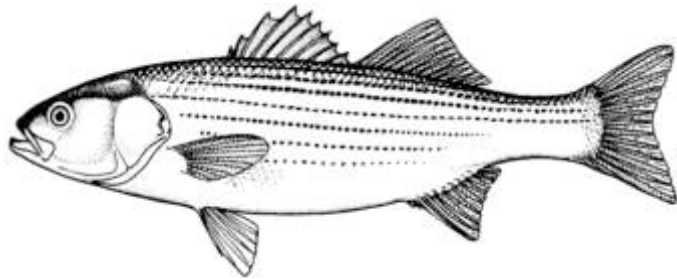


# A Pilot Program for Monitoring, Stakeholder Involvement, and Risk Communication in the Bay-Delta Watershed (aka “Fish Mercury Project”)



SFEI

Moss Landing Marine Lab

UC Davis

DHS/EHIB

OEHHA

Funding provided by the CBDA

# Origins

- ◆ SRWP Fish Focus Group
- ◆ CALFED Mercury Project
- ◆ 2001 CALFED Proposal Solicitation
- ◆ CALFED Mercury Workshop
- ◆ Resubmittals
- ◆ Approval by CBDA in September 2004
- ◆ Contract: soon, I hope!

# Project Goals

- ◆ Protect human health by assessing and reducing exposure to methylmercury-contaminated fish through risk communication
- ◆ Provide “performance measures” to gauge methylmercury contamination of the watershed during restoration and remediation
- ◆ Establish an organizational and technical foundation for cost-effective, scientifically defensible monitoring of mercury in the watershed that meets the identified needs of end users and is coordinated with related science and management efforts

# Project Objectives

- ◆ Monitor spatiotemporal patterns of methylmercury in fishery resources in the watershed
- ◆ Examine the relation of these patterns to ecosystem restoration, remediation, and landscape manipulations
- ◆ Assess health risks of consuming contaminated fish and communicate these risks to appropriate target audiences
- ◆ Establish a Steering Committee and stakeholder advisory groups to facilitate
  - stakeholder input to the monitoring and risk communication activities and
  - coordination with other science and management efforts

# Developing an Organizational Framework

- ◆ Follows guidance of the Strategy
- ◆ Establish a Steering Committee
  - Coordination
  - Stakeholder input

**ERP Implementing Agencies**

CBDA	Donna Podger
	Bev van Buren
	Lauren Hastings
	Dan Ray
	Rebecca Fris
	John Shelton
	Ken McGhee
NOAA	Joe Dillon
USFWS	Dan Welsh
DFG	

**Management Agencies**

Central Valley Regional Water	Chris Foe
San Francisco Bay Regional V	Karen Taberski
State Water Resources Contro	Val Connor
OEHHA	Bob Brodberg
DHS	Alyce Ujihara
DFG	Mark Stephenson

**Related Programs**

SRWP	Claus Suverkropp
DTMC	Carol Atkins
RMP	Jay Davis
UC Davis	Darell Slotton
USGS	Charlie Alpers
DWR	Jerry Boles

**Stakeholder Advisory Group(s)****Environmental advocacy organizations**

Deltakeeper	Bill Jennings
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**Angler organizations****Restoration project representatives****Health Organizations****Tribal Organizations****Community-based Organizations****Local Government****Other Interested Parties**

USEPA	Sharon Lin
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Table 2. Other efforts that the Pilot Program will coordinate with.

<b>Project</b>	<b>Principal Investigator/Contact</b>
<b>Monitoring and Research Programs</b>	
Evaluation of Mercury Transformations and Trophic Transfer in the San Francisco Bay/Delta	Mark Marvin-DiPasquale and Robin Stewart, USGS
Transport, Cycling and Fate of Mercury and Monomethyl Mercury in the San Francisco Delta and Tributaries An Integrated Mass Balance Assessment Approach	Mark Stephenson, MLML
Mercury in San Francisco Bay-Delta Birds: Trophic Pathways, Bioaccumulation and Ecotoxicological Risk to Avian Reproduction	Tom Suchanek, USFWS
Mercury and Methylmercury Processes in North San Francisco Bay Tidal Wetland Ecosystems	Don Yee, SFEI
San Francisco Bay Regional Monitoring Program	Jay Davis, SFEI
Sacramento River Watershed Program	Jay Davis, SFEI
Surface Water Ambient Monitoring Program	Val Connor, SWRCB
Delta Resident Shoreline Fish Monitoring Program	Chuck Armor, DFG
Integrated Regional Wetlands Monitoring Pilot Project	Stuart Siegel
Delta Watershed Fish Program, Fish Consumption Studies Group	Alyce Ujihara, DHS
<b>Stakeholder Involvement/Risk Communication</b>	
Delta Watershed Fish Program, Delta Stakeholder Advisory Group and Technical Advisory Group	Sun Lee, DHS
San Francisco Bay Fish Outreach and Education Task Force	Ian Walker, DHS
California Water Quality and Fish Contamination Project	Maura Mack, DHS
<b>CALFED restoration projects</b>	
Napa River	Dan Ray, CBDA
North Delta Improvement Project	Lauren Hastings, CBDA
Dutch Slough	Lauren Hastings, CBDA
Yolo Bypass	Lauren Hastings, CBDA
<b>Possible remediation projects</b>	
Sulphur Creek complex	
Abbott and Turkey Run Mine complex	
Mt Diablo Mercury Mine	
<b>Programmatic initiatives</b>	
Mercury Coordinator	
QA Program	Dave Crane, CDFG
Data management efforts	Karl Jacobs, DWR

