



## Priest Rapids Fish Forum

### Conference Call

Wednesday, 2 August 2023

10:30 a.m. – 12:00 p.m.

### FINAL MINUTES

#### PRFF Members

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RD Nelle, USFWS  
Ralph Lampman, YN  
Nathan and Clayton Buck, Wanapum  
Jason McLellan, Bret Nine, CTCR  
Mike Clement, Chris Mott, Grant PUD  
Tracy Hillman, Facilitator

Patrick Verhey, Laura Heironimus, WDFW  
Breean Zimmerman, WDOE  
Aaron Jackson, Carl Merkle, CTUIR  
Marchelle Foster, BIA  
Tom Skiles, CRITFC/CTUIR

#### Meeting Attendees

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Breean Zimmerman, WDOE  
Mike Clement, Grant PUD  
Patrick Verhey, WDFW  
Jason McLellan, CTCR  
Tracy Hillman, Facilitator  
Cory Wright, Blue Leaf  
Mariah Mayfield, Douglas PUD

Laura Heironimus, WDFW  
RD Nelle, USFWS  
Chris Mott, Grant PUD  
Erin Harris, Grant PUD  
Jason Fischer, USFWS  
Lance Keller, Chelan PUD  
Chas Kyger, Douglas PUD

#### Action Items:

- Jason McLellan will share the work of Angelina Dichiera, who studied the effects of high temperatures on White Sturgeon, with the PRFF.

#### Decision Items:

- None.

## **I. Welcome and Introductions**

Tracy Hillman welcomed everyone to the meeting and identified all attendees.

## **II. Agenda Review**

The PRFF reviewed and approved the August agenda.

## **III. Approve July Meeting Notes**

The PRFF reviewed and approved the 5 July 2023 meeting minutes.

## **IV. Review Action Items**

The PRFF reviewed the following action items from the July meeting:

- Ralph Lampman will coordinate with the Detroit River Fish Laboratory on a time to present their Lake Sturgeon modeling and reef building work to the PRFF. **Complete.**

## **V. Pacific Lamprey**

**Grant PUD Trapping Efforts** – Mike Clement reported that they began trapping adult lamprey at Priest Rapids Dam on 10 July and they have captured a total of 604 lamprey. Mike added that about 600 adult lamprey were provided to Douglas PUD for their fish passage study. He reminded the group that fish captured during the first four weeks of trapping will be provided to Douglas PUD for their study. Fish captured during the second four-week period will be either provided to Douglas PUD (depending on whether they received enough fish for their study during the first four-week collection period) or will be released at Kirby-Billingsley Hydro Park upstream from Rock Island Dam. Mike concluded by stating that trapping is going very well this year.

**Pacific Lamprey Subgroup Meeting with RRF Subgroup** – Tracy Hillman reminded the PRFF that the PRFF Pacific Lamprey Subgroup and the RRF and ASWG subgroups will meet jointly on Monday, 21 August to evaluate the different models that can be used to estimate juvenile Pacific Lamprey survival rates and behavior through the hydro-system. All the models being evaluated have important assumptions that need to be addressed before a valid survival study can be implemented within the project areas. Tracy said the objectives of the subgroup meeting are to discuss models and assumptions of models used to estimate juvenile survival and behavior. In addition, the subgroup will discuss juvenile studies to be conducted in the upper Columbia in synchrony with the lower Columbia River studies. Tracy noted that the meeting will be virtual.

**Other Pacific Lamprey Items** – No other Pacific Lamprey items were discussed.

## **VI. White Sturgeon**

**White Sturgeon Hatching and Rearing** – Mike Clement reported that he received no update from the Yakama Nation on juvenile sturgeon rearing at the Yakama Nation Sturgeon Hatchery. He said this likely means all is going well.

**Lake Sturgeon Artificial Spawning Reefs Presentation** – Jason Fischer, USFWS, joined the meeting to discuss spawning habitat enhancement work for Lake Sturgeon in the St. Clair and Detroit rivers. Tracy Hillman introduced Jason and thanked him for taking the time to present his work to the PRFF. Jason gave a presentation titled, “Reef Restoration in the St. Clair-Detroit River System” (see Attachment 1).

Jason began by describing the process and development of the spawning habitat enhancement project in the St. Clair and Detroit rivers. He described the geographic area including the Great Lakes system and the interconnecting channels. The St. Clair-Detroit River system connects Lake Huron with Lake Erie and is the system in which the restoration work was conducted. Flows in the St. Clair-Detroit River system are regulated by the surface elevations of the two lakes (Huron and Erie) and therefore flows are relatively constant and stable over time. The river system has high economic, ecological, and societal value. Historically, the river system supported huge runs of spawning fish, especially Lake Sturgeon, and supported large commercial gillnet fisheries. Overfishing and habitat loss contributed to large declines in Walleye, Lake Sturgeon, and Lake Whitefish populations. The construction of shipping channels in the river system resulted in the loss of spawning habitat (from removal of spawning substrates and burial of substrates with dredge spoils) for several species of fish.

Given the loss of spawning habitat within the river system, the “Reef Team” began developing a process for restoring spawning habitat in the river system. Their focus was on constructing reefs (piles of rocks) to bolster the populations affected by spawning habitat loss in the river system. The idea of constructing artificial reefs was informed when researchers noticed that Lake Sturgeon were spawning on coal cinders that spilled from loading docks into the St. Clair River. In addition, natural processes that recruit spawning sediments to the river do not exist within the St. Clair-Detroit River system. Thus, they could not restore the processes that would naturally enhance spawning habitat in the river system.

Jason described some of the unknowns associated with planning the restoration work. For example, what substrate types and sizes are most appropriate? How large should constructed reefs be? Where should constructed reefs be located? The Reef Team used an adaptive management approach that followed the adaptive management paradigm. Evaluation was a critical component of the approach. The first step in the process was to determine whether there was a problem and then to identify the specific problem. They then identified which management actions would address the problem. Based on this work, the first reefs were constructed in 2004 at Belle Isle. They constructed three reefs, each one about 0.1 acres in size. Jason noted that the construction of reefs is very expensive.

The Reef Team evaluated the success of the reefs at Belle Isle by determining whether fish spawned on the reefs and produced larvae. They used egg mats to determine if fish spawned on the reefs and captured larvae upstream and downstream from the reefs to determine the production of larvae. During the evaluation of the Belle Isle reefs, they found no Lake Sturgeon eggs, likely because the reefs were too small. They also ran into issues with land ownership (landowners own the bottom of the rivers) and found that deep-draft vessels could damage the reefs or run aground. Thus, they had to add an additional step to their adaptive management approach: Identify Requirements and Constraints (regulatory and ecological). Based on this information, in 2008 and 2012, they built one-acre and two-acre reefs in the St. Clair and Detroit rivers, respectively. Evaluation determined that these reefs were effective. Lake Sturgeon spawned on the reefs at both sites. Unfortunately, at the middle channel reefs, they observed increasing accumulations of fine sediment. The effectiveness of the middle channel reefs decreased over time because of the fine sediments (i.e., Lake Sturgeon eggs per egg mat decreased over time).

