Mercury in New York State Fish

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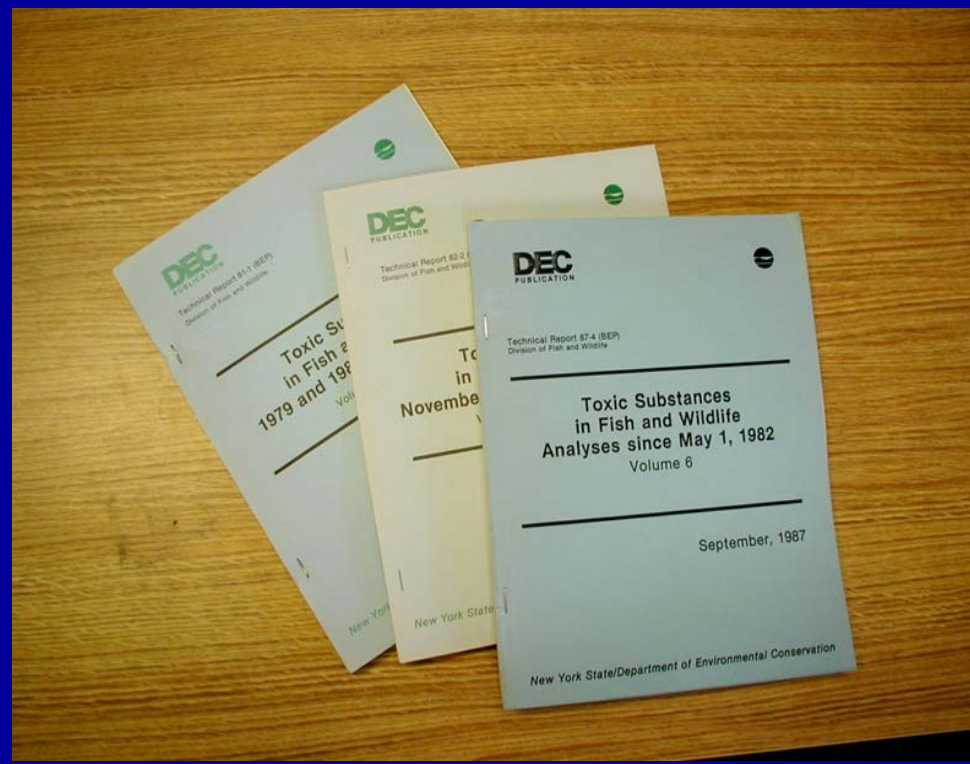
Bureau of Habitat

NYS Dept. of Environmental Conservation

DEC Monitoring Efforts

- Began monitoring Hg in fish before 1970
- Statewide Toxic Substances Monitoring Program (1976 – 1993)
- Specific projects
  - higher Hg in acidic waters
- Continuing targeted monitoring across NYS



Impacts on Fish and Wildlife

- Fish

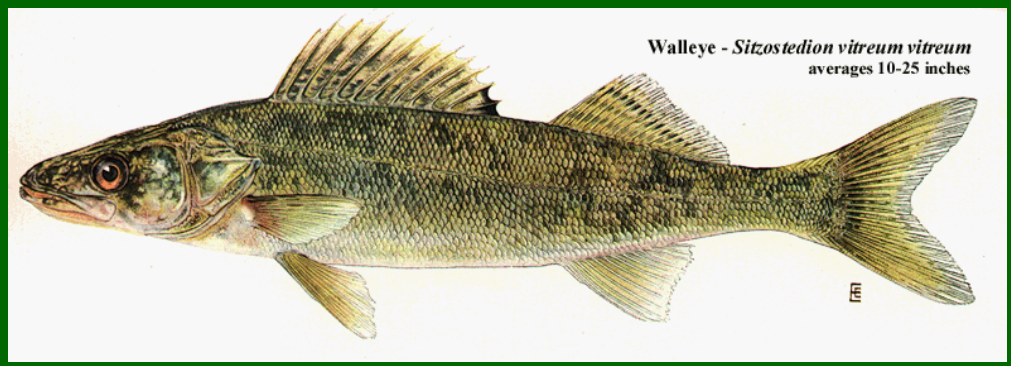
  - not able to excrete mercury; accumulates in muscle & fat

  - highest mercury in older piscivorous fish

  - possible reproductive impacts
- Loons
- Mink & Otter

Methylmercury

- Bioaccumulates up food chains
- Concentrations less than 1 ppt in the water can lead to concentrations greater than 1 ppm in fish and loons



Factors Affecting Bioaccumulation

Water Quality Variables

-Methylation depends on presence of sulfur reducing bacteria, anaerobic conditions, acidic conditions, dissolved organic carbon

