Eastern Massasauga Restoration: If You Build It, Will They Come?

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The Mid-Atlantic Center for Herpetology and Conservation

MAC·HAC
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The Mid-Atlantic Center for Herpetology and Conservation (MACHAC)

- Non-profit organization headquartered in PA
- Amphibian and Reptile research, advocacy, & conservation projects
- Current projects throughout the Mid-Atlantic and Northeastern U.S.
- Staff of herpetologists, ecologists, conservation planners, and restoration specialists

Eastern Massasauga Recovery Project

- Eastern Massasauga *(Sistrurus catenatus)*
  - With PFBC and supporting NRCS Easements
  - Restoration of habitat and monitoring of response
  - PA endangered
  - Federal candidate

Threats

Habitat destruction

Habitat Succession

Poaching

PA Endangered

Venomous

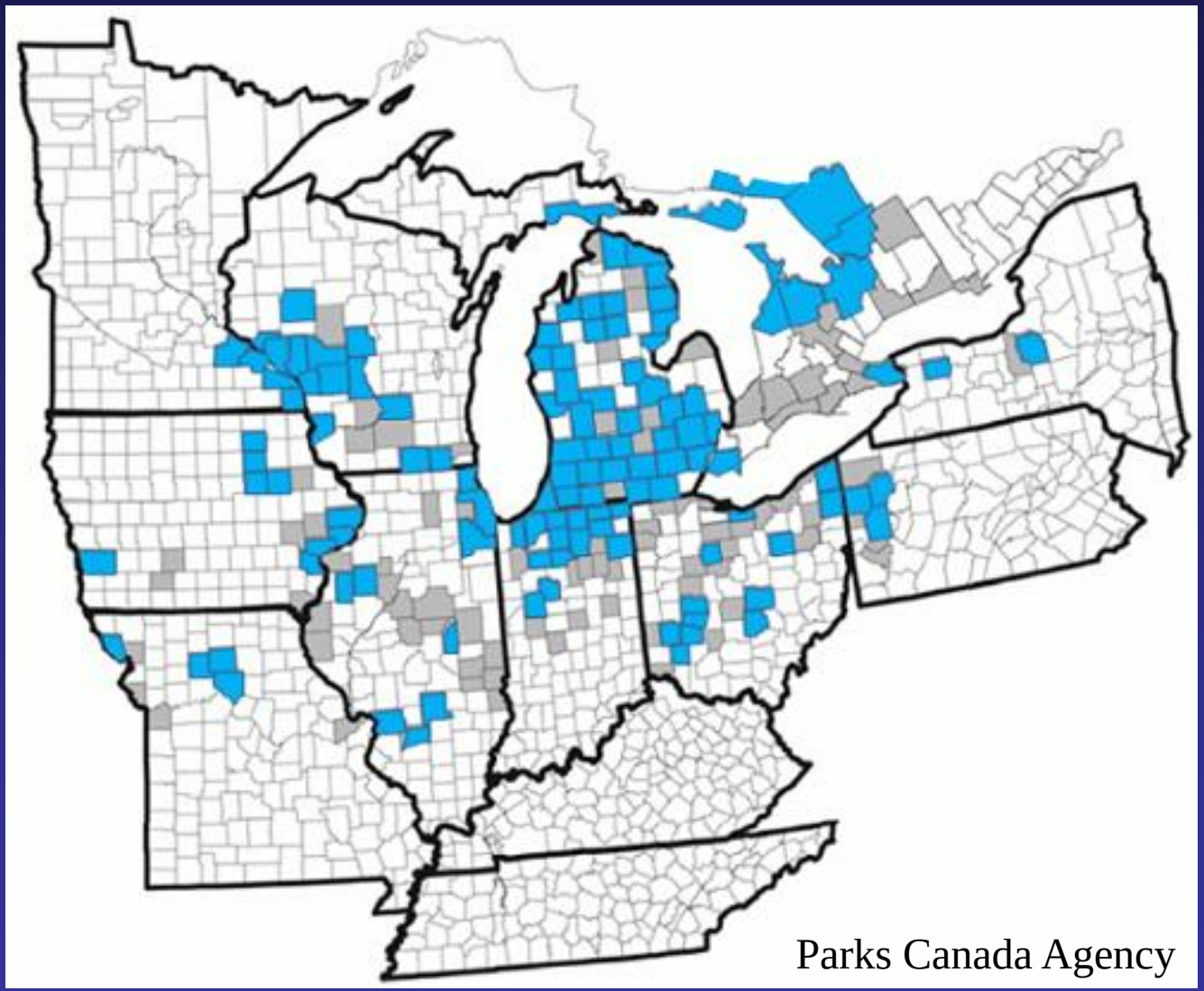
Eastern Massasauga (*Sistrurus catenatus*)