Based on results generated during the evaluation of the reefs constructed in 2008 and 2012, the Reef Team decided to add physical habitat mapping and modeling to their planning process. This included the addition of geomorphic criteria and mapping depths, velocities, substrate, sediment transport, and reef shape. Using this information and coarse- and fine-scale modeling, the Reef Team was able to identify appropriate sites for enhancement. This allowed them to evaluate how flow and sediment interact with reefs. Flume studies were used to assess appropriate reef shapes (e.g., rectangle, airfoil, and wedge shapes). They found rectangular shapes were appropriate and were the most cost-effective. With this

information, several reefs were constructed and Lake Sturgeon eggs were collected on all reefs. In addition to collecting biological information, they measured the physical maturation of the reefs. This included the use of side-scan sonar and underwater video. This allowed them to quantify physical changes in reefs over time, especially changes in sediment composition. Based on this work, they found that fine sediment infilling occurred across all reefs; however, sediment rates and sediment types varied both spatially and temporally. Importantly, portions of the reefs remained exposed and Lake Sturgeon continued to use them.

This work led the Reef Team to evaluate reef maintenance actions. Methods being evaluated include flushing flows, suction dredging, and propulsion. In addition, they want to continue to evaluate the success of the reefs. Funding is needed to continue this work. They intend to piggyback with ongoing research and management to continue egg and larvae assessments and leverage funding from the Cooperative Science and Management Initiative to fund physical habitat assessments.

Lastly, Jason summarized what they learned from the remediation process. Understanding the regulatory constraints, ecological process, and hydrogeomorphic requirements was critical to the success of the process. Although there is still uncertainty associated with this work, they found that cost and uncertainty were inversely related, such that more money was needed to address higher levels of uncertainty. Importantly, the Reef Team was organized for success. That is, all the necessary agencies and stakeholders were included and engaged throughout the process. The Reef Team was proactive, open about shortcomings, and demonstrated learning, which was appreciated by the funding entities.

Following the presentation, Tracy Hillman asked about the source of the sediments that covered portions of the reef in the St. Clair River. Jason responded that they are not certain where the sediments originated but may have come from a large deposit of glacial till upstream from the project site. Some of the finer sediments may have come from bank erosion. Laura Heironimus asked about the proximity of the reefs to the dams that were placed to aid the dredging of the shipping channel. Jason Fischer responded that the coffer dams have been removed and no longer affect the river system. Jason McLellan asked whether they have seen recruitment of Lake Sturgeon into older age classes as a result of reef construction. Jason Fischer responded that they are having a difficult time monitoring juvenile Lake Sturgeon. Michigan Department of Natural Resources monitors age-0 to age-5 sturgeon that use the river system and have seen some increases but it is unknown whether the reefs were the cause of the increase in numbers. They are, however, trying to answer this question. Jason McLellan asked how they balanced the requirements of the three species (Lake Sturgeon, Walleye, and Lake Whitefish) when they designed the reefs. Jason Fischer said the focus was on Lake Sturgeon. He added that Walleye and Lake Whitefish are not currently using the reefs. It is possible Lake Whitefish require or prefer smaller substrates than what are used in the constructed reefs. The reefs are constructed with 4-8-inch substrate. They also have to make sure they do not create Sea Lamprey spawning habitat; hence, they do not use substrates less than 4-inches, which are used by Sea Lamprey.

The PRFF thanked Jason for the presentation.

**Other White Sturgeon Items** – Laura Heironimus reported that they have documented the death of adult White Sturgeon in the Columbia River, mostly within the John Day pool. She noted that high temperatures and diet may be contributing to the loss of sturgeon. One sturgeon was replete with adult Sockeye Salmon. Jason McLellan commented that it is unlikely diet is a contributing factor. Jason referenced work in British Columbia by Angelina Dichiera that indicated feeding status had little to no effect on mortality when fish experience high temperatures. Jason said high temperatures certainly affect mortality rates of White Sturgeon. Jason will share Angelina's work with the PRFF.

**VII. Adjourn**

With no additional business to discuss, Tracy Hillman adjourned the meeting at 12:00 pm.

**VIII. Next Meeting**

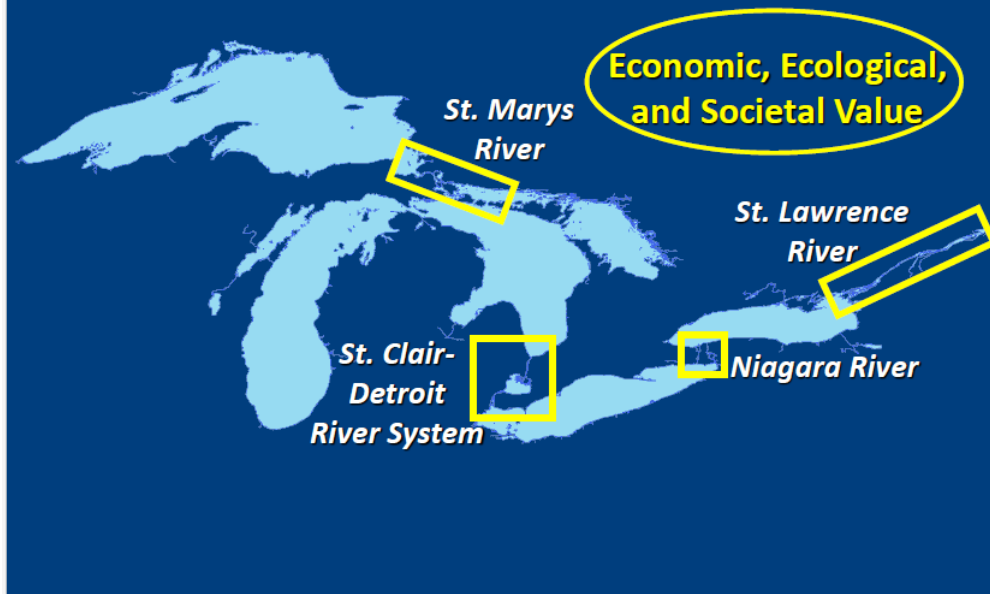
The next meeting of the PRFF will be on 6 September 2023.