# Steps in initiating the project

- ◆ Convene the Steering Committee
- ◆ Refine goals and objectives
- ◆ Design monitoring program
  - Design based on:
    - » Past work
    - » Stakeholder information
    - » Linkage to other projects
  - Peer Review Panel: Jim Wiener, Drew Bodaly, Patricia McAnn, risk communication, sampling design



# Strawman Monitoring Design

- ◆ Temporal trend monitoring
  - Index sites and intensive sites
    - » Biosentinels and sport fish
  - Striped bass
- ◆ Spatial characterization
- ◆ CBDA Project Monitoring
  - Protocol development
  - Site monitoring

Table 3. Preliminary design of sport fish sampling. A) Numbers of each type of site to be sampled in each year of the project. B) Species and compositing scheme for each type of sampling site.

A)

<b>Year</b>	<b>Index Sites</b>	<b>Intensive Sites</b>	<b>Striped Bass</b>	<b>Restoration Sites</b>	<b>Spatial Characterization Sites</b>
2005	12	3	0	3	33
2006	0	3	100 fish	3	33
2007	0	3	0	3	33

B)

<b>Type of Site</b>	<b>Primary Targets</b>	<b>Secondary Targets</b>	<b>Bycatch</b>
Index	Largemouth and one other species (individuals)	2 low mercury species (composites), 2 other species of health concern	Kept when numbers are adequate
Intensive	Largemouth and two other species (individuals)	5 species (composites)	Kept when numbers are adequate
Striped bass	100 fish (individuals)	-	-
Restoration	Largemouth (if possible) and one other species (individuals)	-	Kept when numbers are adequate
Spatial Characterization	Largemouth and one other species (individuals)	2 low mercury species (composites), 2 other species of health concern	Kept when numbers are adequate

Table 4. Preliminary design of biosentinel sampling. A) Numbers of each type of site to be sampled in each year of the project. B) Species and compositing scheme for each type of sampling site.

A)

<b>Year</b>	<b>Index Sites</b>	<b>Intensive Sites</b>	<b>Protocol Development Sites</b>	<b>Restoration , Remediation, and Process Study Sites</b>
2005	12	3	3	12
2006	12	3	3	12
2007	12	3	3	12

B)

		<b>Indiv. Samples (to 30/sample)</b>	<b>Multi-Ind. Composites</b>
<b>Index Sampling</b>			
Basic Sampling	15 sites x 1 taxon x 30 individuals	450	
	12 sites x 1 taxon x 5 comps		60
	12 sites x 4 taxa x 1 comp		48
Intensive sites, other sm fish	3 sites x 4 taxa x 30 ind.	360	
Intensive sites, +4 dates, main taxon	4 dates x 3 sites x 1 taxon x 30 ind.	360	
Intensive sites, +4 dates, comps	4 dates x 3 sites x 5 taxa x 1-5 comps		108
<b>Protocol Development</b>			
Testing new indicators (fish)	3 sites x 2 dates x 2 taxa x 30 ind.	360	
Testing new indicators (inverts)	3 sites x 2 dates x 2-3 taxa x 4 comps		72
Power analysis of alternate species	10 additional samplings x 30 ind.	300	
<b>CBDA Site Monitoring</b>			
	12 sites x 1 taxon x 30 individuals	360	
	12 sites x 5 taxa x 1-5 comps		108

# Stakeholder Involvement

- ◆ Evaluate fishing activities
  - Review of creel data
  - Written survey
  - Site visits and interviews
- ◆ Conduct in-depth needs assessments
  - 3 counties
  - Informant interviews, focus groups, and surveys
  - Agency staff, tribes, health care providers, CBOs, environmental groups
- ◆ Convene stakeholder advisory groups (SAGs)

