Invasive Typha and Frog Populations in the Great Lakes

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Abstract

The presence of the invasive hybrid cattail, Typha x glauca, has increased in Great Lakes coastal wetlands, but attempts have been made to control the invasion through the harvesting of Typha biomass. Anurans (frogs and toads) are sensitive to habitat disturbance and fragmentation, and they are likely negatively impacted by invasive plant species that form dense stands like Typha.

To quantify the effects of Typha and Typha removal on anurans, I have analyzed audio recordings of anuran calls collected from three habitat zones across four coastal wetlands in northern Michigan. The three habitat sites were: native sedge vegetation dominated, invasive Typha dominated, and invasive Typha treated, where Typha stands have been mechanically removed. I have analyzed three five-minute segments from each site during May 2018 for the call activity from different anuran species using bio-acoustic data analysis software (RavenPro).

Methods

Cheboygan Sedge Site

Munuscong Treatment Site

Sand Island Sedge Site

Sand Island Sedge Site

Figures 2-5. Spectrograms of anuran species are (1) green frog, (2) gray treefrog, (3) spring peeper (4) American toad, (5) wood frog, and (6) northern leopard frog.

Results and Conclusions

The frog species I identified were the green frog (Rana clamitans), the eastern gray tree frog (Hyla versicolor) and Cope’s gray tree frog (Hyla chrysoscelis), which were not differentiated, the northern spring peeper (Pseudacris crucifer), the American toad (Anaxyrus americanus), wood frog (Rana sylvatica), and northern leopard frog (Rana pipiens). I found significant differences between sites for the call activity of the green frog (0.006495) and the gray treefrog species (p-value = 0.0201) using the Kruskal-Wallis test, and I will preform further analysis using the call frequency and call duration for each species.

Introduction

Coastal wetlands of the Great Lakes provide important habitats for several anuran species (Price et al., 2005). However, in the Great Lakes, at least 50% of amphibian species are at risk (Hecnar, 2004). In the Great Lakes, almost all anuran species call during the spring or early summer, allowing for their identification via calling surveys (Eagle & Droge, 2019). Compared to other methods of monitoring anuran populations, the use of audio recordings allows for areas to be surveyed over longer periods of time, decreases the disturbances to anurans and subsequent changes in their calling behavior, and creates a permanent record (Bridges & Dorcas, 2000). Male anurans call in order to attract females and establish their territory (Cannatella, 2005). Different mating calls isolate anuran populations, leading to speciation (Blair, 1958). Previous research has involved the harvesting and removal of Typha biomass in Great Lakes coastal wetland in an effort to control the invasive species and reduce nutrient pollution (Carson et al., 2018).

Between May 14 and June 31 of 2018, the Sault Tribe Natural Resources Department (STRND) placed three sound recorders to monitor bird and anuran populations in various coastal wetlands across Northern Lake Huron and the St. Marys River: St. Ignace, Munuscong, Sand Island, and Cheboygan. The recorders were placed in three sites at each wetland: a native sedge meadow, a treated Typha stand, and an untreated, Typha-dominated wetland. In the treated Typha stand, all vegetation above 40 cm was removed using a wetland tractor during 2016. The sound recorders were located so there was a distance of 400 m or more between each one. Data was collected continuously from these recorders for 30 minutes at the beginning of every hour over the entire seven day period. I analyzed this audio data using bio-acoustic data analysis software (RavenPro), listening to recordings from May 2018 each site at every wetland three times from 10:00 to 10:05 pm. I ranked the call activity of each anuran species on a scale, with a value of “0” meaning that no individuals were audible, “1” meaning that one individual was audible, “2” meaning that multiple individuals were audible but there was not a full chorus, and “3” meaning that there was a full chorus. I also have used RavenPro to record the frequency and duration of each call.

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References


