# Effects of a Whole-lake Bass and Sunfish Removal on Walleye in a North Temperate Lake

Holly Embke

# Walleye recruitment has declined

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- Potential factors:
  - Habitat changes
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  - Invasive species
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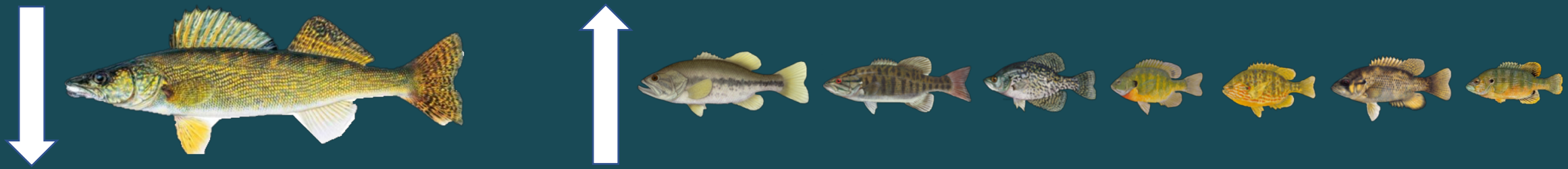
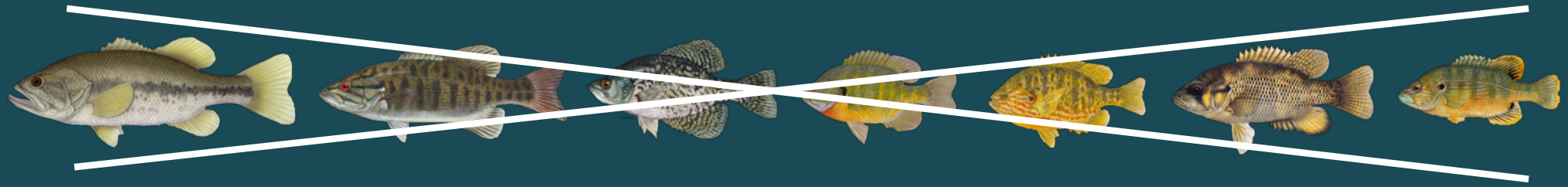
  - **Species interactions**



# Can we increase Walleye populations by removing predators/competitors?




Mercer
Manitowish Waters
Sandy Beach Lake
McDermott Lake
Park Falls
Woodruff

## McDermott Lake (experimental)

- 82 acres
- Max depth – 5.8 m
- Mean depth – 3.0 m
- 55% sand, 25% muck, 20% rock & gravel

## Sandy Beach Lake (reference)

- 110 acres
- Max depth – 3.7 m
- Mean depth – 2.1 m
- 98% sand, 2% gravel

# Whole-Lake Bass and Sunfish Removal

- Walleye population estimate: ~35 adults
- Largemouth Bass population estimate: ~315 adults
- High abundance of panfish
- No evidence of walleye recruitment

April — September — May — August — September — 2019 — 2020 — 2021

**2017**

Baseline Monitoring

# Whole-Lake Bass and Sunfish Removal

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- Walleye population estimate: ~39 adults
- Largemouth Bass population estimate: ~866 adults

- Monitoring continues
- Removal effort using multiple gears: cloverleaf traps, mini-fyke nets, fyke nets, electrofishing

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- Total effort: 2478 net/trap nights + 26 hours of electrofishing

