Spatial Population Genetic Structure of Lake Sturgeon throughout the Great Lakes

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Outline

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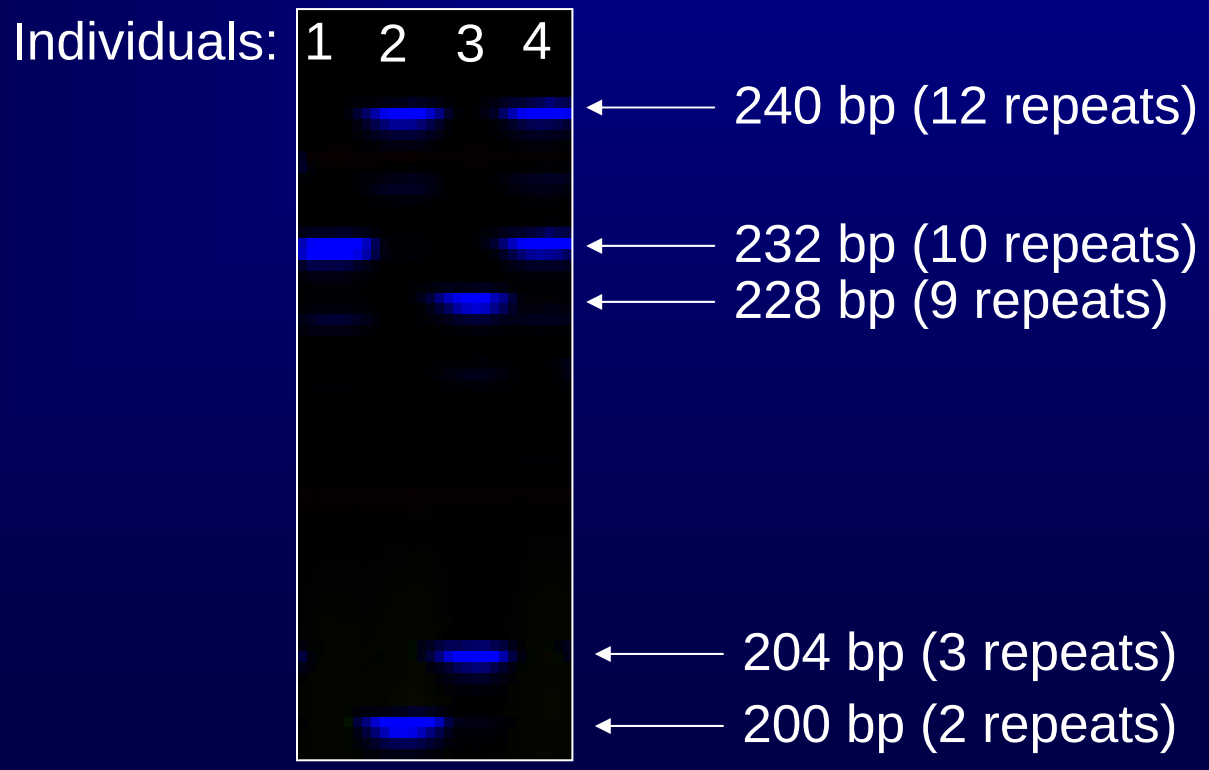
Microsatellites

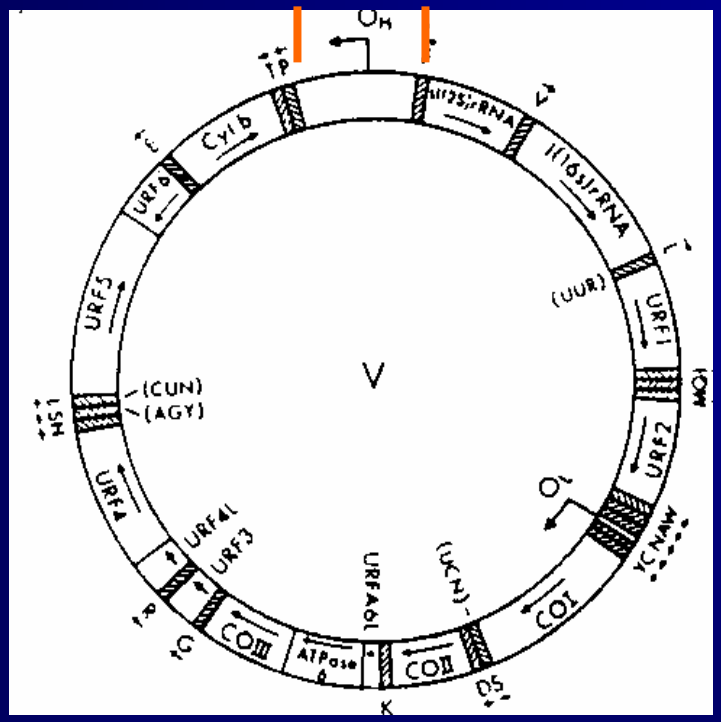
- Short, tandem repeats

G A T A G A T A G A T A G A T A G A T A

- Alleles: length variants



mtDNA



- Maternally inherited
- 450 bp of control region
- 199 individuals across 11 populations
- 22 haplotypes