Hydrologic Variables

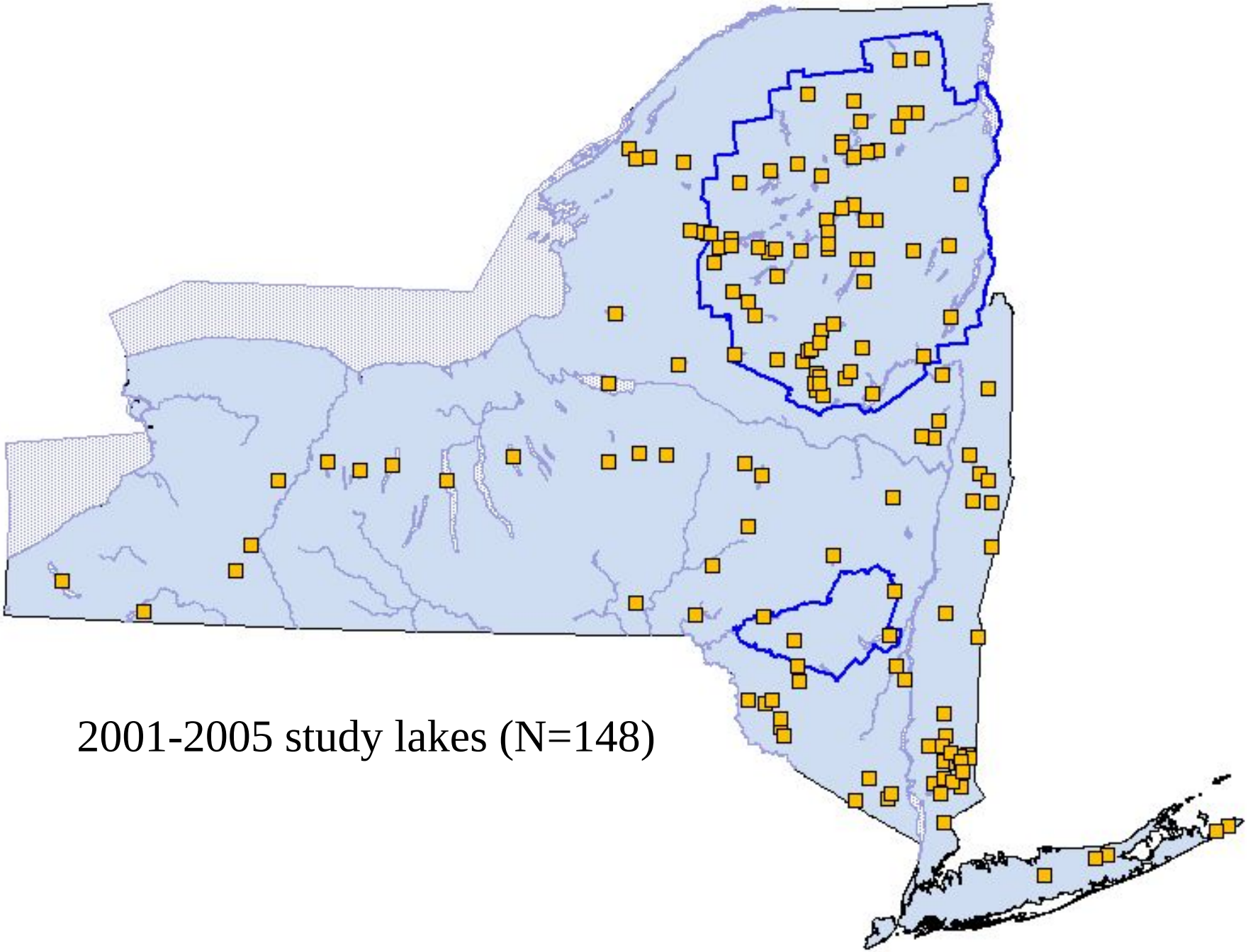
- Reservoir, percent wetlands, watershed size