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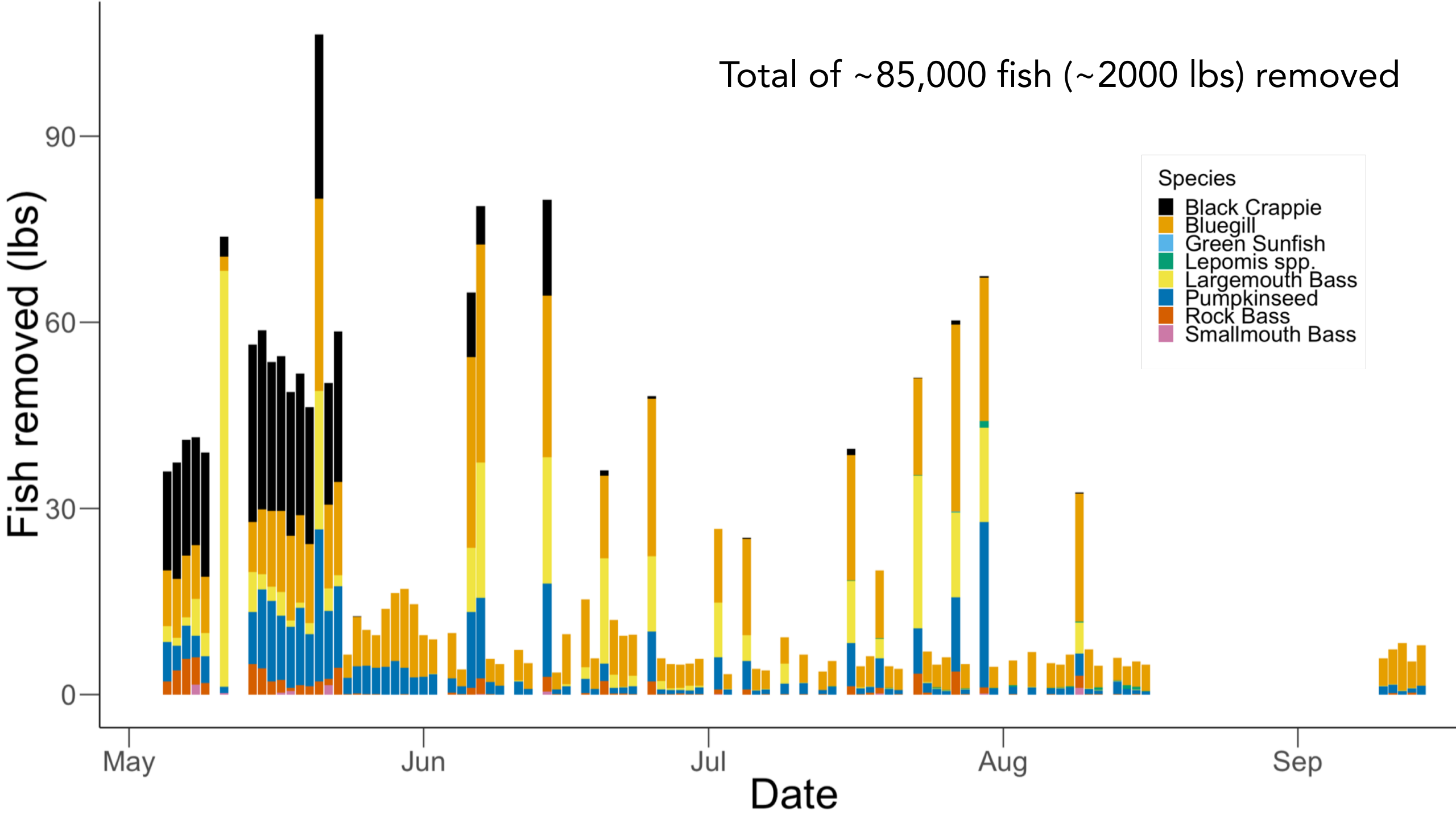
Total of ~85,000 fish (~2000 lbs) removed
Fish removed (lbs)
90
60
30
0
May
Jun
Jul
Aug
Sep
Date
Species
Black Crappie
Bluegill
Green Sunfish
Lepomis spp.
Largemouth Bass
Pumpkinseed
Rock Bass
Smallmouth Bass

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Removal + Monitoring

**2019**

Monitoring

**2020**

Monitoring

**2021**

# Data Collected - Fish

Fish community:
- 20 species in McDermott
- 15 species in Sandy Beach

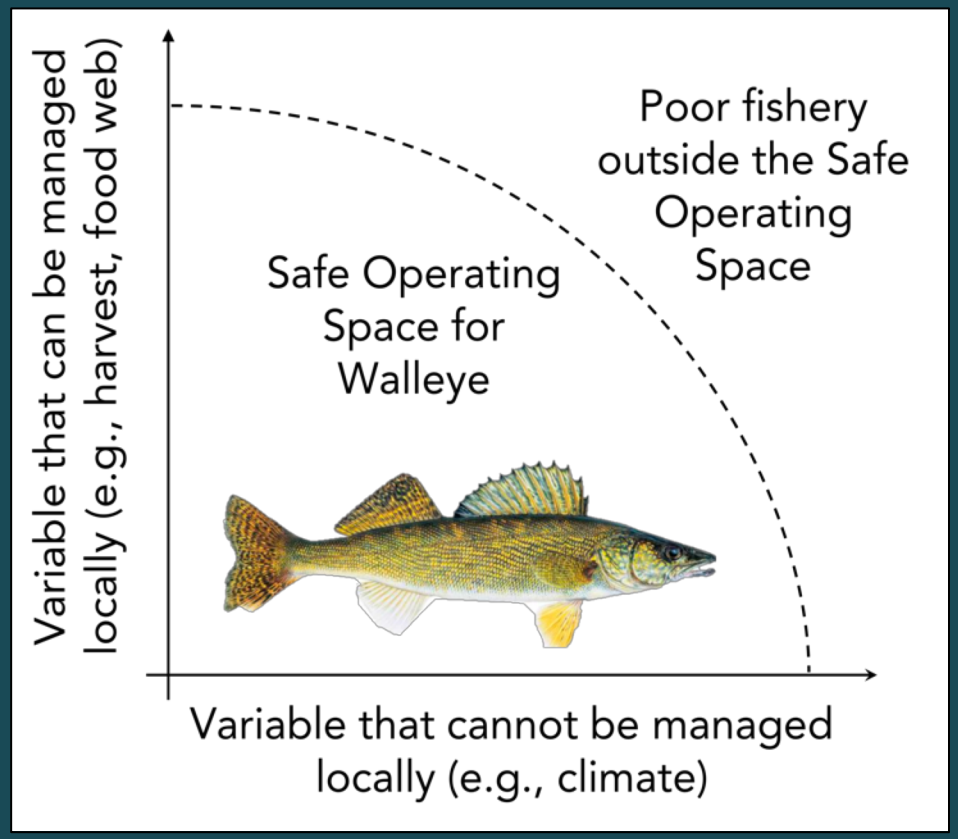
- Adult abundance
  - Population estimates for WAE & LMB
  - Catch per unit effort for all other species
- Larval abundance
- Young-of-year abundance
- Age, growth, diets, stable isotope signatures

