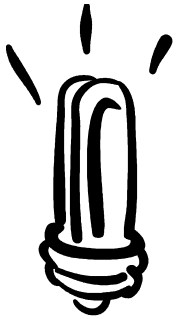
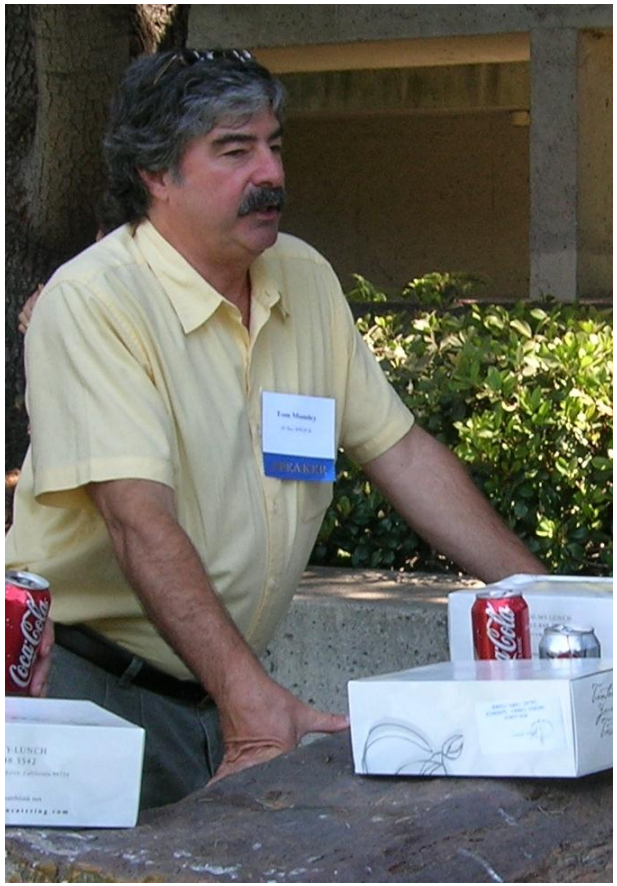




2012 RMP ANNUAL MEETING

The RMP Mercury Strategy

Goal: Collect data to support management decisions

Priority Questions

1. Where and when is mercury entering the food web?
2. What are the high leverage processes, sources, and pathways?
3. What are the best opportunities for management intervention?
4. What are the effects of management actions?
5. Will total mercury reductions result in reduced food web accumulation?

Reducing Methylmercury Accumulation in the Food Webs of San Francisco Bay and Its Local Watershed

