

MONITORING AND ASSESSMENT

Definition

A **monitoring and assessment program** is defined as the establishment and operation of appropriate devices, methods, systems and procedures necessary to monitor, compile, and analyze data on the condition of wetlands in a state or tribe (adapted from *Elements of a State Water Monitoring and Assessment Program, March 2003*). Monitoring is the systematic observation and recording of current and changing conditions, while assessment is the use of that data to evaluate or appraise wetlands to support decision-making and planning processes. Wetlands can be characterized both by their condition and functions. Wetland condition is the current state as compared to reference standards for physical, chemical, and biological characteristics, while functions represent the processes that characterize wetland ecosystems. Condition and functional wetland assessments are currently lacking in many areas of the country.

EPA refers to a three-tier framework for wetlands monitoring and assessment. Most states and tribes draw on one or more of these tiers when designing and implementing their wetlands monitoring programs.

Level 1 or landscape assessments rely entirely on GIS data, utilizing landscape disturbance indices to assess wetland condition. This approach involves characterizing the lands that surround wetlands through the use of landscape metrics (e.g., percent forest cover and land use category). Assessment results can provide a coarse gauge of wetland condition within a watershed.

Level 2 or rapid assessments use relatively simple metrics to assess wetland condition. They are customarily based on the readily observable hydrogeomorphic and plant community attributes of wetlands. They also can employ the use of a “stressor checklist.” Rapid assessment methods typically produce a single score that describes where a wetland generally falls along a gradient of human disturbance and with respect to ecological integrity.

Level 3 or intensive site assessments provide a more thorough and rigorous measure of wetland condition by gathering direct and detailed measurements of biological taxa and/or hydrogeomorphic functions. Two examples of the type of indicators that might be used in Level 3 assessment are plant composition/structure and soil organic matter content.

Wetlands assessment activities at all three levels can be effectively integrated with other surface water monitoring efforts such as stream or habitat assessments. Doing so can provide a more integrated understanding of watershed health and a foundation for developing more effective management approaches.

Goals and Benefits

Well designed and executed wetland monitoring and assessment programs are a critical tool for states and tribes to better manage and protect wetland resources. They allow states and tribes to

establish a baseline in wetlands extent, condition and function, to detect change, to assess value, and to characterize trends over time. Monitoring and assessment plays a foundational role in the other core elements of wetlands programs. For example, states monitor and assess restoration and mitigation sites compared to reference conditions¹ to determine whether they are meeting performance standards and identify areas in need of improvement. Regulatory programs rely on monitoring to detect whether unauthorized actions are occurring, evaluate alternatives to avoid and minimize impacts, determine whether permit holders comply with conditions in CWA Section 401 certifications or in Section 402, 404, or state and tribal permits, and evaluate the cumulative impacts of permitted actions. Monitoring and assessment can also inform planning and prioritization at both the individual wetland and watershed scales and is a tool to guide state or tribal decision-making. States and tribes can use monitoring and assessment data to determine if water quality standards are being met or to develop wetland-specific water quality standards. Finally, by integrating wetland monitoring data with information on other aquatic resources, monitoring and assessment strategies become an important bridge between wetlands and other water programs within a state or tribe.

Monitoring and assessment programs eventually will help EPA to evaluate progress toward meeting its two overarching national goals of “No Net Loss” in wetlands extent and an “Overall Increase” in wetlands extent, functions, and quality. In addition, effective wetland monitoring and assessment programs enable states and tribes to meet federal Clean Water Act requirements under Section 305(b) to assess the condition of all navigable waters, including wetlands. The §305(b) reports must include, “A description of the water quality of all waters of the United States and the extent to which the quality of waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water” (40 CFR 130.8). In addition, the 2008 Compensatory Mitigation Rule calls for the use of scientifically valid functional and condition assessments for determining the amount and location of compensatory mitigation.

