Saginaw Bay Fish Spawning Habitat

Pre-restoration Assessment

Bay County, Michigan

DEQ

LimnoTech

PURDUE UNIVERSITY

DEPARTMENT OF NATURAL RESOURCES · DNR · MICHIGAN

U.S. FISH & WILDLIFE SERVICE

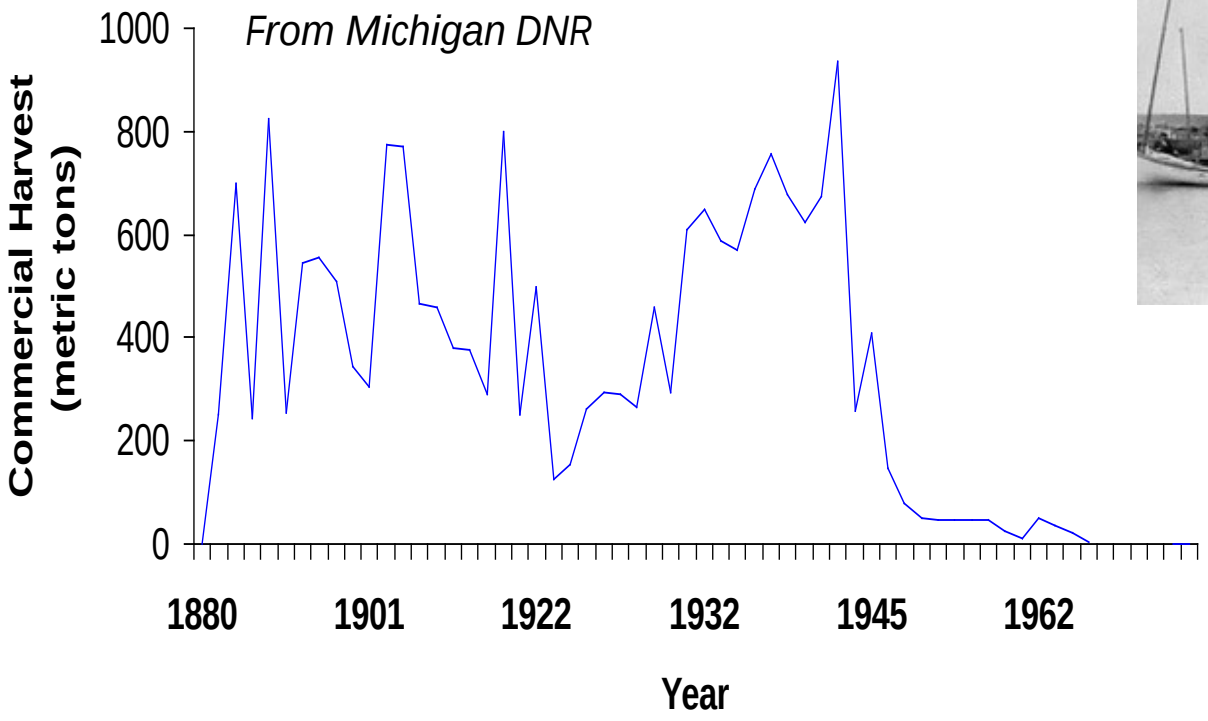
Sea Grant Michigan

USGS science for a changing world

A multi-agency collaborative project: 2014-2016

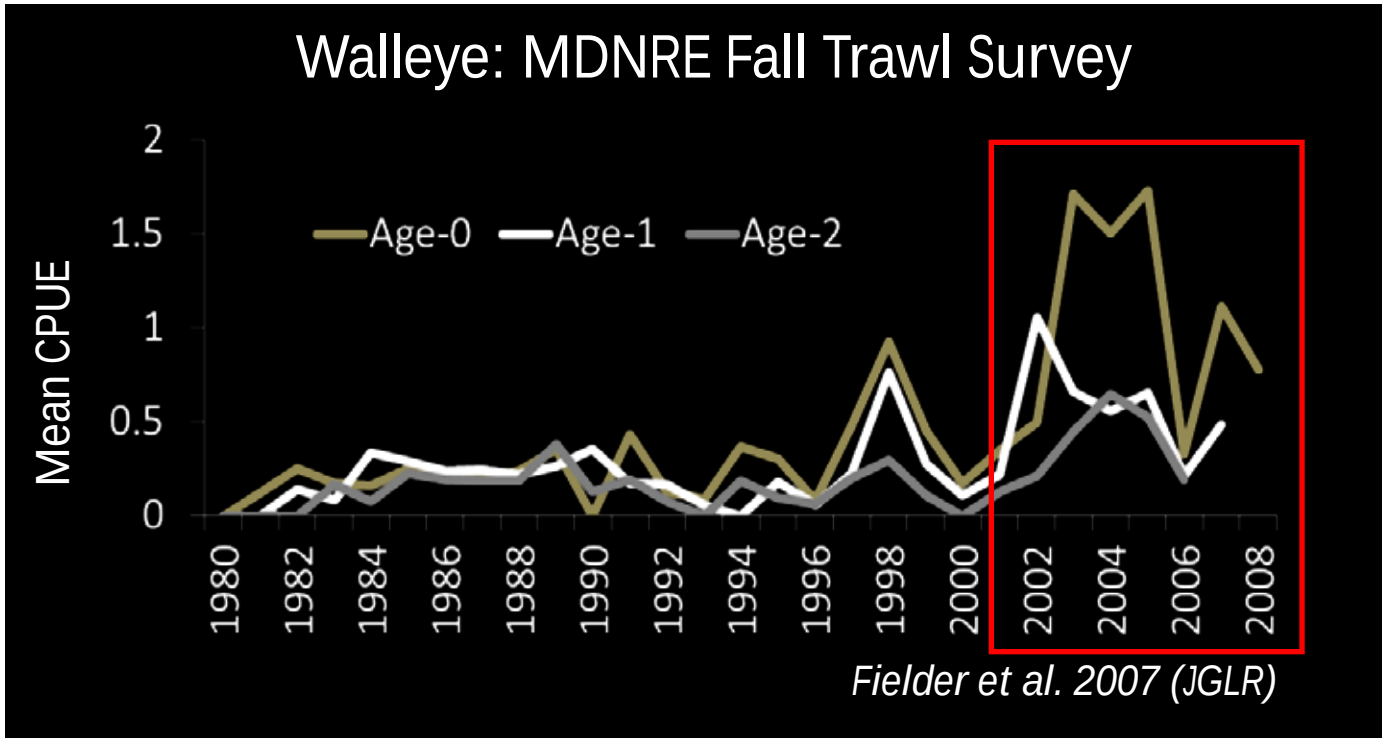
Historical Walleye Fishery in Saginaw Bay

- Pre-1945 average harvest was 1 million pounds per year
- Population collapsed in mid-1940s



