRWD)
- SCCWRP Sediment Toxicity Study (preliminary data 2001)
- Resource Management Associates (RMA) modeling reports



Impairment Assessment

- USEPA used a weight of evidence approach to determine which toxic substances required TMDLs
 - Water Column Concentrations
 - Sediment Concentrations
 - Tissue Concentrations

Toxic Substances Monitoring Program San Diego Creek



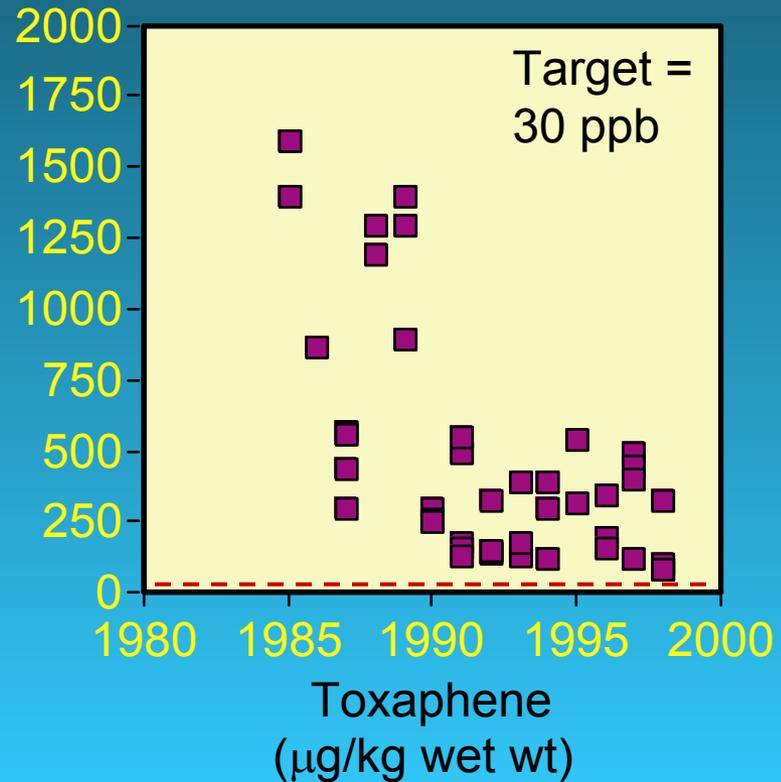
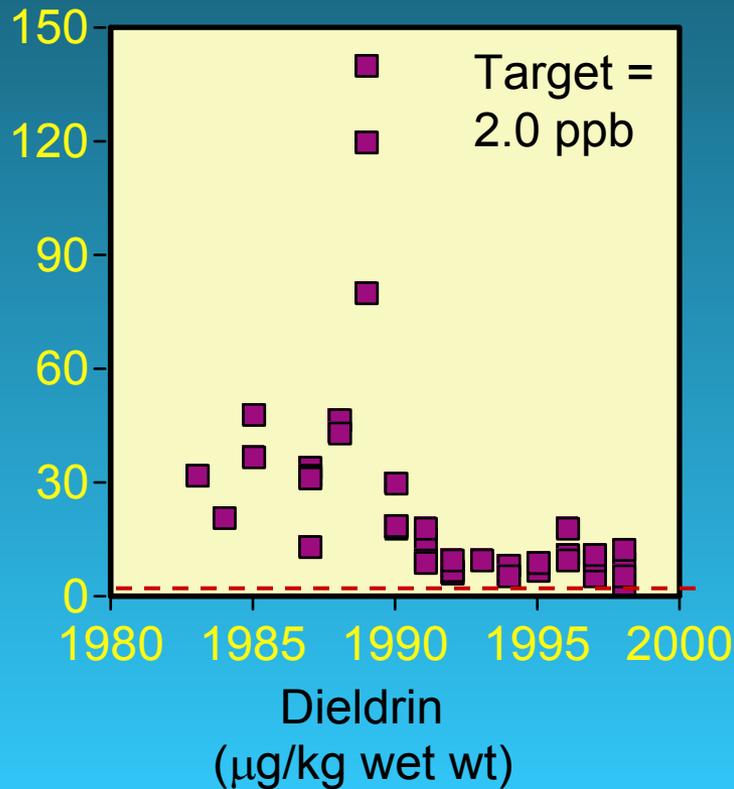
*Fish sampled were primarily red shiner.



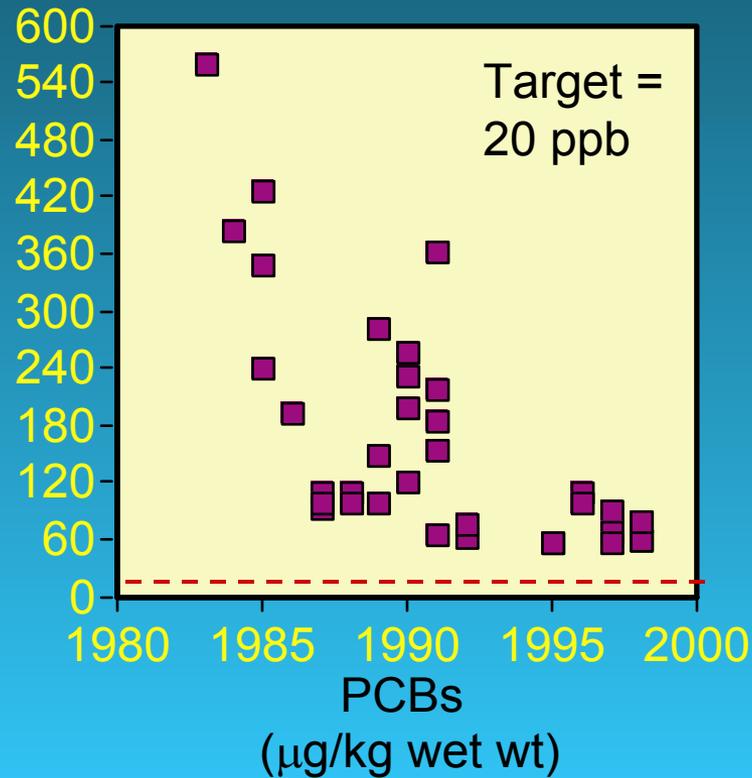
OEHHA Fish Tissue Screening Values

- OEHHA = California Office of Environmental Health Hazard Assessment
- Intended to identify chemical concentrations that may be of human health concern for frequent consumers of sport fish.
- Not a trigger for consumption advisories; identify where more investigation needed
- Calculated for the 1:100,000 cancer risk for a 70 kg adult who eats 21 grams per day of fish

