

Using Freshwater Mussels to Monitor Ecosystem Recovery in the Ausable River Watershed



A.D. Latornell Conservation Symposium, Alliston, Ontario, 17 November 2011



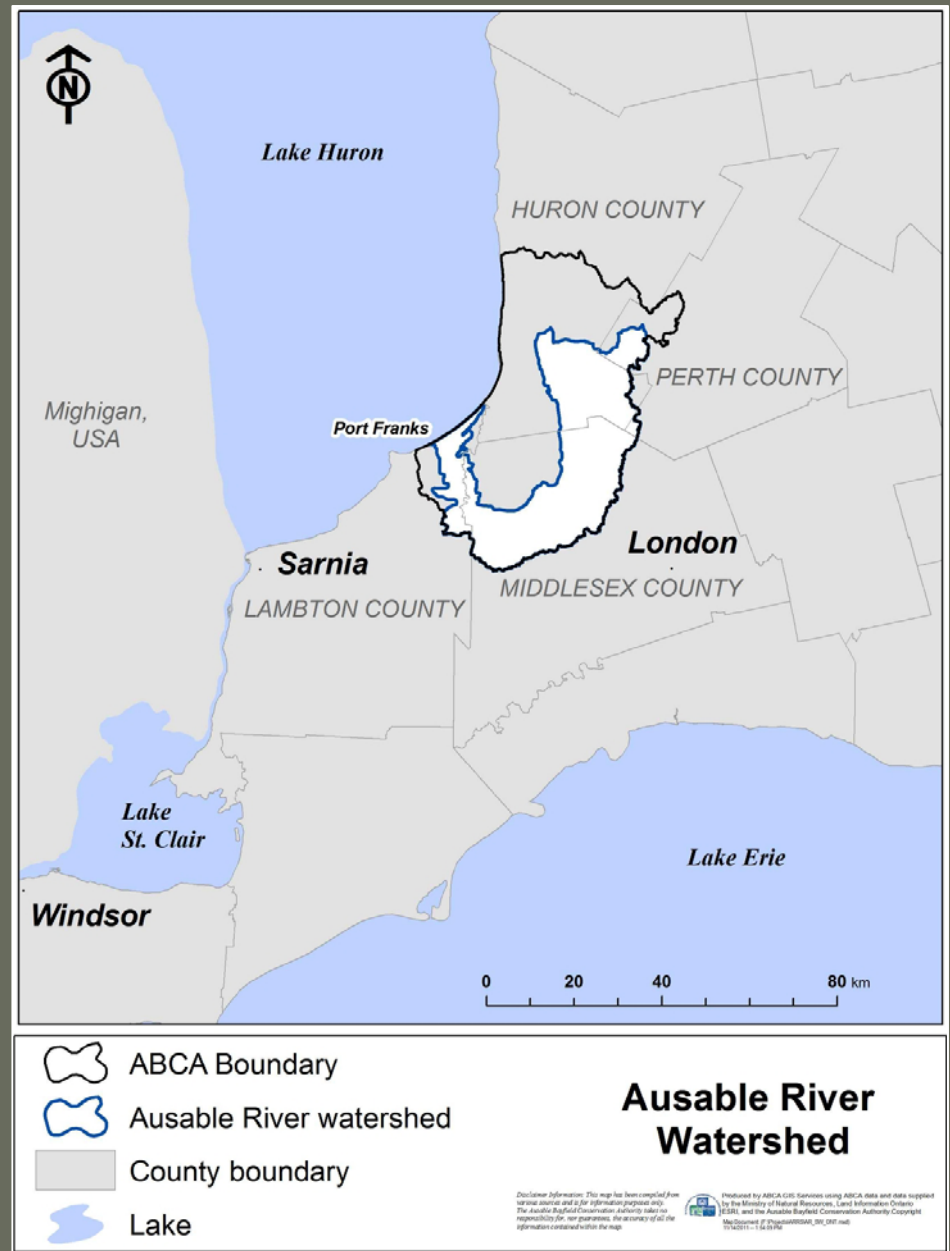
Brynn Upsdell

Ausable Bayfield Conservation Authority

71108 Morrison Line, R.R. 3, Exeter, Ontario, N0M 1S5

Ausable River

- In terms of species, one of the richest watersheds of its size in Canada
- Freshwater mussels:
 - 26 species
 - 6 SAR



