

NORTHERN ILLINOIS UNIVERSITY

**POST-PLEISTOCENE GLACIAL RETREAT, COLONIZATION ROUTES, AND  
GEOGRAPHIC VARIATION OF THE NORTHERN WATERSNAKE,  
*NERODIA SIPEDON*, IN THE GREAT LAKES REGION**

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JACE WILLIAM ROBINSON

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ABSTRACT

The midwestern United States is unique in that it contains the largest freshwater lake system in the world. This region was formed by post-Pleistocene glacial recession, approximately 12,000 years ago. Post-Pleistocene glacial retreat and formation of the Great Lakes in North America is likely to have had a profound impact on the colonization routes of terrestrial and semi-aquatic species. These colonization routes affected the current distribution of species within this region, resulting in intraspecific geographic variation. This research focuses on the relationship between gene lineages and geographic distribution of the northern watersnake, *Nerodia sipedon*, in the Great Lakes region resulting from post-Pleistocene glacial retreat. Specifically, this study tests the hypothesis that formation of Lake Michigan acted as a geographic barrier, forcing a two-front colonization into Wisconsin and Michigan. The northern watersnake is widely distributed in eastern North America, making it an ideal species in which to test this hypothesis. Complete mitochondrial DNA sequences for the gene ND2 have been obtained from 62 individuals. From these data, 28 haplotypes were identified from a total of 27 sites across Illinois, Wisconsin, Michigan, Indiana, Kentucky, Ohio, and Ontario, Canada. Statistical parsimony analysis of these data identified two distinct gene lineages corresponding with populations east and west of Lake Michigan. Maximum parsimony analysis identified congruent eastern and western lineages, with bootstrap values of 80 and 100, respectively. AMOVA and nested clade analysis strongly support the hypothesis that Lake Michigan had a major influence on the genetic structure within this region and that gene flow is limited or nonexistent between these lineages. It is likely that Lake Michigan caused a two-front colonization from southern glacial refugia into the northern portions of the Great Lakes region.