

# Lake Sturgeon Rehabilitation Efforts in Lake Superior



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# Lake Sturgeon in Lake Superior



- Brief history of decline
- Rehabilitation approaches / strategies
- Current status and research

# Tribal/First Nation Subsistence

- Native Americans have strong cultural connection to lake sturgeon
- Ojibwa/Chippewa relied heavily on lake sturgeon for subsistence
- Harvest was sustainable

# Causes of the Decline

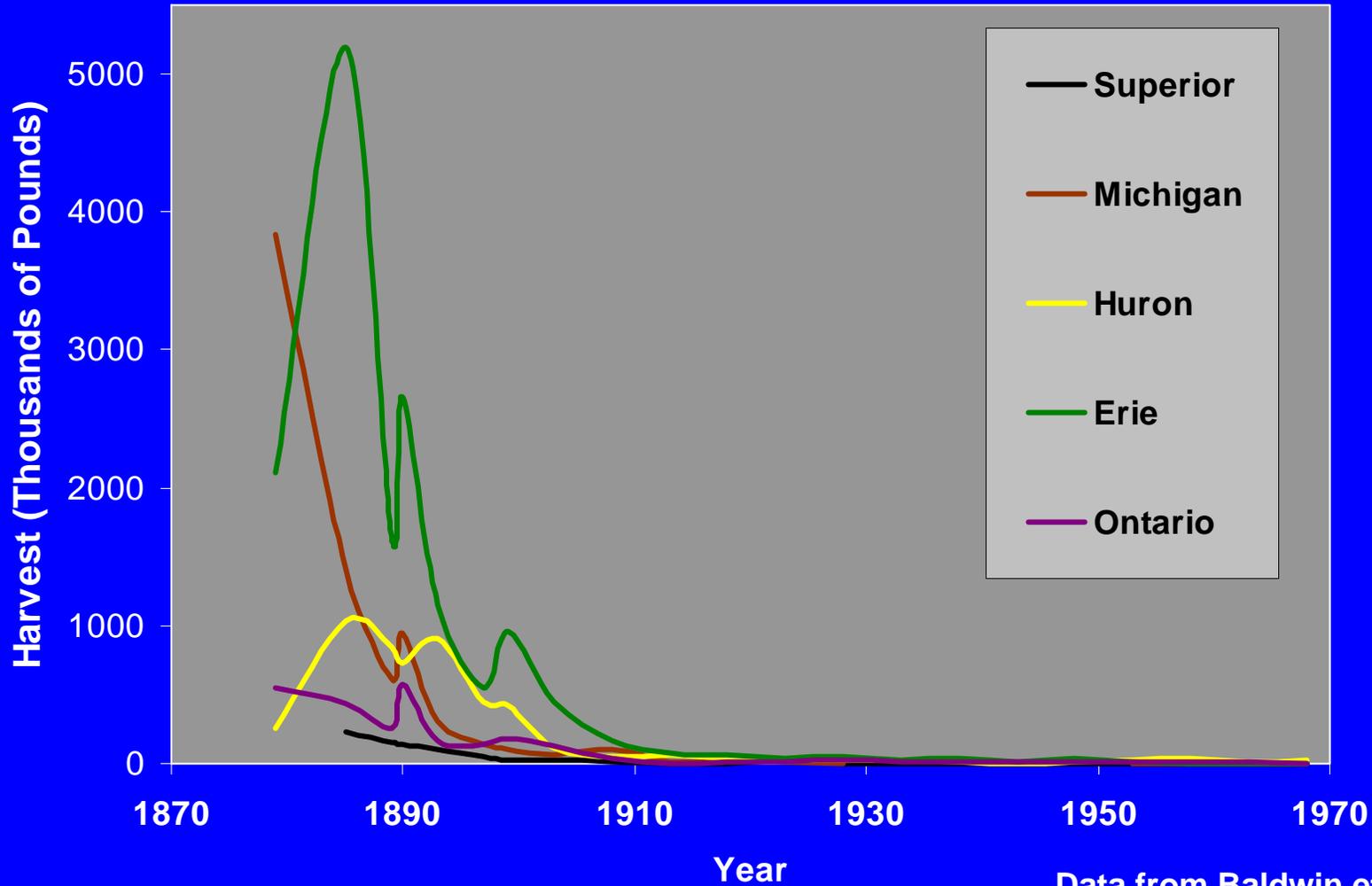
- Decline with European immigration
- Nuisance to commercial fishery
  - Sturgeon killed and discarded
- Habitat destruction
  - Log drives
  - Harbor development
  - Poor water quality – sawmill, municipal, industrial discharge

