Developing a Science and Monitoring Strategy to Assess Recovery of Fisheries Habitats and Populations in the St. Clair-Detroit River System

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St. Clair-Detroit River System

160 km long

International border

Key trade route

Major industrial & metropolitan centers

Hondorp et al. 2014. An ecological basis for fish habitat restoration in the Huron-Erie Corridor. Journal of Great Lakes Research 40 (Suppl 2): 23-30.

Table 1
Mean annual discharge for the Great Lakes connecting channels (highlighted in bold font) and other large river systems of the world. Discharges from Table S1 of Nilsson et al. (2005) except where noted.

River system	Annual mean discharge ($m^3 s^{-1}$)
Mississippi	18,400
St. Lawrence	**10,800**
Columbia	7500
Danube	6450
Yukon	6370
Niagara[a]	**5692**
Detroit[a]	**5210**
St. Clair[a]	**5097**
Nile	3000
St. Marys[a]	**2100**
Missouri[b]	1955
Sacramento	1140
Colorado	550

A Vibrant Ecosystem Exists

- Drinking water, transportation, industry
- World-class muskie, smallmouth bass, walleye, yellow perch
- Increasing evidence of lake sturgeon, lake whitefish, rare and endangered species
- Bald Eagles
- Migratory waterfowl
- Continued recovery

Key Issues in St. Clair & Detroit River

Industrialization
Legacy Contaminants

Urbanization

Erosion/sediment

Loss of habitat

Recruitment issues

Invasive species impacts

R. Burns

The Need for Continued Restoration

- Major habitat degradation associated with:
  - Riparian development / urbanization
  - Industry & associated pollutants
  - Dredging & channel modification
  - 97% of wetlands loss
- Variability in fisheries recruitment and production
  - Within SCDRS and adjoining Great Lakes
- Loss of ecosystem services
  - Societal, Economic, and Ecological

Our Approach

- Communication and Consensus Building
  - Interjurisdictional agencies and partners
  - Identify and define management goals and objectives
- Inventory of monitoring and assessment programs
  - Workshops and conference calls
  - Database developed
  - Relate to broad management goals and objectives
  - Identify redundancies, collaborative opportunities
- Viability analysis
  - Snapshot of baseline conditions and trends
  - Identify and prioritize knowledge and monitoring gaps

Communication & Consensus Building

- **St. Clair – Detroit River System Initiative**
  - Organized in 2004
  - Voluntary consortium of researchers, managers, academic, federal, provincial, state, First Nations and private sector groups
  - Successfully cultivating effective working relationships

St. Clair - Detroit River System Initiative

scdrs.org

St. Clair - Detroit River System Initiative

A Collective Impact Initiative for Recovery

*Components**	*Description*
Common Agenda	Strategic Priorities: shared vision, common understanding of problem, joint approach for solutions, agreed to actions
Shared Measurement System	common evaluation of success
Continuous Communication	frequent, informed interactions
Mutually Reinforcing Activities	coordination of separate signatory efforts thru over-arching plan of actions
Backbone Support Organizations	dedicated core facilitation, structured decision making

