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Analysis of Translocation Techniques using Northern Watersnakes (*Nerodia sipedon*) at a Restored Habitat

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Habitat loss and fragmentation are factors leading to declines in many faunal populations. Restoring habitats to support the rebound of local populations may help to remedy these declines, but in cases where a species has been extirpated, natural recolonization is unlikely. Translocation has proven to be a successful strategy for the repatriation of some extirpated populations, but its effectiveness is unclear and understudied in snakes. Using the Northern Watersnake (*Nerodia sipedon*) we directly translocated individuals to a recently restored nature preserve from a nearby site in 2008. We also raised neonates in simplistic laboratory enclosures ("headstarts") until they were large enough to be translocated to the same preserve. These experimental release groups were compared to resident snakes. Compared to residents, translocated snakes selected aquatic habitats with a more open canopy, moved more extensively, and used areas outside of reserve boundaries more frequently. Headstarts showed restricted movements and used habitats in ways atypical of residents. Translocated and resident snakes grew at similar rates, but headstarts failed to grow appreciably. Both experimental groups had low survivorship relative to residents. Much of the mortality in headstarts occurred during the overwintering period, while mortality in directly translocated snakes was limited to the active season. Due to the poor performance of headstarts, we also examined the alternative approaches of releasing headstarts directly into constructed hibernacula and enriching captive conditions for headstarts prior to release. We compare and contrast the outcomes for these different approaches and provide recommendations for repatriation efforts involving snakes.