

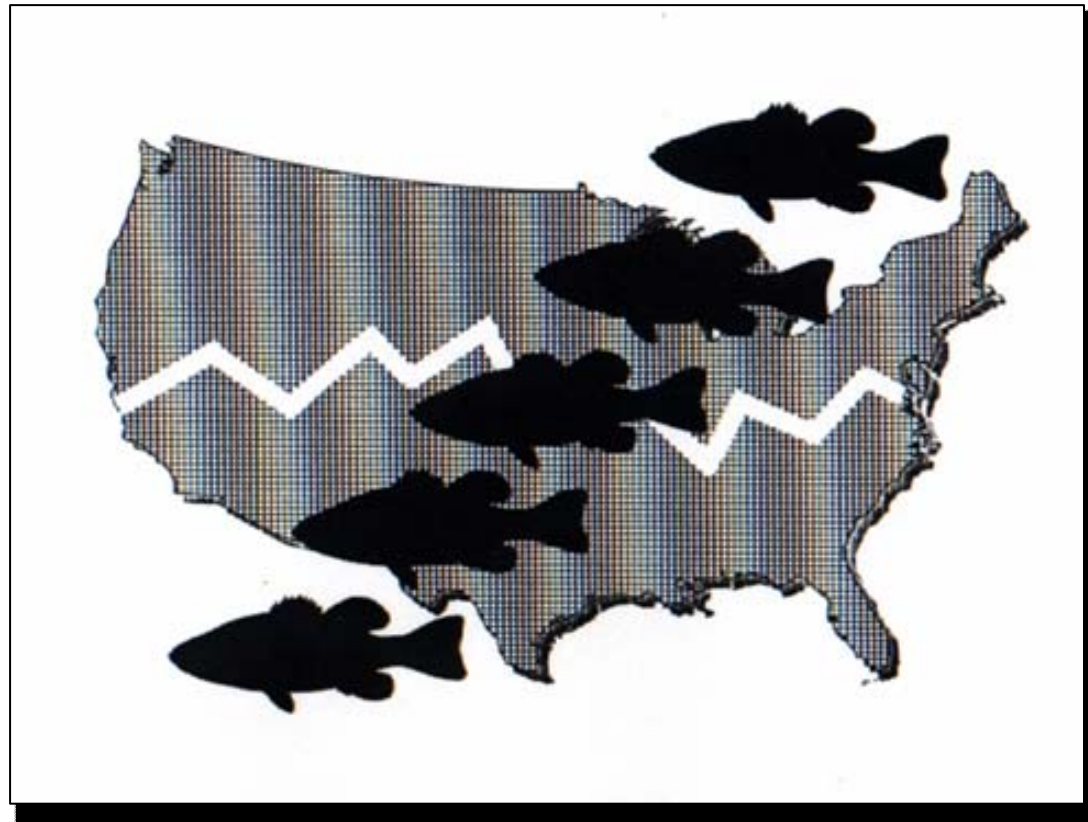
Review of EPA's National Lake Fish Tissue Study Final Report

2009 National Fish Forum

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Leanne Stahl

*Program Manager
Office of Water/
Office of Science &
Technology*





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The National Study of Chemical Residues in Lake Fish Tissue

