

RAPID BIOLOGICAL ASSESSMENT PROTOCOLS:

A quick, cost-effective bio-assessment method for use in streams and wadeable rivers.

DESCRIPTION OF INITIATIVE: One of the most meaningful ways to answer basic questions about the quality of the nation's waters is to observe directly the communities of plants and animals that live in those waters. Because aquatic plants and animal communities are constantly exposed to the effects of various forms of environmental stress, they can show not only current conditions but also changes in conditions over time. Therefore, by measuring the presence, condition, numbers, and types of fish, insects, algae, plants, and other organisms, managers can obtain data that provide direct, accurate information about the ecological health of waterbodies. Using these factors - known as biological indicators- as a way to evaluate the health of a body of water is the basis of biological assessment (bio-assessment).

In the 1980s, the United States Environmental Protection Agency began to understand that traditional chemical, physical, and toxicity assessments often cannot fully answer questions on the ecological health of a waterbody. Recognizing the usefulness of bio-assessment data for inland waterbodies, EPA saw that a cost effective biological survey technique was needed to assess the biological integrity of the vast kilometers of streams in the United States. EPA also recognized that any bio-assessment method for inland waters would have to allow managers to rapidly collect, compile, analyze and interpret environmental data, without forfeiting scientific validity. In response to this need, and in partnership with the States and various research entities, EPA developed the Rapid Bioassessment Protocols. These Protocols, first developed in 1989, and then revised in 1999, are now being used by states, tribes, local agencies, and other entities that either had no established bio-assessment procedures, or were looking for an alternative yet effective methodology.

Briefly, the Rapid Bioassessment Protocols method compares measures of disturbance to macro-invertebrates, periphyton, and fish in high quality reference streams against similar waterbodies with lesser or unknown water quality. In addition, waterbodies having known environmental problems are compared to the reference waterbodies so that measures (indices) of disturbances can be ascertained and used when assessing streams impacted by unknown causes.

When performed correctly, the Rapid Bioassessment Protocols are an environmentally benign, cost effective method that allows managers to:

- Characterize the existence and severity of impairment to the water resource
- Help identify sources and causes of impairment
- Evaluate the effectiveness of pollution control actions and restoration activities
- Demonstrate compliance with biological criteria

MAINSTREAMING/SUSTAINABILITY: Over the last two decades, the use of biological assessment and biocriteria has begun to equip the states, tribal nations and EPA with an effective set of monitoring tools for protecting the ecological integrity of US water resources. In 1994, twenty states were just beginning their biological assessment program for streams and wadeable rivers, while only fourteen states had programs in place. By 2004, most states and several tribes had established biological monitoring programs and many have also begun using quantitative

biocriteria. As the states continue to establish and refine their frameworks for bioassessment, EPA expects the use of the Rapid Bioassessment Protocols tool will continue to expand.

REPLICATING THE INITIATIVE: Rapid Bioassessment Protocols can be used by any national, multi-national or regional entity; that wishes a quick, cost effective, and scientifically valid method to assess the biologic integrity of streams and wadeable rivers in most types of climates and geographic regions.

An example of replication is the work by USAID and the Government of Panama's National Environmental Authority (ANAM) on the use of biological indicators to monitor watershed health in the Panama Canal watershed. Using the EPA model, USAID brought in Dr. James Karr from the University of Washington to work with Panamanian biologists in the development of a monitoring program. Local knowledge of the biodiversity allowed for rapid development of biological indicators, which were added to chemical and physical observations in evaluating watershed health.

LESSONS LEARNED:

1) Properly Define Reference Conditions: As there are few unimpaired streams left in the world, the establishment of reference condition requires a decision on the acceptability of reference sites after considering criteria such as pH, dissolved oxygen, catchment area land use, riparian buffer width, and existence of point source discharges.

2) Properly Classify Streams Being Assessed: Comparing conditions of a stream to a different type of reference stream will have little relevant meaning, and will inevitably lead to incorrect conclusions.

3) Properly Trained Personal are Key: As great care must be taken to make certain that habitat, taxonomic, and water quality data are valid; training and oversight of laboratory and field personal must be adequate.

For more information on bioassessment/bioindicators please visit:
<http://www.epa.gov/bioindicators/index.html>

For EPA's Guidance on Rapid Bioassessment for Streams and Wadeable Rivers please visit:
<http://www.epa.gov/owow/monitoring/rbp/download.html>

For EPA's training module on using Rapid Bioassessment Protocols please visit:
<http://www.epa.gov/owow/watershed/wacademy/acad2000/rbp/index.html>