Jay Davis, Don Yee, Letitia Grenier, Lester McKee, Ben Greenfield

San Francisco Estuary Institute

Richard Looker, Carrie Austin

San Francisco Bay Regional Water Quality Control Board

Mark Marvin-DiPasquale

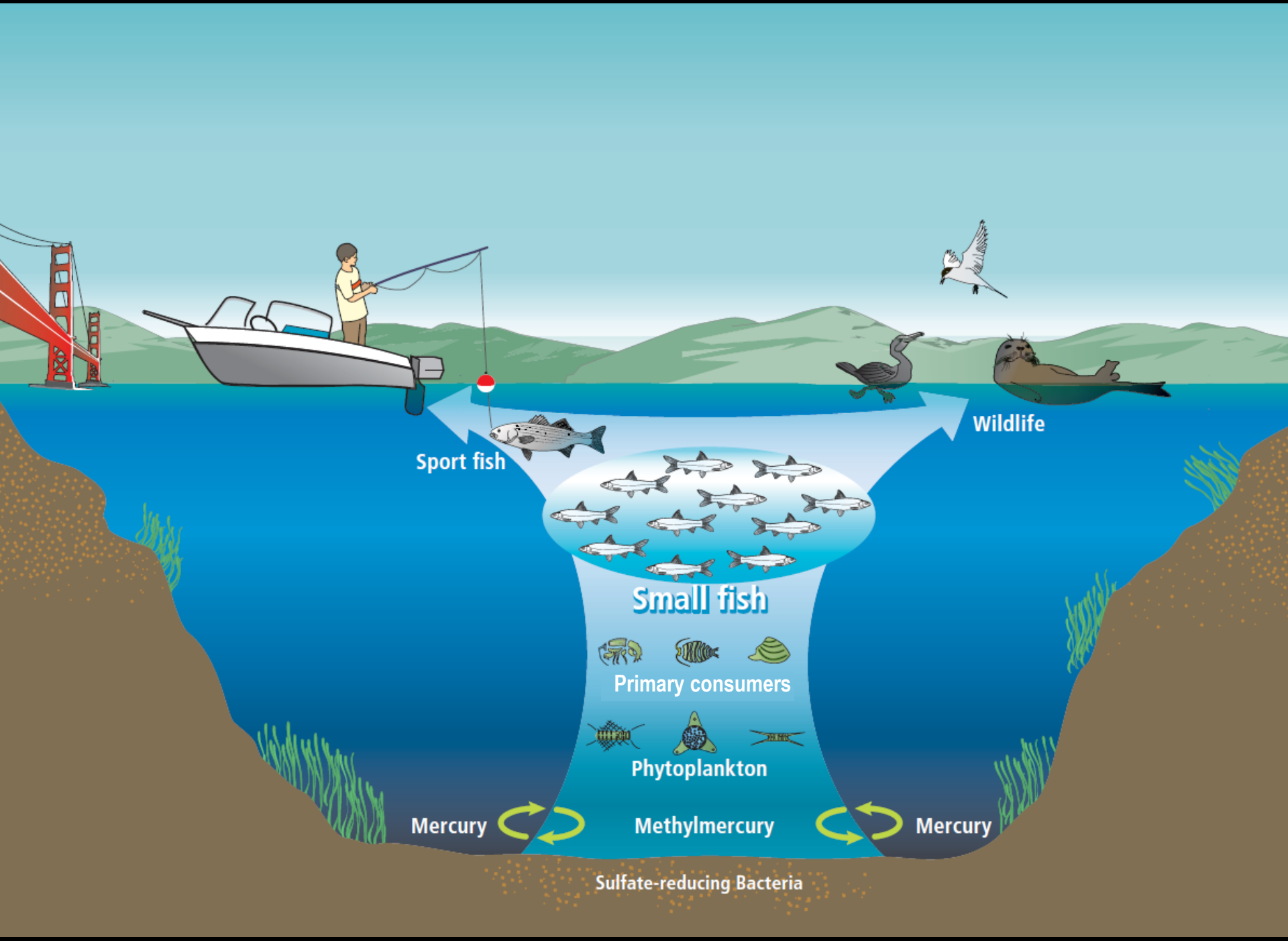
U.S. Geological Survey

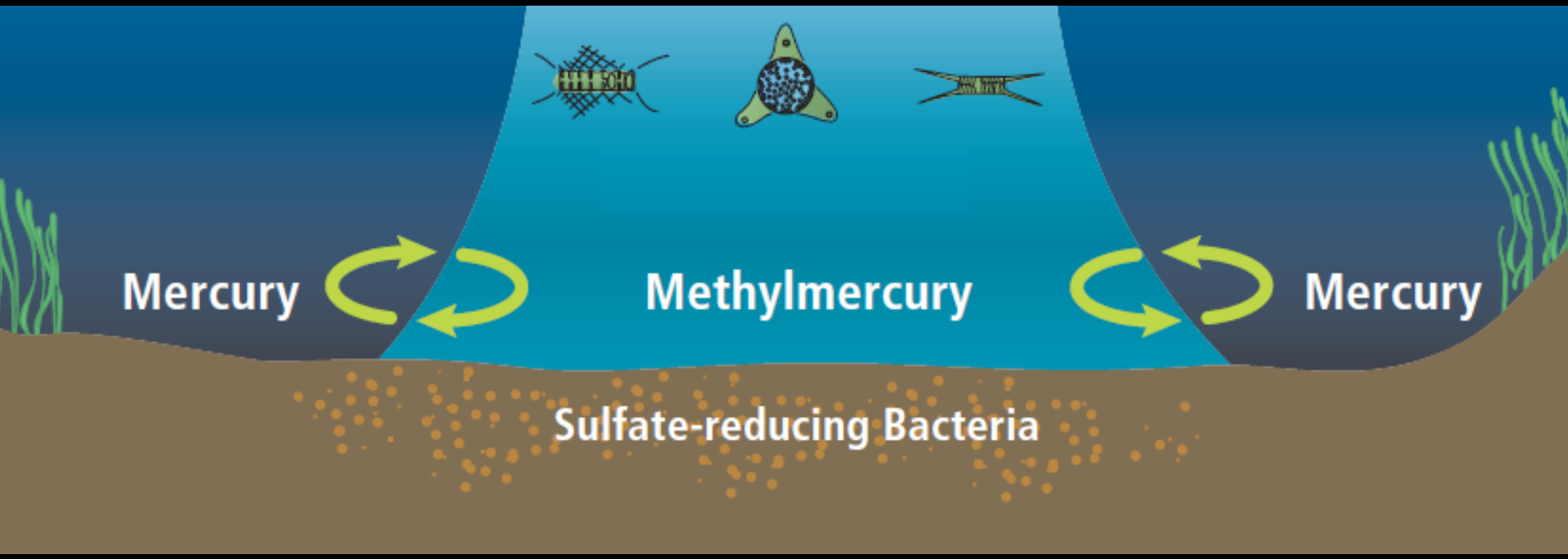
Robert Brodberg

