

The Effects of Age-0 Gizzard Shad Abundance on Piscivore Abundance and Condition in Southern Reservoirs

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Abstract: The majority of piscivores found in southern U.S. reservoirs consume primarily age-0 (≤ 100 mm) gizzard shad (*Dorosoma cepedianum*). However, gizzard shad grow rapidly, so even systems with high gizzard shad biomass could be food-limited if most gizzard shad are too large to be eaten. Previous studies comparing gizzard shad abundance and piscivore prey demand have only considered one or a few piscivores, but many southern reservoirs have seven or more piscivores in the community. This suggests prey limitation may be more common than these studies suggest. We used 29 years of data from the Oklahoma Department of Wildlife Conservation and Arkansas Game and Fish Commission to test for correlations between gizzard shad abundance (catch per unit effort [CPUE] or biomass of all gizzard shad or only gizzard shad < 100 mm TL) and piscivore abundance (CPUE or biomass), relative weight, and proportional size distributions. While some significant correlations were found, the relationships were always weak ($R^2 < 0.18$ for the Oklahoma data and $R^2 < 0.03$ for the Arkansas). To determine the level of correlation that would occur by chance alone, we tested the data from Oklahoma and Arkansas in 1,000 Monte Carlo simulations where the data were randomly sorted and analyzed. The Monte Carlo simulations had an average $R^2 = 0.102$ for the Oklahoma data and an $R^2 = 0.0163$ for the Arkansas data, indicating that the real data were not related any stronger than would be expected by chance. These results suggest that in many systems factors other than abundance and biomass of gizzard shad are important in shaping piscivore communities.

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