# Attachment 1

## Presentation by Jason Fischer, USFWS, on Reef Restoration for Lake Sturgeon in the St. Clair-Detroit River System



# Connecting Channels



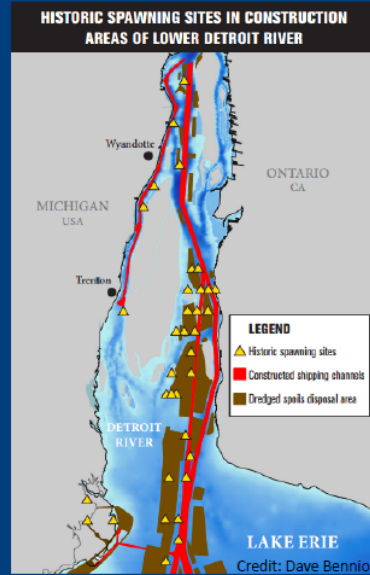
## St. Clair-Detroit River System

- Historically supported:
- Huge runs of spawning fishes
- Largest commercial GL fishery in late 1800s
- Large lake sturgeon population



# Habitat Loss

- Construction of shipping channels
  - Loss of spawning substrates
  - 46,200,000 m<sup>3</sup> substrate removed
  - 4,050 ha covered with dredge spoils

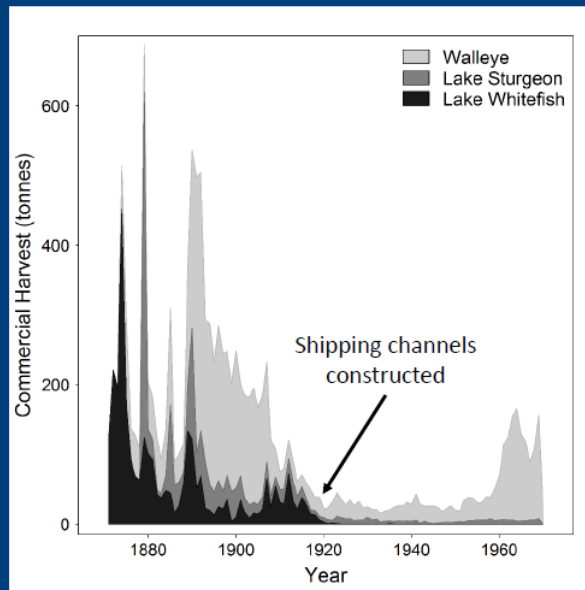


## Habitat Loss: Shipping Channels





## Shipping Channels Reduced Populations



## Reef Remediation in the SCDRS

# Evidence of Spawning At Artificial Reefs



# The Reef Team

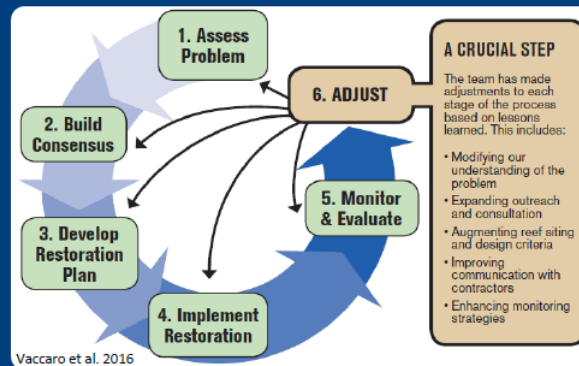


## Many Unknowns Remained

- What substrate types and sizes?
- How large to construct reefs?
- Where to construct reefs?

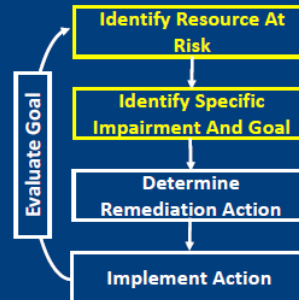
## Adaptive Approach To Remediation

- Follows the adaptive management paradigm
- Evaluation a critical component
  - Measure project effectiveness
  - Learning improves future efforts



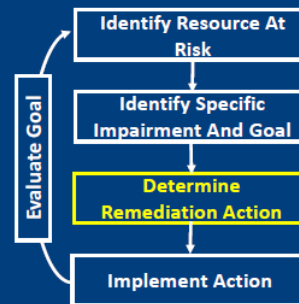
## First Steps

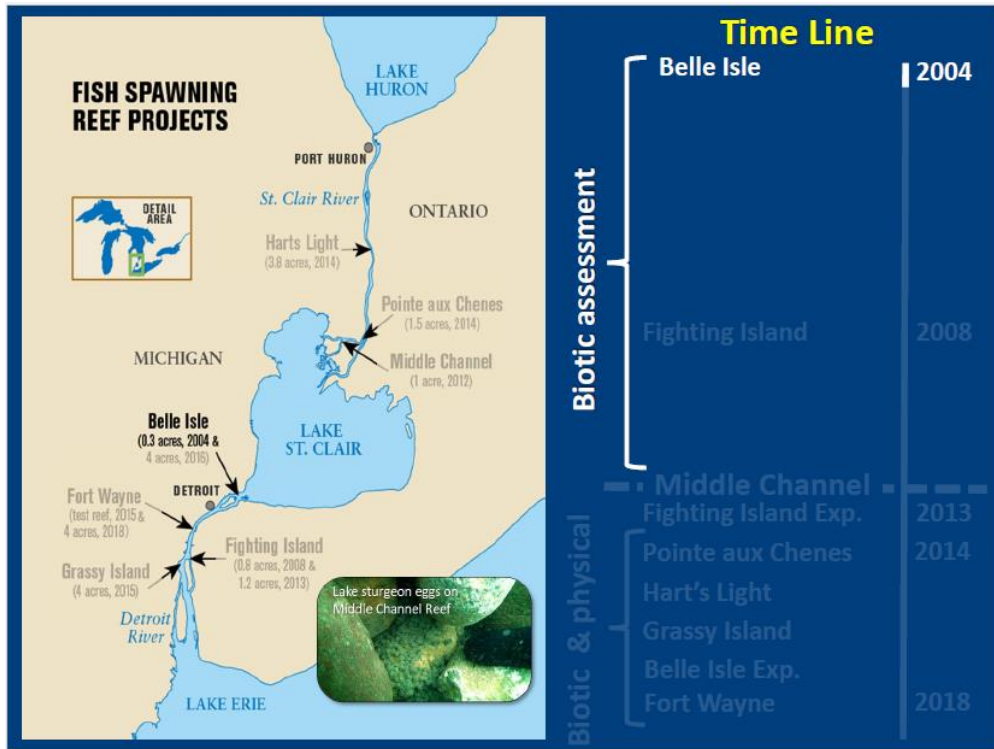
- Is there a problem?
- What is the specific problem?
  - What are the management goals?



