

ABSTRACT

Ecological condition of northern mesic forests in northern Wisconsin, USA based on breeding bird assemblages

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Assessing forest condition or “health” is an important but difficult challenge, especially in regions where spatially varying management activities are superimposed on a naturally heterogeneous landscape. In the western Great Lakes region of North America, breeding birds are potentially useful indicators of forest condition because they are diverse, habitat sensitive, and easily sampled. Like other species, birds must integrate environmental variables over space and time; the status of local populations therefore may provide a signal of cumulative environmental health or degradation. We present a transparent, flexible, and cost-effective method for quantifying ecological condition based on breeding bird assemblages in western Great Lakes forests. Our approach uses bird species occurrences at 917 survey sites ranging from degraded urban/suburban forest remnants to relatively pristine old growth forests. We used an iterative, maximum likelihood approach to quantify species-specific biotic response (BR) functions across this environmental reference gradient. Many species showed significant, directional responses to the reference gradient, consistent with known life history attributes. Response functions of 38 species were used subsequently to estimate ecological condition at specific sites using a similar iterative process. Results produced a bird-based index of ecological condition (IEC) ranging from 0 (maximally degraded) to 10 (minimally degraded). We describe a successful application of this method for the Wild Rivers Legacy Forest (WRLF), a 26,143 ha conservation landscape in northeastern Wisconsin, USA, managed primarily under a working forest conservation easement established in 2006. In general, sites within the WRLF yielded high IEC values (7-9), but nearby forest areas not under the conservation easement gave significantly lower IEC values (based on bird assemblages) than forest lands governed by the easement. Because we used probabilities of occurrences as dependent variables in the *a priori* BR-functions, IEC values can be derived for single points or for target areas of different sizes. Taxa other than birds can easily be incorporated into this indicator framework as long as the methods used in assessing a site are the same as methods used to develop the species-specific BR-functions.

Please contact Erin Giese (giesee@uwgb.edu) to request a copy of her graduate thesis.