Early Successional Species

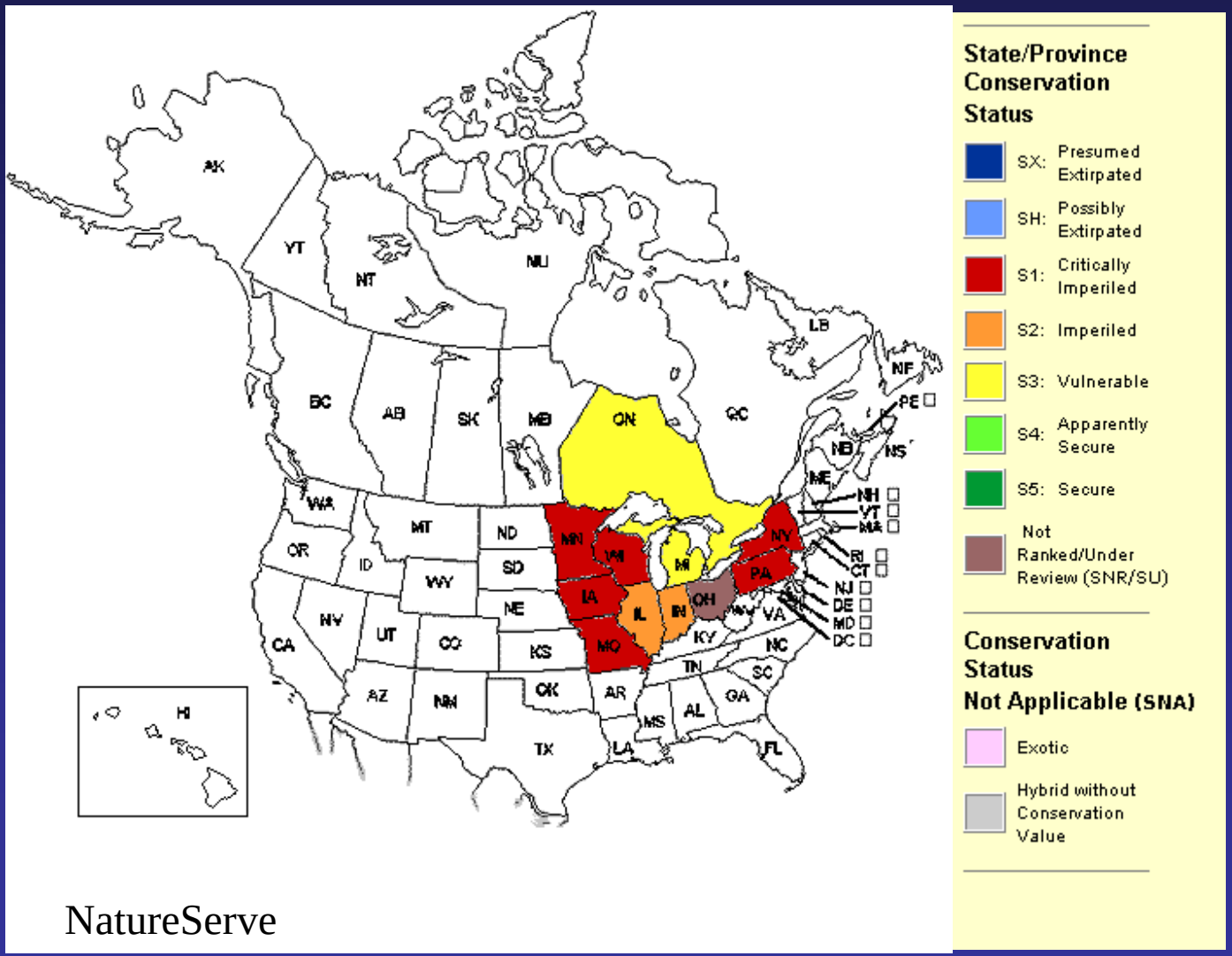
Species Description

- Small rattlesnake (avg. ToL 47-76 cm; max 100 cm.)
- Elliptical pupils and loreal pits
- Rattle
- Typically dorsal blotches
- Neonates/juveniles brighter, more contrast and typically yellow tails

Global Distribution (by county)



NatureServe Conservation Status



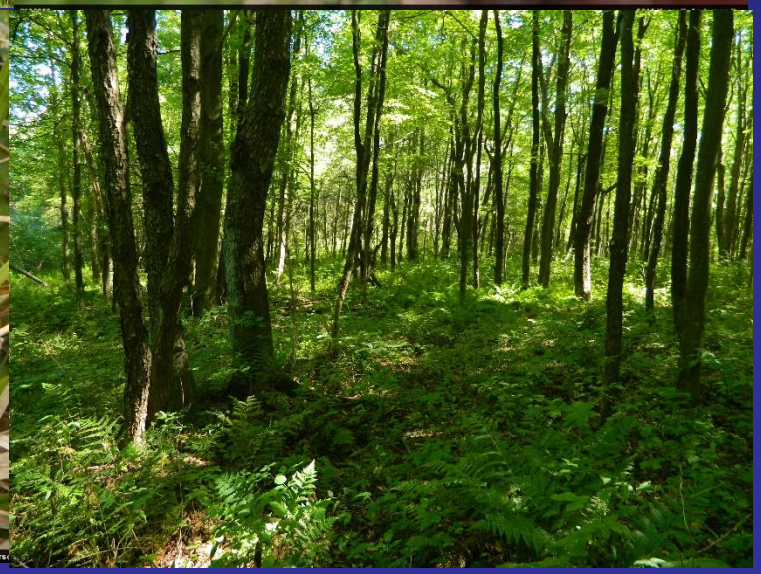
NatureServe

Habitat

- Regional variability
- Fens, bogs, marshes, swamps, bottomlands, wet meadows, alvars, and adjacent uplands
- Uplands typically meadows, prairies, or wooded habitats with canopy openings and thick herbaceous layer
- Will utilize wooded habitats for foraging and dispersal
- Habitats need to support three main biological needs: gestation, hibernation, and foraging