Ausable River Mussel Species at Risk



Snuffbox
(Endangered)



Kidneyshell
(Endangered)



Rainbow Mussel
(Endangered)



Mapleleaf Mussel
(Threatened)



Northern Riffleshell
(Endangered)



Wavy-rayed Lampmussel
(Special Concern)

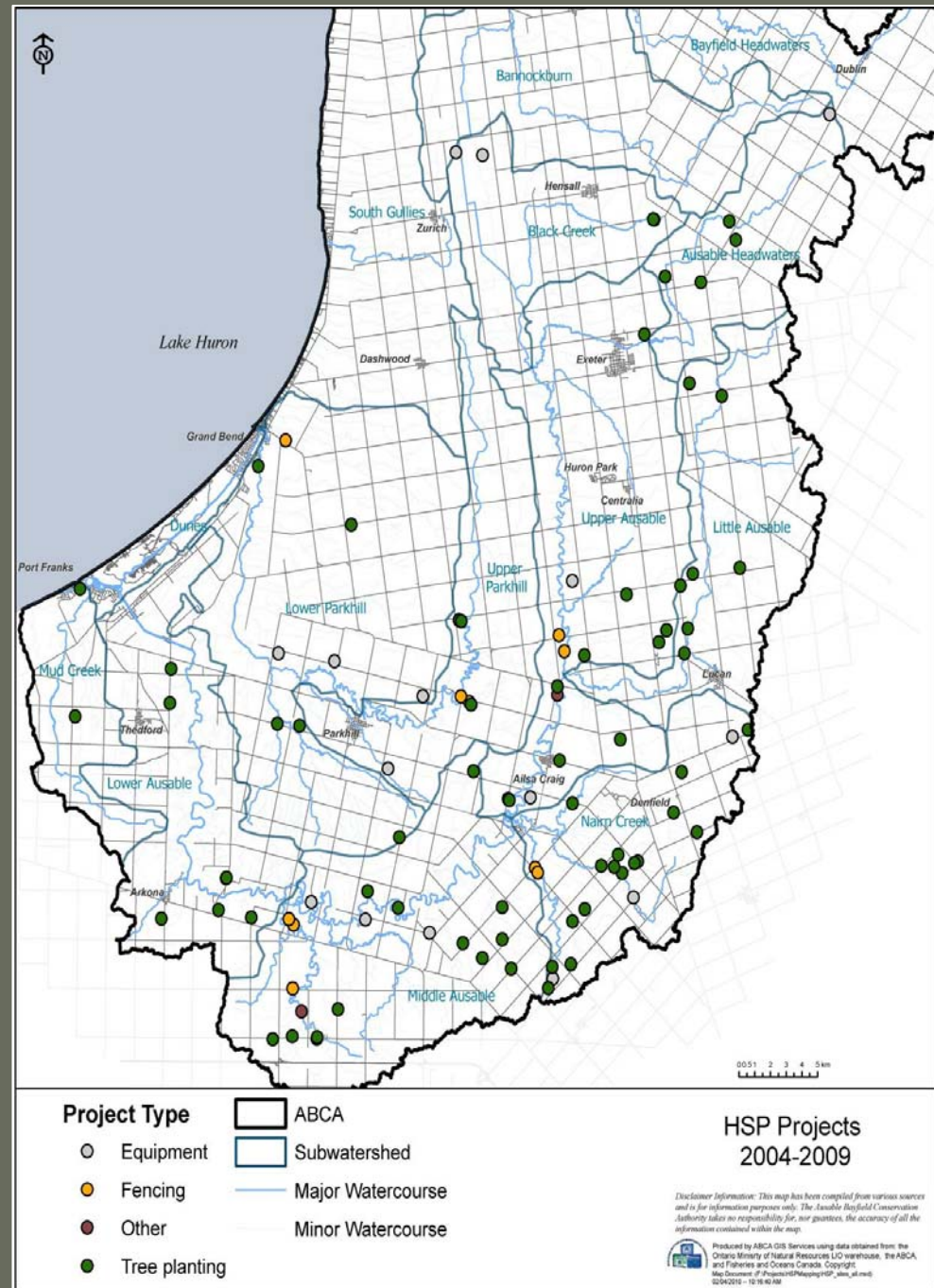
Ausable River Recovery Team (2002)

