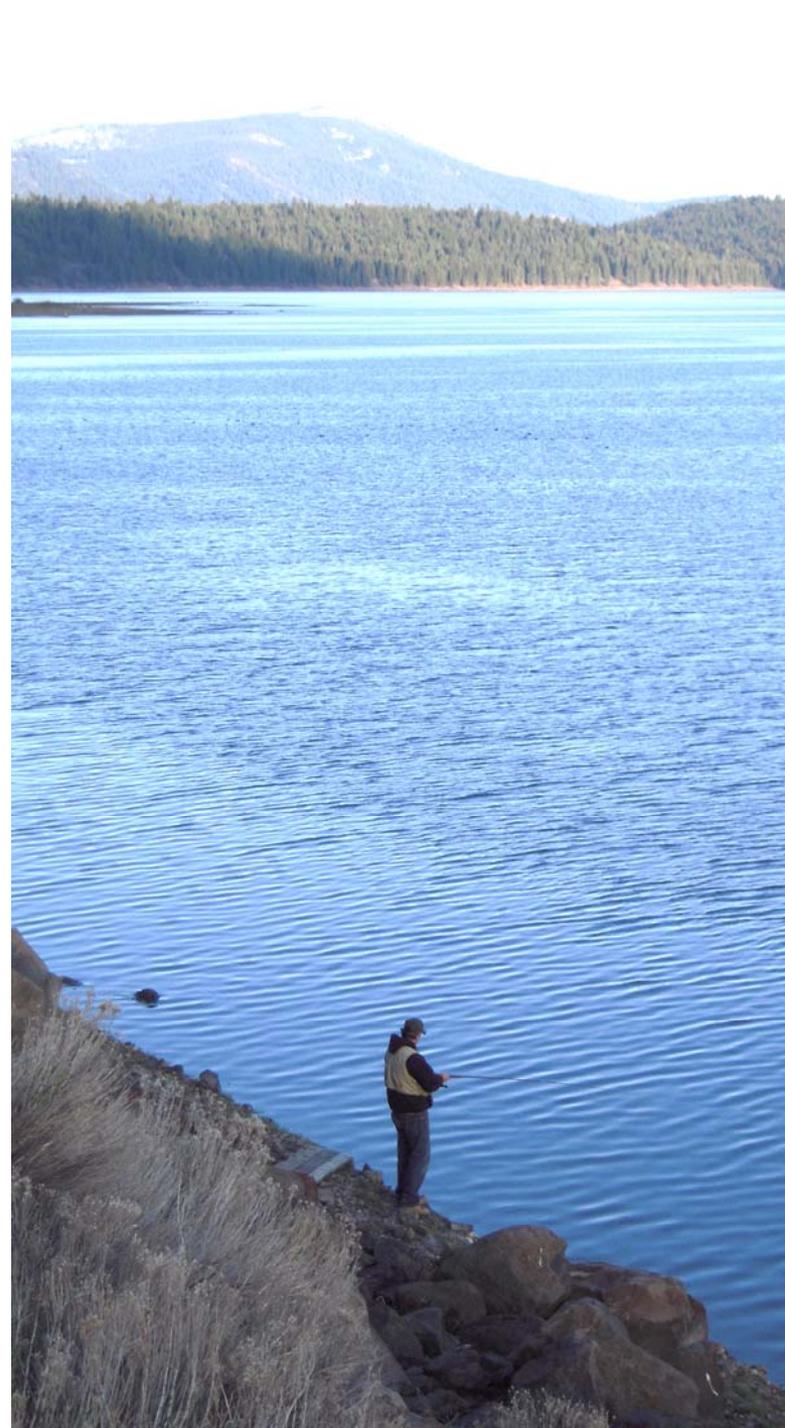


California's Surface Water Ambient Monitoring Program Contaminants in Fish from California Lakes and Reservoirs



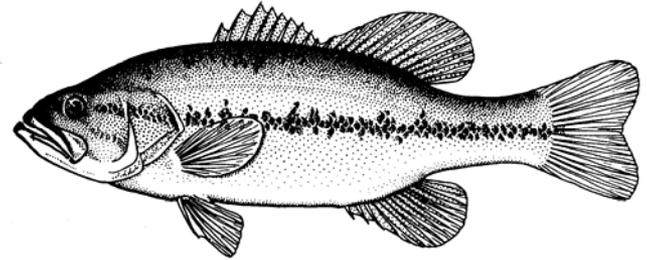
Background

- New systematic statewide bioaccumulation monitoring began in 2007
- \$750,000 to \$1 million per year
- Five-year cycle to cover all water body types, beginning with lakes
- Initial focus on sport fish



