Elements of a Wetland Monitoring and Assessment Program
Checklist

(October 24, 2002 - draft - Sumner)

This checklist offers a simple framework to help USEPA, state and tribal program managers plan and implement a wetland monitoring and assessment program. It is directly applicable to the scoping and review of federal Clean Water Act (CWA) grant actions, including Wetland Program Development Grants. The subject matter and elements of the checklist are consistent with EPA guidance entitled "Elements of a State Water Monitoring and Assessment Program."

The checklist is based on the overall presumption that the building a sustainable wetland monitoring program involves the adaptation of wetland assessment methods used in current practice. Progress also is made when existing state/tribal water monitoring programs include wetland monitoring as an integrated part of their activity. The adoption of an integrated monitoring approach helps ensure that data is collected in a manner that supports both national water quality reporting requirements, as well as the wetland protection efforts implemented under the federal CWA 404/401 program.

Checklist

___ Develop Program Strategy

Most states and tribal wetland monitoring and assessment programs are in the early stages of development. The preparation of a strategic plan provides documentation on how existing monitoring and assessment activity, combined with new projects, will aggregate over time into a sustainable program.

A program strategy can be concisely presented in the form of multi-year work plans and resource allocation models. The work plans and models visually depict how various tasks and activities (i.e., this checklist) are to be accomplished incrementally over time. Work plans may be formatted as grant proposals that forecast budget needs over multiple years. As such, the proposals serve as a prospectus whereby short term funding decisions are informed within the context of a longer term strategy.

___ Define Program Objectives

State and tribal reporting of ambient wetland conditions in their CWA Section 305(b) reports should be a goal of a state water monitoring and assessment program. Early progress made toward that goal will serve many, perhaps more immediate, wetland program needs. The information derived from monitoring can be used to: (1) Evaluate the ecological consequences of a given regulatory action or group of actions; (2) evaluate the performance of wetland restoration and compensatory wetland mitigation, (3) evaluate the cumulative impacts of wetland loss and restoration relative to ambient ecological conditions, and (4) develop water quality standards for wetlands.

Each individual objective, as developed by the states or tribes, will control the nature of the sampling design, sampling methods development, deployment, quality assurance, reporting and essentially the cost of wetland monitoring activity. Practitioners should avoid the pitfall of assuming that any given project or study can automatically serve multiple program objectives. However, this should not discourage practitioners from seeking appropriate opportunities to collaborate between monitoring programs having

different objectives.

The development of wetland assessment methods, and in particular a rapid wetland assessment method, is a prerequisite to the accomplishment of many program objectives.

____ Select Survey Design

There are three generally accepted data collection schemes for studying the characteristics of a population of wetlands. The first is a census, which entails examining every unit in the population of interest. Some "advance identification actions" (ADID) and "special area management plans" (SAMPs) employ this approach.

The second approach relies on best professional judgement to select wetlands that represent a suspected range of conditions. Many rapid assessment methods are developed, and their associated indicators are scaled, using this approach.

The third approach is used for studying an extensive resource, like all wetlands within a watershed. It relies on probability (or stratified random) sampling. Studies based on such statistical samples are referred to as sample surveys.

Implementing a sample survey involves three primary steps: (a) Creating a list of all units of the target population from which to select the sample, (b) selecting a random sample of units from this list, and (c) collecting data from the selected units.

Developing a probability-based sampling design is a rigorous task. EPA can provide technical assistance toward this end. EPA's capacity to provide such support is growing over time with the eventual goal of technology transfer of methods to the States and Tribes.

<u>Establish Reference Condition</u>

The selection and characterization of reference sites is a prudent first step in the design and implementation of a wetland monitoring and assessment program. The ecological understanding that is derived from the characterization of those sites can be extrapolated to other sites to meet a specified set of assessment objectives. In a practical sense, that extrapolation is achieved through the development, verification and use of rapid assessment methods that are linked to a standardized wetland classification system. Steps to establish reference condition include:

1. The prioritization of watersheds to be surveyed to meet a given wetland monitoring and assessment objective (e.g., use of the "synoptic approach" or similar landscape-scale analytical approach);

2. The identification of specific wetland classes within prioritized watersheds targeted for assessment, and the identification of the domain (sample frame) for each selected class relative to the overall wetland landscape profile. The wetland domain is usually defined using available wetland inventories, with added consideration given to ecoregion and hydrogeologic setting. Such inventories may need to be updated or refined during the course of implementing a wetland monitoring and assessment program. Using the inventory, a wetland landscape profile can be developed that depicts the relative abundance and distribution of wetlands in a geographical area by wetland class..

