

Proposal to develop the Niagara River Observatory (NRO)

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**THE GREAT
LAKES CENTER**

Buffalo State
State University of New York



The Importance of the Niagara River:

- Drains the combined watersheds of 4 of the 5 Great Lakes
- Supplies 83% of the tributary flow to Lake Ontario
- Ecologically important corridor for fish and wildlife
- Habitat for diverse aquatic community

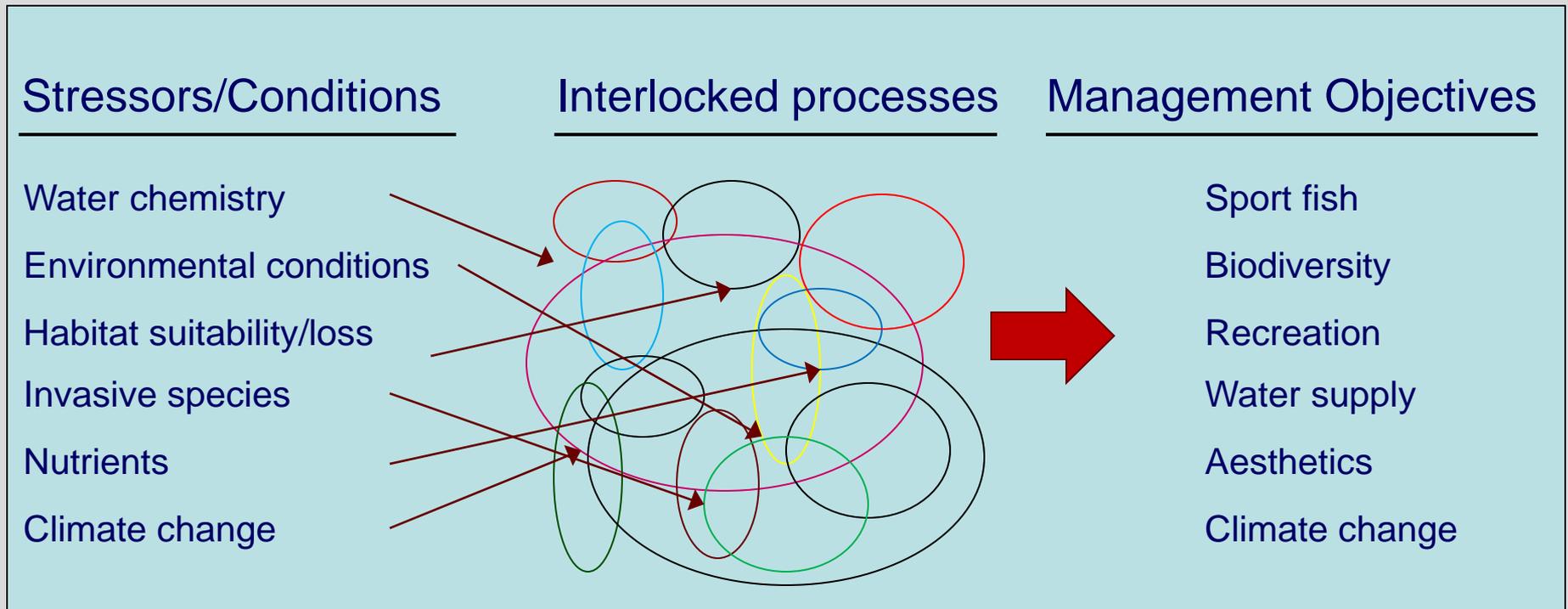


Historic and current impacts on the Niagara River:

- Contamination of water and sediment
- Habitat loss and modification
- Invasive species introduction
- Water level fluctuations
- Nutrient loading



Challenges to resource management



- Lack of data on biological communities (*e.g. benthos, fish*)
- Lack of understanding of the complex ecosystem dynamics
- Lack of contemporary abiotic data online (*e.g. flow rate, temperature, chemistry*)
- Lack of a system that incorporates historic and current data