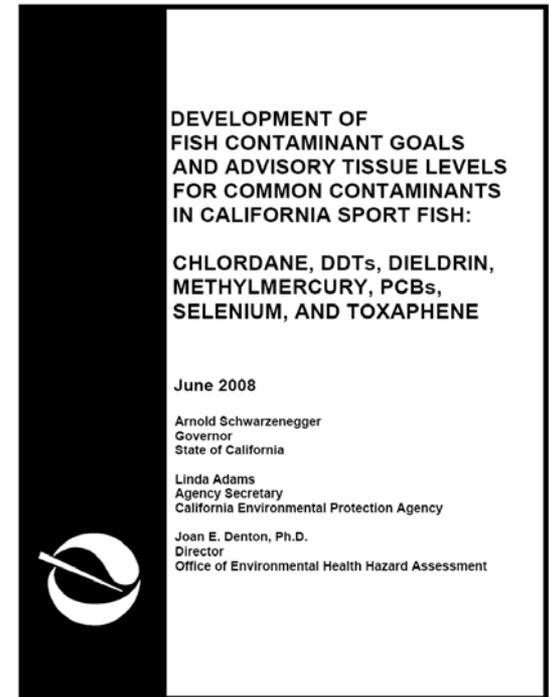
Lakes Survey

- 2007 – 2008
- Screening survey
- Questions
 1. Condition of California lakes?
 2. Candidates for 303(d) listing?
 3. Candidates for additional sampling?
- Focus on indicator species
- Multiple samples and species in each lake



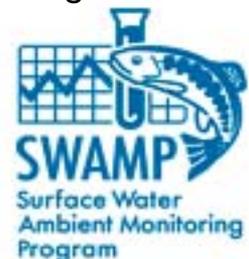
Assessment Thresholds

- Fish Contaminant Goals (FCGs)
 - Purely risk-based
 - 1 serving/wk
 - 1 in 1,000,000 additional cancer risks
 - Useful goals for risk minimization or elimination
- Advisory Tissue Levels (ATLs)
 - Take benefits into account
 - 1 in 10,000 additional cancer risks
 - 0, 1, 2, 3 servings per week categories
 - For OEHHA use in advisories/safe eating guidelines



