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A littoral fish index that responds to eutrophication in boreal lakes

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Littoral fish assemblages were sampled by electrofishing at 70 nearshore sites in the Kitka lake group (lakes Ala-Kitka, Yli-Kitka and Posionjärvi) in northeastern Finland. Water quality monitoring at these sites indicated total phosphorus ranging from 5 to 75 µg/l. Fish assemblages were usually dominated by littoral fish species, especially European minnow (Phoxinus phoxinus) and alpine bullhead (Cottus poecilopus). Young individuals (mainly 0+ and 1+) of other fish species, such as ruffe (Gymnocephalus cernuus), burbot (Lota lota) and perch (Perca fluviatilis) were also recorded frequently. A littoral fish index (LiFI) was developed to respond the degree of eutrophy. Of the candidate metrics, three were chosen for the index: (1) proportion of minnow and alpine bullhead individuals in the electrofishing catch, (2) density of perch and (3) average weight of all individuals in the catch. Values of these metrics were adjusted to range from 0 to 1 and the littoral fish index (LiFI) value was calculated as an average of these three metrics. The index value responded to the extent of eutrophy; total phosphorus explained 55.3 % of the variation in LiFI index values. A test of the index with data from other Finnish lakes suggested that the index is feasible for use in a broader context. Finally, the index values from the Kitka lakes were classified from bad to high in assessing the ecological status of the littoral sites around the studied lakes. We recommend the use of littoral electrofishing and LiFI index in lakes where detailed, bay-specific information is needed about the ecological status and in all situations where the littoral zone is in focus.

Biography

Tapio Sutela has completed his PhD at the age of 39 at Oulu University in Finland. He is a researcher at the Natural Resources Institute Finland. He has published over 40 papers in reputed journals.

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