

An aerial photograph of Big Bear Lake, a large blue reservoir surrounded by dense green forests and rugged mountains. The sky is clear and blue. The text is overlaid on the image.

**CEQA Scoping Meeting for  
Big Bear Lake Mercury TMDL**

**December 9, 2008**

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RWQCB Inland Waters Planning Section**

# Today's Presentation

- I. CEQA Scoping
- II. What is Mercury?
- III. Limits and Guidelines for Hg
- IV. Beneficial Uses of BBL
- V. 303d Listing of BBL
- VI. What is a TMDL?
- VII. Numeric Targets
- VIII. Source Analysis
- IX. Linkage Analysis, Target, & Margin of Safety
- X. Implementation Plan
- XI. Next Steps



# CEQA: Purpose of Scoping

- Scoping is required for projects of “statewide, regional or area-wide significance.” (CEQA §21083)
- Invite public input in the process – head off future problems
- Solicit comments on the scope of our environmental analysis



# CEQA: Benefits of Scoping

- Opportunity to inform the stakeholders about Project
- Helps to identify range of actions, alternatives, mitigation measures, and significant effects to be analyzed
- Incorporate modifications early to resolve potential problems



# CEQA Checklist Categories

- I. Aesthetics
- II. Agriculture Resources
- III. Air Quality
- IV. Biological Resources
- V. Cultural Resources
- VI. Geology & Soils
- VII. Hazards & Hazardous Materials
- VIII. Hydrology & Water Quality
- IX. Land Use & Planning
- X. Mineral Resources
- XI. Noise
- XII. Population & Housing
- XIII. Public Services
- XIV. Recreation
- XV. Transportation/Traffic
- XVI. Utilities & Service Systems



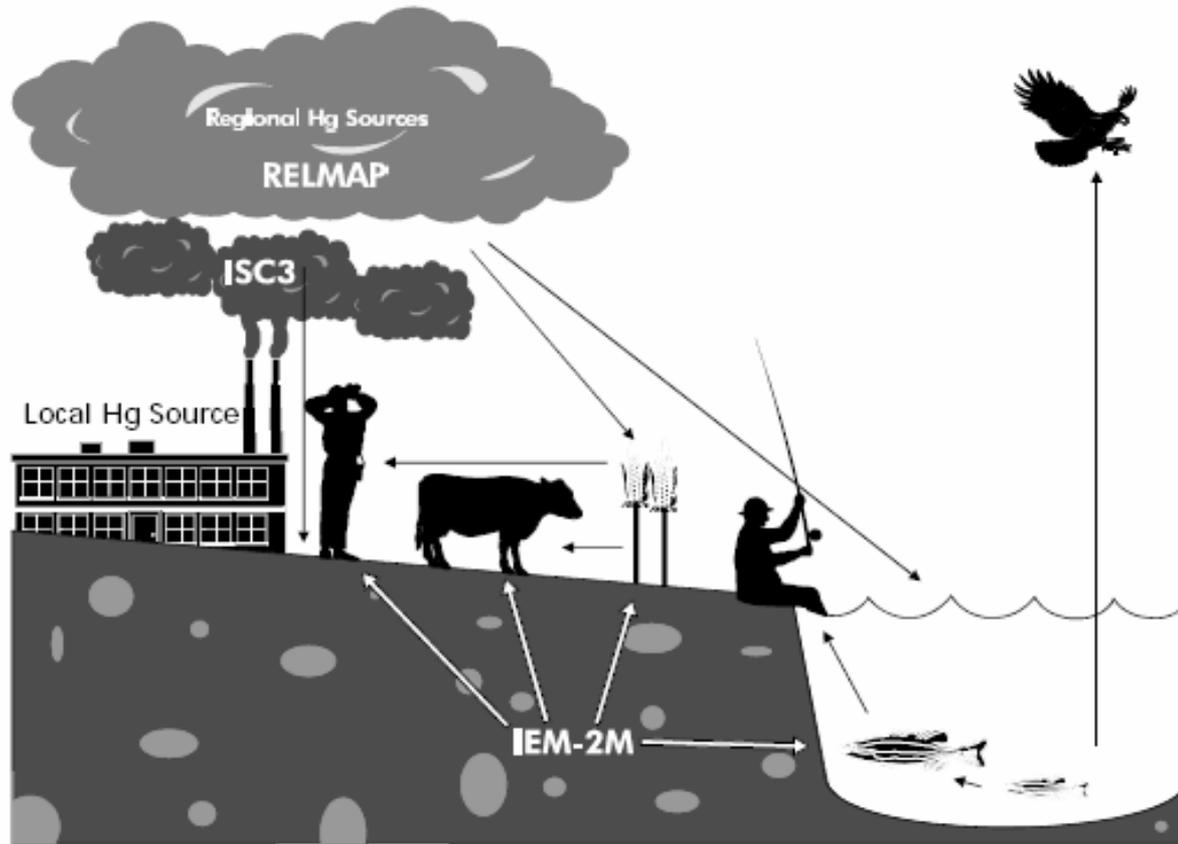
# What is Mercury (Hg)?

- An element that is found in air, water, and soil.
- Exists as Elemental Hg, inorganic, & organic.
- Hg in Air accumulates on ground then gets washed into bodies of water.
- $\text{Hg} \rightarrow \text{CH}_3\text{Hg}$



# Mercury Cycle

Figure I-1  
Fate, Transport and Exposure Modeling Conducted in the Combined ISC3 and RELMAP Local Impact Analysis



# Negative Human Effects of Hg?

- $\text{CH}_3\text{Hg}$  may inhibit Child's ability to think & learn
- High levels can harm brain, heart, kidneys, lungs, and immune system for all ages.