**Klasing and
Brodberg, 2008**

<http://www.oehha.ca.gov/fish/gtIsv/index.html>

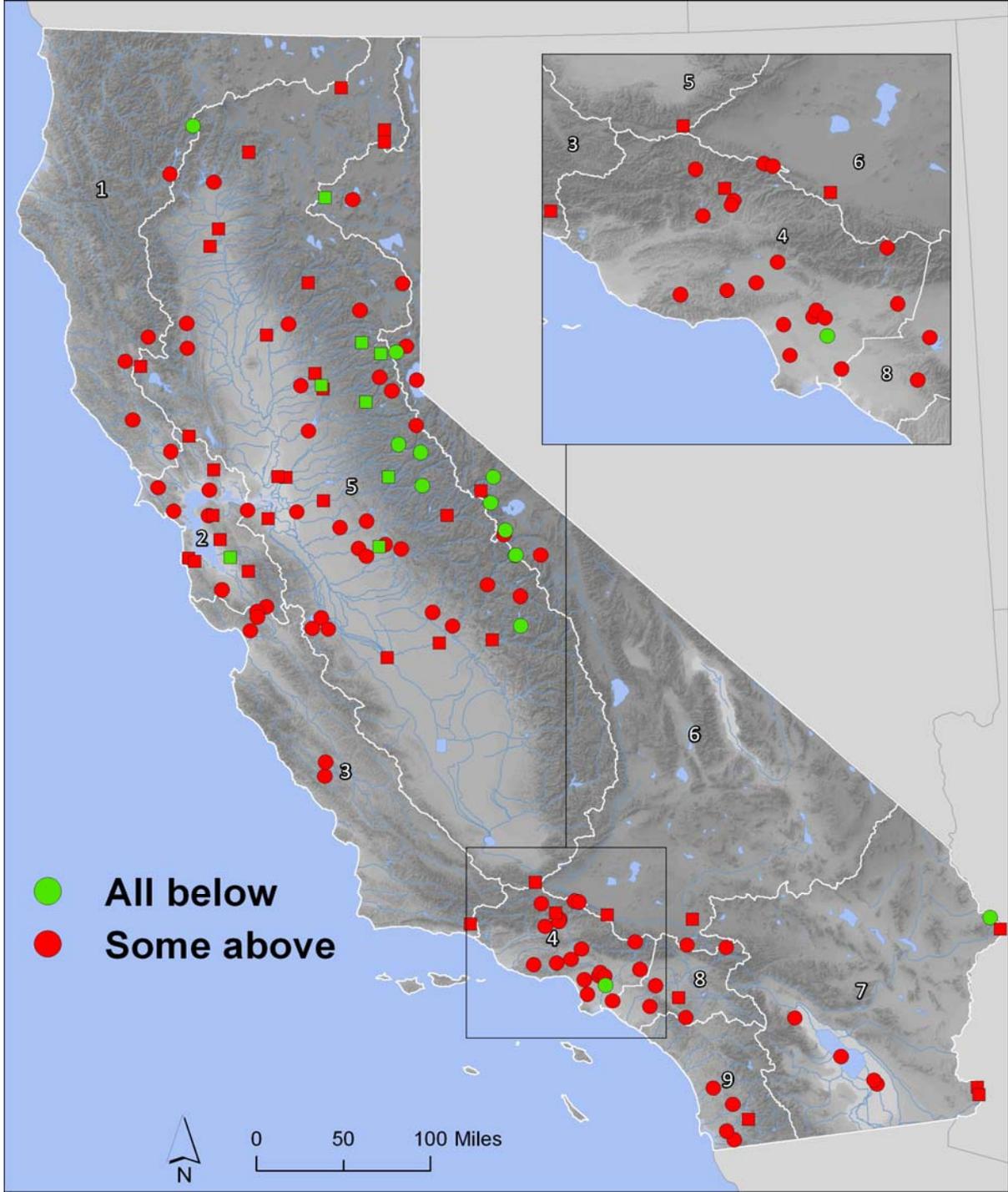


Assessment Thresholds (ppb)

Pollutant	Fish Contaminant Goal	Advisory Tissue Level (3 servings/ week)	Advisory Tissue Level (2 servings/ week)	