Effects of harmful algal blooms on juvenile green turtle (Chelonia mydas) foraging ecology and habitat use

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Abstract

Anthropogenic pressure has led to extensive impacts on the coastal environment. Harmful algal blooms (HABs), often linked to anthropogenic impacts, can cause ecological damage and die-offs of flora and fauna. Successful marine conservation requires an understanding of how organisms respond to environmental changes. As harmful algal blooms are predicted to become more common and severe in the future, it is necessary to evaluate their impacts on marine turtles.

The Indian River Lagoon (IRL) along the east central coast of Florida has experienced an increased frequency of HABs in recent years, causing severe reductions in seagrass cover and drift macroalgae, key food resources for juvenile green turtles (*Chelonia mydas*). While our long-term data (1982- present) indicate decreased juvenile green turtle abundance during and after severe HABs of 2011 and 2012, we hypothesize that HABs also resulted in changes in diet and/or habitat use among the turtles that remained in the IRL during the HABs.

To evaluate this hypothesis, we conducted stable isotope analyses on skin samples from 250 juvenile green turtles captured in the IRL between 2010 and 2015. Briefly, stable isotope ratios in an animal's tissues reflect isotope ratios of what and where that animal has been eating. In our study, it is necessary to account for potential changes in baseline isotope ratios as a result of algal blooms in the IRL. Therefore, we compared turtle isotope signatures to those of 130 samples collected from fish resident in the IRL, enabling us to disentangle changes in baseline ratios from potential behavioral and foraging changes exhibited by the turtles. Initial results indicate that juvenile green turtle stable isotope signatures were more variable before the HABs of 2011-2012 than during or after, indicating more restricted diets and/or reduced turtle recruitment to the IRL as a result of the blooms.

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