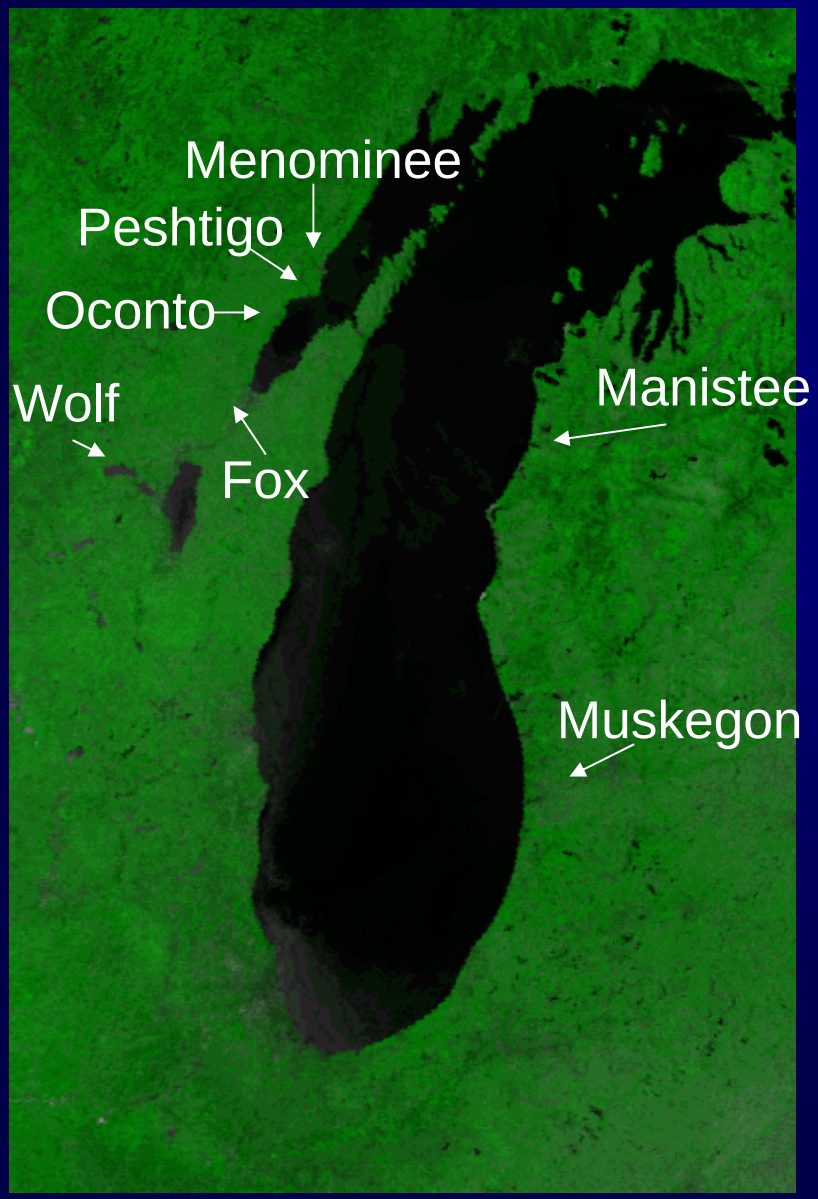
Standardization

LAKE SUPERIOR

River	N	River	N
Bad	**148**	Little Black	0
White	**45**	White (Ontario)	0
Pigeon	2	Michipicoten	1
Kaministiquia	**87**	Batchawana	7
Black Sturgeon	**58**	Chippewa	1
Pic	**33**	**Goulais**	**16**
Black	1	**Sturgeon**	**30**
		Bad	**39**

Map: U.S. Army Corps of Engineers, Detroit District

LAKE MICHIGAN



River	N
Menominee	**47**
Peshtigo	**54**
Oconto	**18**
Wolf	**81**
Fox	**46**
Muskegon	**17**
Manistee	**89**

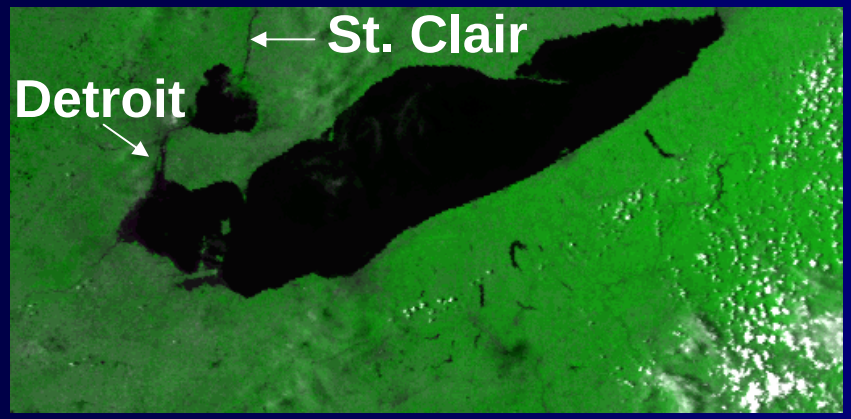
Map: U.S. Army Corps of Engineers, Detroit District