Advisory Tissue Level (No Consumption)
Chlordanes	5.6	190	280	560
DDTs	21	520	1000	2100
Dieldrin	0.46	15	23	46
Mercury	220	70	150	440
PCBs	3.6	21	42	120
Selenium	7400	2500	4900	15000

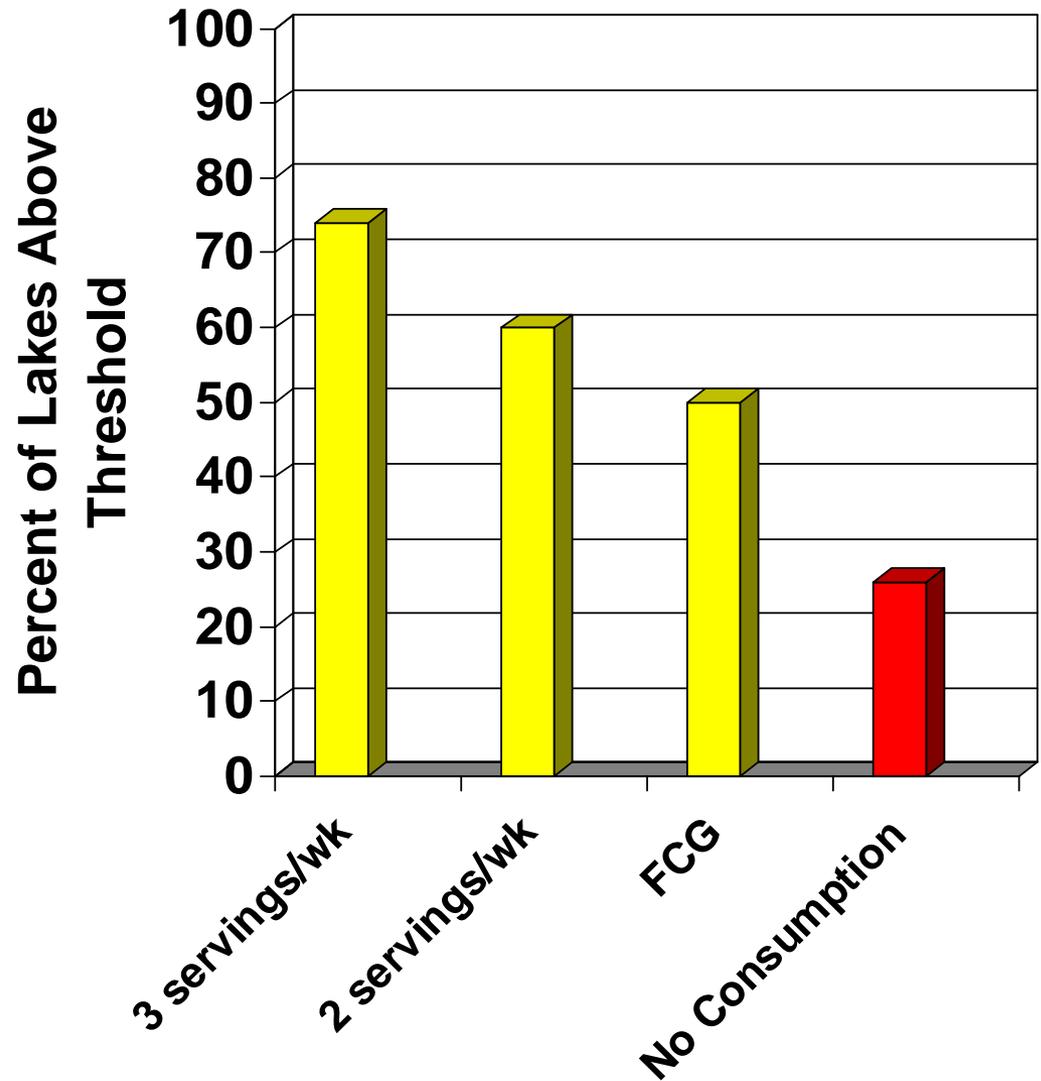
“Clean Lakes” (Based on This Survey)