# Causes of the Decline

- Targeted fishery developed 1870 - 1900



# Historic Lake Sturgeon Harvest



Data from Baldwin et al. 1979

# Causes of the Decline

- Hydropower development
  - Prevent fish passage
  - Alter flow and thermal regime
  - Changes sediment transport and productivity



# Endangered Species Act - 1973

- Petition in 1982 resulted in federal designation as a “candidate” species for listing
  - “Candidate” - Insufficient information to make listing decision
  - Federal status as species of special concern until 1995
  - “Candidate” category redefined to include only species for which sufficient information is available

# Rehabilitation Approach

- Individual agency rehabilitation - 1980s
- Lake-wide effort – 1990
- Sturgeon Committee formed
  - Membership: 6 Tribes/Tribal Organizations, 3 States, Province of Ontario, U.S. federal agency, and Universities

# Rehabilitation Approach

- Review history & current population status
- Set goal for population rehabilitation
- Evaluate regulations
- Address impediments
- Evaluate progress



# Rehabilitation Goal

Self-sustaining populations in at least 17  
Lake Superior rivers that historically  
supported lake sturgeon



# Self-Sustaining Population

- Minimum of 1,500 adults
- 20 or more year classes of adults
- Roughly equal sex ratio
- Annual recruitment
- Exploitation rate <5%
- **\*No Population Meets Above Criteria\***

# Strategy – Evaluate Regulations

- Commercial fishing for lake sturgeon prohibited
  - Tribal home use of dead sturgeon allowed
- States / Province restrict or prohibit sport fishing
  - Size limit increases and season closures
- Most Tribes restrict sport / subsistence harvest
  - Protected from harvest (2 Tribes)
  - 1-2 fish per year limit (3 Tribes)
  - No regulations (3 Tribes)
    - Harvest estimated at 10 – 15 fish per year



# Strategy – Evaluate Regulations

## Tribal Commercial

- Commercial gill net fishery
  - Targets lake trout, whitefish, lake herring
  - Live sturgeon released
  - Fishers support sturgeon rehabilitation
- Assist assessment efforts
  - Tag returns, collect biological data
- First Nation harvest unknown
  - Strong conservation ethics



# Rehabilitation Approach

- Hydropower re-licensing in U.S.
  - 3 Peaking facilities changed to seasonal run-of-river flow
    - $\text{inflows} = \text{outflows}$



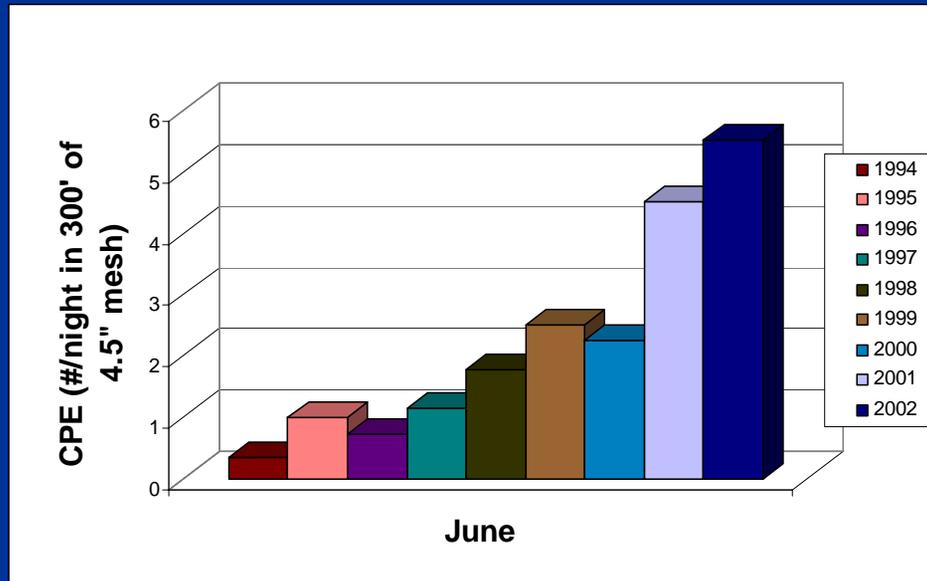
# Result

- Michigan hydropower facility - ROR
  - Number and Size of spawning adults increase
  - Spawning duration reduced
  - Potential for egg and larvae loss decreased
- Increased potential for recruitment