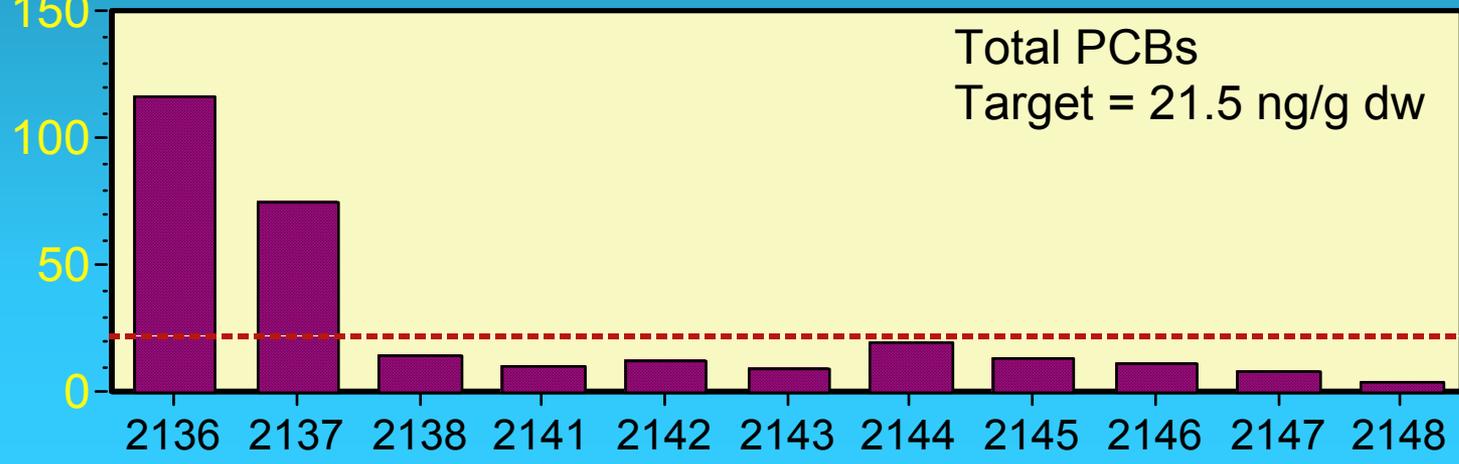
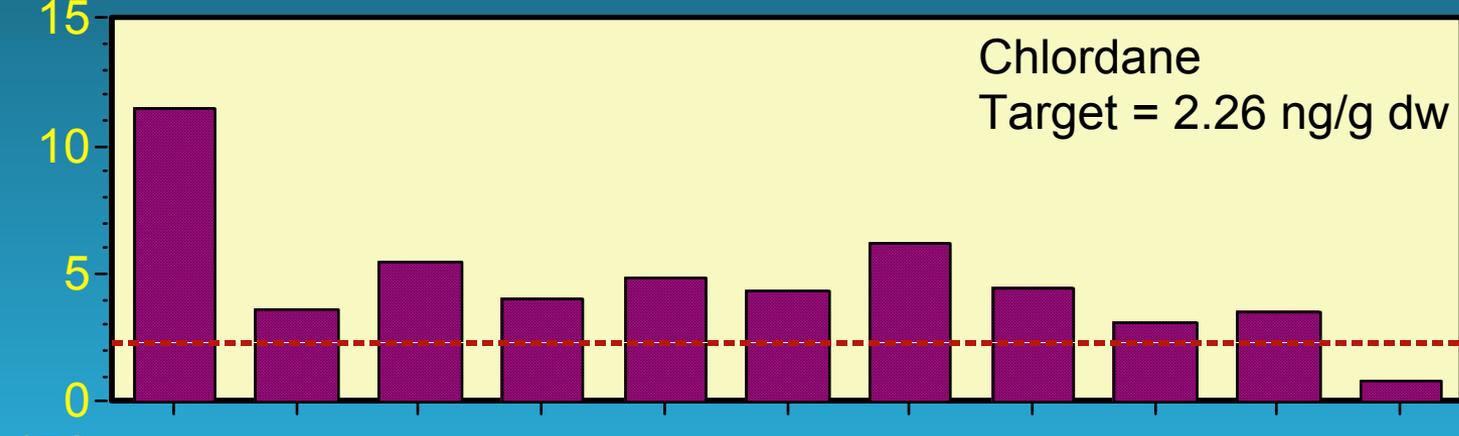
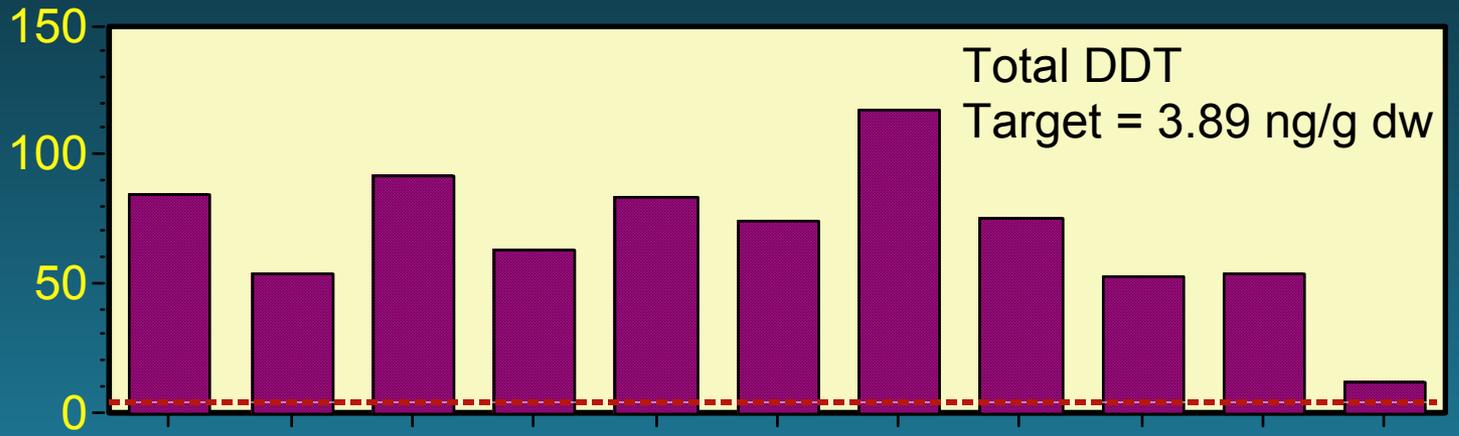
Toxic Substances Monitoring Program San Diego Creek