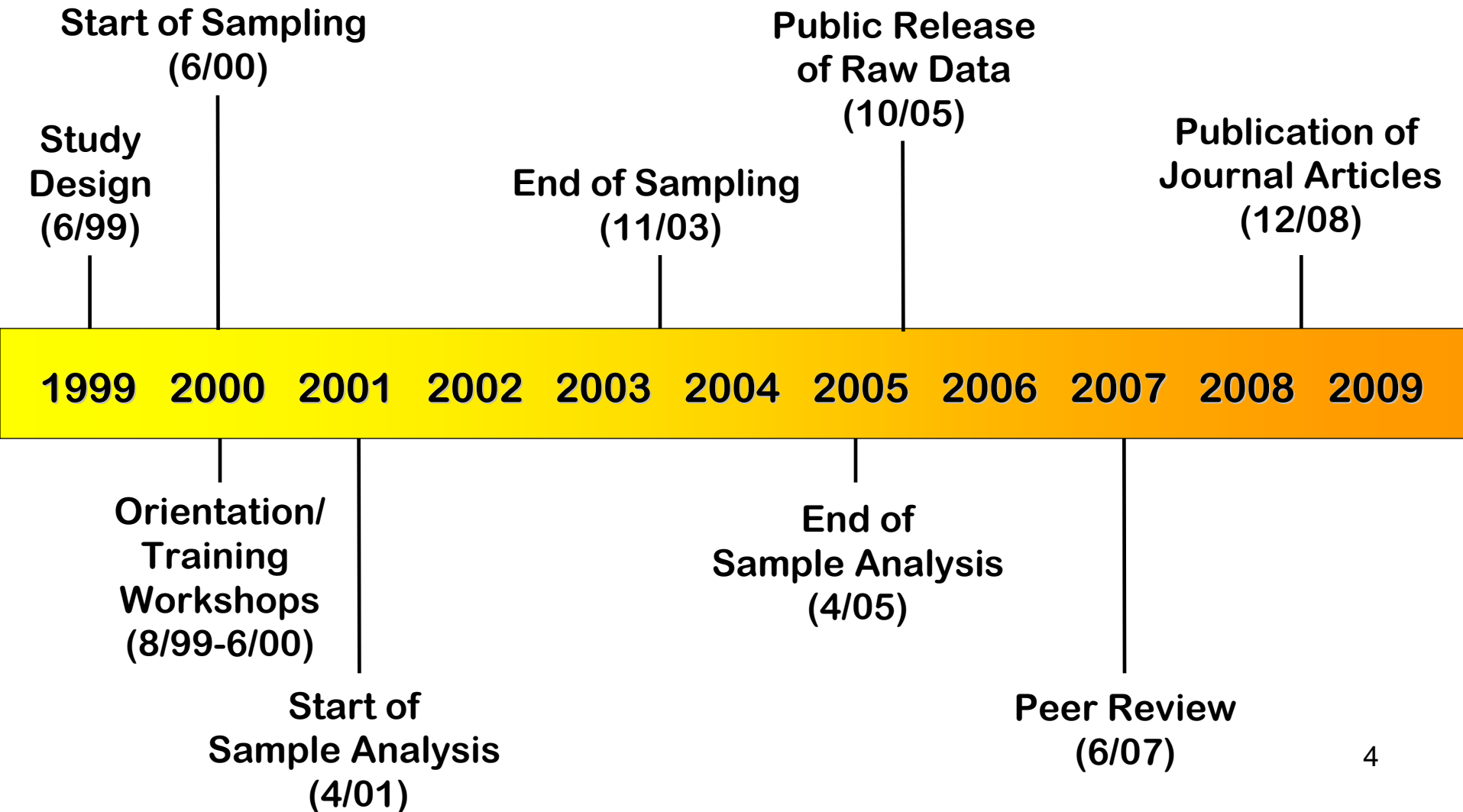


**It's Done and
It's Available!
(soon)**

A Unique Study

- ◆ First national study of contaminant levels in freshwater fish based on a statistical design
- ◆ Largest set of chemicals ever studied in fish

