Blending Research, Management, Outreach, and Policy to Recover a Federally Listed Species

Megan M. Seymour
LIFE HISTORY
Lake Erie Watersnake (LEWS)

*Nerodia sipedon insularum*

Subspecies of the Northern Watersnake

LEWS: Absent or reduced banding pattern; rocky substrates; different diet; larger adult body size; lower growth rates; and shorter tails

Appearance

- Often uniform gray or brown
- Some with dark bands or intermediate bands
- Keeled scales
- 1 ½ to 4 feet long
- Non-venomous
Summer Habitat

- Rocky shoreline of islands, 75% within 13 m of shoreline
- 75% of individuals used 437 m or less shoreline
- Water/Vegetation interface
- Lake Erie
- Exhibit site fidelity to summer habitat

(King 2003)
Summer Habitat
Hibernation

- Hibernate from October through May
- Variety of different locations
- Natural and artificial
- 75% within 69 m of shoreline

(King 2003)
Reproduction

- Breed upon emergence from hibernaculum
- Form “mating balls” of 1 female, multiple males
- Viviparous—females give birth to average of 23 live young per litter in Aug/Sept.
- Reach sexual maturity from age 2-3
  
  (King 1986)
Population Status & Distribution

French explorers referred to “the snake islands” (McDermott 1947; Langlois 1964). Other accounts by early travelers indicate, “myriads of watersnakes basking in the sun,” and watersnakes “sunning themselves in heaps, knots and snarls” (Ballou 1878; Hatcher 1945; McDermott 1947; Wright and Wright 1957; Parker 1976).

At time of listing (1999), U.S. adult population was estimated to be 1,530-2,030, and snakes had been extirpated from 2 U.S. islands and 2 Canadian islands (King 1998).
Threats

- **Human Persecution!**
  - Intentional
  - Accidental

- **Habitat loss**
  - Shoreline development
  - Inland development
  - Habitat fragmentation
  - Improper habitat management
Theory of Island Biogeography
MacArthur & Wilson (1967)

- Island species more likely to become extinct
- Smaller islands more likely to have extinctions
- Island species less able to adapt to changing environments
- Restricted to finite amount of habitat/resources
- Limited immigration/emigration
Limitation of Small Populations

- More susceptible to catastrophic events, demographic variation, negative genetic effects, environmental stresses
- More likely to fluctuate below minimum viable pop threshold for long-term survival
- Chance variation in age/sex ratios = death rates exceed birth rates
- Decreasing genetic variability = inbreeding depression, genetic drift

(Dodd 1993; Gilpin and Soulé 1986; King 1987b, 1998b; King and others 1997; Nunney and Campbell 1993; Shaffer 1981; Soulé 1987)
ENDANGERED SPECIES ACT
**Endangered Species Act of 1973 (ESA)**

**Purposes:**
- Provide a means whereby ecosystems of Threatened and Endangered species may be conserved
- Provide a program for the conservation of Threatened and Endangered species
- Take steps to achieve purposes of relevant treaties and conventions

**Goal:** To restore listed species to a point where they are secure, self-sustaining components of their ecosystem, so that the protections of the ESA are no longer necessary.
Relevant Sections of ESA

- Sect. 4—Listing and Recovery
- Sect. 6—Cooperation with States
- Sect. 7—Cooperation with other Federal Agencies
- Sect. 9—Prohibited Acts
- Sect. 10—Permits
SECT. 4—LISTING AND RECOVERY PLANNING
Rationale for Federal Listing

- Significant population declines due to
  - Habitat loss
  - Human persecution
- Limited range and insular distribution
Listing

- Federal “threatened” designation applied on August 30, 1999 by U.S. Fish and Wildlife Service (USFWS)
  - Likely to become endangered in the foreseeable future in all or a significant portion of its range
- State “endangered” designation applied on May 3, 2000 by Ohio Department of Natural Resources, Division of Wildlife (DOW)
- Canadian “endangered” designation applied in 1977 by Ontario Ministry of Natural Resources
Protections Afforded by ESA

- Sect. 9- Prohibition of “Take”—to pursue, harm, harass, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to do any of these.
  - “Harm”-Significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering
  - “Take” can be permitted in some instances, if it will not jeopardize the continued existence of the species.

