



RMP
REGIONAL MONITORING
PROGRAM FOR WATER QUALITY
IN SAN FRANCISCO BAY

sfei.org/rmp

Contaminants in San Francisco Bay Sport Fish

Monitoring to Protect Human Health and Inform Regulatory Action

Jennifer Sun, Jay Davis, San Francisco Estuary Institute

Vince Palace, University of Manitoba

Robin Stewart, USGS Menlo Park











Status and Trends

Protect Public Health


Inform Management

A guide to eating San Francisco Bay fish and shellfish

Women 18 - 45 and children 1 - 17

Safe to eat 2 servings per week	OR	Safe to eat 1 serving per week	Do not eat
 Chinook (king) salmon  Brown rockfish  Red rock crab  Jacksmelt <p>♥ = High in Omega-3s</p>		 California halibut  White croaker	 Striped Bass  Surfperches  Sharks  White sturgeon

Eat only the skinless fillet. PCBs are in the fat and skin of the fish.





- Always remove and throw away the skin of white croaker before cooking.
- Cook thoroughly and allow the juices to drain away.
- For crab, eat only the meat.

What is the concern? Some fish have high levels of PCBs and mercury. PCBs might cause cancer. Mercury can negatively affect how the brain develops in unborn babies and children. It is especially important for women who are pregnant or breastfeeding to follow these guidelines.

♥ **Why eat fish?** Eating fish is good for your health. Fish have Omega-3s that can reduce your risk for heart disease and improve how the brain develops in unborn babies and children.

What is a serving?

For Adults **For Children**

The recommended serving of fish is about the size and thickness of your hand. Give children smaller servings.

California Office of Environmental Health Hazard Assessment • www.oehha.ca.gov/fish.html • (510) 622-3170 10-11

**Total Maximum Daily Load
Selenium in North San Francisco Bay**

Staff Report
For Proposed Basin Plan Amendment




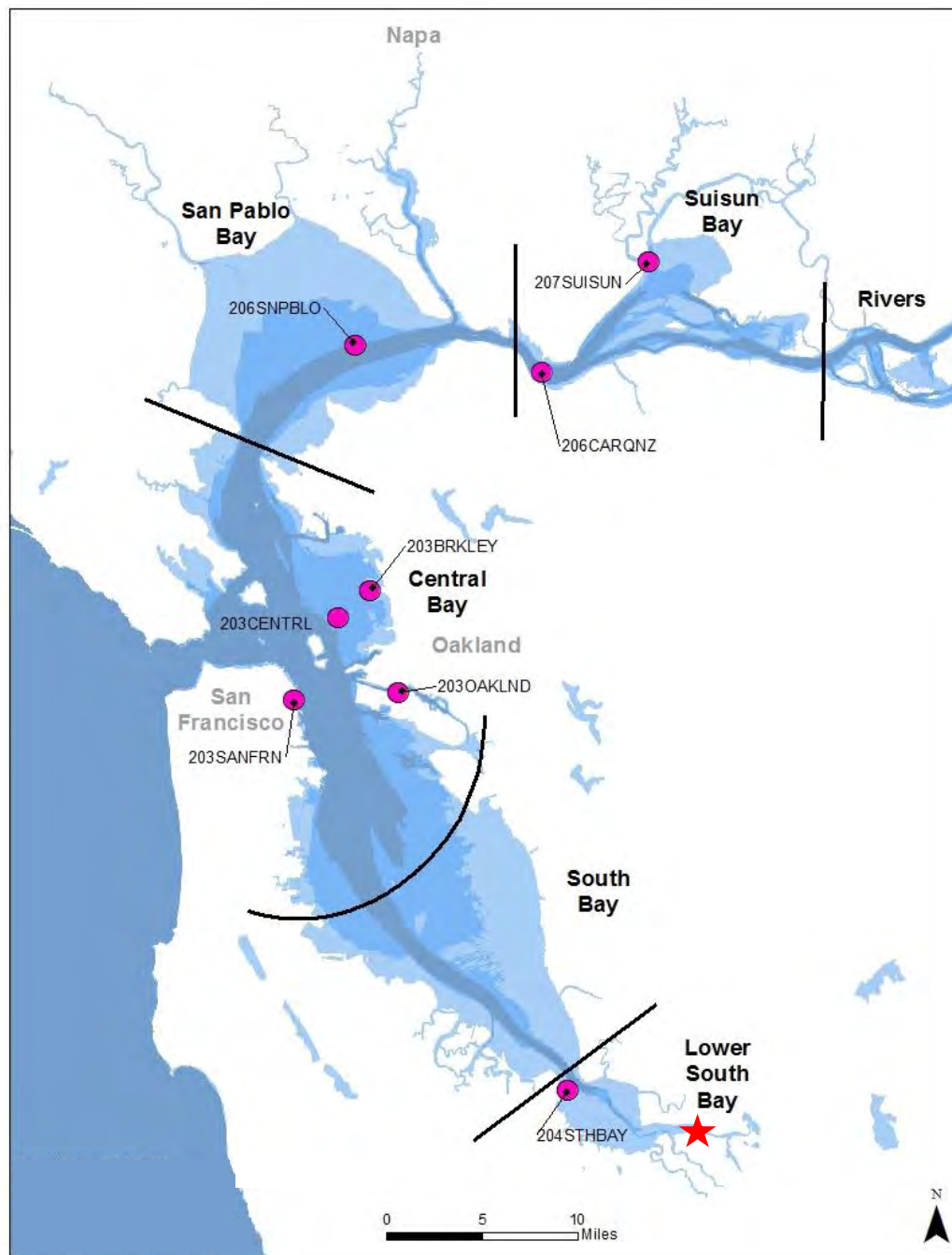
Photo: CA Department of Fish and Wildlife

Barbara Baginska
California Regional Water Quality Control Board
San Francisco Bay Region
November 18, 2015