Toxic Substances Monitoring Program San Diego Creek



BIGHT '98
Lower
Bay

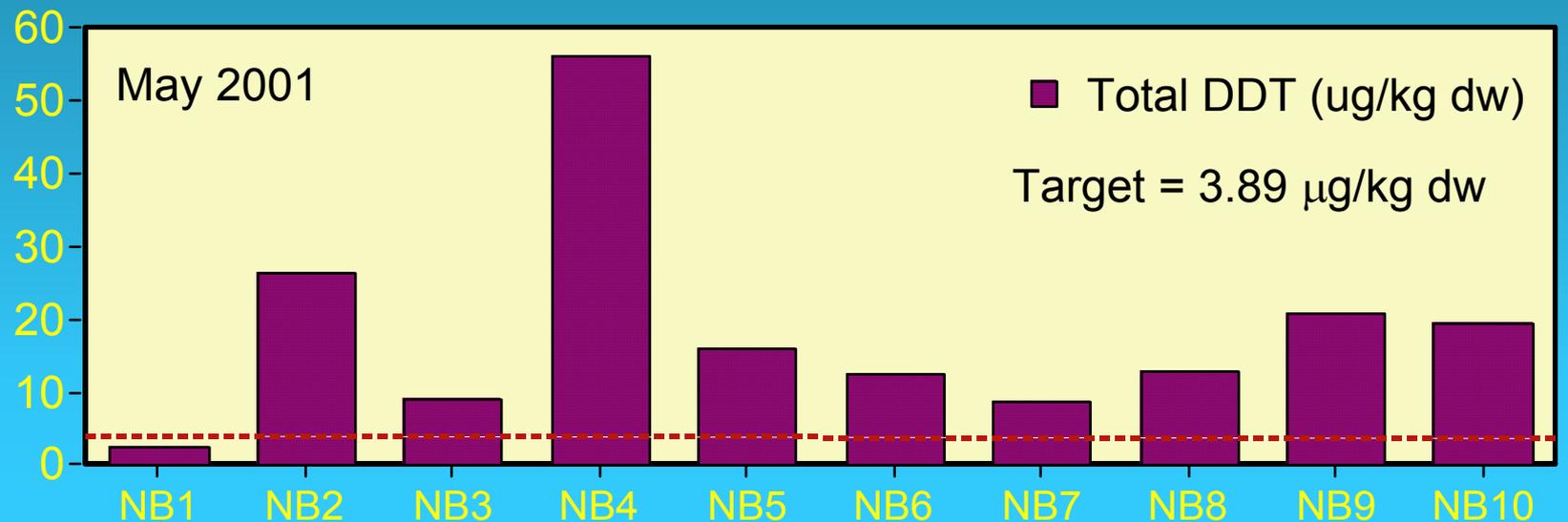
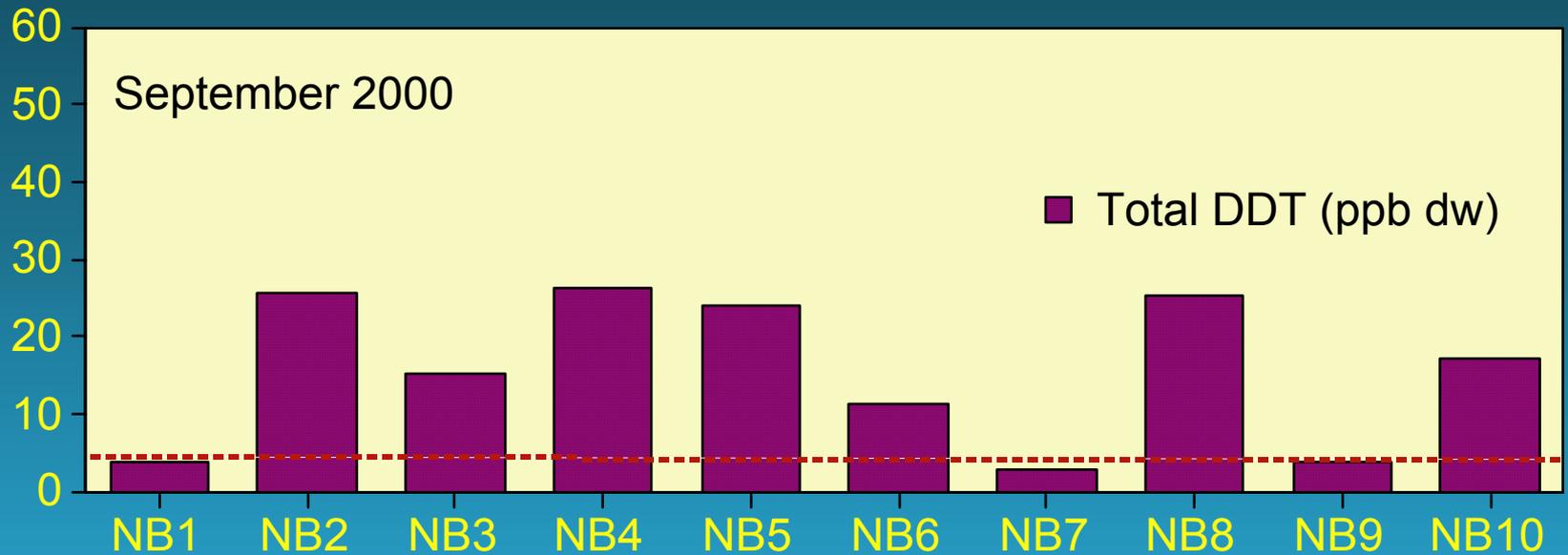




NOAA Threshold Effects Levels (TELS)

