

NORTHERN ILLINOIS UNIVERSITY

**SPATIAL AND TEMPORAL VARIATION IN DEMOGRAPHIC PARAMETERS OF
THE LAKE ERIE WATERSNAKE (*NERODIA SIPEDON INSULARUM*)**

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ABSTRACT

Mark-recapture data from 7888 individuals spanning 28 years along with reproductive characteristics for 196 litters (4905 offspring) were used to analyze temporal and spatial variation in demographic parameters of the recently de-listed Lake Erie Watersnake, *Nerodia sipedon insularum*. Specifically, goals were to 1) determine whether demographic parameters had increased following a rapid shift in diet, 2) identify sources of temporal and spatial variation 3) provide estimates of sub-adult (neonate and juvenile) survival, and 4) provide current estimates of adult survival, reproductive output and population growth that demonstrate recovery. Using data from 41 litters (844 offspring) in the pre-round goby period and 155 litters (4061 offspring) in the post-round goby period, I found that both litter size and offspring snout-vent length (SVL) have increased. Similarly, post-partum mass also increased (26% heavier). Although mark-recapture data from early in this study (1980-1983) were limited, comparisons at one site (North Bass Island) indicated survival has increased by 17% in males (from 28% in 1980-1983 to 45% in 1996-2008) and 4% in females (from 66% in 1980-1983 to 70% in 1996-2008). Analysis of recent data (1996-2008) showed that spatial variation, but not temporal variation, was an important factor in adult survival, both among islands and among sites within islands. Sex influenced survival, but without clear pattern; male survival was higher at some sites and female survival was higher at others. Age influenced survival within a single site, increasing

from 18% as neonates, to 21-53% as juveniles before reaching adult levels (60-78%). These survival estimates are combined with results from the literature as a large summary table found in the supplemental materials to this dissertation. Litter size varied among years when sites were pooled, and within a single site. The proportion of gravid females varied temporally, ranging from 80-97% over 5 years. The realized population growth rate also varied temporally over 8 years (mean: 1.07, range: 0.90 to 1.21, $\sigma^2 = 0.014$). The combined results of this long-term, detailed study allow for a thorough review of the demographic parameters currently controlling population growth and are important for investigating the role of large-scale processes and their influence on life-history.