Often Very Difficult to Find in Field

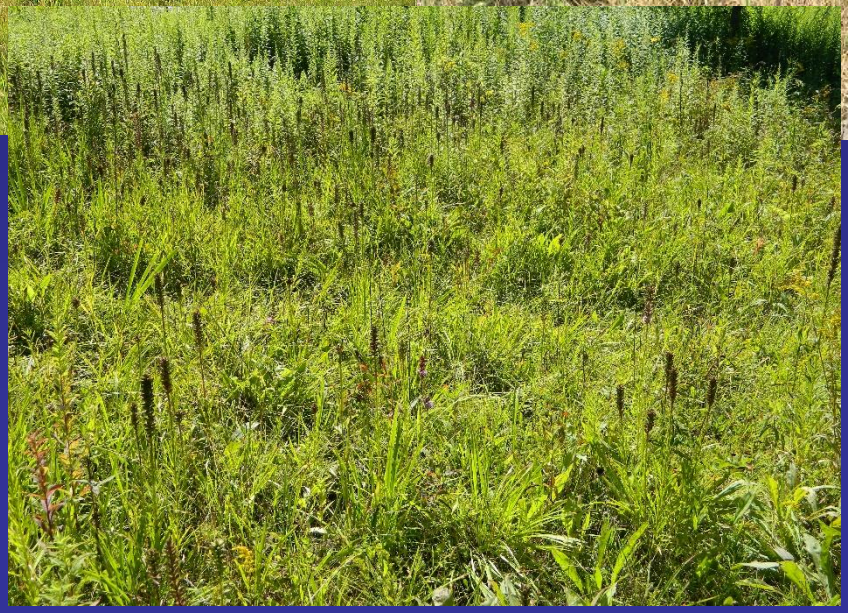
Foraging Habitat



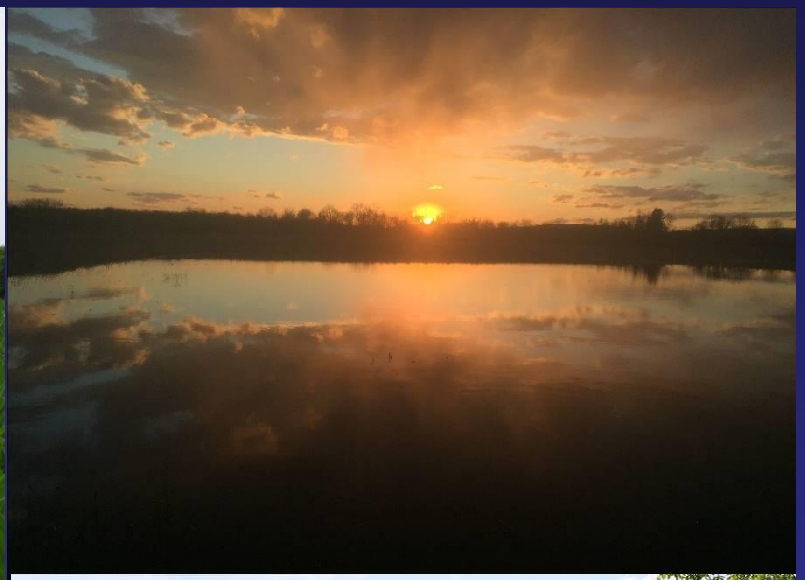
PA Overwintering Habitat – Groundwater Access

PA Overwintering Habitat

Gestation Habitat



Historical Threats



Threats - Poaching

OPERATION SHELLSHOCK

2006-2009

E. Massasauga "Priceless"

33 Rattlesnakes hidden in a minivan's compartments

https://www.fws.gov/international/pdf/archive/workshop-terrestrial-turtles-operation-shellshock.pdf