Status & Trends

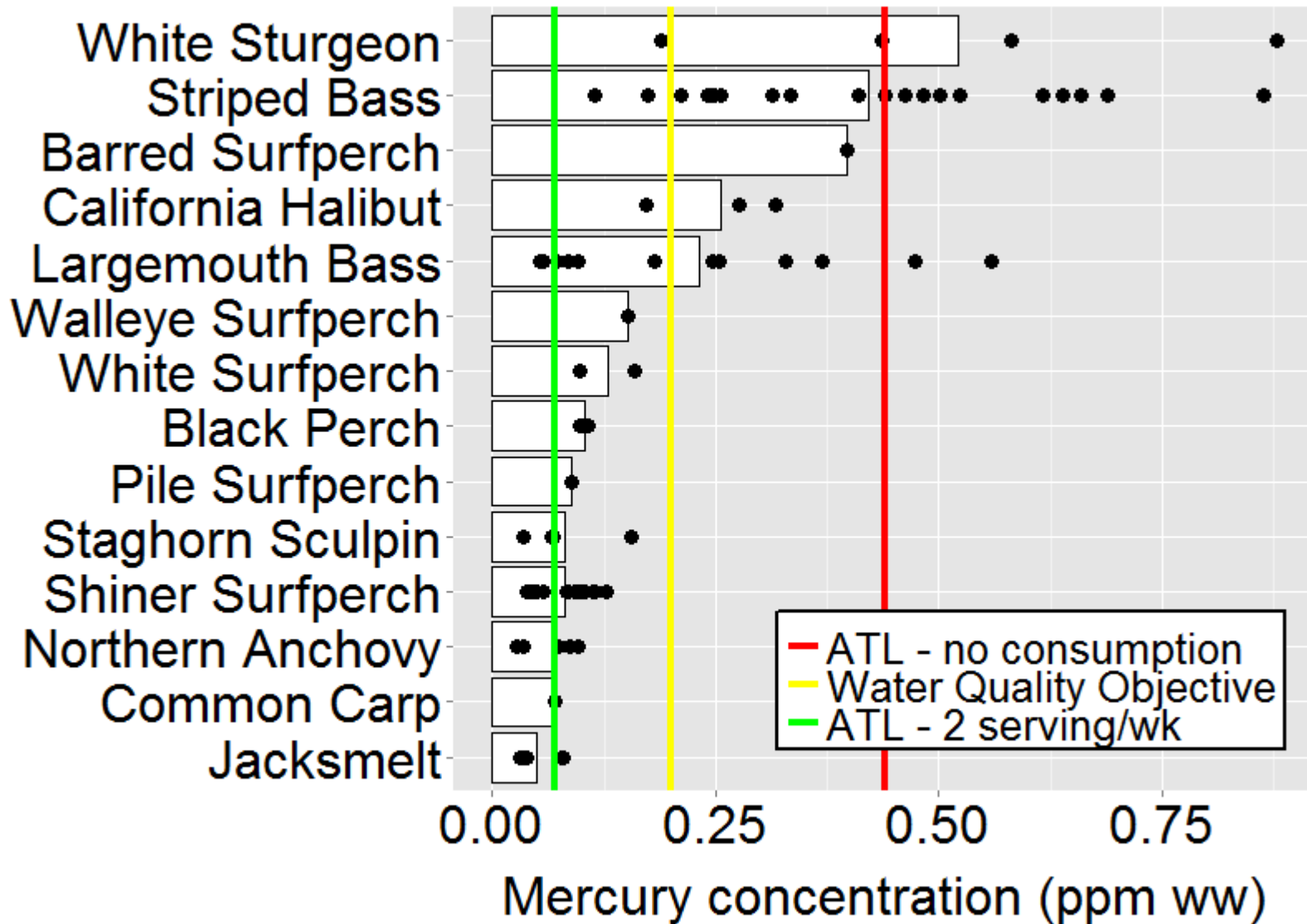
Hg
PCBs
Dioxins
PBDEs
PFOS
Se



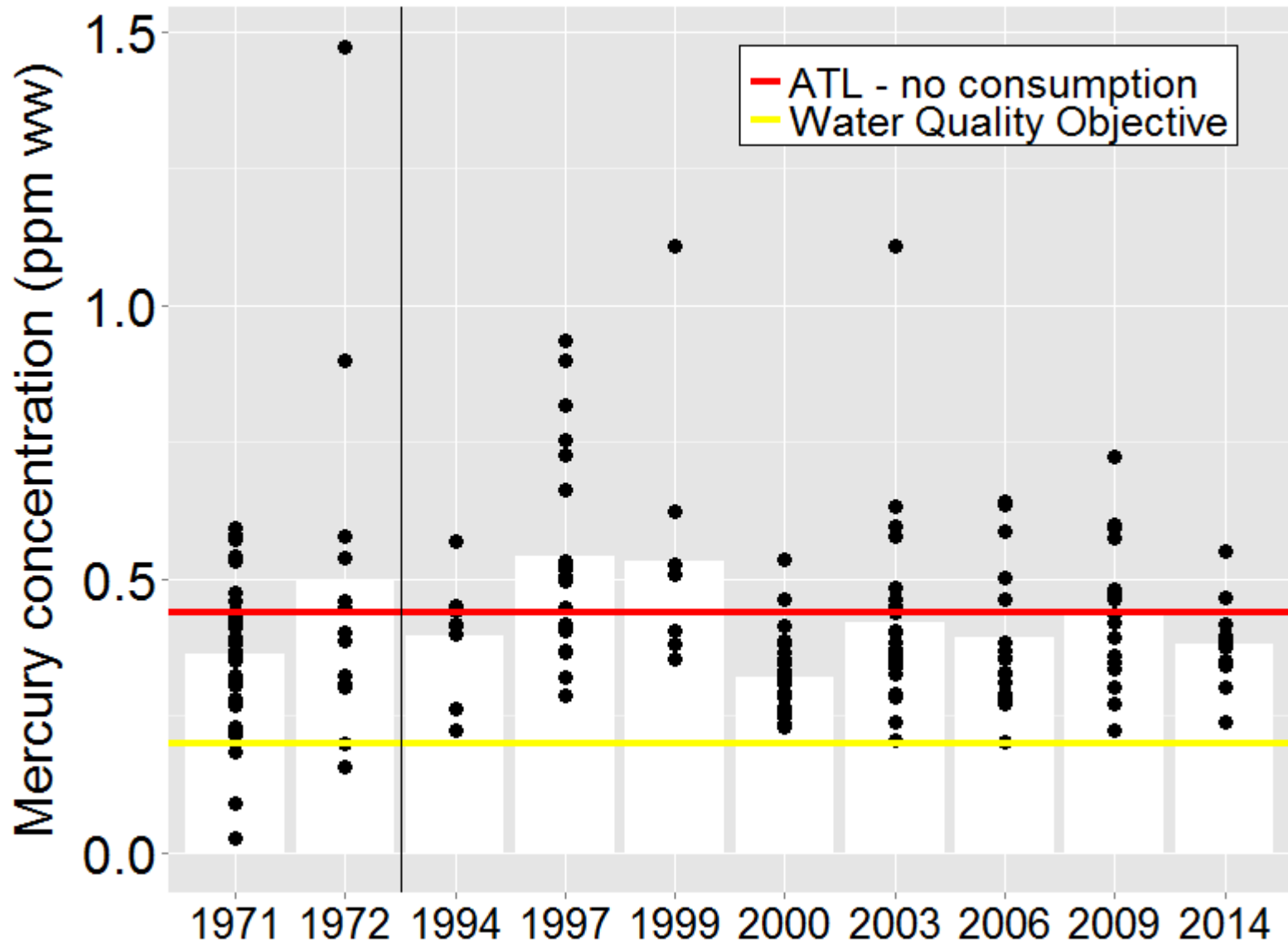
Mercury



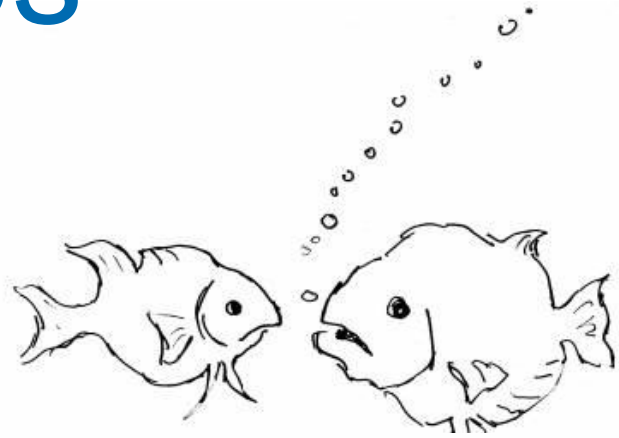
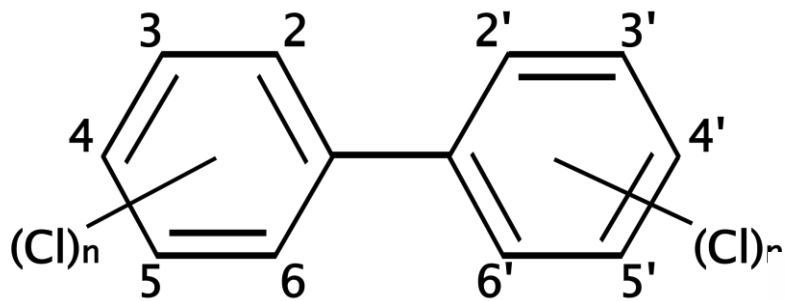
Mercury Exceeds Thresholds



