

RECOVERY PRIORITIES FOR THE EASTERN MASSASAUGA

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INTRODUCTION

Canadian populations of the eastern massasauga (*Sistrurus catenatus catenatus*) are restricted to Ontario where they are legally protected under the Game and Fish Act (1990). The sub-species is listed as *threatened* in the province and *threatened* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Massasaugas are known to persist in Ontario in four geographically distinct population segments of unequal size and extent. Two relatively small populations occur in the isolated ecosystems/natural communities of Wainfleet Marsh (1500 ha, peatland) and Ojibway Prairie (4 parcels totaling ca. 456 ha, primarily tallgrass prairie). In contrast, moderately large regional populations occur on the Bruce Peninsula (ca. 1962 km², mixedwood plains ecoregion) and along the islands, shores, and inland portions of eastern Georgian Bay (ca. 5484 km², mixedwood shield ecoregion).

The global distribution of the massasauga is believed to have diminished in response to pre-historic changes in the climate and distribution of key vegetation communities (e.g., prairie) across eastern North America since the end of the hypsithermal interval (i.e., 8500-5000 B. P.). This hypothesis is supported by evidence of extreme genetic divergence between populations (e.g., Bruce Peninsula vs. Georgian Bay). More recently, habitat loss due to land-clearing for timber and the drainage of wetlands for agriculture accelerated contraction in the sub-species' range. As a result, massasauga populations are now confined to remnant habitat patches over much of their global range. In addition to direct habitat removal, the fragmentation (e.g., roads) and degradation (e.g., human activity) of critical habitat elements, coupled with indiscriminate persecution, have contributed to population declines, local extinctions, and broad-scale range collapse.

The goals of the (Canadian) National Recovery Plan are to (1) achieve viable populations of massasaugas in tallgrass and peatland ecosystems and (2) retain the current distribution, structure, and connectivity among local populations throughout the Bruce Peninsula and Georgian Bay regions. Achieving viable prairie and peatland populations in Ontario may require active repatriation of populations to some localities from

which they were previously extirpated. Re-establishing the sub-species' broad historic distribution in Ontario is not feasible since much of the habitat landscape in this part of the province has been altered by human land-use practices. As such, we see the maintenance of extant populations in Ontario and the U.S. (i.e., IL, IN, IA, MI, MN, MO, NY, OH, PA, WI) as a realistic goal, achievement of which however would probably *not* warrant downlisting the sub-species in Canada.

Recovery *per se* will require that we effectively improve the species' current conservation status by reducing the risk of population extinctions (improve population viability). In most cases this means that we manage threats from human activity. To improve the species' status we need to know how many effective populations we have on the land? We need to define the relative viability of those populations. Are the Ojibway and Wainfleet populations actually still viable? We must carefully define the distribution and demographic/genetic structure of massasaugas across the Bruce Peninsula and Georgian Bay. Reducing the risk of extinction may require that we undertake active repatriation, population augmentations, direct management of habitat and site characteristics, and maximize the number and connectivity of safe havens or shelter areas. Ultimately, successful recovery will hinge on our

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capacity to manage threats imposed by humans. For instance, for all populations we will need to mitigate incidental mortality. It will undoubtedly help if we are able to identify the "costs of extinction"; what might be the damages to society if population X were to go extinct? All of this requires that we raise awareness and alter negative attitudes within the public at large. Finally, it will be equally important that we integrate the needs of massasauga populations (and the ecological communities in which they reside) into government & industry policy in order to avoid conflicts of interest.

The National Recovery Plan identifies five major strategies for sub-species recovery. First, we are developing an internet-based *communications and coordination* strategy to facilitate (a) informed and complimentary actions among team members, (b) direct collaboration with individuals and agencies engaged in recovery of tallgrass and peatland ecosystems, and (c) cooperation with U.S. counterparts for global recovery of the sub-species. It is recommended that all recovery-related correspondence be channeled through the communications and coordination network. The Sistrurus Information Network (SIN) is now serving this role; <http://www.terra-plex.com/sin/>.

Second, *public education and outreach* will receive high priority. An adaptive outreach campaign is being developed and implemented to (a) raise public awareness of the sub-species' status and life history, (b) cultivate a positive attitude toward snakes (including massasaugas) and the ecosystems with which they are associated, and (c) establish strong community support for the recovery goals via direct involvement by local residents in recovery actions.

The third strategy is to conduct *scientific research* to (a) quantify habitat use and availability within the Ojibway and Wainfleet (and analogous) ecosystems, (b) evaluate population viability, and (c) determine the prospects and actions required for population recovery. Applied studies on the sub-species' population ecology, genetic population structure, and habitat requirements will be required to fully inform this process.

The fourth recovery strategy is to *monitor and manage* populations to reduce vulnerability. Monitoring is required to develop an understanding of the baseline patterns of massasauga population dynamics and to quantitatively assess the efficacy of management actions (e.g., is adult survivorship improving?). Management typically refers to either the control of human activity (e.g., restricting access) or manipulation of habitat (e.g., cutting vegetation, restoring watersheds) to improve massasauga population viability, rather than any direct handling of snake populations *per se*. However, active management of massasaugas, including repatriation, may be required as part of this strategy in order to

reduce the vulnerability of highly jeopardized populations.

The fifth strategy is to establish a broad *shelter areas network* for massasaugas across all population regions. Ideally, this network of "snake-safe" or "massasauga-friendly zones" will be composed of all property types including federal and provincial parks, conservation areas, first nations, private, public, and municipal lands. Establishing and mapping shelter areas will help define regional conservation priorities and thus guide on-the-ground recovery actions. Increasing the number and/or size of shelter areas may be critical to the persistence of the Ojibway and Wainfleet populations since the limited amount of habitat currently available and direct conflicts with surrounding landuse activities may be seriously limiting their prospects for long-term viability.

Importantly, the recovery plan recommends the formation of both population- and strategy-based working groups; expert groups charged with the design, implementation, and evaluation of recovery actions across Ontario. As a result of existing infrastructure, expertise, and/or jurisdictional authority we currently have Paul Zorn (Heritage Canada) leading the *Communications & Coordination Working Group*, Bob Johnson (Toronto Zoo) leading the *Public Education & Outreach Working Group*, Ron Black, Chris Parent (Ontario Ministry of Natural Resources) & Darlene Upton (Heritage Canada) leading the *Georgian Bay Population Working Group*, Bob Gray (Ontario Ministry of Natural Resources) & Frank Burrows (Heritage Canada) leading the *Bruce Peninsula Working Group*, Paul Pratt & Karen Cedar leading the *Ojibway Population Working Group*, and Kim Frohlich (Niagara Peninsula Conservation Authority), John Middleton (Brock University), & Anne Yagi (Ontario Ministry of Natural Resources) leading the *Wainfleet Population Working Group*. We encourage all working groups to include as members, citizens of local communities. Furthermore, we invite direct participation by U.S. colleagues in Canadian recovery team activities.

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