Threats – Historical vs Current

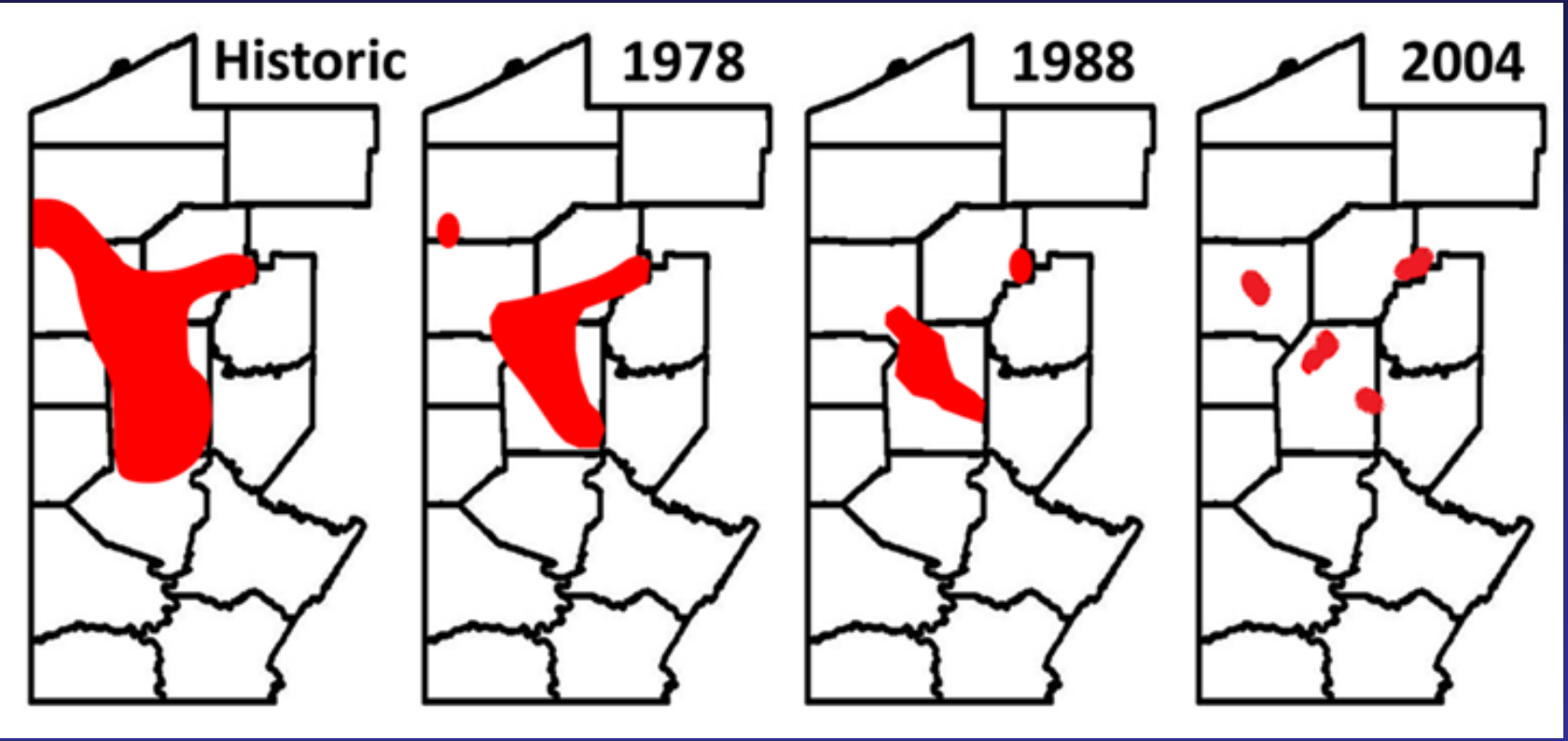
Table 1.
Factors responsible for altering massasauga habitat in Pennsylvania.

	PERCENT OF SITES IMPACTED*	
FACTOR	**TO 1978**	**1978-1988**
Damming	32%	0%
Highway construction	21%	0%
Housing and urban expansion	16%	12%
Forest succession	10%	75%
Surface mining	5%	12%
Agriculture	5%	0%

* Based upon the evaluation of 19 sites prior to 1978 and 8 sites from 1978-1988.