Biological Variables

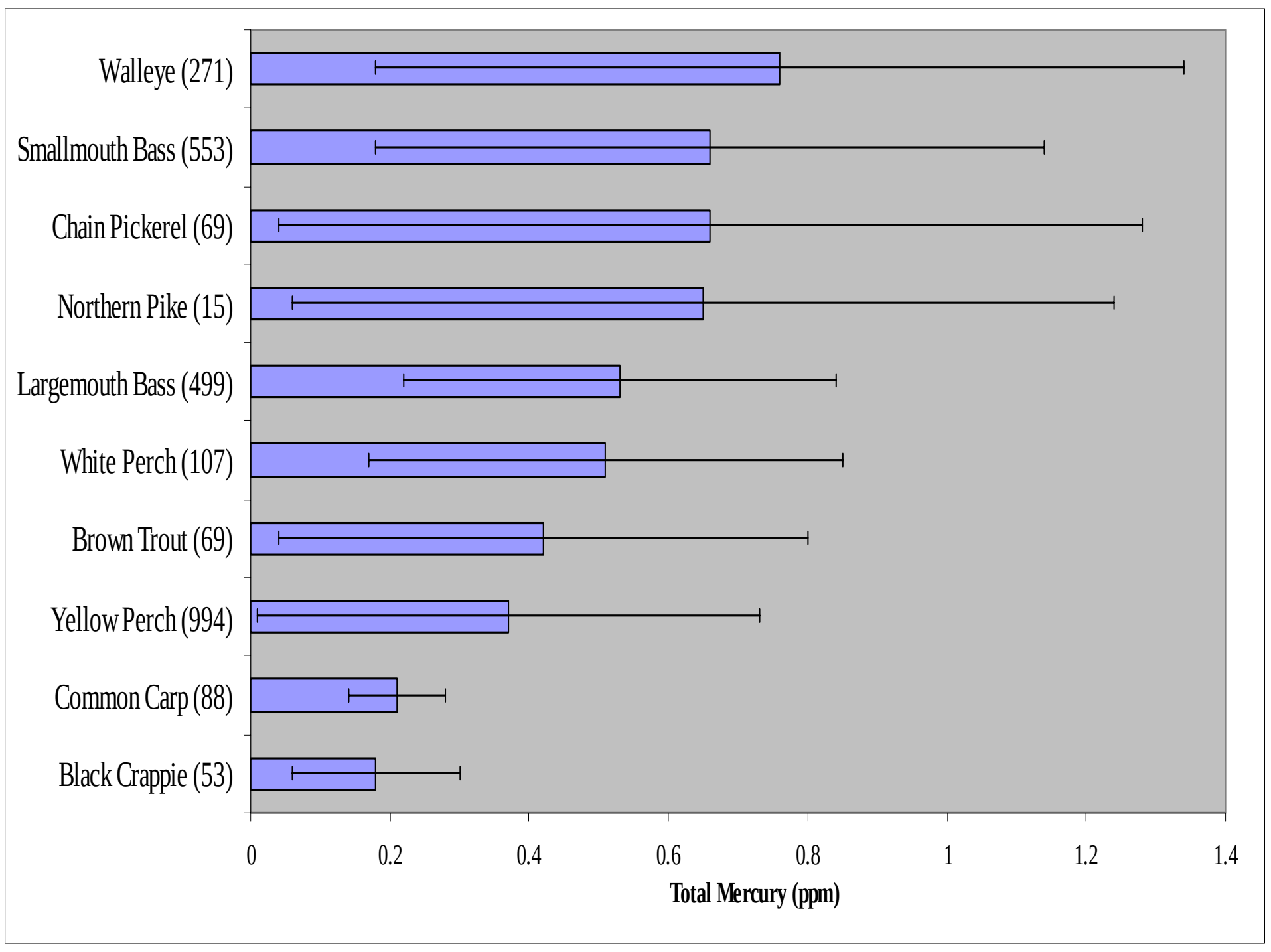
- Fish species and age
- Length of food chain affects fish Hg conc
- Productivity of lake affects fish Hg conc

Statewide Strategic Monitoring of Mercury in Fish

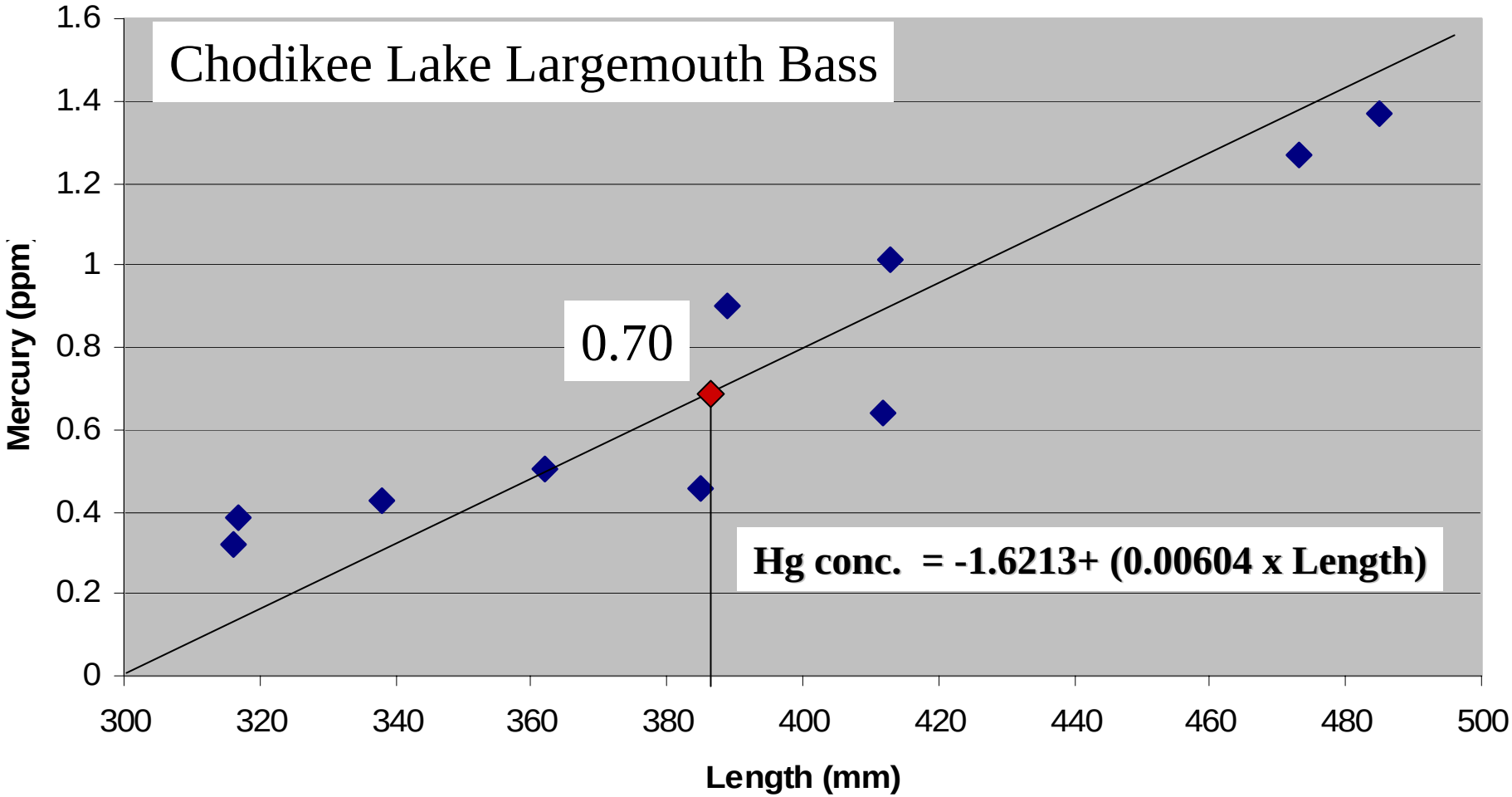
- 4-year project: 2003-2006
- 131 lakes surveyed
- 4 target species
  - *YP, LMB, SMB, WEYE*
- Primarily new lakes, temporal and spatial trends, test model
- Summarize historical database