- Synthesis – What do we know?
 - Loss of natural cover and changes to drainage pathways exacerbate the tendency of the Ausable to carry heavy sediment loads and be susceptible to low base flows
 - Excessive nutrient concentrations from town and rural sources
- Strategy – What should we do?
 - Rural actions to reduce nutrient and sediment inputs
 - Outreach and education
 - Applied research
 - Monitoring



Actions to Protect and Enhance Habitat

- Actions:
 - Agricultural equipment modification
 - Livestock restriction from watercourses
 - Tree planting
- Results:
 - Protected or improved 6000 ha of habitat or riparian zone and 36,000 m of shoreline



Research and Monitoring

- 2004 Mussel inventories
- 2005 Aquatic habitat assessment
- 2006 Mussel surveys at 7 long-term monitoring stations
- 2008 Mussel surveys to fill data gaps
Suitable habitat criteria and mapping
- 2009 Geomorphic assessment
- 2011 Mussel surveys at 7 long-term monitoring stations





Lake Huron




Grand Bend

Exeter

Upper Ausable

Little Ausable

Long-term Mussel Monitoring Stations

-  Site
-  Ausable River habitat survey 2005
-  Ausable River sub-watershed

Port Franks

Lucan

Lower Ausable

AR-26

Ailsa Craig

AR-24

Nairn

Nairn Creek

Arkona

AR-5

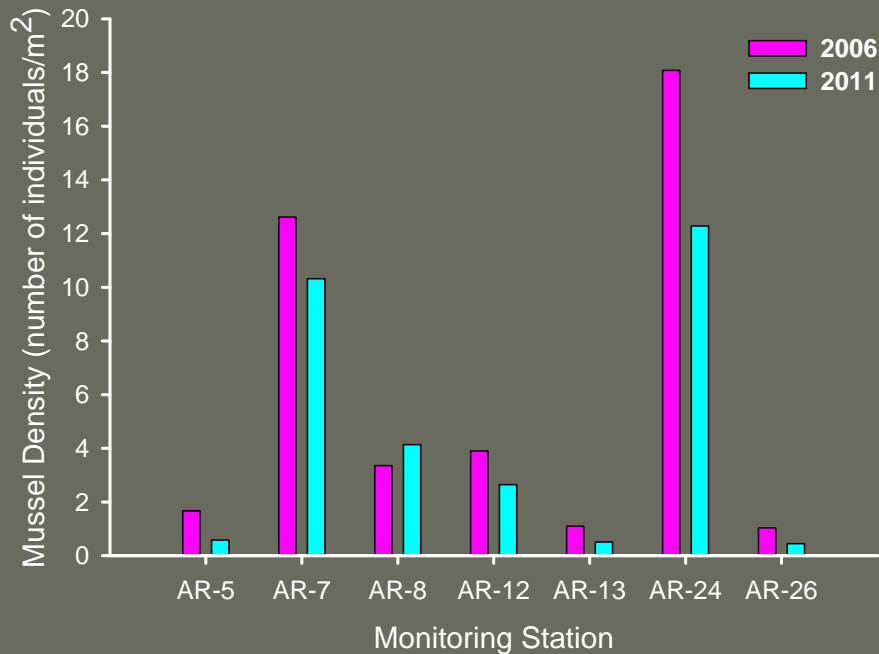
Middle Ausable

AR-7

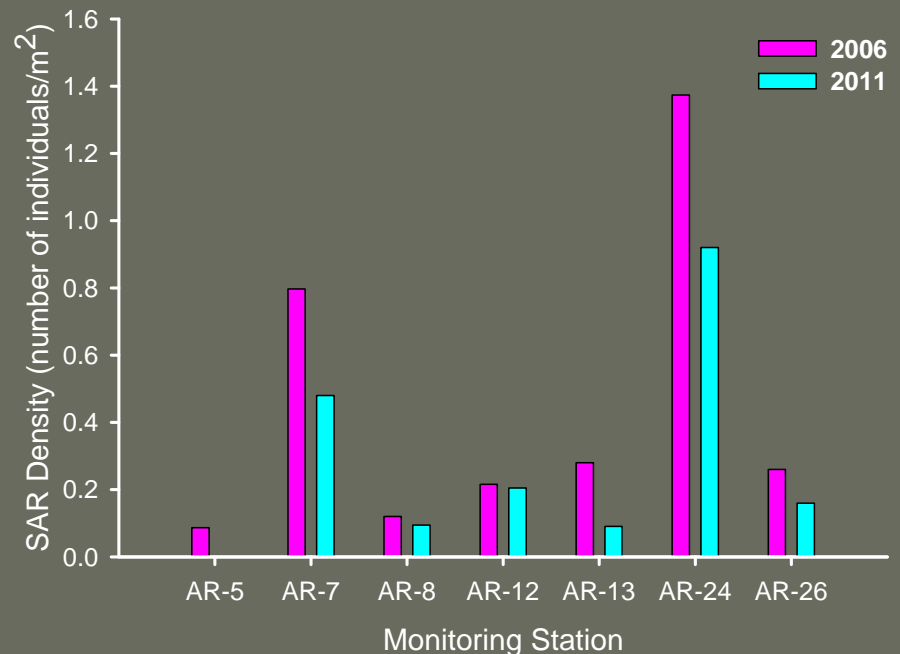
AR-12

