

Statewide Survey of Bioaccumulation on the California Coast

The Bioaccumulation Oversight Group



Background

- Lack of systematic study of contaminants in coastal sport fish to date
- Prior work
 - Coastal Fish Contamination Program
 - Regional Monitoring Program
 - Recent NOAA work in Bight
 - Historic Bight work
 - NPDES monitoring

SWAMP Bioaccumulation Work

- Lakes - 2007-2008
- Coast - 2009-2010
- Rivers and Streams - 2011
- 2012? - Serious discussion begins tomorrow

Management Questions For This Screening Study

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?

Coordination

Coordinated Efforts

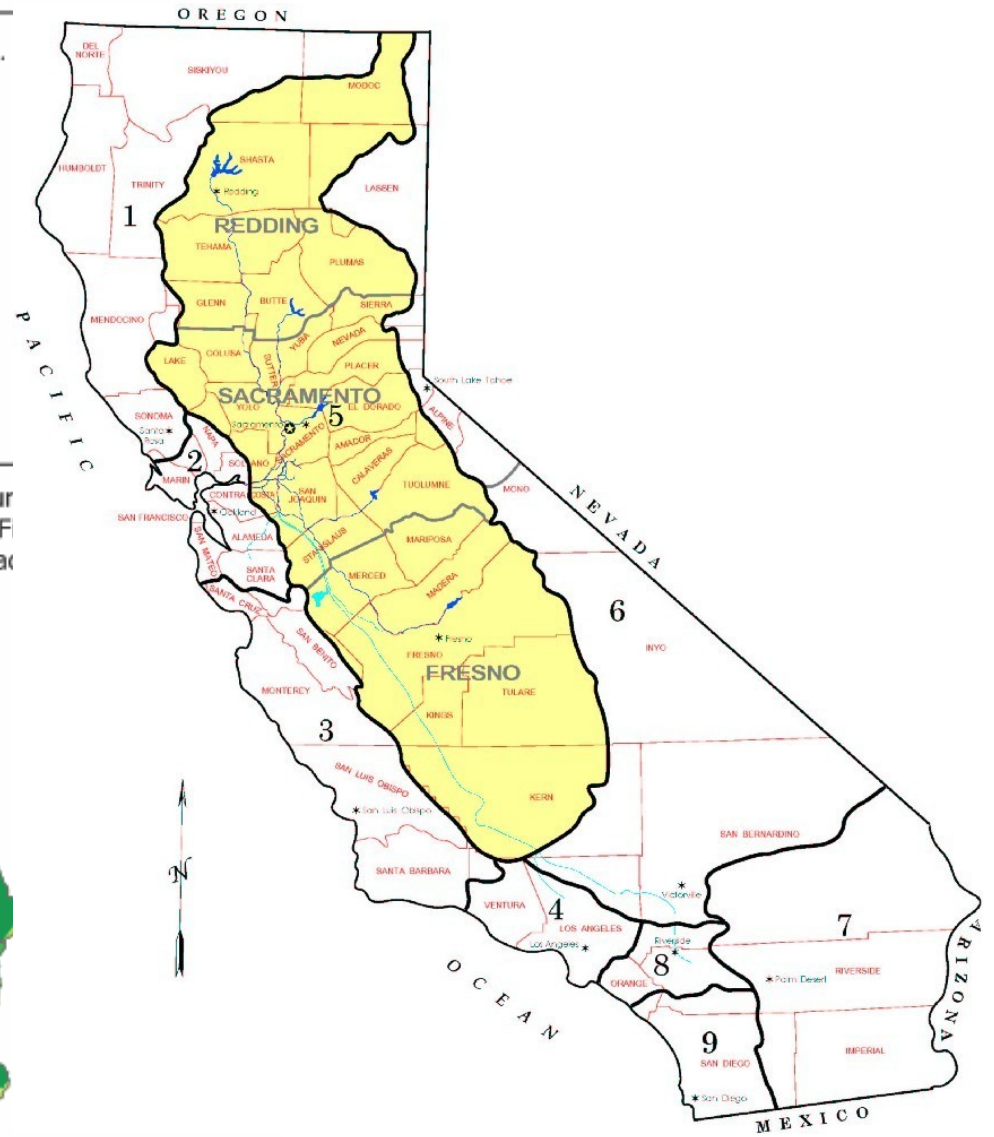
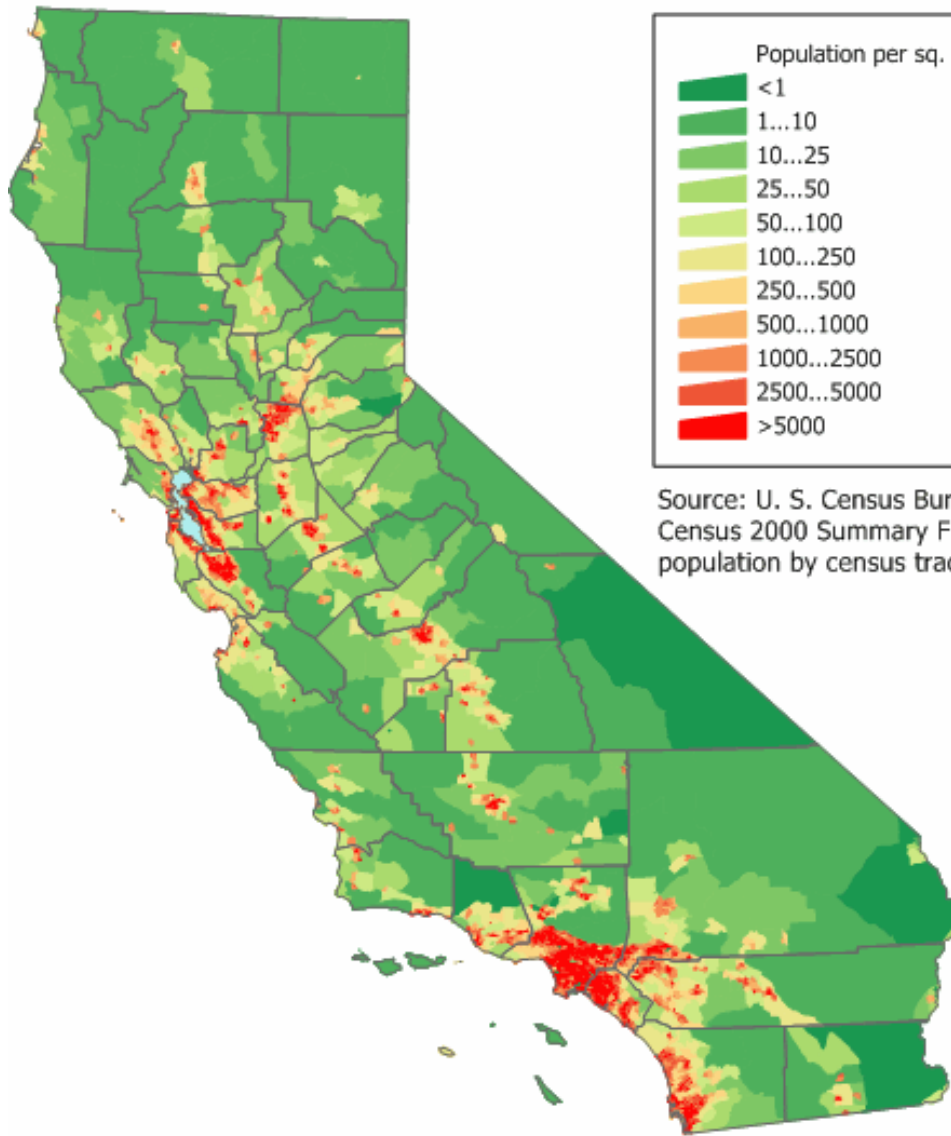
- Bight '08 – contributing analysis of organics in 200 samples
- Region 4 augmentation - more species, zones
- RMP – covering San Francisco Bay with a similar approach, coordinating sampling and assessment