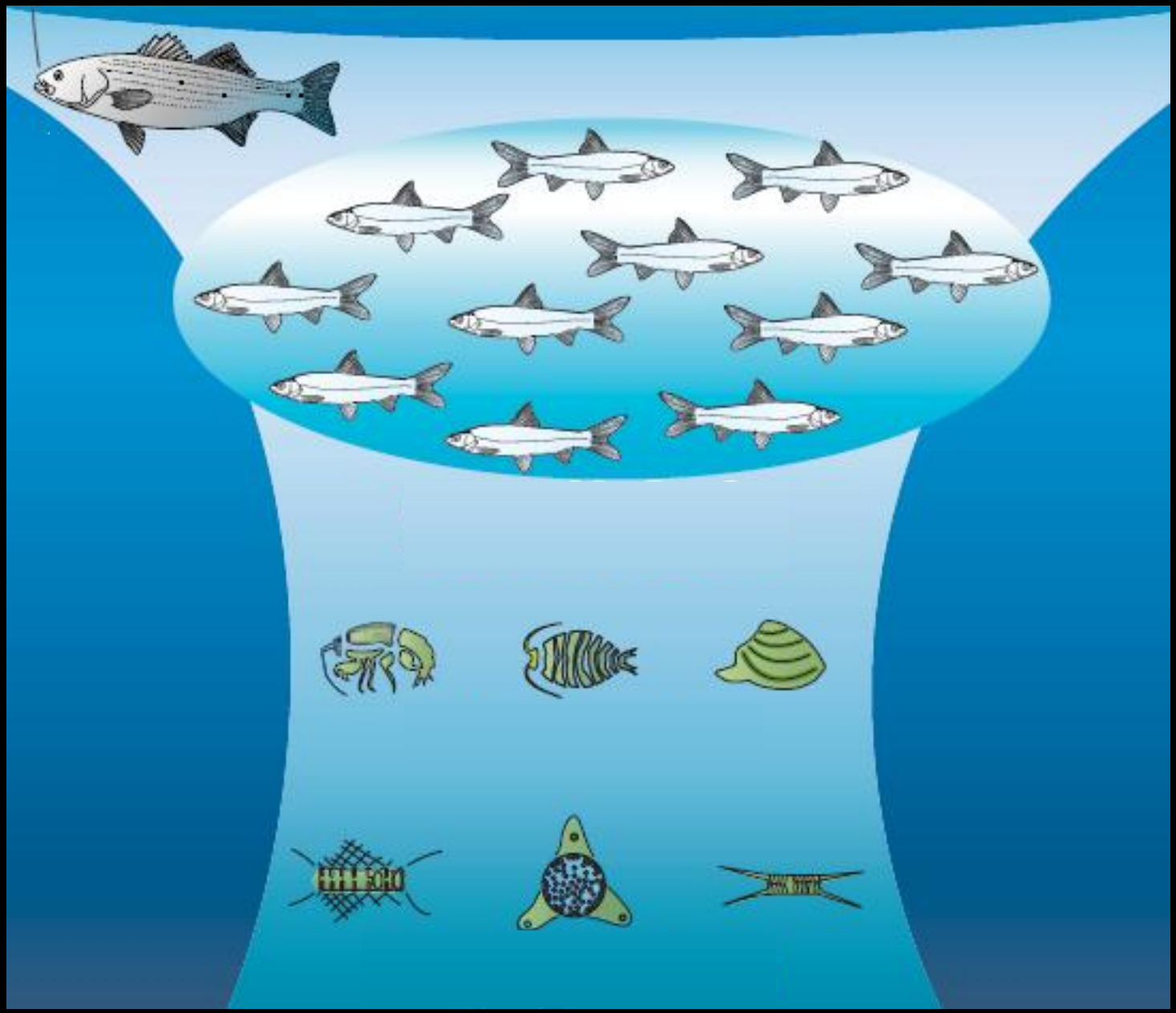
California Office of Environmental Health Hazard Assessment

Joel Blum

University of Michigan


Sport fish
Wildlife
Small fish
Primary consumers
Phytoplankton
Mercury
Methylmercury
Mercury
Sulfate-reducing Bacteria


Mercury
Methylmercury
Mercury
Sulfate-reducing Bacteria


ECHO

What have we learned in the last few years?

