

Tribal assessment of PBT contaminant concentrations across size ranges of four commonly harvested Lake Superior fish

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Great Lakes Indian Fish and Wildlife Commission



Great Lakes Indian Fish & Wildlife Commission (GLIFWC)

- Inter-tribal, co-management agency committed to the implementation of off-reservation treaty rights on behalf of its eleven Ojibwe member tribal governments.



GLIFWC Member Tribes



GLIFWC's Contaminant Monitoring Program

- Objectives
 - Subsistence and cultural
 - Commercial fishery
 - Contaminant monitoring data in biota



2006 Lake Superior regulated commercial harvest by WI and MI Ojibwe tribes (in round US pounds)

- Whitefish (*Coregonus clupeaformis*)- 1,909,749



- Lake Trout (*Salvelinus namaycush namaycush*)- 325,145



- Cisco (*Coregonus artedii*)- 46,562



- Siscowet (*Salvelinus namaycush siscowet*)- 22,451

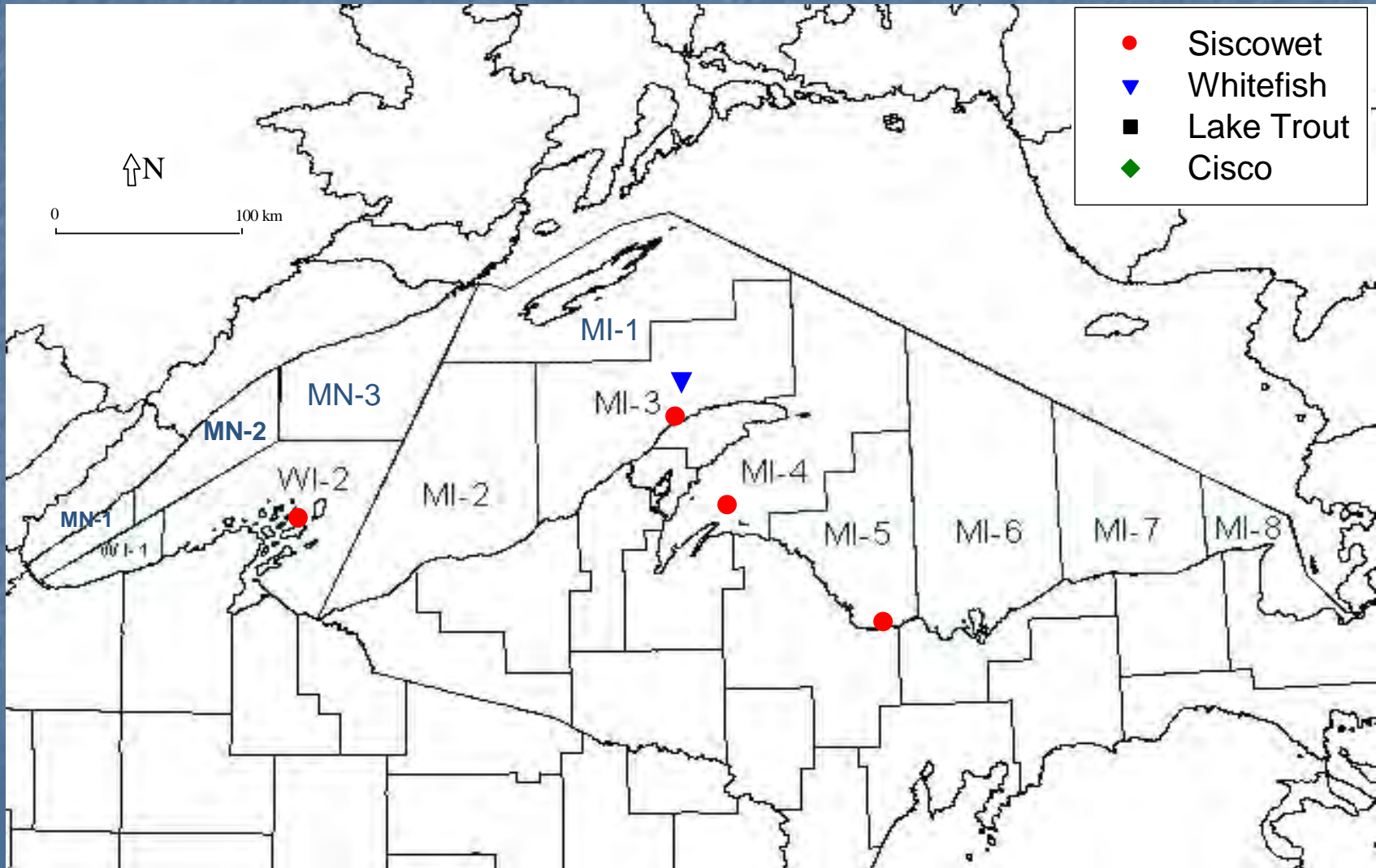


Project Design

- Concentrations of 37 PBT contaminants measured across common, tribally harvested size ranges of:
 - Cisco (33-47cm, Nov. 2006)
 - Whitefish (43-61cm, Nov. 2004)
 - Lake trout (43-72cm, April-Nov. 2003)
 - Siscowet (43-65cm, Oct. 1998-Aug. 1999)
- Four designated size groups were collected from each species from central, southern Lake Superior



Lake Superior Lake Trout Management Units



Project Design

- Composite each fish species by length and age into three tissue types (muscle, skin & fat)
- Measure concentrations in muscle for all species and in siscowet skin and fat
- Estimate concentrations in lake trout and whitefish skin and fat using percent lipid in those tissues and lipid normalized concentrations in muscle