Benefits

- Overall **\$575K** of matching funds
- Budgetary efficiencies
- Joint assessment across programs
- SCCWRP labs benefit from intercalibration

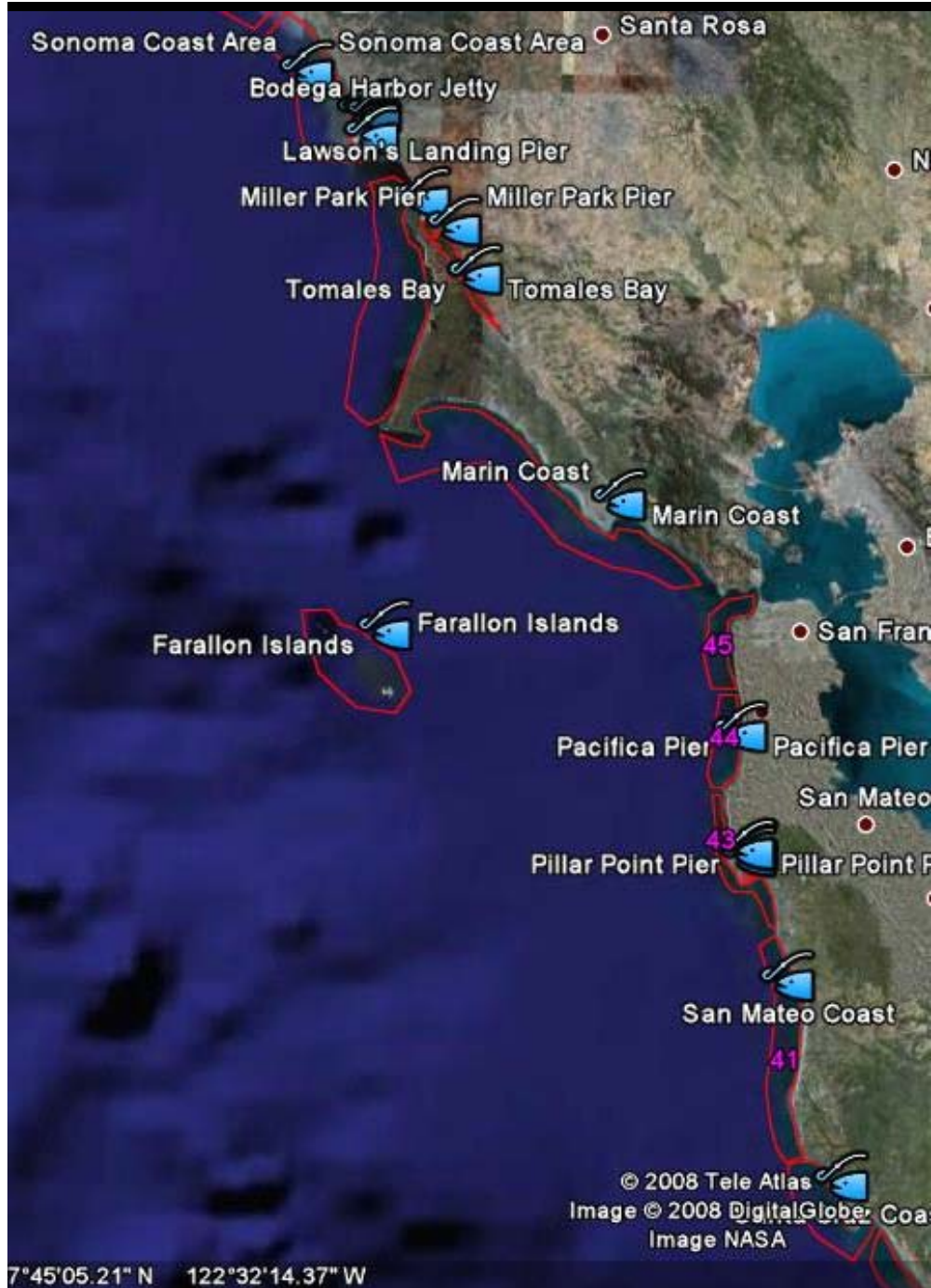
Strategy for Phased Approach

- Two-year study
- Phasing
 - Year 1: Regions 4, 8, 9 (So Cal Bight); Region 2
 - Coordination with Bight group, RMP
 - Year 2: Regions 1 and 3, remaining gaps



Spatial Units: Fishing Zones

- Approach developed by SC Bight group
- 70 for the state
- Nearshore (includes bays and estuaries)
 - Zone width guidelines
 - Depth not to exceed 200 m (rule)
 - mainly 60 m and less (guidance)
- Considerations for delineating zones
 - Fishing pressure
 - Even distribution across coast
 - Homogeneity of land use, contamination
 - Stakeholder interest



Target Species

- 5 per zone: one replicate each
- 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. Cleaner species
 5. Represent different exposure pathways (benthic vs pelagic)
 6. Continuity with past sampling
- Guild approach for some taxa
 - Practical approach that allows spatial coverage

Target Species

- Targets vary by region
- Primary targets and secondary targets

Target Species

Coast <3m	SoCal	CenCal	NorCal
Primary	Rockfish: Kelp Bass	Rockfish: Blue	Rockfish: Black
			Lingcod
	Croaker: White	White Croaker	
		Salmon	Salmon
	Surfperch: Barred	Surfperch: Barred	Surfperch: Redtail
		Smelt: Jacksmelt	
			Rockfish: Blue
	Chub Mackerel		
Secondary		Lingcod	
		Smelt: Topsmelt	
	Rockfish: Barred Sandbass, Scorpionfish, Spotted Sandbass, Olive Rockfish	Rockfish: Black	
	Surfperch: Walleye	Surfperch: Shiner	Surfperch: Walleye
			Cabezon
	Croaker: Yellowfin		