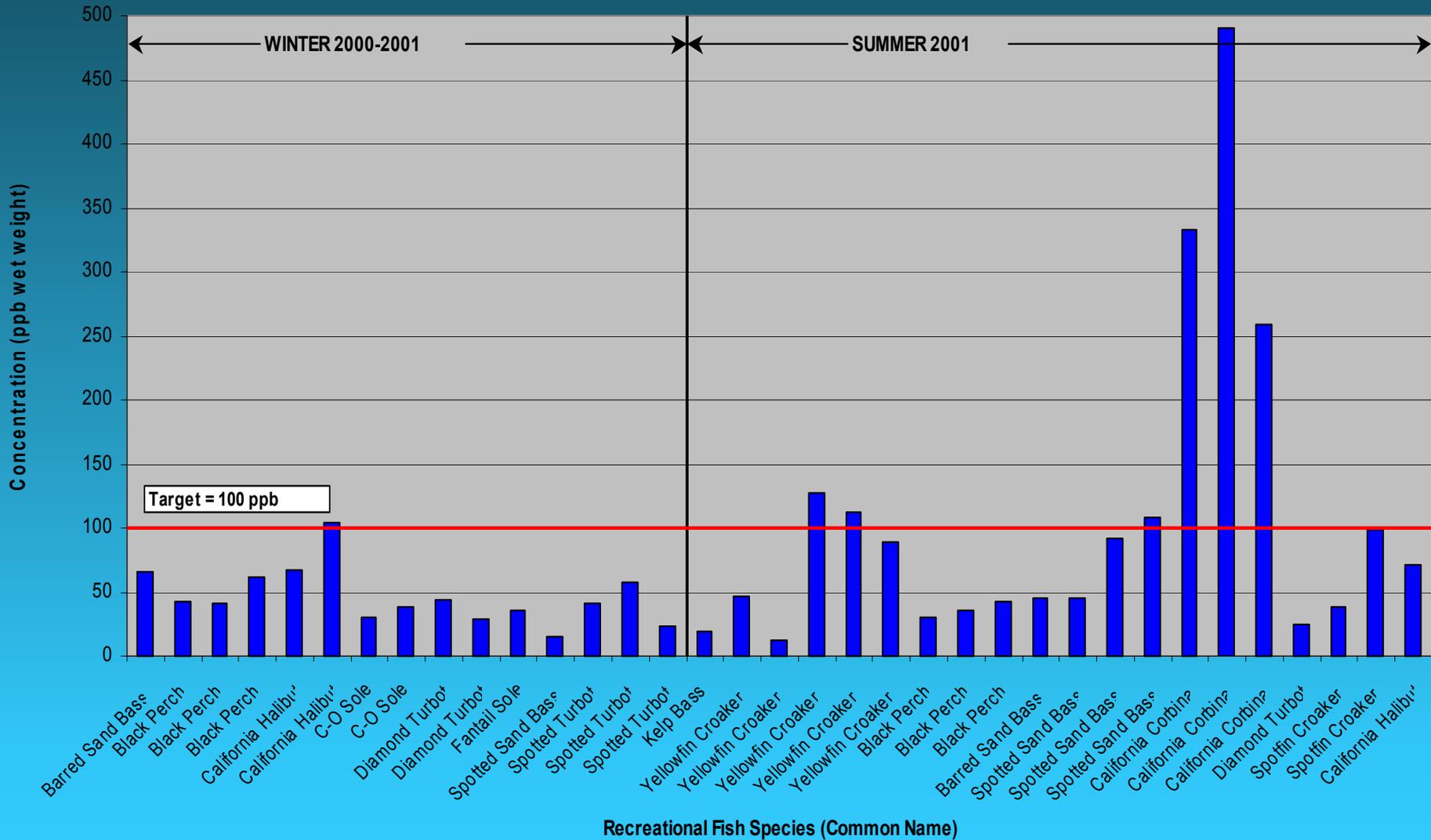
- NOAA = National Oceanic & Atmospheric Administration
- Sediment Quality Guidelines (SQGs) are preliminary screening values used to identify substances that could adversely affect coastal resources
 - Not intended as regulatory criteria or clean-up levels
 - Based on toxicity to benthic organisms
 - TELs apply statistics to a nationwide data set, and represent the concentration below which adverse effects are expected to occur only rarely

SCCWRP Sediment Toxicity Study (2004)