- 15% of the lakes tested “clean” - all samples below all thresholds
- These lakes are low priorities for further sampling
- 85% were “red”
- Mercury is the main problem at most of these lakes



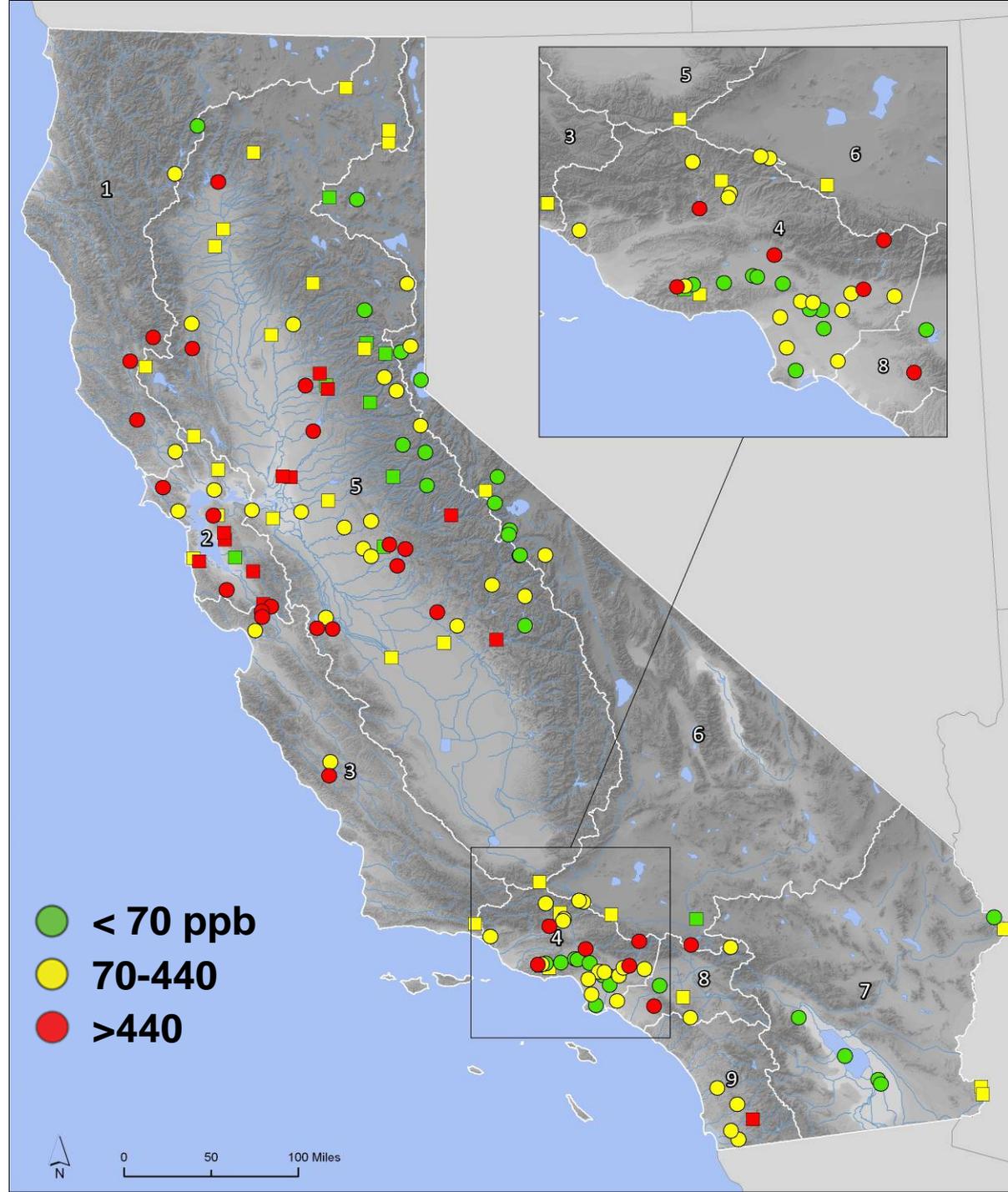
Mercury: Severity of the Problem

- Based on highest species average at each lake
- 26% in no consumption range (> 440 ppb)
- 50% above Fish Contaminant Goal (220 ppb)
- 61% above 2 serving/wk ATL (150 ppb)
- 74% above 3 serving/wk ATL (70 ppb)



