Development of Genetic Stocking Guidelines for Lake Sturgeon

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- Kim Scribner & Pat DeHaan – MSU
- Lake Michigan Lake Sturgeon Task Group

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DEVELOPMENT OF A MANAGEMENT PLAN FOR LAKE STURGEON WITHIN THE GREAT LAKES BASIN BASED ON POPULATION GENETIC STRUCTURE

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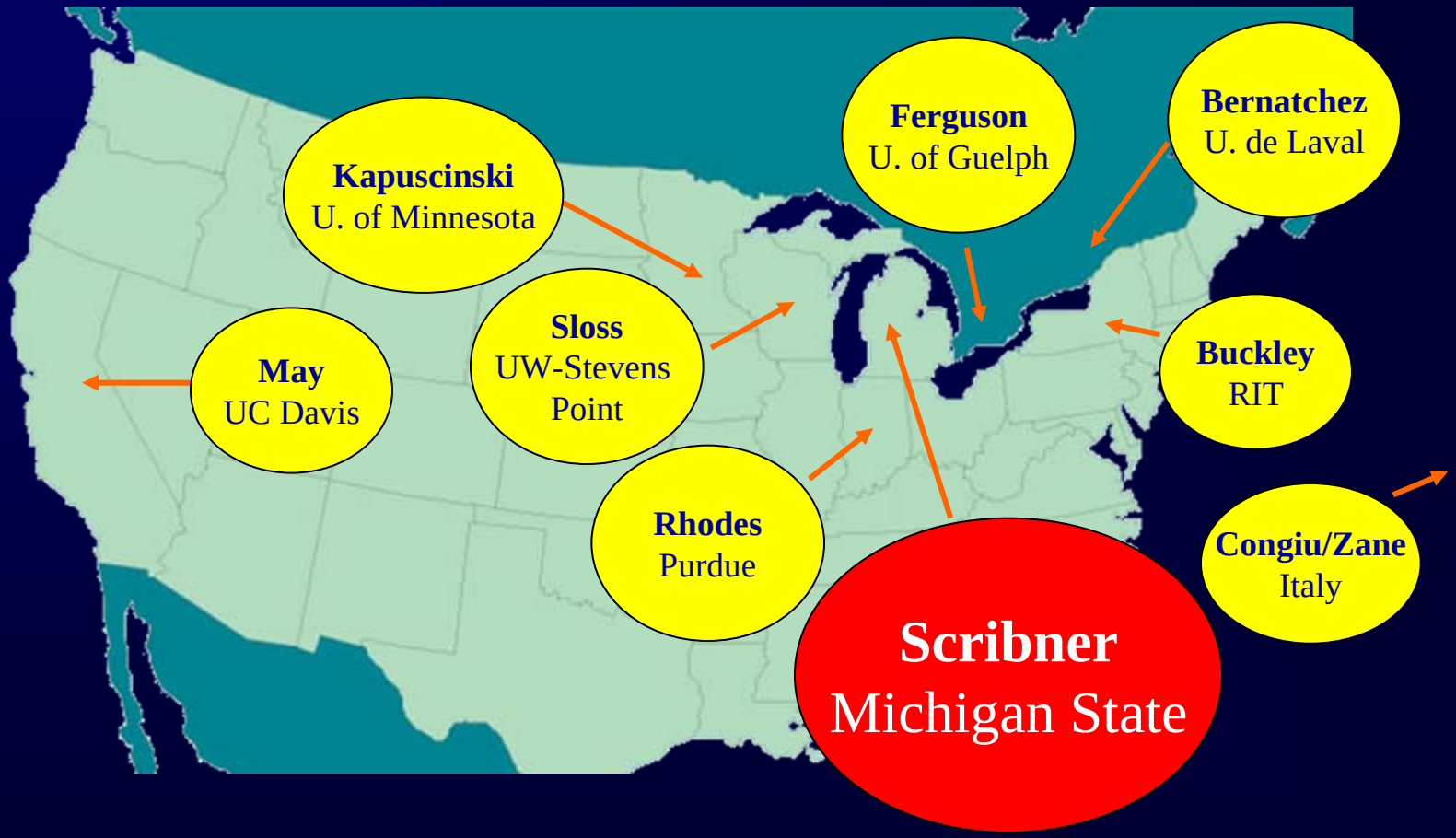
PHASES	TASKS
PHASE I	TASK 1 Develop robust genetic markers Microsatellites (May): Highly polymorphic; population studies Mitochondrial DNA (Scribner): Determine distinct lineages TASK 2 Standardize genetic markers among labs Potential labs: Ferguson, Fuerst, Kapuscinski,King, Bernatchez, and OTHERS TASK 3 Sample breeding populations Sampling will be coordinated by Lowie
PHASE II	TASK 1 Continue sampling of breeding populations TASK 2 Gather population-specific genetic data
PHASE III	TASK 1 Summarize all genetic data TASK 2 Provide Great Lakes basin-wide management plan,with sub-basin specific plans

