Listening to Estuarine Soundscapes to Investigate Shifts in Fish Reproduction Associated with Climate Variability

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Abstract

Atlantic croaker (*Micropogonias undulatus*), black drum (*Pogonias cromis*), red drum (*Sciaenops ocellatus*), silver perch (*Bairdiella chrysoura*), southern kingfish (*Menticirrhus americanus*), spot croaker (*Leiostomus xanthurus*), spotted sea trout (*Cynoscion nebulosaus*), and weakfish (*Cynoscion regalis*) are all fish that belong to the family Sciaenidae and inhabit estuaries of the southeastern USA. Fish within this family produce sounds that are associated with courtship behavior and spawning, and these calls are species specific. Thus, by listening to estuarine soundscapes, we can determine reproductive timelines for a community of sciaenid species. Since 2013, the Montie Lab has been using long-term acoustic recorders to quantify the intensity and duration of sound produced by aggregations of spawning silver perch, spotted seatrout, red drum, and other fish species in the May River estuary, SC. The goal of this study was to investigate how climate variability influences the initiation and termination of the spawning season, its overall duration, and the total number of days and hours in which chorusing occurred. An additional objective was to determine how reproductive timelines (i.e. obtained from acoustic data) correlated with the appearance of young-of-the-year (YOY) (i.e. obtained from bimonthly seining sampling). Preliminary data indicate that the timing of courtship sounds from year-to-year varies according to yearly temperature patterns. For example, in years where spring water temperatures come sooner, silver perch call earlier in the season. In 2016 and 2017, silver perch YOY were most abundant April through July, spotted seatrout YOY from July through October, and red drum YOY from October to December. These data matched the reproductive timelines obtained from the sound data. Listening to the estuarine soundscape may provide an easier, more efficient alternative to plankton sampling to track inter-annual variability in spawning and possible phenological shifts associated with climate change.