# Ecological Effects of Hg?

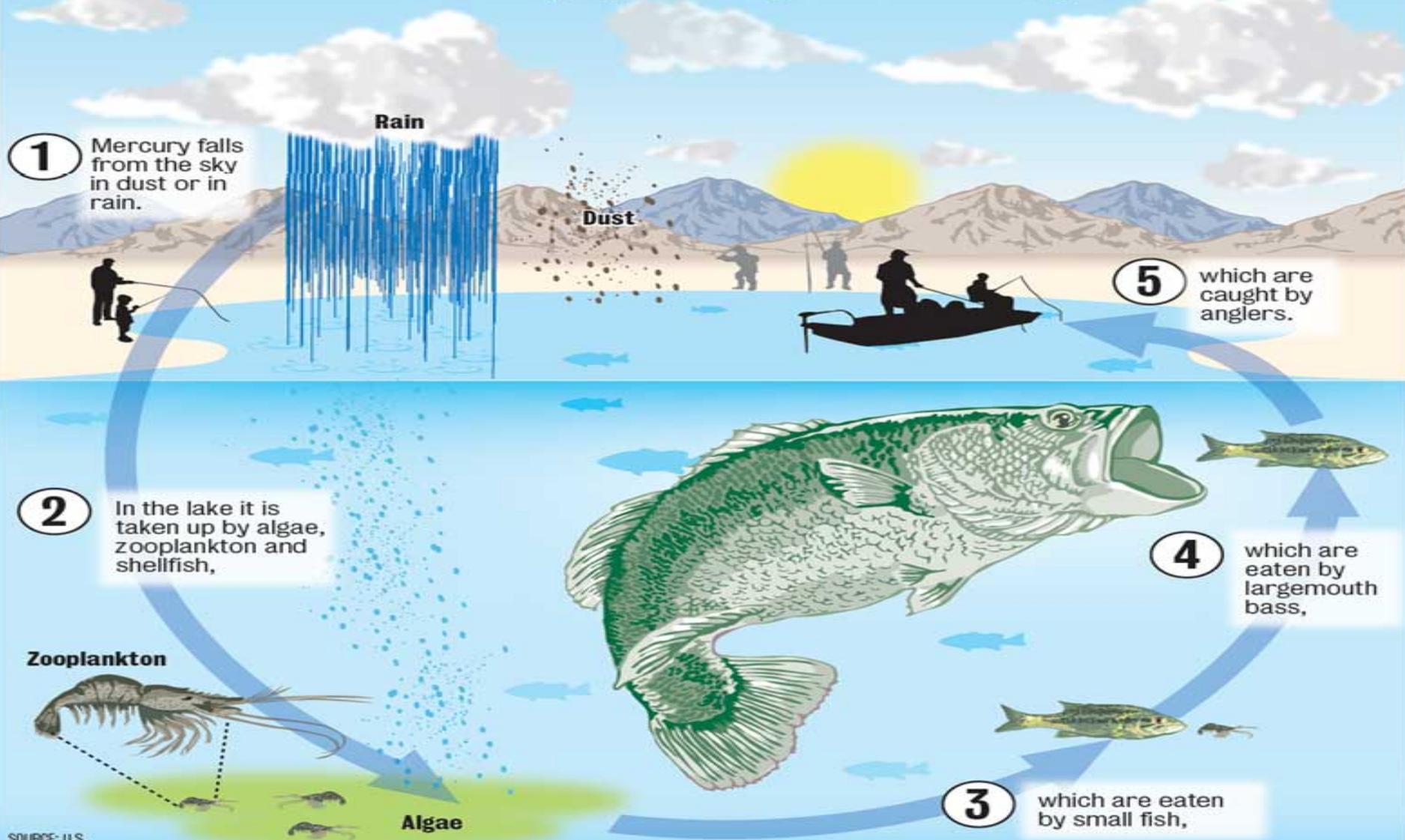
- Fish eating animals are exposed more exposed than other animals.
- High levels of exposure include death, reduced reproduction, slower growth & development, & abnormal behavior.