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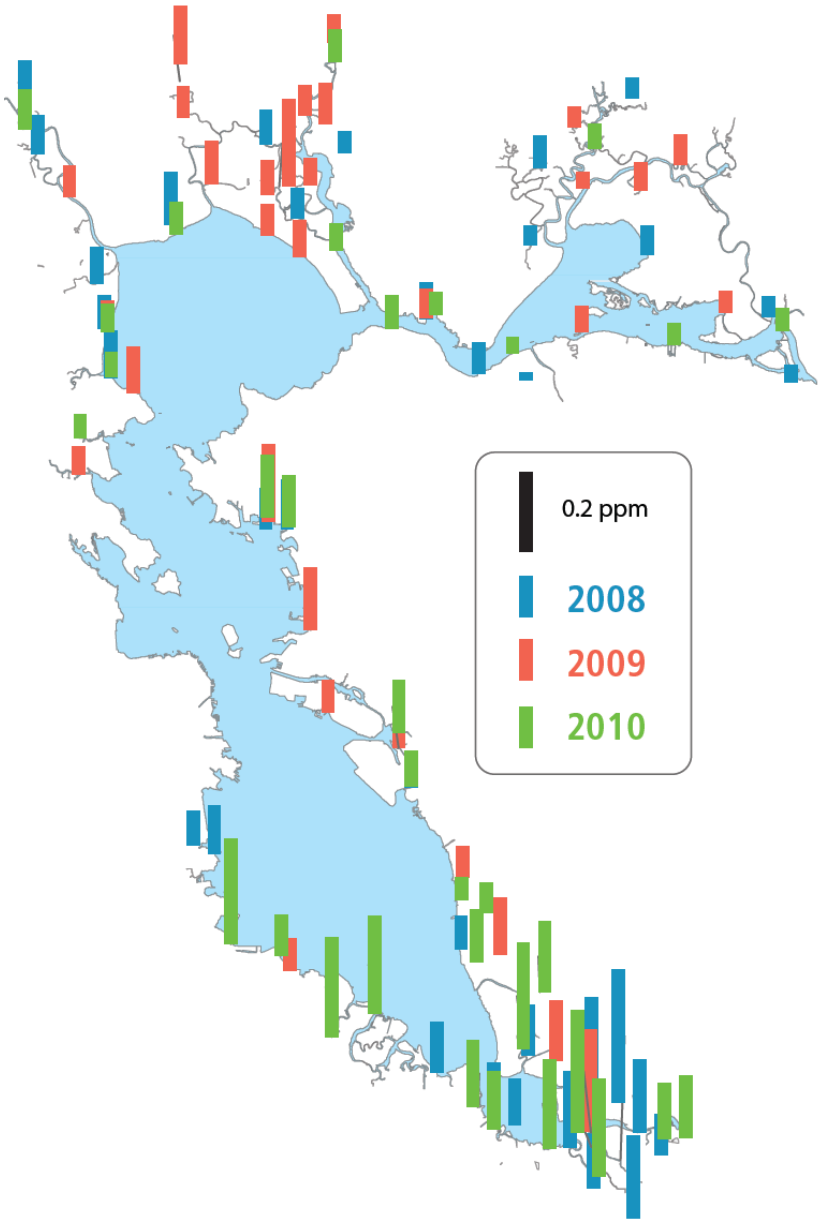
Small Fish Survey