2001-2005 study lakes (N=148)


Walleye (271)
Smallmouth Bass (553)
Chain Pickerel (69)
Northern Pike (15)
Largemouth Bass (499)
White Perch (107)
Brown Trout (69)
Yellow Perch (994)
Common Carp (88)
Black Crappie (53)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Total Mercury (ppm)

Standard size determinations

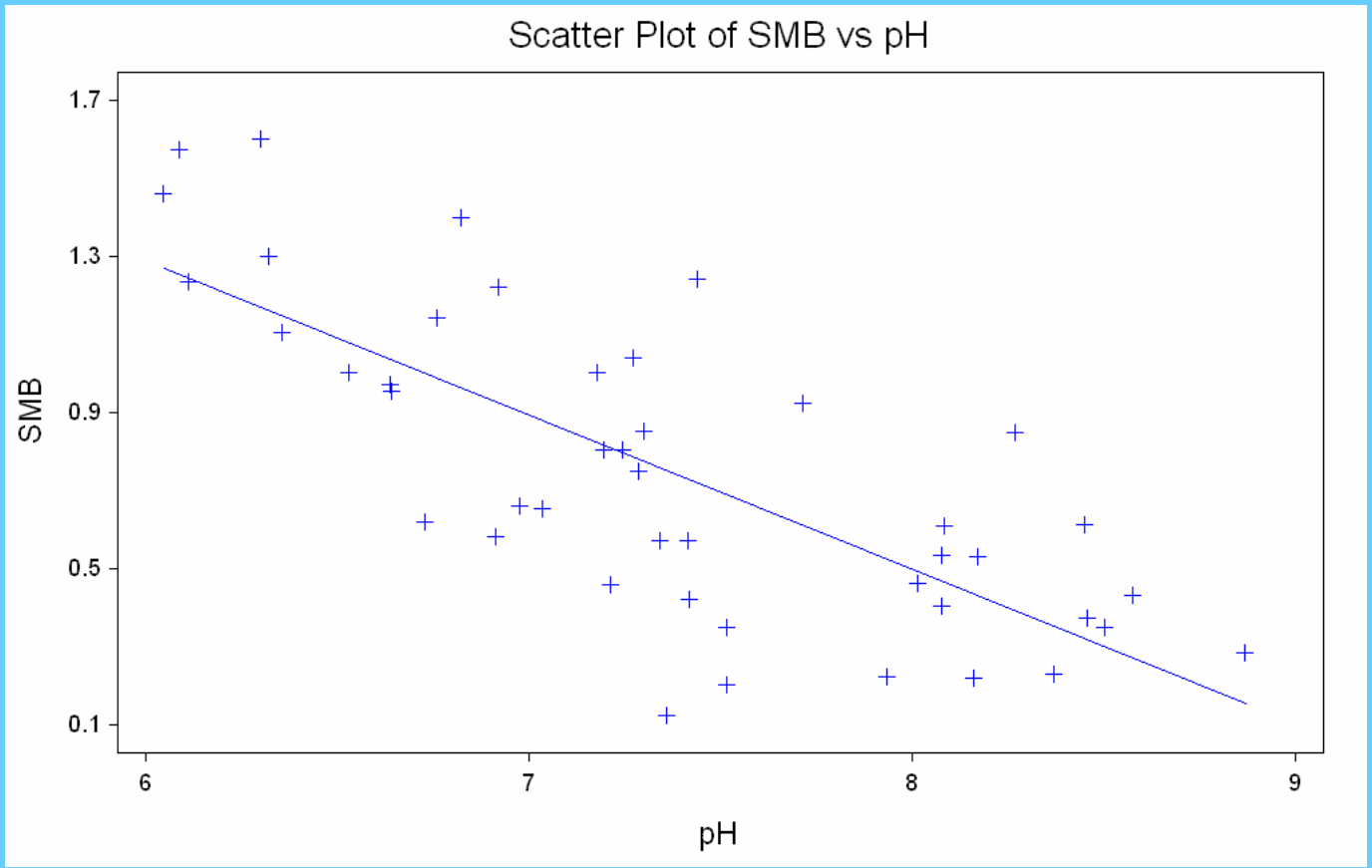


9 inch Yellow Perch

Mean = 0.35 ppm

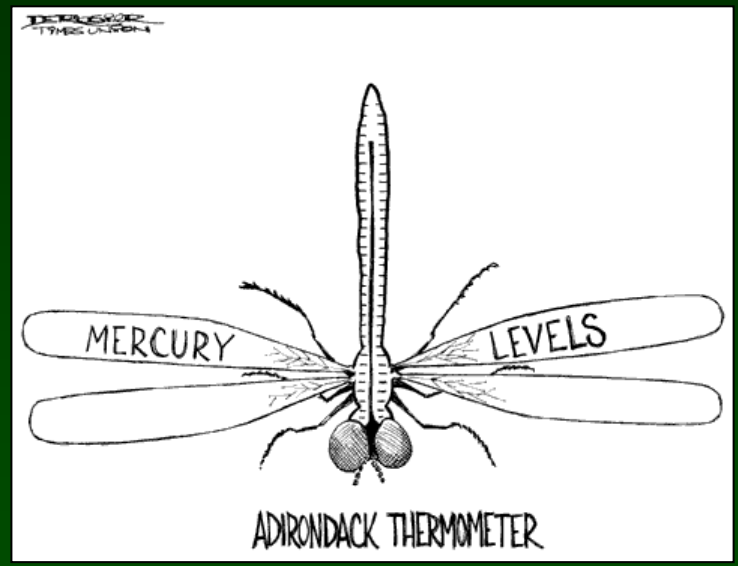
Lakes = 95

Standard Size Smallmouth Bass Hg Conc. vs. pH

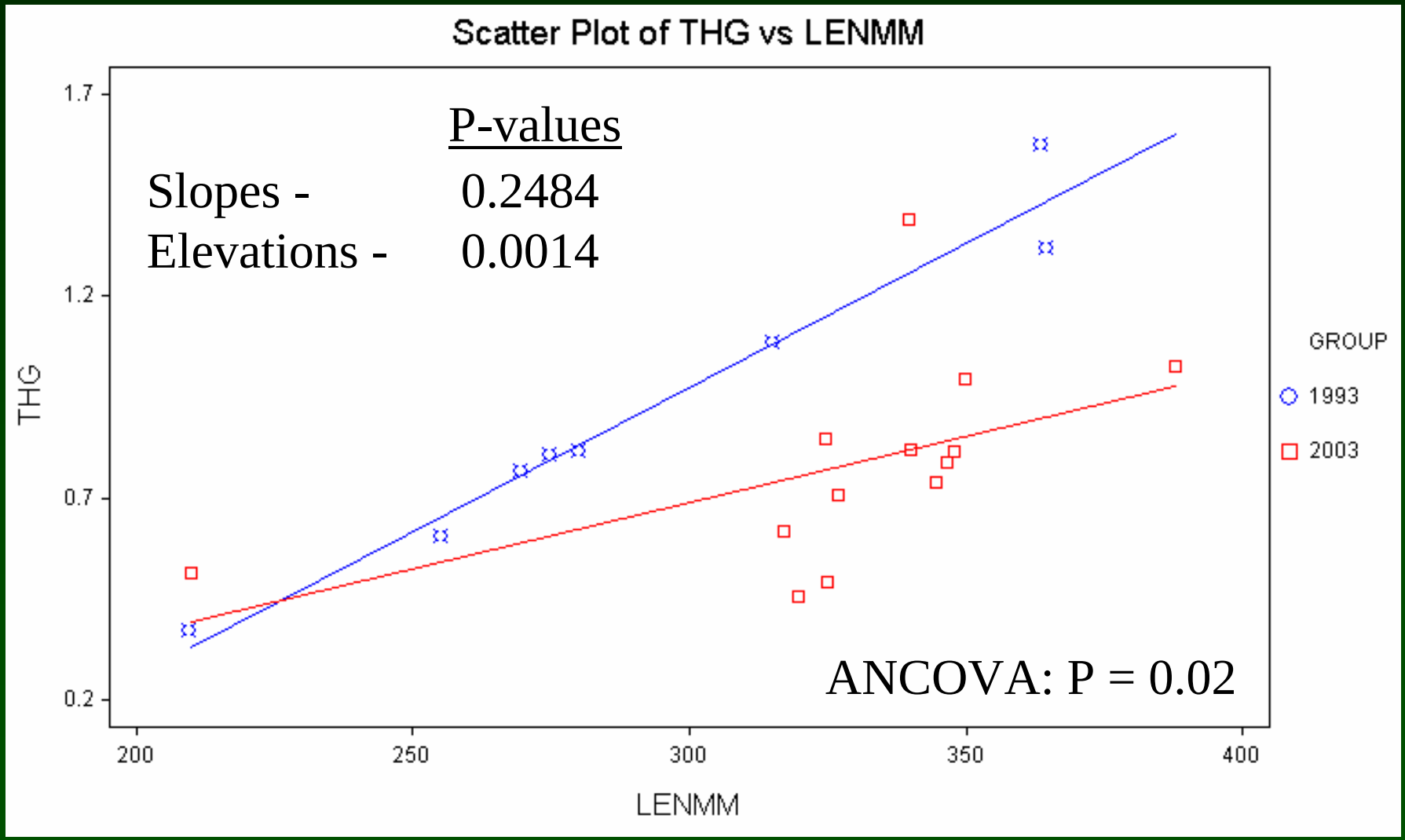


Have mercury levels changed?