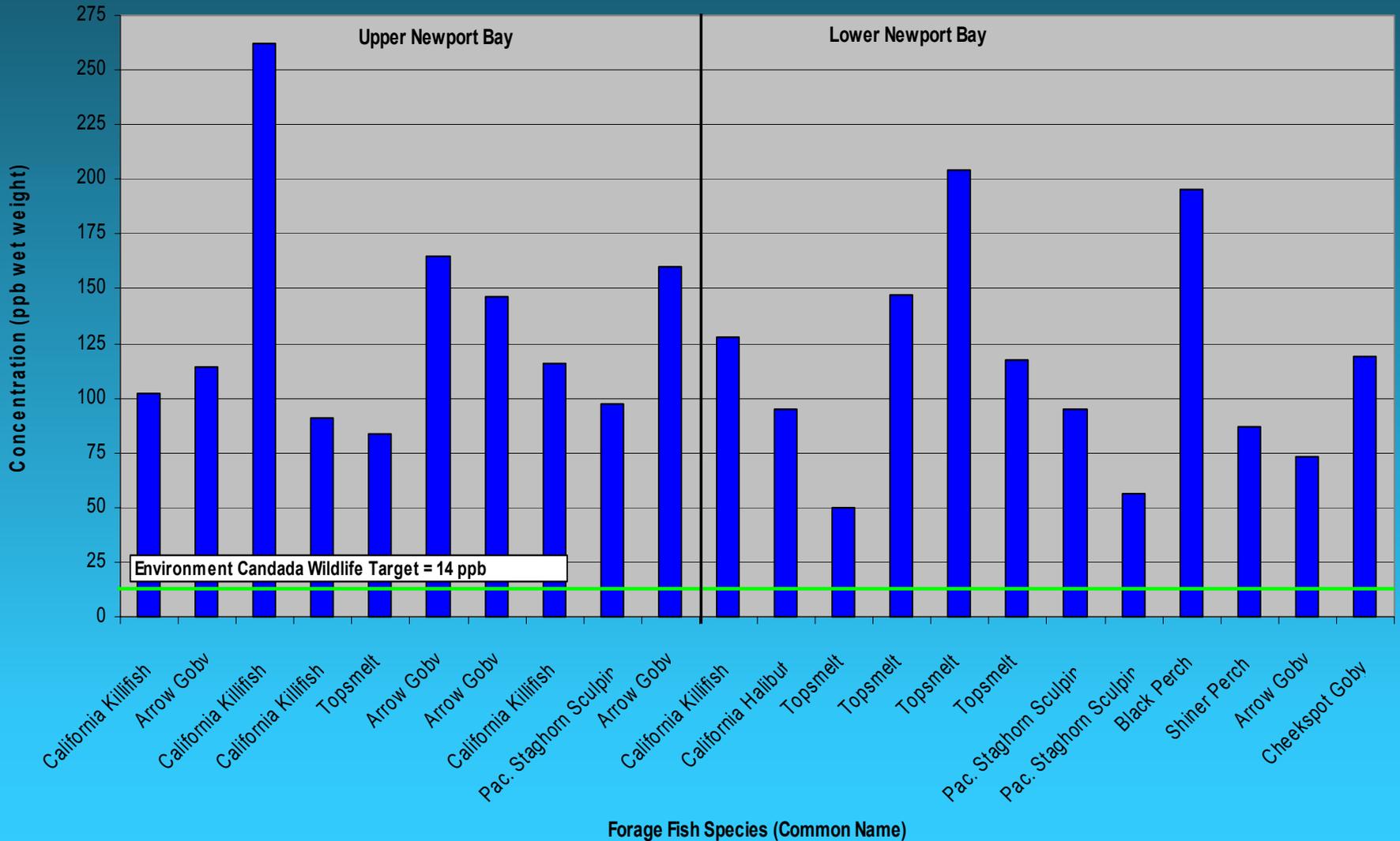
SCCWRP Fish Bioaccumulation Study

Total DDT Tissue Residues in Fish Filets, Lower Newport Bay

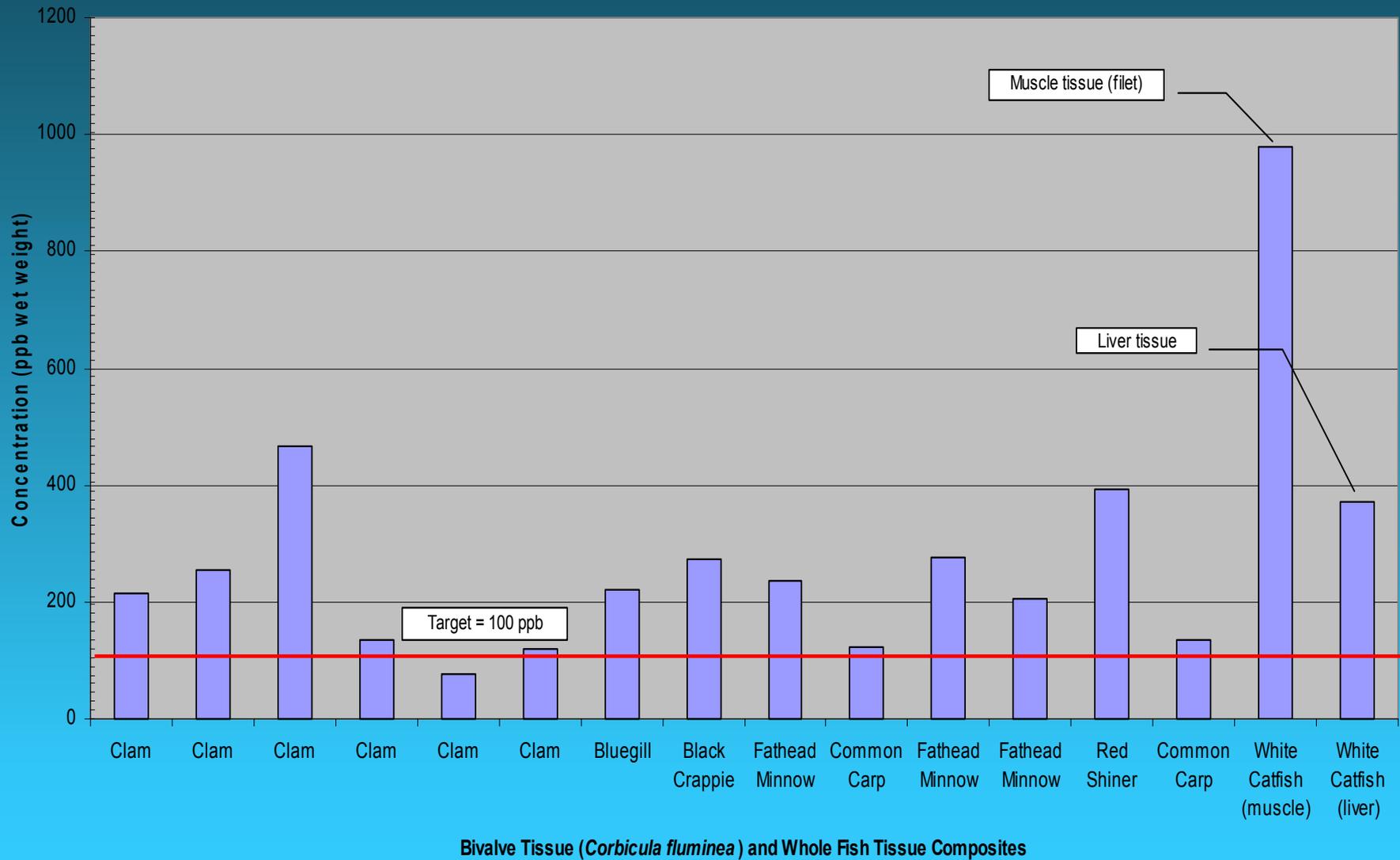


SCCWRP Fish Bioaccumulation Study

Total DDT Residues in Whole Fish Tissue Composites, Newport Bay



Total DDT Tissue Residues in Bivalve and Fish Tissue from San Diego Creek Basin No. 2, June 2003





Numeric Targets

- TMDL must identify endpoints in sediment, water column or tissue that equate to attainment of water quality standards
- Set to be protective of most sensitive beneficial use
- Newport Bay supports 7 federally listed bird species; two endangered plant species; 78 species of fish, some of which are caught and consumed by people



Numeric Targets (cont'd)

- USEPA identified sediment targets as the primary targets in developing the TMDLs because:
 - OC pollutants directly associated with fine sediment
 - OC pollutants primarily transported via adherence to particulates
 - Limited water column data are available
 - Attainment of sediment targets will result in attainment of water column criteria (CTR) and tissue screening values (OEHHA)

Discharges of organochlorine pollutants are associated with discharges of contaminated sediments.



