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Conference Abstract

eDNA reveals widespread presence of marine fish in the Panama Canal

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Abstract

Shipping corridors can be hotspots for biological invasions as they connect the world's oceans and dissolve dispersal barriers between these aquatic systems. As a consequence, multiple opportunities for biotic exchange arise and the resulting establishment of non-native species often causes adverse ecological and economic impacts. In this study, a combined effort of traditional gillnetting and eDNA-based surveys was implemented to characterize the fish community of the Panama Canal, which is a key region for biotic exchange as it connects the Pacific and Atlantic Oceans in Central America. The Canal was recently expanded and new lock systems installed potentially providing novel opportunities for fish to enter the Canal. Using COI metabarcoding, we detected a total of 142 taxa, including thirteen potentially new records for the freshwater part of the Canal. Furthermore, we found evidence for the presence of 16 Atlantic and 10 Pacific non-native marine fish inside different sections of the Canal. Identifications based on molecular data did not cover all species caught with gillnets, but generally provided a more complete image of the fish fauna. Diversity indices based on eDNA surveys revealed significant differences across different sections of the Canal reflecting in part the prevailing environmental conditions. The observed changes in the fish community may be attributed to the recent expansion of the lock systems, which facilitates species migration directly by

enlarging the canal entrances on either side of the Isthmus and indirectly by allowing more salt water to enter the Canal and thus increasing the overall salinity. Given the potential ecological and socio-economic consequences of non-native species crossing the Canal and establishing in the ocean basins on either end, it seems advisable to evaluate limiting salt water intrusion as well as implementing additional barriers to species dispersal (acoustic/electric/chemical deterrents) as a precautionary measure.

Keywords

Environmental DNA, Metabarcoding, Invasion Biology, Fish Ecology

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