

Michigan's Recovery Implementation Strategy for Eastern Massasauga

2020-2025 (updated 03/04/20)

Introduction

Purpose

The Michigan Recovery Implementation Strategy (RIS) is a planning document that steps down the range-wide Eastern Massasauga Rattlesnake (EMR) Draft Recovery Plan. The goal of Michigan's RIS is to describe high-priority actions and activities that could be implemented in our state over the next 5 years (2020-2025). The RIS may be revised at any time during the recovery process, maximizing flexibility of recovery implementation.

RIS Contributors and Partners

The Recovery Implementation Strategy was developed by conservation partners in Michigan (Appendix 1). It provides guidance to anyone who wants to implement recovery actions for EMR. Being listed as a contributor or partner in the strategy does not obligate anyone to participate; rather, partners have the potential to meaningfully contribute to EMR conservation where they are best suited and when resources are available.

Connecting Strategy to Draft Range-Wide Recovery Plan

A range-wide [Draft Recovery Plan](#) for EMR has been developed and has been released for public comment (02/20). The Draft Recovery Plan identifies draft recovery criteria and high-level actions necessary to achieve recovery. For example, draft Recovery Criterion 1: The probability of persistence over 50 years is 95% within each of three geographic units across the range (note that Michigan is within the central unit).

Identifying a target for viable populations in Michigan will occur after the Recovery Plan is released. The U.S. Fish and Wildlife Service and Michigan Department of Natural Resources will work with the Michigan EMR Working Group to set targets in Michigan.

Implementation and Review Strategy

The U.S. Fish and Wildlife Service and Michigan Department of Natural Resources will convene an annual meeting with the Michigan EMR Working Group to share implementation efforts and lessons learned. This strategy will be reviewed annually and modified as needed and will go through a more formal review at the end of 5 years (2025).

Current EMR Status in Michigan

A total of 187 EMR populations have been delineated based on known element occurrences (see Glossary) in Michigan's Natural Heritage Database and population modelling using cost-weighted distance analysis; 145 are known extant populations. Of these, 31 populations are located in the northern Lower Peninsula (NLP) and Bois Blanc, and 114 populations are located in the southern Lower Peninsula (SLP).

Michigan Geographic Focus Areas

The Michigan RIS will frame our implementation in four Geographic Focus Areas: Southwest, Southeast, Northern, and Northern Coastal – Island. The intent of these Geographic Focus Areas is to increase collaboration and coordination amongst partners to improve and increase EMR conservation, given partners and threats to EMR vary by region in Michigan. Additionally, the Geographic Focus Areas likely capture adaptive capacity (genetic and ecological diversity) of the extant populations within Michigan. However, research is necessary to fully understand the genetic and ecological diversity of EMR in Michigan and how to maximize adaptive capacity (i.e., the ability of massasauga to adapt to long-term changes in the environment).

Figure 1. EMR Geographic Focus Areas within Michigan.