EPA encourages states and tribes interested in comprehensive monitoring and assessment programs to pursue three objectives over time:

1. Develop a monitoring and assessment strategy consistent with *Elements of a State Water Monitoring and Assessment Program for Wetlands* (EPA, 2006) that states and tribes can use to manage wetlands according to their objectives;
2. Implement a sustainable monitoring program consistent with the wetlands monitoring strategy;
3. Incorporate monitoring data into agency decision-making.

The three objectives generally correspond to stages of state or tribal program development in monitoring and assessment. States and tribes in the beginning stages of a monitoring program

¹ Reference condition is a standard or benchmark of ecological integrity, which is the ability of a system to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization typical of wetlands in the region.

may want to focus on steps in Objective 1; those that have a monitoring program underway would be most likely to take the steps under Objective 2. We recommend that the steps in Objectives 1 and 2 be taken in sequential order. The actions under Objective 3 are a menu of applications for those states and tribes with substantial monitoring data in-hand and ready to use the information in program management decisions.

Program Building Activities Menu

The following actions outline how a state or tribe can engage in developing, implementing, and using a monitoring and assessment strategy to meet its program objectives. These actions are universal to any wetland assessment program, including those that use both functional or condition assessments

Objective 1 (for programs in the earliest stages of monitoring and assessment): Develop a monitoring and assessment strategy consistent with *Elements of a State Water Monitoring and Assessment Program for Wetlands* (EPA, 2006) that states and tribes can use to manage wetlands according to their objectives

Actions [†]	Menu of Activities [†]
a. Identify program decisions and long-term environmental outcome(s) that will benefit from a wetlands monitoring and assessment program	<ul style="list-style-type: none"> • Document program’s long-term environmental goals • Identify programs that will ultimately use monitoring data, e.g. track trends, 401 certification, restoration, permitting • Collaborate with water quality programs in a state/tribe • Identify how wetland data can be used to implement watershed planning
b. Define wetlands monitoring objectives and strategies	<ul style="list-style-type: none"> • Coordinate with most relevant partners, for example: federal, state, tribal, and local agencies, universities, regional and national work groups • Examine other sources for monitoring information within the state or tribe • Identify monitoring objectives • Define data needs and uses • Coordinate with your state/tribe’s Water Quality Monitoring Program to identify shared goals and activities • Examine how to integrate wetlands monitoring strategy into existing water quality monitoring efforts as feasible • Document wetlands monitoring strategy
c. Develop monitoring design, or an approach and rationale for site selection that best serves monitoring objectives (e.g., census, probabilistic survey, rotating basin)	<ul style="list-style-type: none"> • Determine classification scheme in order to group the type, class, and size of wetlands • Describe site selection process • List universe of wetland resources from which sites could be selected if available • Determine which data are already available.
d. Select a core set of indicators to represent wetland condition or a suite of functions	<ul style="list-style-type: none"> • Identify indicators that are relevant for established monitoring objectives • Confirm indicators are scientifically defensible • Develop/select field method(s) • Add supplemental indicators if needs dictate and as resources allow

Notes:

† EPA encourages states and tribes to follow “Actions” and “Activities” in Objectives 1 and 2 sequentially.

Objective 2 (for programs prepared to implement a monitoring and assessment plan): Implement a sustainable monitoring program consistent with the wetlands monitoring strategy