Key Milestones

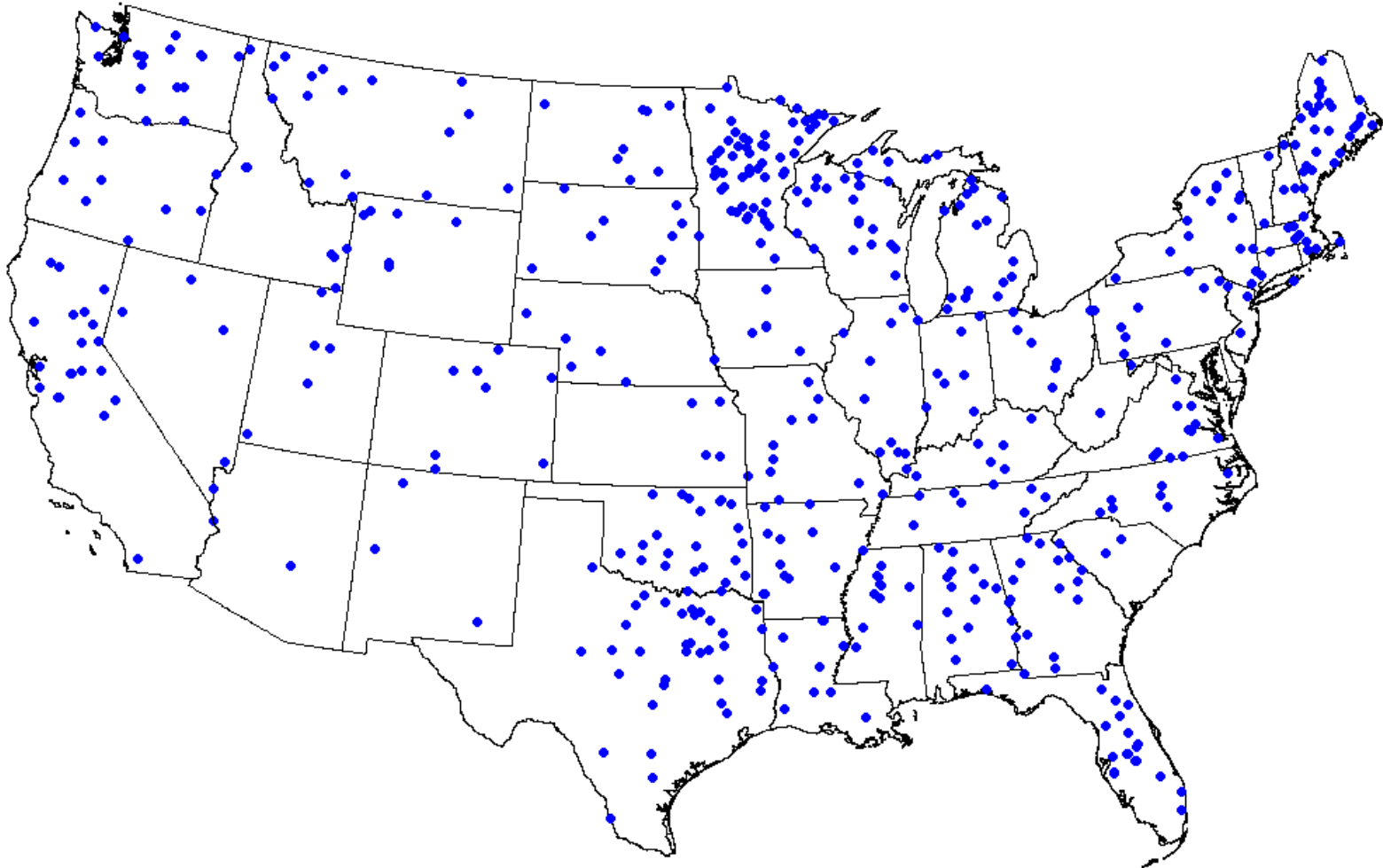


Objective

- ◆ *The objective of the National Lake Fish Tissue Study was to estimate the national distribution of the mean levels of selected persistent, bioaccumulative, and toxic chemical residues in fish tissue from lakes and reservoirs in the conterminous United States.*
- ◆ Study results
 - ✦ Provided the first national estimates of median concentrations of PBT chemicals in fish tissue.
 - ✦ Defined a national baseline for assessing progress of pollution control activities.

