Incorporating lakes in stream fish habitat models: are we missing a key landscape attribute?

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Abstract

Although lakes and rivers are intimately connected, more effort is needed to develop conceptual approaches that account for lake-stream interactions within the drainage network. Lakes can buffer the impacts of environmental variability in streams and facilitate recolonization of the stream network by fish after a disturbance. However, lakes have rarely been incorporated in habitat models for stream fish. We examine whether including the presence of lakes in habitat models can improve our understanding of brook trout Salvelinus fontinalis relative abundance in streams. We quantified brook trout relative abundance in 36 streams over three consecutive years by single-pass electrofishing. Relative abundance of brook trout in streams was greatest when lakes were present in the stream network. Lakes appeared to have greater influence on relative abundance in headwater streams than in larger streams. These results emphasize the importance of considering lakes as a critical attribute in landscape fish habitat models, many of which currently focus on terrestrial landscape variables. We discuss potential gains from incorporating the presence of lakes in (i) multiscale habitat models, (ii) prediction of thermal refuges, and (iii) metrics of habitat connectivity in stream-lake networks.

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