LAKE HURON

River	N
Mississaugi	**96**
Nottawasaga	8
Spanish	5
Thessalon	3
Magnetawan	0
Serpent	0
Rifle	0
Black Lake	**114**

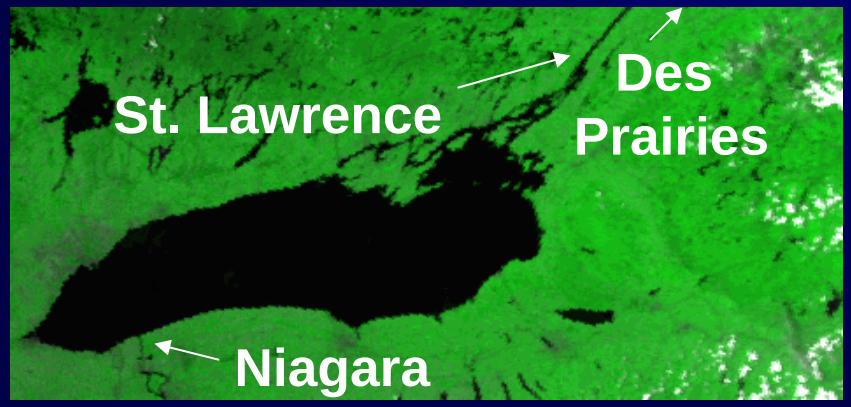
Map: U.S. Army Corps of Engineers, Detroit District