Target Species

Bays/ Harbors	SoCal	CenCal	NorCal
Primary	Surfperch: Barred	Surfperch: Shiner	Perch: Walleye
	Shark: Leopard	Shark: Leopard	Shark: spiny dogfish
	Croaker: White	White Croaker	
		Smelt: Jacksmelt	Smelt: Jacksmelt
		Flatfish: California Halibut	
	Rockfish: Kelp Bass		Rockfish: Black
			Surfperch: Shiner
	Chub Mackerel		
Secondary	Rockfish: Barred Sandbass, Scorpionfish, Spotted Sandbass, Olive Rockfish	Rockfish: Brown	Rockfish: Blue
			Lingcod
	Surfperch: Walleye	Surfperch: Black	
	Shark: Gray Smoothhound	Shark: Brown Smoothhound	Shark: smoothound
		Smelt: Topsmelt	Top or Jacksmelt
		Flatfish: RecFin XX	
	Croaker: Yellowfin		

Design Within Each zone

- Replication (within-zone variance estimates)
 - 3 reps in SoCal, SF Bay
 - Maybe in other selected zones
 - Other enclosed bays and estuaries: one zone
 - Potential basis for advice (9 - 12 fish minimum for OEHHA)
- Otherwise no reps in Central and North
 - Focus on covering more species
 - Better info for OEHHA, public
 - Better spatial coverage and comparisons

Design Within Each Zone (continued)

- Focus on areas within zone with highest fishing pressure
- Opportunistic approach - obtain fish from easiest areas to get them

Sample Processing and Analysis

- Ancillary data
 - Total length, fork length
 - Location coordinates to store in database: start of a trawl, fishing, gill net or dive
 - Field observations: dominant substrate, Beaufort scale, wind direction, bycatch
- Skin-off fillets
 - Including white croaker – RMP special study
- Exceptions
 - E.g., shiner surfperch [muscle+skin+skeleton]

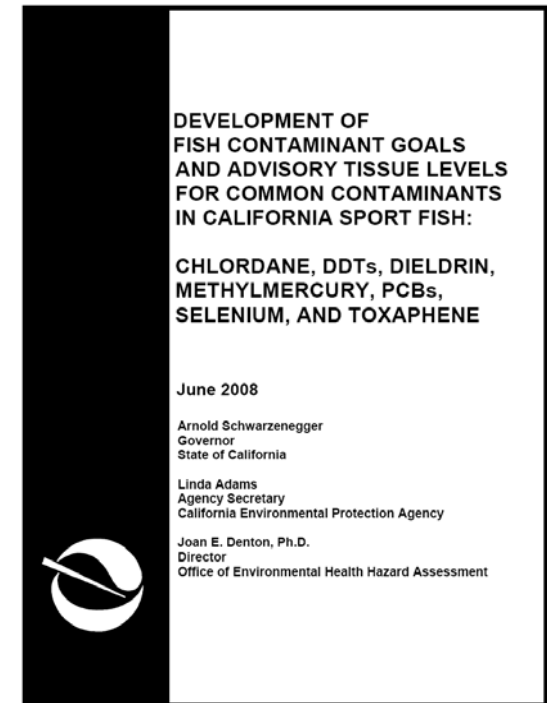
Analytes in Tissue

Analyte	Included in Screening Study?
Methylmercury ¹	Some individuals, all composites
PCBs	All composite samples
DDTs	All composite samples
Dieldrin	All composite samples
Aldrin	All composite samples
Chlordanes	All composite samples
PBDEs	All composite samples – low cost method
Dioxins	SF Bay only – generally low priority and expensive
Perfluorinated chemicals	SF Bay only
Selenium	SF Bay only – generally low concern in sport fish
Omega-3 fatty acids	SF Bay only
Organophosphates	Not included – low concern in sport fish
PAHs	Not included – low concern in sport fish
TBT	Not included – low concern in sport fish
Cadmium	Not included – low concern in sport fish

¹ Measured as total mercury.

Assessment Thresholds

- Fish Contaminant Goals (FCGs)
 - Purely risk-based
 - 1 serving/wk (32 g/day, or 8 ounces per week)
 - 1 in 1,000,000 additional cancer risks
 - Useful goals for risk minimization or elimination
- Advisory Tissue Levels (ATLs)
 - Take benefits into account
 - 1 in 10,000 additional cancer risks
 - 0, 1, 2, 3 servings per week categories
 - For OEHHA use in advisories/safe eating guidelines
- Region 2 Water Board
 - 95th percentile rate (32 g/day) for all Bay fish consumers
 - 1 in 100,000 cancer risk



Klasing and
Brodberg, 2008

<http://www.oehha.ca.gov/fish/gtIsv/index.html>

Assessment Thresholds (ppb)

Pollutant	Fish Contaminant Goal	Advisory Tissue Level (3 servings/ week)	Advisory Tissue Level (2 servings/ week)	Advisory Tissue Level (No Consumption)
Chlordanes	5.6	190	280	560
DDTs	21	520	1000	2100
Dieldrin	0.46	15	23	46
Mercury	220	70	150	440
PCBs	3.6	21	42	120
Selenium	7400	2500	4900	15000