# Result

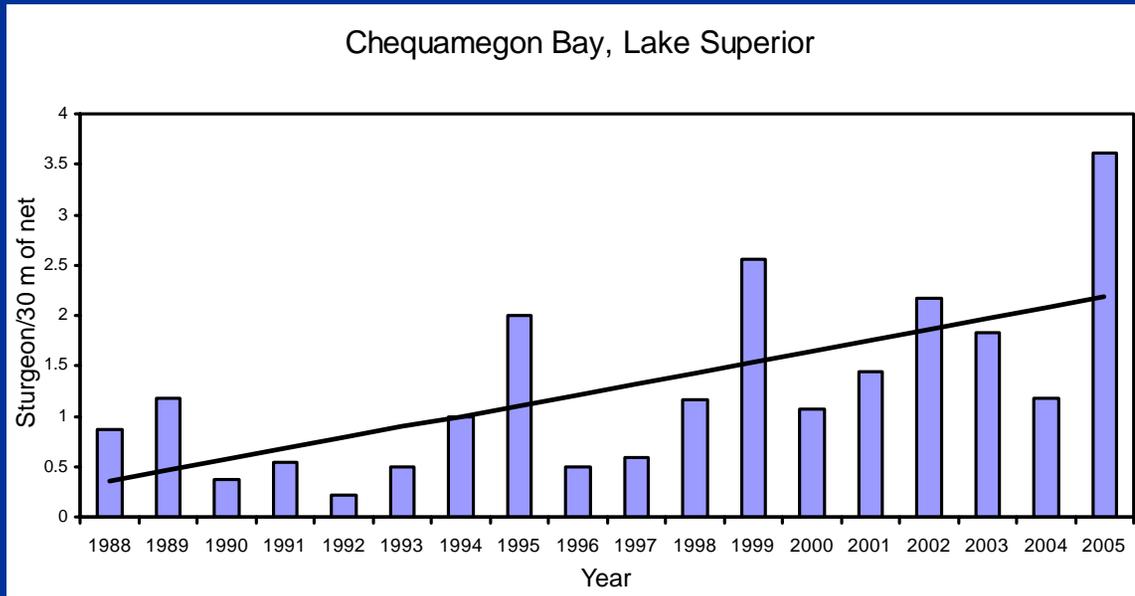
- Wisconsin hydropower facility - ROR
- Increasing trend in CPE of juveniles



Great Lakes Indian Fish and Wildlife Commission data  
from Lake Superior near the mouth of the Bad River