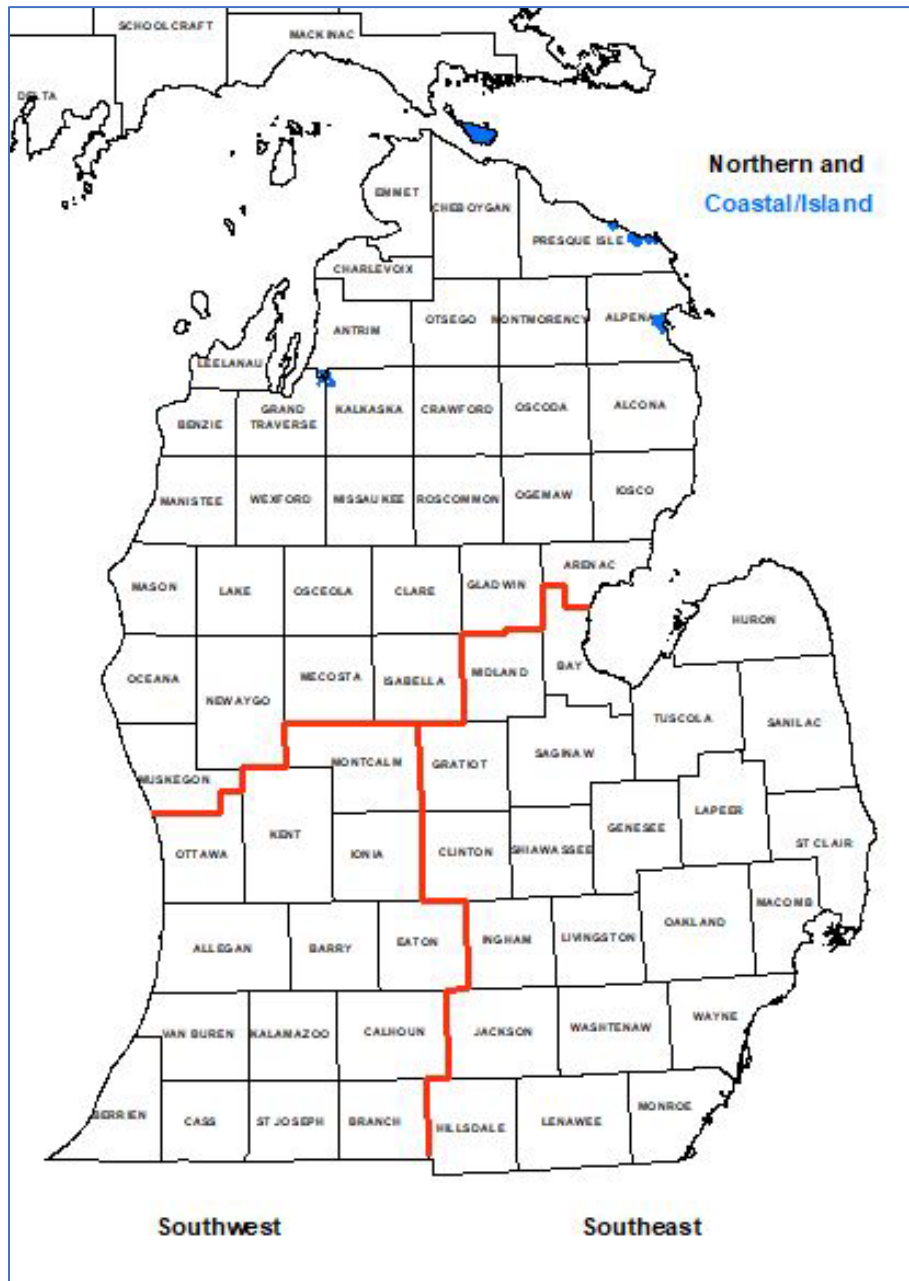


Table 1. Current condition and targets for the four Michigan Geographic Focus Areas. EO ranks (estimated viability values, see Appendix 2): A- excellent, B- good, C- fair, D- poor, H- historical.

Michigan Geographic Focus Area	Counties or Northern Coastal/Island Areas	Number of extant/presumed extant populations (as of 2019)	Number of extirpated or historical populations (as of 2019)	Number of populations for estimated viability values
Northern coastal/island	Bois Blanc Island, Grand Lake/Thompson’s Harbor, Squaw Bay, Lake Skegemog/ Skegemog Lake Swamp, Evergreen Beach, Swan River Mouth (6)	6	5	A – 1 AB – 2 AC – 1 B – 1 BC – 1
Northern	Emmet, Cheboygan, Presque Isle, Alpena, Montmorency, Antrim, Benzie, Grand Traverse, Kalkaska, Crawford, Oscoda, Alcona, Iosco, Roscommon, Missaukee, Manistee, Mason, Lake, Clare, Arenac, Newaygo, Muskegon (21)	25	12	A – 3 AB – 5 AC – 4 B – 2 BC – 8 C – 2 CD – 1
Southeast	Gratiot, Saginaw, Huron, Lapeer, Genessee, Shiawassee, Clinton, Ingham, Livingston, Oakland, Macomb, St. Clair, Wayne, Washtenaw, Jackson, Hillsdale, Lenawee (17)	52	14	AB – 5 B – 12 BC – 18 C – 7 CD – 6 D – 4
Southwest	Kent, Montcalm, Ionia, Eaton, Barry, Allegan, Van Buren, Kalamazoo, Calhoun, Branch, St. Joseph, Cass, Berrien (13)	62	1	A – 1 AB – 6 B – 5 BC – 18 C – 8 CD – 17 D – 7

Actions and Activities

The following section identifies actions and activities identified by partners as important for the conservation and recovery of EMR. The tables below show the level of priority partners determined for each activity for each geographic focus area (see Glossary for definitions). Each geographic focus area has a different landscape context, threats, and partners, hence the differences in levels of priority of any action or activity. Partners that self-identified as interested in contributing to an action are listed below. And metrics that will be used to help evaluate our effectiveness in implementing this strategy are detailed. See glossary for definitions.