Mercury in Striped Bass – no long-term trend

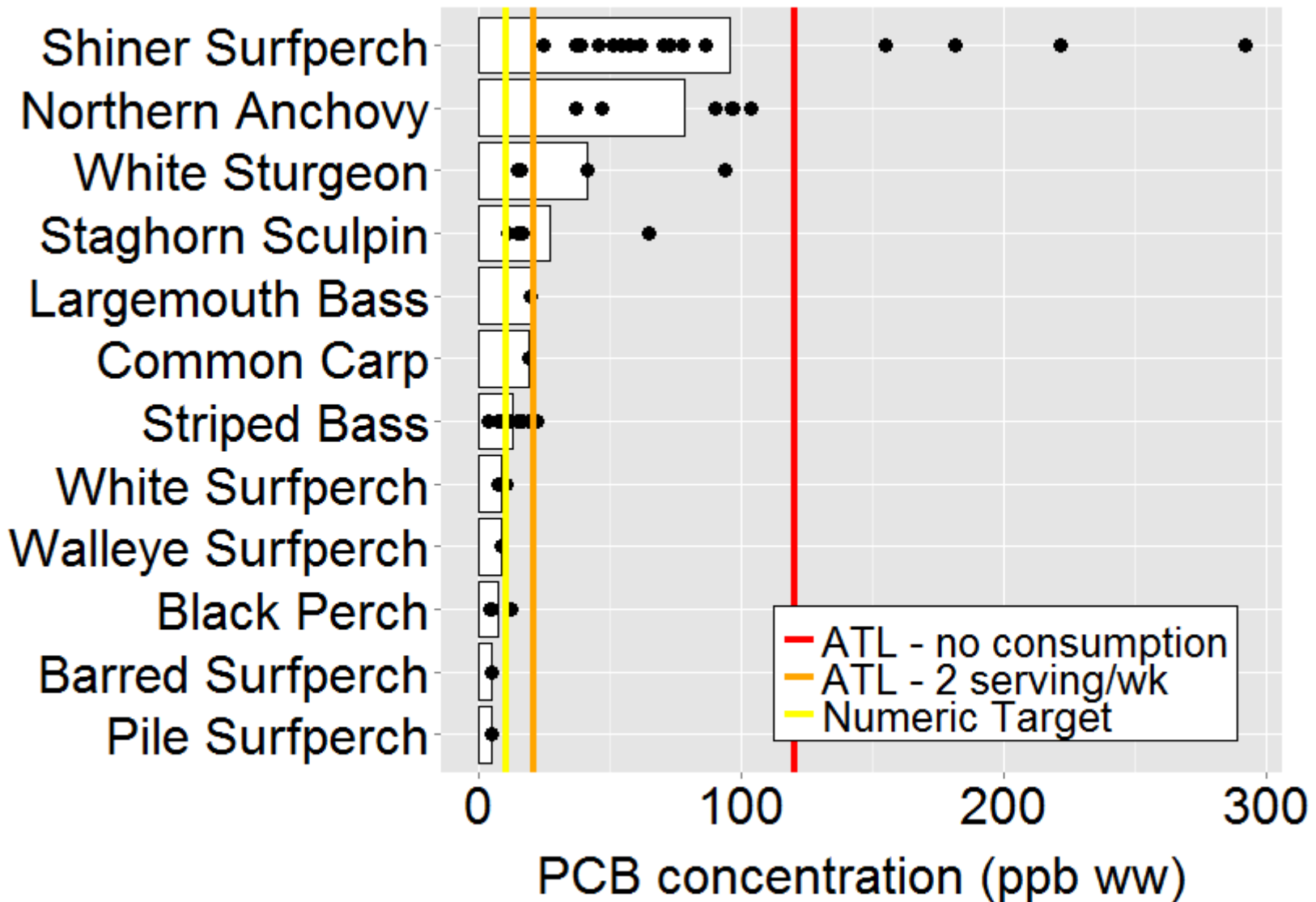


PCBs

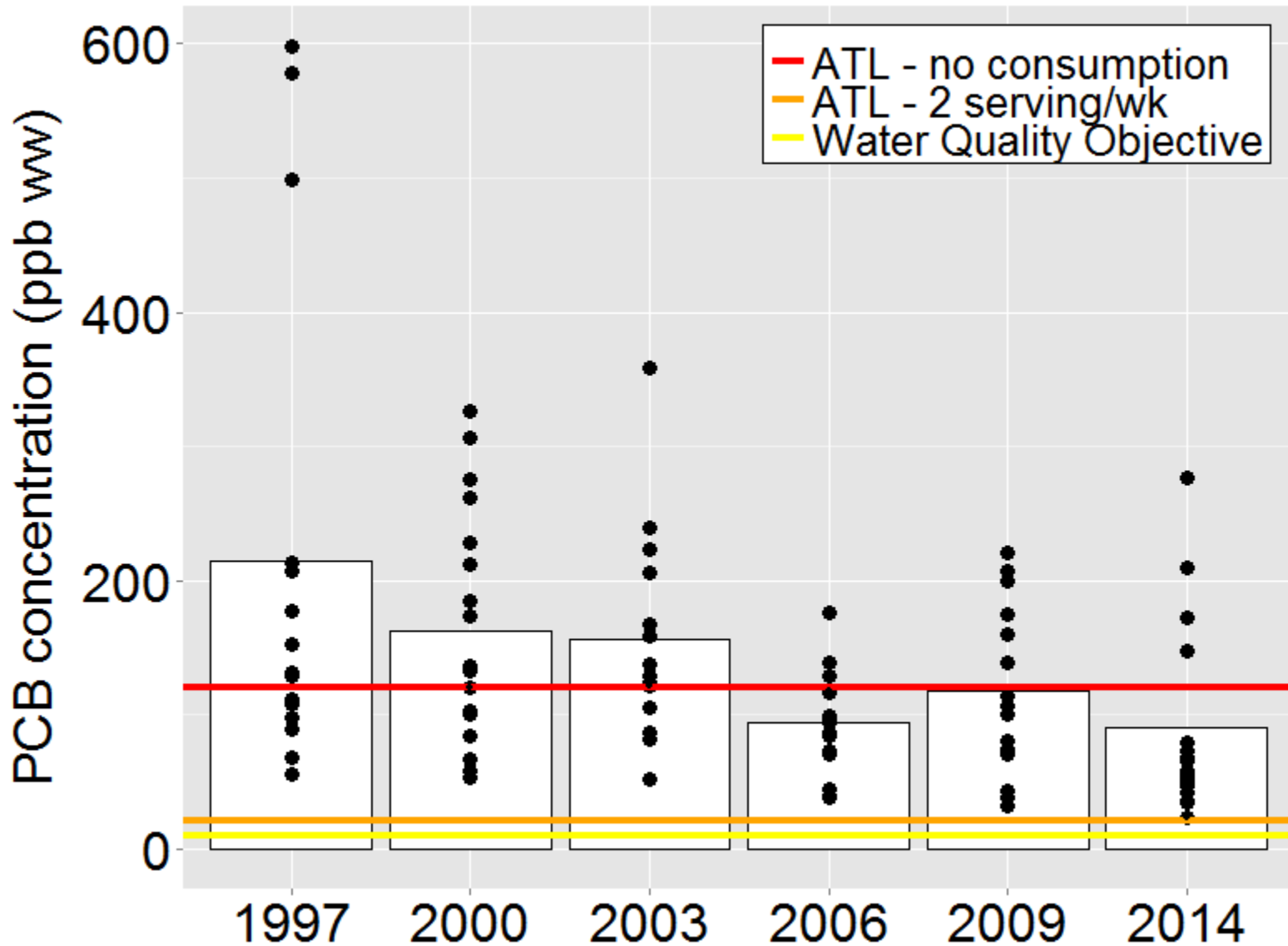


"EATING PCB IS ALL RIGHT, BUT MERCURY HAS MORE CHARISMA."