Providing information to stake-holders of the Niagara River

Stressors/Conditions

Interlocked processes

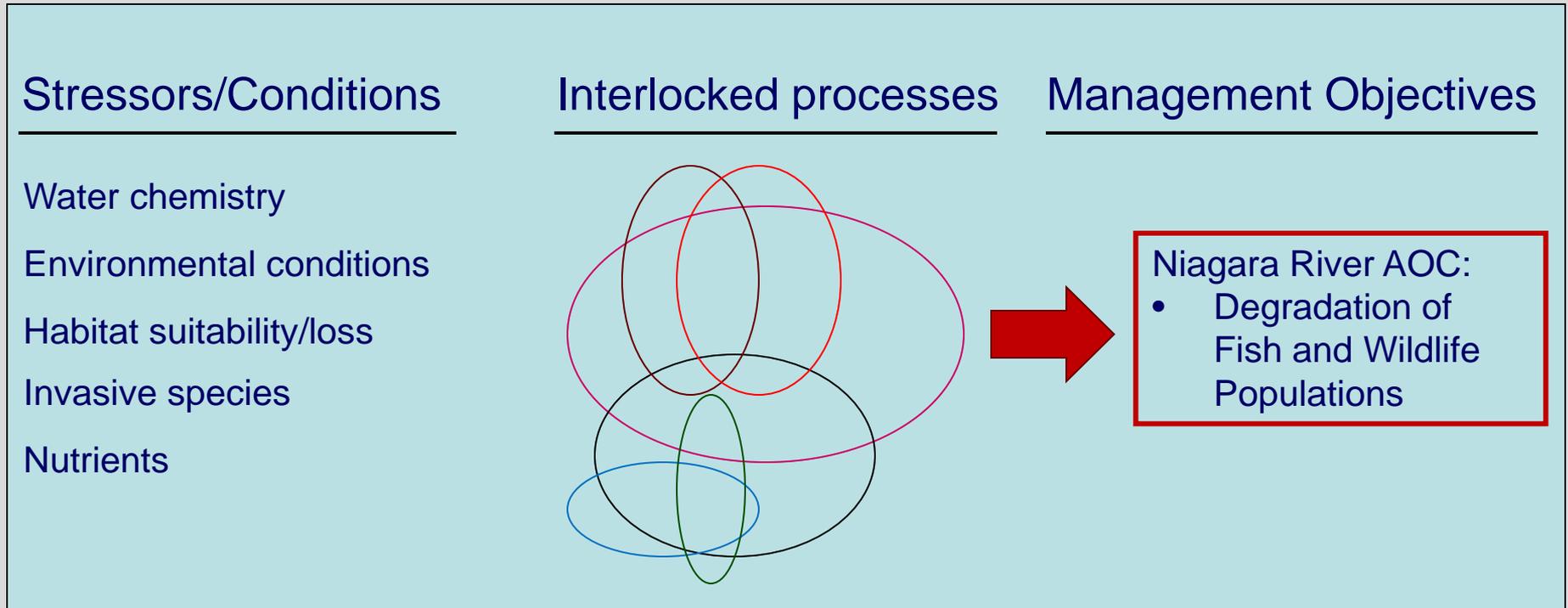
Management Objectives

Niagara River AOC:
• Degradation of Fish and Wildlife Populations

Niagara River Remedial Action Plan calls for:

- 1. Assessment of Lake Sturgeon Population**
- 2. (If necessary) Develop and implement long-term restoration plan for Lake Sturgeon**
- 3. Develop and implement long-term monitoring plan for Lake Sturgeon**

Providing information to stake-holders of the Niagara River



Assessment needs

1. **Suitability of available critical habitat (spawning, nursery, and feeding grounds)**
2. **Sufficient food availability and quality**
3. **Historic abundance and habitat use**

We Need:

an Integrated Observing System, where ecosystem functions are understood in a comprehensive, holistic process, closing the data and knowledge gaps in the prediction of the ecosystem functioning