Mussel Density

All Species



Species at Risk



- Preliminary data show a decline in mussel densities at most of the 7 long-term monitoring stations
- Thus far, there is no evidence of an improvement in SAR as a result of our recovery actions

Prioritization of Stewardship Efforts

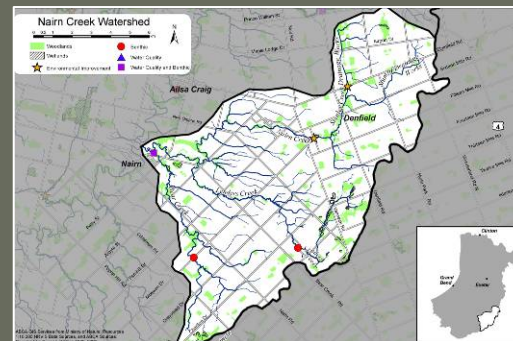
- Broad ecosystem recovery plans, but limited resources for implementation
- Previously:
 - Scattergun approach to recovery actions
 - Limited data that do not show an improvement in densities of freshwater mussels in the Ausable River
- New strategy:
 - Target resources towards locations and actions that will have the greatest success in recovering SAR



Prioritization of Stewardship Efforts

- Approach -

1. a) Prioritized SAR.
b) Prioritized sub-watersheds within Ausable River watershed based on SAR.
2. Assessed sediment loading potential of each sub-watershed.
3. Determined Conservation Priority of each sub-watershed based on SAR abundance and sediment loading potential.



Mussel SAR Prioritization

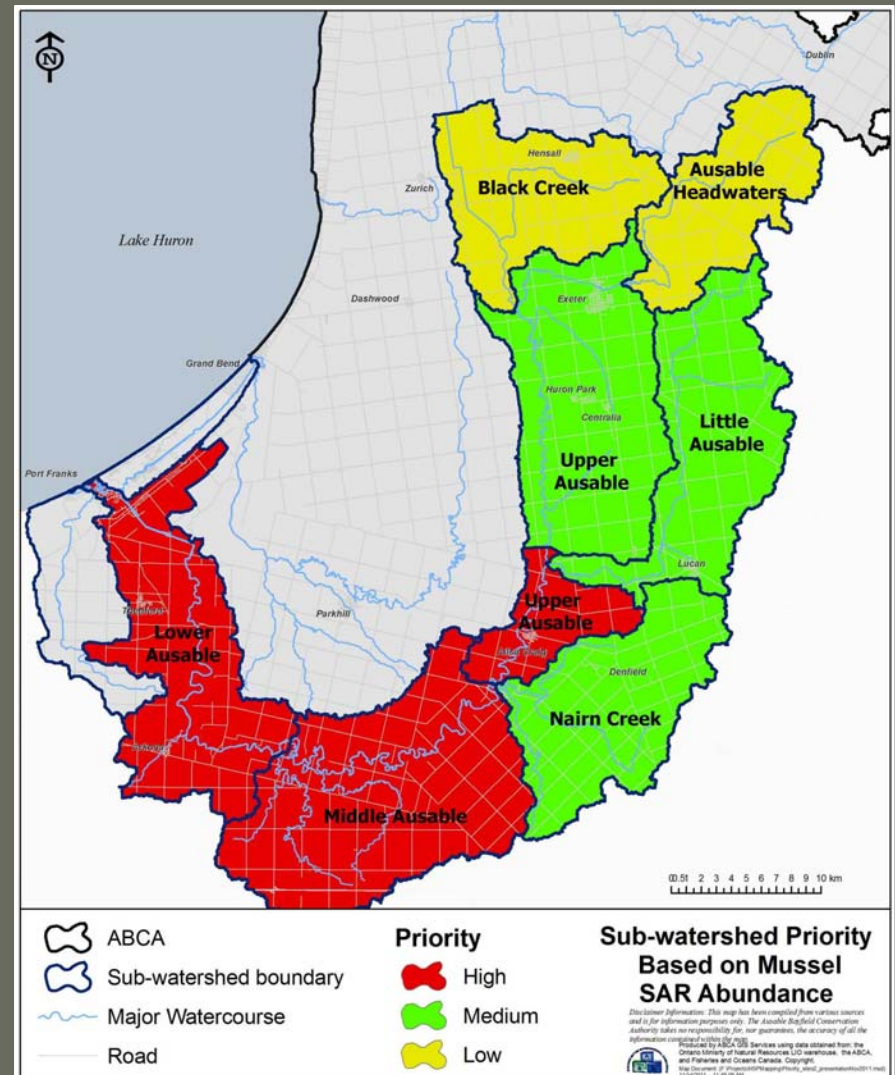
- How critical is the protection of each mussel SAR in the Ausable River watershed?
- A Conservation Priority was assigned to each species based on:
 - COSEWIC status (Endangered, Threatened, Special Concern)
 - Number of sub-watersheds in which species occurs
 - Abundance in watershed