TMDL Targets

Waterbody	Pollutant	Sediment ($\mu\text{g}/\text{kg dw}$)	Fish Tissue ($\mu\text{g}/\text{kg ww}$)
SD Creek and tributaries	Total DDT	6.98	100
	Chlordane	4.5	30
	Dieldrin	2.85	2.0
	Toxaphene	0.1	30
	Total PCBs	34.1	20
Upper and Lower Newport Bay and Rhine Channel	Total DDT	3.89	100
	Chlordane	2.26	30
	Dieldrin	0.72	2.0
	Total PCBs	21.5	20

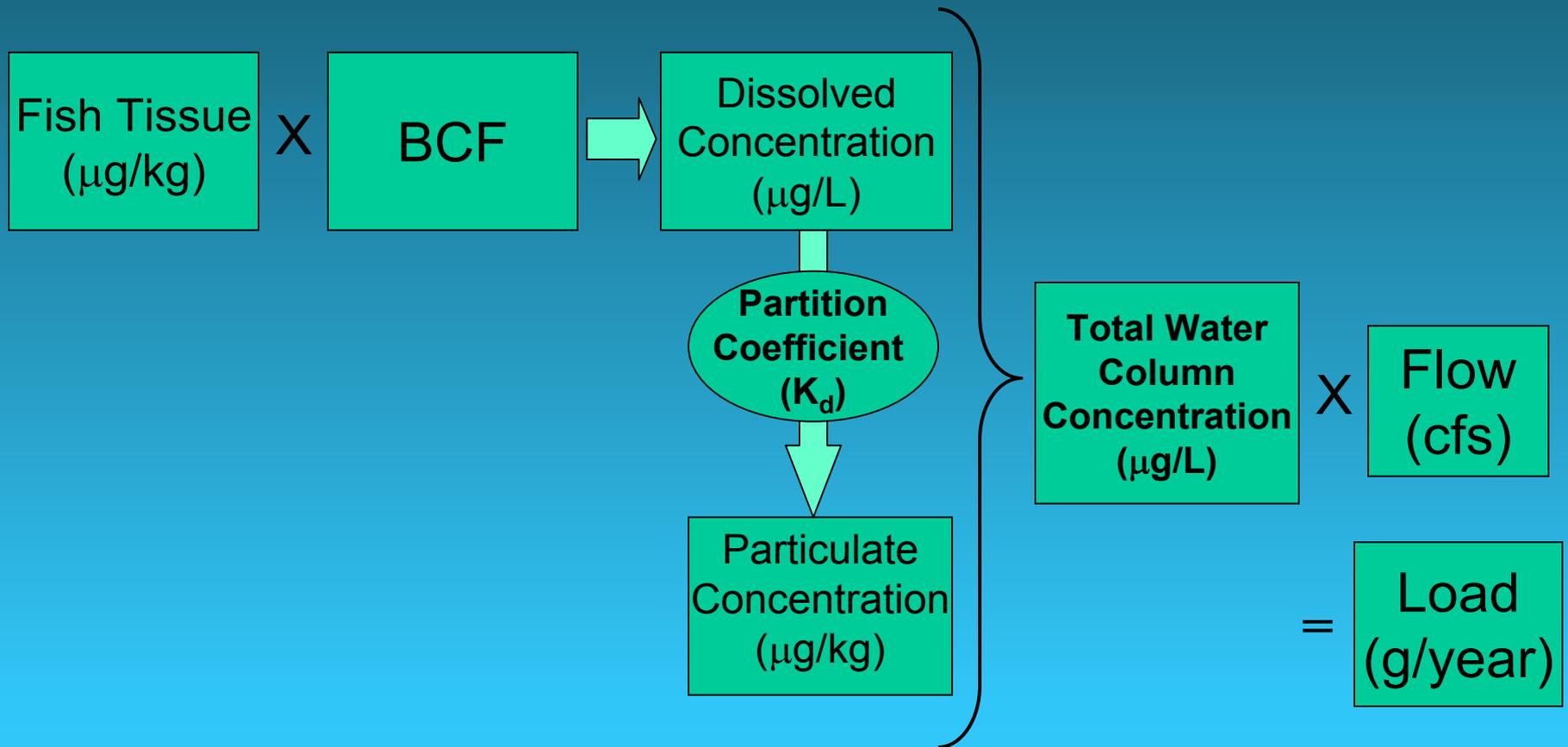
Sediment targets are equivalent to threshold effect levels (TEL) from Buchman 1999, except toxaphene is from NY Dept. of Environmental Conservation. Fish tissue targets are OEHHA screening values; may not represent values that would be protective of wildlife.



USEPA TMDL Development

- Used sediment targets to calculate loading capacities (assimilative capacity; usually equal to the TMDL)
- Used measured sediment or fish tissue concentrations to estimate existing loads
- Set the TMDL to the lower of either the loading capacity or existing load
- Applied an explicit 10% MOS
- Identified WLAs and LAs

USEPA's Approach to Calculating Existing Load – San Diego Creek





Staff's Proposed Revisions to Technical TMDL

- TMDLs for San Diego Creek calculated using “short ton” conversion instead of “metric ton”
- Revised K_d for total DDT to reflect a weighted average of log K_d values for DDT, DDE, and DDD (USEPA used arithmetic average)
- *For consistency between the OCs TMDLs and the sediment TMDLs, staff calculated loading capacities based on allowable sediment loads*

USEPA vs. Revised TMDL

San Diego Creek

Constituent	2002 Loading Capacity	2002 Existing Load	Revised Loading Capacity	Revised Existing Load
Total DDT	432.6	3733.8	327.2	5220.3
Chlordane	314.7	615.7	248.0	552.5
Dieldrin	261.5	381.8	208.4	353.2
Toxaphene	8.9	582.1	7.3	536.0
Total PCBs	2226	282.1	1721.1	256.7

Units are grams per year.

Numbers are very low in both cases; revisions will not result in changes in TMDL implementation.

USEPA vs. Revised TMDL

Upper Newport Bay

Constituent	2002 Loading Capacity	2002 Existing Load	Revised Loading Capacity	Revised Existing Load
Total DDT	276.5	1080.2	160.0	1080.2
Chlordane	160.6	290.7	93.0	290.7
Total PCBs	1528.2	858.7	884.0	858.7

Units are grams per year

USEPA vs. Revised TMDL

Lower Newport Bay

Constituent	2002 Loading Capacity	2002 Existing Load	Revised Loading Capacity	Revised Existing Load
Total DDT	101.85	438.4	59.0	438.4
Chlordane	59.2	50.2	34.0	50.2
Dieldrin	18.6	5.9	11.0	5.9
Total PCBs	562.95	409.8	326.0	409.8

Units are grams per year

USEPA vs. Revised TMDL

Rhine Channel

Constituent	2002 Loading Capacity	2002 Existing Load	Revised Loading Capacity	Revised Existing Load
Total DDT	2.92	5.6	1.7	5.6
Chlordane	1.7	0.33	1.0	0.33
Dieldrin	0.53	3.76	0.3	3.76
Total PCBs	16.2	70.0	9.4	70.0