We propose to establish

Niagara River Observatory (NRO) as a

- Multidisciplinary research, Education, and Service program
 - Focusing on the physical, chemical, biological, and social dimensions of the Niagara River and its watershed
- Concentrating scientific expertise among local and international scientists from multiple institutions and across disciplines focusing on the Niagara River ecosystem

Long-term goals of the NRO

1. Provide historical and current data, reports, and perspectives to help establish targets for remediation, restoration, and conservation.
2. Monitor and assess the current status of communities and environmental conditions to provide up to date status assessments.
3. Develop an outreach platform that provides functional access to compiled data for use in management, restoration, and conservation.

The Niagara River Observatory

- Is there a need?
 - Yes, a very obvious lack of data and coordinated effort
- Is there interest?
 - Yes, several government agencies have agreed on the need for this type of system
- Who might be interested?
 - Agencies and researchers
 - Fishermen and recreationalists
- Can we do this all in one shot?
 - No, we can't.



Objectives of proposed work

1. *Create a knowledge database that will incorporate historic and current data on biodiversity and community structure of the major aquatic communities, with the special emphasis on threatened and endangered species as well as exotic species.*
2. *Provide real-time environmental data for sites in the lower Niagara River by installing a Great Lakes Observation System (GLOS) buoy and water level loggers in the lower Niagara River.*
3. *Estimate presence and biomass of selected fish species, and temporal/spatial distribution of selected fish species in the lower Niagara River using hydro-acoustic fishery surveys.*
4. *Use bathymetric and habitat data obtained from USFWS's side-scan sonar project on the lower Niagara River to develop habitat maps. Using the habitat maps, assess diversity and community structure of benthic invertebrates in the lower Niagara River.*
5. *Document diet, habitat use and behavior (movements and migrations) of lake sturgeon in the lower Niagara River.*

1. Create a knowledge database that will incorporate historic and current data on biodiversity and community structure of the major aquatic communities, with the special emphasis on threatened and endangered species as well as exotic species.

- People seek scientific information about the ecology the Niagara River for management, policy making, recreation and research.
- Sources are often difficult to find, spread out across multiple agencies, or not cataloged as relevant to the Niagara River.
- Develop a geographically focused and relevant bibliographic database with references to aquatic organisms of the Niagara River and the Great Lakes.

KnowledgeBase Science & information management for the Gulf of Maine & its watershed

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2. *Provide real-time environmental data for sites in the lower Niagara River by installing a Great Lakes Observation System (GLOS) buoy and water level loggers in the lower Niagara River.*

