Habitat Use and Movement Patterns of Age-0 Juvenile Lake Sturgeon in the Lower Peshtigo River, Wisconsin

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Background

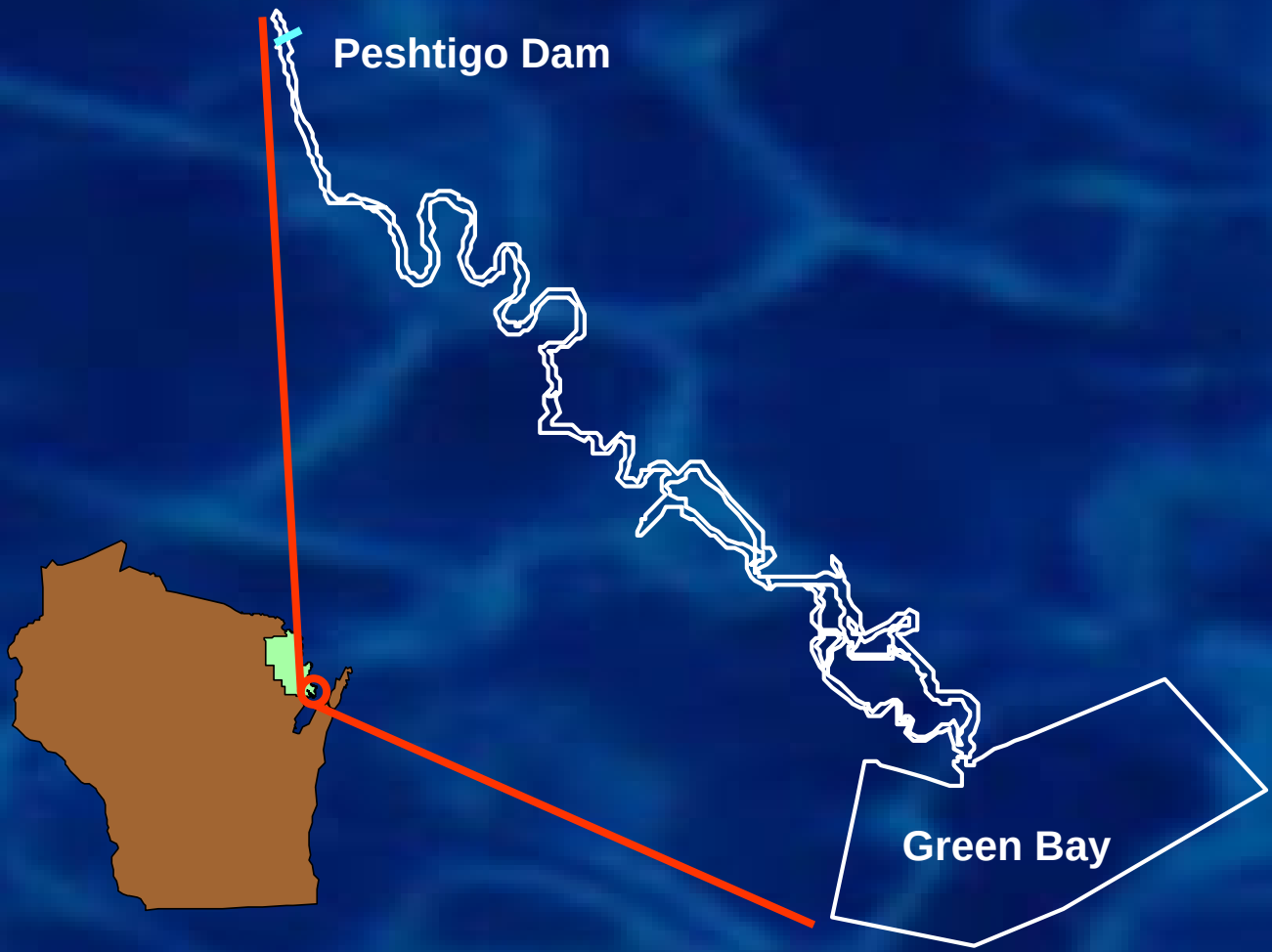
- Habitat Use
  - Physical attributes
  - Prey resource availability
- Movement Patterns
  - Variability in relation to habitat
- Nursery Habitats
  - Environmental features

Study Objectives

- Determine seasonal and spatial movement patterns of age-0 juvenile lake sturgeon during their river-residence period

- Assess the relationship between habitat preferences of age-0 juvenile lake sturgeon and their subsequent spatial distribution