ACTION 1) Continue to manage, restore, and enhance habitat at EMR sites

- Activity a) Identify the most important sites to manage for recovery
- Activity b) Develop Best Management Practices document for habitat management that includes consideration of habitat variability and climate change based on geography
- Activity c) Implement habitat management with goal to maintain or increase suitable habitat
- Activity d) Create a network/contact list of site managers by region

Table 2. Partner-determined priority for activities under Action 1.

Activity	Priority			
	Southwest	Northern	Southeast	Coastal/Islands
1a	1	2	2	1
1b	2	2	2	2
1c	1	1	1	1
1d	3	-	-	3

Partners: Barry Conservation District, Kalamazoo Nature Center, Michigan Audubon, Michigan Department of Natural Resources, Michigan Natural Features Inventory, Michigan Nature Association, Oakland County, Oakland Township Parks and Recreation, Pierce Cedar Creek Institute, Southwest Michigan Land Conservancy, Springfield Township, The Nature Conservancy, US Fish and Wildlife Service, US Forest Service Huron-Manistee National Forest

Metrics used to evaluate strategy: # of acres enhanced, # of acres newly managed, # of partners managing land for EMR

ACTION 2) Acquire and protect land important to EMR conservation

- Activity a) Develop acquisition criteria and prioritize EMR sites and then parcels for acquisition or easement
- Activity b) Work collaboratively with partners to acquire parcels or easements from willing landowners on high priority areas
- Activity c) Identify willing landowners for acquisition for highest viability populations
- Activity d) Prioritize retention of lands associated with EMR populations within conservation organizations

Table 3. Partner-determined priority for activities under Action 2.

Activity	Priority			
	Southwest	Northern	Southeast	Coastal/Islands
2a	1	3	1	3
2b	1	3	1	2
2c	3	3	2	2
2d	3	3	1	3

Partners: Michigan Department of Natural Resources, Michigan Natural Features Inventory, Michigan Nature Association, Oakland County, Southwest Michigan Land Conservancy, The Nature Conservancy, US Fish and Wildlife Service, Washtenaw County

Metrics used to evaluate strategy: # of acres acquired, # of acres protected by easements, % of priority populations protected

ACTION 3) Monitor and inventory EMR populations to improve our understanding of EMR and to guide conservation efforts

Activity a) Develop an effective and feasible long-term standardized monitoring plan/framework with different levels of monitoring effort to estimate abundance, assess population health, status and trends, and delineate occupied habitat

Activity b) Coordinate within and among Geographic Focus Areas and conduct surveys and monitoring

Table 4. Partner-determined priority for activities under Action 3.

Activity	Priority
	Statewide
3a	1
3b	1

Partners: Ed Lowe Foundation, Fort Custer Training Center, Grand Valley State University, Kalamazoo Nature Center, Michigan Audubon, Michigan Department of Natural Resources, Michigan Natural Features Inventory, Pierce Cedar Creek Institute, Southwest Michigan Land Conservancy, Springfield Township, University of Michigan Botanical Gardens, US Fish and Wildlife Service, US Forest Service Huron-Manistee National Forest

Metrics used to evaluate strategy: # of sites monitored; # of sites with long-term monitoring data; # of sites with snake fungal disease, # of sites verified as occupied, # of newly occupied or identified sites

ACTION 4) Conduct research on EMR to investigate threats and limiting factors

Activity a) Conduct 3 research projects that contribute meaningfully to recovery, which may include:

- a) Continue to investigate the prevalence, distribution, and population level impacts of snake fungal disease
- b) Continue genetic investigations to monitor genetic health and inbreeding depression in lieu of population demographics
- c) Investigate methods/techniques to improve snake and hibernacula detection
- d) Investigate the threats and limiting factors to EMR (e.g., barriers to movement, corridor needs, effects of prescribed fire, effects of invasive species, collection and persecution, minimum habitat requirements to support a population)
- e) Better understand EMR response to different habitat management techniques
- f) Determine if augmentation, head start and/or captive breeding programs are needed for EMR conservation in Michigan
- g) Study impacts of climate change in both the northern and southern populations
- h) Refine habitat suitability model
- i) Understand which crayfish burrows are most used as hibernacula and how invasive crayfish could impact EMR

Table 5. Partner-determined priority for activities under Action 4.

