

Abundance and mortality of lake sturgeon in the Peshtigo River, Wisconsin

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Early Life Stages

- Much unknown
- Year-class strength
- Identify mortality sources



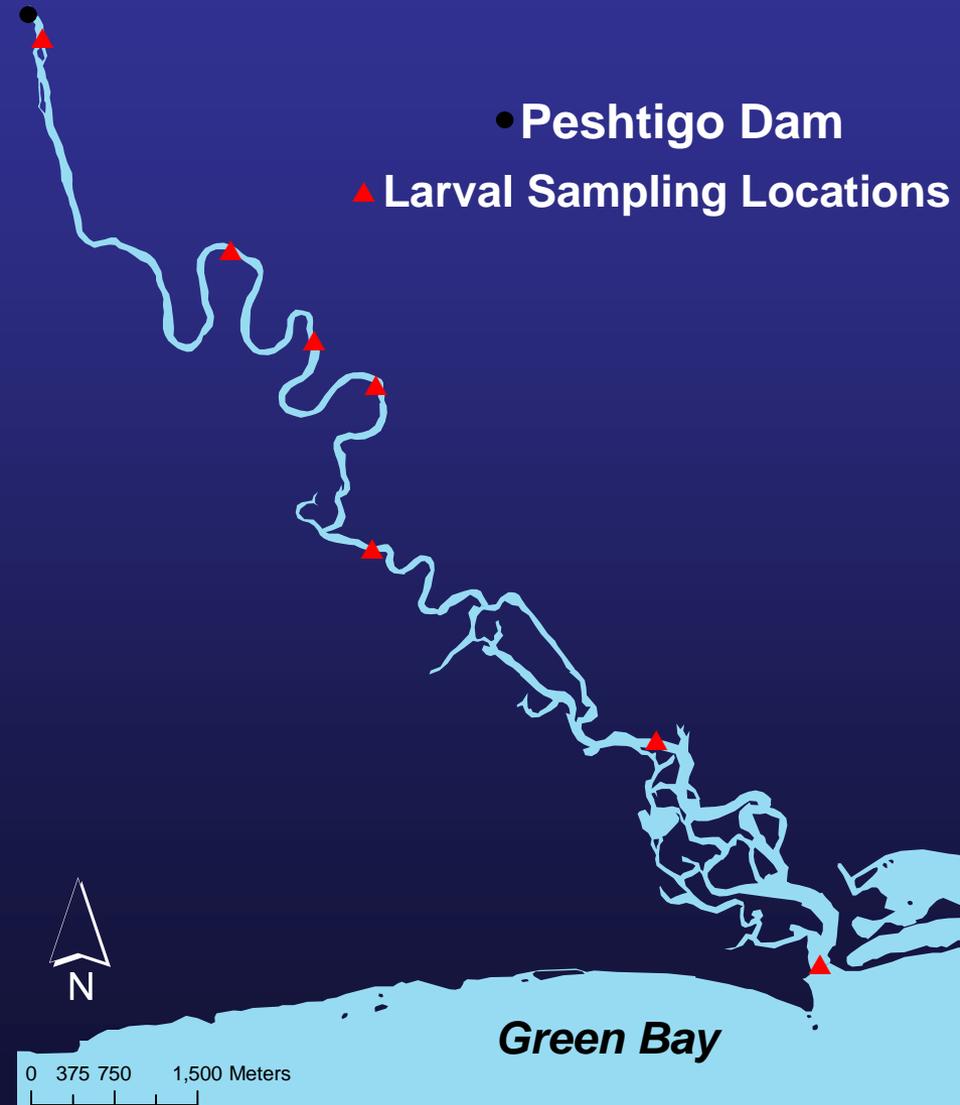
Suitability of the Peshtigo

- Spawning population
- Effectively sampled