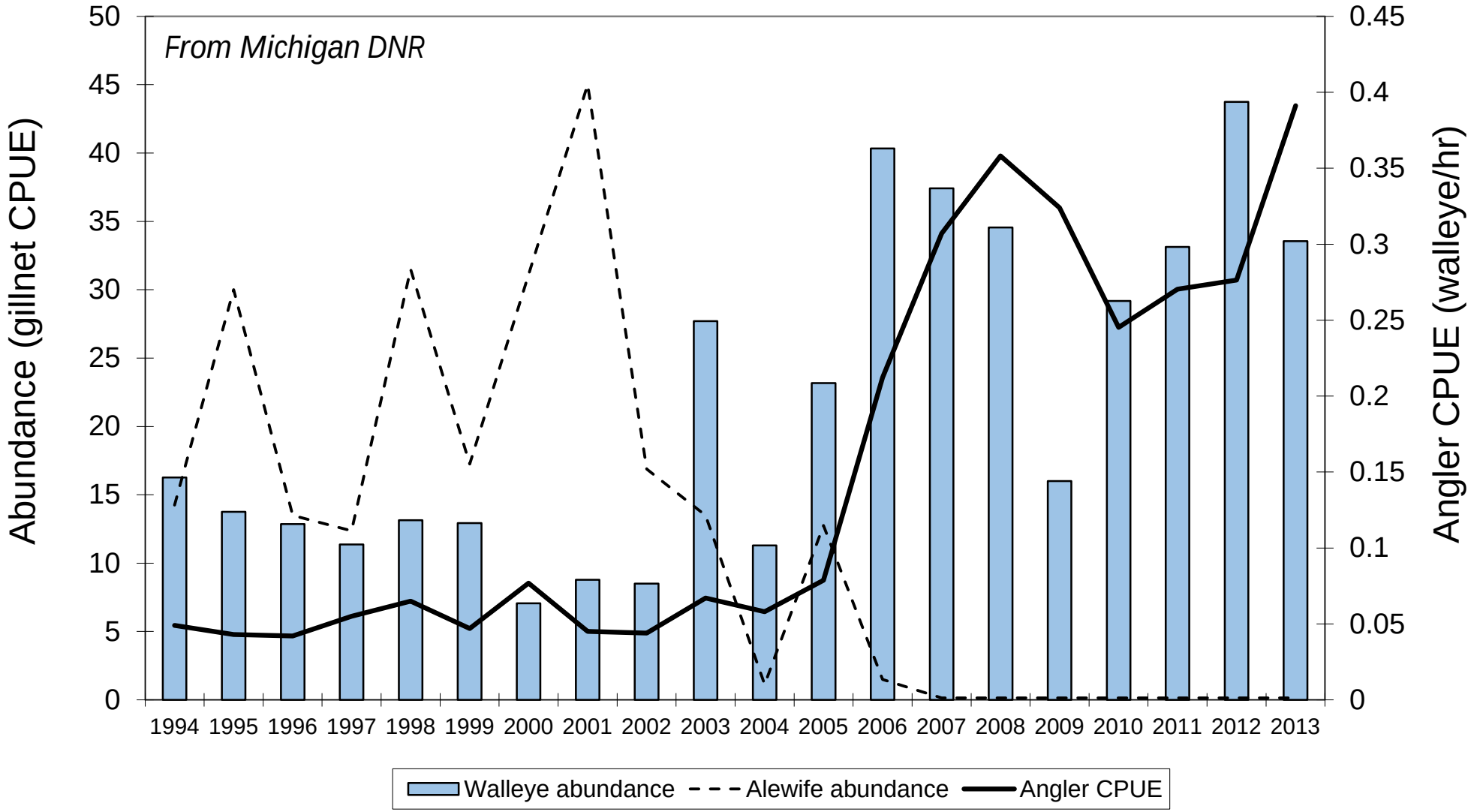
Walleye Recruitment in Saginaw Bay

- Michigan DNR started stocking walleye in Saginaw Bay since early 1980s
  - But this resulted in little natural reproduction