- Sect. 7- Federal agencies shall utilize their authorities…by carrying out programs for the conservation of endangered and threatened species.
Recovering the LEWS

- Recovery is the process by which the decline of species is arrested or reversed, and threats to its survival are neutralized so that its long-term survival in nature can be ensured.

- A blend of policy, research, land management, partnerships, education and outreach framed in the context of the Endangered Species Act
Recovery Plan

- Outlines management actions to help species recover
- Required for each species
- Identifies measurable criteria to determine when recovery has been met
- Estimates time frame for recovery
- Estimates cost of recovery
Recovery Plan Criteria

- Stable, persistent subpopulations on each of 4 largest islands (Bass Islands and Kelleys) with population goals overall and per island for 5 consecutive years.

- Persistence on small islands.

<table>
<thead>
<tr>
<th></th>
<th>Kelleys</th>
<th>South Bass</th>
<th>Middle Bass</th>
<th>North Bass</th>
<th>Combined U.S. Islands</th>
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</thead>
<tbody>
<tr>
<td>Recovery Goal</td>
<td>900</td>
<td>850</td>
<td>620</td>
<td>410</td>
<td>5555</td>
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</tbody>
</table>

Four Largest U.S. Islands with Lake Erie Watersnake Populations
Maintain enough suitable habitat to support subpopulations in perpetuity, with habitat goals overall and per large island

<table>
<thead>
<tr>
<th>Island</th>
<th>Length of shoreline (mi)</th>
<th>Land within 69 m of shore (ac)</th>
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</thead>
<tbody>
<tr>
<td>Kelleys</td>
<td>0.75</td>
<td>20.5</td>
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<tr>
<td>South Bass</td>
<td>0.7</td>
<td>19.3</td>
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<tr>
<td>Middle Bass</td>
<td>0.51</td>
<td>14.1</td>
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<tr>
<td>North Bass</td>
<td>0.34</td>
<td>9.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4.6</td>
<td>126</td>
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</tbody>
</table>
Recovery Plan Criteria

- Reduce human-caused mortality such that it is not a significant threat to population
SECT. 6—COOPERATION WITH THE STATES AND RECOVERY IMPLEMENTATION
Section 6

- USFWS shall cooperate with the States to carry out the ESA
  - Management agreements
  - Cooperative agreements
  - Funding
USFWS provides “Traditional” Section 6 funding to DOW (all state Wildlife Agencies) every year for, “conservation of E/T species or...monitoring the status of candidate species.”

USFWS “Non-traditional” Section 6 funds are available through a competitive grant process nationwide.
Research

Many aspects of LEWS ecology were not fully understood at time of listing

- Hibernation
- Habitat usage & home range
- Threats
- Population size/distribution
- Diet
- Annual survivorship
Telemetry Study
Diet Study

More than 90% nonnative, invasive round goby (*Neogobius melanostomus*)
(Jones et al. 2009; King et al. 2006)
“Nerodeo”—Annual Census

- Mark-recapture study
- 2 weeks in May/June
- Provides data for population estimates per island and overall
- Many contributing partners
- Over 16,000 captures of over 10,000 individuals!
Additional Studies

- Contaminants
- High-incident road-kill locations
- Public opinion surveys
- Neonate survivorship
Education & Outreach Campaign

- To minimize human persecution
- Targets both residents and visitors
- Variety of methods
- Highly visible
- Engage island kids
- Community involvement
Education & Outreach Campaign

- Understand island communities’ snake “problems”
- Be honest and upfront
- Address individual concerns
- Have a regular presence