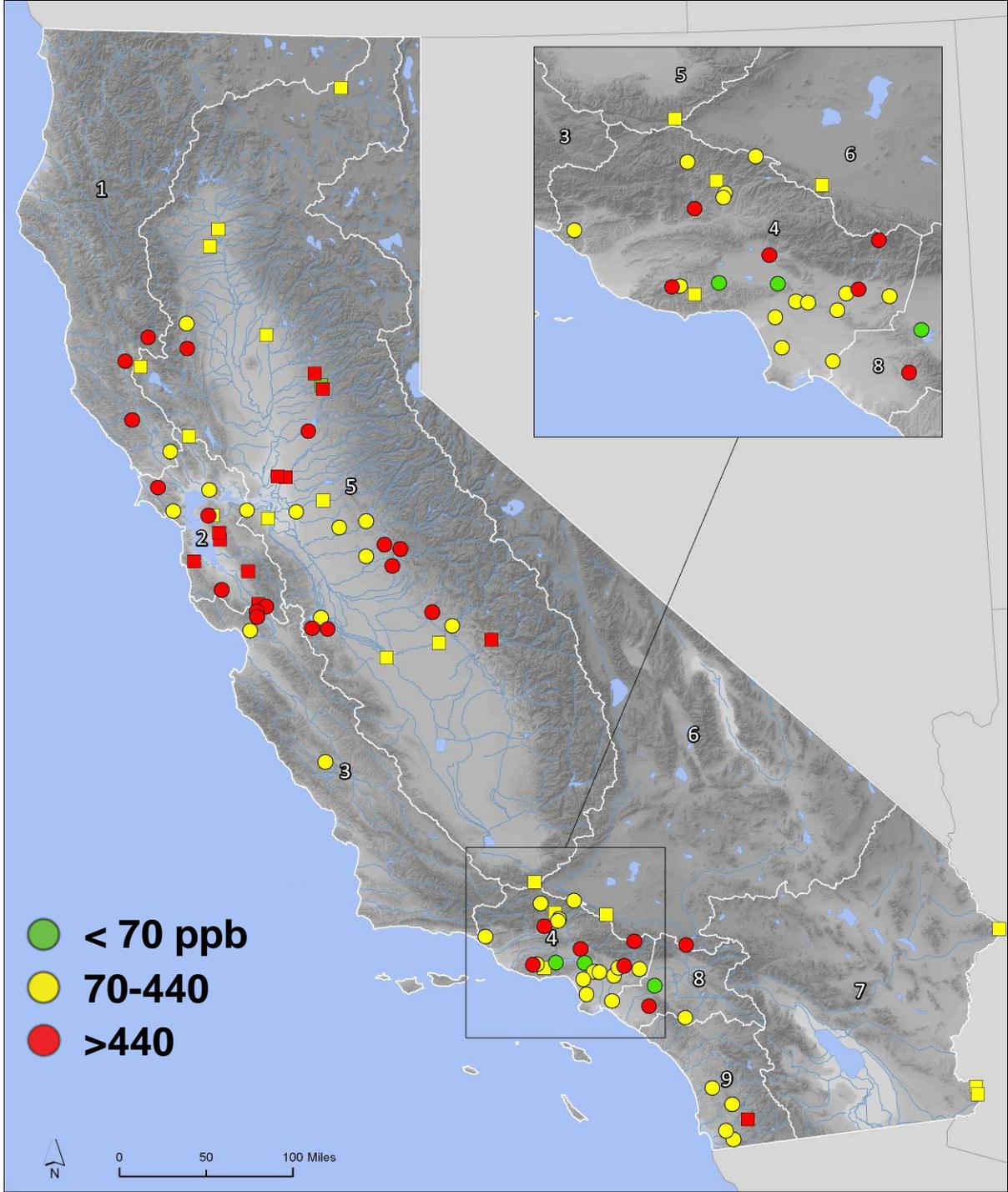
Mercury: Spatial Distribution

- Based on highest species average at each lake
- Low concentrations in some Sierra Nevada and southern CA lakes
- Not just a northern CA problem
- Species distribution has a big influence
- Red lakes a high priority for followup

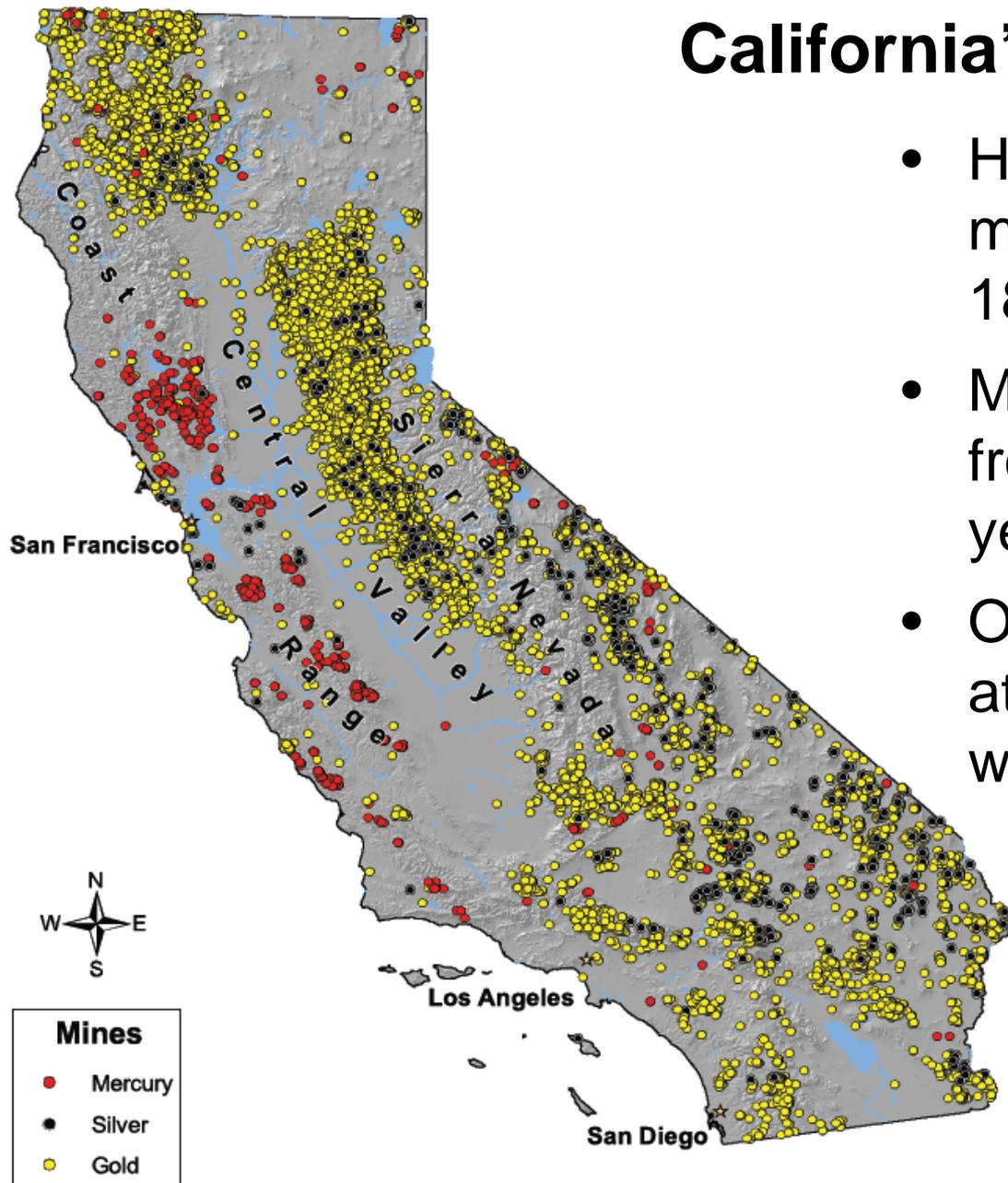


Mercury: Spatial Distribution

- Standard size largemouth bass: apples vs. apples
- One “clean” lake in northern California
- Three clean lakes in southern California
- Sources: mining may not be the only driver



