WHAT IS THE BOG?

The Surface Water Ambient Monitoring Program (SWAMP) Roundtable has formed a subcommittee, the Bioaccumulation Oversight Group (BOG) that develops plans for and guides implementation of SWAMP bioaccumulation monitoring. The BOG is composed of State Water Resources Control Board and Regional Water Quality Control Board staff and representatives from other agencies and organizations including USEPA, the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Fish and Game (CDFG), and the San Francisco Estuary Institute (SFEI) (Table 1). The members of the BOG possess extensive experience with bioaccumulation monitoring. Many other agency representatives also track BOG activities via email.

The BOG has also convened a Bioaccumulation Peer Review Panel that is providing evaluation and peer review of the bioaccumulation program. The members of the Panel are internationally-recognized authorities on bioaccumulation monitoring (Table 1).

BOG ACTIVITIES/PRODUCTS

Review of Past Monitoring

The first major task undertaken by the BOG was to perform a thorough review of past bioaccumulation monitoring in California. This review assessed the status of bioaccumulation in waters of the state and set the stage for improved monitoring in the future. The report found that concentrations of some bioaccumulative pollutants (e.g., PCBs and DDTs) declined greatly since the 1970s in response to management actions. However, present concentrations of pollutants in fish collected from many California water bodies remain high enough to cause concern for possible effects on human health. The report found that fish in 68% of the water bodies sampled recently have moderate to very high levels of mercury or persistent organics. Consumption advisories exist for only a fraction of the water bodies likely to need them. Many water bodies with elevated contaminant concentrations in fish are near population centers and are popular for fishing. Products related to this review (along with other SWAMP bioaccumulation products) are listed in Table 2.

SWAMP Bioaccumulation Monitoring

The BOG has developed and begun implementing a plan to evaluate bioaccumulation impacts on the fishing beneficial use in all California water bodies. Sampling of lakes and reservoirs has been conducted in the first two years (2007 and 2008). In 2009 and 2010, the California coast, including bays and estuaries, will be sampled. Rivers and streams will be sampled in 2011. In 2012 the plan is to again begin a two year effort on lakes and begin another five-year cycle of sampling all of these water body types.

Contaminants in Fish from California Lakes and Reservoirs

In the first year of this screening study (2007), over 6000 fish from 18 species were collected from 152 lakes and reservoirs in California. Targeted sampling of "popular" lakes comprised the bulk of the year 1 effort (102 of 152), with the remainder comprising a random sampling to provide for an unbiased statewide assessment. Another 131 targeted lakes were sampled in 2008 (results to come in early 2010). Only 19% of the lakes sampled in 2007 were found to have concentrations of pollutants below thresholds for safe consumption. Mercury was the pollutant primarily responsible for the remaining 81% of lakes having at least one species with an average concentration above thresholds (OEHHA's advisory tissue levels were used for this assessment). Approximately 26% of the 152 lakes surveyed had a species with an average mercury concentration high enough that OEHHA would consider recommending no consumption of the contaminated species (greater than 0.44 ppm). Although mercury concentrations were generally not as high in southern California, the mercury problem is not confined to northern California and its well-known mining regions (Figure 1). PCBs reached concentrations posing the second greatest potential known health risks to consumers of fish caught from California lakes, with 12% of lakes above ATLs. Concentrations of dieldrin, DDT, chlordane, and selenium were generally low, and infrequently exceeded ATLs. In 2010, a final report on the Lakes Survey will be released that will cover both years of sampling and a more detailed exploration of factors influencing patterns in bioaccumulation, including sources.

Contaminants in Fish from California Coastal Waters

A two-year screening study of contaminants in fish from California coastal waters will begin this spring. The BOG has developed a sampling design for this survey and obtained peer review comments on it. The first year of sampling will focus on the Southern California Bight and the area near San Francisco Bay. The effort will be closely coordinated with Bight '08, the Regional Monitoring Program for San Francisco Bay, and additional monitoring by the Los Angeles Regional Board. Overall, these collaborations represent $575,000 in matching funds to provide for a thorough assessment of bioaccumulation on the coast.

Table 1. BOG members.

SWAMP Stakeholders		**Bioaccumulation Contractors**	
Terry Fleming	USEPA	Jay Davis	SFEI
Bob Brodberg	OEHHA	Mark Stephenson	CDFG
Chris Foe	Region 5 Water Board	Dave Crane	CDFG
Mary Adams	Region 3 Water Board	Gary Ichikawa	CDFG
Michael Lyons	Region 4 Water Board	Autumn Bonnema	CDFG
Jennifer Doherty	State Water Board	Aroon Melwani	SFEI
Karen Taberski	Region 2 Water Board	Cassandra Lamerdin	MLML
		Marco Sigala	MLML
Other Interested Parties (Partial List)			
Darell Slotton	UC Davis	Dorena Goding	State Water Board
Alyce Ujihara	DPH	Chris Beegan	State Water Board
Tom Maurer	USFWS	Charlie Alpers	USGS
Collin Eagles-Smith	USGS	Ken Schiff	SCCWRP
Scott McReynolds	DWR	Jay Rowan	CDFG
Peer Review Panel			
Jim Wiener	Distinguished Professor, University of Wisconsin, La Crosse		
Chris Schmitt	USGS, Columbia, Missouri		
Ross Norstrom	Canadian Wildlife Service (retired); Carleton University, Ottawa, Canada		

Table 2. SWAMP bioaccumulation products.

Product	**Title**	**Release Date**	**Link**
Review of Past Monitoring			
Technical Report	Bioaccumulation Of Pollutants In California Waters: A Review Of Historic Data And Assessment Of Impacts On Fishing And Aquatic Life	September 2008	http://www.waterboards.ca.gov/water_issues/programs/swamp/bop.shtml
Fact Sheet	Long-Term Monitoring of Pollutants in Fish and Mussels Documents Major Improvements and Persistent Problems	September 2008	http://www.waterboards.ca.gov/water_issues/programs/swamp/bop.shtml
Lakes Survey: Year 1			
Technical Report	Technical Report on Year One of a Two-Year Screening Study of Contaminants in Fish from California Lakes and Reservoirs	*March 2009*	Not posted yet
Fact Sheet	Contaminants in Fish from California Lakes and Reservoirs	*March 2009*	Not posted yet

Figure 1. **Highest species-average mercury concentrations** at lakes sampled in Year 1 of the Lakes Survey. Concentrations based on location composites and individual fish, from both targeted (circles) and random (squares) lakes. Colors represent mercury concentration categories. Advisory tissue levels (ATLs) are thresholds developed by OEHHA (Klasing and Brodberg 2008: http://www.oehha.ca.gov/fish/gtlsv/crnr062708.html).