LAKE ERIE



River	N
St. Clair	**56**
Detroit	**36**
St. Clair	**50**

LAKE ONTARIO



River	N
Niagara	**21**
Black	0
Trent	0
St. Lawrence	**54**
Des Prairies	**14**

Map: U.S. Army Corps of Engineers, Detroit District

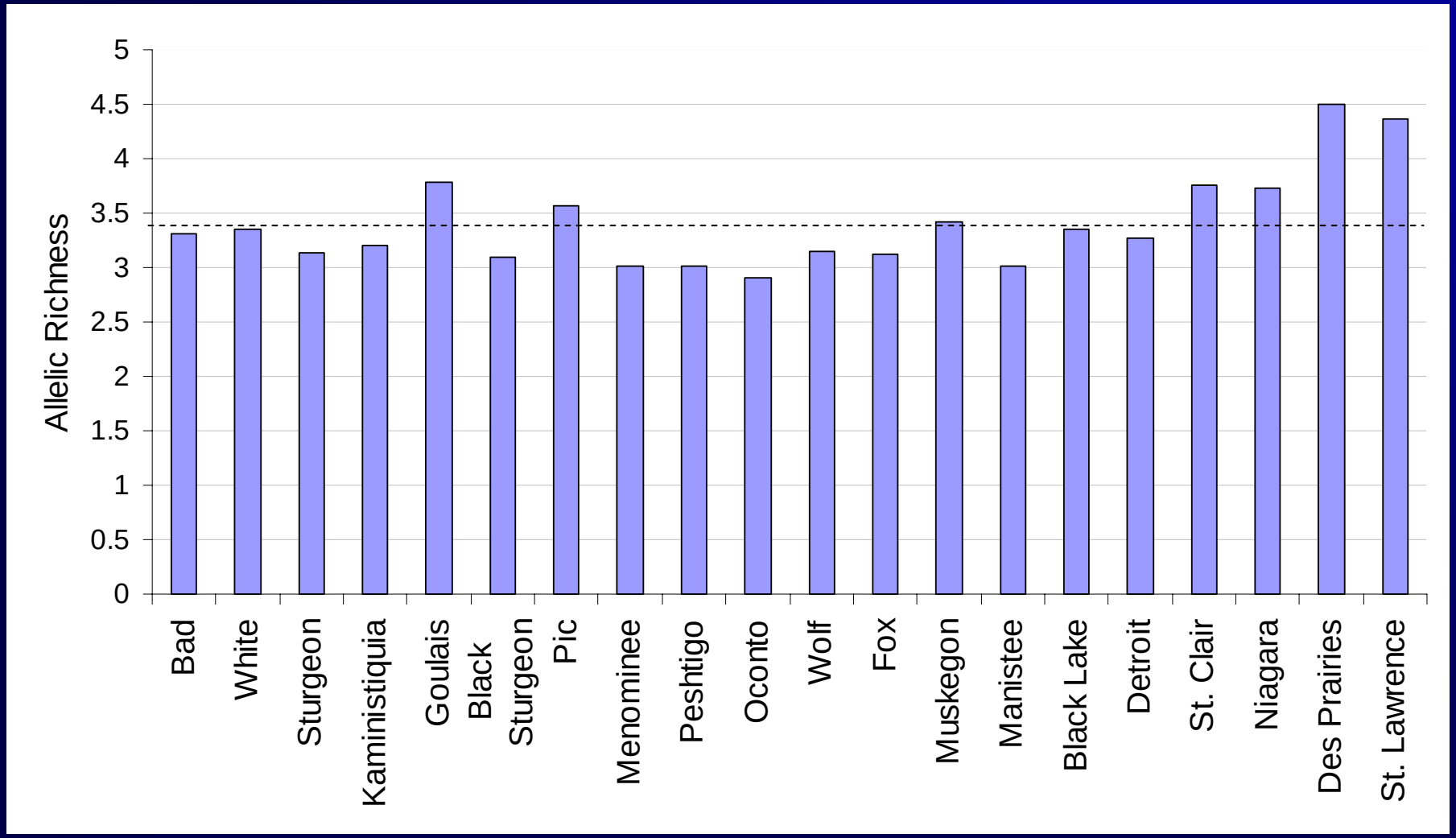