## Management Actions

- What actions will address management goals?





## Belle Isle Reefs - 2004

- 0.3 acres
- 3 sub-reefs



## Evaluation

- Did fish spawn on reef?
- Are larval fish present?
- Are spawning adults using reef?



## Belle Isle Reefs – Results and Lessons Learned

- No Lake Sturgeon eggs collected
  - Reefs too small?

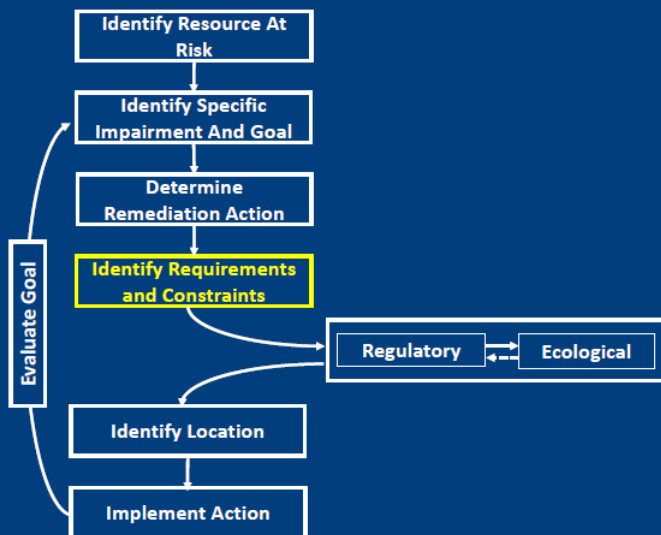


## Belle Isle Reefs – Results and Lessons Learned

- Hiccups with land ownership
  - Property rights extend to Canadian boarder
- Hiccups with navigation
  - Deep draft vessels could damage reefs or run a ground



## Another Step in the Process

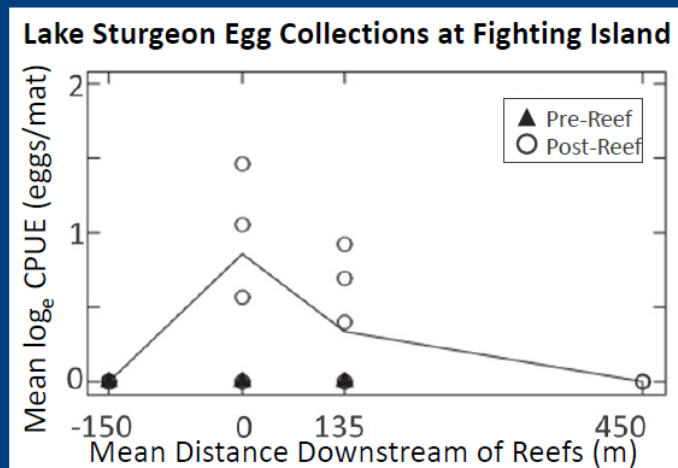


# Fighting Island and Middle Channel Reefs



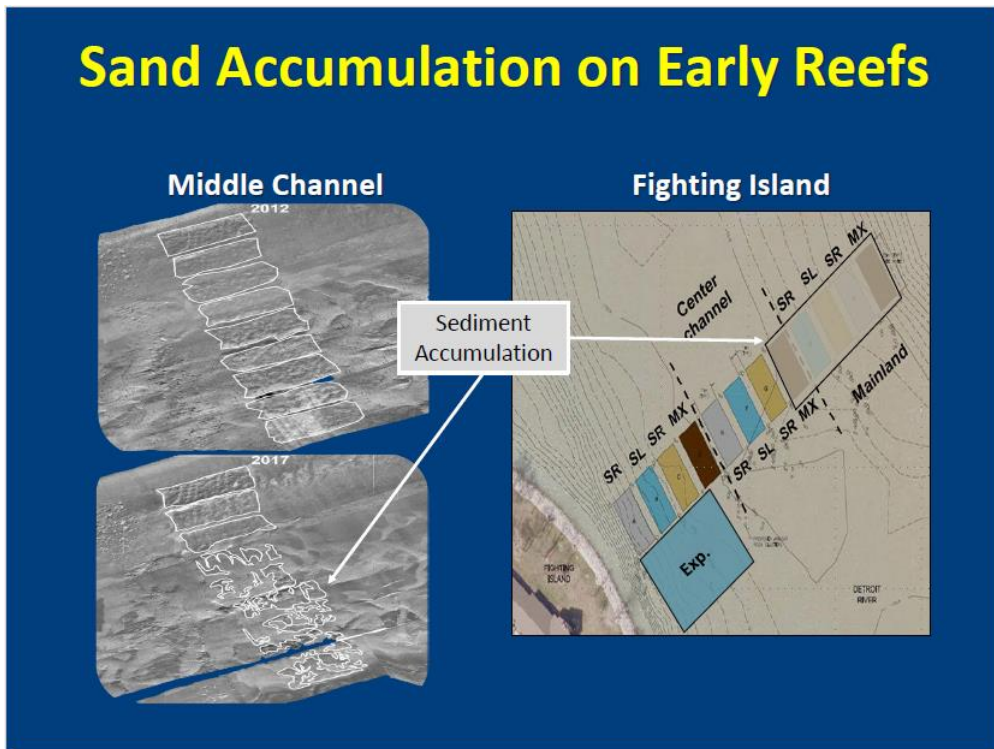
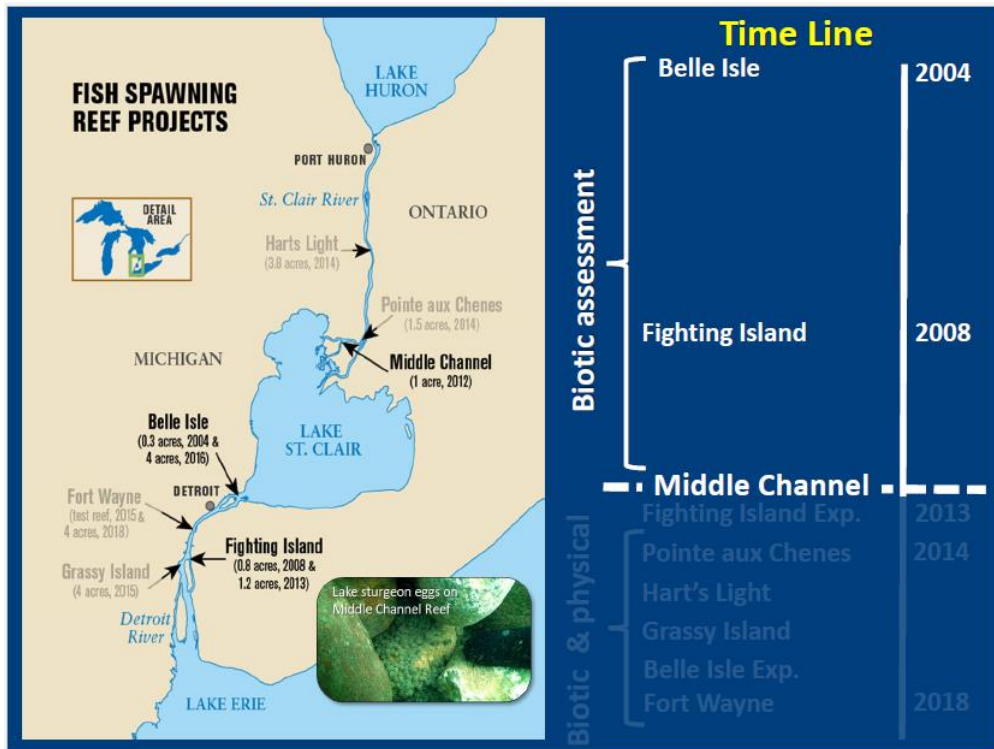
## Evaluation

