ENVIRONMENTAL INDICATOR: FISHABLE

WATERBODY TYPE: LAKES	**MEASURE:** CONTAMINATION IN SPORT FISH
MESSAGE: 78% of California's lakes have fish that are contaminated	

KEY STATISTICS	
Number of California Lakes Statewide:	*~9,000*
Number of Lakes Sampled:	*273*

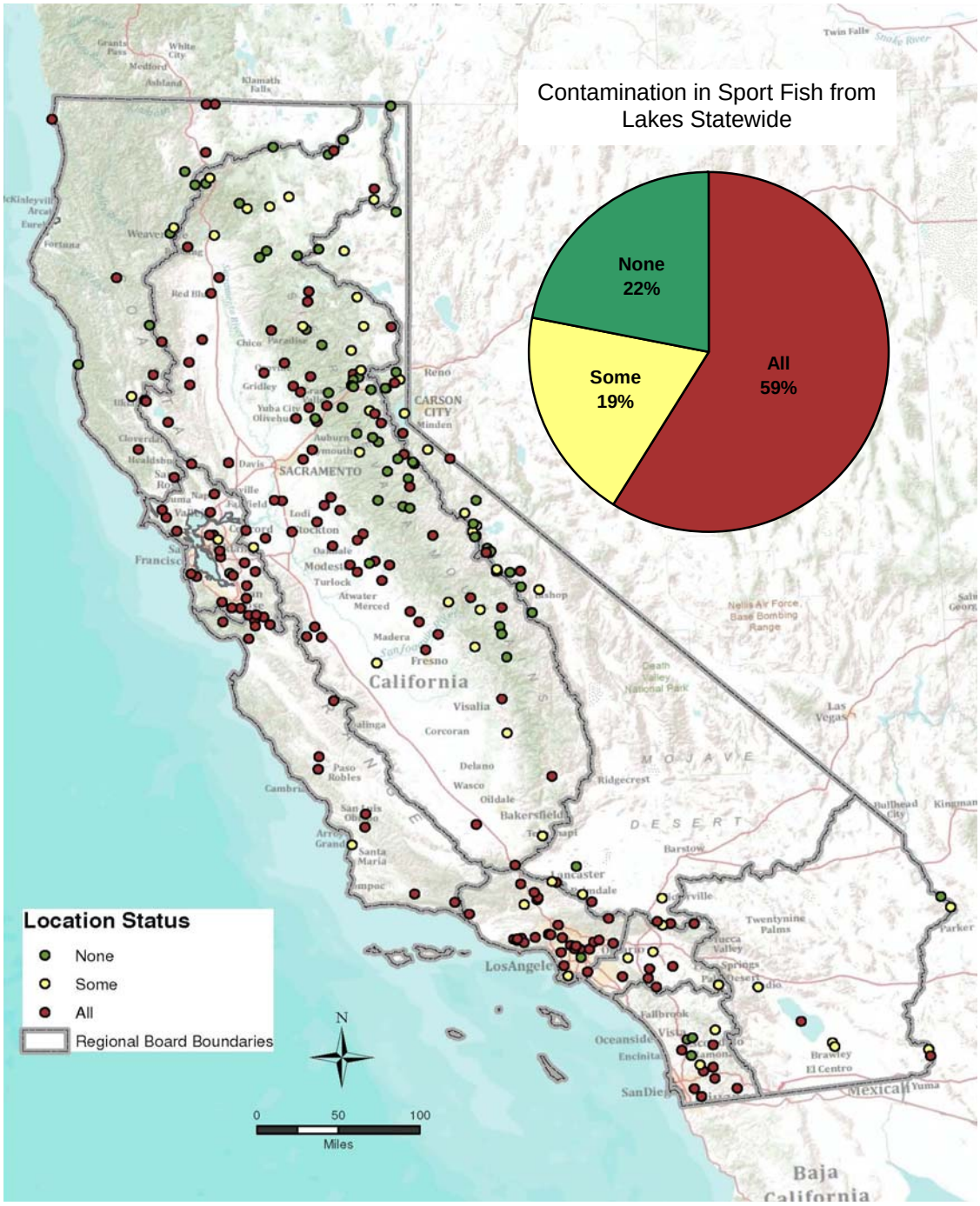

Figure 1. The Status of Contamination Above Any of the Known Human Health Thresholds Caught at Each Location.