# Risk Assessment and Advisory Development

- ◆ San Joaquin River data assessment and advisory report
- ◆ Sacramento River data assessment and advisory report
- ◆ Delta data assessment and advisory report

# Risk Communication

1. Communicate with community leaders
2. Enhance existing risk communication strategy
3. Develop messages and materials
4. Conduct trainings
5. Convene forum in year 3
6. Evaluate stakeholder involvement and risk communication activities

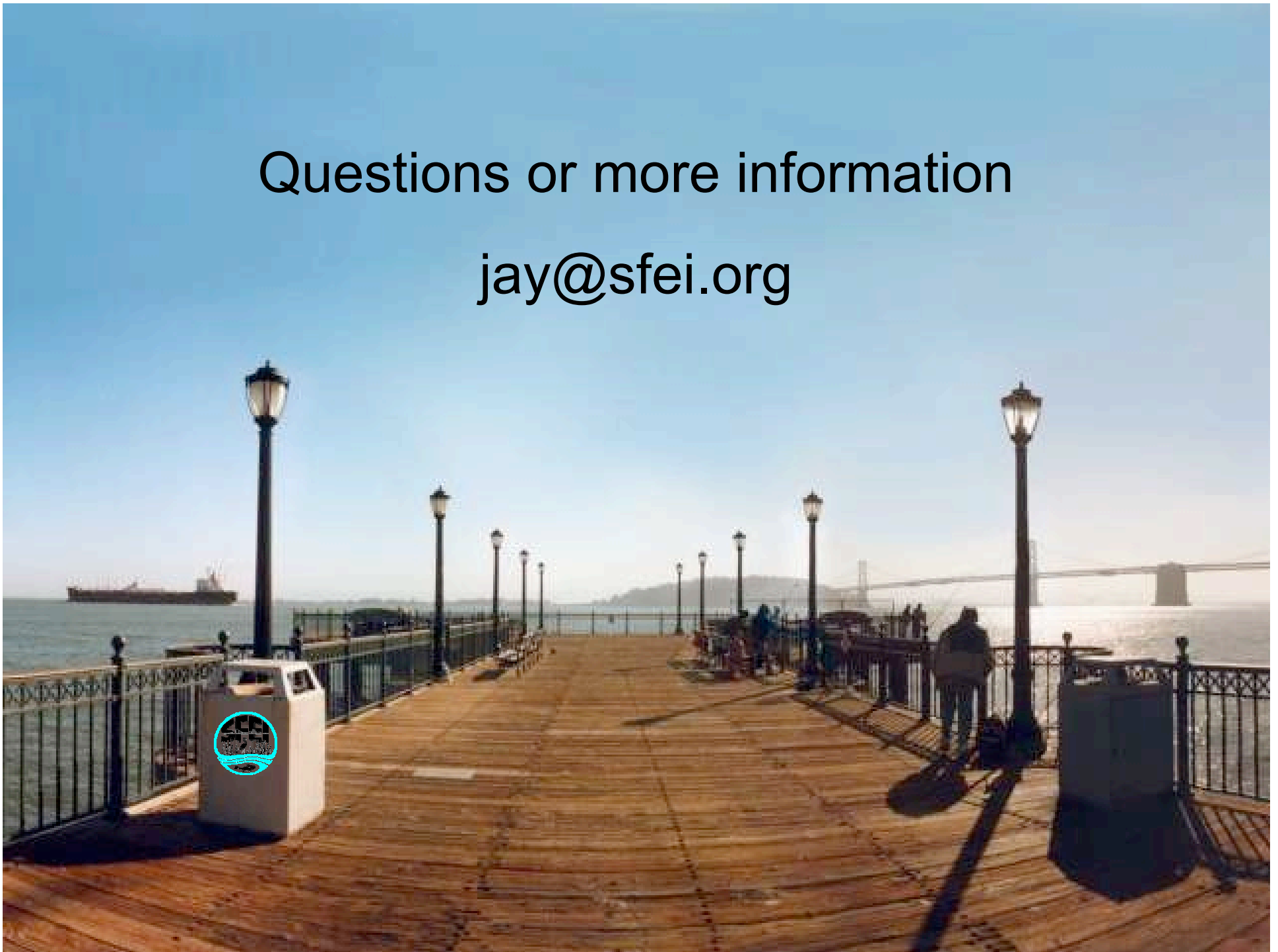


# Data management

- ◆ Coordination with SWAMP and BDAT via CEDEN
- ◆ Standard data format to be shared with CBDA, SWRCB (SWAMP), DWR (BDAT), and SFEI
- ◆ Incorporating historic data (SFEI studies, etc.)
- ◆ Develop public web access

