



Project Summary

Environmental Monitoring and Assessment Program

Assessment Framework

Kent W. Thornton, Gary E. Saul, and D. Eric Hyatt

The assessment framework proposed in this report provides a common approach for planning and conducting a wide variety of ecological assessments within the Environmental Monitoring and Assessment Program (EMAP). The framework also demonstrates how EMAP complements EPA's assessment approach proposed in the Risk Assessment Forum's (RAF's) *Framework for Ecological Risk Assessment* (RAF 1992). EMAP assessments can contribute directly to the problem formulation phase of the EPA-RAF *Framework* by identifying and quantifying factors that might contribute to the condition of ecological resources. EMAP assessments also will provide information needed to conduct ecological risk assessments that verify model predictions and the cumulative effectiveness of environmental protection and management decisions.

EMAP uses a retrospective or effects-oriented approach to assessment. There are three phases in EMAP assessments: problem formulation, analysis, and interpretation and communication. These three phases emphasize (1) formulating and refining assessment questions and issues with EMAP users, (2) identifying indicators of condition, (3) developing conceptual models, (4) analyzing data on ecological resources using weight of evidence and process of elimination approaches to infer factors contributing to observed trends in ecological effects, and (5) interpreting and effectively communicating assessment results in a

policy-relevant context for users. There are five basic assessment products: quality-assured data, annual statistical summaries, ecological resource assessments, assessment tools, and guidance.

Because it will take a number of years before all resources in all regions of the country will be routinely monitored, the ability of the program to conduct ecological resource assessments will depend on implementing its research, monitoring, and assessment activities in planned phases. Initial assessments will focus on data to determine extent, geographic coverage, and condition for individual ecological resources. Single region, single resource assessments will be conducted before assessments encompass multiple regions or national levels. Assessments of multiple ecological resources in a single region will be conducted as other resources start monitoring in that region.

This Project Summary was developed by EPA's Environmental Monitoring and Assessment Program Center, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Over the past several years, there has been an increased emphasis on comparative ecological risk assessment within the U.S. Environmental Protection Agency (EPA), other agencies, and the scientific community. Also, there have been questions raised on the role of the Environ-



mental Monitoring and Assessment Program (EMAP) in comparative ecological risk assessment and its relationship with EPA's Risk Assessment Forum (RAF). This report describes a framework, and its basic elements, for conducting assessments within EMAP as well as the relation of EMAP assessments to EPA's RAF. This document about EMAP's assessment framework is intended primarily for scientific administrators and managers who require assessment information for making decisions related to environmental protection and management.

Discussion

This document provides a scientific explanation, *i.e.*, a "definition," of ecological assessment in the context of the EMAP program and should not be interpreted as a strategic planning document or any other form of planning or policy document. The assessment framework proposed in this report provides a common outline for planning and conducting a wide variety of ecological assessments within EMAP. The framework also demonstrates how EMAP

complements EPA's assessment approach proposed in RAF's *Framework for Ecological Risk Assessment* (RAF 1992). EMAP assessments can contribute directly to the problem formulation phase of the EPA-RAF *Framework* by identifying and quantifying factors that might contribute to the condition of ecological resources. EMAP assessments also will provide information needed to conduct ecological risk assessments that verify model predictions and the cumulative effectiveness of environmental protection and management decisions.

EMAP uses a retrospective or effects-oriented approach to assessment. There are three phases in EMAP assessments: problem formulation, analysis, and interpretation and communication. These three phases emphasize (1) formulating and refining assessment questions and issues with EMAP users, (2) identifying indicators of condition, (3) developing conceptual models, (4) analyzing data on ecological resources using weight of evidence and process of elimination approaches to infer factors contributing to

observed trends in ecological effects, and (5) interpreting and effectively communicating assessment results in a policy-relevant context for users. There are five basic assessment products: quality-assured data, annual statistical summaries, ecological resource assessments, assessment tools, and guidance.

Because it will take a number of years before all resources in all regions of the country will be routinely monitored, the ability of the program to conduct ecological resource assessments will depend on implementing its research, monitoring, and assessment activities in planned phases. Initial assessments will focus on data to determine extent, geographic coverage, and condition for individual ecological resources. Single region, single resource assessments will be conducted before assessments encompass multiple regions or national levels. Assessments of multiple ecological resources in a single region will be conducted as other resources start monitoring in that region.

Key Words

USEPA-EMAP
ecology
decision making
risk assessment
measurement
environmental monitoring
risk assessment
environmental policy
environmental risk assessment
indicators (biology)
landscape assessment
risk assessment
risk communication
risk management
statistics.

Kent W. Thornton is with FTN Associates, Ltd., Little Rock, AR 72211. Gary E. Saul is with FTN Associates, Ltd., Austin, TX 78735. The EPA author, D. Eric Hyatt (also the Technical Coordinator), is with the Environmental Monitoring and Assessment Program Center, Research Triangle Park, NC 27711.

The complete report, entitled "Environmental Monitoring and Assessment Program: Assessment Framework," (Order No. PB94-158862; Cost: \$19.50; subject to change) will be available only from

*National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650*

*The EPA Technical Coordinator can be contacted at
Environmental Monitoring and Assessment Program Center
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711*

United States
Environmental Protection Agency
Center for Environmental Research Information
Cincinnati, OH 45268

Official Business
Penalty for Private Use
\$300

EPA/620/SR-94/016

BULK RATE
POSTAGE & FEES PAID
EPA
PERMIT No. G-35