	Priority
Activity	Statewide
4a	2

Partners: Binder Park Zoo, Fort Custer Training Center, Grand Valley State University, John Ball Zoo, Michigan Department of Natural Resources, Michigan Natural Features Inventory, Michigan State University, Pierce Cedar Creek Institute, Potter Park Zoo, US Fish and Wildlife Service

Metrics used to evaluate strategy: # of ongoing research projects; # of publications and reports

ACTION 5) Develop and implement an outreach and education program

Activity a) Develop and maintain a repository for EMR materials including outreach, research, and information for herpetologists and land managers

Activity b) Continue to provide outreach to targeted public audiences

Activity c) Develop and implement a marketing and outreach plan

Activity d) Engage a social scientist or Public Relations firm to help “sell” EMR conservation

Activity e) Continue training land managers to understand effective habitat management practices and the ecology of EMR

Table 6. Partner-determined priority for activities under Action 5.

	Priority
Activity	Statewide
5a	2
5b	2
5c	2
5d	2
5e	2

Partners: John Ball Zoo, Kalamazoo Nature Center, Michigan Department of Natural Resources, Michigan Natural Features Inventory, Michigan Nature Association, Pierce Cedar Creek Institute, The Nature Conservancy, US Fish and Wildlife Service

Metrics used to evaluate strategy: # of active outreach opportunities provided, # of participants in active outreach opportunities, # of passive outreach efforts

Glossary

We will use the following definitions for this plan:

Acres enhanced are lands that are being managed and have been previously managed within a 5 year timeframe.

Acres newly managed are lands that are being managed for the first time, or haven't been managed within the last 5 years.

Actions are broad measures that clearly describe what needs to be done to accomplish the goal of long-term viability.

Activities are the detailed, on-the-ground tactical steps needed to implement the higher-level recovery actions.

Element Occurrence - An Element Occurrence (EO) is an area of land and/or water in which a species or natural community is, or was, present. For species, the EO often corresponds with a local population, but when appropriate, may be a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation). EOs may consist of one or multiple specific locations or sites.

Population is a group of individuals of the same species that live in a particular geographic area at the same time, with the capability of interbreeding. A population may consist of individuals within a single location/site or within multiple locations/sites that are close enough and/or connected by suitable habitat to allow individuals to move between locations. For purposes of this plan, EMR populations were delineated based on known EMR element occurrences, land cover data, and GIS modelling of snake movements and connectivity based on land cover.

Priority 1 actions and activities are defined as those that must be taken to prevent the species from declining irreversibly in the foreseeable future.

Priority 2 actions and activities are those that must be taken to prevent a significant decline in population size or habitat quality or some other significant negative impact.

Priority 3 actions and activities are all other measures that are necessary to provide for full recovery of the subspecies. The assignment of priorities does not imply that some actions and activities are of low importance, but instead implies that lower priority items may be deferred while higher priority items are being implemented.

Priority Populations will be determined when identifying a target for viable populations in Michigan once the Recovery Plan is released; will be identified under Action 1 Activity a.

Site refers to a specific, individual geographic location or area in which massasaugas have been observed and documented. For purposes of this plan, a site refers to a management unit or area in which EMRs occur and are actively managed currently or will be managed in the future to support EMR conservation. Sites are based on how partners identify management units on their properties.

Appendix 1. Contributors to RIS

Southwest Partners:

Andrews University
Barry Conservation District
Binder Park Zoo
Camp Friedenswald
Ed Lowe Foundation
Fort Custer Training Center DMVA
Kalamazoo Nature Center
John Ball Zoo
Pierce Cedar Creek Institute
Sarett Nature Center
Southwest Michigan Land Conservancy

Southeast Partners:

Huron – Clinton Metro Parks
Oakland County
Oakland Township Parks and Recreation
Potter Park Zoo
Springfield Township

University of Michigan Botanical Gardens

Washtenaw County

Northern and Northern Coastal/ Island Partners:

Camp Grayling Training Center DMVA
Huron Pines
US Forest Service Huron-Manistee National Forest

Statewide Partners:

Environmental Consulting & Technology, Inc.
Grand Valley State University
Herpetological Resource Management
ITC
Michigan Audubon
Michigan Conservation Districts
Michigan Department of Natural Resources
Michigan Natural Features Inventory

Appendix 2. Nature Serve Definitions for EO ranks

A: Excellent viability. Occurrence exhibits optimal or at least exceptionally favorable characteristics with respect to population size and/or quality and quantity of occupied habitat; and, if current conditions prevail, the occurrence is very likely to persist for the foreseeable future (i.e., at least 20-30 years) in its current condition or better. These occurrences have characteristics (e.g., size, condition, landscape context) that make them relatively invulnerable to extirpation or sustained population declines, even if they have declined somewhat relative to historical levels.