SCDRS.org

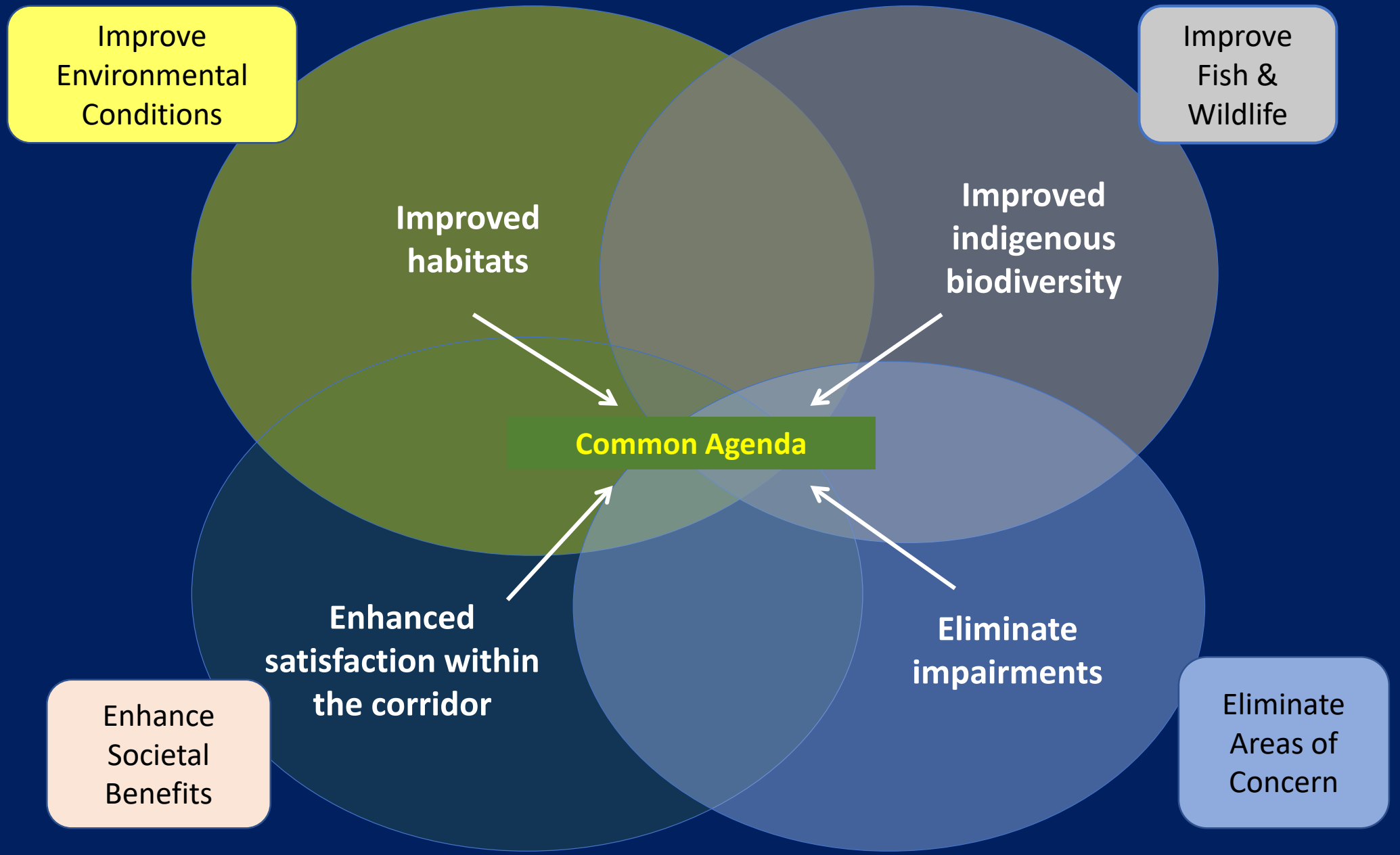
Kania& Kramer, 2011. Collective Impact. Stanford Social Innovation Review.

St. Clair - Detroit River System Initiative

Shared Vision Statement: The St. Clair-Detroit River System is a thriving ecosystem managed with science-based principles and broad social support, providing desired environmental services for the region and the Great Lakes basin.

SCDRS.org

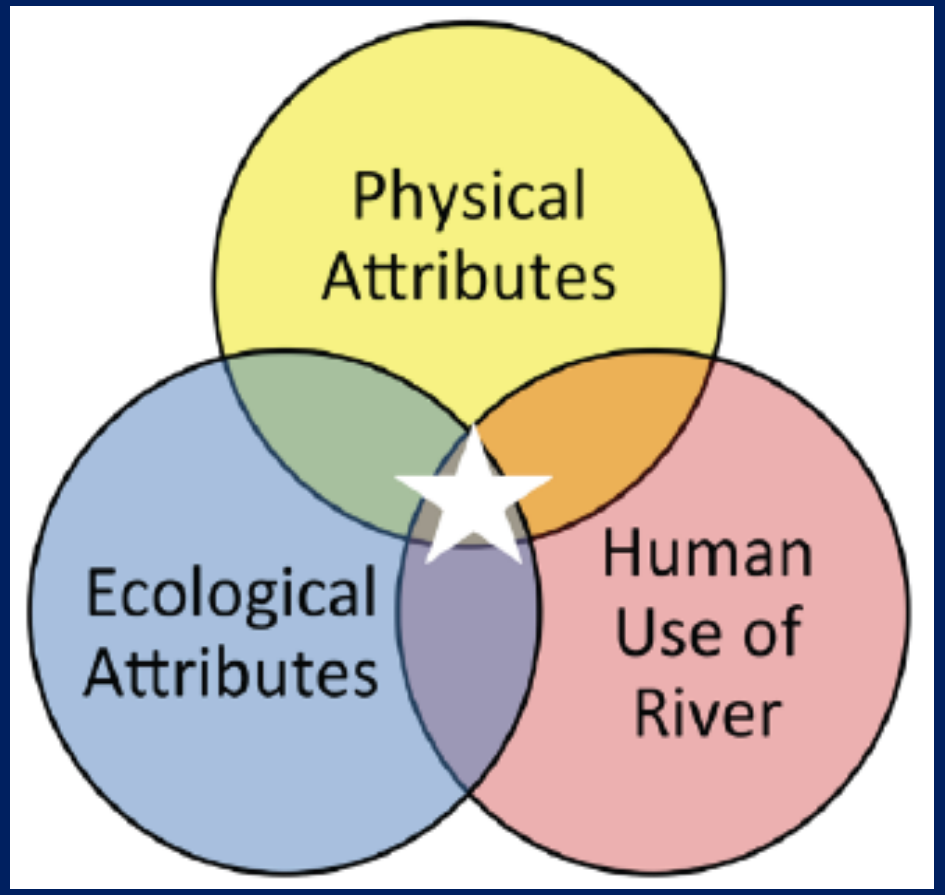
Common Agenda : An Integration of Strategies