- Recruitment has rebounded since the mid-2000s

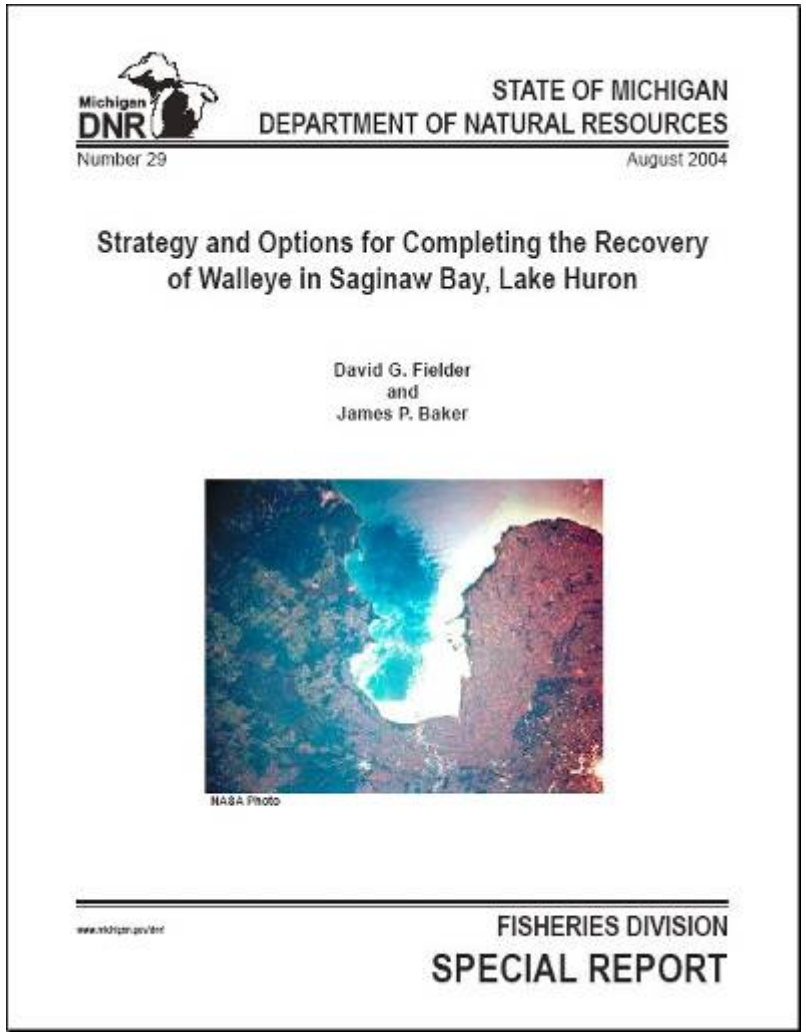
Recent Walleye Recovery in Saginaw Bay



Reef Restoration in Saginaw Bay

- Michigan DNR developed recovery plan for walleye in 2004

- Reef restoration was a key strategy in this plan



Walleye Spawning in Saginaw Bay

- Historically, walleye populations in Saginaw Bay were supported by both reef and river spawning

- Previous studies suggest that almost all natural reproduction occurs in the Tittabawassee River

- Recent research at Purdue suggests that walleye recruits are also coming from other areas
  - Reef spawning??

Why Reef Restoration?