Previous Research

- Benson et al. 2005
- Larval drift
- Habitat
- Age-0 juvenile
 - 261 fish



Objectives

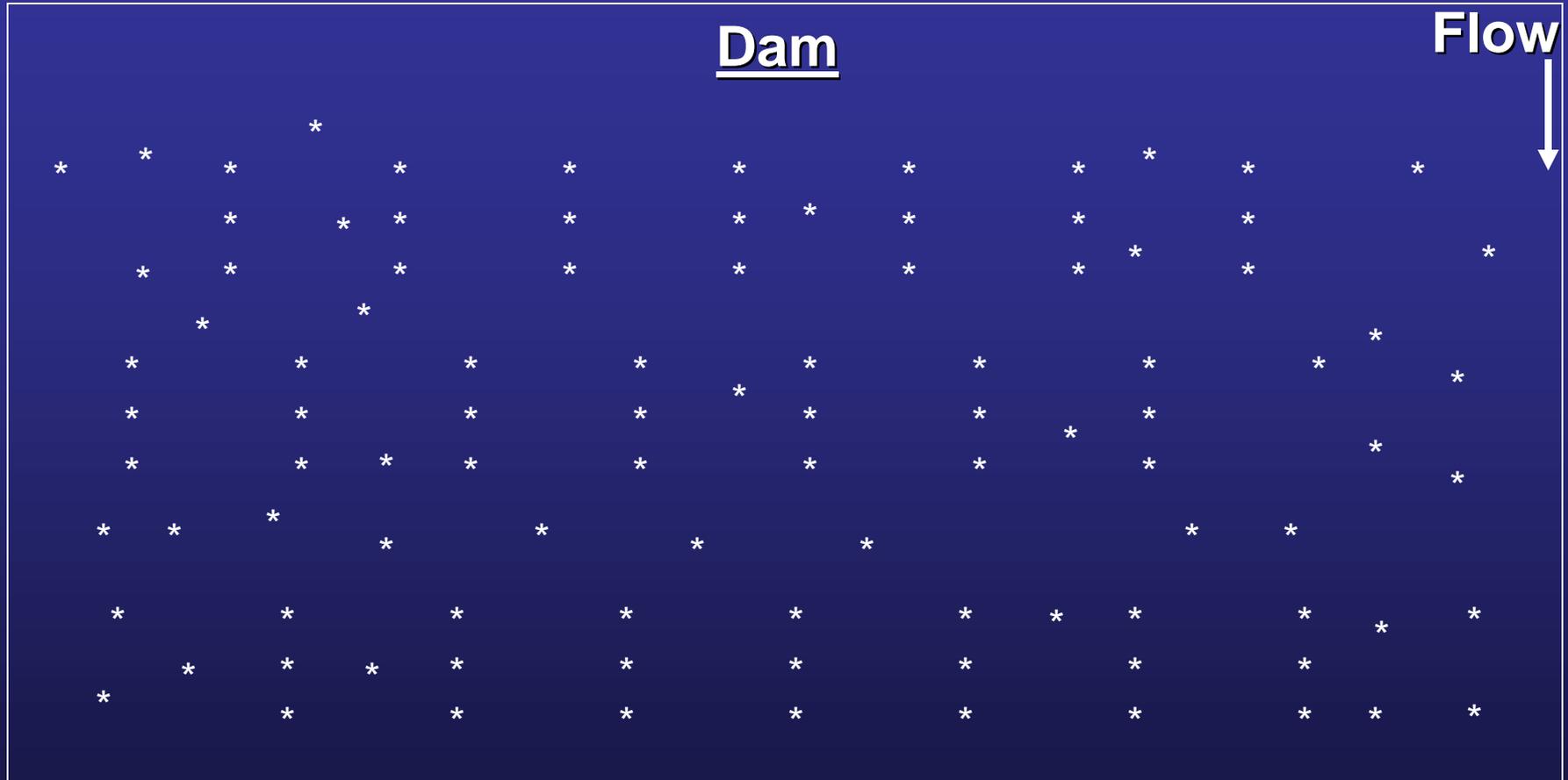
1. Estimate egg deposition, production of larvae, and abundance of age-0 lake sturgeon
2. Identify and quantify sources of mortality acting on each life stage of age-0 lake sturgeon