- Selected 20 lakes with data from 10 – 20 years ago
- Mostly YP from Adirondack Lakes
- Repeated the historical sampling effort to determine trends



Trend analysis – Cranberry Lake Smallmouth Bass



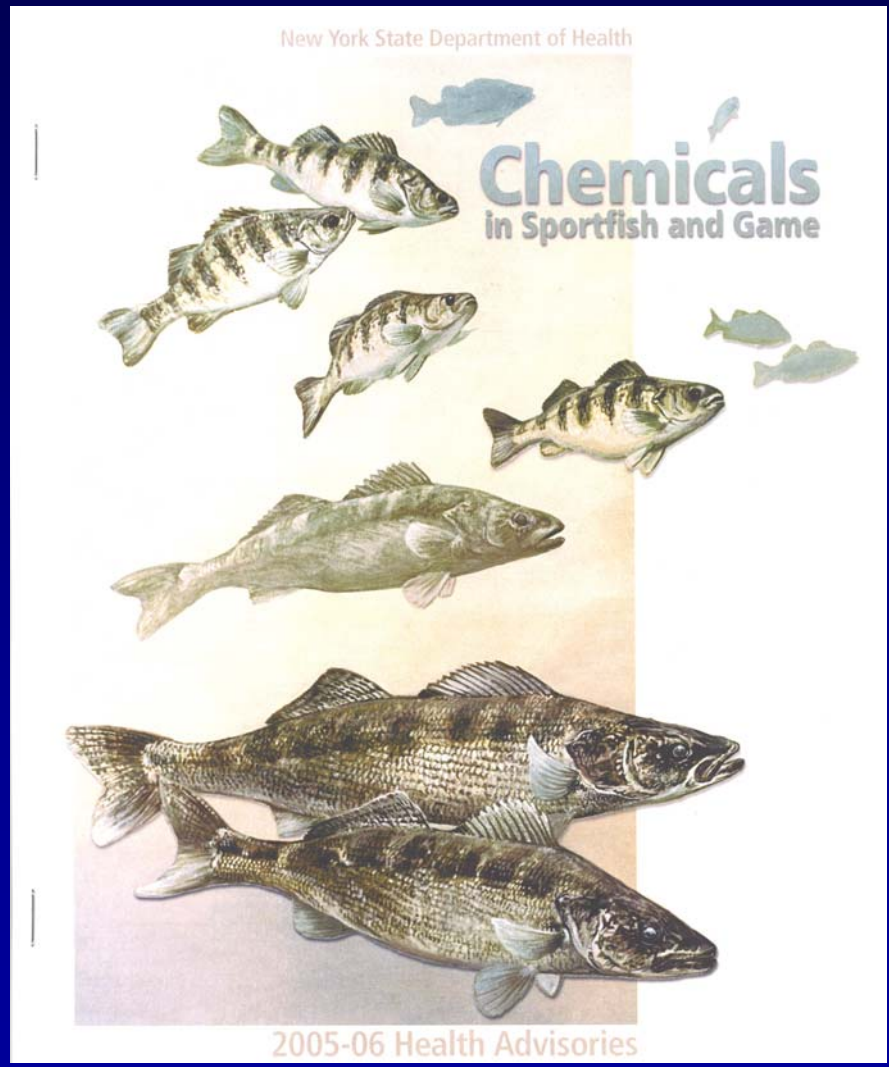
Change in Mercury Concentration

Lake	Size/Species	Change
• Lake Adirondack	9 inch YP	+ 0.08 ppm
• Cranberry Lake	15 in. SMB	- 0.48 ppm
• Ferris Lake	9 in.YP	- 0.67 ppm
• Big Moose	9 in.YP	- 0.20 ppm
• Kings Flow	9 in. YP	- 0.22 ppm

