

ASSESSING TRENDS: THE POWER OF BIOLOGICAL ASSESSMENTS TO DETECT CLIMATE CHANGE

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ABSTRACT

Climate change is altering the temperature and hydrology of streams, with a variety of consequences for ecological processes including the maintenance of ecological integrity. Local and regional extirpation and/or replacements will likely occur as a result. These changes happen atop other existing and projected anthropogenic impacts, potentially confounding assessments. This represents a challenge to state and tribal resource managers tasked with monitoring stream quality in the face of climate effects. Intriguing questions include: what types of change in assemblage structure are expected, how much change is expected, and how detectable are climate-induced changes using common assessment approaches? We assembled a dataset of multiple least-disturbed reference sites sampled each year over a 6 year time period including, fortuitously, dry and wet periods. We combined this with literature on predicted effects of climate on aquatic insect and fish communities. These data were used to estimate the power of assessment programs to detect various climate change effects across different regions. The results suggest a range of program sensitivities to climate effects, with some having high power to detect changes across the range of predictions and others with fairly low power. Various adaptive strategies exist to adjust programs to account for expected climate effects.

KEY WORDS

Climate change, biological indicators, bioassessment, trend detection, aquatic ecosystems