Conservation Priority	Species
High	Northern Riffleshell Snuffbox
Medium	Kidneyshell Rainbow Mussel Wavy-rayed Lampmussel
Low	Mapleleaf Mussel

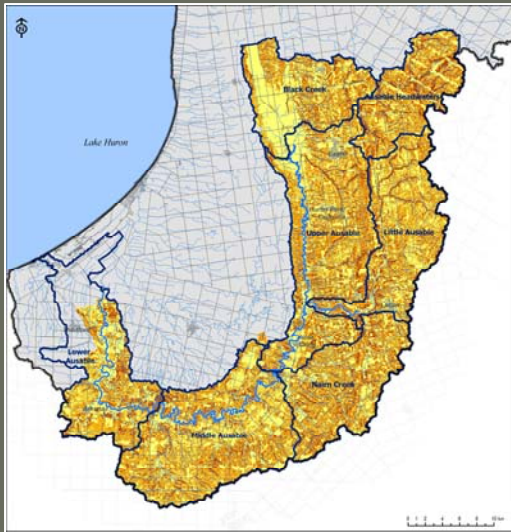
Sub-watershed Prioritization Based on Mussel SAR

- Each sub-watershed was assigned a priority based on the presence and abundance of mussel SAR.



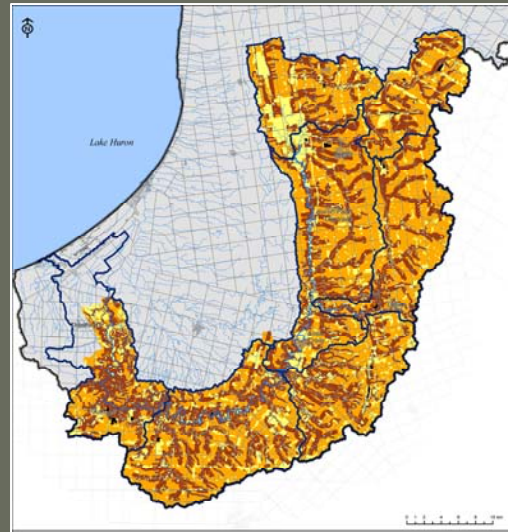
Sub-watershed Sediment Loading Potential

Soil Loss Analysis



- Revised Universal Soil Loss Equation (RUSLE)
- Classified watershed areas as having high, moderate, or low soil loss potential.

Sediment Delivery Analysis



- Technique by Snell (1984)*
- Classified watershed areas as having high, moderate, or low sediment delivery potential.