| Species | Total Removed |
|---|---|
| Green Sunfish | 10 |
| Smallmouth Bass | 14 |
| Rock Bass | 708 |
| Black Crappie | 1,375 |
| Pumpkinseed | 8,864 |
| Largemouth Bass | 17,247 |
| Bluegill | 52,162 |

# Project Questions

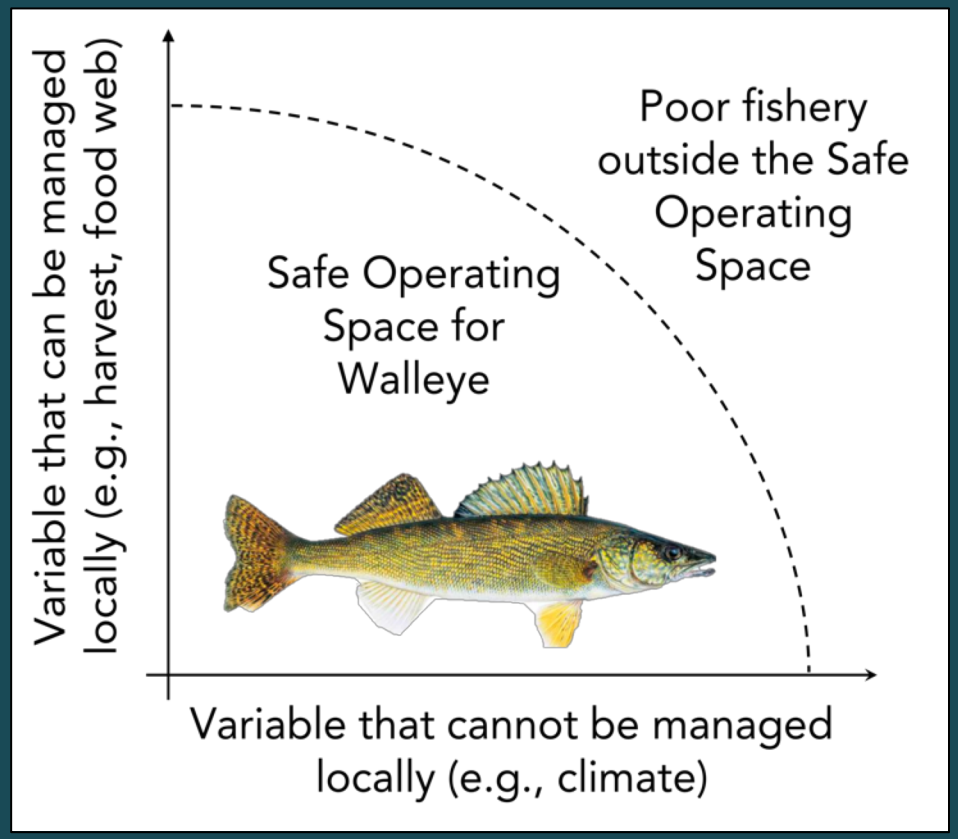
- How are walleye effected by a reduction in competition & predation?
  - How can this information be used to support self-sustaining walleye populations?

# Safe Operating Space for Inland Recreational Fisheries




- Anthropogenic influences affect freshwaters' ability to support fisheries
- Walleye, an economically and culturally important fish species, have experienced declines

# Safe Operating Space for Inland Recreational Fisheries




- Anthropogenic influences affect freshwaters' ability to support fisheries
- Walleye, an economically and culturally important fish species, have experienced declines

- **Objective: Develop Safe Operating Space (SOS) for Walleye**
  - Which conditions support self-sustaining fisheries in a changing climate?

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- How do remaining bass and sunfish respond to reduced competition & predation?

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- How are walleye effected by a reduction in competition & predation?
- How do remaining bass and sunfish respond to reduced competition & predation?
- How do other fish species (e.g., Muskellunge, Northern Pike, Yellow Perch) respond to decreased fish biomass?

# Thank you!

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