NORTHERN ILLINOIS UNIVERSITY

DELAYED NEONATAL FEEDING AND GROWTH IN THE LAKE ERIE WATERSNAKE, *NERODIA SIPEDON INSULARUM*

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BY

ELIZABETH WHITNEY MACK

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ABSTRACT

Growth early in life can have lasting consequences on survival and reproduction in many animal species. For snakes, larger, faster growing neonates are more likely to survive their first hibernation, have higher foraging success, and may reach sexual maturity sooner (therefore increasing lifetime fecundity) than their smaller littermates. However, studies of the youngest age classes are rare for New World natricine snakes (gartersnakes, watersnakes, and allied taxa). The purpose of this thesis is to better understand the life history characteristics of neonatal Lake Erie Watersnakes (*Nerodia sipedon insularum*), a New World natricine snake with a long history of evolutionary and ecological research and conservation management that is endemic to the islands in the Western Basin of Lake Erie (Ohio, USA; Ontario, Canada). Previous studies of Lake Erie Watersnakes have found them to grow slower, mature later, and possibly delay feeding compared to related species. To determine if Lake Erie Watersnakes do indeed delay feeding until after their first hibernation, age class 0 (between birth and first hibernation) and age class 1 (emergence from hibernation and through the first full season) snakes were compared in the field and in the laboratory. In the field, only 0.6% of age class 0 snakes contained prey while 11.9% of age class 1 snakes contained prey. During captive feeding experiments, the probability of a snake eating offered fish was positively correlated with its age in growth days (binary logistic regression, Wald $\chi^2 = 25.354$, $P < 0.001$). In addition, linear regression analysis of six year/site combinations revealed a lack of growth during age class 0, followed by rapid growth in those snakes that survived their first hibernation. Taken together, this evidence suggests that age class 0 Lake Erie Watersnakes do indeed delay feeding and growth until after their first hibernation, contrary to other New World natricine species. Dissection of the fat bodies and yolks of newborn Lake Erie Watersnakes reveals the mechanism that may allow for this behavior. When compared to four other natricine species, Lake Erie Watersnakes had the highest combined yolk+fat body mass relative to their carcass weight, allowing newborn snakes to utilize fat reserves for metabolic processes during their first fall instead of needing to forage. Once growth began in age class 1 snakes, it was highly variable across years and sites (eight year/site combinations; $F_{1,7} =$

8.113, $P < 0.001$). This variability may lead to some groups of snakes reaching sexual maturity a full two seasons before their slow-growing counterparts, possibly resulting in large differences in life-time fitness among cohorts. The results of this study highlight the importance of understanding the variability present within a taxonomic family, species, or even population. Long-term study of the Lake Erie Watersnake emphasizes the temporally and geographically variable nature of wild populations and the possible need to tailor conservation management strategies accordingly.