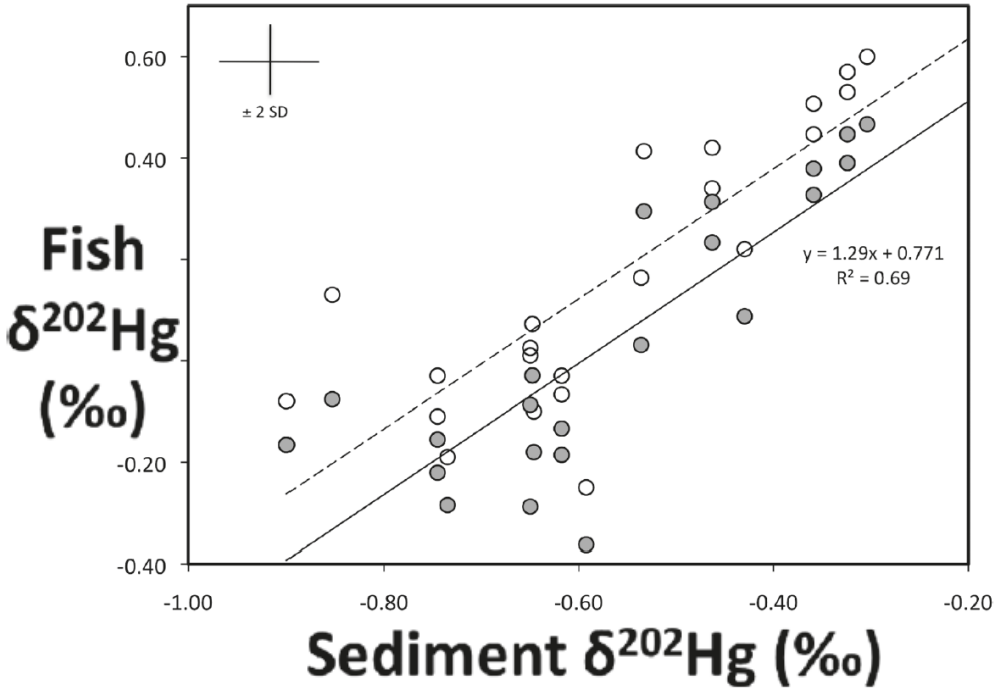
- Questions 1 and 2
- Regional variation
- Lots of seasonal variation
- No clear high leverage pathways
- POTW effluent appears to be a low leverage pathway



Mercury concentrations (ppm) in silverside from 2008-2010.

Hg Isotope Study

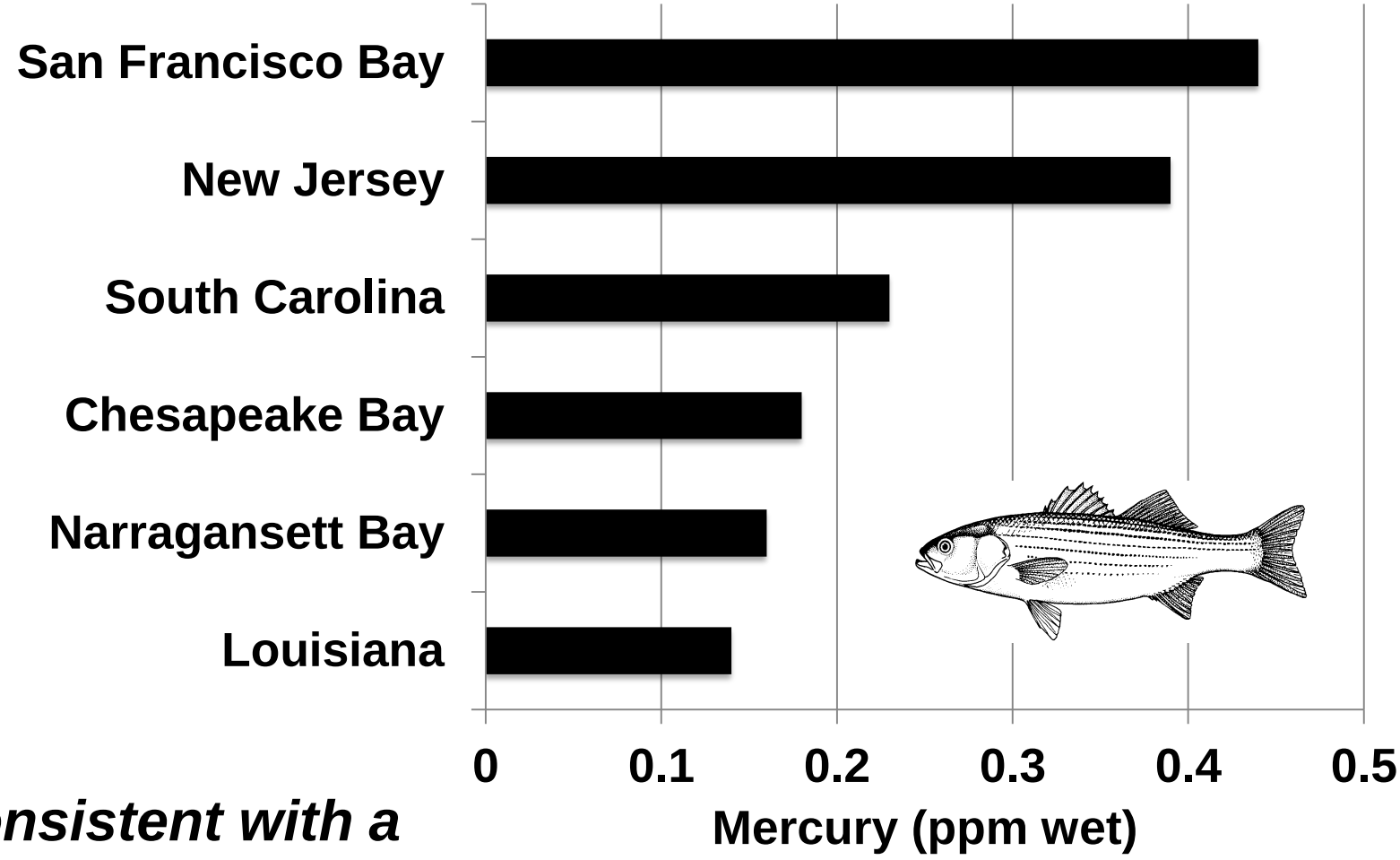
- Questions 2 and 5
- Legacy Hg matters
- Hg from historic mining regions is clearly a concern
- Elemental Hg from gold mining, urban/industrial, and atmosphere is also important