Study Area



Fish Sampling

- June – October 2002 & 2003
  - Visual surveys
  - Snorkeling surveys
  - Haul seines
  - Backpack electrofishing
  - Set lines
  - Fyke nets
  - Bottom trawls
  - Gill nets

Habitat Sampling

- Sampling Period
  - Lower Peshtigo River (28 May – 29 July 2002)
  - Green Bay (30 July – 13 August 2002)

- Substrate and Macroinvertebrate Samples
  - Lower Peshtigo River
    - Three samples (L, M, R) – 0.1-km intervals
    - 667 samples
  - Green Bay (1.5 km x 1.5 km)
    - Three samples/cell (L, M, R) – 300 m x 150 m cells
    - 300 samples

Substrate Sample Analyses

- Dominant Substrate Type
- Macroinvertebrate Assemblage
- Macroinvertebrate Density and Diversity
- GIS Map Layers
- Factor/Selectivyt Analyses

Radio Telemetry

- External Transmitters
  - 1.6 g in weight (74 g)
  - 14-d life span
- Sampling Year 2002
  - N = 4 fish
  - 15 Sept – 10 Oct
- Sampling Year 2003
  - N = 22 fish
  - 17 Sept – 17 Nov

Fish Collections

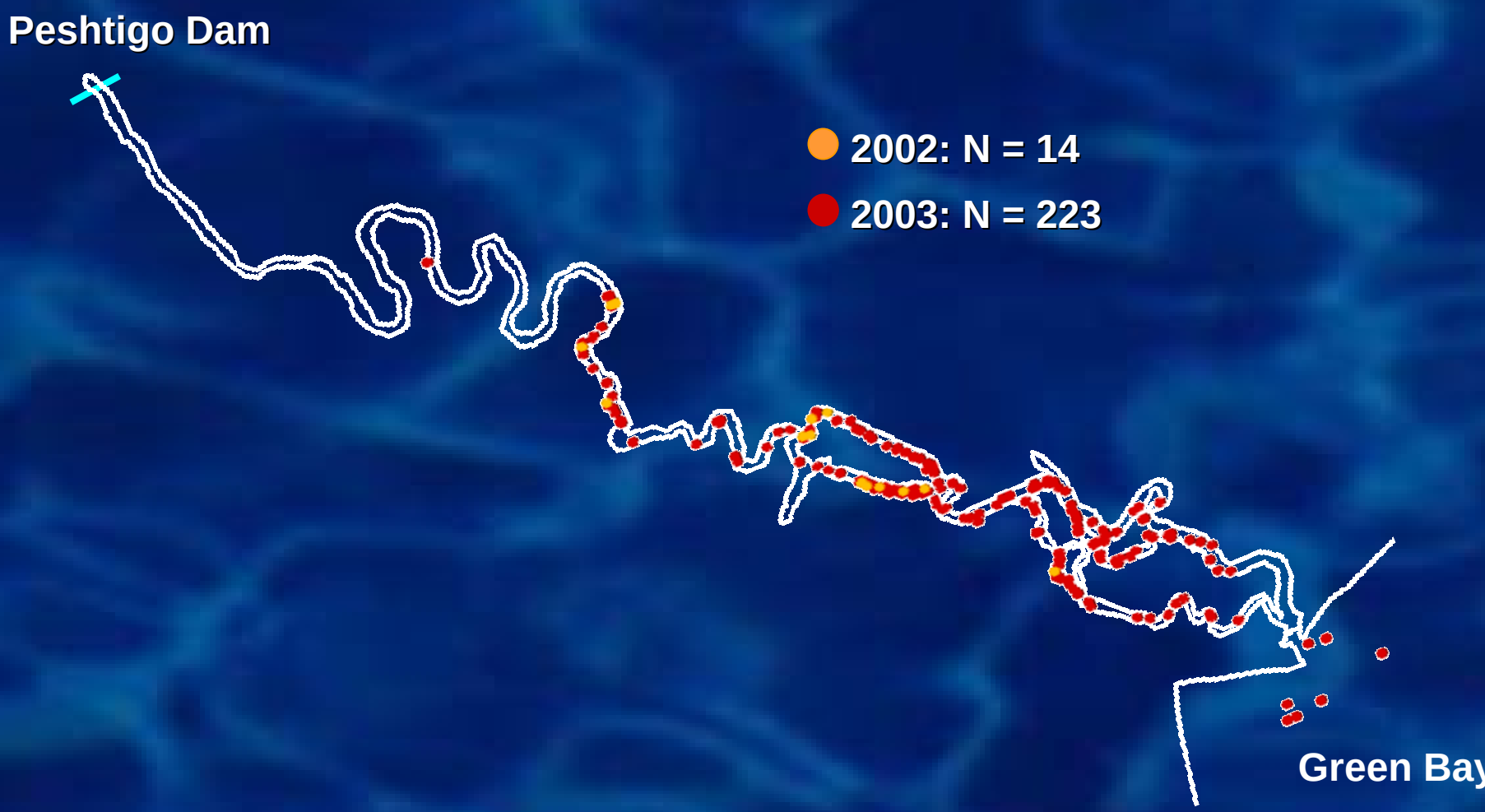
Sampling Gear	2002	2003
Visual surveys	6 & 7	81 & 134
Snorkeling surveys	0	6
Haul seines	0	16 & 8
Backpack electrofishing	0	3 & 4
Set lines	0	0
Fyke nets	0	0
Bottom trawls	0	0
Gill nets	1	0
Total	14	252