Pie chart: **green** = none of the fish caught had contamination above any of the known human health thresholds, **yellow** = some of the fish caught had contamination above any of the known human health thresholds, and **red** = all of the fish caught had contamination above any of the known human health thresholds.

WHAT IS THE MEASURE SHOWING?

California Lakes - This measure shows the percent of California lakes in which sport fish are contaminated with mercury or other chemicals. Fish in 22% percent of California lakes did not have contamination above any of the known human health thresholds (None category). In 19% percent of California lakes one or more fish caught exceeded a known human health threshold (Some category), while in 59% percent of the lakes all of the fish caught exceeded known human health thresholds (All category).

The objective of this screening survey was to identify lakes where sport-fish are contaminated and to prioritize additional sampling locations. As a consequence, the information used for this measure did not provide enough information for the development of consumption guidelines for the lakes sampled – this would require a larger and more focused monitoring effort that would include a broader array of species and larger numbers of fish. The data collected under this study can be used in conjunction with other data from other sources to help develop Health Consumption Advisories.

WHY IS THIS MEASURE IMPORTANT?

Knowing the contamination levels of sport-fish is important because humans eat sport-fish. Contaminants like mercury and PCBs can reach levels that directly affect human health. Mercury poisoning can cause brain damage and other neurological problems, particularly in fetuses and small children. PCBs may cause cancer, damage the liver, digestive tract, and nerves; and affect development, reproduction, and the immune system. The information from this study can be used to prioritize which lakes need follow-up studies and to inform the public of potential high contaminant levels in certain sport fish.

WHAT FACTORS INFLUENCE THE MEASURE?

Mercury is the number one contaminant found in sport-fish, reaching concentrations that pose potential health risks to consumers of fish caught from California lakes. Mercury tends to accumulate in popular sport fish like large-mouth bass which are high up the food chain. California's historic mining legacy is considered the main reason for the concentration of mercury found in certain fish. Other potential sources of mercury include incinerators and atmospheric deposition, landfills, wastewater discharges, gas pipelines and electrical equipment. PCBs were second to mercury in reaching concentrations that pose potential health risks from ingestion of fish caught in California lakes. PCBs are organic chemicals once used in electrical equipment and other industrial products, which bioaccumulate in the fatty tissue of sport-fish. Fish with high percentages of fat tissue tend to accumulate the most PCBs. In California Lakes, PCBs are more likely to be found in carp, channel catfish, and brown bullhead. PCBs tend to occur in areas of historic use or maintenance of electrical equipment such as largely populated areas with high amounts of industrial activity, areas where electrical equipment or other PCB-containing equipment was used, and hydroelectric facilities.

TECHNICAL CONSIDERATIONS:

- Data source: Statewide SWAMP study of contaminants in fish from California Lakes and Reservoirs; Period 2007 – 2008. http://www.waterboards.ca.gov/water_issues/programs/swamp/lakes_study.shtml
  - Also available in interactive map on the "My Water Quality" portal: http://www.waterboards.ca.gov/mywaterquality/safe_to_eat/
- Unit of Measure: Concentrations of mercury and PCBs in fish tissue.
- Not all fish species found in the lakes were sampled. Scientists targeted top predator species like large-mouth bass to evaluate food web bioaccumulation of mercury up the food chain. High fatty tissue bottom-feeding fish, like carp, channel catfish, and brown bullhead, were sampled because they bioaccumulate organic compounds like PCBs.
- For fish consumption advise (Safe Eating Guidelines) please visit the Office of Environmental Health Hazard Assessment (OEHHA): http://www.oehha.ca.gov/fish/so_cal/index.html
- USGS – Toxic Effects of Mercury: http://www.usgs.gov/themes/factsheet/146-00/
- CDC – Toxic FAQs for PCBs: http://www.atsdr.cdc.gov/tfacts17.html#bookmark05

GLOSSARY

Polychlorinated biphenyls (PCBs)
A class of organic compounds manufactured for use as cooling and insulating fluids in electrical wiring and components. Use of these chemicals was banned in the 1970s but, due to their persistence, they can still be found in the environment.

Atmospheric deposition
Air pollution deposited directly into water or onto land and then washed into water.

Bioaccumulate
The accumulation of substances, such as pesticides, or other organic chemicals in an organism through absorption from surrounding water or through ingestion of other contaminated organisms.

Sport-fish
Fish typically targeted by recreational anglers.

(Updated 9/26/2011)