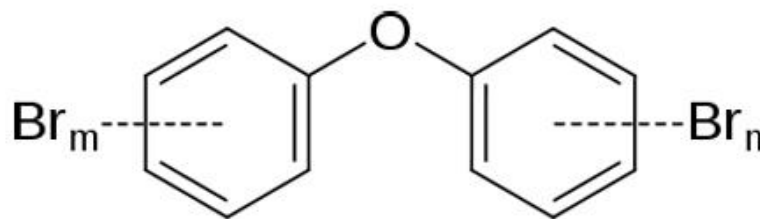
PCBs Exceed Thresholds



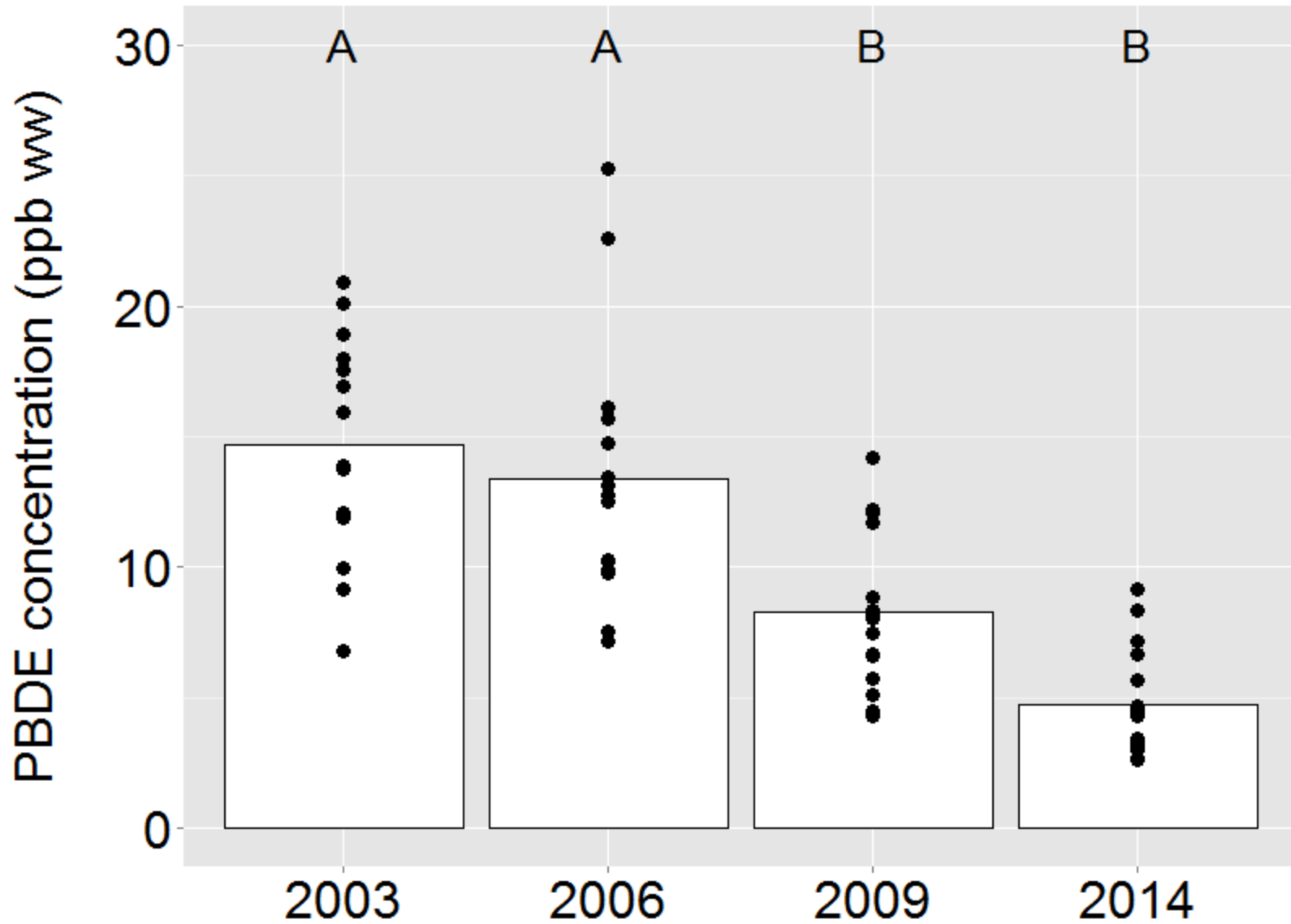
PCBs may be declining in shiner surfperch