California's Mining Legacy

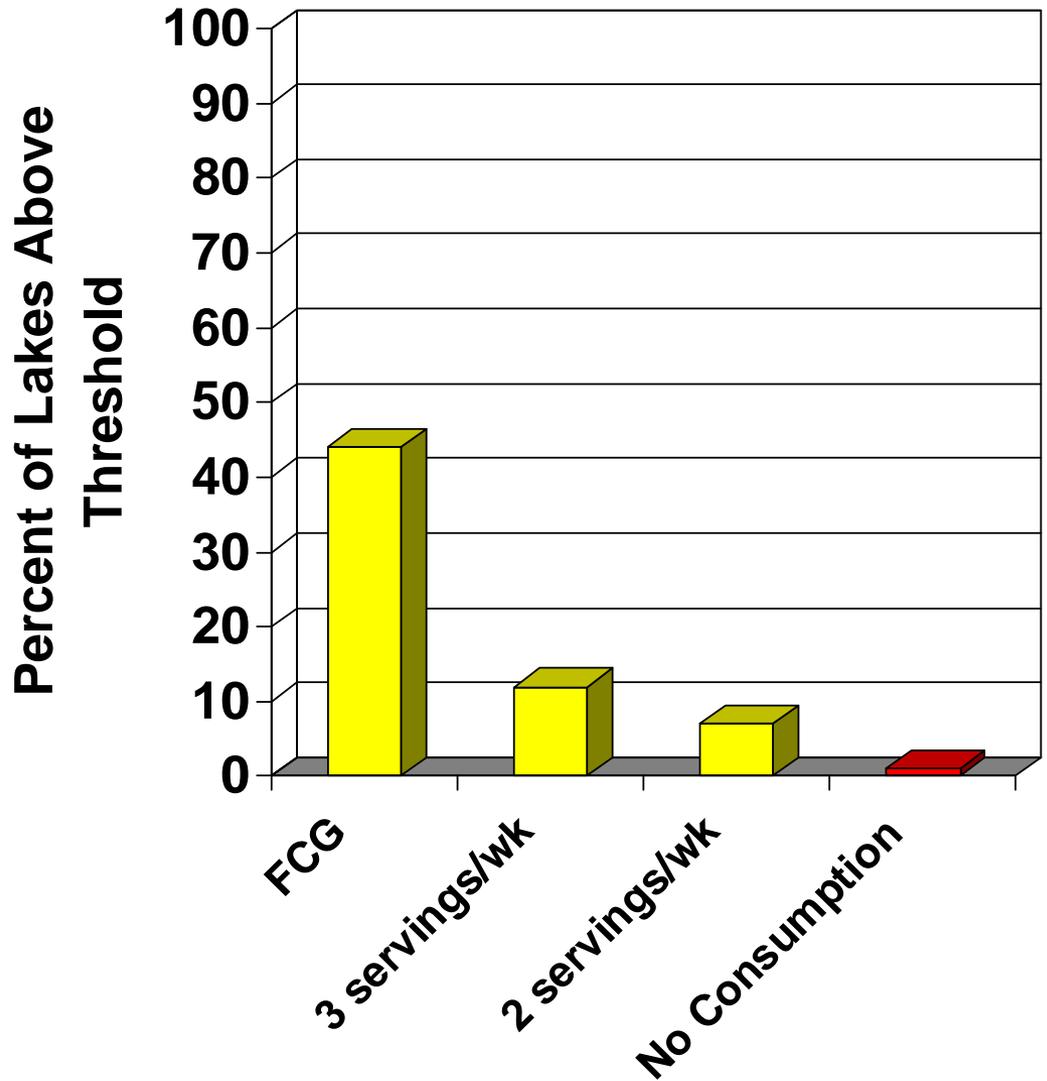


- Hundreds of gold and mercury mines from mid-1800s
- Mercury contamination from mining persists 150 years later
- Other sources: atmospheric deposition, wastewater, urban runoff

From Wiener and Suchanek (2009).
Ecological Applications 18(8)
Supplement: A3-A11.