Fish Processing Methods

- Segmented each fillet into 3 tissue types (skin, muscle, and dorsal/ventral fatty tissue)
- Siscowet
 - 4-12 fish per composite, 4-8 composites per size group
- Cisco, Whitefish and Lake Trout
 - 4 fish per composite (2 for smallest lake trout group), 4 composites per size group
- Recorded the weight of each tissue type per individual
- Homogenized each tissue using equal weight per individual
- Formed composites by length, age, and tissue type
- A portion of each tissue type was archived



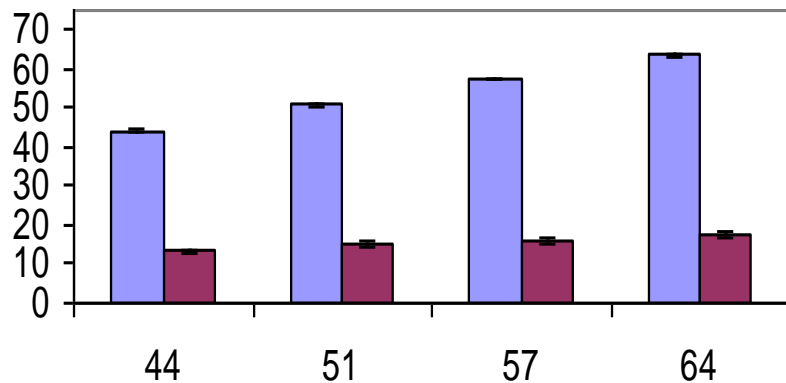
Skin-On Untrimmed (SOUT) and Skin-On Trimmed Fillets (SOT)



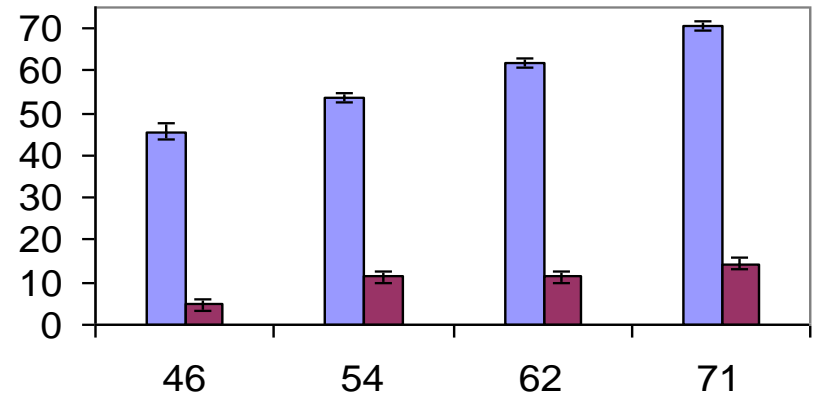
Composite Length & Age Information

Length (cm) and Age (yr)

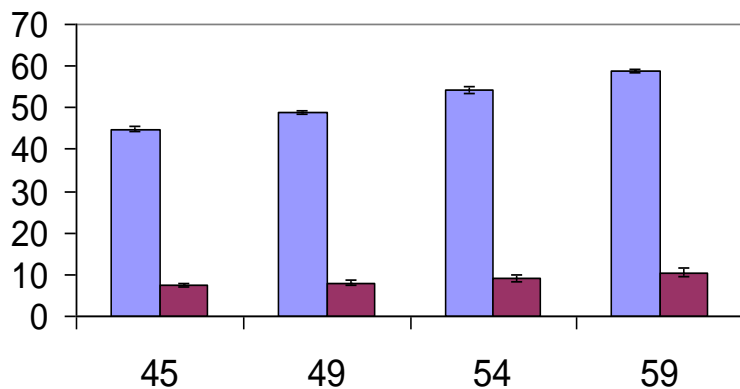
Siscowet



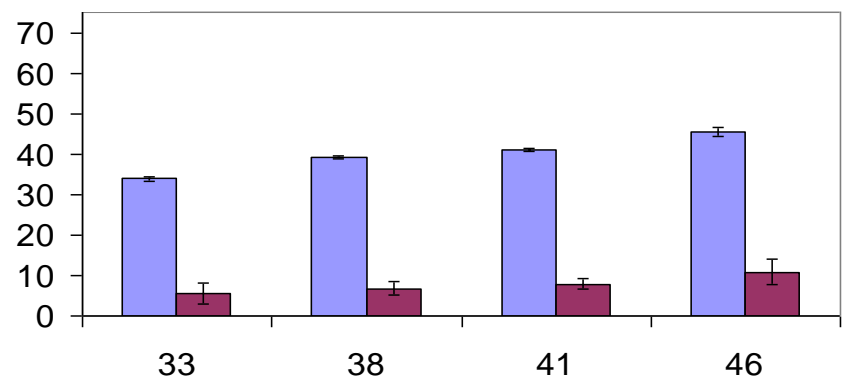
Lake Trout



Whitefish



Cisco



Length Age

Mean Size Group (cm)



Contaminants Measured

- 36 Chlorinated organics and 1 inorganic including:
 - Total Mercury
 - Total PCBs
 - Toxaphene
 - Total Chlordane
 - Total DDT
 - Dieldrin
- Percent Lipid and moisture in all tissues