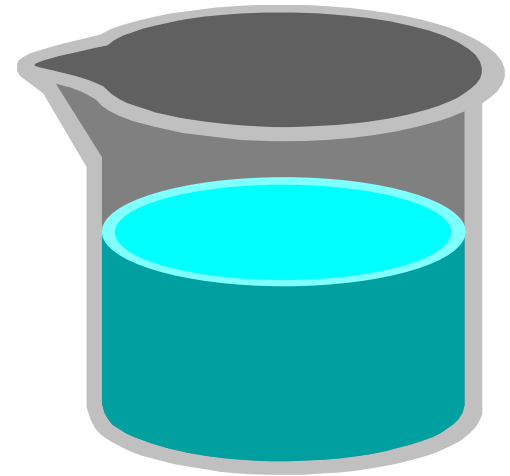


500 Sampling Locations



Study Design

- ◆ Six size categories of lakes ranging from 1 hectare to > 5000 hectares with varying probabilities for each size category
- ◆ Two fish composites per site (predators and bottom dwellers) with 5 adult fish per composite
- ◆ Analysis of fish tissue for 268 chemicals
 - ⊕ 2 metals (Hg and As [5 forms])
 - ⊕ 17 dioxins/furans
 - ⊕ 159 PCB congener measurements
 - ⊕ 46 pesticides
 - ⊕ 40 semi-volatile organics (e.g., PAHs)



Final Report Summary

- ◆ The National Lake Fish Tissue Study Final Report is a 242-page document containing:
 - ⊕ Executive Summary
 - ⊕ 4 Chapters of study information
 - ⊕ 9 Appendices of data summaries
- ◆ The report presents 2 primary products from statistical analysis of the data:
 - ⊕ Cumulative density functions (or CDFs)
 - ⊕ Percentile tables for each target chemical



Critical Reporting Information

- ◆ Predator and bottom-dwelling species did not occur together at every sampling site.
 - ⊕ The target lake was sampled if either composite type occurred.
 - ⊕ 486 predator composites and 395 bottom-dweller composites were collected from the 500 sampling sites.
- ◆ Results from each composite type comprise nationally representative samples, but differences in occurrence define different sampled populations.
 - ⊕ Predator results can be extrapolated to 76,559 lakes.
 - ⊕ Bottom-dweller results can be extrapolated to 46,190 lakes.
- ◆ Developing national estimates of tissue concentrations required use of sample weights due to the unequal probability design.

Reporting the Results

- ◆ Analytical results are presented in three tiers:
 - ⊕ Non-detected chemicals
 - ⊕ Rarely-detected chemicals
 - ⊕ Commonly-detected chemicals
- ◆ Five chemicals are highlighted as commonly detected:
 - ⊕ Mercury
 - ⊕ Total PCBs
 - ⊕ Total Dioxins and Furans
 - ⊕ Total DDT
 - ⊕ Total Chlordane



Chemical Detections

CHEMICAL	PREDATORS	BOTTOM DWELLERS
Mercury	100%	100%
PCBs	100%	100%
Dioxins/furans	81%	99%
Total DDT	78%	98%
Chlordane	20%	50%

2008 Fish Advisories

CHEMICAL	NO. OF ADVISORIES	LAKE ACRES UNDER ADVISORY	PERCENT OF TOTAL U.S. LAKE ACRES
Mercury	3,361	16,808,032	42 %
PCBs	1,025	6,049,506	15 %
Dioxins	123	35,400	<1 %
DDT	76	876,520	2 %
Chlordane	67	842,913	2 %

Percentile Tables

Tissue Concentration Estimates for Predators (Fillets)											
Chemical	Number of Samples	Number of Detects	Maximum Concentration	Units	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
PCB 84	486	449	2320	ppt	< MDL	< MDL	0.97	3.02	10.01	31.61	85.04
PCB 85 + PCB 116 + PCB 117	486	485	7980	ppt	2.84	3.81	8.76	17.97	64.98	179.65	300.95
PCB 86 + PCB 87 + PCB 97 + PCB 108 + PCB 119 + PCB 125	486	476	18900	ppt	1.96	6.86	14.89	37.03	126.15	418.07	660.55
PCB 88 + PCB 91	486	469	4770	ppt	< MDL	0.77	1.72	4.33	14.31	73.43	113.10
PCB 89	486	121	22.3	ppt	< MDL	< MDL	< MDL	< MDL	< MDL	0.76	1.26
PCB 90 + PCB 101 + PCB 113	486	484	36500	ppt	10.30	15.72	38.92	80.10	262.84	884.10	1420.95
PCB 92	486	481	8620	ppt	1.83	2.94	6.99	15.23	54.77	187.79	303.98