- A diversity of spawning locations is important
  - Populations that use multiple spawning sources are more resilient

- Walleye recovery should aim to maximize the number of spawning sources and genetic diversity, not just total numbers

- Benefits for other species (e.g. lake whitefish, cicso, lake trout)

- Improved habitat & prey availability

Prior to Reef Restoration

Before we can invest in reef habitat restoration in inner Saginaw Bay, we need to know:

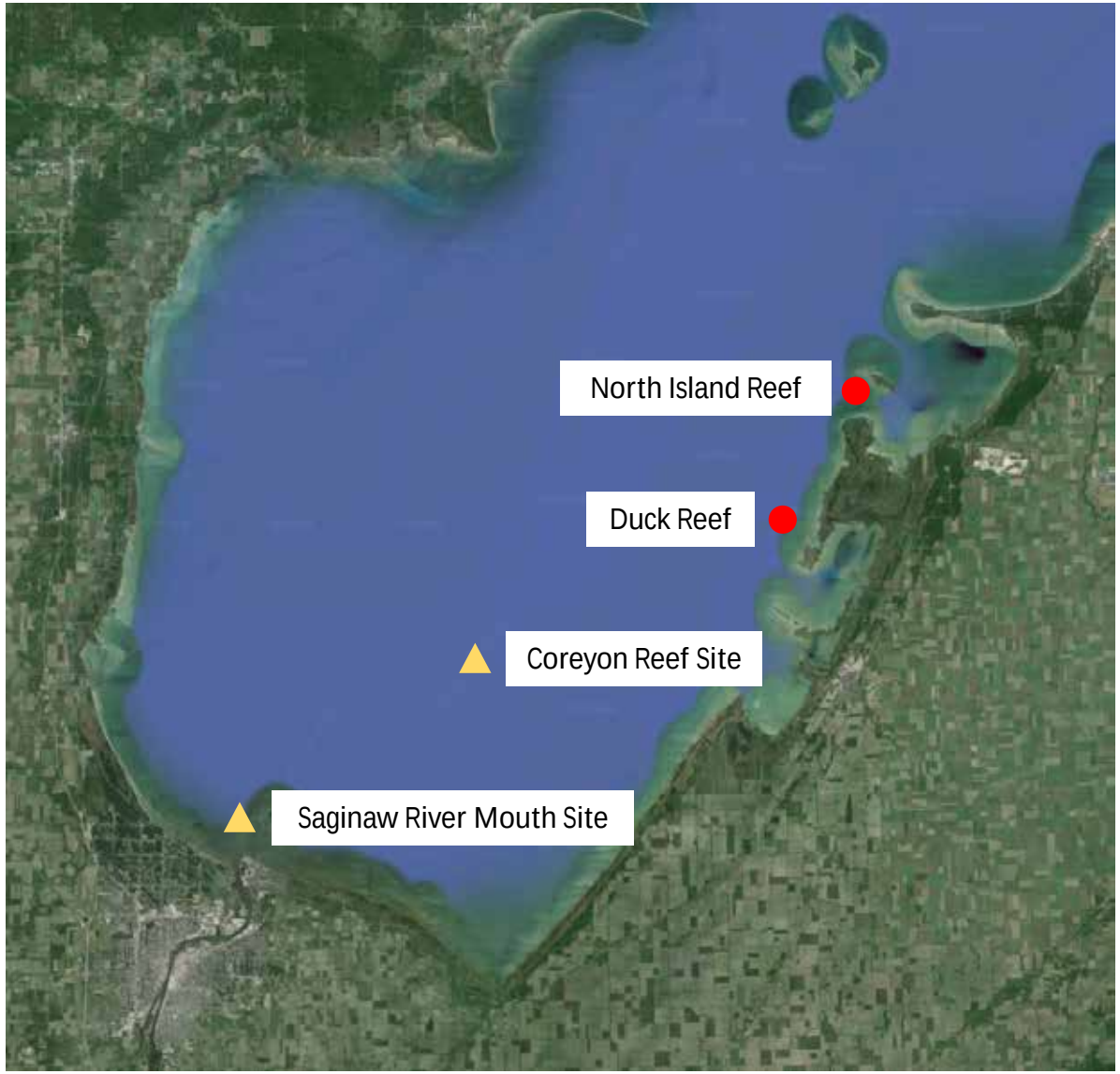
- Current status of remnant reef habitat
- Current status of proposed reef restoration sites
- Who/what/where/when fish are spawning
- Spawning success