# Result

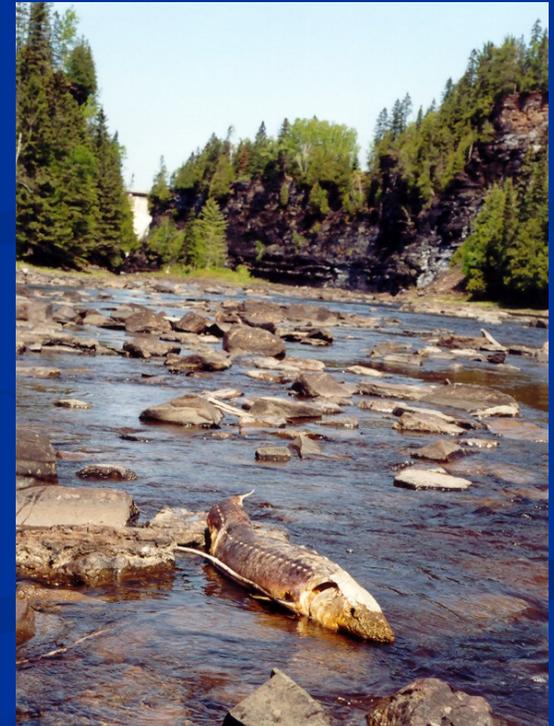
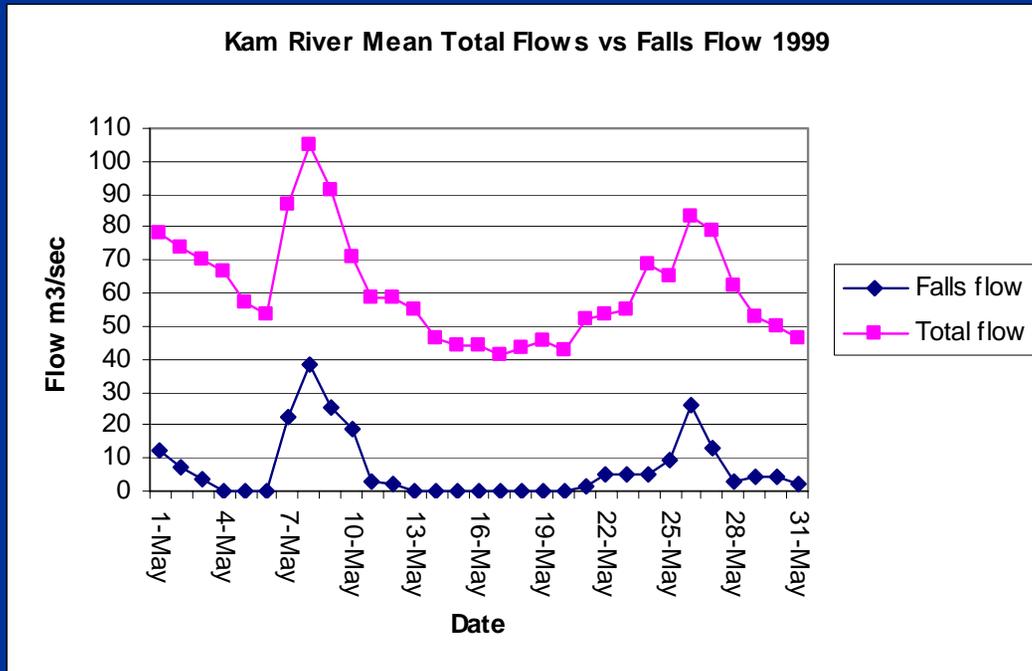
- Wisconsin hydropower facility – ROR??
- Increasing trend in CPE of adults



Wisconsin DNR 8" and 10" mesh gill net set in June

# Address Impediments

- Kaministiquia River, Ontario
  - Diversion hydropower plant



# Address Impediments



- Kaministiquia River Study

- Goal: Determine discharge required to allow access to spawning habitat and reproductive success
- Two year trials of constant discharge for 5 weeks in May-June
  - 23 cms, 20 cms, 17 cms, ...

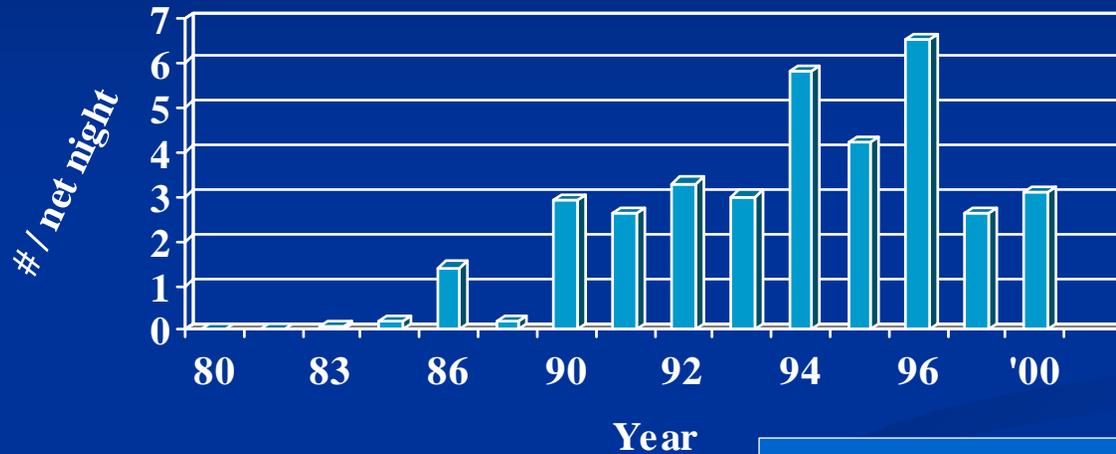
# Address Impediments

- Treatment facility improved water quality in St. Louis R., MN/WI
- Physical habitat adequate
- Lack of sturgeon in river