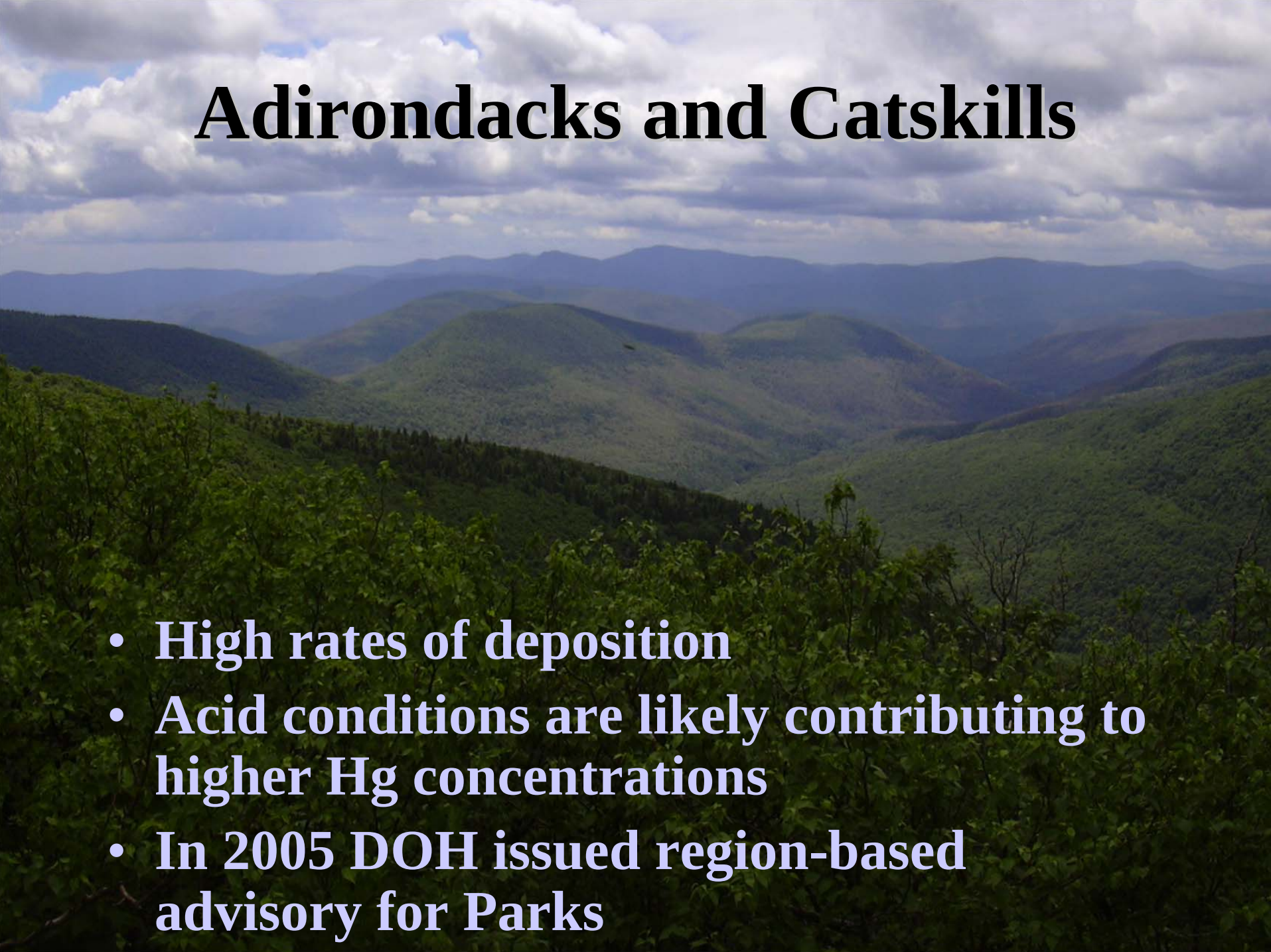
Policy Implications

Health Advisories

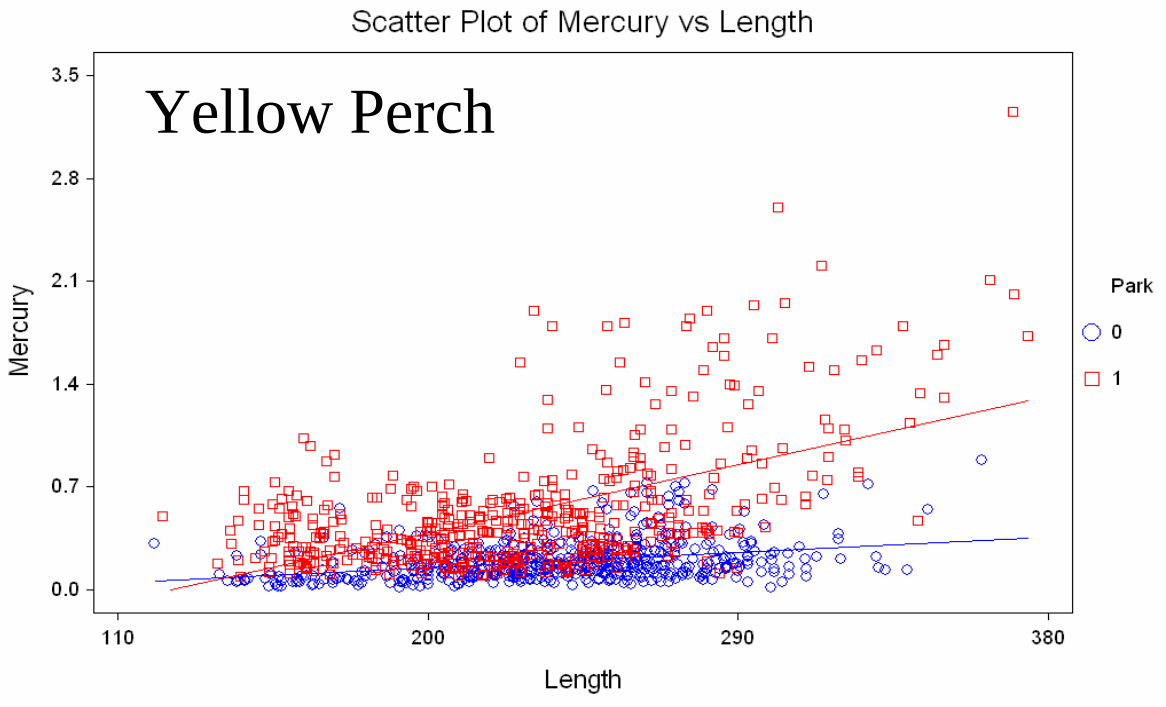
- Prior to these studies there were 24 lakes with mercury advisories
- Based on review of data from 17 NYC reservoirs and 96 statewide lakes (2001 – 2004), DOH issued 49 additional advisories