- Documented Lake Sturgeon spawning on both reefs

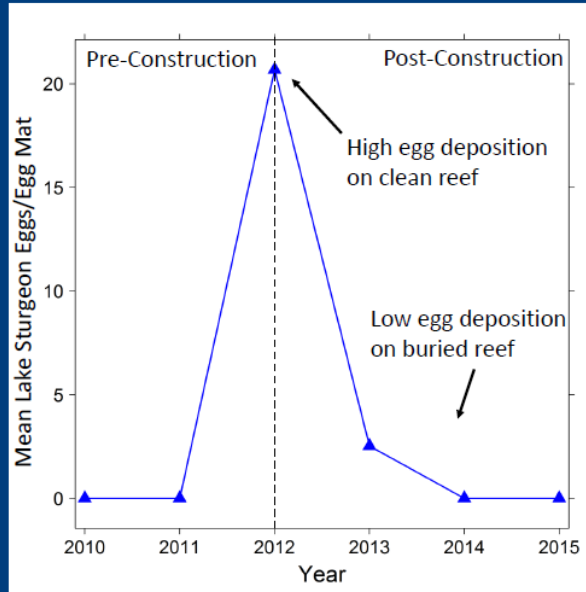


Prichard et al. 2017

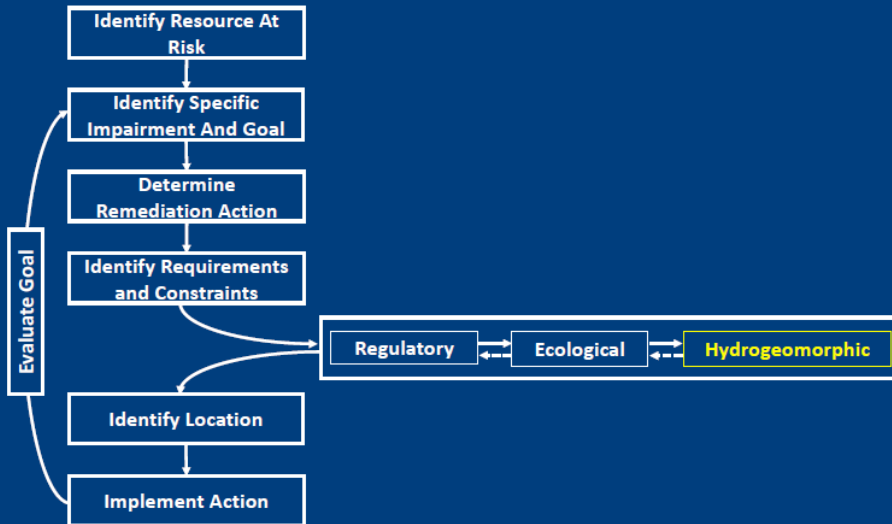




# Lost Spawning Habitat



# Expand the Process Further

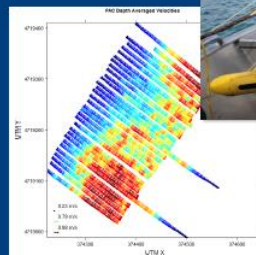


# The Reef Team Expanded

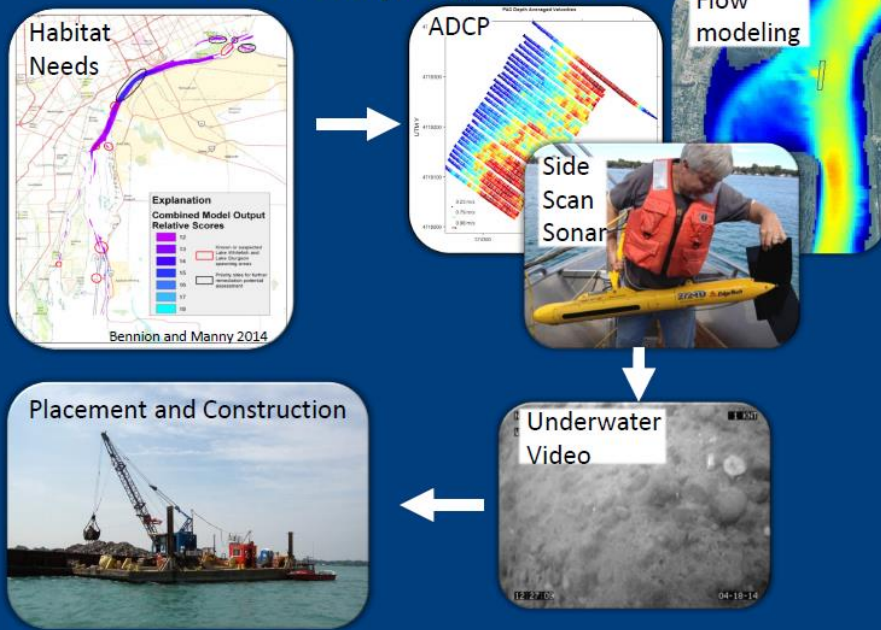


# Added Physical Habitat Assessments

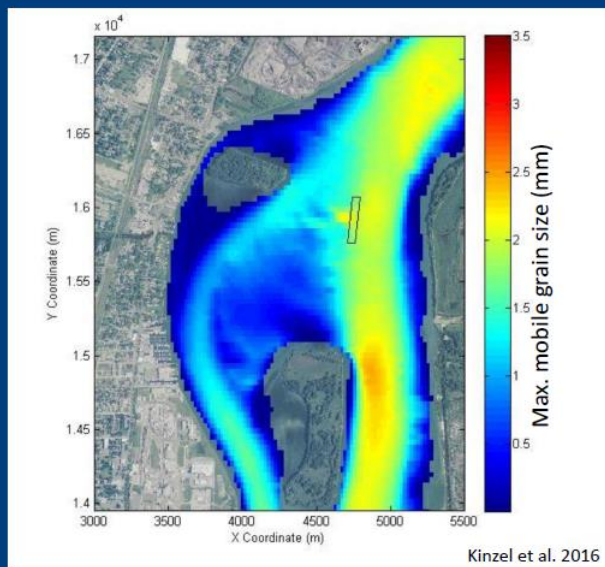
- New reefs cited using geomorphic criteria
  - Optimize design and placement
  - *After Middle Channel*
- Mapping and modeling:
  - Depth
  - Velocity
  - Substrate
  - Sediment transport
  - Reef shape