Gehrke et al. 2011. ES&T 45 (4), pp 1264–1270

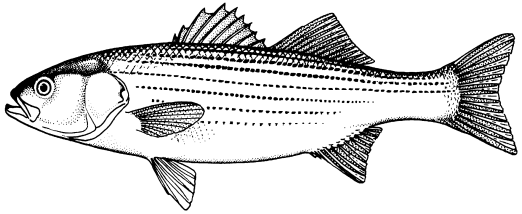
Total Hg reductions will lower food web Hg

Sport Fish: Striped Bass



Consistent with a large role of the mining legacy

Sport Fish: Striped Bass



ATL - no consumption
TMDL Target
ATL - 2 servings per week

Also consistent with legacy influence

Methylmercury Concentration (ppm)

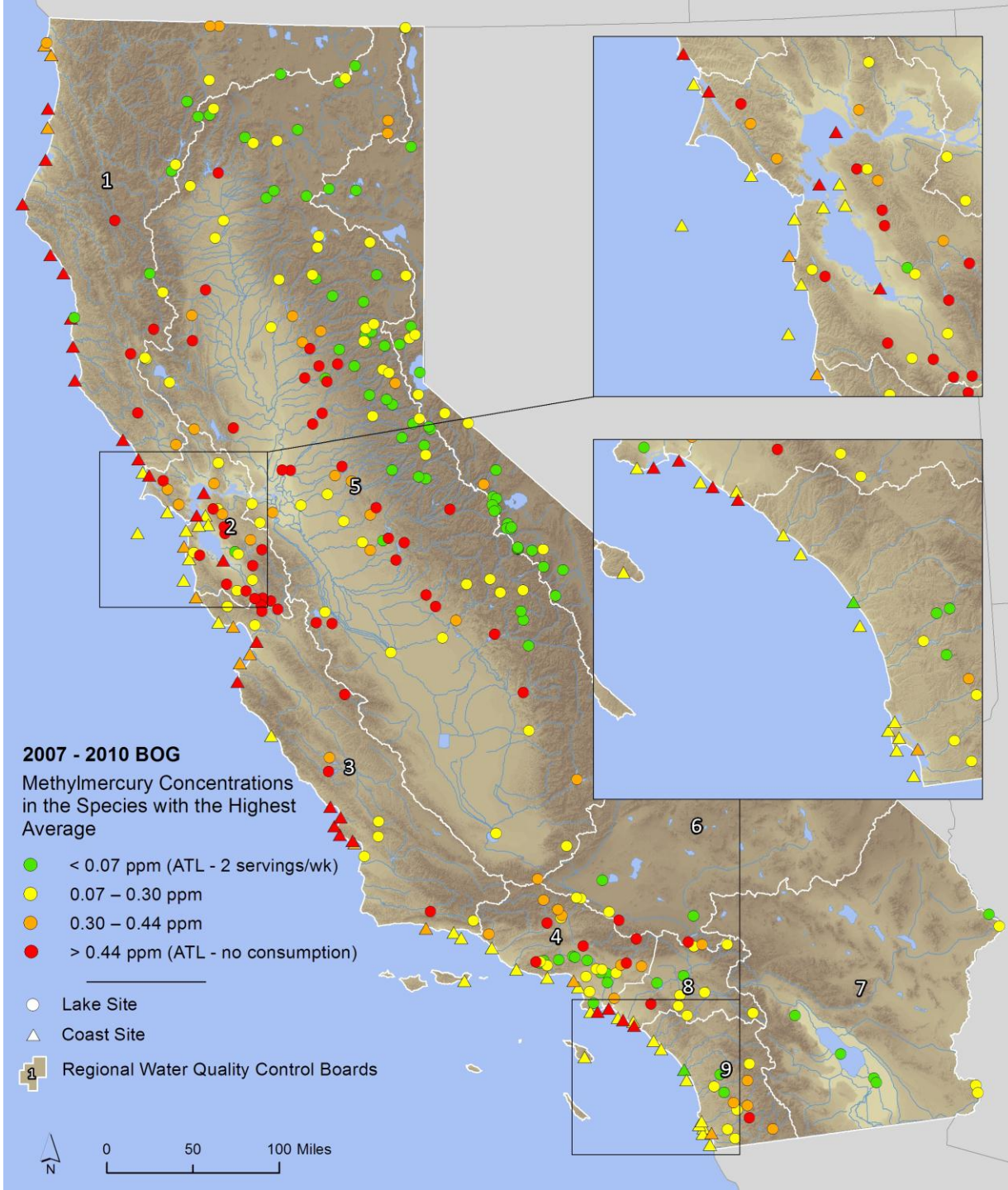
0.0
0.5
1.0
1.5
2.0

1971
1972
1994
1997
1999
2000
2003
2006
2009

Statewide Sport Fish Surveys

- SWAMP
- Finding accumulation in even the most remote corners of the state