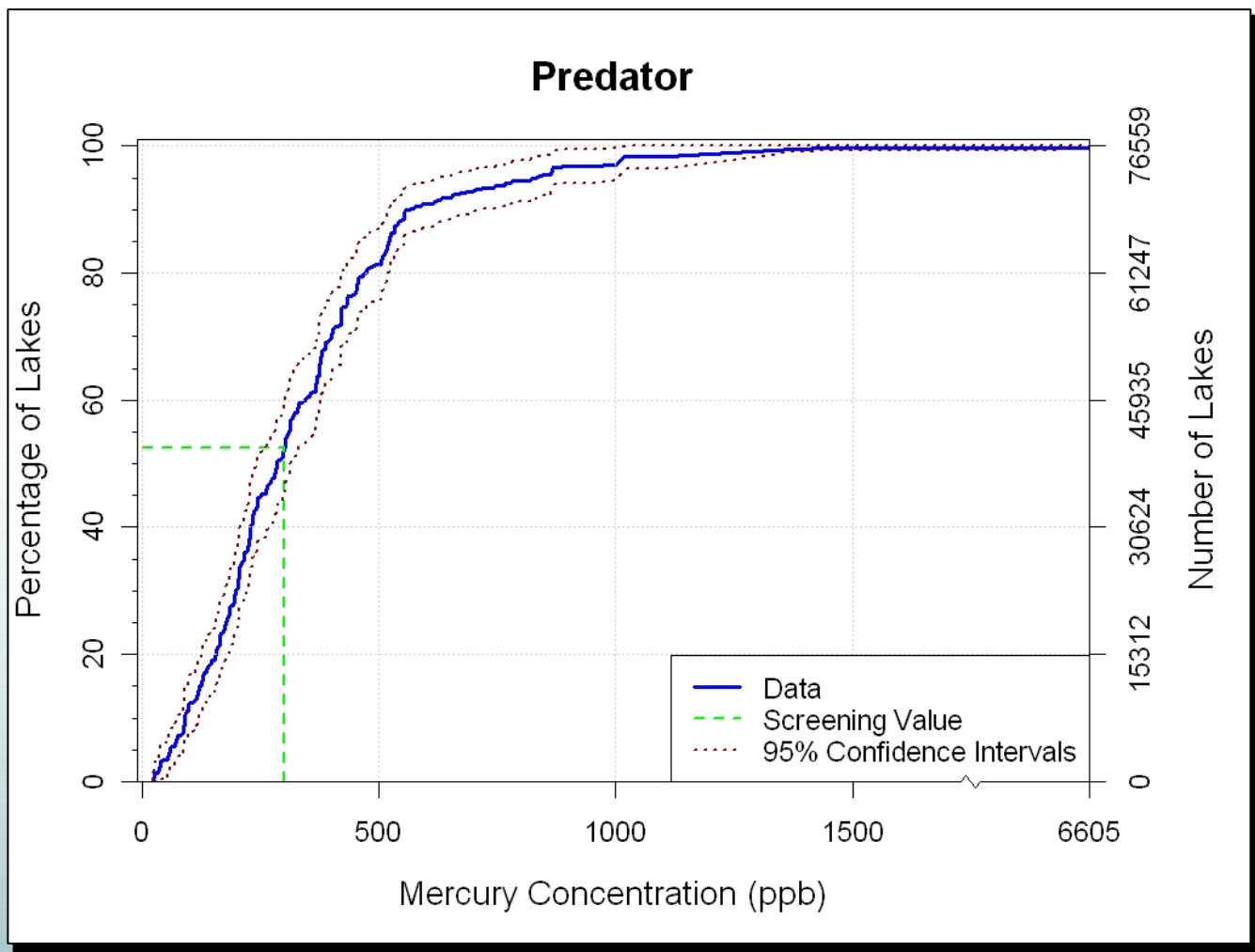
Tissue Concentrations

Chemicals	Predators (ppb)		Bottom Dwellers (ppb)	
	Median	Maximum	Median	Maximum
Mercury	285	6605	69	596
PCBs	2	705	14	1266
Dioxins/furans	6×10^{-6}	8×10^{-3}	4×10^{-4}	2.4×10^{-2}
DDT	1.5	1481	13	1761
Chlordane	<MDL	100	2	378