Contaminant Analysis

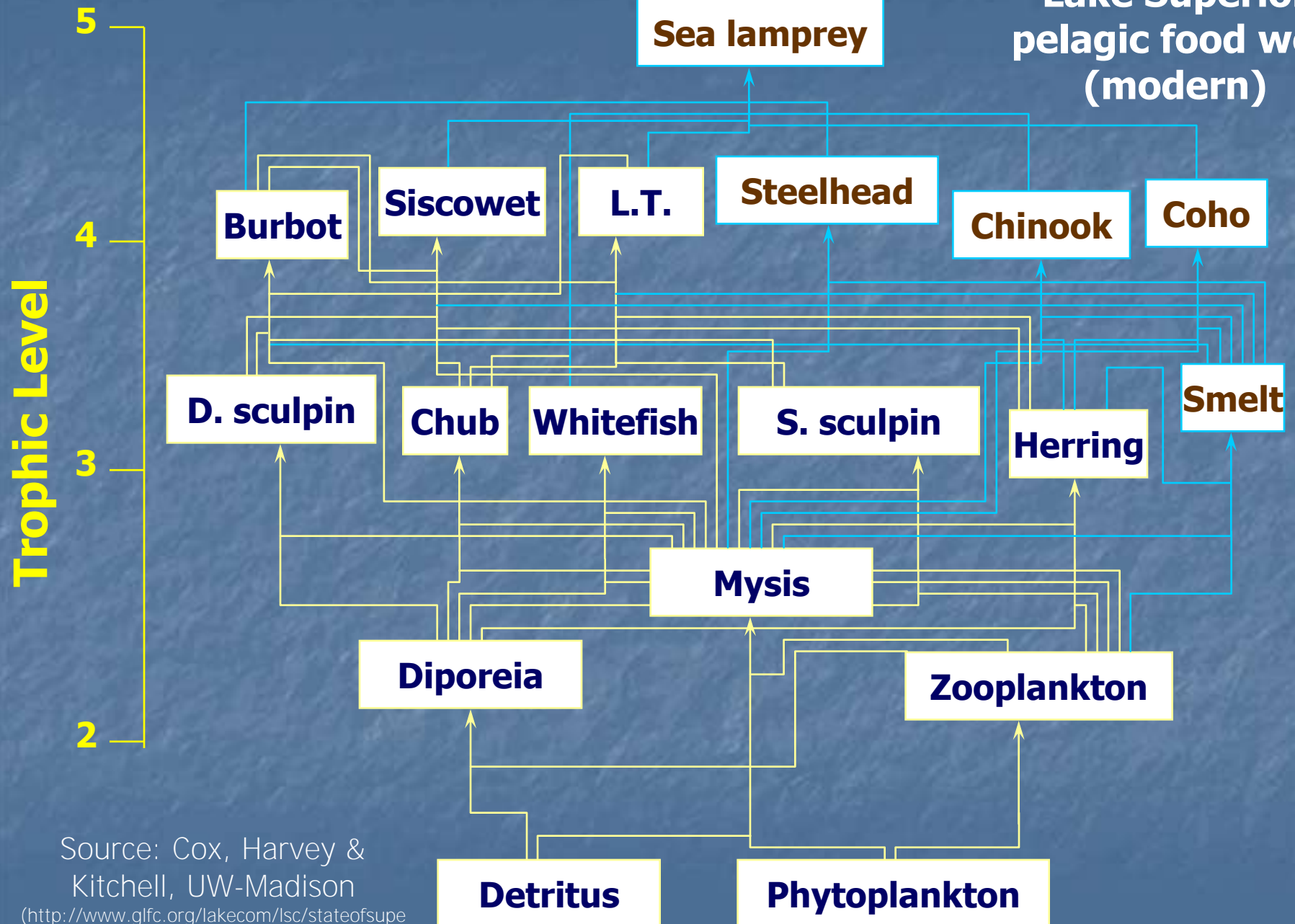
- Organics analysis performed by Pace Analytical, Inc., Green Bay, WI (formerly En Chem, Inc.)
 - PCBs – EPA Method 8082 (Aroclors)
 - OC Pesticides – EPA Method 8081A
- Mercury analysis performed by Lake Superior Research Institute, UW-Superior, Superior, WI
 - Total Mercury – EPA Method 245.6



RESULTS



Lake Superior pelagic food web (modern)