Adirondacks and Catskills



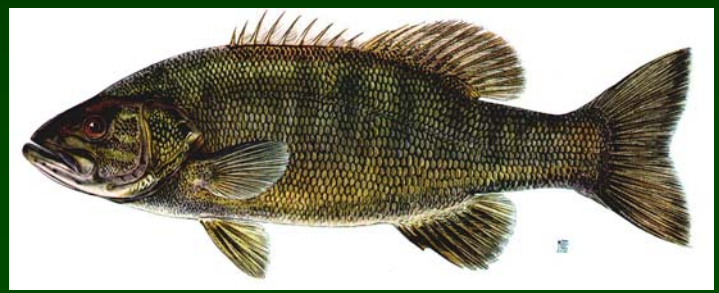
- High rates of deposition
- Acid conditions are likely contributing to higher Hg concentrations
- In 2005 DOH issued region-based advisory for Parks



9 inch YP

Out of Parks: 0.18 ppm

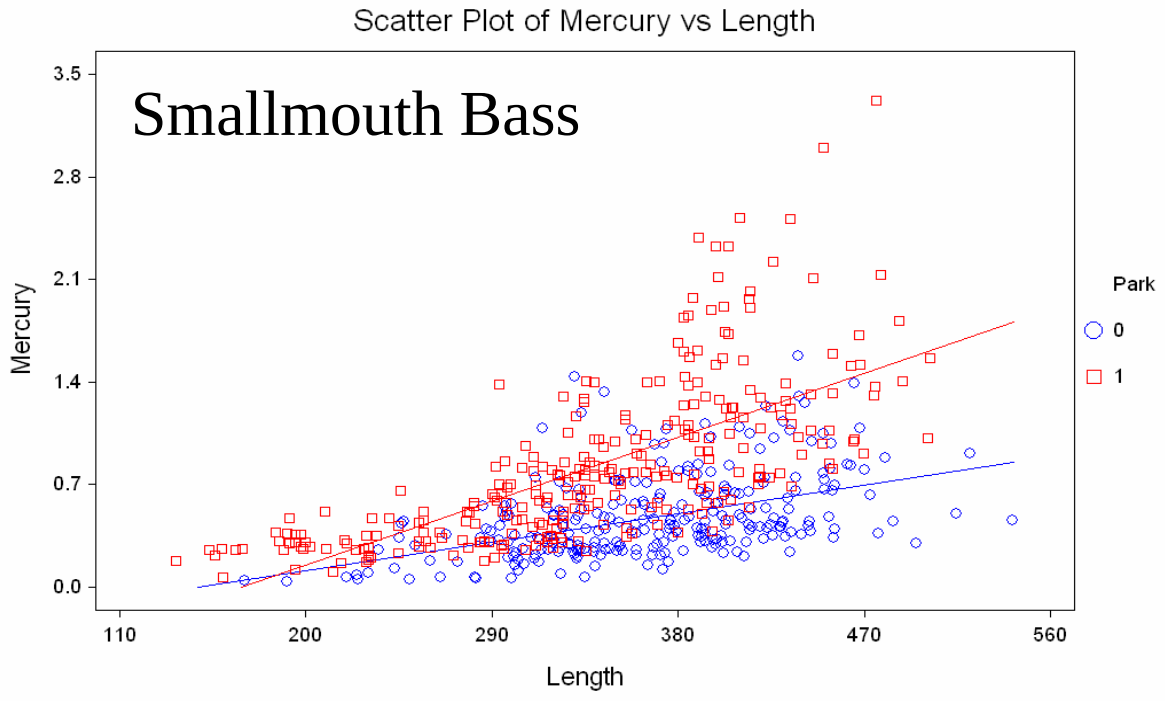
Inside Parks: 0.54 ppm

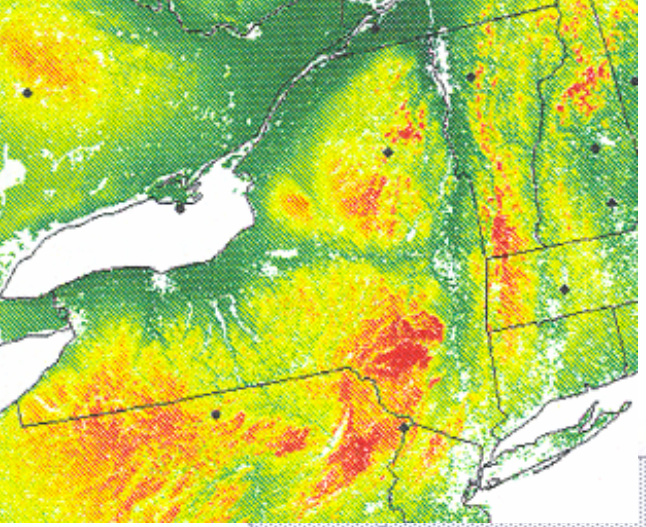


15 inch SMB

Out of Parks: 0.51 ppm

Inside Parks: 1.05 ppm





All inland lakes tested 1970 – 2004

73 Lakes with Health Advisories:

What's next?

- Analyze ~600 additional fish from 25 lakes
- Test simple predictive model
- Examine landscape characteristics that may influence mercury accumulation
- Examine mercury in other biota (e.g., macroinvertebrates, songbirds, loons, etc.)