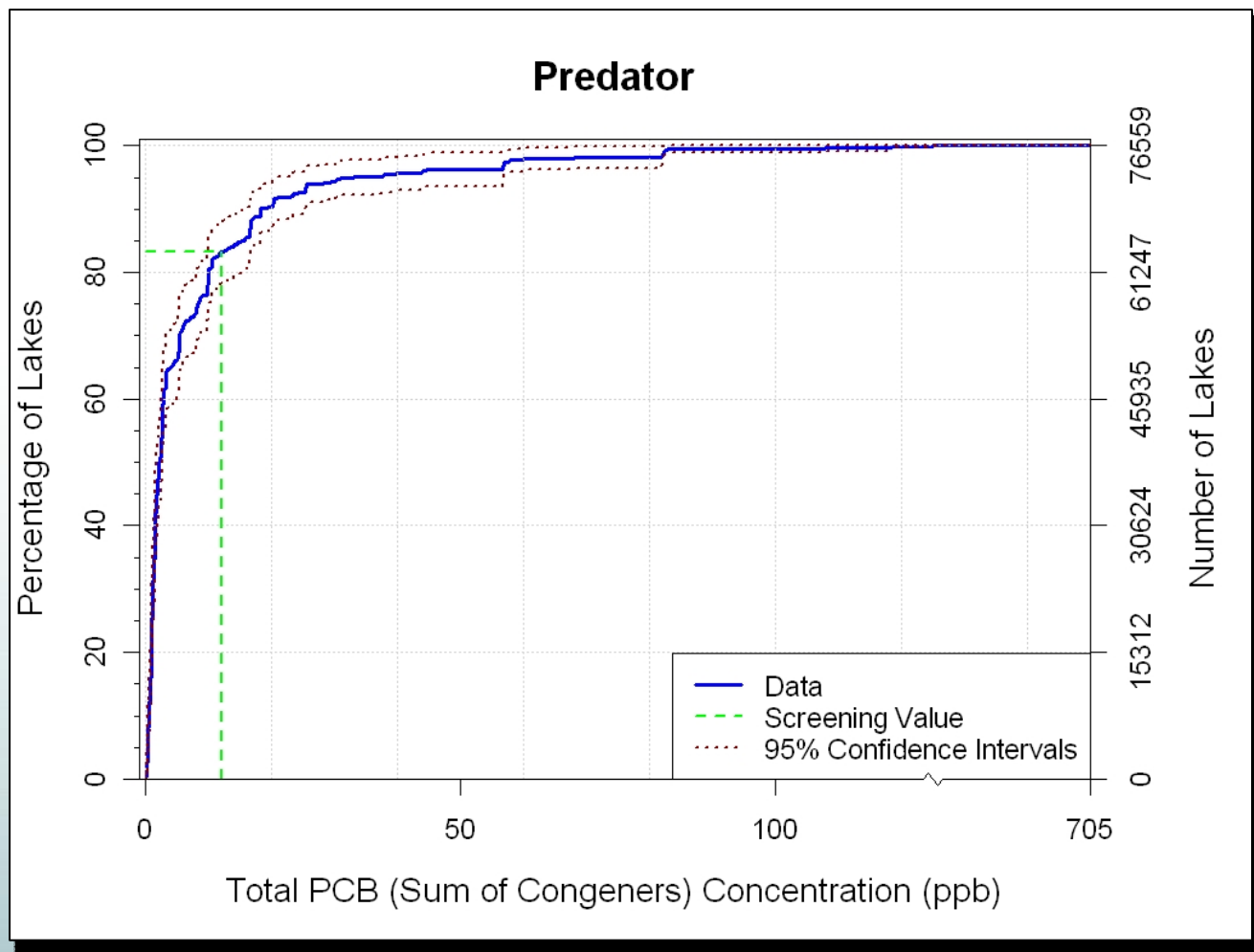
Screening Value Exceedances

CHEMICAL	HUMAN HEALTH SCREENING VALUE	PERCENT OF LAKES EXCEEDED	NUMBER OF LAKES EXCEEDED
Mercury	0.3 ppm	49 %	36,422
PCBs	12 ppb	17 %	12,886
Dioxins/Furans	0.15 ppt	8 %	5,856
DDT	69 ppb	2 %	1,329
Chlordane	67 ppb	<1 %	235