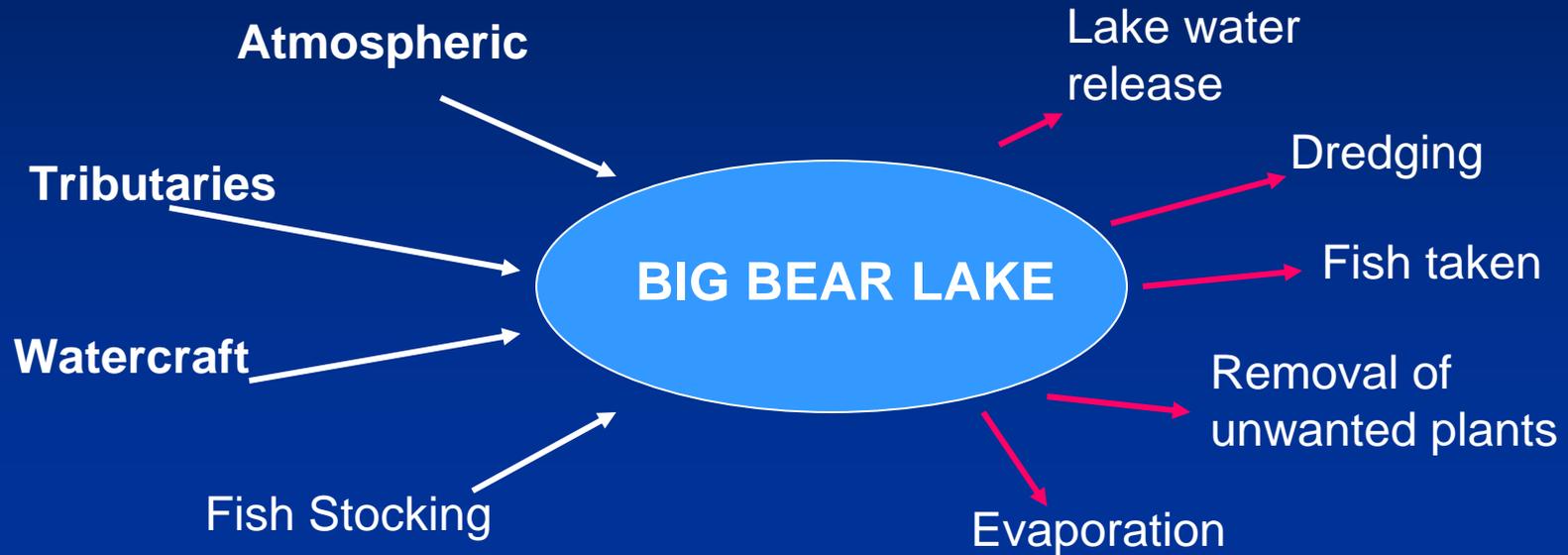
# MERCURY IN BASS

Authorities say that unusually high levels of mercury found in largemouth bass in Big Bear Lake could be a result of industrial pollution elsewhere. Mercury levels tend to concentrate in predators like bass.

**How contaminant might get into largemouth bass at Big Bear Lake.**



# Hg Mass Balance



# Limits and Guidelines for Hg

- California Toxics Rule (CTR) 50 ng/L for Municipal and Domestic Supply (MUN)
- USEPA CH<sub>3</sub>Hg Fish Tissue Criteria 0.3ppm (2001)



# Beneficial Uses of BBL

1. Municipal and Domestic Supply (MUN)
  2. Agricultural Supply (AGR)
  3. Groundwater Recharge (GWR)
  4. Water Contact Recreation (REC 1)
  5. Non-Contact Water Recreation (REC 2)
  6. Warm Freshwater Habitat (WARM)
  7. Cold Freshwater Habitat (COLD)
  8. Wildlife Habitat (WILD)
  9. Rare, Threatened or Endangered Species (RARE)
- 

# 303d Listing of Big Bear Lake

1. Big Bear Lake listed for Mercury in 1994 based on TSMP fish tissue concentrations.
2. Tissue Concentrations exceed OHHEA Hg Screening value (0.3 ppm)
3. Triggered by placement on CWA 303(d) List



# What is a TMDL?

- **Total Maximum Daily Load:** The maximum amount of a pollutant that a waterbody can receive and still attain water quality standards (i.e., meet applicable water quality objectives and support all beneficial uses)



# TMDL Elements

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



# TMDL Elements

- Problem Statement
- **Numeric Targets**
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# Proposed Numeric Targets