3. The selection, scaling and verification of indicators that are used to assess wetland condition. Verification may be achieved based on information gathered through empirical studies (e.g., See below: “Assessment Indicators and Methods - Level 3").

___ Develop Assessment Indicators and Methods

Environmental indicators are used in making determinations of whether wetland function is changed or lost to the point where it affects wetland condition, causing an impairment of wetland beneficial use. The indicators will reflect either the level of wetland function or level of use attainment, or both. The choice of indicators (and associated metrics) depends on the purpose of monitoring and level of accuracy needed for decision-making. Wetland indicators, and their associated measures, are often aggregated into wetland assessment methods.

Three types of wetland assessment methods can be developed to support program objectives. The selection of the appropriate type of method will depend on the availability of resources for project deployment and the desired level of rigor of project reporting.

The three types of assessment are generally described as:

* Landscape Assessment (Level 1) relies almost entirely on Geographic Information Systems (GIS) and remote sensing data to obtain information about watershed conditions and the distribution and abundance of wetland types in the watershed. The National Wetland Inventory (NWI) is a Level 1 type of assessment. Also, wetland landscape profiles and landscape development indices are used in “Level 1" assessment.

* Rapid Assessment (Level 2) uses relatively simple, methods to collect data at specific wetland sites. Depending on the assessment objective, indicators used in the method help define the nature of site disturbance.

* Intensive Site Assessment (Level 3) provides higher resolution information on the condition of wetlands within an assessment area. Wetland bioassessment (i.e., use of indices of biological integrity - IBI)) are often developed and used in this type of assessment. Hydrogeomorphic (HGM) based assessment methods also may be used. The detailed information is used to refine rapid assessment methods based on a characterization of reference condition, diagnose the causes of wetland degradation, and develop design and performance standards for wetland restoration, including compensatory wetland mitigation.

Work may begin on the development, refinement or verification of any of the three types of assessment methods. For example, rapid wetland assessment methods (Level 2) that are developed using best professional judgement can be tested and refined using results from more intensive wetland monitoring activity (Level 3). Results from both Level 2 and Level 3 assessments can be used to enhance the utility or test the efficacy of landscape scale (Level 1) assessments.

___ Commit to Development of a Quality Assurance Program and Project Plans

Quality assurance plans are used to prevent the introduction of both random and systematic errors into data analysis and reporting. They ensure the scientific validity of monitoring and laboratory activities, and ensure that state and tribal reporting requirements are met.

____ Select Data Management Procedures

Monitoring and assessment should be conducted with the intent that collected data will be shared for use in other studies and investigations. The selection of a data management system also should be planned in the initial phases of a project. The EPA will be requiring fully implemented aquatic monitoring and assessment programs to directly or indirectly use the new STORET (STOrage and RETrieval system. STORET provides an accessible, nationwide central repository of water information of known quality. Familiarity with the system, gained during program development, will help facilitate its later adoption for use in wetland water quality criteria development and the monitoring of ambient wetland conditions.

____ Select Data Analysis Procedures

Data analysis procedures are used to analyze the data that is collected to meet a specific monitoring and assessment objective. They include the design and use of field data sheets and the specification of statistical/graphical analysis methods. The documentation of procedures, prior to environmental sampling, ensures monitoring and assessment data is produced and analyzed in a timely and cost effective manner. It also ensures that the quality of assessment results is commensurate with assessment objectives and the rigor needed for a particular course of decision-making. For example, the quality of assessment results needed for general wetland resource planning may differ from the quality needed for criteria development.

___ Select Project Reporting Venues

Wetland monitoring and assessment should be conducted with the intent that results will be used to influence wetland management decisions. The intended audience, format, style and peer review requirements of project reports should be planned in the initial phases of a monitoring and assessment project.

____ Prepare for Program Evaluation

Periodic reviews of each aspect of the monitoring program are necessary to determine how well the program serves the needs of wetland managers. This will involve auditing the monitoring program to determine how well each of the ten elements (checklist) are addressed and determining how needed changes and additions are incorporated into future monitoring and assessment activity.

____ Account for Program Infrastructure and Deployment

The start-up of a wetland monitoring and assessment program will likely occur at geographical locations where there are wetlands at risk, discretionary dollars, interested people and readily available data. Work at these locations should take into account the logistics and budget resource needs relative to project staffing, training, field operations (e.g., access to private properties) and office operations (e.g., access to existing information, new data management and analysis). The actual costs of such “demonstration projects” also should be documented in terms of time and money. Such documentation forms the basis for future budget requests and project plans.