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TRACKING TRENDS & PERFORMANCE IN BASIC RESEARCH

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2008 : November 2008 - Fast Moving Fronts : Gerald J. Niemi &amp; Michael E. McDonald

## FAST MOVING FRONTS - 2008

November 2008



**Gerald J. Niemi & Michael E. McDonald talk with *ScienceWatch.com* and answer a few questions about this month's Fast Moving Front in the field of Plant & Animal Science. The authors have also sent along images of their work.**



### Article: Application of ecological indicators

Authors: Niemi, GJ;McDonald, ME

Journal: ANNU REV ECOL EVOL SYST, 35: 89-111 2004

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### SW: Why do you think your paper is highly cited?

There is mounting concern about the state of our environment. Ecological indicators, if measured in a consistent manner and over time, can tell us whether the environment is improving, stable, or becoming further degraded. The article reviews the current thinking about ecological indicators and, to a lesser extent, design considerations for answering important questions about the condition of the environment.

### SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

Our paper was a synthesis of knowledge and it highlights what has been done thus far and where we need to go in the future to improve this knowledge.

### SW: Would you summarize the significance of your paper in layman's terms?

The public demands that we understand and report on the condition of the environment just like we do on the state of our economy. With the increasing cost of collecting monitoring data, getting the best indicator(s) for the questions of interest is crucial. The need for useful and tested ecological indicators will continue to be necessary to establish environmental conditions and to determine the effectiveness of management programs and policies.



Coauthor

Michael E. McDonald

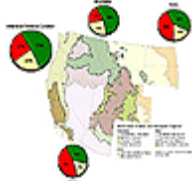
**SW: How did you become involved in this research and were there any particular problems encountered along the way?**

Figure 1: [+ details](#)



We have been involved in using ecological indicators to establish the condition of aquatic and terrestrial ecosystems for a long time. Niemi has studied birds as indicators of environmental health for over 25 years and he recently completed a major study on the health of the US Great Lakes coastal region. McDonald has worked in aquatic ecosystems for over 25 years and is the director of US EPA's Ecological Monitoring and Assessment Program (EMAP).

Figure 2:



Ecological indicators provide a better and more direct measure of ecosystem condition than the more traditional chemical measures. One of the problems that we encountered is developing the appropriate metrics for the ecological indicators needed to answer specific problems, and then ensuring that these metrics will work consistently across varying spatial scales. The linkage between potential cause-and-effect—or what do indicators indicate—is a critical but difficult problem in real-world situations.

**SW: Where do you see your research leading in the future?**

Our research will lead to the use of better and more consistent indicators and environmental monitoring designs. This will provide managers and policy makers with the data necessary to make better informed decisions from the local to the national levels. Overall, ecological indicators can guide decisions toward healthier environmental conditions by identifying problems before they lead to environmental degradation.

**SW: Do you foresee any social or political implications for your research?**

Ideally, science and the development of ecological indicators will be of great benefit to society in the improved health of our natural ecosystems. The solutions for improving environmental health, however, can be controversial, especially if the cost for such solutions is high (e.g., climate change). This can obviously lead to some social controversy. As the use of effective ecological indicators and monitoring designs increases and these measures continue to be made through time, we will be able to establish and demonstrate the effectiveness of environmental protection programs and policies.

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Keywords: ecological indicators, environmental conditions, us great lakes coastal region, aquatic ecosystems, epa, environmental protection association's ecological monitoring and assessment program, ecosystem condition, environmental degradation, improving environmental health, environmental protection programs policies.



[back to top](#)

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