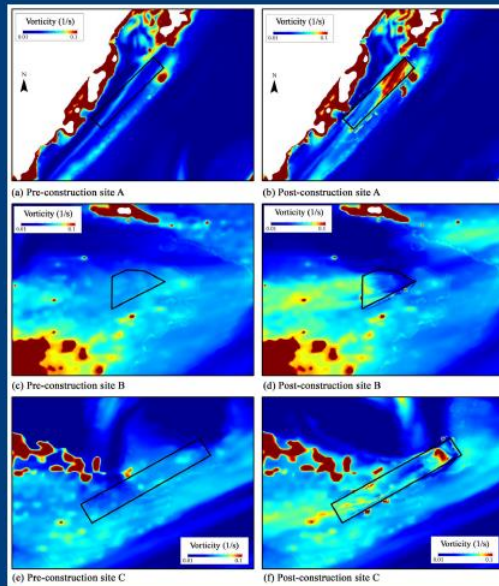
# Identifying Sites



# Course Scale Flow Models To Narrow Down Possible Sites

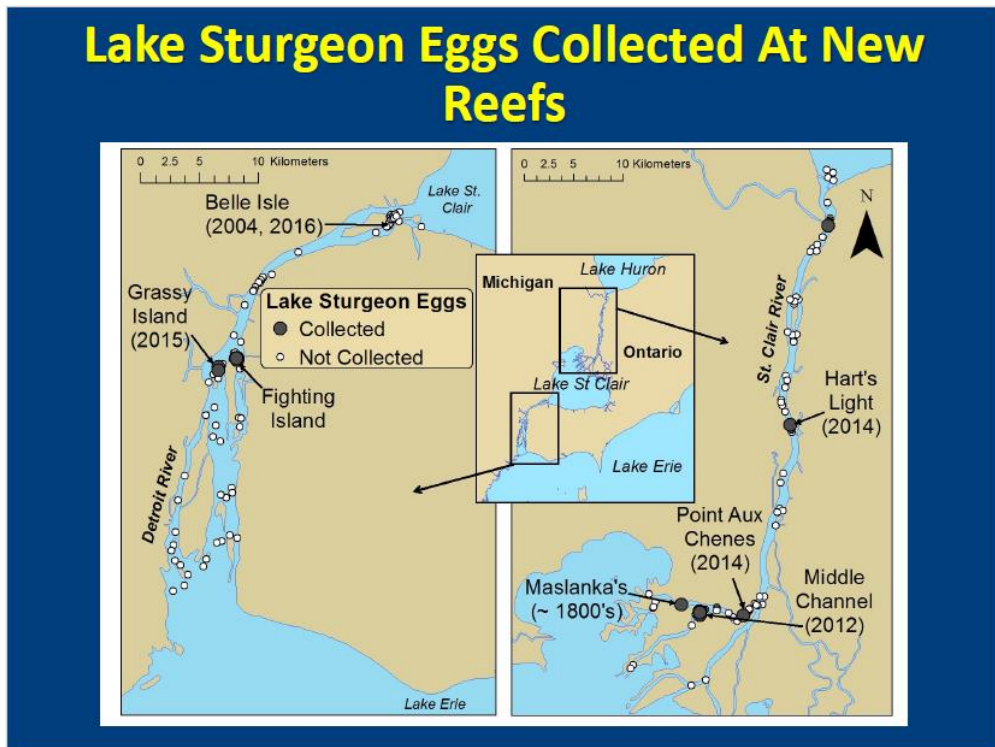
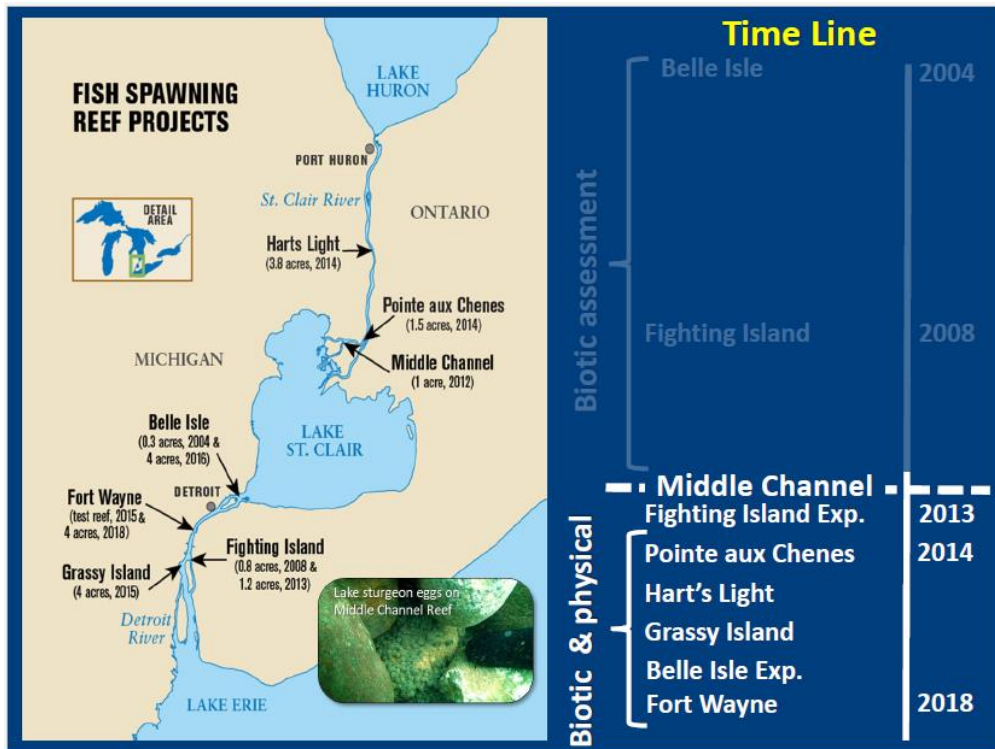