Atmospheric deposition probably matters too



Is there anything we can do to reduce food web methylmercury in the next 10-20 years?

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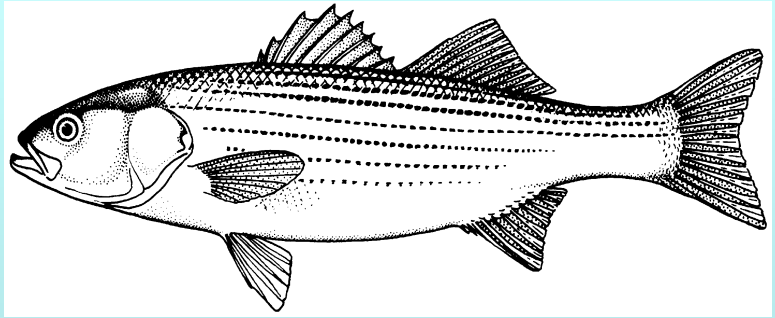
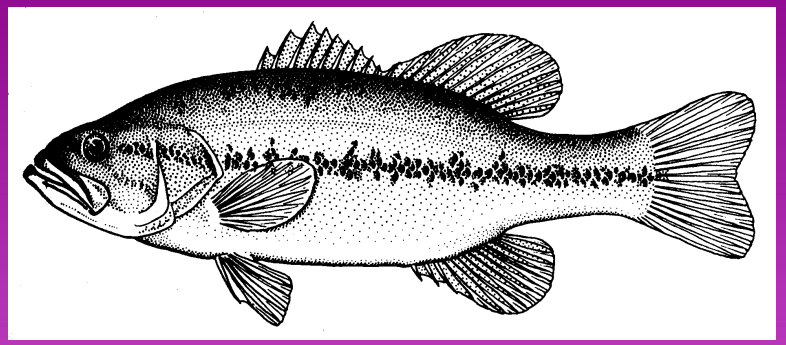
Open Bay



Tidal Marsh

Managed Pond

Reservoir



Open Bay: Possible Knobs

- Elective strategies
  - Slow knobs
    - THg inputs: mining region runoff, urban runoff
  - Fast knobs
    - Nutrient control?
- Non-elective changes
  - Suspended sediment regime
  - Food web shifts
  - Temperature change
  - Sea level rise