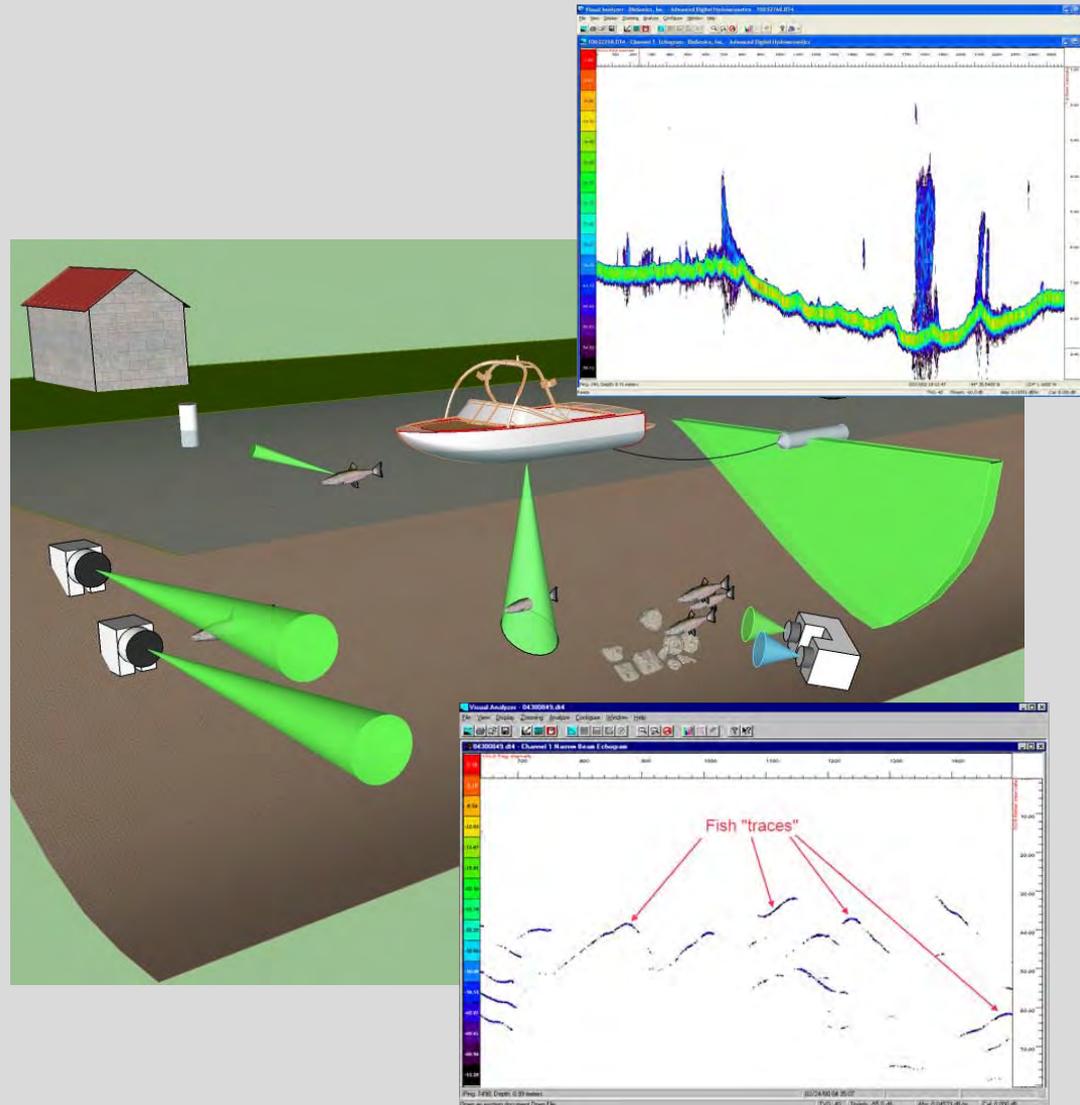


- Great Lakes Observation System (GLOS) framework
- GLOS buoys typically measure air temperature, relative humidity, wind speed and direction, air pressure, water temperature, wave height, period, and direction
- Incorporate water level and temperature loggers throughout the system that follow strict and consistent protocols
- Share this data in as close to “real-time” as possible