Units are grams per year

Needed Load Reductions

San Diego Creek

Pollutant	Loading Capacity	Existing Load	Needed Reduction
Total DDT	327.2	5220.3	4893.1
Chlordane	248	552.5	304.5
Dieldrin	208.4	353.2	144.8
Toxaphene	7.3	536	528.7
Total PCBs	1721.1	256.7	0

Units are g/year

Needed Load Reductions

Upper Newport Bay

Pollutant	Loading Capacity	Existing Load	Needed Reduction
Total DDT	160	1080.2	920.2
Chlordane	93	290.7	197.7
Total PCBs	884	858.7	0

Units are g/year

Needed Load Reductions

Lower Newport Bay

Pollutant	Loading Capacity	Existing Load	Needed Reduction
Total DDT	59	438.4	379.4
Chlordane	34	50.2	16.2
Dieldrin	11	5.9	0
Total PCBs	326	409.8	83.8

Units are g/year

Needed Load Reductions

Rhine Channel

Pollutant	Loading Capacity	Existing Load	Needed Reduction
Total DDT	1.7	5.6	3.9
Chlordane	1	0.33	0
Dieldrin	0.3	3.76	3.46
Total PCBs	9.4	70	60.6

Units are g/year



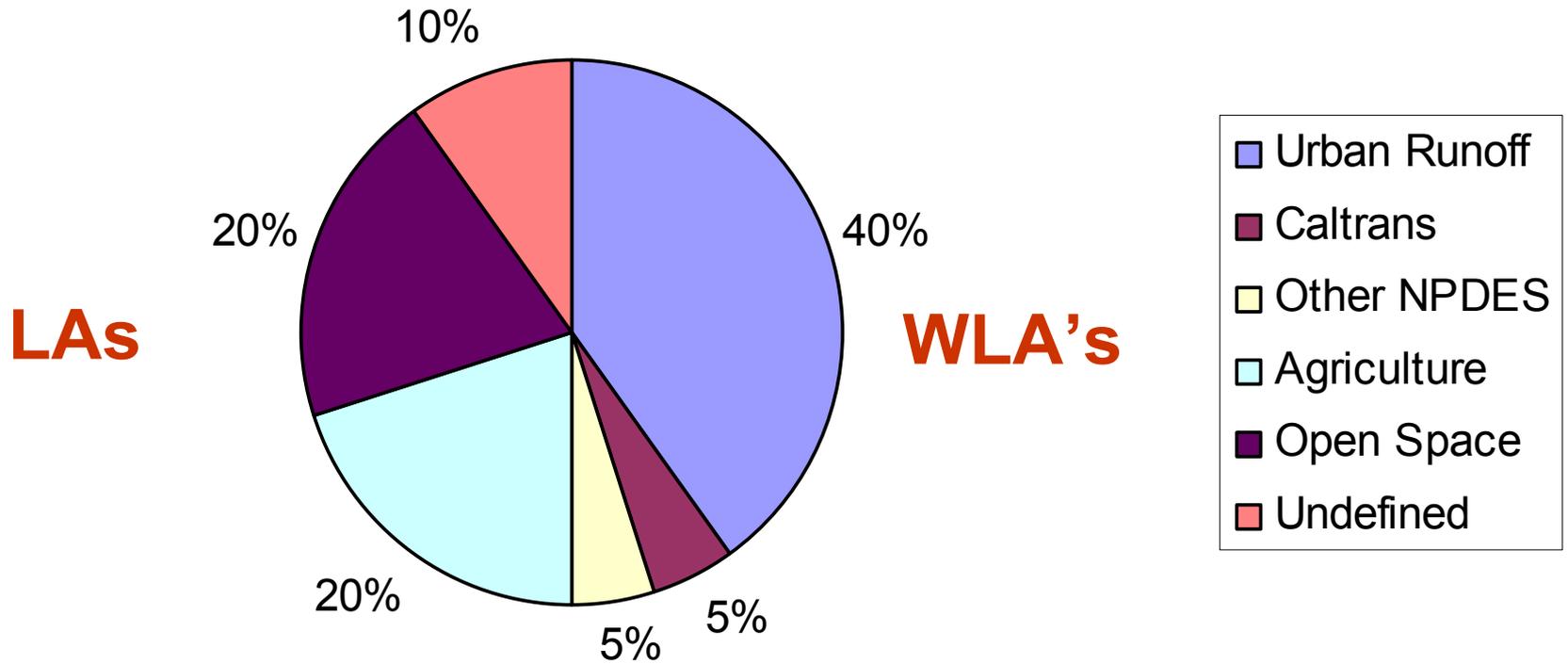
TMDL Allocations

- USEPA (2002) allocations modified by RB staff after:
 - Loading capacities were revised
 - Sediment TMDL allocations and current land use estimates were considered

TMDLs and Allocations

- **TMDL = WLA + LA + MOS**
 - MOS – Explicit 10%
 - WLA = Point Source Allocations
 - Urban (MS4) (40%)
 - Caltrans (5%)
 - Other NPDES (5%)
 - LA = Non-point Source Allocations
 - Agriculture (20%)
 - Open Space (20%)
 - Undefined (10%)

TMDL Allocations



Allocations – San Diego Creek

Category	Type	Total DDT	Chlordane	Dieldrin	Toxaphene	Total PCBs
WLA	Urban	117.8	89.3	75.0	2.62	92.4
	Caltrans	14.7	11.2	9.4	0.33	11.6
	Other NPDES	14.7	11.2	9.4	0.33	11.6
	Subtotal	147.2	111.6	93.79	3.27	115.5
LA	Agriculture	58.9	44.6	37.5	1.31	46.2
	Open Space	58.89	44.6	37.5	1.31	46.2
	Undefined	29.4	22.3	18.8	0.65	23.1
	Subtotal	147.2	111.6	93.79	3.27	115.5
MOS 10%		32.7	24.8	20.8	0.73	25.7
TMDL		327.15	248.01	208.38	7.27	256.7

Units are grams per year.

Allocations – Upper Bay

Category	Type	Total DDT	Chlordane	Total PCBs
WLA	Urban	57.6	33.48	309.1
	Caltrans	7.2	4.19	38.64
	Other NPDES	7.2	4.19	38.64
	Subtotal	72	41.85	386.4
LA	Agriculture	28.8	16.74	154.6
	Open Space	28.8	16.74	154.6
	Undefined	14.4	8.37	77.28
	Subtotal	72	41.85	386.4
MOS 10%		16.0	9.3	85.87
TMDL		160.0	93.0	858.7

Units are grams per year.