Fish Collections

- Fish Sampling 2002
  - Total Length
    - 235 mm (209 - 272 mm)
  - Wet Weight
    - 57 g (35 – 90 g)

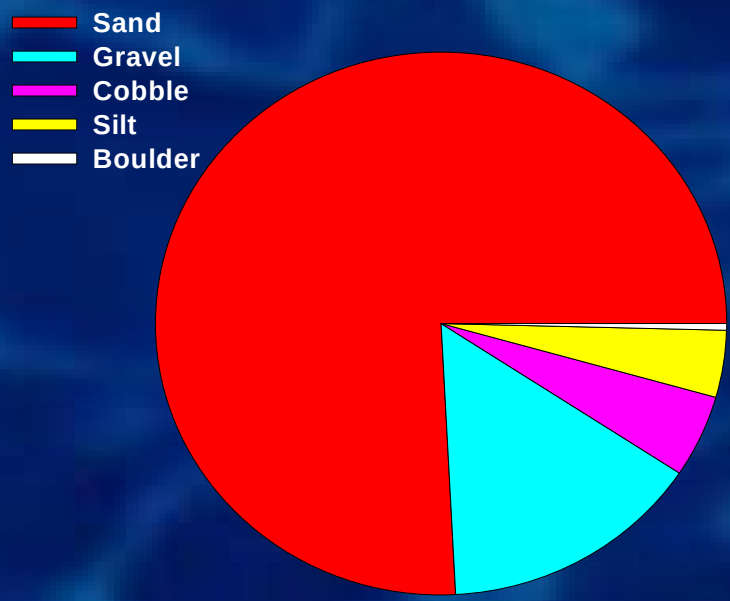
- Fish Sampling 2003
  - Total Length
    - 136 mm (40 – 316 mm)
  - Wet Weight
    - 10 g (0.2 to 134 g)

Capture Locations (2002 & 2003)



Substrate Composition

Substrate Type	Availability (%)	Selectivity Index
Sand	75	0.98
Gravel	15	-1
Cobble	5	-1
Silt	4	-1
Boulder	1	-1