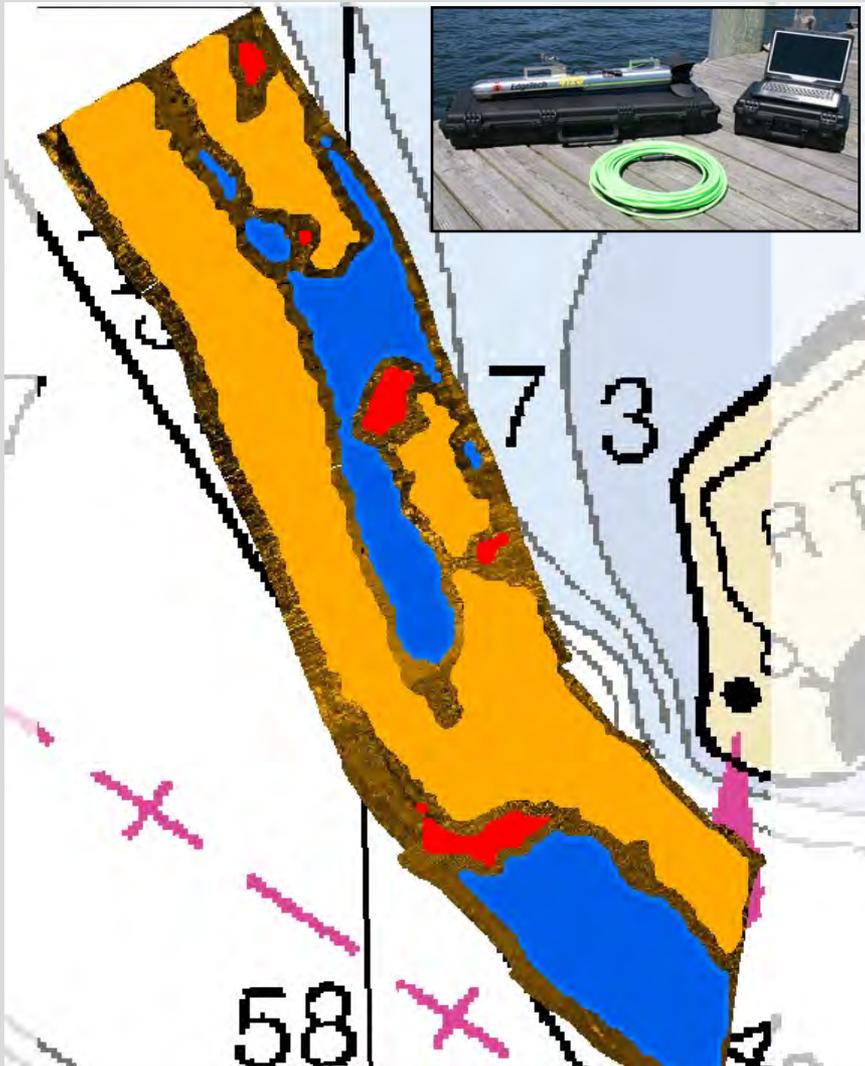


3. Estimate presence and biomass of selected fish species, and temporal/spatial distribution of selected fish species in the lower Niagara River using hydro-acoustic fishery surveys.

- Understand distributional patterns of the fish community
- 2-styles of hydro-acoustic components
 - Side-looking for across river observation
 - Downward-looking for biomass and distribution
- Observe migratory patterns in and out of the river
- Estimate numerical abundance or biomass of species of interest



4. Use bathymetric and habitat data obtained from USFWS's side-scan sonar project on the lower Niagara River to develop habitat maps. Using the habitat maps, assess diversity and community structure of benthic invertebrates in the lower Niagara River.