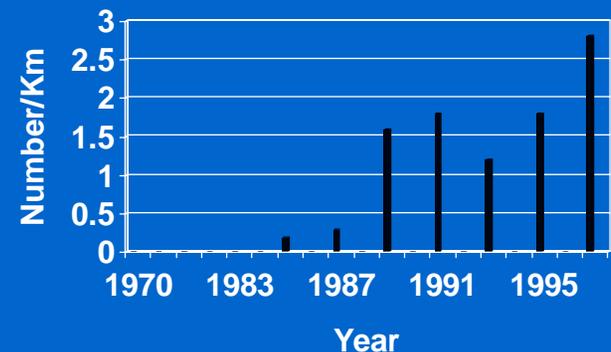
# Stocking Results

## MNDNR St. Louis R. assessment



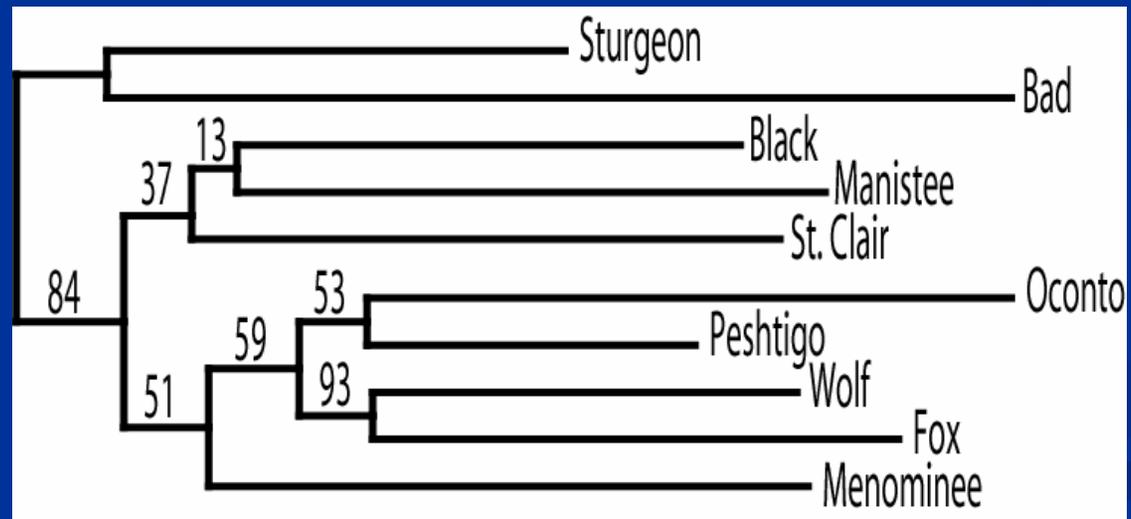
- Abundance increase in St. Louis R. and L. Superior
  - 0 to 5-6/gill net night in river
  - 0 to 2.8/km gill net in lake
- Females will soon mature

