

Sampling Design for a Statewide Survey of Contaminants in Sport Fish in California Rivers and Streams

The Bioaccumulation Oversight Group

Products and Timeline

- BOG planning discussions - November-January
- Draft Sampling Plan and QAPP - January
- Peer Review Panel meeting - February
- Finalize Sampling Plan and QAPP - End of February
- Begin sampling - End of February
- Year 1 data available - May 2012
- Draft report on year 1 - January 2013
- Final report on year 1 - May 2013

SWAMP/BOG Monitoring Objectives

1. Status
2. Trends
3. Sources and Pathways
4. Effectiveness of Management Actions

Over the long-term, primary BOG emphasis on
1 and 2; 3 and 4 are secondary

In the near-term, emphasis on 1 (Status)

Beneficial Uses

1. Fishing
2. Aquatic Life

Over the long-term, the Program will evaluate the impacts of bioaccumulation on both, with an emphasis on 1

In the near-term, emphasis on 1 - Aquatic Life
NOT INCLUDED

Toolbox of Bioaccumulation Indicators

- Sport fish
- ~~Prey fish~~
- ~~Birds~~
- ~~Mammals~~
- ~~Bivalves~~

Benefits of This Survey

- Consistent statewide assessment of all water body types
 - Overall summary report when we're done
- Rivers and streams part of long-term survey cycle
- Fuller array of analytes

Significant Prior Work

- TSMP
- Fish Mercury Project
- Region 5 Studies
 - Mercury
 - Organics
- Sacramento River Watershed Program
- UC Davis
- USGS - Alpers et al, Valley work
- USEPA National Rivers and Streams Assessment

Budget

Amount available for
sampling and analysis:
~ \$426,000

SFEI Coordination	\$55,000
MPSL Coordination & QAPP prep	\$100,000
Peer Review	\$15,000
Collection	\$235,600
Prep	\$10,250
Chemical Analysis	\$181,265
Data Entry and Validation	\$50,000
Data Analysis and Reporting	\$82,000
Freezer Costs	\$8,000
SJSUF	\$8,667

Total \$745,782

With these assumptions,
budget covers 41 sites

Management Questions For This Screening Study

LAKES

1. 305(b): What is the condition of California lakes with respect to contamination?
 - Indicator: lakewide average concentration
2. 303(d): Should a given lake be on the 303(d) list?
 - Indicator: Two independent samples above the relevant guideline (different days or different locations)
3. *(Consumption Guidelines: Should additional sampling be conducted for the purpose of developing an advisory?)*

COAST

1. Status of the Fishing Beneficial Use
 - For popular fish species, what percentage of popular fishing areas have low enough concentrations of contaminants that fish can be safely consumed?
2. Regional Distribution
 - What is the regional distribution of contaminant concentrations in fish?
3. Need for Further Sampling
 - Should additional sampling of bioaccumulation in sport fish (e.g., more species or larger sample size) in an area be conducted for the purpose of developing comprehensive consumption guidelines?

Audience

- Policy makers
- Water quality managers
- The fishing public

Design Basics

- Target species of concern: humans that consume fish
- Population of spatial units: fishing locations
- Species of interest
 - Fish species that are:
 - Popular
 - Widely distributed
 - Good indicators

Coordination

Coordinated Efforts

- Are there any other studies happening that we should coordinate with?
- Check into:
 - Alpers work in the Sierra
 - The Sierra Fund

Strategy for Phasing

- One year
- No phasing needed

Spatial Units: Fishing Locations

- Similar to locations used in lakes
- Up to 1 mile length
- Considerations for selection
 - Coverage of popular locations for sport fish consumption
 - Stakeholder (Regional Board) interest

Locations

- See Gary's spreadsheet for latest list

Questions

- How far to go with coverage of streams?
 - A: hit popular locations as defined by Stienstra and Regional Boards

Design Within Each Location

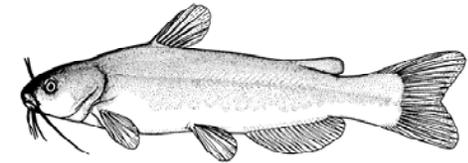
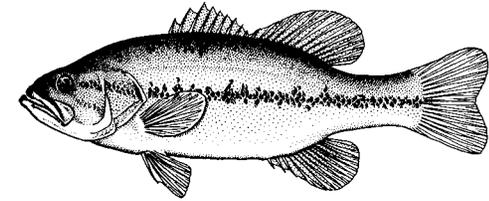
- Replication to support 303(d) listing?
 - No
- Sampling design with a follow-up strategy to conserve budget?
 - No

Target Species

- Fish species that are (in order of priority):
 1. Popular for consumption
 2. Sensitive indicators of problems - “bad boys” - for the different pollutants of concern - helps with evaluating safe consumption
 3. Widely distributed - spatial coverage and patterns
 4. Represent different exposure pathways (benthic vs pelagic)
 5. Continuity with past sampling

Target Species

- Primary Targets
 - Where appropriate, two indicator species per location
 - Mercury indicator: e.g., largemouth
 - Organics indicator: high lipid benthic species
 - Most locations will only have trout - sample one species at these locations
- Secondary Targets
 - In case primary targets are not found
- Vary by region
- Bycatch



Target Species

Species	Foraging Type		Trophic Level	Distribution			Good Candidate
	Water column	Bottom feeder		Low Elevation	Low Sierra	High Sierra	
Largemouth bass	X		4	X	X		A
Smallmouth bass	X		4	X	X		A
Spotted bass	X		4	X	X		A
Sacramento Pikeminnow	X		4	x	x		B
White catfish		X	3	x	x		A
Brown bullhead		X	3	x			B
Channel catfish		X	4	X	X		A
Carp		X	3	X	X		A
Sacramento sucker		X	3	x	x		B
Tilapia		X	3				B
Bluegill	X		3	X	X		B
Green sunfish	X		3	X	X		B
Crappie	X		3/4	x	x		B
Redear sunfish	X		3	X	X		B
Rainbow trout	X		3/4	x	x	X	A
Brown trout	X		3		x	x	A
Brook trout	X		3			x	A
Kokanee	X		3	?	x	x	B

Target Size Ranges and Compositing for Each Species

- Composite to stretch dollars
- Use 75% rule
- Target middle of distribution that is caught and consumed
- Need to determine ranges
- Numbers in composites
 - Generally 5

Questions

- How to handle hatchery vs resident fish?
 - A: try to get residents

Sample Processing and Analysis

- Ancillary data
 - Total length, fork length
 - Location coordinates
 - Field observations: bycatch, others?
- Skin-off fillets

Analytes in Tissue

- Mercury: generally composites, some individuals
- PCBs: sum of 55?? congeners, skip Aroclors, no coplanars
- DDTs: sum of six isomers
- Dieldrin
- Chlordanes: sum of 5 compounds

Analytes in Tissue (continued)

- PBDEs - sum of xx congeners
- Selenium - yes
- PFCs - no
- Dioxins - no
- Omega - no
- Others?
- Ancillary parameters: lipid, moisture

Ancillary water or sediment quality data?

- Will explore collaboration with Charlie Alpers' study

Archiving

- Tiered approach
 - Long-term archives
 - Short-term archives

Sampling Methods

- E-boat
- Backpack shocker
- Gill nets
- Hook and line

QA

- QAPP

Assessment Thresholds

- Advisory Tissue Levels
- FCGs
- State Board Mercury Objective?