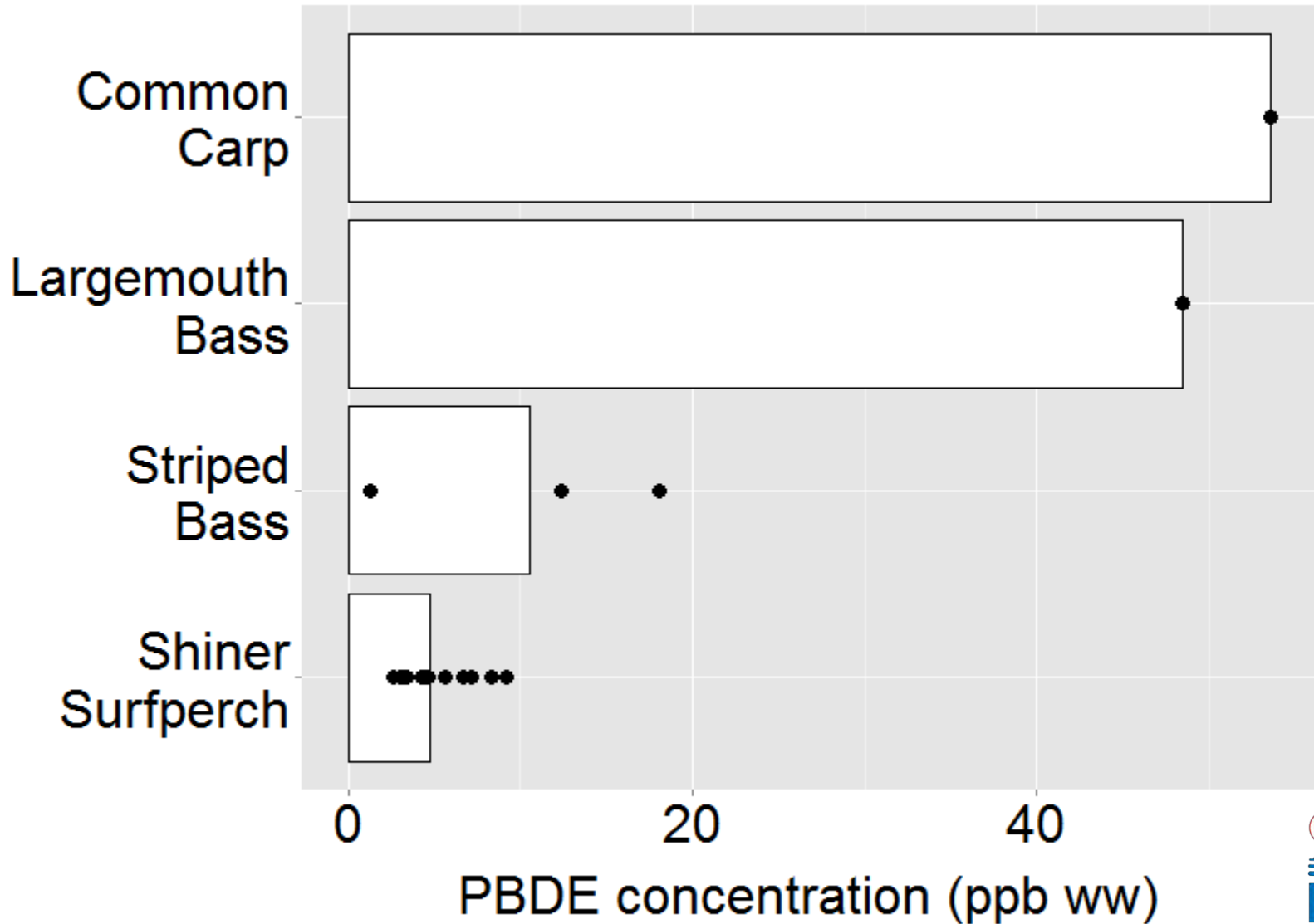
PBDEs



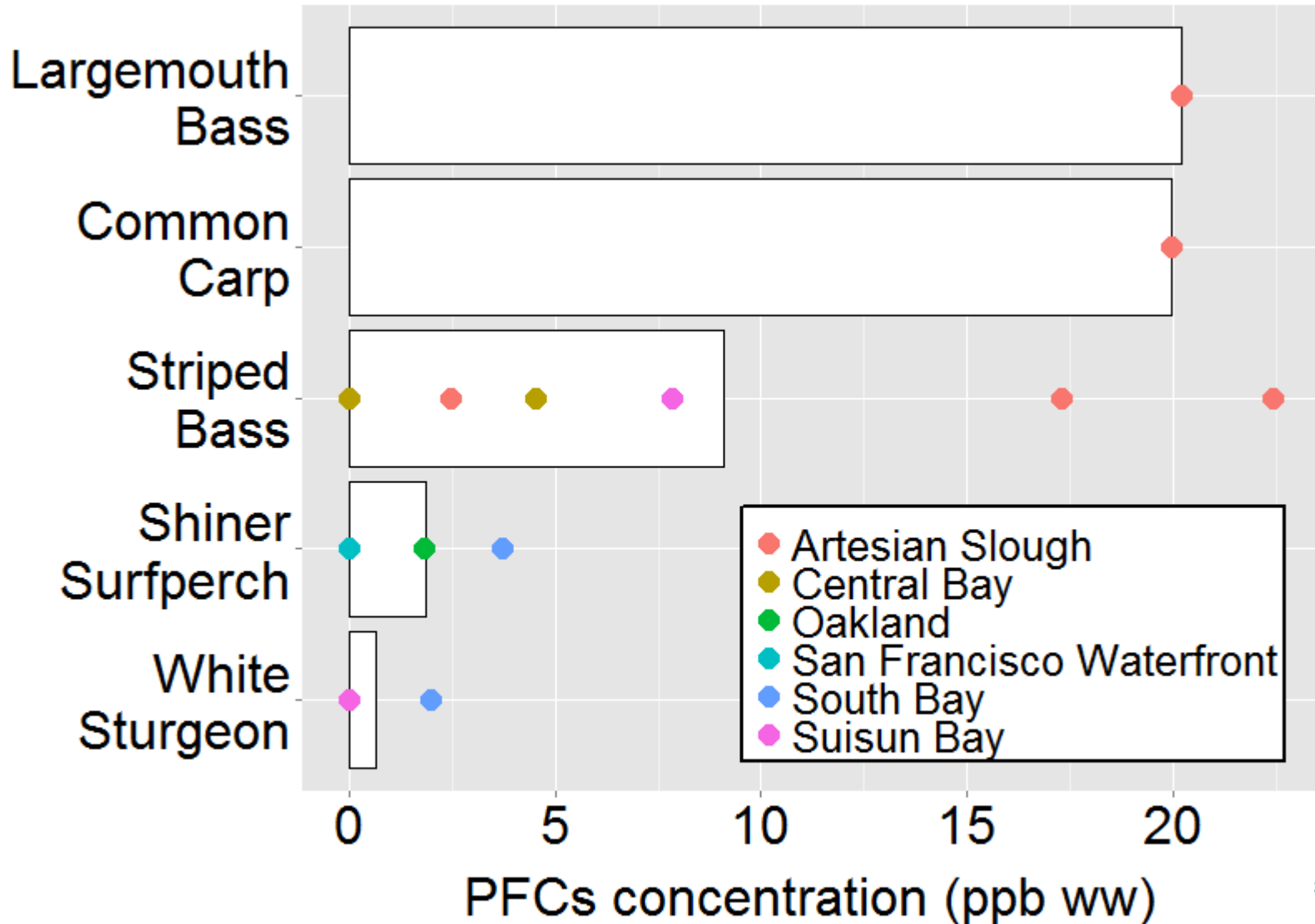
PBDEs continue to decline



PBDEs are elevated in wastewater-influenced fish



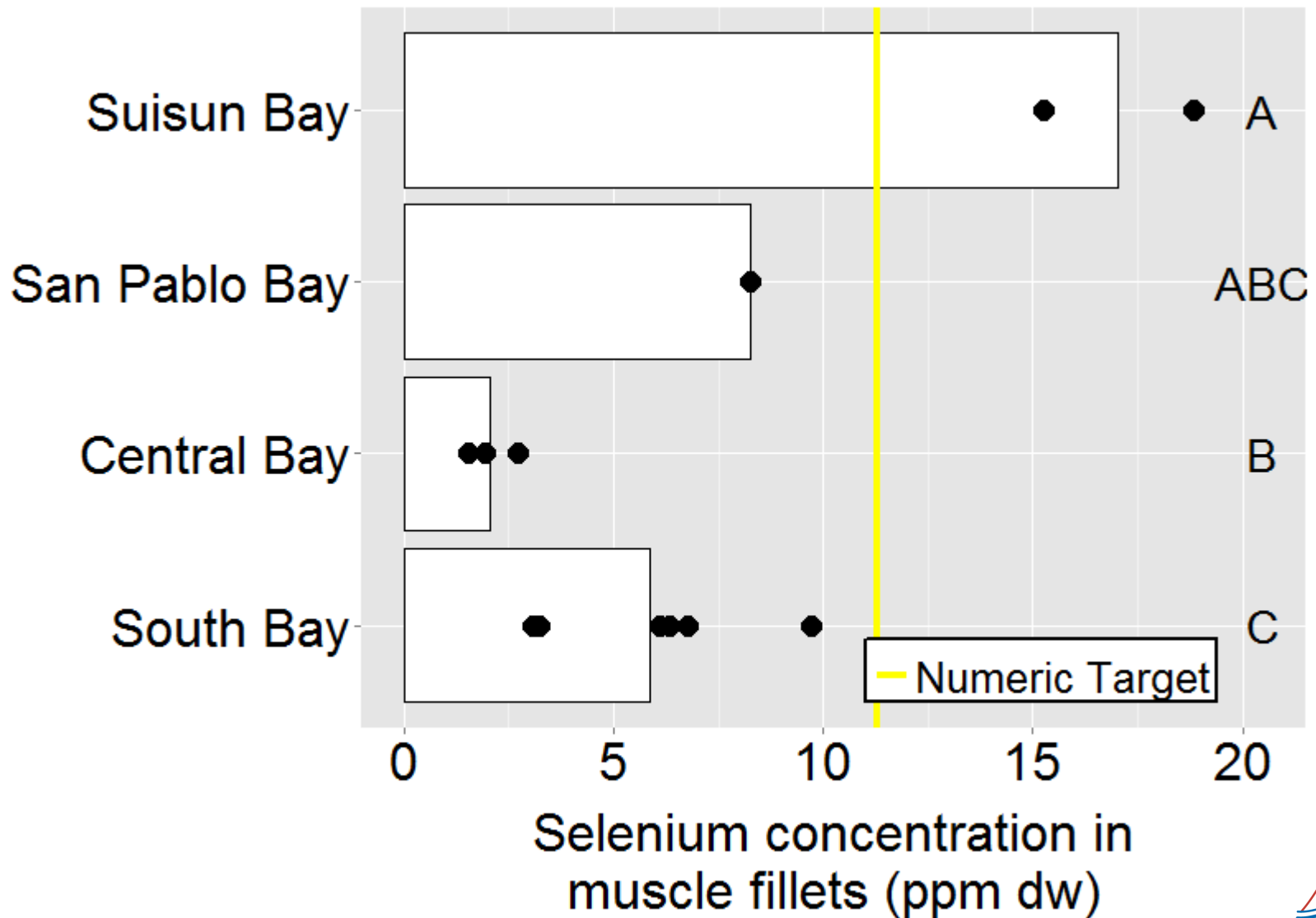
PFCs are elevated in wastewater-influenced fish