### Lake Sturgeon CPUE in western Lake Superior - WI DNR data

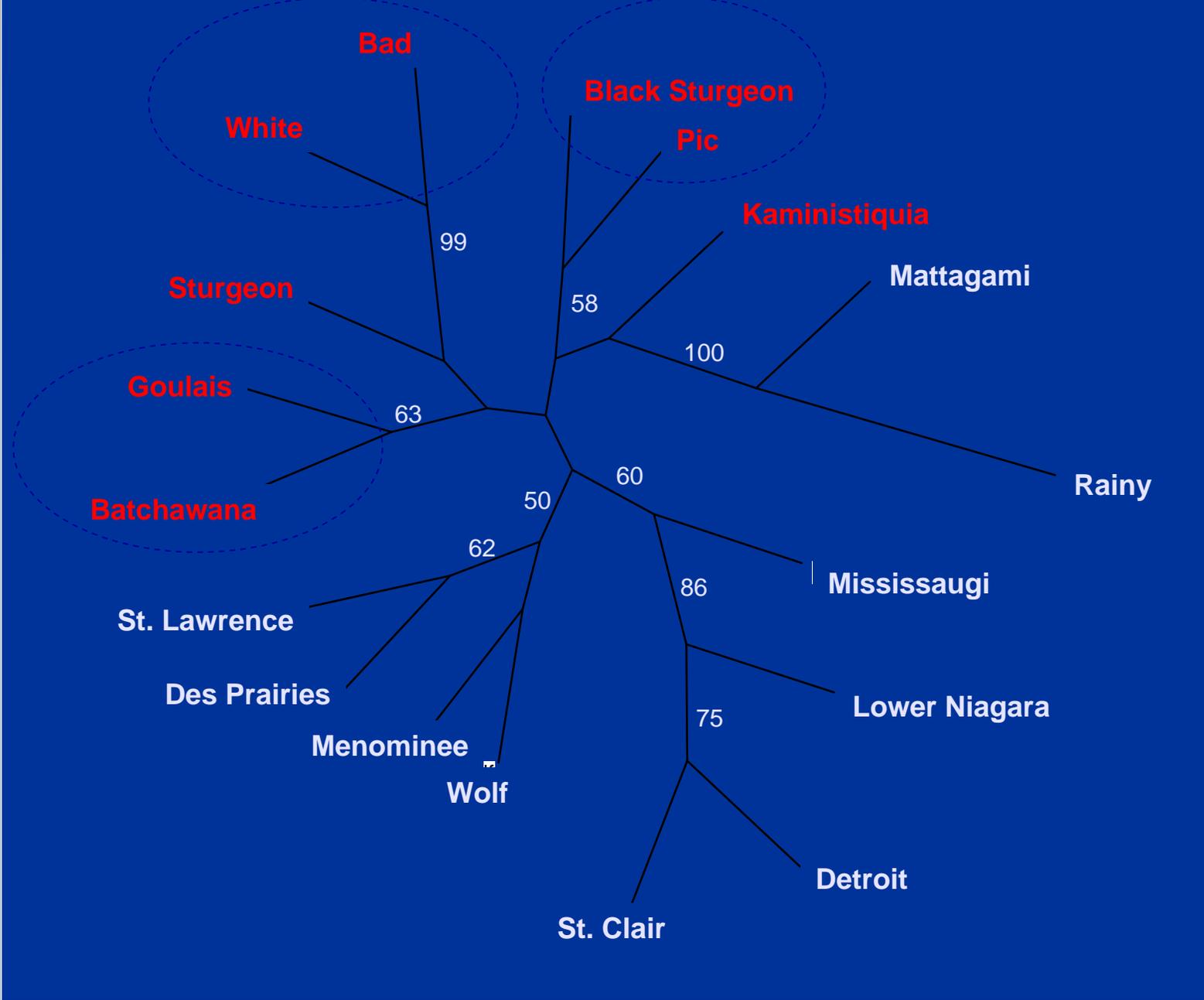


# Research - Genetic Analysis

- Pat DeHaan 2003 MS Thesis
  - Demographic and life history characteristics of remnant lake sturgeon populations in the upper Great Lakes basin: Inferences based on genetic analyses.



Neighbor joining tree based on Cavali-Sforza and Edwards chord distance showing the genetic structuring of remnant lake sturgeon populations in the Upper Great Lakes. Values indicate bootstrap support over 2000 replicates.



Lake Superior does not group with other Great Lakes populations

# Summary of Progress

- Broad support for rehabilitation efforts
- Better understand current population status and trends
  - Increasing trend in CPE – adults and juveniles
  - Occurring naturally – in absence of stocking
- Regulatory protection - conservative
- Stocking successfully increased sturgeon numbers

# Summary of Progress

- Despite some success, hydropower problems / threats persist – Ontario
- Genetic data is available to assist management decisions
- Harvest / exploitation rates are unknown for most populations
- On-going research on habitat requirements and movement and dispersal patterns

No Lake Superior population meets self-sustaining criteria