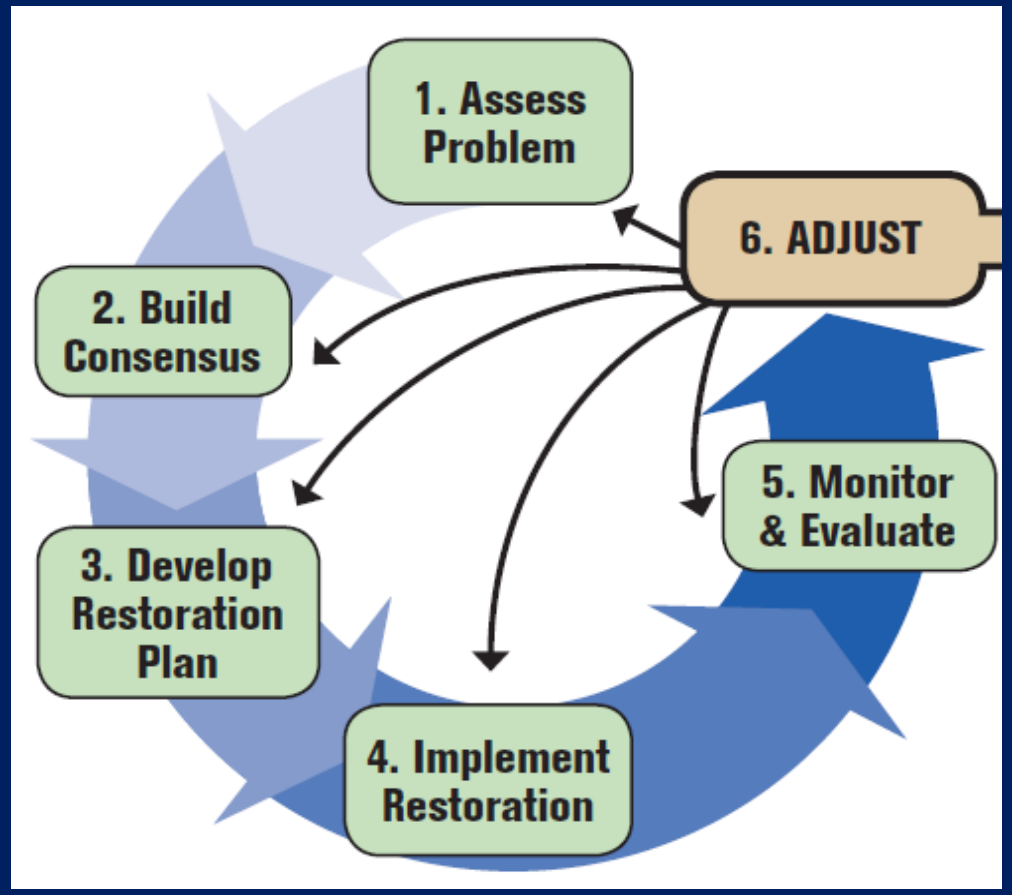


Adaptive Management Principles

Involves risk, uncertainty

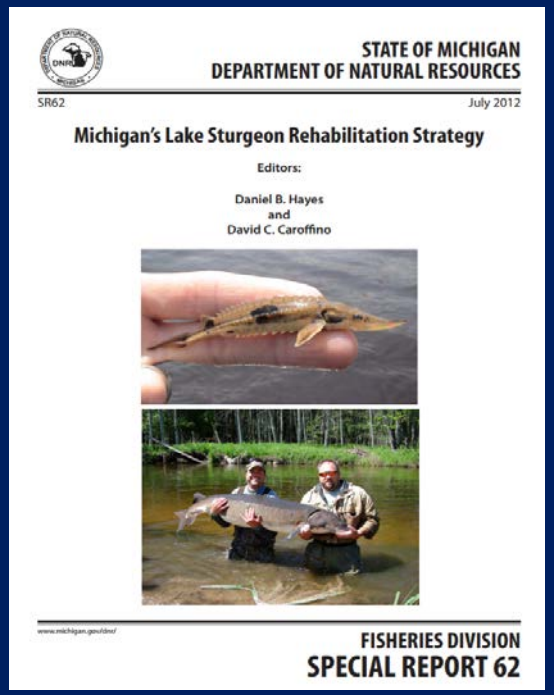
Learning by questioning, experimenting, & monitoring outcomes





Integration with Larger Fisheries Plans

- Strategic Great Lakes Fishery Management Plan
- Lakes Huron & Erie Fish Community Objectives (GLFC)
- Michigan & Ontario Lake Sturgeon Rehabilitation Strategies
- Species at risk programs



Large Investments in Habitat Restoration

- Shoreline habitat restoration, added riparian complexity
- Fish spawning reefs restored
- Water quality improvements
- Positive responses by fish, aquatic fauna, & stakeholders
- Delisting of Beneficial Use Impairments

The Need to Measure Progress

- How are restoration efforts performing/maturing?
  - Physical maturation
  - Biological function
- What are trajectories for fish populations?
- What are views and desires of anglers and stakeholders?
- How are management goals and objectives being realized?

Transitioning from Research to LTMP

- Relevant to management goals/objectives
  - Adaptive management design
  - Interjurisdictional consensus
  - Timely and regular analyses and reporting
- Ability to detect changes in metrics
  - Standardized methods
  - Establish baselines
- Statistically rigorous & credible
- Realistically affordable & sustainable
  - Requires commitment
  - Pool resources & collaborate

Caughlan & Oakley. 2001. Cost considerations for long-term ecological monitoring. Ecolog. Indic. 2001:123-134.

Lindenmayer & Likens. 2010. The science and application of ecological monitoring. Biol. Conserv. 143:1317-1328.

Oakley et al. 2003. Guidelines for long-term monitoring protocols. Wildlife Society Bulletin 31(4):1000-1003.

Compiling an Inventory & Database of Monitoring Programs

- Inventory of historic and existing monitoring programs
  - Agency, Target, Methods, Scope, Data sets, Reports
  - Long-term and short term programs
  - Relational database routinely updated

- Link to SCDRSI Priority objectives and key indicators