Habitat Characteristics

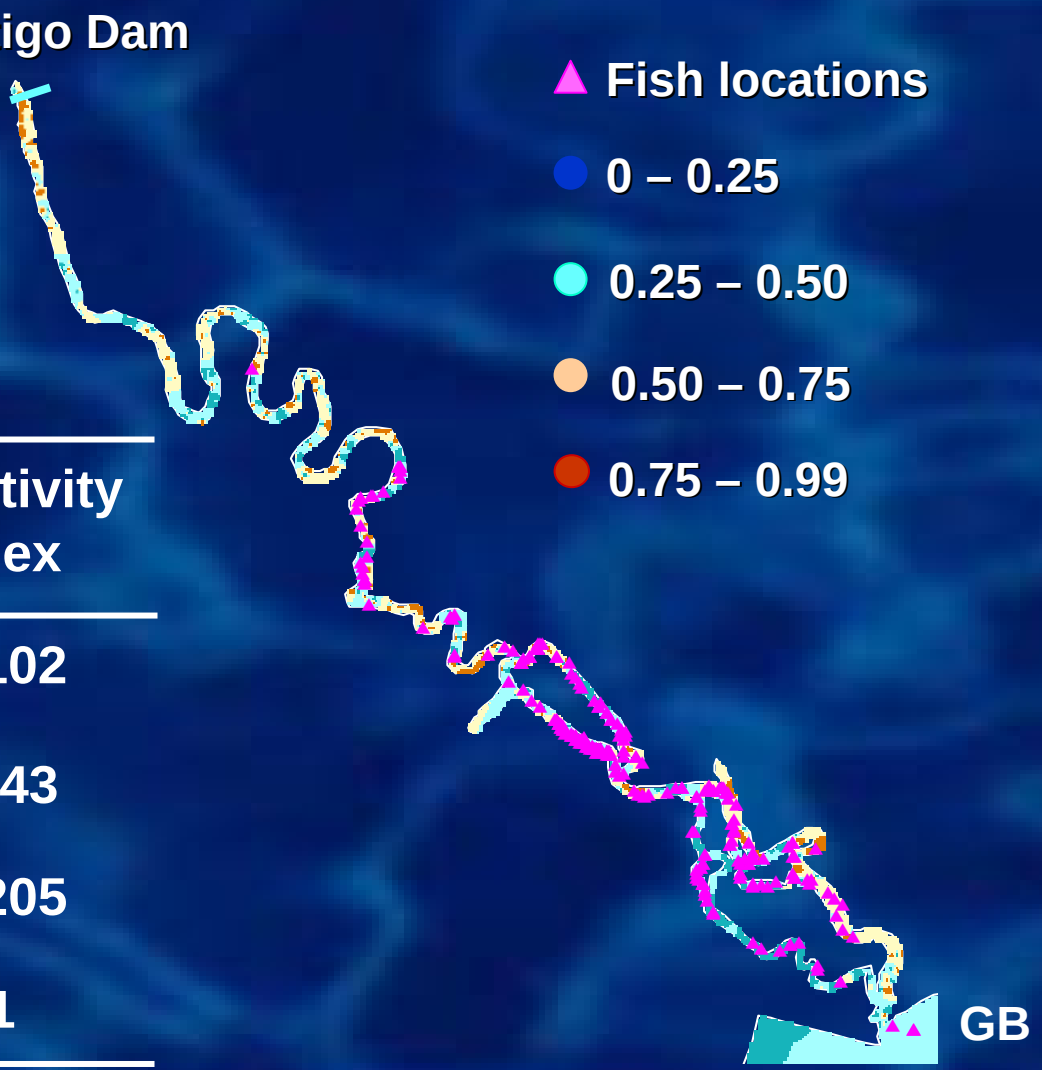
	Current Velocity (m/s)	Depth (m)
2002 capture sites	0.33 (0.20 – 0.48)	0.56 (0.32 – 0.90)
2003 capture sites	0.29 (0.00 – 0.53)	0.66 (0.20 – 1.74)
Overall study site	0.34 (0.00 – 0.89)	1.25 (0.20 – 7.62)

Invertebrate Taxa & Density

- Predominant Macroinvertebrate Taxon
  - Chironomidae
  - Ceratopoginidae, Oligochaeta, Hydrosychidae

- Macroinvertebrate Density
  - Capture sites
    - 33 individuals/m^2 (0 to 2,013 individuals/m^2)
  - Overall study area
    - 67 individuals/m^2 (0 to 2,727 individuals/m^2)

Invertebrate Diversity



Diversity (#/m²)	Availability (%)	Selectivity Index
0 – 0.25	46	-0.102
0.25 – 0.50	25	0.143
0.50 – 0.75	19	-0.205
0.75 – 0.99	10	-1

Factor Analysis

	Biotic Constructs	Abiotic Constructs
Temperature	-0.34532	-0.43394
Current Velocity	-0.14524	0.86948
Depth	0.11174	0.61771
Invertebrate Density	-0.02249	-0.24500
Invertebrate Diversity	0.99664	-0.00199

Fish Movements (2002)

- Little Initial Movement
- Rapid Downstream Movement (3 d)
  - Increase in discharge (24 to 63 m^3/s)
  - Declining water temperatures (16 to 13^oC)
- Median Daily Movement
  - 0 m/d (0 to 5,121 m/d)

Fish Movements (2003)

- Little Initial Movement
- Slow Downstream Movement (30 d)
  - River discharge
  - Rate of water temperature decline
- Median Daily Movement
  - 38 m/d (0 to 4,625 m/d)

Conclusions

- Nursery Habitat Requirements
  - Sand substrates
  - Low current velocity and shallow depth
  - Dipteran prey
- Seasonal Movement Patterns
  - Environmental cues = discharge & water temperature
  - Movement to deeper (and warmer) waters

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