

US EPA ARCHIVE DOCUMENT



Western Ecology Division

Methods for Aquatic Resource Assessment

The MARA project goal is to improve national aquatic resource assessments by conducting research on aquatic monitoring and assessment methods.

The Methods for Aquatic Resource Assessment (MARA) project conducts research on: 1) aquatic indicators, survey designs and assessment methods required for EPA Office of Water's National Aquatic Resource

Surveys (NARS); 2) spatial prediction of river and stream condition at unsampled locations; and 3) development of indicators of *ecosystem services*, or the sum total of benefits that an ecosystem provides to society.



above: Many sites in the west are remote and require "unusual" means of transport for the field crew and their sampling gear. Equipment includes nets for collecting macroinvertebrates, filtration kit to collect bacteria samples, and surveying equipment to characterize physical habitat.

1) NARS Research

The National Aquatic Resource Surveys conducted by EPA's Office of Water, in collaboration with states, assess the condition of the nation's waters (streams, rivers, lakes, coastal waters, wetlands). To improve their scientific basis and cost-effectiveness, MARA conducts research in three main areas: 1) indicator development with an objective to recommend new indicators or improve existing indicators, 2) survey design with an objective to increase cost-effectiveness of NARS and integration with state monitoring, and 3) assessment methods with an objective to improve methods on how to summarize the state of the aquatic resources.

2) Spatial Prediction of Aquatic Resource Condition

Spatial prediction uses data from sampled locations to predict, i.e. spatially interpolate, aquatic resource condition at locations that have not been sampled. Since it is not possible to monitor condition everywhere, states and EPA require spatial prediction methodology to better manage aquatic resources. Spatial prediction models require information from monitoring programs, such as NARS, as well as information on watershed characteristics and other factors that influence aquatic condition. MARA has developed a simple spatial prediction model to predict the probability of high phosphorus concentrations in Western streams. Current research focus is on predicting the condition of stream biota, nutrients, and physical features of habitat.

3) Ecosystem Service Indicators

Ecosystem services are the many life-sustaining benefits we receive from nature--clean air and water, fertile soil for crop production, pollination, and flood control. These ecosystem services are important to our health and well-being, yet they are limited and often taken for granted as being free. There is a need to identify, understand and quantify these services so that environmental decision makers can evaluate the trade-offs to sustainability and human health when ecosystem services are changed by human activities. MARA focuses on 1) identifying indicators of ecosystem services quantity and value that can be monitored nationally and 2) developing a monitoring framework to conduct that monitoring.

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Assessment reporting on biological condition of streams based on macroinvertebrate index of biotic condition from EPA Wadeable Stream Assessment

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