Sediment Load Analysis

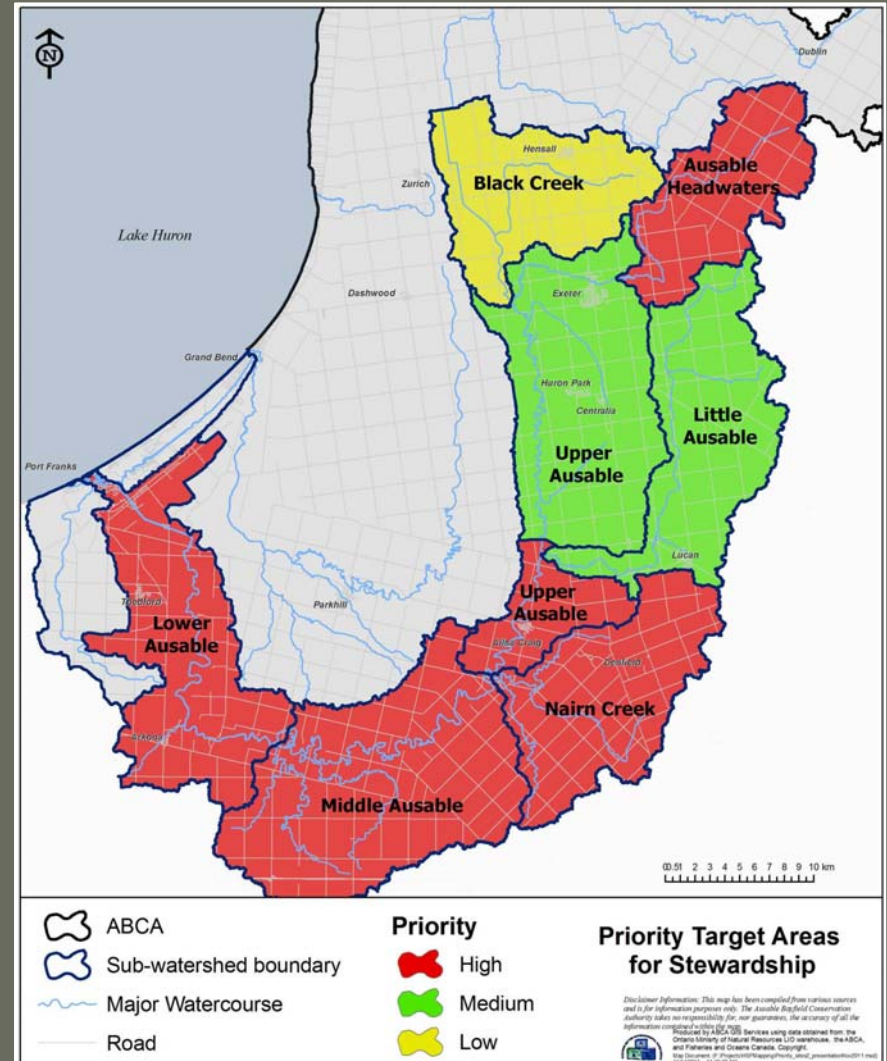
Potential of each sub-watershed to contribute sediment to Ausable River

- Multiplied results from soil loss and sediment delivery analyses.
- Classified watershed areas as having high, moderate, or low sediment loading potential.

*A Manual for Regional Targeting of Agricultural Soil Erosion and Sediment Loading to Streams

Sub-watershed Conservation Prioritization

- Each sub-watershed was assigned a Conservation Priority based on its abundance of mussel SAR and its potential for sediment loading.



Recommendations



- **Prioritize funding** for future recovery actions:
 - 80% to projects in high priority areas
 - 15% in medium priority areas
 - 5% in low priority areas
- Provide funding for a broader scope of **recovery actions**:
 - Enhancement of water retention areas
 - Creation of berms and grass waterways
 - Block planting of trees and prairie vegetation on erosion-prone land
 - Manure management
 - Modifications to tile drain infrastructure
- Continue **research** into factors affecting the distribution of mussel SAR (e.g., flow, channel stability, suspended sediments).
- **Monitor** over the long term to provide more information on how mussel SAR respond to recovery actions.

Acknowledgements



Contributors from ABCA:

- Mari Veliz
- Kari Jean
- Tracey Boitson
- Kate Monk

Ausable River Recovery Team

Numerous agency staff and volunteers who helped with mussel surveys

Funding Sources:

- Ausable Bayfield Conservation Foundation
- Fisheries and Oceans Canada
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Government of Canada's Interdepartmental Recovery Fund
- Ministry of Natural Resources' Species at Risk Stewardship Fund