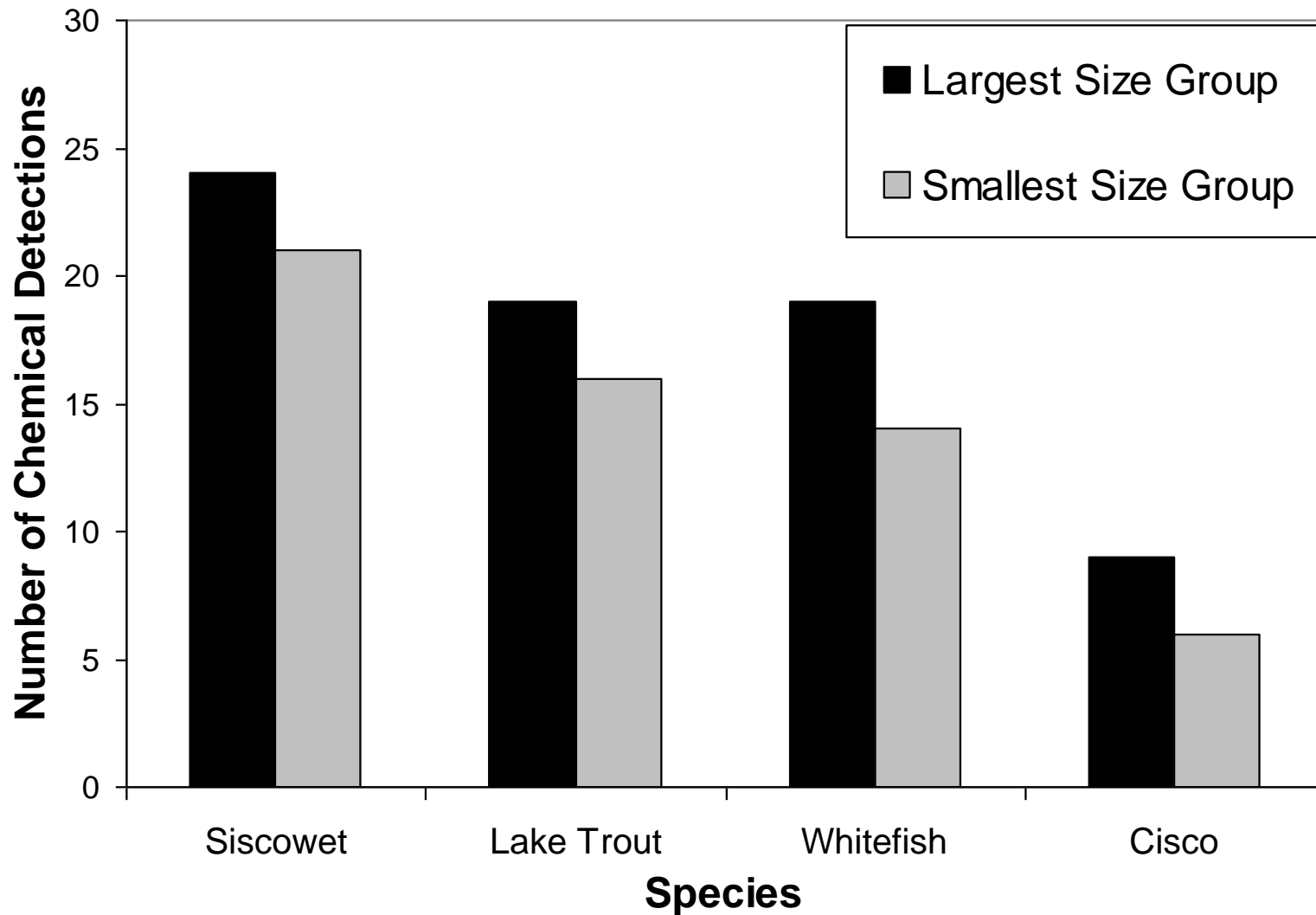


Source: Cox, Harvey & Kitchell, UW-Madison

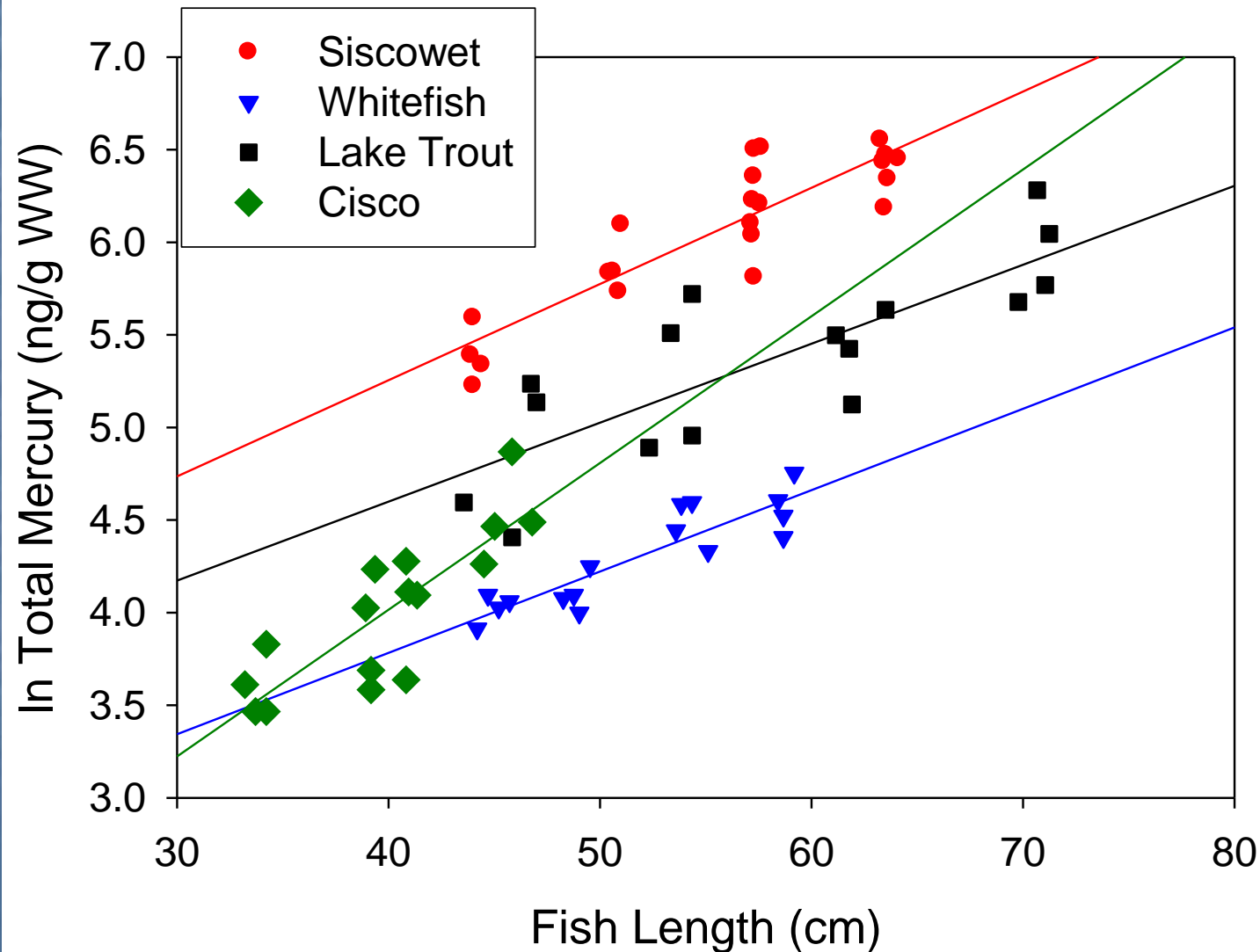
<http://www.glf.org/lakecom/lsc/stateofsuperior/EcologicalInteractions.ppt#397,5,Slide 5>