- 0.3 ppm in Largemouth  $>$  400 mm
- Proposed Implementation Date of 2024



# Data for Numeric Target



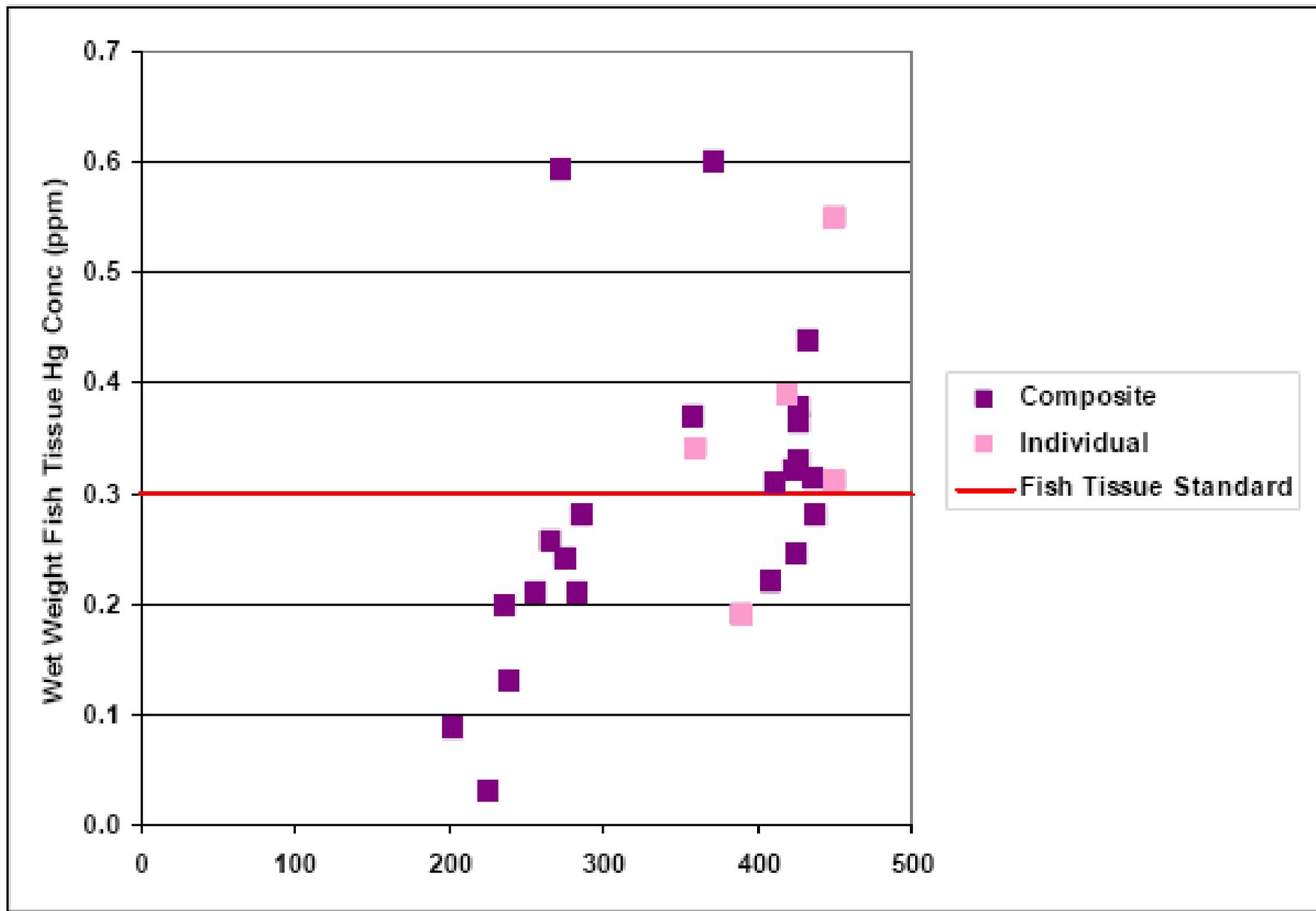


Figure 4. Mercury Concentrations in Largemouth Bass Versus Mean Length



# Source Analysis

1. Atmospheric
2. Tributary Monitoring
3. Lake Water Column



# Source Analysis

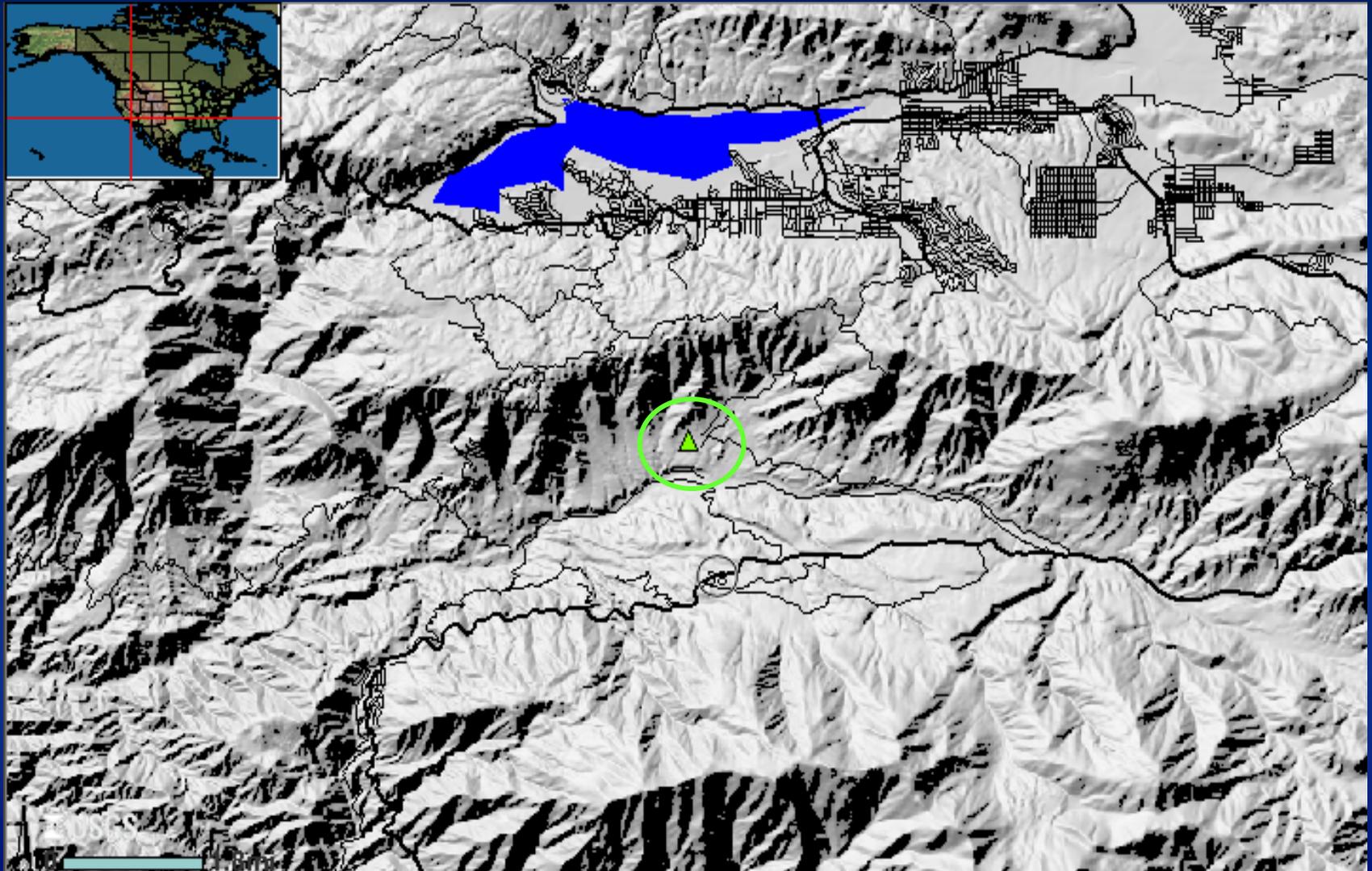
## 1. Atmospheric (National Atmospheric Deposition Program, NADP)

a. Weekly sampling April 25, 2006 – Present (Converse Flats)