Poster prepared by Eve McQuown, University of California-Davis

Introduction

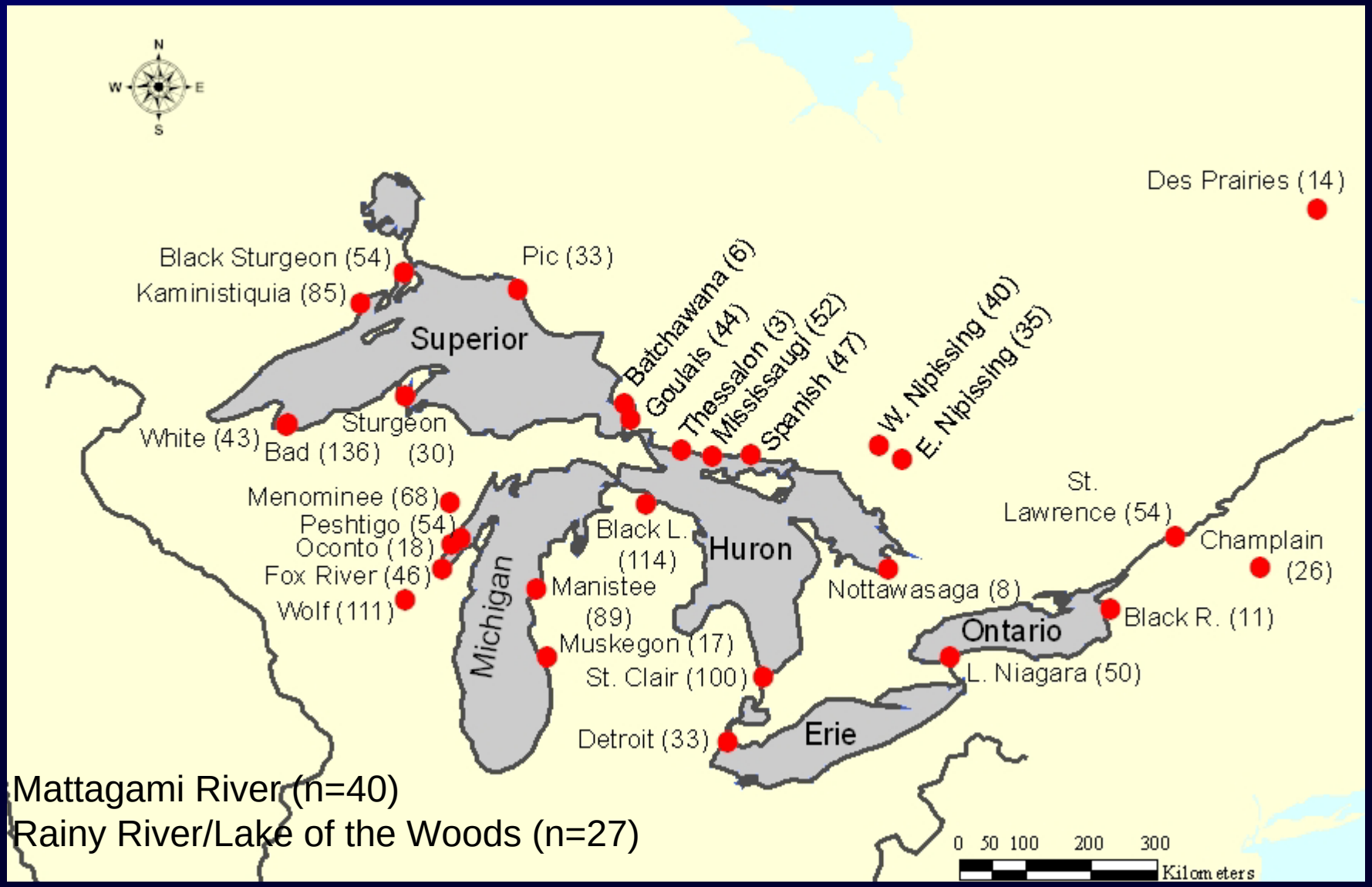
Standardization (Phase I, Tasks 1 & 2)