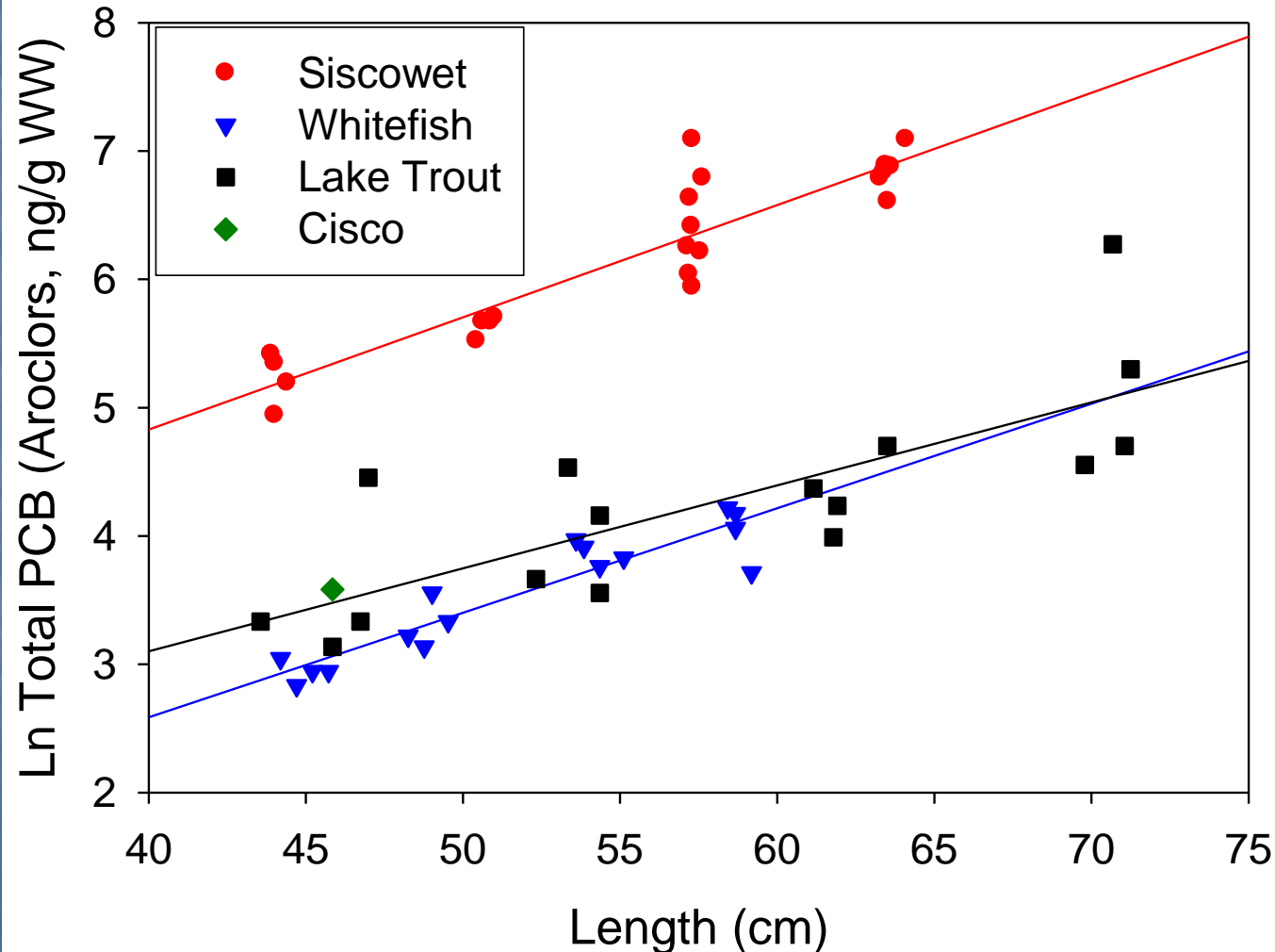
Summary of Detections



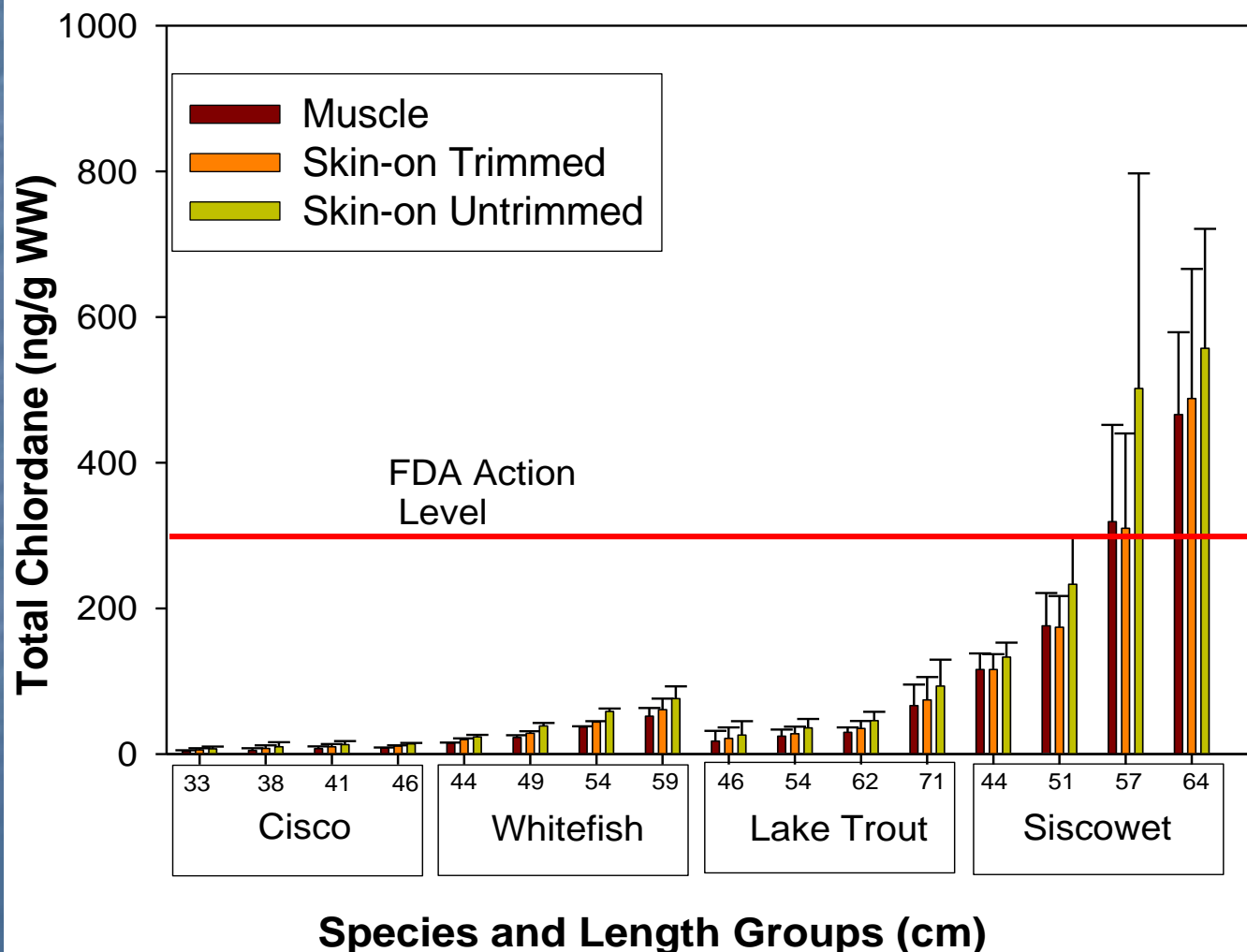
Total Mercury Significantly Related to Length – Species Differences in Concentration



