Bombs, Snakes and Trees at Camp Grayling - aka Eastern Massasauga Life History, Research, and Management at Camp Grayling

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April 17, 2019
Eastern Massasauga (EMR)  
(*Sistrurus catenatus*)

- 1992 - Special Concern in MI
- 1993 - Protected under DNR Director’s Order
- 1999 - Federal Candidate
- 2016 - Federally Threatened
Michigan is critical to conservation and recovery of EMRs.

YOU are critical to EMR conservation and recovery!

Map from U.S. Fish and Wildlife Service EMR Species Status Assessment 2016
EMR Status & Distribution in MI

- **MI Status Assessment 1994-1996:**
  - 204 occurrences
    - 40 secure
    - 40-50 extirpated
    - 78 vulnerable

- **2016 – 285 EOs, 208 extant**
  - 65 “secure” (A/B rank)
  - 74 historical / extirpated
  - 116 vulnerable

MNFI 2016
** Only venomous snake in MI!**
EMR Look-alike Snakes
Gray [Black] Rat Snake
Wetland Habitats
Upland Habitats

- Open & forested uplands
- Adjacent to wetlands
- Foraging, gestation/giving birth, dispersal
A Year in the Life of a Massasauga in MI

- Active - April to October
  - Emerge in April (late March - early May)
  - Soil temp inversion
  - Basking & feeding
  - Disperse/migrate to summer activity areas
  - Breed & give birth in summer/early fall (late July-early Sept)
  - Return to hibernacula – Sept/Oct
Threats in Michigan

- Habitat loss/fragmentation
- Inappropriate management
- Road mortality and barriers
- Intentional killing
- Illegal collection
- Climate change
- Snake fungal disease (2015)
Massasauga Conservation in MI

- Eastern Massasauga Candidate Conservation Agreement with Assurances (2016)
- Michigan Massasauga Conservation Plan/Recovery Implementation Strategy (in process, with USFWS)
- Surveys and monitoring
- Research
- Habitat management / restoration
- Education and outreach
CCAA

- Candidate conservation agreement with assurances (CCAA) – EMR CCAA between MDNR, MDMVA, and USFWS (2016)
- Address conservation needs of proposed/candidate species prior to listing
- Landowners voluntarily commit to minimize adverse impacts to species
- Can prevent species from being listed
- IF listed, the CCAA becomes a permit authorizing landowners with incidental take for maintenance and management activities
Grayling Research

- Short-term clear-cutting (DeGregorio 2008)
- Head-starting (Bieser 2008)
- Overwintering (Smith 2009)
- Feeding (Tetzlaff 2015)
- Long-term clear-cutting/burn (Ravesi 2016)
- Snake fungal disease (2013-present)
- Translocation (2014-present)
Overwintering

Mike Ravesi
Study Site Variability

- Other EMR locations in SLP
  - Frequently alone
  - Crayfish burrows

- Grayling
  - Communal
    - Other species/taxa
  - Moss hummocks, root systems, mammal burrows
  - Site fidelity
Hibernation Structures

- Stumps and root mounds = 76%
- Root systems of living trees and shrubs = 12%
- Mammal burrows = 12%
Habitat Management Research

- Successional habitat
- **Thermoregulatory opportunities (Critical!)**
- Prey abundance
- Refuge availability
- Need for lengthy studies on impacts of manipulations

Photo: Brett DeGregorio
Timber Harvest

- A landscape-level approach
- Practiced by private industry
- Used as a conservation measure for other herpetofauna
  - Salamanders (Semlitsch et al. 2009)
  - Reptile guild (Todd and Andrews 2007)
  - Snakes (Pringle and Shine 2006)

From Ravesi 2016
Prescribed Fire

- Intentional, controlled burning
- Range of uses
  - Combat invasive plant species
  - Forest fuel reduction
  - Manage wildlife habitat
    - Reptiles (Webb and Shine 2008)

From Ravesi 2016
Objectives

- What happened over time?
  - Habitat selection
  - Spatial ecology
  - Clear-cut usage

- Why?
  - Thermal regime/opportunities
  - Microhabitat

- Implications of habitat manipulation

From Ravesi 2016
Radio Telemetry

Photo: Grayling Hospital for Animals

From Ravesi 2016
Timeline


From Ravesi 2016

Photo: Sasha Tetzlaff
ArcGIS

From Ravesi 2016
2013-2015

From Ravesi 2016
*Letters represent significant difference (multiple Z tests)

From Ravesi 2016
* No significant differences (multiple Z tests)

From Ravesi 2016
Movement and Habitat

- Spatial ecology did not change over time
- Macrohabitat preferences
  - Scrub-shrub
  - Edge
  - Did not change over time
  - Manipulated not highly selected…

From Ravesi 2016
Major Take-aways

Ravesi 2016:
- Thermal and structural benefits
- Cut usage increased over time
- Burn still used (overwintering too)
- Gravid females used burn and cuts in long-term
- Realized benefit vs. opportunity
- Ecosystem/culture
- Management recommendations
Snake Fungal Disease

- Caused by *Ophidiomyces ophiodiicola*
- Indiscriminate – found in 12 genera
- Dysecydysis, blisters, lesions
- Morbidity/mortality
- Eastern U.S.
- Origin?
- Conservation
Protocol

- Disinfection (bleach solution)
  - Handling gear
  - Boots (between sites)
- Isolation
- Swab regime
  - Dr. Matt Allender
Swab results

- 5/35 (14.3%) sampled from 2013-2015 were SFD positive (Grayling)
- 12.7% across MI
  - N = 102
  - Grayling
  - Edward Lowe
  - Pierce Cedar Creek
Acknowledgements

- **Mike Ravesi!!!!** And Camp Grayling staff – Carla Lange, Cullen Haesler
- Advisor: Bruce Kingsbury
- Committee: Jordan Marshall and Robert Gillespie
- Funding: Michigan Department of Military and Veterans Affairs, Fort Wayne Children’s Zoo, Michigan Society of Herpetologists
- Staff: Camp Grayling, Fort Wayne Children’s Zoo, Grayling Hospital for Animals
- IPFW Biology Department and Environmental Resources Center
- Kingsbury lab, especially Evin Carter, Sasha Tetzlaff, and Brett DeGregorio, and Field Help
- Friends & Family
Questions?