DNA Analysis

- Extracted DNA from fin clips

- Amplified DNA
  - May Lab: 13 microsatellite loci
  - Scribner Lab: 8 microsatellite loci; mtDNA

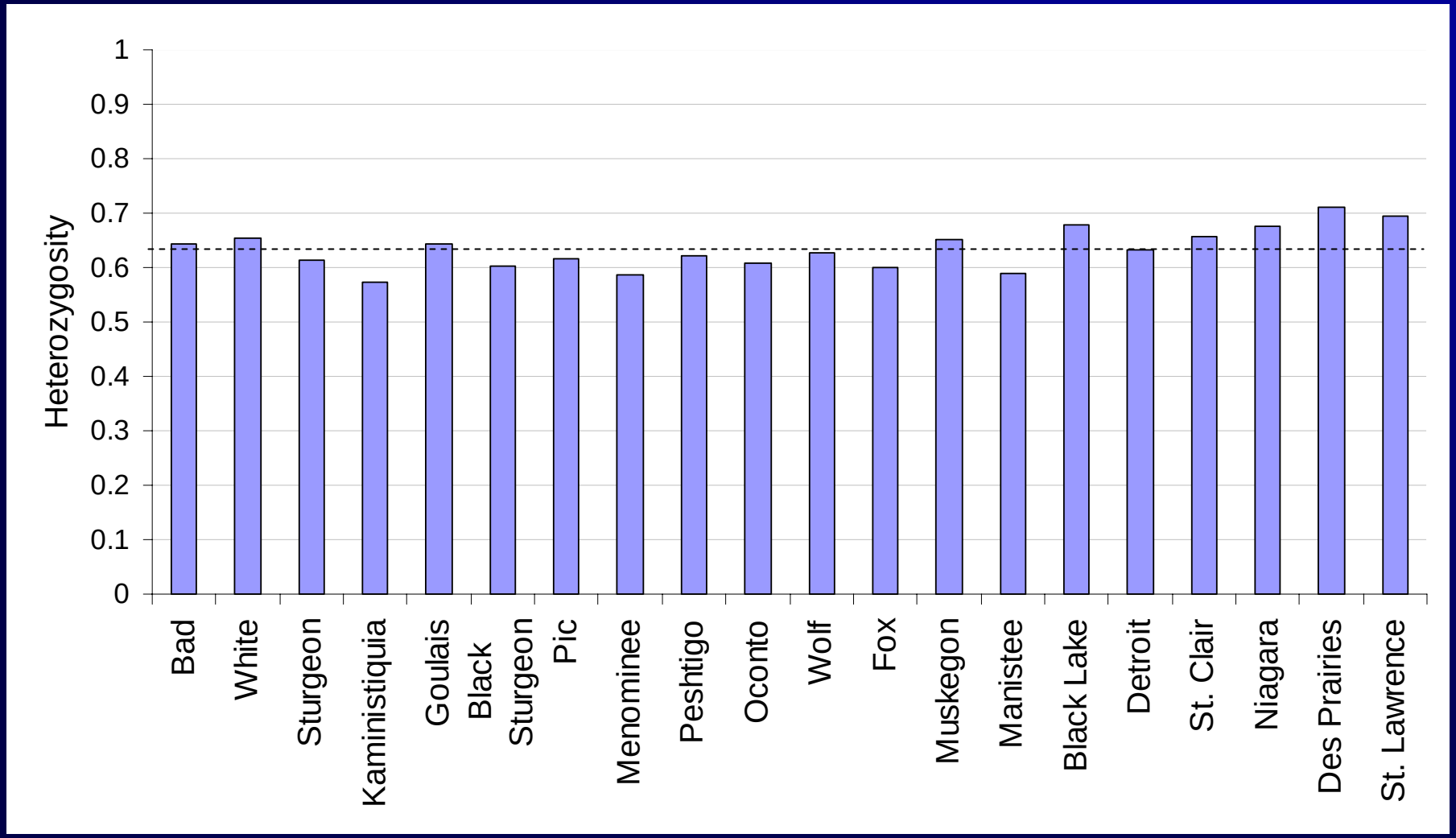
- Data Analysis
  - Within-population diversity
  - Between-population differences