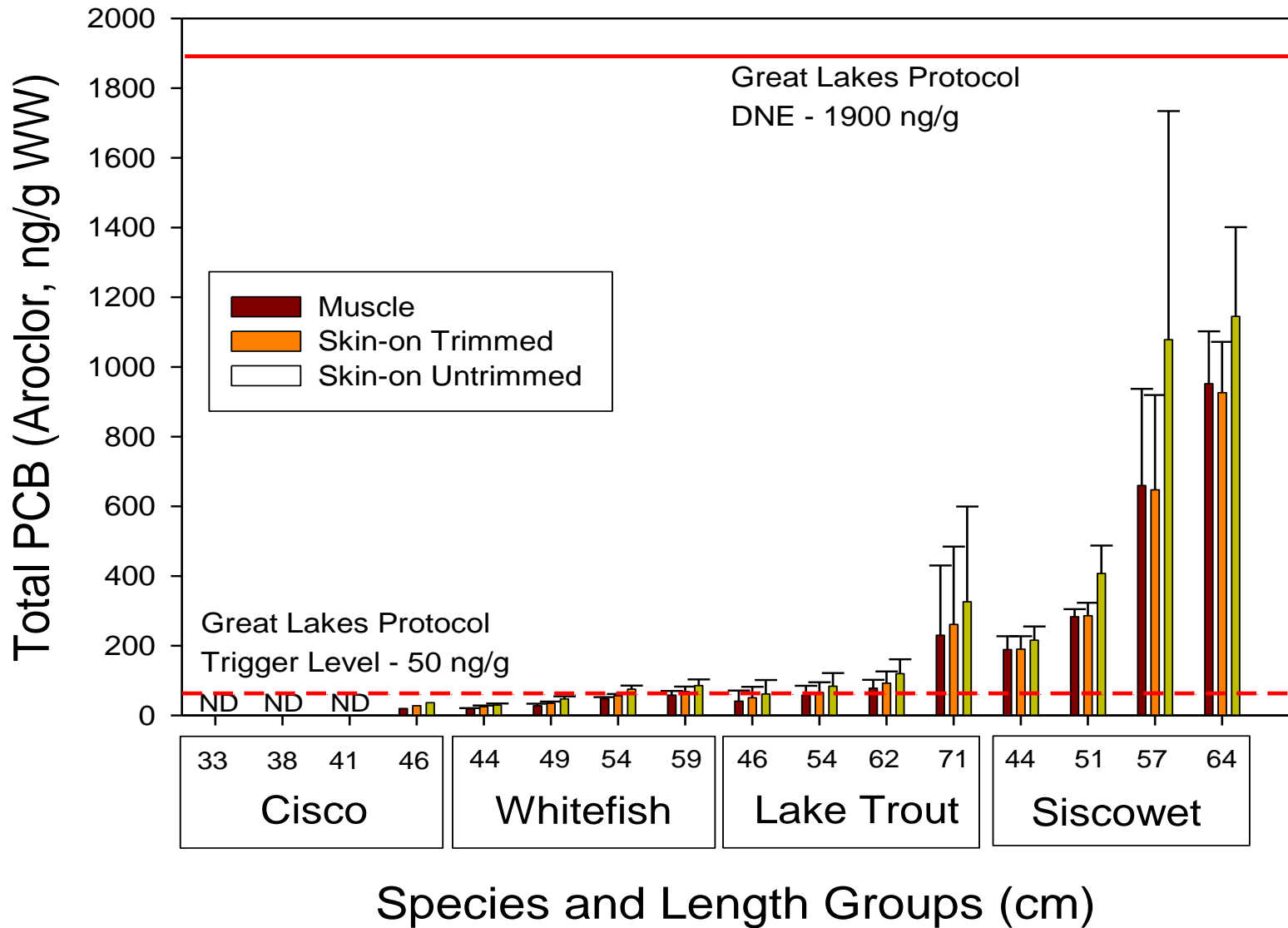
Total PCBs significantly related to length, Siscowet again with highest concentrations, Only 1 of 16 cisco composites had detectable PCBs



