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Effect of non-native versus native invaders on macrophyte richness: are carp and bullheads ecological proxies?

Przemyslaw G. Bajer[1], Marcus W. Beck[2], Peter J. Hundt[1]

[1]University of Minnesota, St. Paul, MN

[2]Southern California Coastal Water Research Project, Costa Mesa, CA

ABSTRACT

While it is accepted that invasive species are non-native organisms that become abundant and cause ecological damage in areas where they are introduced, the problem of 'native invaders,' native species that become excessively abundant due to anthropogenic impacts, is frequently encountered by ecologists. Often, native and non-native invaders occur in sympatry. Understanding relative severity of their impacts and niches they occupy is needed to inform management actions. Here, we quantify relative impact of native (black bullhead) and non-native (common carp) benthic fish on macrophytes species richness in over 200 lakes in North America. The impact of each species was addressed while accounting for the effects of water clarity, depth, lake area, watershed size, shoreline irregularity, land use by humans, abundance of planktivorous fishes, and ecoregion. Using model selection, we show that both species had negative impact on macrophytes richness, but the impact of carp was approximately two times as strong when adjusted for catch rates. We also conducted a principal component analysis followed by permutation procedures, which showed that carp and bullheads often occurred together in shallow, turbid lakes in watershed dominated by human use. Our findings have implications for lake-restoration efforts via carp or bullhead management.

Full Text

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