Development of an index of Ecological condition based on great river fish assemblages

USEPA, ORD/NHEERL/Mid-Continent Ecology Division, Duluth, MN 55804, United States

As part of the Environmental Monitoring and Assessment Program for Great River Ecosystems we developed a fish-assemblage based multimetric index (Great River Fish Index,GRFIn) as an indicator of ecological conditions in the Lower Missouri, impounded Upper Mississippi,.unimpounded Mississippi, and Ohio Rivers. We compiled and tested 81 candidate fish metrics for their ranges and predicted responses to an empirical stressor gradient based on water chemistry, human disturbance, and landscape measures. Redundant metrics were eliminated and final reach-specific GRFIn's included 8-10 metrics scored on a continuous scale from 0-10 (10=good). Condition class thresholds were calculated by trisecting the condition range (difference between the y-intercept of the Q=95 percentile quantile regression and 5th percentile of sample). Cumulative distribution functions for each river or reach showed that 57% ± 7 of the Lower Missouri River, 51%± 20 of the unimpounded Upper Mississsippi, 43± 8 of the impounded Upper Mississippi, and 39± 7 of the Ohio River to be in most disturbed condition. Validation of GRFIn showed that slopes of the development and validation datasets were not significantly different ($p \leq 0.05$). The discrimination efficiency (ability of GRFIn to indicate disturbed sites) ranged from 64% for the impounded Upper Mississippi to 87% for the Ohio River.

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