B: Good viability. Occurrence exhibits favorable characteristics with respect to population size and/or quality and quantity of occupied habitat; and, if current conditions prevail, the occurrence is likely to persist for the foreseeable future (i.e., at least 20-30 years) in its current condition or better. B-ranked occurrences have good estimated viability and, if protected, contribute importantly to maintaining or improving the conservation status of threatened or declining species.

C: Fair viability. Occurrence characteristics (size, condition, and landscape context) are non-optimal such that occurrence persistence is uncertain under current conditions, or the occurrence does not meet A or B criteria but may persist for the foreseeable future with appropriate protection or management, or the occurrence is likely to persist but not necessarily maintain current or historical levels of population size or genetic variability. This rank may be applied to relatively low-quality occurrences with respect to size, condition, and/or landscape context if they still appear to have reasonable prospects for persistence for the foreseeable future (at least 20-30 years). Examples include very small non-degraded relict occurrences as well as some remnant occurrences of former landscape-level species such as many extant occurrences of tall-grass prairie insects. These occurrences represent the lower bound of occurrences worthy of protection.

D: Poor viability. If current conditions prevail, occurrence has a high risk of extirpation (because of small population size or area of occupancy, deteriorated habitat, poor conditions for reproduction, ongoing inappropriate management that is unlikely to change, or other factors). Questionably viable occurrences that could be restored to at least fair viability should not be ranked D if restoration is deemed feasible and plausible; in most such cases CD should be used. Very small occurrences that may be vulnerable to deleterious stochastic events may be ranked as follows: If the stochastic event is highly theoretical or of very low probability in the appropriate time frame (e.g., 20-30 years), then a C or CD rank may be appropriate. If a minority of other similar occurrences have disappeared as a result of, say, disease or inbreeding, then perhaps CD is best. If most of these small occurrences have been extirpated or are disappearing due to such

events, then D is probably appropriate. The D rank also applies if the population is so small that there will inevitably be a year (or generation) in the near future in which by chance all adults will be the same gender.

E: Verified extant. Occurrence recently has been verified as still existing, but sufficient information on the factors used to estimate viability of the occurrence has not yet been obtained. Use of the E rank should be reserved for those situations in which the occurrence is thought to be extant, but an A, B, C, D, or combination rank cannot be assigned.

H: Historical. Recent field information verifying the continued existence of the occurrence is lacking. Examples of this rank include occurrences based only on historical collection data, or occurrences that previously were ranked A, B, C, D, or E but that are now, without field survey work, considered to be possibly extirpated due to general habitat loss or degradation of the environment in the area. H may be applied to recently verified occurrences if two or more competent subsequent efforts that should have found the species did not, or if there has been a known major disturbance since the last observation such that continued existence of the occurrence is in doubt.

F: Failed to find. Occurrence has not been found despite a search by an experienced observer at a time and under conditions appropriate for the Element at a location where it was previously reported, but the occurrence still might be confirmed to exist at that location with additional field survey efforts. For occurrences with vague locational information, the search must include areas of appropriate habitat within the range of locational uncertainty.

X: Extirpated. Adequate surveys by one or more experienced observers at times and under conditions appropriate for the species at the occurrence location, or other persuasive evidence, indicate that the species no longer exists there or that the habitat or environment of the occurrence has been destroyed to such an extent that it can no longer support the species.

NR: Not ranked. An occurrence rank has not been assigned to the occurrence. This category may be used for occurrences that never have been ranked. Additionally, NR may be used for previously ranked occurrences that have been altered to such an extent that the previous rank likely no longer applies but the current appropriate rank is completely unknown. Note that H may be appropriate if there has been a major, presumably detrimental disturbance since the last observation such that continued existence of the occurrence is seriously in doubt (versus unknown).