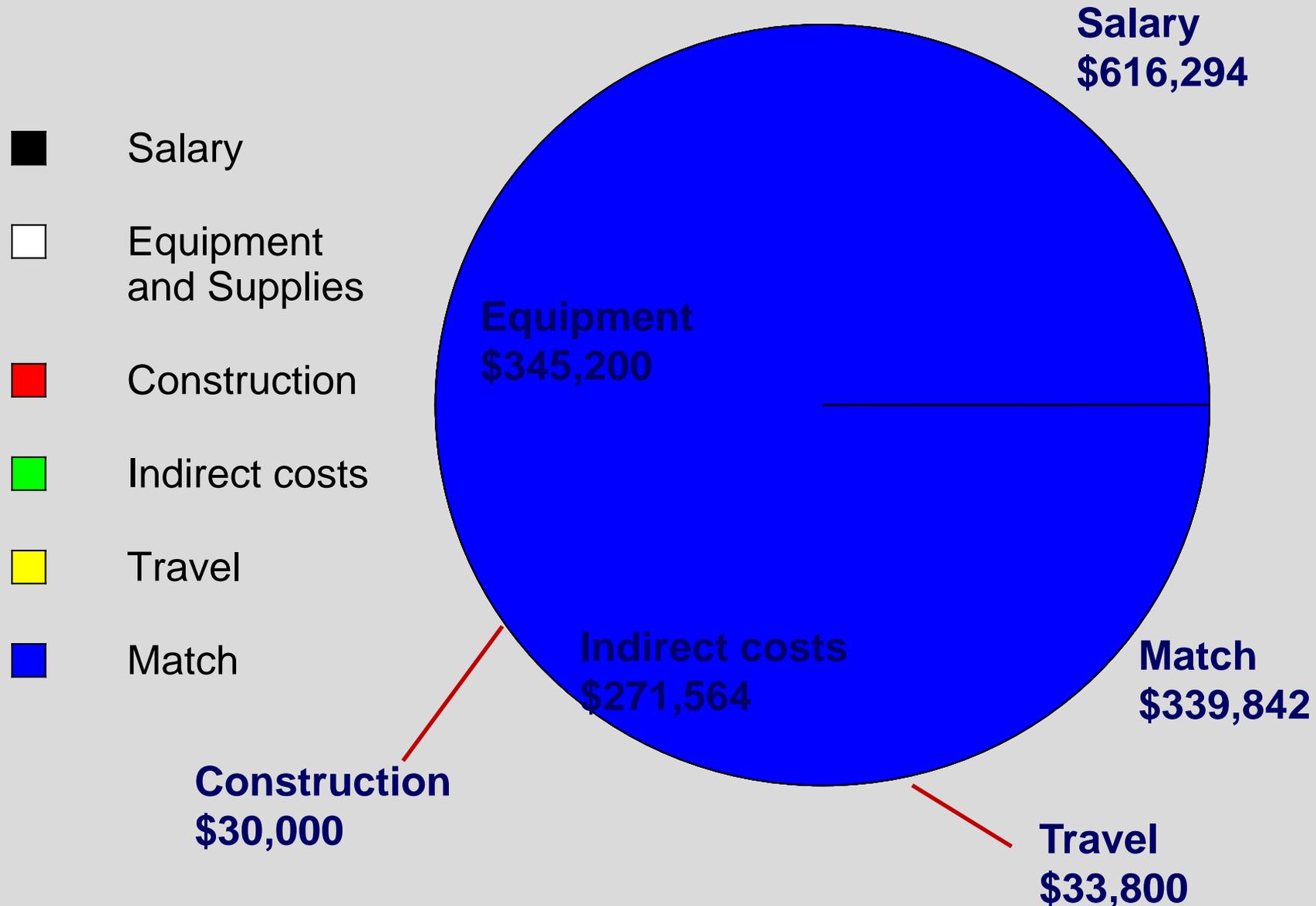
- Combining high-tech remote sensing data with traditional ecological surveys
- Species composition, densities, and biomass to develop benthic indices
- Identify priority habitats and extent by combining physical characteristics and benthic indices
- Develop habitat maps for multiple species of organisms across the benthic community

5. Document diet, habitat use and behavior (movements and migrations) of lake sturgeon in the lower Niagara River.

- Status and observed habitat use
- Dietary needs of lake sturgeon using the Niagara River
- Habitat use
 - Acoustic telemetry
 - High occupancy
 - Relate to benthic habitat maps
- Model habitat availability and carrying capacity of the lower Niagara River
- Relevant to establishing recovery targets for Lake Sturgeon



Proposed budget



The Niagara River Observatory will:

- **Provide the best possible science** to decision-makers concerned with the health and sustainability of resources of the Niagara River
- Serve as a **technical and intellectual resource** for resolving environmental issues, and interpret the unique natural, cultural, recreational, scenic and heritage resources of the Niagara River
- **Promote and facilitate collaboration** with all stakeholders including USFWS, USGS, DEC, River Keepers, etc.
- **Improve the knowledge and understanding of biological resources and ecosystem** of the Niagara River, which is critical in promoting long-term sustainability of the system.
- **Serve as a model** for other important river corridors in the Great Lakes Region and nationwide