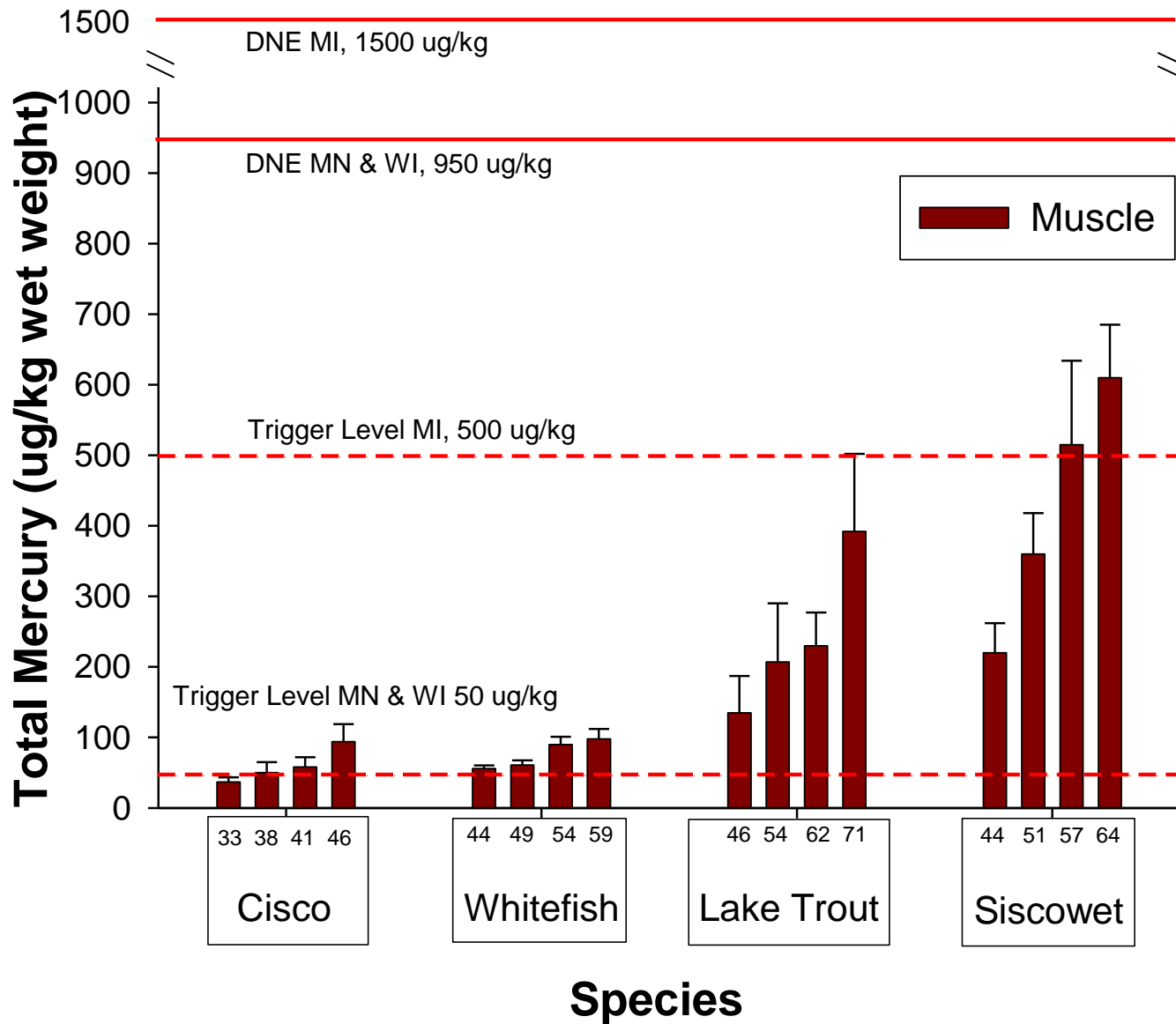
Larger Siscowet Exceeded FDA Total Chlordane Action Level – All Other Regulated Contaminants Were Below FDA Levels



Total PCBs



Total Mercury



What Are We Doing With This Information?



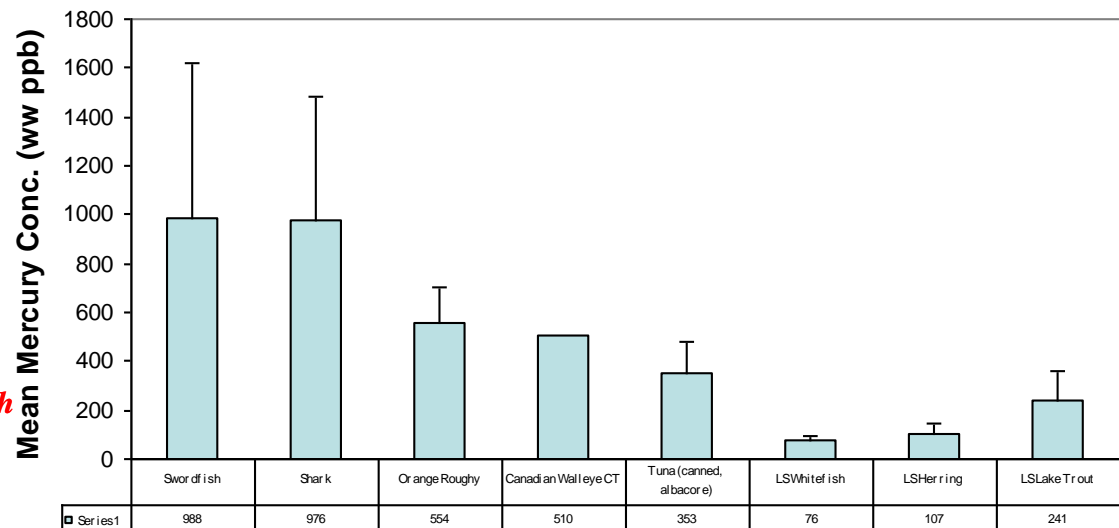
Chemical contaminants and Lake Superior Fish



Lake Superior whitefish, lake trout, and lake herring have undergone rigorous laboratory testing to ensure these fish meet FDA chemical contaminant safety standards.