Need baseline information!

Former Inner Bay Reef Areas
From Organ et al. (1979) & Goodyear et al. (1982)

Study Sites in Saginaw Bay

2 x Proposed reef restoration sites



2 x Remnant reef sites

Current Project Objectives

Goal: Conduct baseline assessment of habitat, fish populations and spawning that may guide future reef restoration in Saginaw Bay.

Objective 1: Determine habitat suitability of remnant reef and proposed restoration sites

Objective 2: Evaluate reproductive usage by adult walleye (spring) and whitefish (fall)

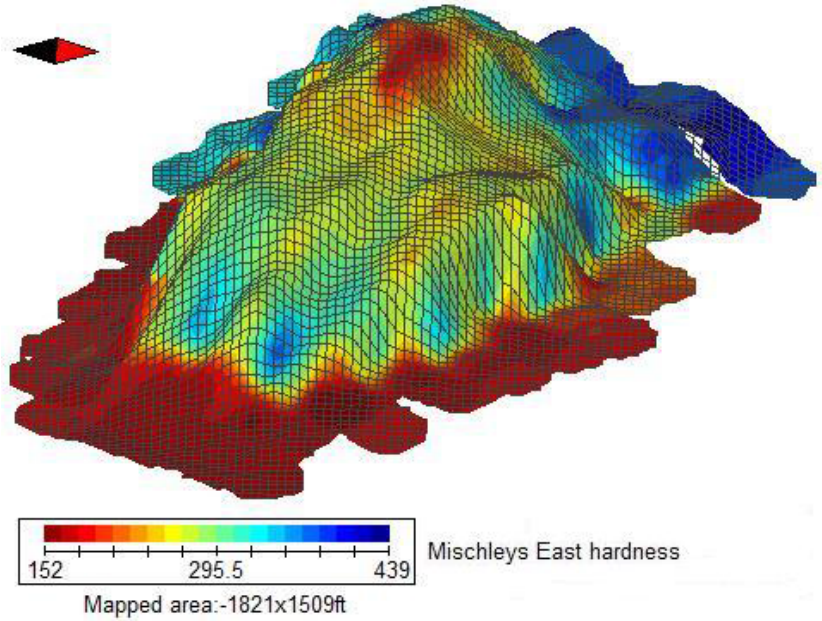
Objective 3: Assess genetic diversity of walleye and whitefish populations

Objective 4: Develop and execute a plan to engage local stakeholders in reef restoration in Saginaw Bay