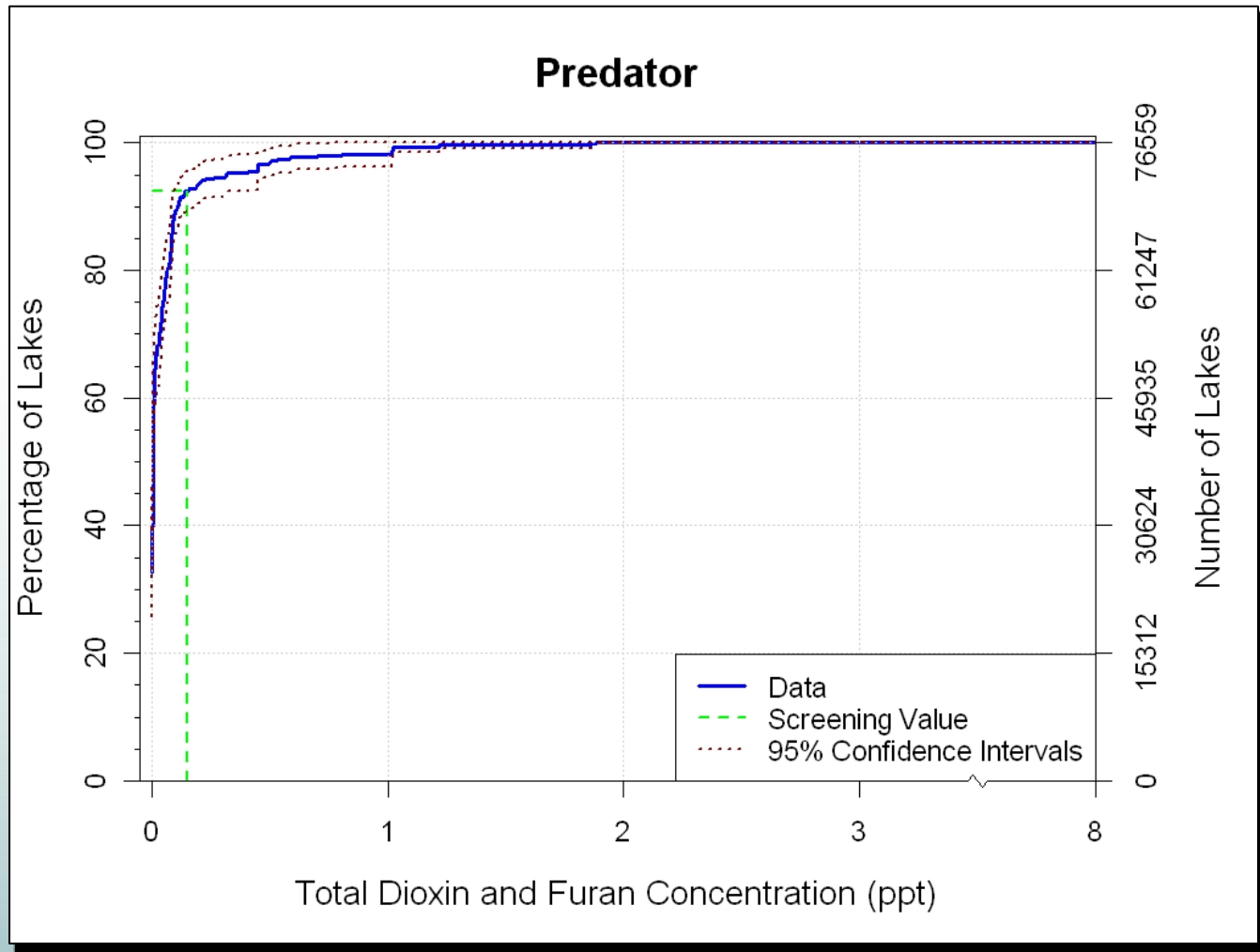
Mercury CDF



Total PCB CDF



Total Dioxin and Furan CDF



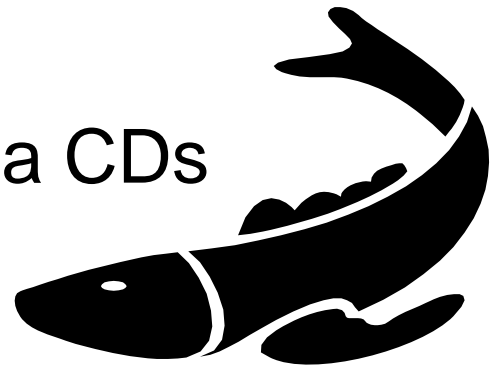
Published Journal Articles

Olsen, A.R., B.D. Snyder, L.L. Stahl, and J.L. Pitt. 2009. Survey design for lakes and reservoirs in the United States to assess contaminants in fish tissue. *Environmental Monitoring and Assessment* 150:91-100.

Stahl, L.L., B.D. Snyder, A.R. Olsen, and J.L. Pitt. 2009. Contaminants in fish tissue from U.S. lakes and reservoirs: a national probabilistic study. *Environmental Monitoring and Assessment* 150:3-19.

What's Coming on the National Lake Fish Tissue Study Web Site

- ◆ Soon to be available online
 - ⊕ Report Release Fact Sheet
 - ⊕ Final Report Executive Summary
 - ⊕ Final Report (full 242-page document)
 - ⊕ Journal Articles
 - ⊕ Instructions for ordering data CDs



Our Final Thanks

Alabama Department of Environmental Management
Arizona Game and Fish Department
Arkansas Department of Environmental Quality
California Department of Fish and Game
Colorado Division of Wildlife
Connecticut Department of Environmental Protection
Crater Lake National Park
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
Idaho Department of Environmental Quality
Illinois Environmental Protection Agency
Illinois Department of Natural Resources
Indiana Department of Environmental Management
Iowa Department of Natural Resources
Kansas Department of Health and Environment
Kentucky Department of Environmental Protection
Louisiana Department of Environmental Quality
Maine Department of Environmental Protection
Maryland Department of the Environment
Maryland Department of Natural Resources
Massachusetts Department of Environmental Protection
Michigan Department of Environmental Quality