PCBs: Severity of the Problem

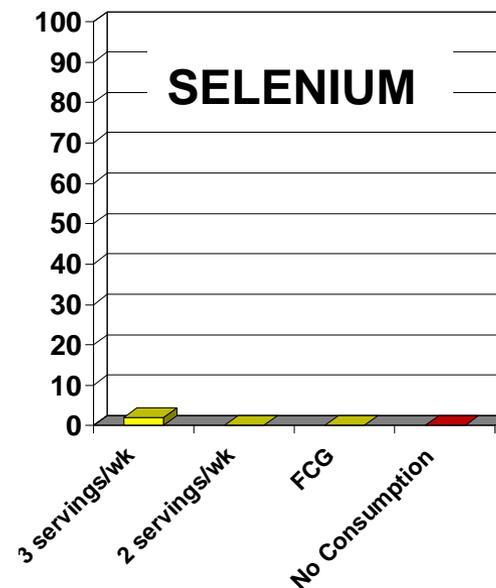
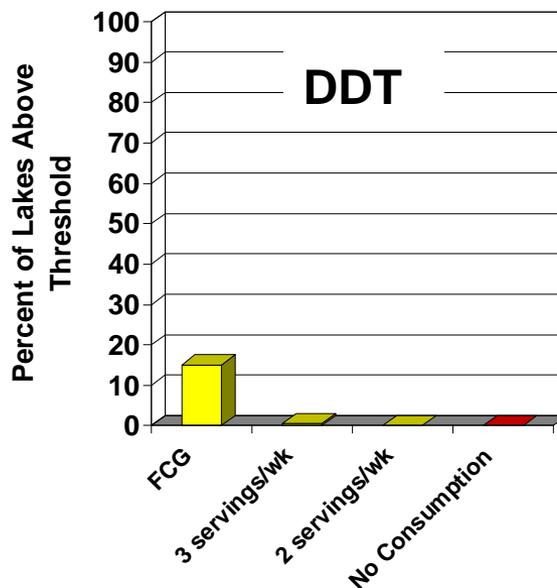
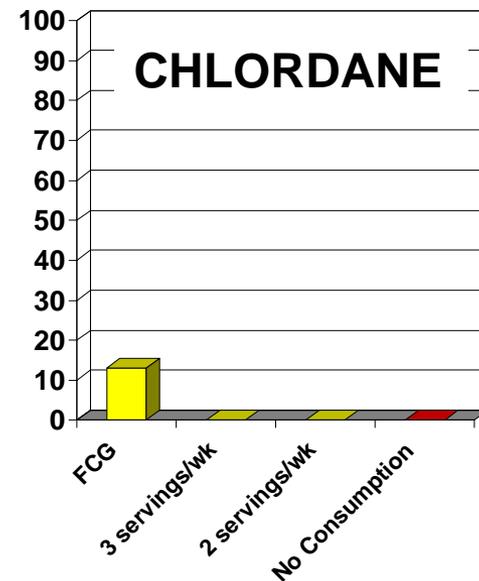
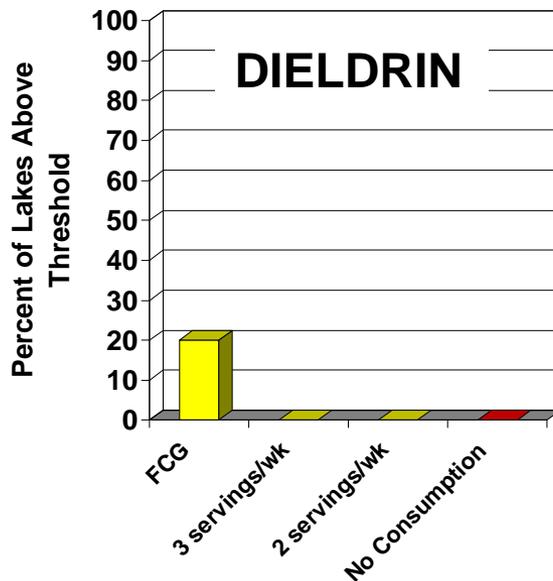
- Based on highest species at each lake
- 1% of lakes in no consumption range (>120 ppb)
- 8% above 2 serving/wk ATL (42 ppb)
- 13% above 3 serving/wk ATL (21 ppb)
- 37% above Fish Contaminant Goal (3.6 ppb)



Other Pollutants:

Severity of the Problem

- Dieldrin: 21% above Fish Contaminant Goal (0.46 ppb)
- DDT: <1% above 3 serving/wk ATL, 17% above FCG (21 ppb)
- Chlordane: 10% above FCG (5.6 ppb)
- Selenium: 2% above 3 serving/wk ATL (2500 ppb)



Questions?