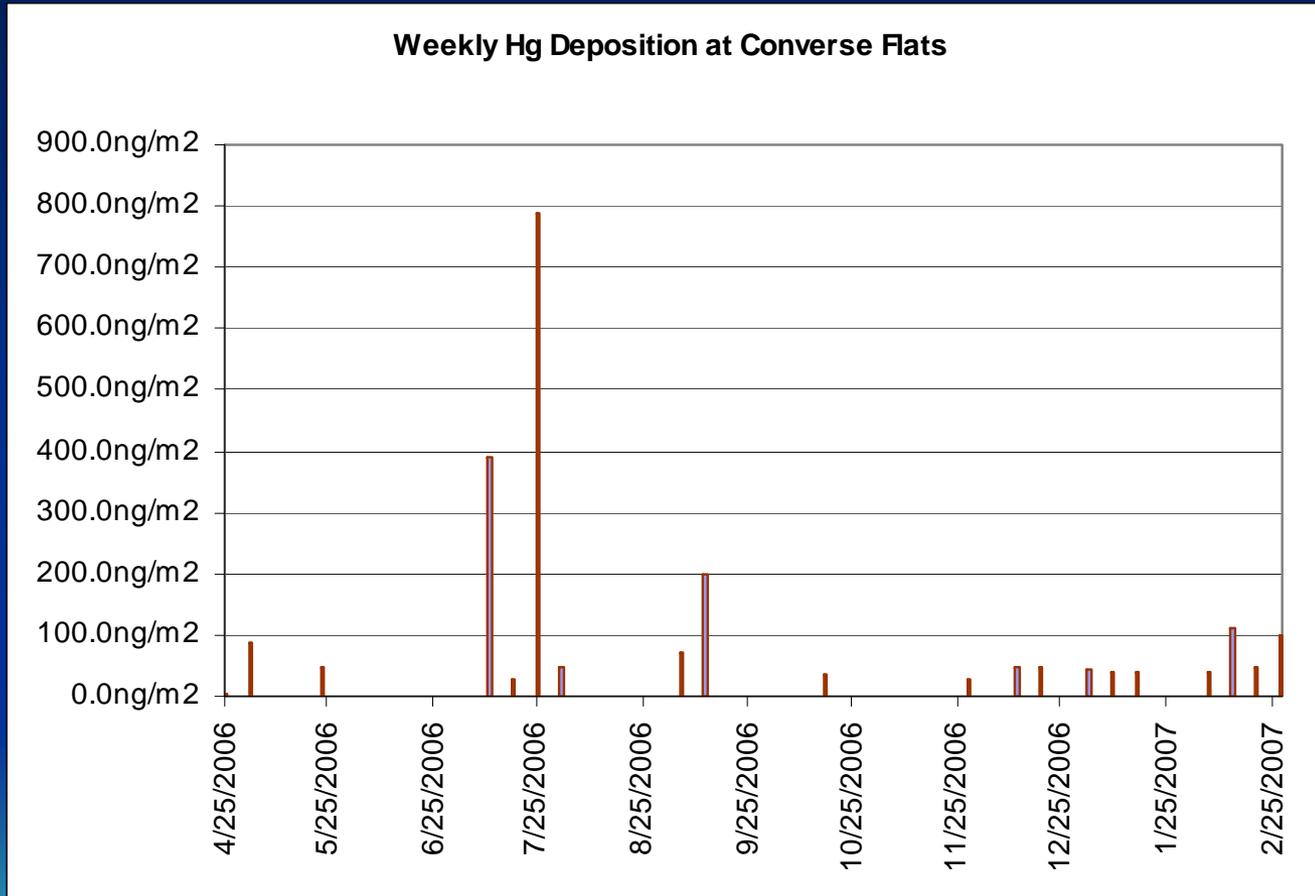
b. Tetra Tech Report



# Location of Converse Flats



# Atmospheric Deposition DATA



# Source Analysis

## c. Tetra Tech Report

- 78 facilities.
- 43 zero pounds emissions
- 23 <10 lbs/yr
- 4/5 top emitters are cement factories.
- 1 is oil refinery.



