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Variations in biogeographic composition and functional structure of estuarine-associated fishes among ecoregions in the Japanese Archipelago

Yukiya Ogata, Atsunobu Murase

University of Miyazaki, Japan

Abstract

While the relationships between functional guild and biogeography of estuarine-associated fishes are largely understood, the factors affecting the structure of ecological guilds at the regional level remain unclear. Past studies have indicated that differences in climate regions may affect faunal assemblage structures. Building on this data, and focusing on the Japanese Archipelago, the present study hypothesized that differences in climate region affect the biogeographic composition and guild structure of fishes in estuaries. To test this hypothesis, the following steps were taken: 1) construction of faunal list of fish species (excluding freshwater fishes) in estuaries of Japan based on literature records; 2) biogeographic classification of these fish species into three categories (cool-temperate, warm-temperate, and tropical); 3) classification of these species into twelve estuarine-use functional guilds; and 4) statistical analysis to clarify differences in biogeographical and functional structure of these guilds among five ecoregions in Japanese waters.

We found that the percent contribution (based on the number of species) of each biogeographic category differed significantly among regions. Moreover, a permutational analysis of variance with local assemblage data for guild components (percent contribution of each guild in number of species) detected significant differences between the guild structures of northern Japan and those of other regions.

These results suggest that differences in marine climate regions affect biogeographic composition and guild structure of fishes in Japanese estuaries. In addition, a regional analysis of guild structure showed that the differences in northern Japan were driven more by diadromous than by marine species. This study highlights the importance of differences in marine ecoregions with respect to assemblage structure and ecological function of fishes in estuaries.

Keywords

Biogeography, Functional guild, Estuarine fishes, Japan