Minnesota Chippewa Tribe
Minnesota Department of Natural Resources
Mississippi Department of Environmental Quality
Missouri Department of Conservation
Missouri Department of Natural Resources
Montana Department of Fish, Wildlife and Parks
Nebraska Department of Environmental Quality

Nevada Division of Wildlife
New Hampshire Department of Environmental Services
New Jersey Department of Environmental Protection
New Mexico Environment Department
New York Department of Environmental Conservation
North Carolina Department of Environment
North Dakota Department of Health
Ohio Department of Natural Resources
Oklahoma Conservation Commission
Oklahoma Department of Environmental Quality
Oregon Department of Environmental Quality
Pennsylvania Department of Environmental Protection
Pictured Rocks National Lakeshore
Pyramid Lake Paiute Tribe
Rhode Island Department of Environmental Management
South Carolina Department of Health and Environmental Control
South Dakota Game, Fish, and Parks
Tennessee Valley Authority
Tennessee Wildlife Resources Agency
Texas Commission on Environmental Quality
Utah Department of Environmental Quality
Vermont Department of Environmental Conservation
Virginia Department of Environmental Quality
Washington Department of Ecology
West Virginia Department of Environmental Protection
Wind River Environmental Quality Commission
Wisconsin Department of Natural Resources
Wyoming Game and Fish Department
Yellowstone National Park

What's Next?

- ◆ Final technical report for the PPCP Fish Pilot Study.
- ◆ Report on PBDE results from the National Lake Fish Tissue Study.
- ◆ Analysis of CECs for the National Rivers and Streams Assessment (NRSA) Urban River Study (Please visit our poster this evening).