## Fine Scale Models at Select Locations



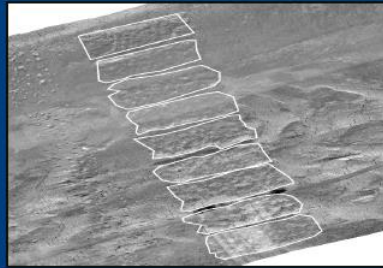
## Flume Studies to Assess Designs





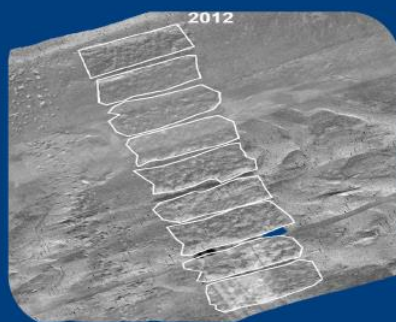
# Measuring Physical Maturation

- Evaluation:
  - Side-scan sonar
    - Quick
    - Large coverage
  - Underwater video
    - Intensive processing
    - Small extent

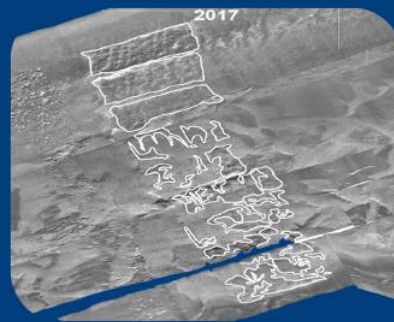


# Measuring Reef Size

- Quantify changes through time
- Reef outlines visually delineated

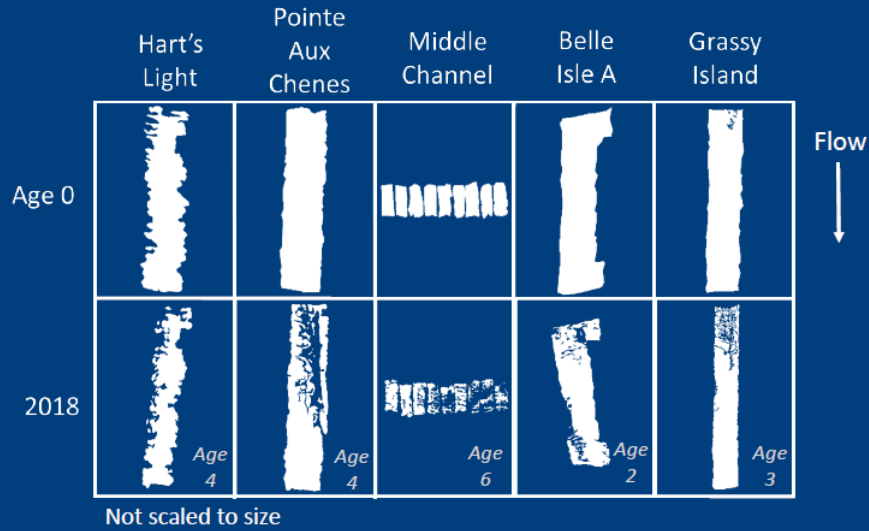


Middle Channel: Age 0



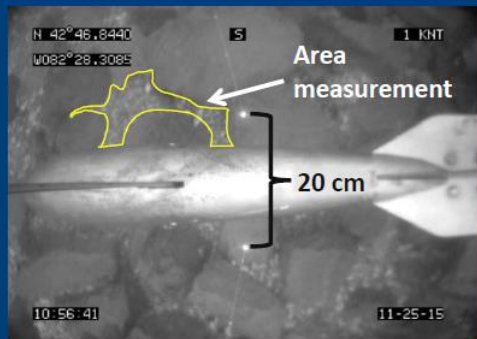
Middle Channel: Age 5

# Reef Area Decreasing



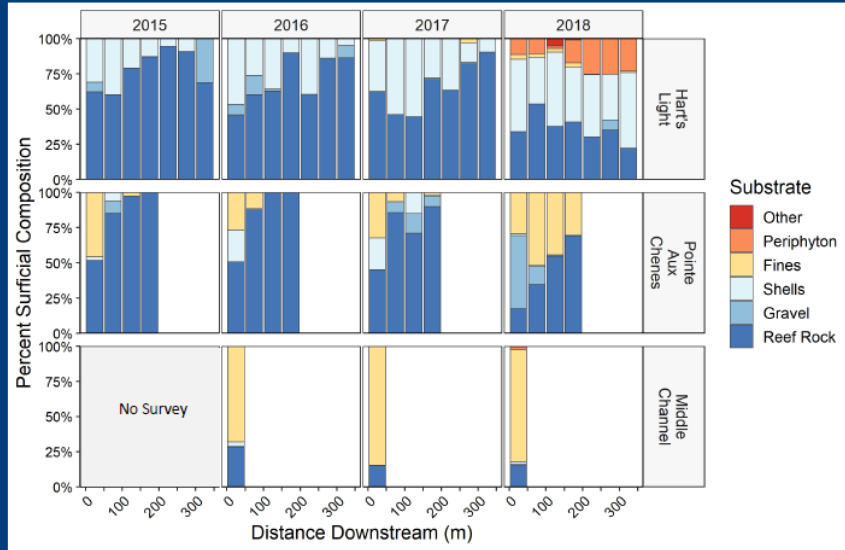
# Underwater Video

- Transects parallel to reefs
- Measure percent coverage
- 2015-present

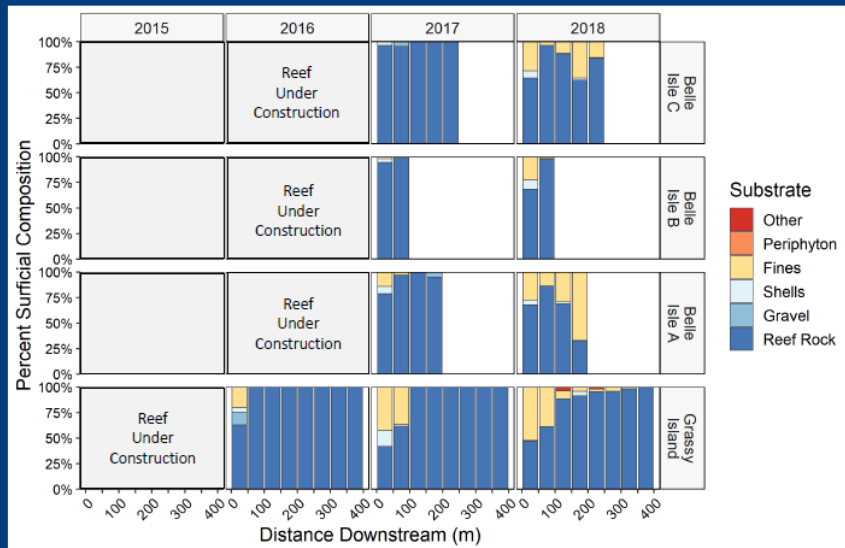




# Changing Sediment Composition



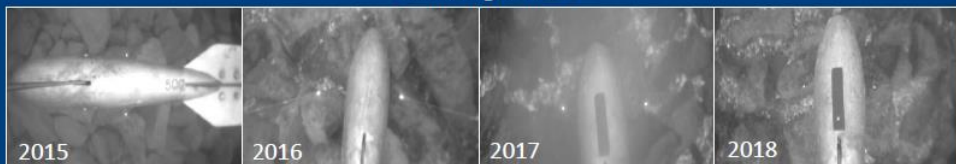
# Changing Sediment Composition



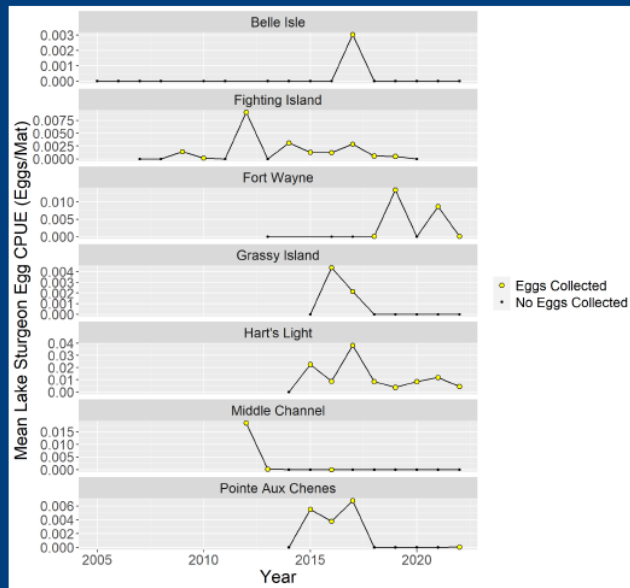
# 2018 Observations

- In-filling occurring across reefs
  - Rate varies
  - Sediment type varies
- Type of in-filling matters
  - Lake sturgeon continue to spawn at Hart's Light
- Portions of reefs remain exposed

Hart's Light Reef