Questions or more information

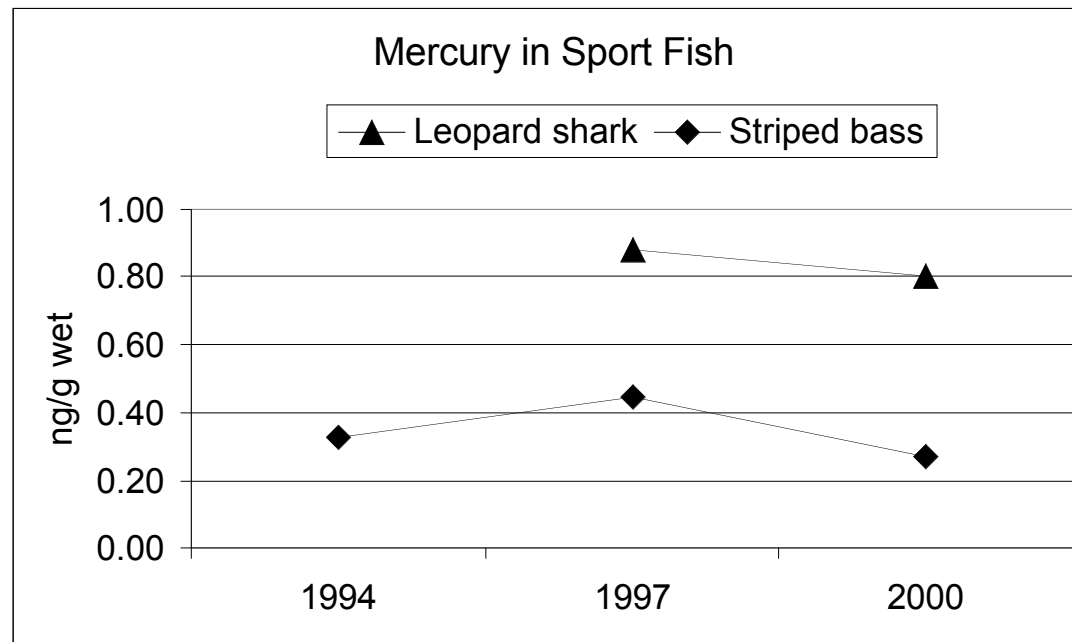
[jay@sfei.org](mailto:jay@sfei.org)



# RMP Mercury Work

- ◆ Harbor seal hair
- ◆ Cormorant eggs
- ◆ Tern eggs (with hatchability survey)
- ◆ Clapper rail study?
- ◆ Sport fish
- ◆ Sediment
- ◆ Water
- ◆ Atmospheric deposition
- ◆ Loading from Delta
- ◆ Loading from Guadalupe River
- ◆ Possibly a mass budget model beginning this year
- ◆ Got ideas?

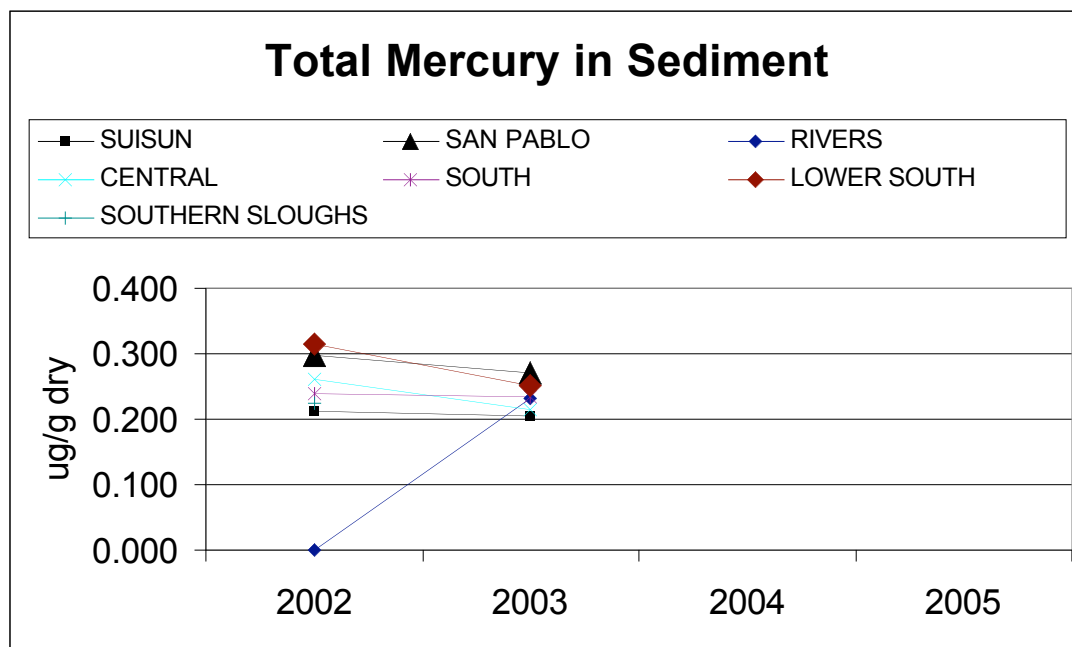
**Figure 1.2 Mercury in Sport Fish.** Leopard shark and striped bass are the two species that accumulate the highest concentrations of mercury and are therefore important indicators of mercury impairment. Mercury concentrations have shown some variation, but no clear long-term trend. RMP fish monitoring began in 1997. Data from the RMP and Fairey et al. 1997.