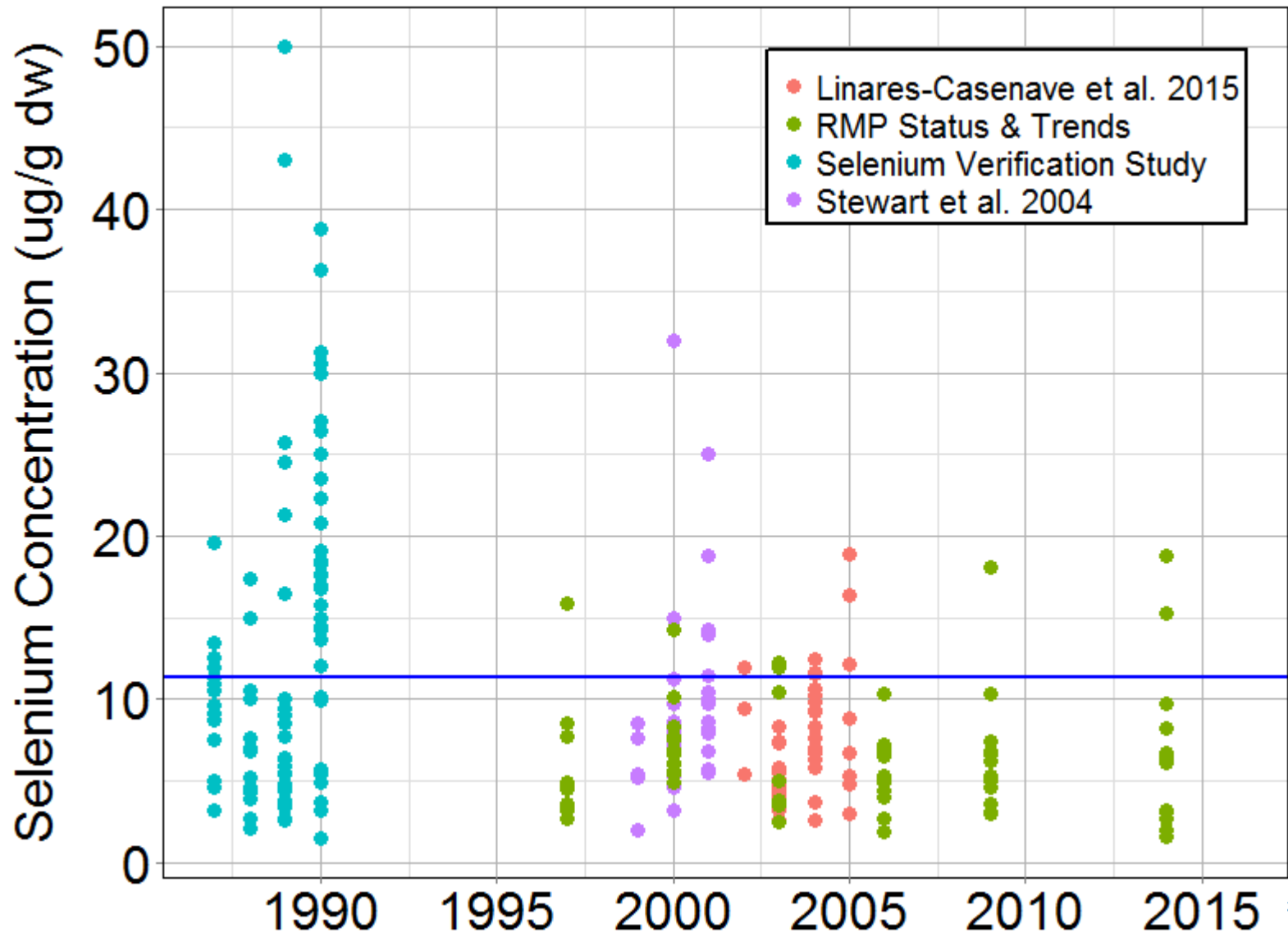
Selenium



Selenium is elevated in Suisun Bay sturgeon



Selenium in sturgeon – no long-term trend



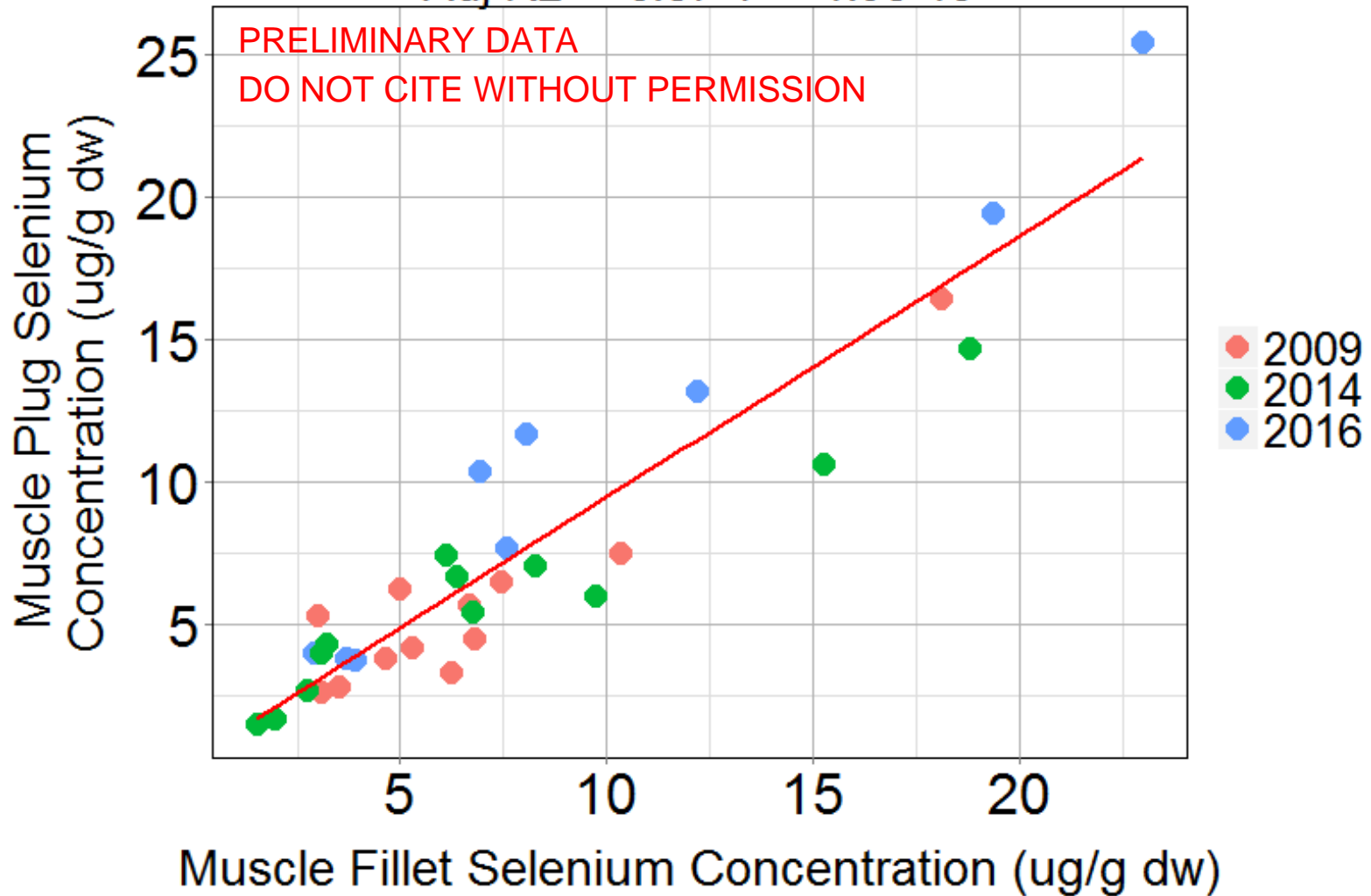
Muscle Plugs

- 5 mm diameter biopsy plug
- 2-3 plugs per fish
- Non-lethal sampling method
- Monitor attainment of regulatory thresholds



Muscle plugs & fillets are well correlated

$$\text{Plug} = 0.91 * \text{Fillet} + 0.33$$
$$\text{Adj R}^2 = 0.87 \quad P = 1.9e-15$$





Muscle Plug Study

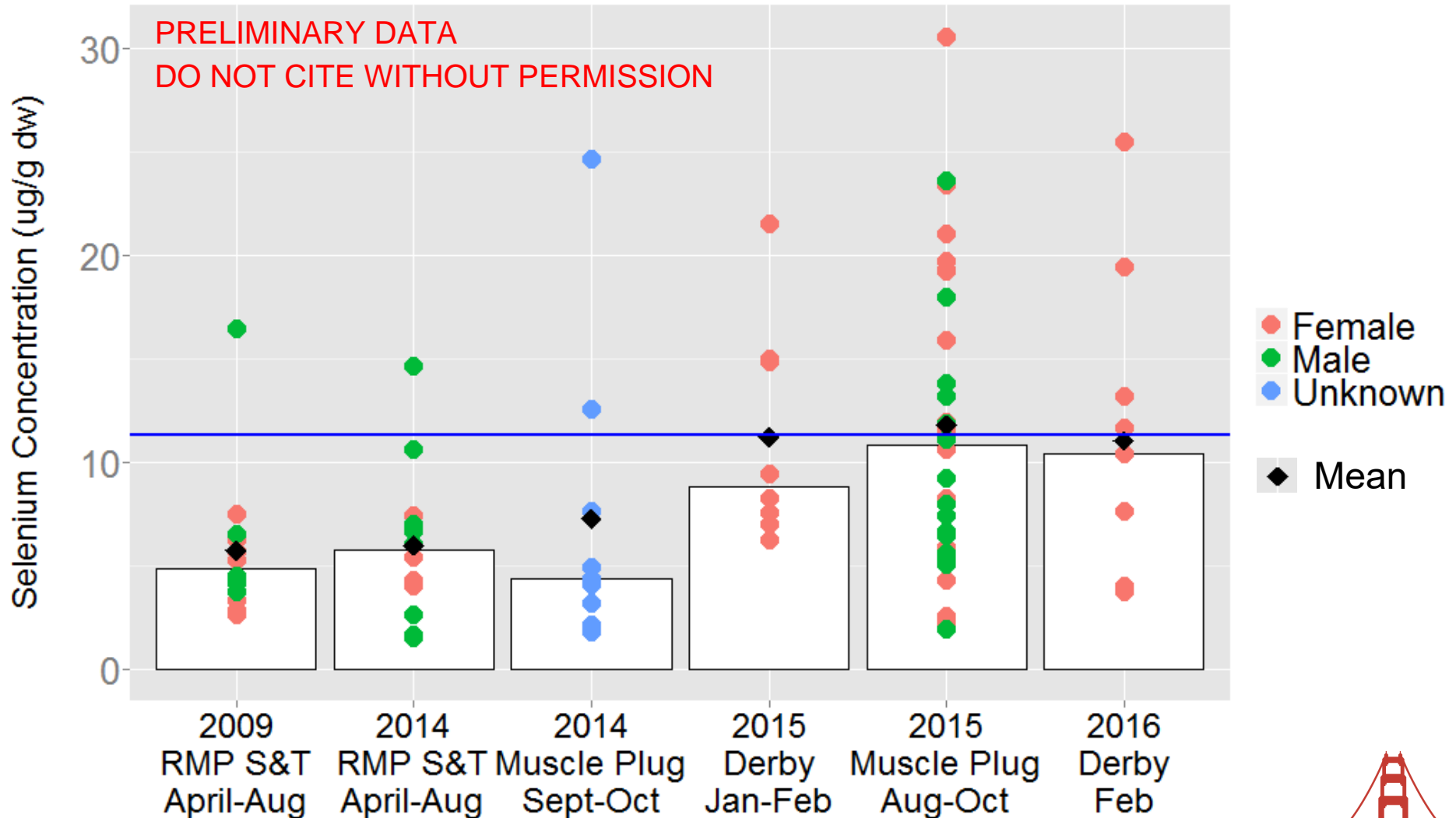
Test muscle plug
monitoring in the field