# Lake Sturgeon Egg Collections Variable Across Reefs



## Reef Maintenance

- Relevant to natural and constructed reefs
- Applicable methods from other fields
  - Flushing flows
  - Suction dredging
  - Propulsion
- Cost effective methods currently being evaluated

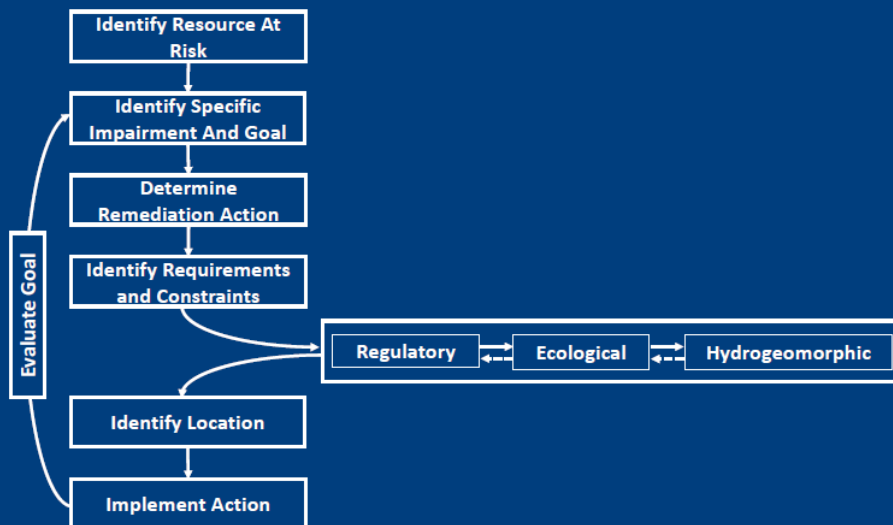


## Continued Monitoring

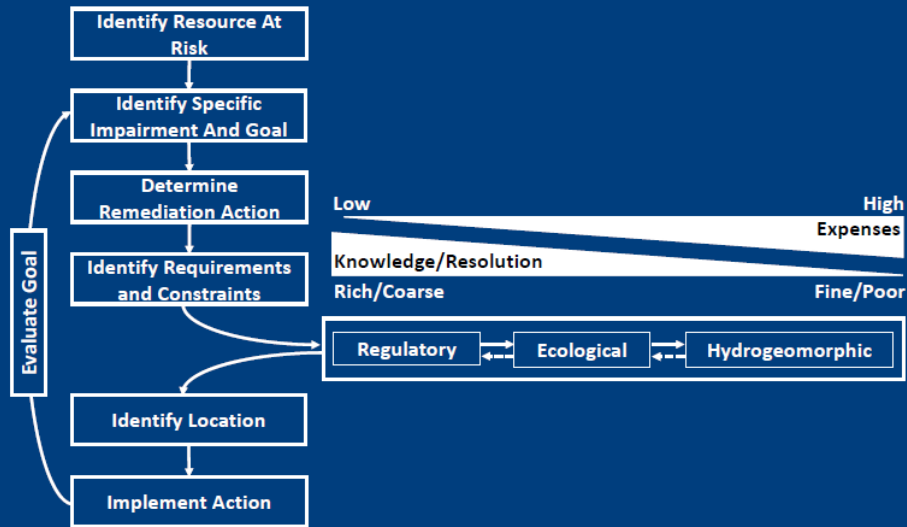
- Short-term funding for each project
  - “Extended” funding by spacing projects and planning evaluations strategically
- Long-term evaluations:
  - Piggyback on ongoing research and management
    - Egg and larval assessments
  - Leverage funding from CSMI
    - 5-year rotation
    - Physical habitat assessments

# What Did We Learn About the Restoration Process?

## Remediation Process



# Remediation Process



# Organized For Success



# Organized For Success

**“Third-party” coordination**

- Non-manager/research leads
- Served as fiduciary
- Maintained open and constructive discussion

# Organized For Success

**Diverse group**

- Wide knowledge base
- Input and critique on multiple facets

# Organized For Success



**Proactive**  
Eval. successes and failures  
Open about shortcomings  
Demonstrate learning



# Questions?