Egg Sampling

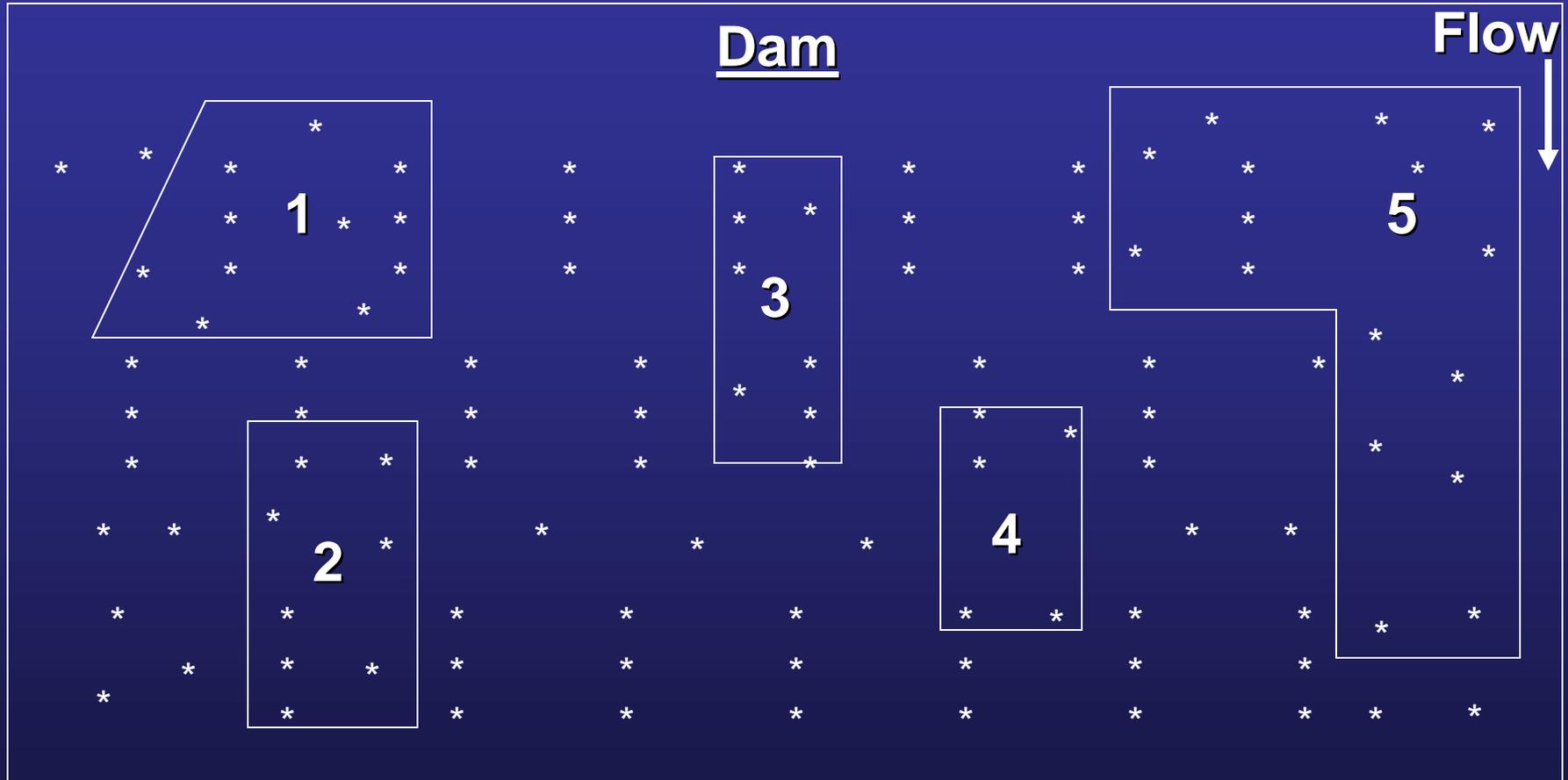
- Substrate egg mats below dam (N = 218)
 - Deployed 18 April
- Monitored daily