Actions [†]	Menu of Activities [†]
a. Ensure the scientific validity of monitoring and laboratory activities	<ul style="list-style-type: none"> • Draft and peer review Quality Management Plan • Draft and peer review Quality Assurance Project Plan • Draft and peer review Field Operations Manual • Select, prioritize, and peer review candidate assessment indicators
b. Monitor wetland resources as specified in strategy	<ul style="list-style-type: none"> • Identify and train staff to monitor for each indicator • Verify monitoring strategy by conducting sufficient number of pilot monitoring projects (small-scale projects to test methods, calibrate, enhance reference network, etc.) • Develop a schedule for monitoring wetland resources • Track sites that are monitored
c. Establish reference condition	<ul style="list-style-type: none"> • Define reference condition (the gradient from unimpaired to impaired) • Define reference standard condition (e.g., Best Attainable Condition, Least Disturbed Condition, Minimally Disturbed Condition, Historical Condition, Best Professional Judgment) • Determine process for measuring reference standard condition (e.g., reference sites, historical data) • Select reference sites using a systematic approach
d. Track monitoring data in a system that is accessible, updated on a timely basis, and integrated with other state or tribal water quality data	<ul style="list-style-type: none"> • Design a data management system that supports program objectives • Administer and update data system so that state or tribe can use it for analysis • Make data system compatible with and regularly update Water Quality Standards • Integrate with other water quality data systems (e.g., state watershed planning databases) • Georeference data as it is gathered for reporting • Identify sites to sample repeatedly for a trend network
e. Analyze monitoring data to evaluate wetlands extent and condition/function or to inform decision-making	<ul style="list-style-type: none"> • Document data analysis and assessment procedures • Develop assessment method to determine condition thresholds relative to reference standard condition (i.e., departure from reference standard condition) • Establish baseline wetland condition • Analyze changes in wetland extent or condition relative to reference conditions • Analyze changes in wetland extent or condition in response to climate change • Regularly report wetlands status and trends (e.g., annual reporting of no net loss, net gain, or 305(b) reports for wetlands)

Notes:

† EPA encourages states and tribes to follow “Actions” and “Activities” in Objectives 1 and 2 sequentially.

Objective 3 (for the most developed programs that already monitor and assess wetlands): Incorporate monitoring data into agency decision-making

Actions	Menu of Activities
a. Evaluate monitoring program to determine how well it is meeting a state/tribe’s monitoring program objectives	<ul style="list-style-type: none"> • Develop schedule to evaluate monitoring program • Track program reviews • Ensure the assessment method is providing the necessary information • Make changes as necessary to the program • Review other wetlands program elements (e.g., restoration, regulation, water quality standards) • Modify other aspects of wetlands program as needed based on review of monitoring data
b. Evaluate the environmental consequences of a federal or state/tribal action or group of actions; modify programs as needed based on M&A data	<ul style="list-style-type: none"> • Inform state/tribal wetland permit decisions • Inform 401 certification decisions on federal actions • Modify permitting or 401 certification practices as needed based on assessment information
c. Improve the site-specific management of wetland resources.	<ul style="list-style-type: none"> • Incorporate monitoring and analysis into restoration techniques • Establish ecologically-meaningful benchmarks for gauging restoration success • Evaluate the performance of compensatory mitigation sites • Evaluate the ecosystem services provided by individual wetlands.
d. Develop geographically-defined wetland protection, restoration, and management plans	<ul style="list-style-type: none"> • Identify and prioritize management areas (e.g. identify vulnerable wetlands, prioritize restoration potential) • Incorporate wetlands into a comprehensive Watershed Plan that serves state and tribal water quality management needs and addresses all waters • Evaluate progress toward meeting wetland objectives identified in other projects/programs, for example: State Wildlife Action Plans • Inform broader watershed activities (e.g., reducing erosion, providing floodplain storage, reducing nutrient loading, etc.)

Resources

- Basic Monitoring Fact Sheet at http://www.epa.gov/owow/wetlands/pdf/monitor_pr.pdf (PDF) (4 pp, 58K, [About PDF](#))
- Tribal Case Examples at: <http://www.epa.gov/owow/wetlands/initiative/tribalpro.html>
- Environmental Law Institute (2005-2007). *State Wetland Program Evaluation: Phases I-IV*. Washington, D.C. Accessed at <http://www.eli.org>.
- EPA Monitoring Information at <http://www.epa.gov/owow/wetlands/monitor>

- [Tribal Wetland Program Highlights](#) | [PDF version](#) (93 pp, 1.8MB, [About PDF](#))
- US EPA (2006). *Elements of a State Water Monitoring and Assessment Program for Wetlands*. Accessed at http://www.epa.gov/owow/wetlands/pdf/Wetland_Elements_Final.pdf (PDF) (12 pp, 90K, [About PDF](#))
- US EPA (2003). *Elements of a State Water Monitoring and Assessment Program*. EPA 841-B-03-003. Washington D.C.