Sturgeon Derby Study

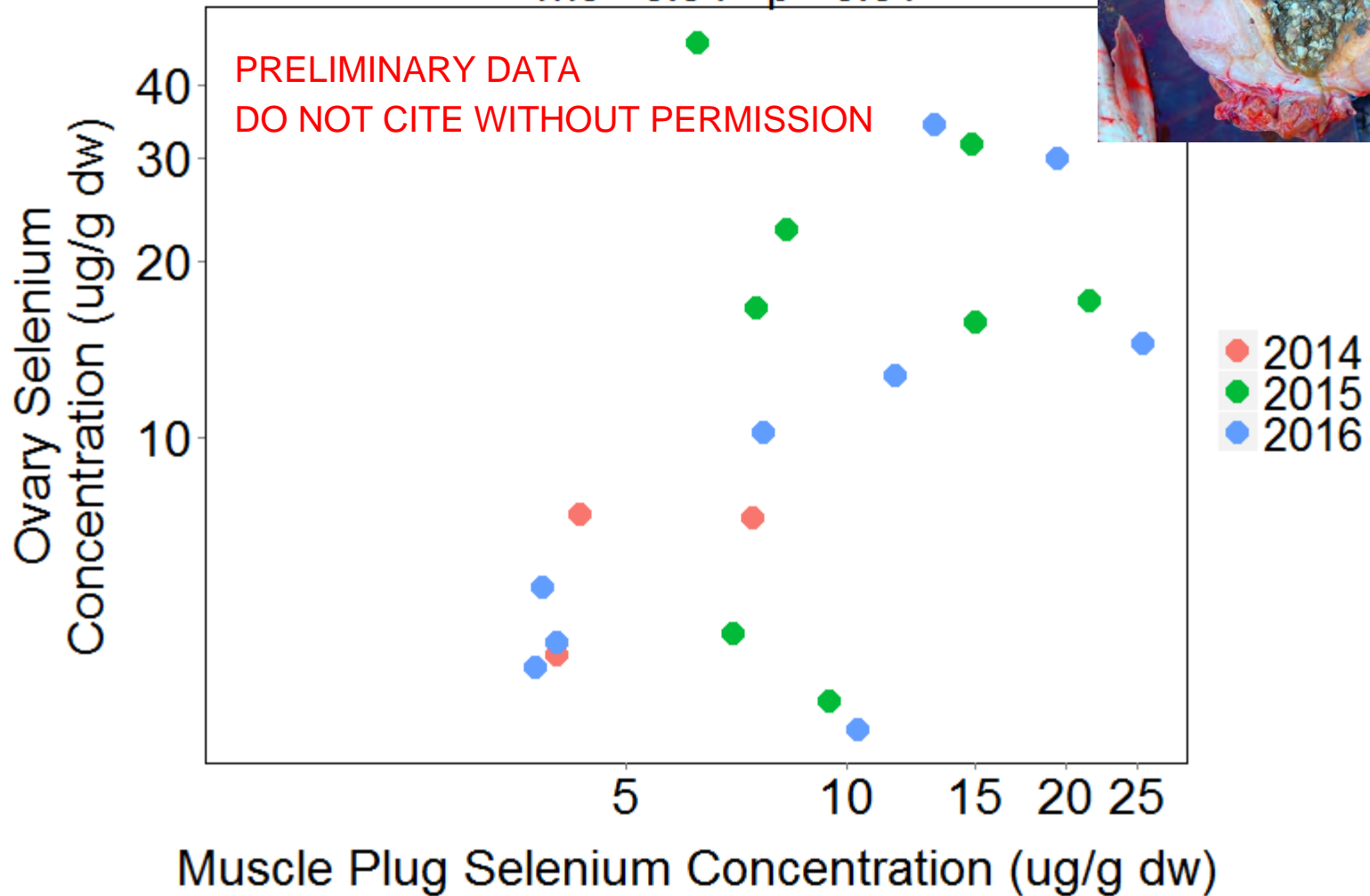
Link Se in muscle plugs and
ovaries (non-lethally
collected vs. toxicity
endpoint)