Allelic Richness



Most close to overall average of 3.4 alleles

Heterozygosity



All have high heterozygosity

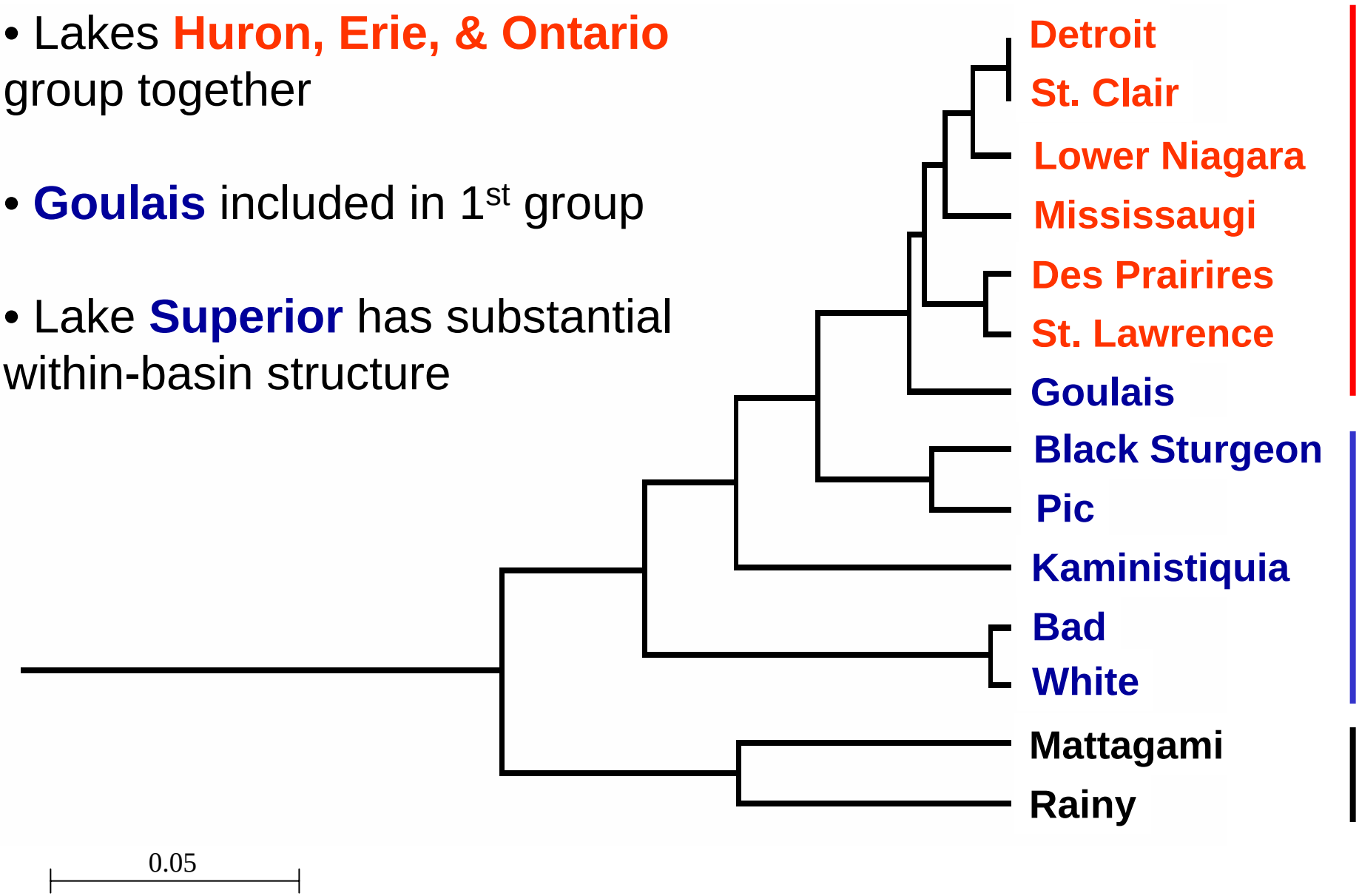
All populations genetically distinct

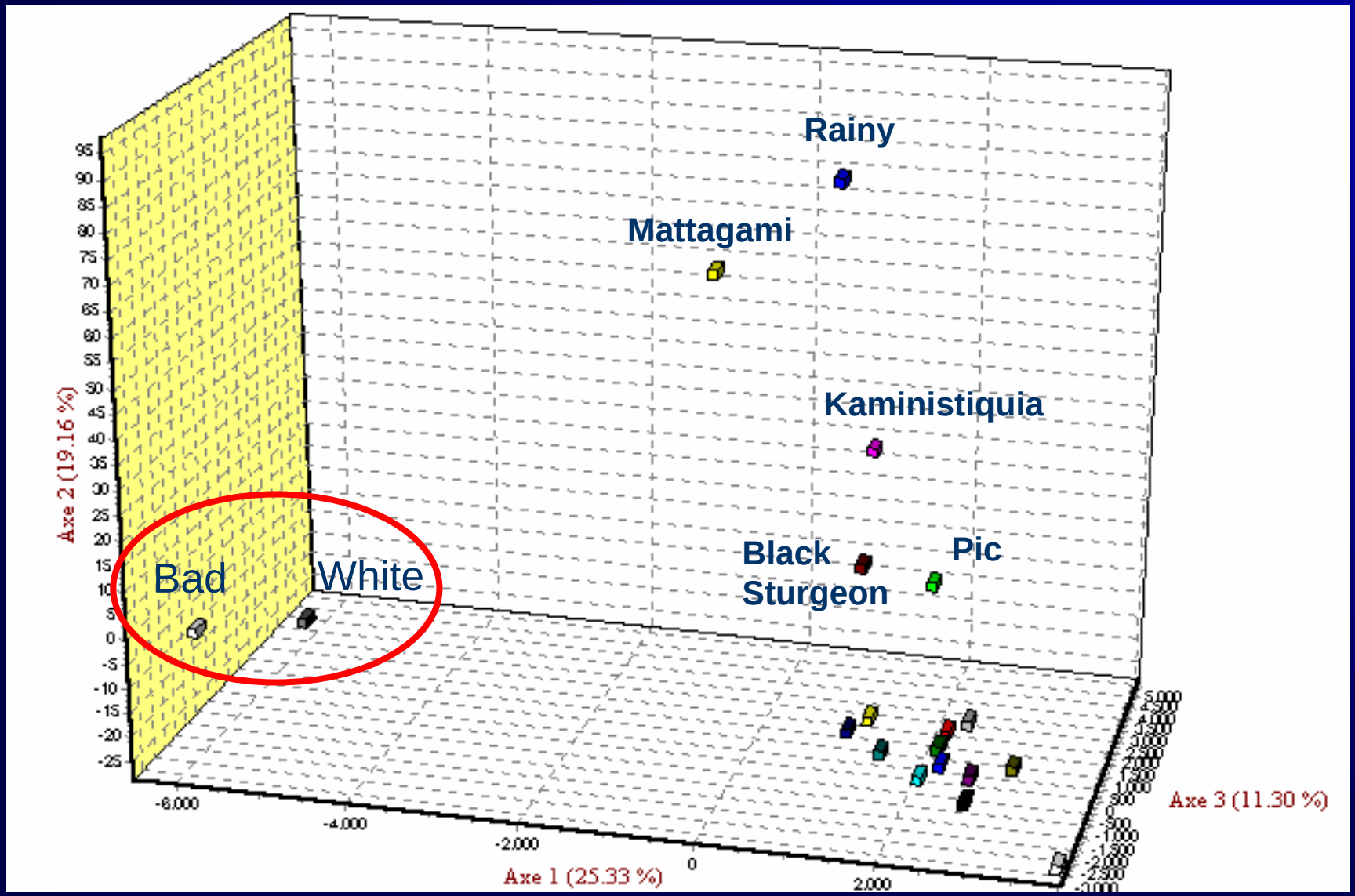
EXCEPT:

- Bad - White
- Detroit - St. Clair - Lower Niagara
- Lower Niagara - Des Prairies