Egg Deposition Estimate



Egg Deposition Estimate



(polygon area) * (mean # eggs per mat)
surface area of 1 mat

Egg Mortality

- Egg Bags (Perkins and Krueger 1994)
- 40 eggs / bag
- 4 cover sizes (0.8 mm, 12.7 mm, 38.1 mm, none)
- 92 total bags set
- Retrieved after 1, 2, 3, 4, or 5 days



Larval Sampling

- Four, D-frame drift nets
- Equally spaced, 40 m below spawning site
- Set from 2100 – 0200, emptied hourly
- 2 May – 8 June



Larval Abundance Estimate

- Estimated for each river section, each night of drift netting

- Assumptions:

1) Larvae drift equally in water column

$$\text{total larvae} = \text{larvae captured} * \frac{\text{area of river section}}{\text{area of net opening}}$$

2) Larvae mostly drift along the bottom

$$\text{total larvae} = \frac{\text{larvae captured} * \text{width of river section}}{\text{width of net opening}}$$

Age-0 Sampling and Abundance

- Snorkeling (< 100 mm)
- Night visual surveys (>100 mm)
- VIE tags (50 mm > 160 mm)
- PIT tags (> 160 mm)
- Schnabel estimator



Larval / Age-0 Mortality

- Electrofishing
- Fyke Nets
- Gill Nets
- Seines



Egg Deposition Results

- Observed 3 spawning events:
 - 23 April, 5 May, 18 May
 - 13.7°C – 14.9°C
- 23 April – 252,601 eggs
- 5 May – 156,188 eggs
- 18 May – 305,608 eggs
- Total estimate of **714,397 eggs**
 - 95% CI: 432,100 – 997,021
 - Not including 1) drifting eggs
2) first night mortality

Egg Mortality



Egg Mortality



Egg Mortality



Egg Mortality







Egg Mortality

Cover	Range	Median
0.8 mm	32 – 41	38
12.7 mm	9 – 39	29
38.1 mm	3 – 33	22
None	5 – 36	21

- 9 crayfish, 1 blackside darter, 7 banded darters
- Active sampling limited by conditions:
 - 9 eggs in brown trout
 - 6 eggs in northern hog sucker

Larval Abundance Results

- 25 day drift period (9 May – 2 June)
- 190 sturgeon captured (14 – 22 mm)

- Assumption 1: entire water column
 - Total estimate: **5,761 larvae**
 - 95% CI: 1,466 – 11,975

- Assumption 2: mostly benthic
 - Total estimate: **3,260 larvae**
 - 95% CI: 829 – 6,776



Age-0 Abundance Results

- Marked 50 individuals, recaptured 27
- Total estimate: **76 age-0 juveniles**
 - 95% CI: 54 – 126



Larval / Age-0 juvenile mortality

<u>Species</u>	<u># Examined</u>
Brown trout	40
Burbot	7
Channel catfish	2
Common carp	9
White sucker	45
Freshwater drum	14
Longnose gar	3
Northern hogsucker	17
Northern pike	11
Shorthead redhorse	42
Rainbow trout	14
Rock bass	27
Smallmouth bass	49
Silver redhorse	41
Walleye	29

Larvae

1 in a BNT

Age-0 juveniles

Zero

Overall Mortality

- Egg → Age-0 juvenile = **99.9894% mortality**
- As low as **99.9708%**
- As high as **99.9946%**

Implications

- **Early-life mortality is high**
- **Influenced heavily by dam operation and environmental conditions**
 - **Cumulative effect**
- **Predation?**

Acknowledgements

- Jessica Hoffmeister, Adam Charlton, Stephanie Shaw, Dathan Shifflett
- Angie Benson, Dan Daugherty