# Preliminary Data

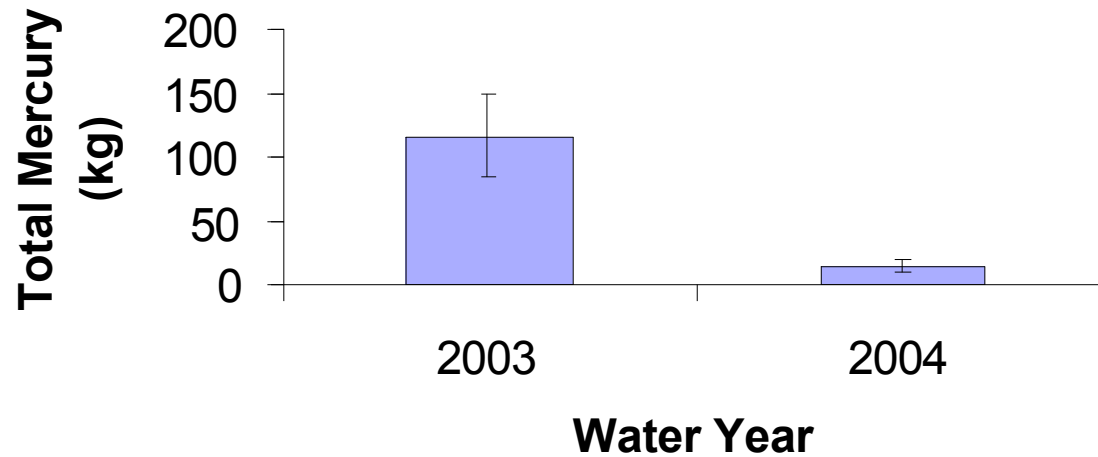
CommonName	Berkeley	Central Bay	land Inner	Harancisco	Watian Pablo Ba	South Bay	Grand Total
Anchovy					0.06	0.08	0.07
Barred Surfperch						0.41	0.41
Black Surfperch		0.09					0.09
Brown Rockfish		0.10					0.10
California Halibut	0.30			2.06			0.60
Chinook Salmon	0.04				0.06		0.05
Diamond Turbot					0.22		0.22
Herring				0.02			0.02
Jacksmelt	0.02		0.09	0.02		0.09	0.06
Leopard Shark	0.66				0.80	1.24	0.88
Sardine				#DIV/0!			#DIV/0!
Shiner Surfperch	0.06		0.15	0.07	0.06	0.12	0.10
Smoothhound	1.29				0.55	1.05	1.00
Starry Flounder				0.03	0.07		0.05
Striped Bass	0.37			0.45	0.38	0.38	0.38
Walleye Surfperch				0.17			0.17
White Croaker	0.20		0.16	0.27	0.36	0.13	0.22
White Sturgeon					0.24	0.58	0.48

**Figure 1.6 Annual Average Total Mercury in Sediment by Bay Segment.** The mercury TMDL established a target of 0.2 parts per million (ug/g dry) for mercury. In 1992 the RMP began sampling in a manner that yields representative average concentrations for each Bay segment.



**Figure 1.7 Annual Loads of Mercury from the Guadalupe River** The Guadalupe River is a significant pathway for transport of mercury and other pollutants into the Bay, and the first small tributary to the Bay selected for a rigorous evaluation of loads. Data from the Clean Estuary Partnership and the RMP.

### Annual Mercury Loads from the Guadalupe River



**Figure 1.8 Annual Loads of Mercury from the Delta.** Delta outflow carries significant loads of mercury and other pollutants into the Bay. A RMP study has allowed estimation of loads from 1995–present. Error bars indicate estimated uncertainty of estimates.