  - Identify match/mismatch between objectives and monitoring
  - Identify need for new or expanded monitoring programs
  - Identify specific research projects

Viability Analysis

- Identify Key Ecological Attributes and Targets
- Rate status of indicators
- Identify information gaps and science needs
- Provide snapshot of baseline status and trajectories
- Inform monitoring needs

Indicator Rating	Description	Points Assigned to Indicators	KEA / Target Range
Very Good	The indicator is functioning at an ecologically desirable status and requires little human intervention.	4.0	3.75 - 4.0
Good	The indicator is functioning within its acceptable range of variation; it may require some human intervention.	3.5	3.0 – 3.745
Fair	The indicator lies outside its acceptable range of variation and requires human intervention. If unchecked, the target will be vulnerable to serious degradation.	2.5	1.75 - 2.995
Poor	Allowing the indicator to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.	1.0	1 – 1.745
NA	Target was not applicable in the specific segment		

Example Indicator Report Card to Measure Progress

Themes ⟹ Protection, enhancement, and restoration of physical habitat.

Goal ⟹ Completion of targeted habitat projects as per AOC habitat plans; pre/post monitoring protocol for projects.

Priority Objective ⟹ Complete habitat improvement projects to remove loss of fish and wildlife habitat Beneficial Use Impairment (BUI)

Indicator	Time Frame	Status
Number of projects left to complete leading to the removal of this BUI in the Detroit River	**Annually**	9
Number of projects left to complete leading to the removal of this BUI in the St. Clair River	**Annually**	**Complete**
Canadian response indicators	**Annually**	**Research and monitoring need**
Overall rating		**Good/Improving**

A Renaissance for Large Rivers

- Scientifically credible collective impact & adaptive approach.
- Reviving resilient functional ecosystems and economies.
- Support multiple wise uses.
- Restore a *sense of place*, heritage, & tradition.

Acknowledgments