Collaborative Project

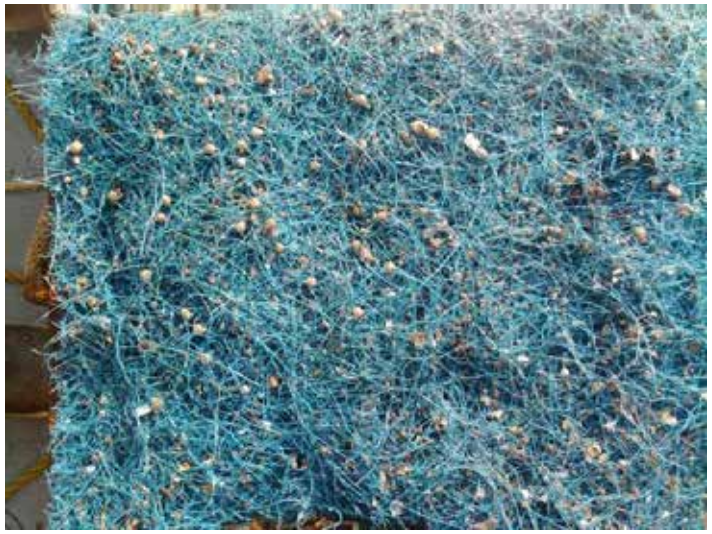
Objective 1: Habitat Suitability

- Side-scan sonar mapping (June 2015)
- Water quality and substrate type
- Potential egg predators



Objective 2: Fish Spawning

- Walleye (spring) and lake whitefish (fall) sampling
- Biological assessment of adult fish
- Collection of eggs from habitats



Objective 3: Genetic and Phenotypic Diversity

- Length, weight & age of walleye and whitefish
- Investigate variation in condition, egg size etc.
- Genetic samples (fin clips)

Objective 4: Plan for Reef Restoration

- Work with local stakeholders
- Secure funding
- Design reefs
  - Number, size, location
  - Material (e.g. cobble, gravel)
  - Logistics

Objective 1: Preliminary Results

- Potential egg predators (Fall 2014)
  - Targeted = **ZERO** fish eggs in stomachs

Round Goby

Yellow Perch

Logperch

White Perch

Spottail Shiner

Trout Perch

Objective 1: Preliminary Results

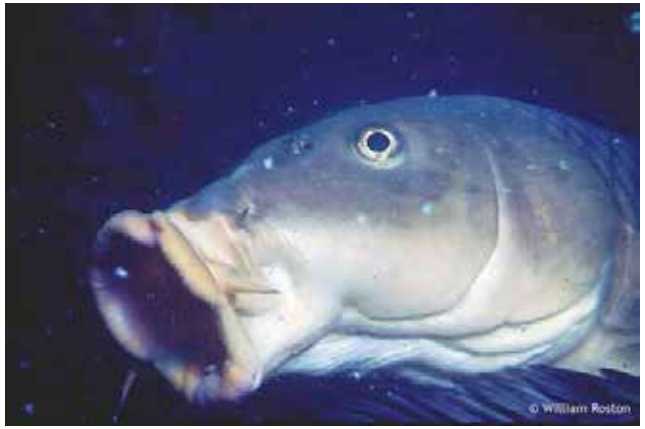
- Potential egg predators (Fall 2014)
  - Large fish sampling = fish eggs in stomachs!

    1 x Lake Whitefish = 7 eggs

    2 x White Sucker = 1-5 eggs

    3 x Common Carp = 1-5 eggs

    1 x Channel Catfish = 1500+ eggs!



Objective 2: Preliminary Results

- Fish catch rate (# per net) at each site (Fall 2014)

Site	Walleye	Lake Whitefish	Common Carp	White Sucker	Channel Catfish
Saginaw River	0.8	1.1	2.2	0.5	0.3
Coreyon Reef	1.8	1.3	-	1.0	-
Duck Reef	3.0	1.0	-	-	1.0
North Island Reef	1.0	3.0	-	-	-
TOTAL	1.3	1.3	1.2	0.5	0.3

Running male whitefish collected at all sites

- Egg collection
  - Eggs collected from Saginaw River and Coreyon Reef sites
  - Duck and North Island Reef sites not sampled due to bad weather

The work continues!

- Fish and egg sampling seasons (2 of 4 completed)
  - Lake Whitefish = Fall ~~2014~~ & 2015
  - Walleye = Spring ~~2015~~ & 2016
- Side-scan sonar and substrate survey
  - June 2015, Done
- Genetic analyses and lab work
  - Continuing through June 2016
- Future stakeholder meetings

Project Finishes September 2016

Questions?