13 microsatellite loci standardized



DeHaan et al. (2006) Transactions of the American Fisheries Society 135: 1478-1492.

Data Collection
(Phase I, Task 3; Phase II, Tasks 1 & 2)



Mattagami River (n=40)
Rainy River/Lake of the Woods (n=27)

Guideline Development (Phase III, Tasks 1 & 2)

Objectives of Guidelines

- Reduce genetic risks
- Incorporate agency goals
- Develop small-scale management plans
- Facilitate interbasin management

Genetic Risks of Stocking

Outbreeding Depression

- Mating of distinct populations/subspecies
- High genetic diversity in populations
- Straying of stocked individuals

Loss of Genetic Diversity

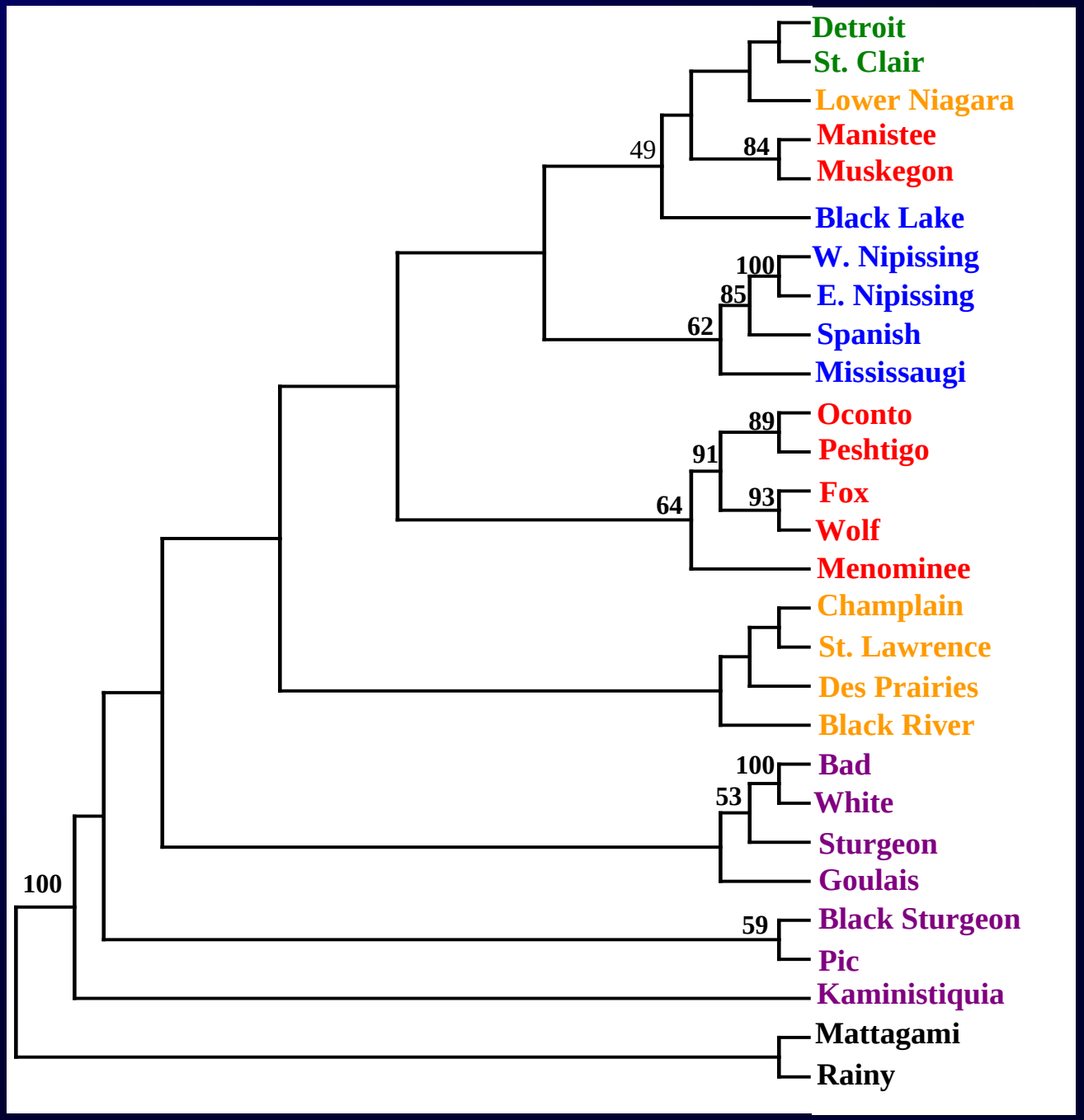
- Limited sampling of broodstock

Artificial Selection

- Captive breeding
- Broodstock sampling

Step 1: Identify Genetic Stocking Units

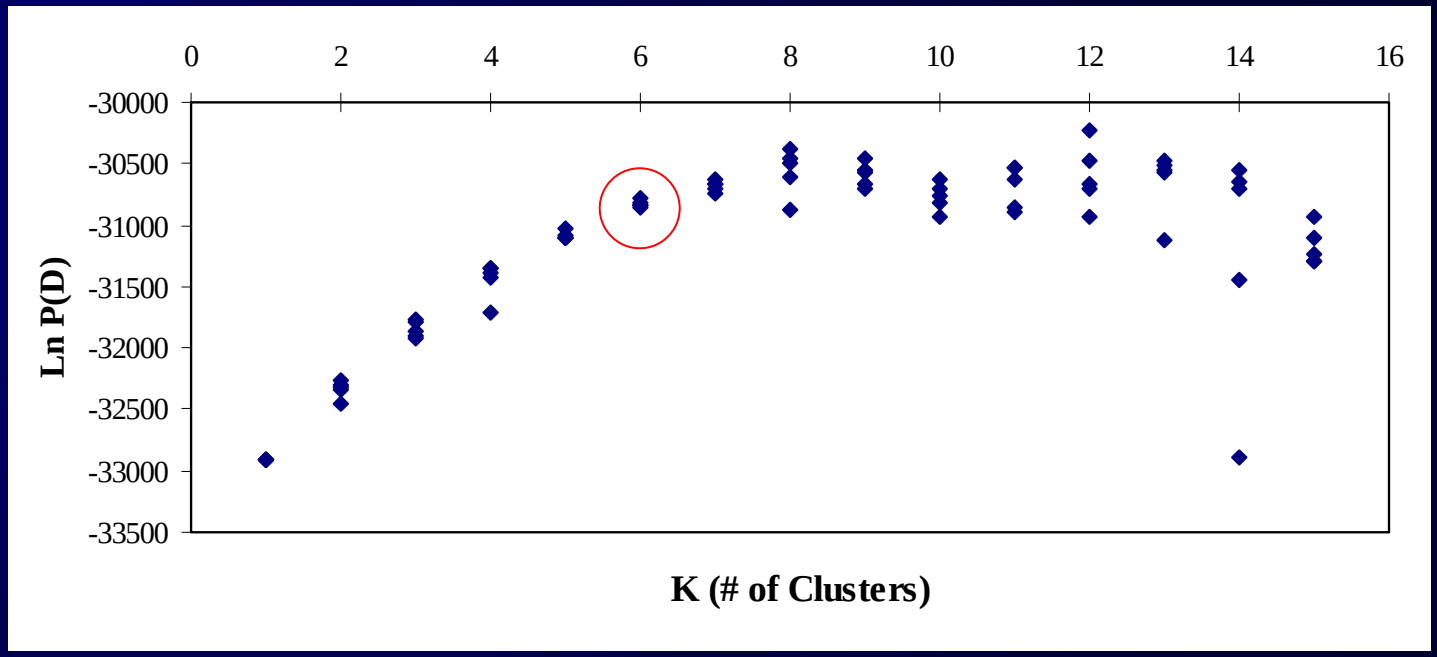
- Pairwise F_{ST}
- Neighbor-joining tree

