Snake Assemblages Inhabiting Four Man-Made Wetlands in Letterkenny Army Depot, Franklin County, South-central Pennsylvania: Implications for Wetland Management and Conservation

Daniel F. Hughes¹, Pablo R. Delis¹ and Walter E. Meshaka²

¹Department of Biology, Shippensburg University, Shippensburg, PA 17257
²Section of Zoology and Botany, Pennsylvania State Museum, Harrisburg, PA 17120

ABSTRACT

There is a dearth of information on the status of snake assemblages in Pennsylvania. The characterization of snake species assemblages and their population status are necessary to enact conservation and management policies. We have chosen Letterkenny Army Depot (LEAD), a federally owned 7,000 ha facility, as the study site where to examine the snake community inhabiting man-made lakes in south-central Pennsylvania. In this study, we will use cover boards and opportunistic transect searches to determine the species composition, relative population size, sex ratios, morphometrics, and activity patterns of the snake assemblages around four man-made lakes in LEAD. Monthly surveys will start in April until October of 2012. Findings from this study will provide the base line to the better to understanding of the critical role that man-made wetlands play in snake community dynamics.

Introduction

The northern United States has a large diversity of biomes and Pennsylvania exhibits many of them. The Ridge Valley Region of Pennsylvania is characterized by low elevations, forested ridges and extensively farmed valleys. The Appalachian Mountains to the west, the Coastal Plains to the east, low valleys and many wetlands, are all trademarks of the Ridge Valley Region in south-central Pennsylvania. This suite of geographic and environmental features makes this a unique and diverse region. Unfortunately, little is known about the specific composition of biotic communities in most of these physiographic regions. This information is more relevant in the light of the recent anthropogenic pressures facing the state, from urban sprawl to hydraulic fracturing. Pennsylvania is home to approximately 35 species of reptiles, of which 20 are snakes. Many of these snakes are restricted to specific biomes throughout the state (Hulse et al. 2001). There is, however, an inherent lack of literature on the natural history of snake populations in the state. Thus, the greatest limitation for the conservation of either populations or entire snake assemblages is the fundamental lack of biological information (Hulse et al. 2011).

Wetlands are diverse and critically important ecosystems. They prevent flooding, filter and clean water supplies, and provide critical habitat for wildlife (PGC, 2005). Some snakes depend on wetlands for food, refuge, protection, and other resources essential to their survival. Sadly, many wetlands are destroyed by human activities. In Pennsylvania, wetlands are estimated at 30 ha a year (PGC, 2004). The destruction of wetlands forces snakes inhabiting them to relocate or threaten them with local extinction. Studies have shown that constructed wetlands are an invaluable natural wetlands in providing a habitat for many anurans and semi-aquatic species (Matero et al., 2006).

Previous studies conducted in south-central Pennsylvania indicated that the area possesses a good representation of state's native herptile fauna (Delis et al. 2001). With this background, I set up to examine the natural history of the snake assemblage inhabiting constructed wetlands in an anthropogenically impacted environment. Specifically, the objectives of my study are to determine the species composition, relative abundance, sex ratios, morphometrics, characteristics, and reproductive and health status of snakes at four different wetlands. I will also determine the yearly activity patterns in relation to distance from the sites of peak human disturbances.

Study Site

Letterkenny Army Depot (LEAD)

- Property: Federal (OD) ammunition depot established in 1942
- Geographic: Southeast Ridge Valley, Chambersburg, Franklin Co.
- Coordinates: 39°59’N Lat. / 77°42’W Long
- Surface Area: 7,000 hectares
- Altitude: 182 m - 470 m
- Habitat: Deciduous forest
- Zone I (Amendment Area) Land Use
  - Mostly disturbed, fragmented by roads, military mission
- Zone II (Buffer Area) Land Use
  - Mostly undisturbed, limited agricultural

Methodology

- Snake cover boards (54) set at ~50 m intervals in wetlands perimeter
- Placed in areas with direct sunlight exposure (Figure 5)
- Monthly surveys from April 2012 to October 2012

Expected Results

Snakes native to south-central Pennsylvania (Hulse et al. 2001)
- Regale exsulans (Eastern Garter Snake)
- Thamnophis sauritus (Common Garter Snake)
- Territorialus (Rough Green Snake)
- Thamnophis sexippetis (Northern Water Snake)
- Eumeces viridula (Gopher Snake)
- Eumeces sciurus (Eastern Coachwhip)
- Lampropeltis triangulum (Milksnake)
- Agkistrodon contortrix (Corn蛇)
- Sistrurus catenatus (Milk snake)
- Heterodon platirhinos (Eastern Hognose Snake)

Discussion on Expected Results

We are optimistic that this site will be a good representation of the native snake assemblage characteristic of south-central Pennsylvania. If snake abundance is found to be higher in this study in Zone I compared to the study carried out by Delis and coworkers in 2005, this may be partly attributed to the higher diversity of wetlands (i.e., streams, ponds, vernal pools, man-made lakes, etc.) within Zone I. A low number and diversity of wetlands can impose restrictions of some aquatic and semi-aquatic snakes such as Nerodia sipedon and Thamnophis species. Additional characteristics of the structural habitat influencing snake abundance are leaf litter depth, tree density, and disturbance level. Disturbed forests seem to have a higher abundance of snake species which may be the result of increased food and microhabitat availability. The large number of wetlands and other microhabitats in Zone I at LEAD, therefore, increases the spatial heterogeneity of the site. Expands and diversifies the resource available and allows larger biodiversity. The information from this study will be used to establish and enact management and conservation policies for the future of wetlands and other natural resources at LEAD.

Acknowledgements

We would like to thank the Letterkenny Army Depot Natural Resources Department, especially Mr. Craig Knobl, Mr. Samuel Kolesny, Mr. Matthew Miller, and the Commander, Colonel Provancha. We would also like to thank the Shippensburg University Research Advisory Committee for providing the initial funding for the project.

References