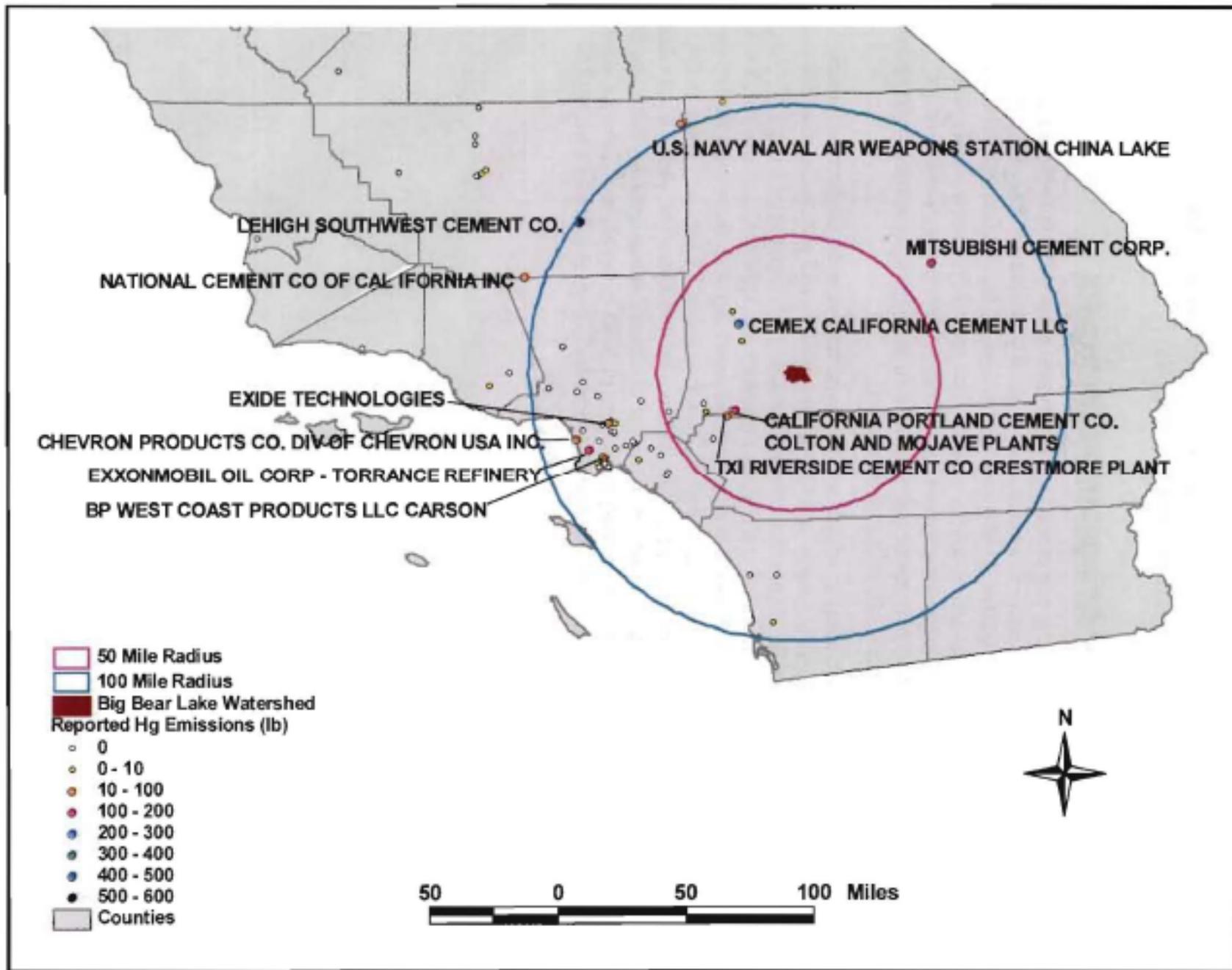


Figure 5. Location of Facilities Reporting Mercury Emissions in Southern California

# Source Analysis

## 2. Tributary Monitoring

a. BBMWD

b. Regional Board



# Tributary Monitoring

## a. BBMWD (2002)

Sample ID	Collection Date	Location	Sample Type	Processing	Method	Result (ng/L)
EE-2976	10/10/2002	Knickerbocker	Grab	Total Rec	EPA 1631c	0.94
EE-2977	10/10/2002	Knickerbocker	Field Duplicate	Total Rec	EPA 1631c	0.60
EE-2982	10/10/2002	Knickerbocker	Grab	Dissolved	EPA 1631c	0.38
EE-2981	10/10/2002	Knickerbocker	Field Duplicate	Dissolved	EPA 1631c	0.41

## b. Regional Board

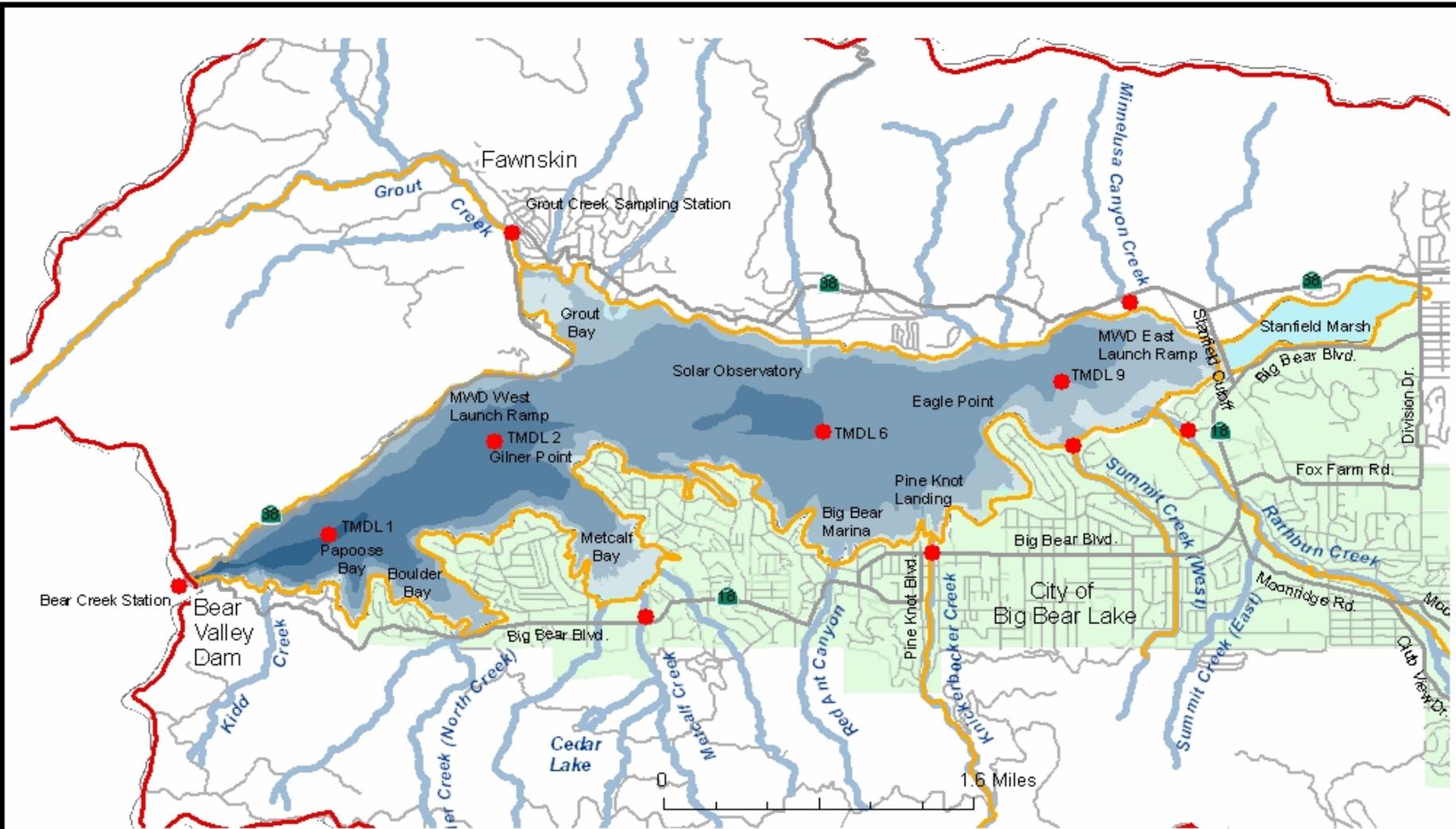
Collection Date	Location	Sample Type	Processing	Method	Result (ng/L)
04/19/1993	Rathbun	Grab	Total Rec	245.1	2,500
04/19/1993	Grout	Grab	Total Rec	245.1	2,500

