Annual movement patterns of Roanoke River Atlantic sturgeon, including inter-DPS marine movements and spawning periodicity

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For endangered Roanoke River, North Carolina Atlantic Sturgeon *Acipenser oxyrinchus oxyrinchus*, there are questions regarding annual migration patterns, spawning timing, and marine movements. Six adult Atlantic Sturgeon from the Roanoke River were implanted with acoustic telemetry tags from 2010-2012. These sturgeon were monitored through a network of passive receivers in North Carolina and eight additional states. We used a multi-state model to estimate movement probabilities among riverine, estuarine, and marine areas. From September 2010 to December 2014, five of six of our Atlantic Sturgeon were detected in three different NOAA Distinct Population Segments. Seasonally, sturgeon were observed to either spend the entire year in marine waters or winter-spring in marine waters, summer in Albemarle Sound and fall in the Roanoke River spawning. The multi-state model suggests that movement probabilities were seasonably variable. Annual estimated Atlantic Sturgeon mortality during the study was low (0.03) and detection probability high (>0.50) in most study areas. Sturgeon were observed to spawn in consecutive years or with a year in between spawning events. The complexity of Atlantic Sturgeon movements and the mixing of populations in marine waters add to the potential difficulty in managing the recovery of this species.