- Des Prairies - St. Lawrence
- Peshtigo - Oconto (microsats only)
- Black Lake - Manistee - St. Clair (microsats only)

Population Relationships – May Lab

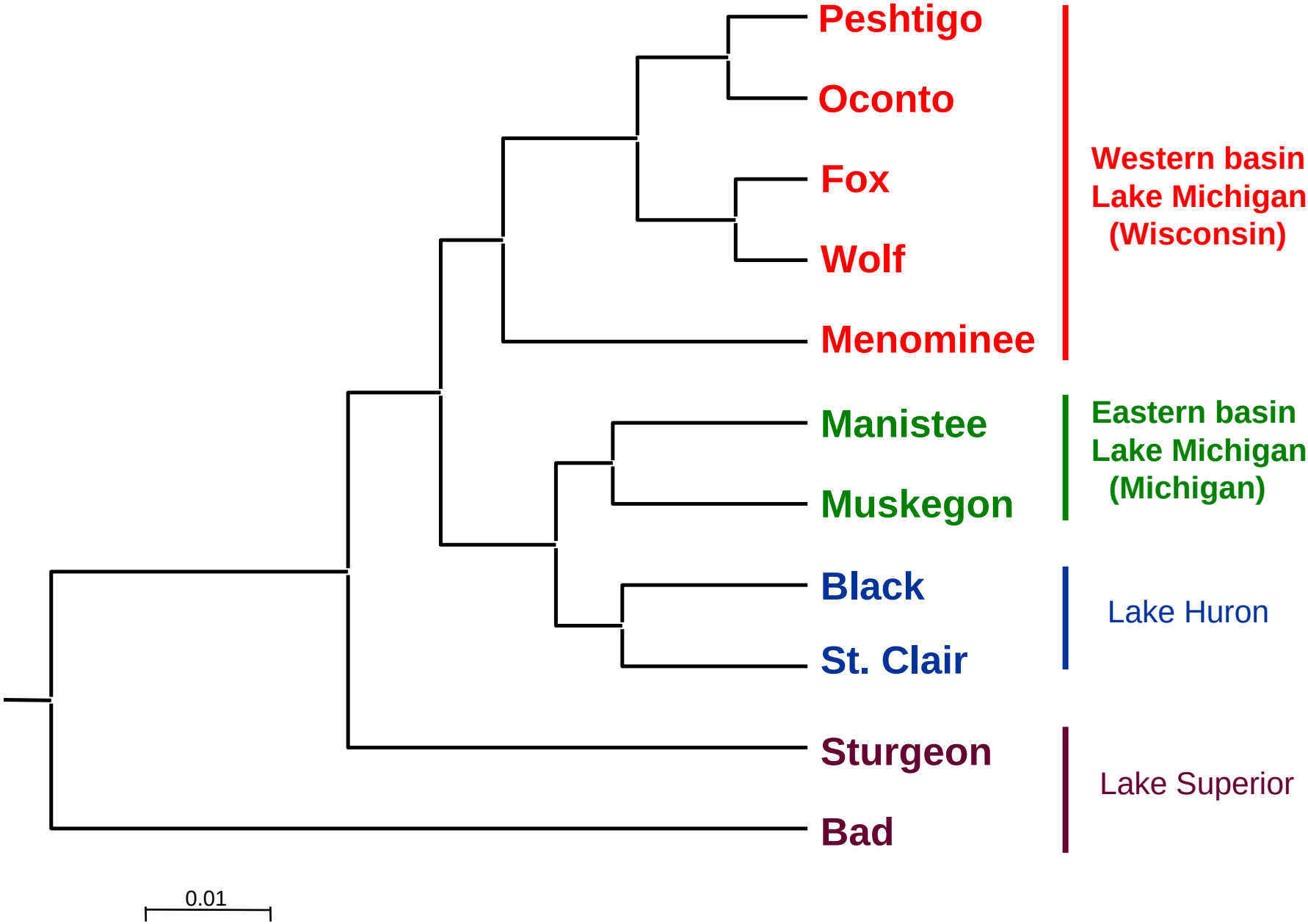
- Lakes **Huron, Erie, & Ontario** group together
- **Goulais** included in 1st group
- Lake **Superior** has substantial within-basin structure