# Tributary Monitoring

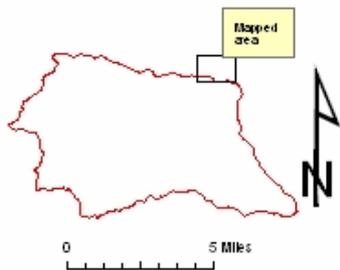
## b. Regional Board (continued)

Collection Date	Location	Count	Min. (ng/L)	Max. (ng/L)	Avg (ng/L)
12/07/2007	Grout	1	20.0	20.0	20.0
12/07/2007	Knickerbocker	3	10.1	14.9	11.8
12/07/2007	Rathbun	2	16.8	17.4	17.1
12/07/2007	Summit	2	12.4	17.8	15.1

Collection Dates	Location	Count	Results (ng/L)	Average	ND
5/29-8/06/2008	Bear	6	0.5-2.6	1.5	2
5/29-6/25/2008	Grout	3	1.4	1.4	2
5/29-8/06/2008	Knickerbocker	6	0.9-1.6	1.2	2
5/29-8/06/2008	Metcalf	6	0.7-1.7	1.2	2
6/25-8/06/2008	Mennilusa	4	0.8-5.2	2.5	1
5/29-6/11/2008	Rathbun	2	1.4	1.4	1
5/29-6/11/2008	Summit	2	1.8	1.8	1



Data Sources:  
 Tributaries - modified by RWOC 8/8  
 Elevation - San Bernardino County, 2004  
 Water island boundary - Hydrex, Inc., 2003  
 Lake bathymetry - ReMetric, Inc., 2000  
 Section 303(d) listed water bodies - SWRPC 6, 2004  
 Major roads - San Bernardino County, 2004  
 City of Big Bear Lake boundary - City of Big Bear Lake, 2002



### Map Features

- Clean Water Act Section 303(d) listed bodies of water
  - Major roads
  - Big Bear Lake Tributaries
  - City of Big Bear Lake boundary
  - Big Bear Lake water island boundary
  - Monitoring/Sampling Stations
- Big Bear Lake Bathymetry**
- | DEPTH |              |
|-------|--------------|
|       | 69 - 51 feet |
|       | 50 - 36 feet |
|       | 35 - 21 feet |
|       | 20 - 9 feet  |
|       | 8 - 1 feet   |

## Big Bear Lake and Tributary Monitoring Stations

# Source Analysis

## 3. Lake Water Column DATA

a. BBMWD

b. Regional Board



# 3. Lake Monitoring

## a. BBMWD

Collection Date	Location	Depth	Parameter	Result ( $\mu\text{g/L}$ )	ng/L
06/11/2001	TMDL - 1	Photic	Total Rec	0.2	200
06/11/2001	TMDL - 9	Photic	Total Rec	0.3	300
06/11/2001	TMDL - 3 (Grout Bay)	Bottom	Total Rec	0.2	200
06/11/2001	TMDL - 8 (Stanfield North)	Photic	Total Rec	0.4	400
06/11/2001	TMDL - 8 (Stanfield North)	Bottom	Total Rec	0.4	400
06/11/2001	TMDL - 10 (Stanfield South)	Photic	Total Rec	0.3	300
06/11/2001	TMDL - 10 (Stanfield South)	Bottom	Total Rec	0.5	500