Unfortunately, this is not the case with much of the fish eaten today by customers. A recent Chicago Tribune article noted:

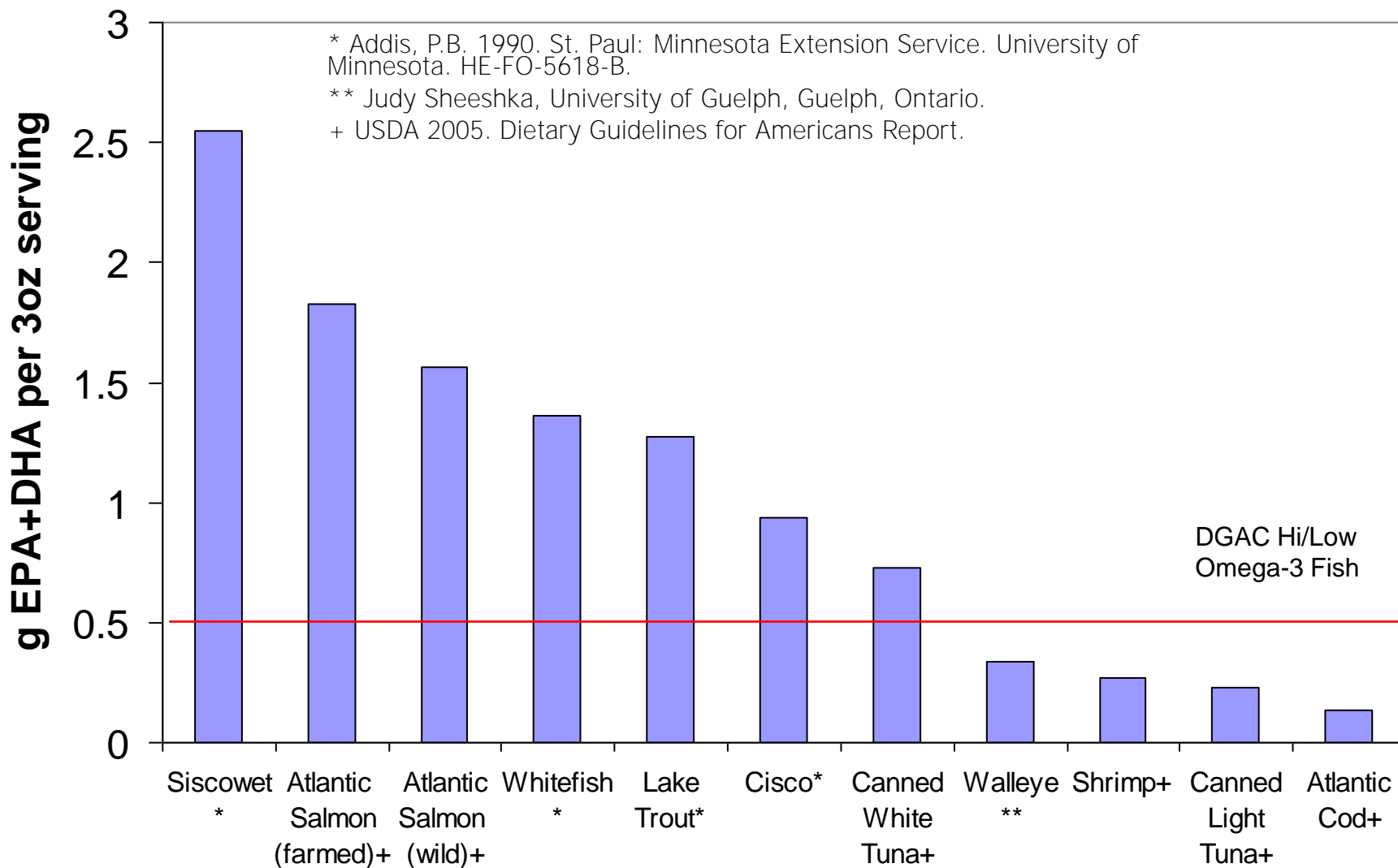
1. “The FDA has tested only four walleye samples since 1978, 14 fewer than the Tribune.”
2. ***“The amount [mercury] the Tribune found in walleye, which was imported from Canada, is above the limit at which the Canadian officials can ban the fish from sale within that country’s borders.” Toxic risk***



on your plate, Chicago Tribune, December 11, 2005 Sam Roe and Michael Hawthorne www.chicagotribune.com/news/spec



Lake Superior fish a good source of nutritional omega-3 fatty acids (EPA+DHA)



Steps you can take to minimize risk

- Know where your fish comes from
- Choose species of fish known to be low in contaminants – Lake Superior whitefish and cisco are great examples
- Choose smaller sizes of fish
- Trim skin and fatty tissue from fillets before cooking
- Cook fish so fat drips away



Thoughts on Methods Used

- Cost-effective approach for obtaining detailed contaminant information (\$20-25K per project, siscowet more)
- Provides contaminant information across a wide range of fish lengths and also accounts for age
- Sample archives provide resource for monitoring other contaminants of interest in the future
- Composite method provides a good estimate of average concentrations for a fish species at a given length but does not give good indication of individual variability between fish



Summary

- In general: Whitefish lowest concentrations, Siscowet highest
- Concentration is significantly related to length for mercury and PCBs and could be useful in providing size-specific contaminant information in fillets for each species
- Lake Superior whitefish and herring provide good levels of healthy omega-3 fatty acids and low levels of contaminants



Acknowledgements

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- LSRI staff
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