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Dietary overlap between jellyfish and forage fish in the northern Gulf of Mexico

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ABSTRACT: Despite the speculations that jellyfish (hydromedusae, siphonophores, scyphomedusae and ctenophores) may compete with forage fish for prey, there are few direct comparisons of their diets. To determine the dietary overlap between *Aurelia* sp. (Cnidaria, Scyphozoa) and *Brevoortia patronus* (Goode, 1878) (Pisces, Clupeidae) in the northern Gulf of Mexico, we collected monthly samples in Louisiana, Mississippi and Alabama coastal waters (USA) during summer and early fall 2009–2010. We determined carbon and nitrogen stable isotope ratios in predators and their potential prey, including small plankton (<200 µm) and mesozooplankton (200–2000 µm), and identified prey in the stomachs of adult *Aurelia* sp. and *B. patronus*. Trophic niche overlap was defined using the stable isotope Bayesian ellipses in R (SIBER) procedure and ranged from 0–28% for *Aurelia* sp. and 0–64% for *B. patronus* across the 3 sites. While stable isotope values in *B. patronus* clearly reflected the range of mesozooplankton, those for *Aurelia* sp. indicated a high individual variability, which likely accounted for the niche separation in Louisiana. Copepods were numerically the most abundant prey in the stomachs of predators at all sites, resulting in a percent similarity index of 93% in Louisiana, 87% in Mississippi and 86% in Alabama. Our results highlight that, despite local and species-specific variability, dietary overlap between *Aurelia* sp. and *B. patronus* is high across the northern Gulf of Mexico. Our data contribute to the definition of trophic interactions between jellyfish and forage fish in the Gulf of Mexico region and other ecosystems where they co-occur.

KEY WORDS: Stomach contents · Stable isotopes · Niche overlap · SIBER · MixSIAR · *Aurelia* sp. · *Brevoortia patronus*

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INTRODUCTION

Jellyfish (hydromedusae, siphonophores, scyphomedusae and ctenophores) and forage fish potentially share middle trophic levels in marine food webs (Purcell & Arai 2001). Except for a few species, most jellyfish are zooplanktivorous and include a large variety of prey taxa within their diets (Purcell 1997, 2009). Because detecting and identifying gelatinous tissues in stomach contents is difficult, predators of jellyfish, which include sea turtles, sea birds, sharks and several fish species, have likely been underestimated (Arai 2005). Forage fish are schooling fish and serve as a critical link between plankton and higher trophic level predators within marine food webs worldwide (Springer & Speckman 1997). Based on the similarity of their diets, trophic niches of jellyfish and forage fish are likely to overlap (Purcell & Arai 2001), but the dietary composition and degree of overlap between jellyfish and forage fish diets have

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