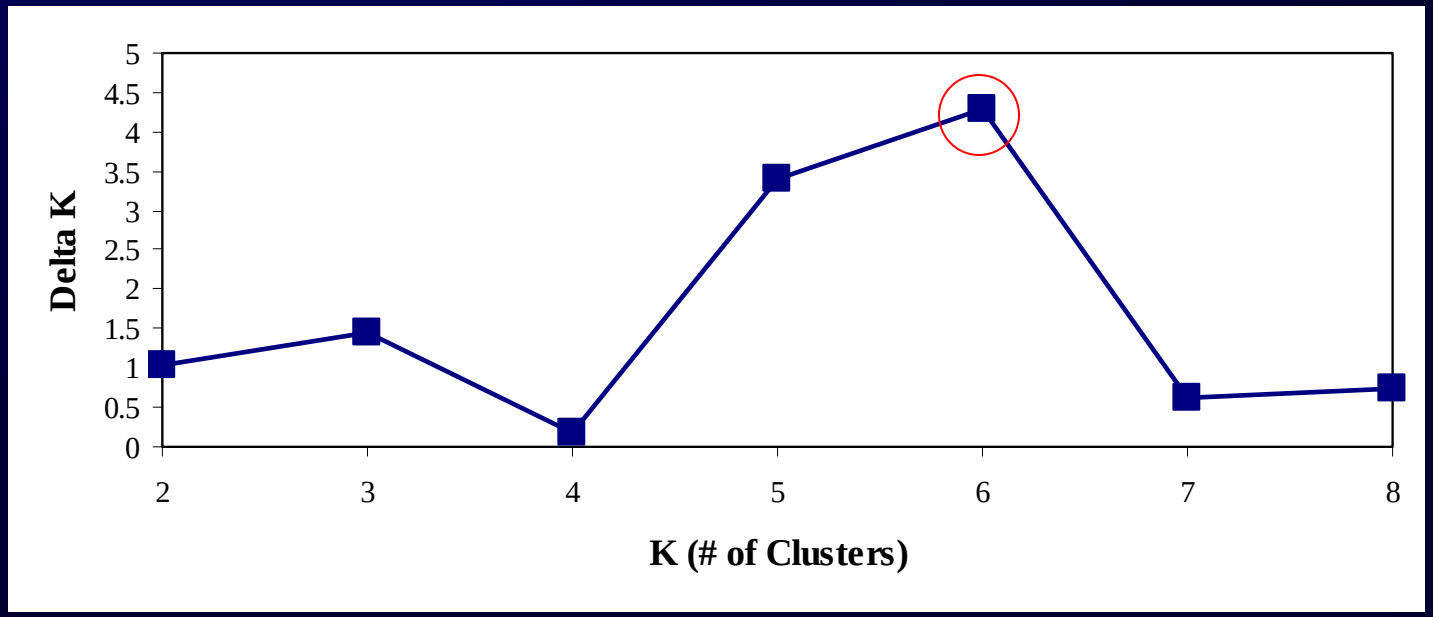


Results

Step 1:
Identify Genetic Stocking Units

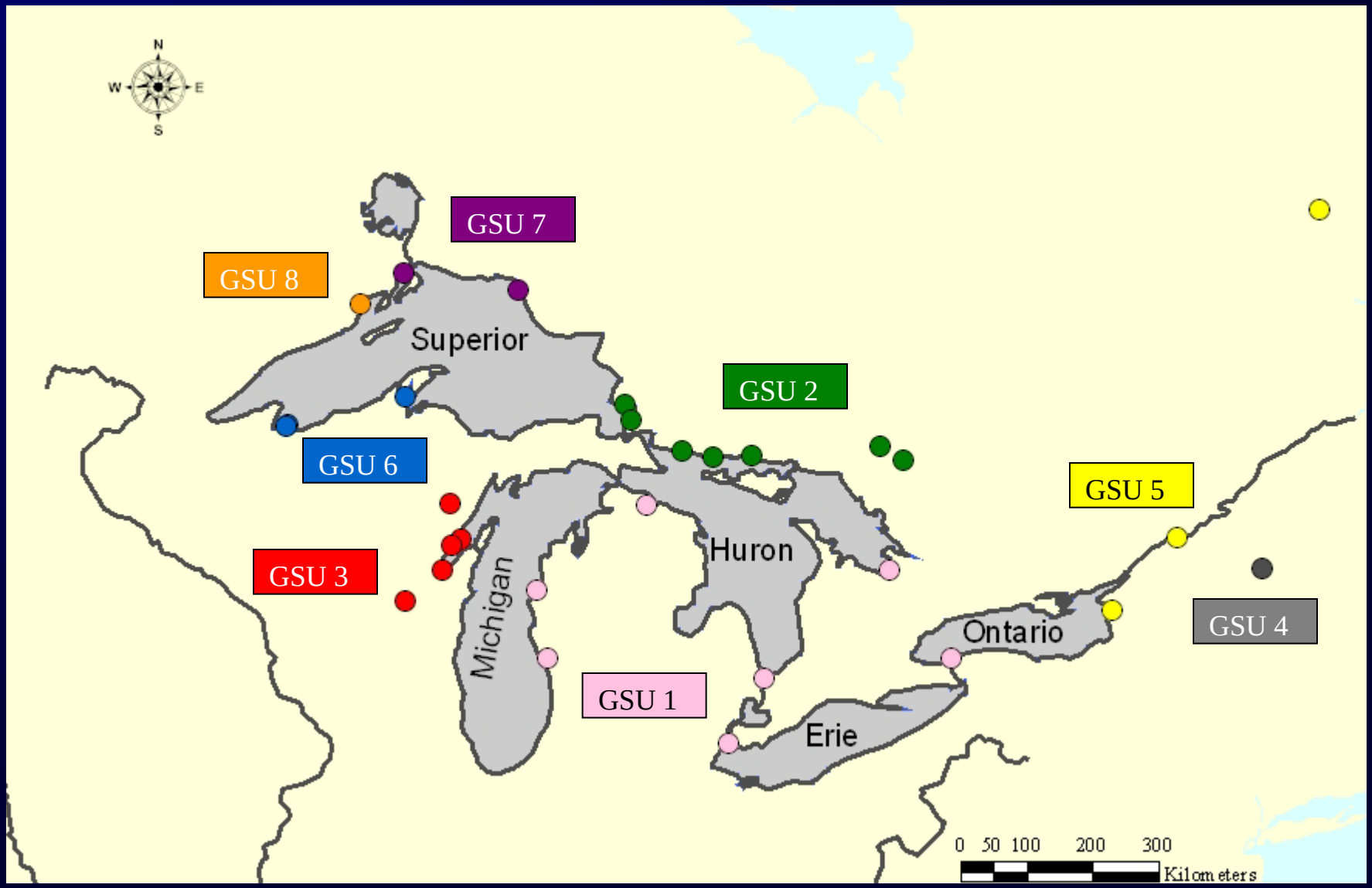
- Bayesian analysis





Results

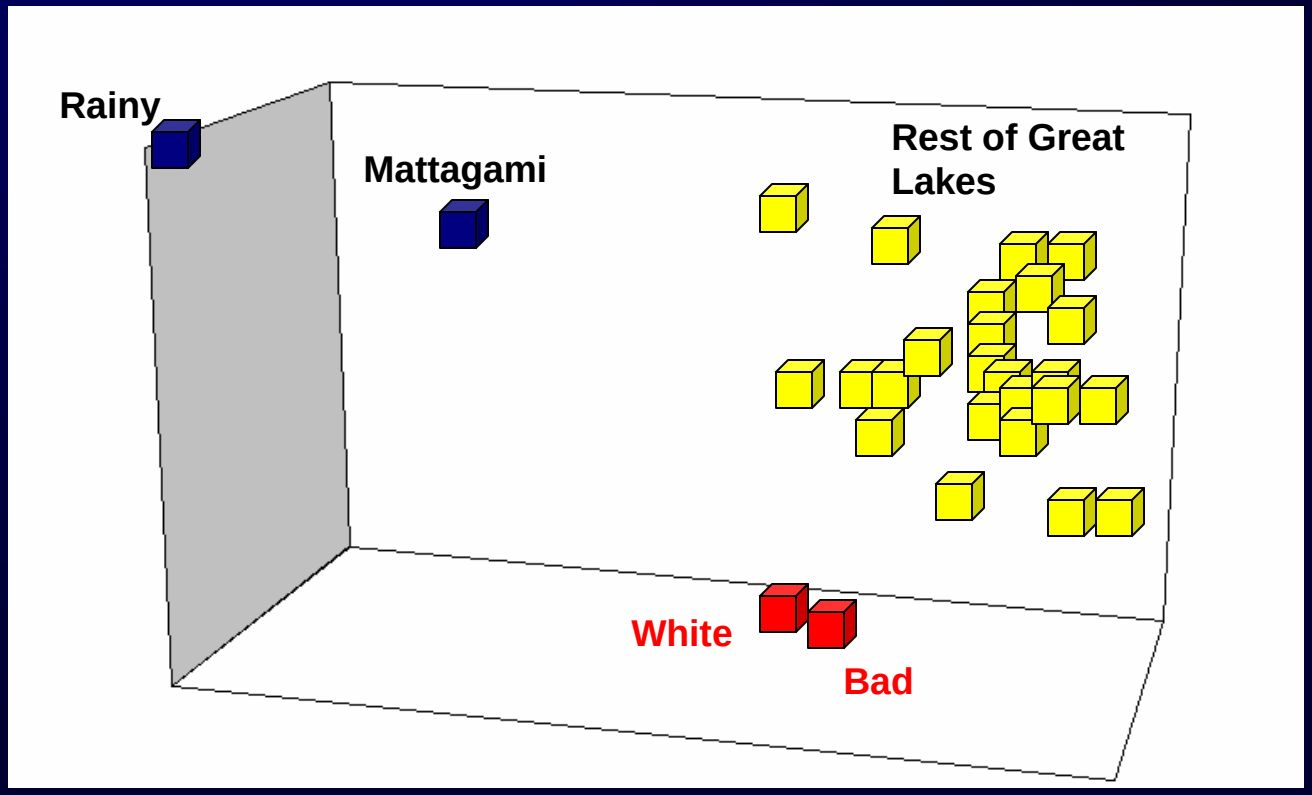
Action Item: Identify nearest GSU



Results

Step 2: Define Priority Genetic Preservation Stocks

Amount of genetic differentiation
Unusual life history
Geographic isolation



Results

Step 3: Decision Tree

Status of the reintroduction site & existing population

↓

Priority Genetic Preservation Stock nearby?
streamside rearing

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Suitable donor population?
- within GSU
- sufficient numbers
- similar habitat
- logistical feasibility

Step 4: Stocking Program Design & Implementation

- Gametes from 100 females & 100-500 males over 25 years
- Equalize family contributions
- Stocking numbers based on local survival rates
- Monitoring
  - insufficient number of donors
  - larval and juvenile survival
  - recruitment at site & neighboring sites

Results

Conclusion

WORK IN PROGRESS

- Continue to receive comments
- Case studies on different management scenarios

Discussion

Support & Input

- Great Lakes Fishery Commission
- Kim Scribner's lab group
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