Abstract:

The primary objective of this study was to use direct (acoustic telemetry) and indirect (genetic assignment) methods to characterize basic aspects of lake sturgeon (*Acipenser fulvescens* Rafinesque, 1817) breeding ecology. Specifically, data on natal origin, spawning habitat, spawn sex-size structure, and sex-specific residence times, spawning site fidelity, seasonal movements and degree of straying between demographically and genetically independent populations. A secondary benefit of the project was the non-spawning period movements of tagged fish. The analysis was based on acoustic telemetry and genetic assignment tests for individuals captured from the Menominee, Peshtigo, Oconto and Fox rivers (draining into Green Bay) in Wisconsin, which represent the only spawning rivers in western Lake Michigan. Sturgeon (*N* = 160) were captured during the spring (18 April-25 May) of 2011-2015 using large dip nets (51%) and electrofishing (49%). Captured sturgeon were genotyped and assigned to a Great Lakes river population using likelihood-based estimators based on microsatellite (*N* = 13) genotype and mtDNA haplotype frequencies. Assignments revealed that captured adults from four Green Bay rivers were of an aggregate composition from the overall sample size (*N* = 160) of 38.2% assigned to the Fox-Wolf River population, 23.5% to the Menominee River population and 37.4% to the Peshtigo-Oconto River population. One adult female sturgeon was assigned to the Manistee River population (eastern Lake Michigan). Of the 160 captured adults, 115 spawning lake sturgeon were tagged with surgically inserted acoustic tags/transmitters (Vemco V-16). Collected lake sturgeon ranged in size from 114 cm to 185 cm total length, and girth from 43 cm to 74 cm. Visual examination during surgery confirmed the sex of each individually tagged fish. Timing of post-surgery departure from the rivers differed significantly between males (mean 35.6 days) and females (mean 8.9 days), but was not significant because of the large variability. Post-surgery residence time was longer for the Menominee River sturgeon compared to individuals from the other rivers. More than twice as many males versus females were detected in the four rivers during the non-spawning period. A subsample of 53 lake sturgeon returned to one of the four rivers 1.9-3.4 years after surgery. Eight males returned to one of the four rivers in successive springs but no female sturgeon returned in successive years. High straying (i.e., dispersal to a non-native stream to spawn) rates occurred among rivers. Transition probability was highest for lake sturgeon captured in the Peshtigo and Oconto Rivers moving to the Fox River (0.77), and Fox River captured lake sturgeon moving to the Peshtigo and Oconto rivers (0.21). Since these populations represent the only spawning sturgeon in western Lake Michigan, lake sturgeons associated with these rivers represent spawning populations of significant importance towards their restoration in Lake Michigan. This study improved the understanding of the species breeding ecology and movement patterns needed to guide management decisions, such as prioritizing habitats for restoration or protection.

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