Tidal Marsh

Knobs

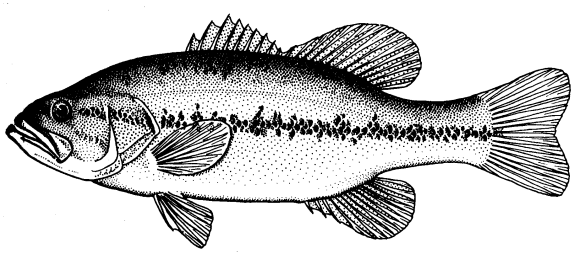
- Elective strategies
  - Slow knobs
    - THg inputs
  - Fast knobs
    - Restored marsh design and placement
- Non-elective changes
  - Temperature change
  - Food web shifts

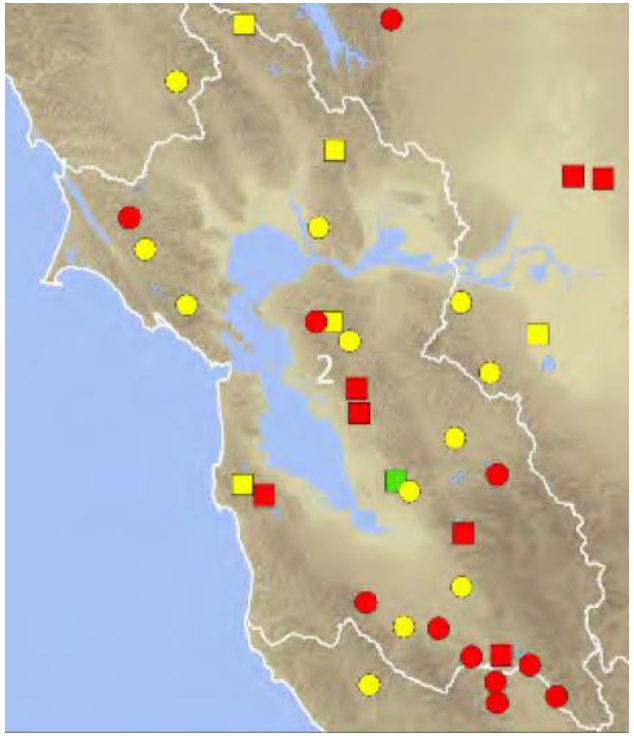
Managed Pond

Knobs

- Elective strategies
  - Slow knobs
    - THg inputs
  - Fast knobs
    - Pond design and placement
    - Pond management
- Non-elective changes
  - Temperature change
  - Food web shifts

Reservoir

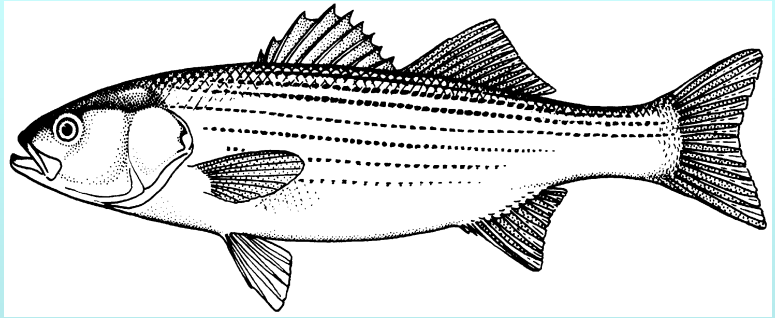




Knobs

- Elective strategies
  - Slow knobs
    - THg inputs
  - Fast knobs
    - Water management
    - Water chemistry
    - Fishery management
- Non-elective changes
  - Temperature change
  - Food web shifts

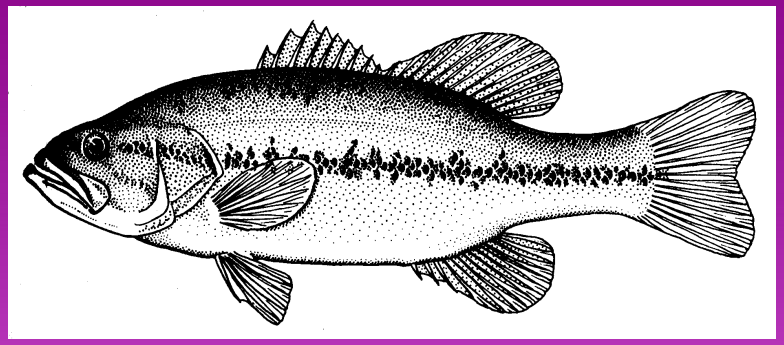
Open Bay



Tidal Marsh

Managed Pond

Reservoir



Coming soon in
Environmental Research

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2012

Regional Monitoring Program

A Report of the Regional Monitoring Program for Water Quality in the San Francisco Estuary

Update