Reinert & Bushar, *in* Johnson and Menzies (editors) 1992

Very Rare Species in PA



Background

- 54-acre property bought by two of the project collaborators with personal funds after site came up for sale
- Restoration study funded by PA Fish & Boat Commission (Chris Urban, lead) via State Wildlife Grant (USFWS) to MACHAC
- Property Enrolled in Natural Resources Conservation Service WRP (now WRE) program (program created after property acquisition)

PFBC-funded study via SWG

- Does a change in the available habitat structure alter the spatial behavior of the Massasauga population, and, if so, how rapid is the response to such habitat change?
- Does the prescribed management program create habitat that is used more frequently by Massasaugas, and, if so, which managed habitats show the greatest usage?
- What management techniques result in the best improvement in habitat as measured by an increase in habitat use?
- Does the prescribed management program improve Massasauga prey density (small mammals), and, if so, what specific habitats are improved and which management activities are most effective?
- Does the prescribed management program improve the thermal profile of any habitat for use by reproductive (gestating) Massasaugas?
- If the program of management does improve the functionality of available habitats for the Massasauga population, which habitats are most responsive to management procedures?

Habitat Succession

1977 ⟶ 2010

Open, old-field and wet meadow habitat once used for successful gestation and foraging has become unsuitable due to the invasion of dense woody vegetation cover.

1980 ⟶ 2010

Pre-restoration

- 10 snakes from adjacent properties implanted with transmitters and tracked for 2 years – no significant use within property
- Coverboards set on transects
- Vegetation transects created
- Small mammal trapping on transects
- Large amount of information available about snakes from past studies

Restoration

- Site timbered over winter of 2012/2013
- Central wetland and areas near overwintering sites (boundary) not entered by loggers
- ±10 ha allowed to re-vegetate naturally
- ±4 ha cleared after logging and seeded with Ernst Seed Mix (native meadow species)
- Implanted snakes tracked through restoration

Winter 2012/2013

Summer 2013

A Stark Contrast

Former Pine Stand edge 2012

Former Pine Stand edge late Summer 2015

Fall 2015

First meadow mowings

Post-Restoration Preliminary Results 1

- Snakes immediately moved into restoration area following emergence in 2013
- Foraging snakes with prey items found within restoration area beginning spring 2013
- Gestating females found within restoration area in summer 2013
- Parturition and neonates observed within site in summer 2013
- Mating snakes observed within restoration area in 2013

Preliminary Results 2

- Use of site for foraging, mating, gestation, and birthing continued from 2014-present.
- Two snakes utilized restoration area for overwintering in 2014/2015
- Three snakes used known, communal overwintering sites (offsite)
- Five snakes shifted overwintering locations up to 150 m

Preliminary Results 3

- Coverboards – EM never used them and still don't, however use of coverboards by other species has exploded. Post-restoration use by large numbers of: *Opheodrys vernalis, Plestiodon anthracinus, Storeria dekayi, S. occipitomaculata, Thamnophis brachystoma, T. sirtalis*

- Significant increase in small mammal captures

- Restoration area >80% meadow, snakes utilizing open meadow, woody debris piles, shrub clumps, and edges

- aspen invasion in eastern area (1 acre)

Critical Habitat Use

Basic Steps for Restoration

- Identify Management Need

- Contact State/Federal Agencies Responsible for regulating the species (in Pennsylvania is PA Fish & Boat Commission and the US Fish & Wildlife) – You may be required to apply for a permit and/or have a management plan accepted – collaborate!
- Create a restoration/management plan

*The EM will presumably be elevated to Federally-threatened or endangered in the very near future, consultations may change

Basic Steps for Restoration

- Can restoration/management work be done by hand or is machinery required? Burn?
- Plan to treat invasives that may respond favorably to treatment
- Herbicide options (certification?)
- If machinery needed
- 1 – use low PSI
- 2 – ensure that overwintering sites are avoided by machinery, goal is to avoid entombing overwintering snakes or altering hydrology

Basic Steps for Restoration

- Setup photo-stations and transects to monitor vegetation response
- Conduct all work with machinery during inactive season
- Monitor site quarterly for first two years post-restoration, and annually thereafter
- Maintain an updated plan and be flexible for treatment post-restoration – recommend 2 years
- Look for long-term management strategies

A Shout Out to Our ‘Sauga Partners

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