

ROUND TABLE DISCUSSION GROUP #4

Our question was:

How can stress indicators in aquatic ecosystems be used more effectively for protection and reclamation in coming decades?

Discussion summary: K. D. Curry, Bridgewater State College

Session 1: Stress indicators for wetlands and lakes and target specific indicators

Wetland and lake biologists need biotic indicators of stress.

The discussions focused on development of indicators similar to those that have been developed for rivers.

Work is being done in NH and NY on lakes and lake outlets. References were made to the North American Lake Management Society also discussing this need at a conference in the Southeastern U.S.

Why do this? If you could have specific target organism stress indicators for these systems, then steps could be developed to link this to doing a TMDL as an action step.

Odonate exuviae were discussed as a potential indicator for lakes and wetlands that could be species specific target indicators of specific stressors for the region. This would require regional data exchange of water quality for wetlands and lakes and Odonate survey data from agencies and volunteer groups for species occurrence in the same lakes. Distinctions would have to be made between systems having fish and no fish.

Stressor specific biotic indicators are an increasing need by consultants and regulators. Industries are wanting more specific information that river problems are caused by their specific discharge and not something discharged by other sources upstream.

Session 2: Data exchange and IT support for "data mining" to develop stress indicators

References were made to topics that Tom Danielson had introduced on using periphyton as bioindicators as well as A.J. Smith's poster on nutrients and macroinvertebrate indicators.

Discussion centered on the concept that river biologists are still working on developing evidence to understand community level response to specific stressors. Most of our experience has been in assessment and less of our experience is on determining causal relationships with specific stressors.

A great deal of discussion was centered on the need to go back and do "data mining" of many of our existing water quality and macroinvertebrate databases to develop these new stress indicators. Some agencies have WQ data in separate formats and databases from macroinvertebrate data and often they are not in compatible formats to look for relationships.

There was consensus on the need for agency support for dedicated IT staff / Data Managers to manage and "mine" natural resource data sets. Since there are not enough resources in many states to support this now, standardizing the format of commonly used data would promote development of better regional stress indicators.

Supporting graduate assistantships at local universities to specifically target the use of historical data sets on water quality and macroinvertebrates could help advance this effort as well as working on stressor specific bio indicators.

Session 3. Better definition of criteria for stress indicators and the potential of periphyton as target specific stress indicators.

We need better criteria defining when parameters are considered to be a stressor. This is particularly true for commonly used criteria like D.O. and temperature. When is a segment considered impaired using just D.O. and temperature? This will certainly vary by region but just these two important parameters are not clearly understood as to when they are considered a stressor.

Biological data are now being shared revealing streams are supporting trout populations. These data were not available previously and now other agencies are being asked if these trout streams meet our existing cold water streams criteria!!!!

Periphyton may be one of our best biotic indicators of stress that has not been given major attention until now. Periphyton may be more discriminatory and respond as a biotic indicator sooner than other species assemblages because of their shorter life cycle times. Some groups are specific indicators of particular stressors like zinc and other metals.

Most states can not afford to do all three assemblages (periphyton, macroinvertebrates, fish) as biotic indicators of stress.

Periphyton may offer an effective two-tiered screening approach of using soft counts first of good and bad algal groups and then using something like pigment analysis to assess the strength of the community response.

Overall, we need assemblage level understanding of stress indicators for the region. This will require a regional collaboration of sharing data, encouraging research on target specific indicators and a regional consensus on what assemblage(s) would be best for early stress indicators, especially for wetlands and lakes. Data exist on some specific target indicators that are not commonly known that need to be shared and investigated; ex. Heptageneidae seem to be sensitive to zinc, certain mussels are no longer present when ammonia levels increase, periphyton groups that specifically dominate in high levels of nutrients, or metals.

Participants:

Round 1

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Round 2

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Round 3

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