CTR for MUN 50 ng/L



# 3. Lake Monitoring

## c. Regional Board (water column)

Collection Date	Location	Count	Parameter	Result (µg/L)	ng/L Average
04/19/1993	Lake - 1	1	Total Rec	3.9	3900
05/20/2008	MWDL -1	2	Dissolved	-	2.6
05/20/2008	MWDL -2	2	Dissolved	-	3.2
05/20/2008	MWDL -6	2	Dissolved	-	3.0
05/20/2008	MWDL -9	1	Dissolved	-	2.8
09/10/2008	MWDL -1	1	Dissolved	-	0.8
09/10/2008	MWDL -2	1	Dissolved	-	1.4
09/10/2008	MWDL -6	1	Dissolved	-	1.5
09/10/2008	MWDL -9	1	Dissolved	-	1.3
09/10/2008	MWDL -1	1	Total Rec	-	1.8
09/10/2008	MWDL -2	1	Total Rec	-	2.1
09/10/2008	MWDL -6	1	Total Rec	-	1.9
09/10/2008	MWDL -9	1	Total Rec	-	1.9

CTR for MUN 50 ng/l

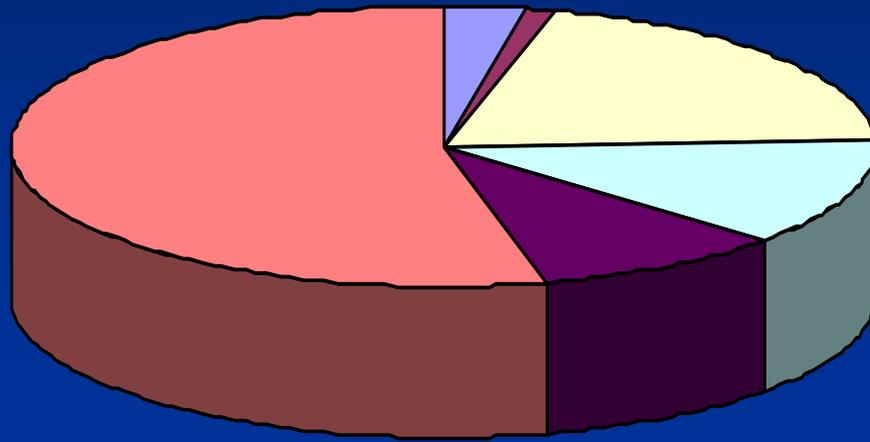
# 4. Geological Sources

## a. Tetra Tech Report

- Geological formations
- Minnelusa Canyon Creek



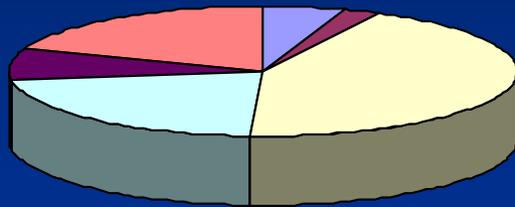
# Total Mercury Loads (692.2 g-Hg/yr)



- 21.2 - Sediment NPS
- 7.9 - Sediment Urban
- 137.3 - Water Column NPS
- 86.6 - Water Column Urban
- 66.5 - Wet Deposition to Lake
- 372.6 - Dry Deposition to Lake

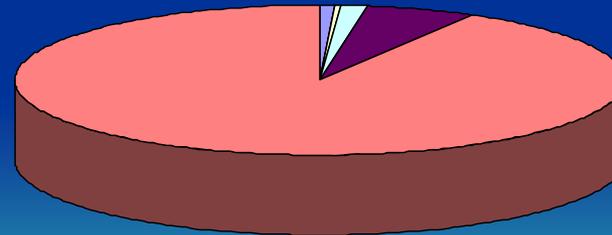
# Total Mercury Loads (g-Hg/yr) Dry Vs Wet

1993 ( 1,930 g/yr )



104.1	- Sediment NPS
41.9	- Sediment Urban
836.4	- Wtr Clmn NPS
427.8	- Wtr Clmn Urban
146.8	- Wet Dep to Lake
372.6	- Dry Dep to Lake

1999 ( 407 g/yr )



3.0	- Sediment NPS
0.9	- Sediment Urban
0.5	- Wtr Clmn NPS
6.2	- Wtr Clmn Urban
23.3	- Wet Dep to Lake
372.6	- Dry Dep to Lake

# Linkage Analysis, Target, & Margin of Safety

Target (mg Hg/kg-400mm largemouth bass)	Existing Load (g/yr)	Allocatable Load (g/yr)	Percent Reduction
0.3	692.2	528.0	23.7%

# Proposed Implementation Plan



# Proposed Implementation Plan

- a. Monitoring (all dischargers & RB)
- b. BMP Investigation & Implementation (MS4s, USFS, AQMD, ARB)
- c. Collaboration with AQMD and ARB (RB, other stakeholders?)



# a. Monitoring

phase II of source evaluation

Stocked trout

Mobil Sources

Methylation around Lake

Storm weather monitoring



## b. Potential BMPs

- Sediment Basins
- Dredging
- Capping
- Sorbents
- Polymer Filtration Technology



## c. Collaboration with AQMD and ARB (RB staff)

- Monitoring DATA
- Source analysis
- Models



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- XIV. Recreation
- XV. Transportation/Traffic
- XVI. Utilities & Service Systems



# Next Steps

- **Receive Comments for CEQA Scoping (01/15/09)**
  - **Staff report**
  - **Proposed Basin Plan Amendment**
  - **CEQA document**
- 

Above will be provided to Public

- **Regional Board Workshop**
  - **Adoption by Regional Board**
  - **Approval/Adoption by SWRCB, Office of Administrative Law (OAL) and EPA**
- 

Questions?

Answers?

Comments?