Selenium in White Sturgeon Muscle Plugs

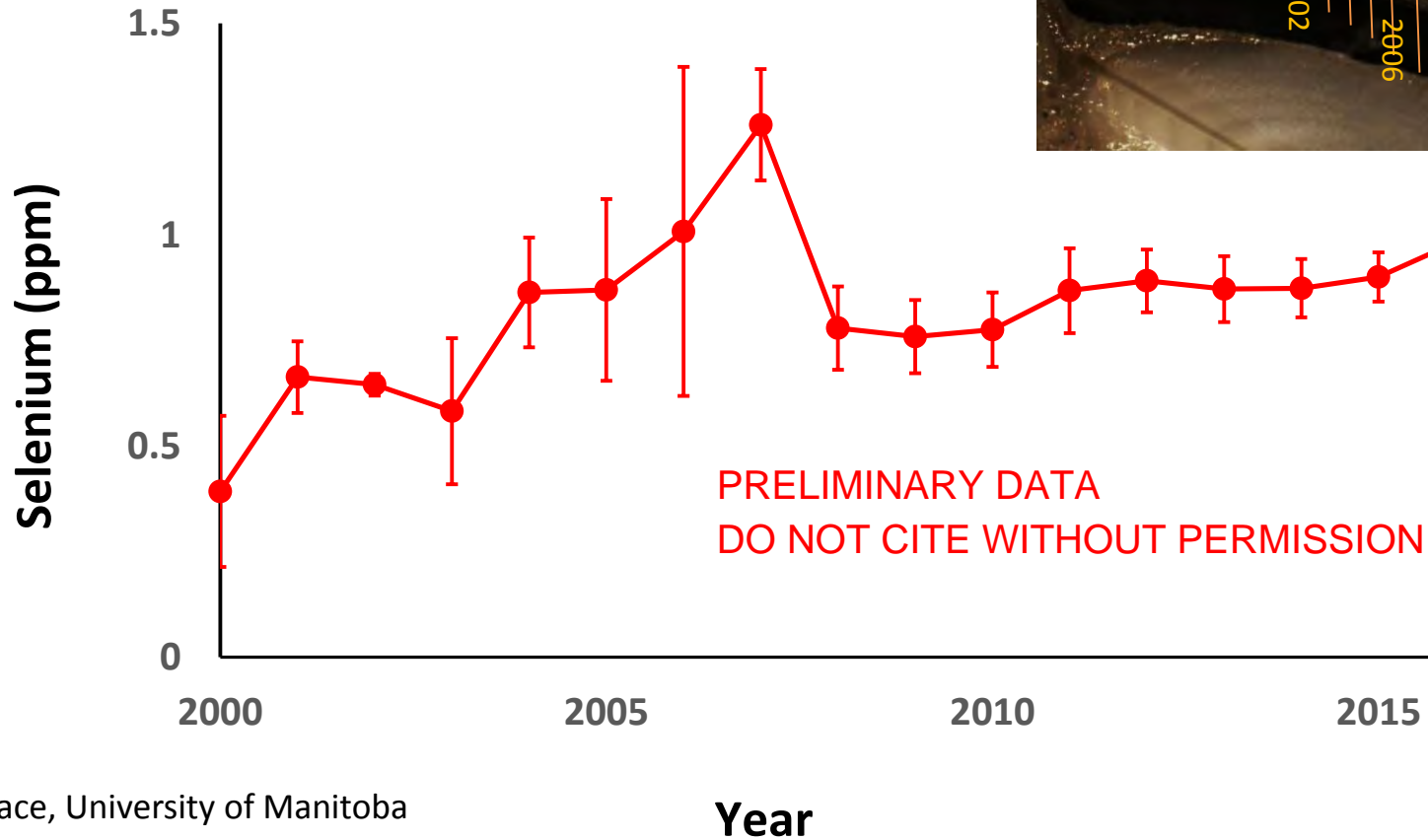
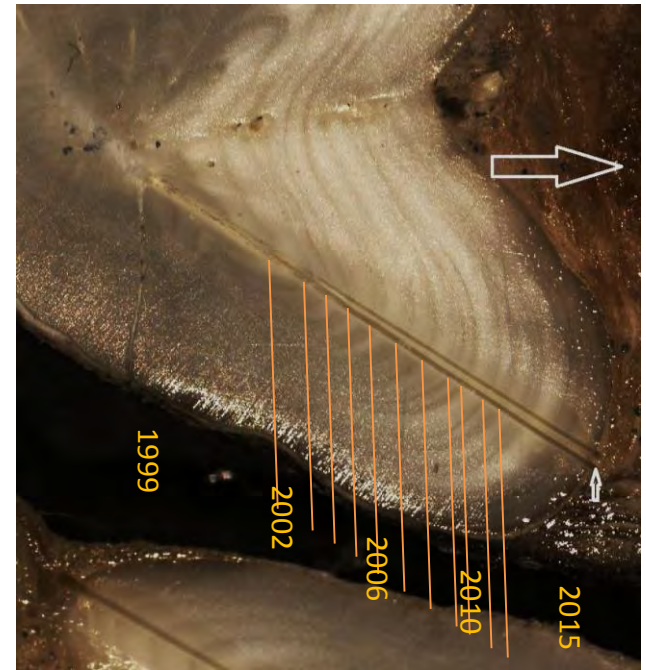


Muscle Plug and Ovary Selenium is Correlated

Spearman's Rank Correlation Test
 $\rho = 0.54$ $p = 0.01$

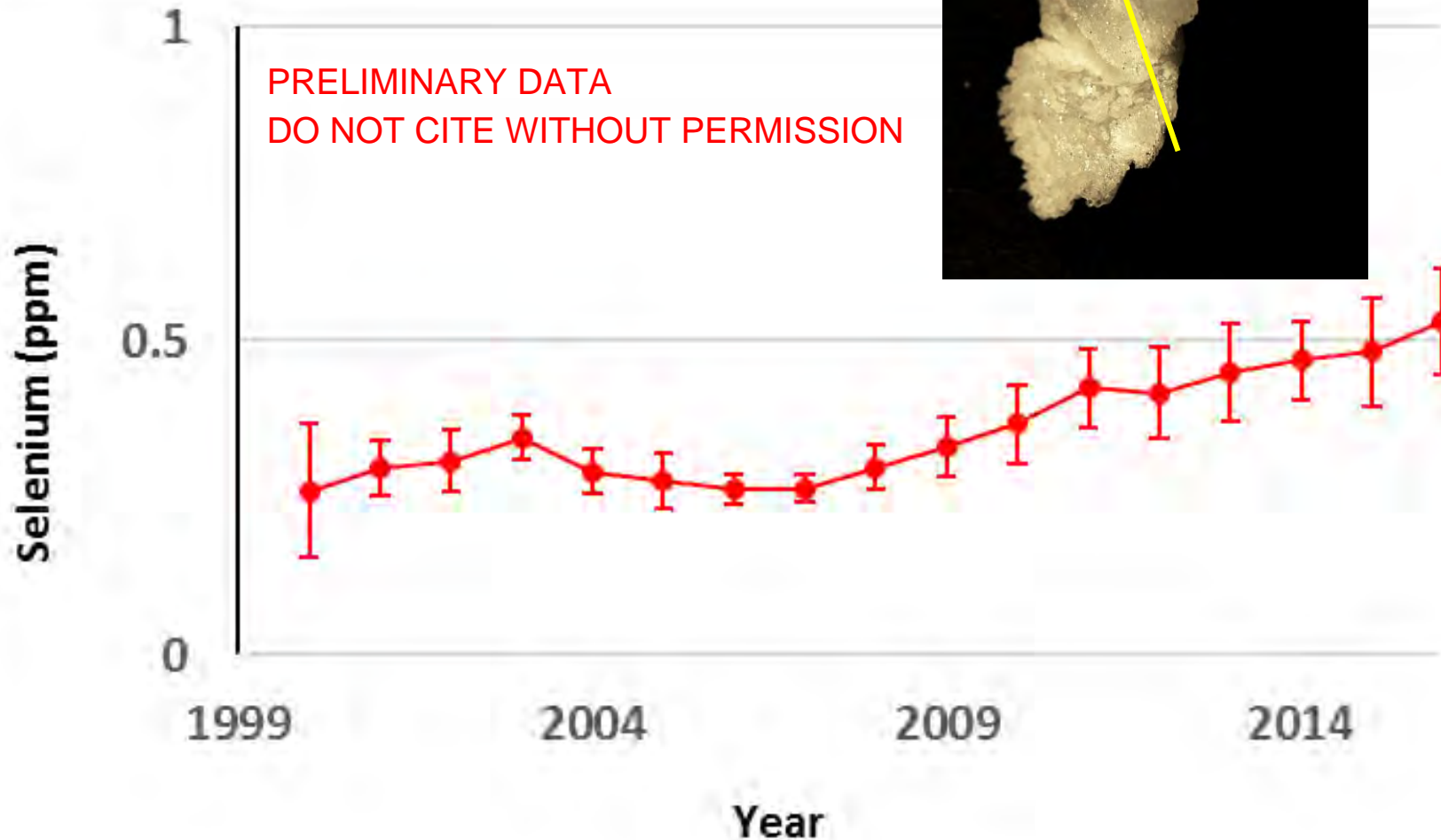
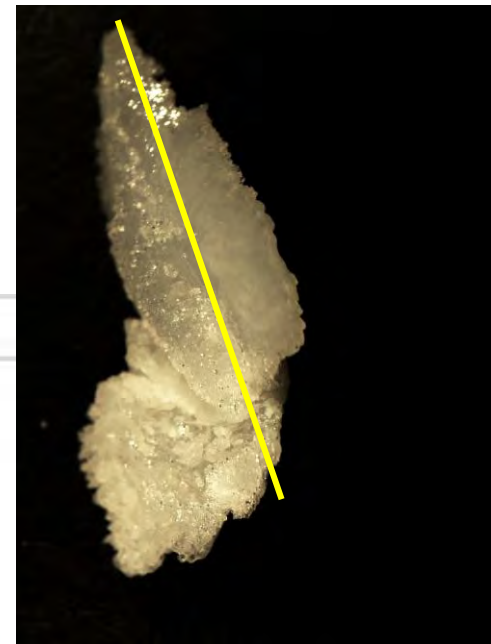


Sturgeon Fin Rays Selenium trend



Sturgeon Otoliths

Selenium trend



What's Next?

- Continue developing non-lethal monitoring tools (2017)
- Develop long-term Se monitoring plan (2017 strategy)
- Continue evaluating temporal trends (2019 S&T)
- Draft Sport Fish, Muscle Plug and Derby reports coming Fall 2016



Questions?



Contact: jennifers@sfei.org