Allocations – Lower Bay

Category	Type	Total DDT	Chlordane	Dieldrin	Total PCBs
WLA	Urban	21.24	12.24	2.12	117.36
	Caltrans	2.66	1.53	0.266	14.67
	Other NPDES	2.66	1.53	0.266	14.67
	Subtotal	26.55	15.3	2.66	146.7
LA	Agriculture	10.62	6.12	1.06	58.68
	Open Space	10.62	6.12	1.06	58.68
	Undefined	5.31	3.06	0.531	29.34
	Subtotal	26.55	15.3	2.66	146.7
MOS 10%		5.9	3.4	0.59	32.6
TMDL		59	34	5.9	326

Units are grams per year.

Allocations – Rhine Channel

Category	Type	Total DDT	Chlordane	Dieldrin	Total PCBs
WLA	Urban	0.612	0.119	0.108	3.384
	Caltrans	0.076	0.0148	0.0135	0.423
	Other NPDES	0.076	0.0148	0.0135	0.423
	Subtotal	0.765	0.1485	0.135	4.23
LA	Agriculture	0.306	0.0594	0.054	1.692
	Open Space	0.306	0.0594	0.054	1.692
	Undefined	0.153	0.0297	0.027	0.846
	Subtotal	0.765	0.1485	0.135	4.23
MOS 10%		0.17	0.033	0.03	0.94
TMDL		1.7	0.33	0.3	9.4

Units are grams per year.



RB Staff's Proposed Implementation Plan

- Implementation & compliance tied to sediment TMDLs
 - Revisions to the sediment TMDLs will trigger revisions to the OCs TMDLs
 - Staff is developing recommended revisions to the sediment TMDLs; these revisions may be substantial



RB Staff's Proposed Implementation Plan

- Compliance schedule
 - Tied to sediment TMDLs compliance
 - 10-year running average (1999-2009)
 - Evaluate in 2009
 - Phase 1 of the OCs TMDLs therefore has a 3-4 year schedule for re-evaluation



RB Staff's Proposed Implementation Plan

- MS4 – Urban WLA
 - Permit will be modified to incorporate WLA's upon renewal
 - Encompasses developed areas as well as construction activities that can potentially discharge to the MS4
 - Latest revision to MS4 permit resulted in greater local oversight of new development and redevelopment; permit required the County to:
 - Review/revise local plans, policies and ordinances
 - Conduct inspections of construction sites
 - Conduct study of erosion control BMPs and formulate a “county-preferred” list



RB Staff's Proposed Implementation Plan

- MS4 Requirements (continued)
 - Evaluate whether current strategies are adequate to meet WLA for urban runoff
 - Identify Construction BMPs and associated pollutant control effectiveness that demonstrate the WLAs will be attained
 - Submit a WLA compliance plan and schedule that demonstrate how the WLA will be implemented



RB Staff's Proposed Implementation Plan

MS4 Requirements (continued)

- Ensure developers made aware of TMDL compliance issues early in planning process (e.g., Conditions of Approval).
Notification to developers to include:
 - Where applicable, the need to sample for nonvisible pollutants in construction site discharges (i.e., OCs in storm water runoff from sites previously in agricultural land use) per requirements of existing storm water permit for construction activities



RB Staff's Proposed Implementation Plan

- MS4 Requirements (cont'd)
 - Requirement for SWPPP to provide discussion of how selected BMPs and their implementation will ensure the MS4 will achieve WLAs for the OCs TMDLs
- Recommendations
 - Consider restricting large mass grading projects to the dry season
 - Identify a financial mechanism to defray the cost of dredging



RB Staff's Proposed Implementation Plan

MS4 Requirements (continued)

- Monitoring
 - Develop and implement toxics RMP (may be incorporated into NPDES monitoring)
 - Coordinate with implementation of sediment TMDLs
 - Document trends (especially fish tissue concentrations), potential hot spots in the creek and/or bay to be remediated, areas/sources that need additional control measures



RB Staff's Proposed Implementation Plan

- Caltrans MS4
 - Implementation similar to County MS4
- Other NPDES/WDRs
 - Evaluate existing permits, and Incorporate discharge limits consistent with WLAs
- Agriculture LAs
 - Regulate through appropriate implementation of State's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (Nonpoint Source Policy)



RB Staff's Proposed Implementation Plan

- Nonpoint Source Policy provides options for regulation:
 - Conditional waivers, WDRs, or prohibitions
 - Any individual WDRs will be modified upon renewal to incorporate discharge limits consistent with LAs.
 - Monitoring will be required.
- UCCE actively involved in assisting with development and implementation of BMPs



RB Staff's Proposed Implementation Plan

- Staff currently developing nonpoint source regulatory approach
- Plan to make specific recommendations to the Regional Board in September



RB Staff's Proposed Implementation Plan

- Open Space LAs
 - Evaluate open space land use as a potential source of OCs
 - Regulate through appropriate implementation of the State's Non-point Source Policy



RB Staff's Proposed Implementation Plan

- Rhine Channel
 - Will recommend a separate TMDL
 - Implementation to consist of remediation activities (to be determined)
- Re-run RMA model to estimate:
 - Deposition amounts and locations within the Bay that reflect current conditions (especially fine particulates)



RB Staff's Proposed Implementation Plan

- **Monitoring/research studies**
 - County of Orange, PRISM grant (\$188,254)
 - Measure existing loads of OCs
 - SCCWRP, PRISM grant (\$185,155)
 - Source analysis
 - Measurement of air deposition
 - SFEI, Food Web model and BSAFs
 - Part of work of Sediment Quality Objectives Task Force
 - SCCWRP, Fish Food Web Analysis (\$253,532)
 - Predator/prey evaluation



RB Staff's Proposed Implementation Plan

- Study results may lead to development of site-specific sediment quality objectives and refinement of TMDL targets
 - Identify most sensitive species
 - Evaluate food web structure for that species
 - Determine BSAFs/BAFs that will lead to identification of protective sediment target
 - Performed in whole or in part through contract or TAC
 - Monitoring results may lead to TMDL revisions and/or de-listing for certain of the OCs constituents in the next phase of the TMDL

Contact

- We encourage your input and items to consider with respect to CEQA
- Send comments no later than July 6, 2005, to:

Kathy Rose
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