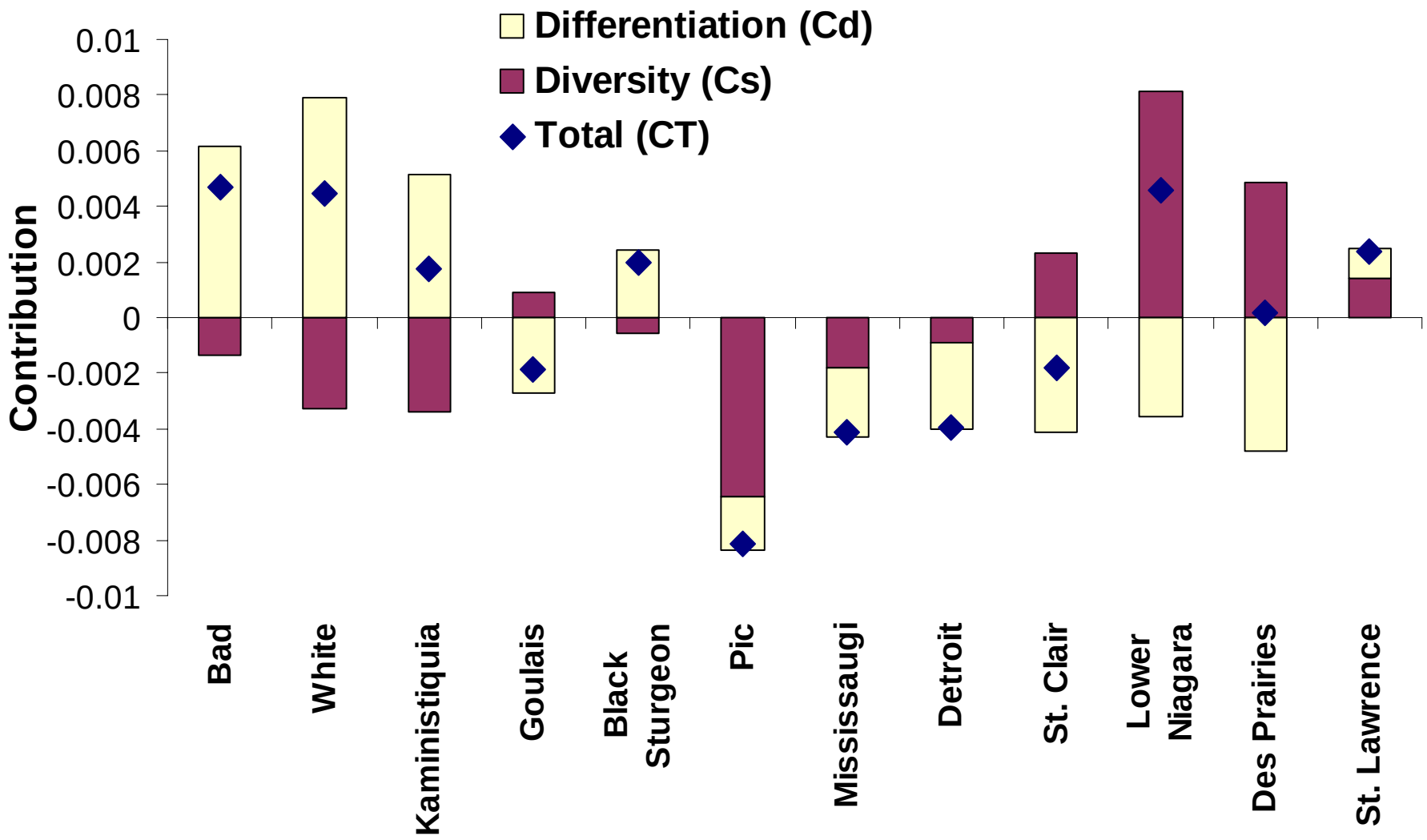


Bad & White very distinct

Population Relationships – Scribner Lab

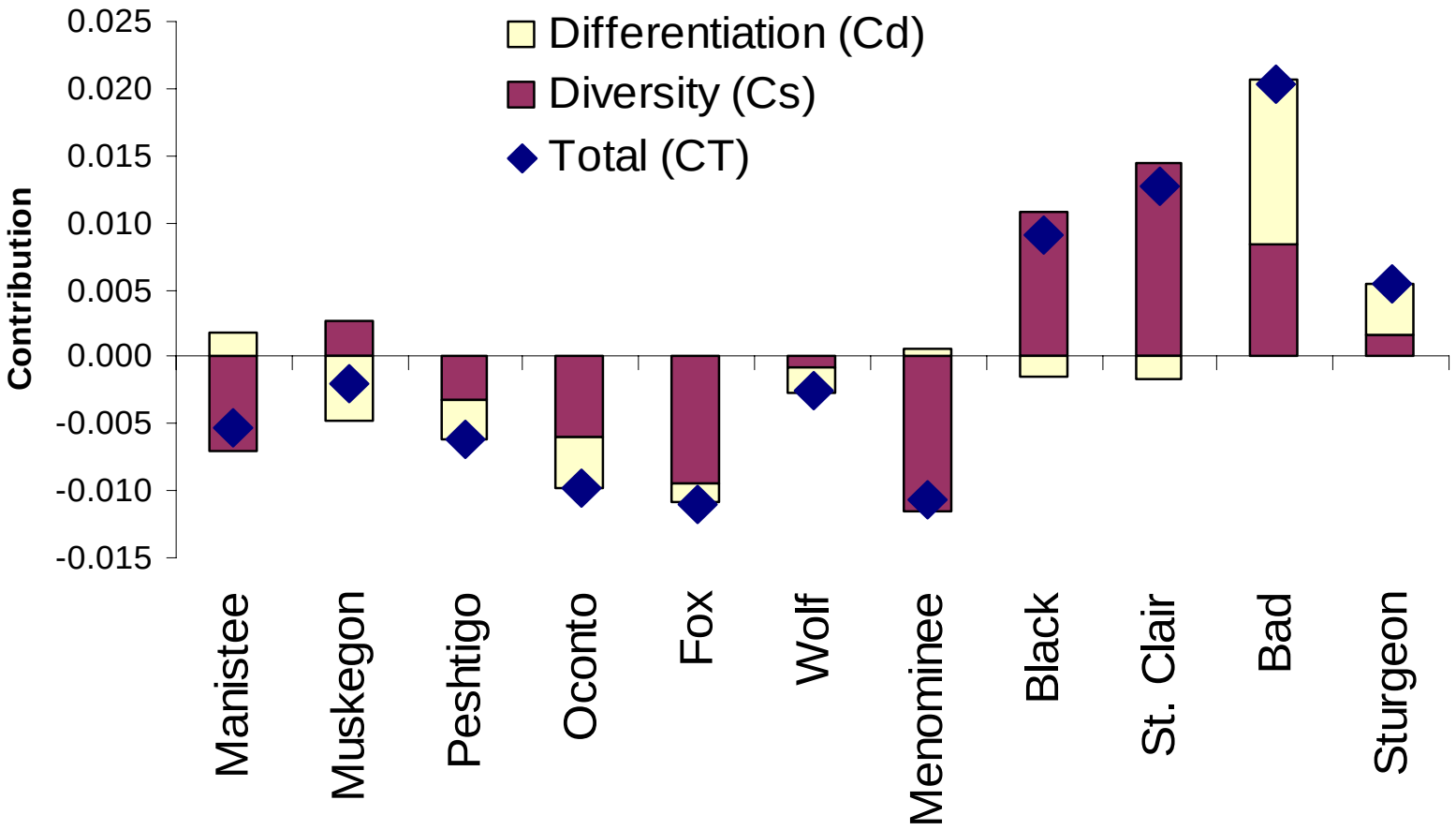


Diversity Contributions – May Lab



Largest populations ≠ Highest diversity contributor

Diversity Contributions – Scribner Lab



Largest populations ≠ Highest diversity contributor

Summary:
What This All Means

- Number of alleles similar in all populations
- Heterozygosity remains high
- Spawning site fidelity
- Unique populations within lake basins
- Most similar populations may be between basins
- Largest populations not contributing most diversity
- Additional sampling needed

Summary: Management Implications

- Maintenance of genetic structure
- Proper selection of donor stocks
- Genetic management guidelines

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