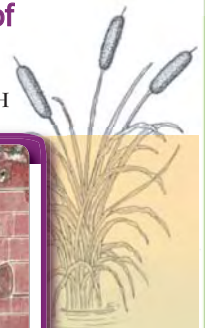# Advancing EPA Wetland Science: Developing Tools for Quantitative Assessment of Wetland Function and Condition at the Regional Level

Charles Lane, Ph.D. • US EPA, Office of Research and Development, National Exposure Research Laboratory, Cincinnati OH

CHALLENGE

The EPA Office of Water (OW) has recognized a critical need for states and federal agencies to be able to quantitatively assess the condition of the Nation's wetland resources. This research has been identified as a priority both in the Office of Wetlands, Oceans, and Watersheds Top 10 Research Needs list and in the OW Framework for Habitat Science. Currently, greater than 85% of states, tribes, and territories are lacking even rudimentary biological assessment methodologies for wetlands. Additional important needs identified include obtaining base line nutrient and physical/chemical conditions to aid in understanding the role of wetland systems (isolated wetlands in particular) in ensuring aquatic life and beneficial uses of lakes, rivers, and streams in the watershed.
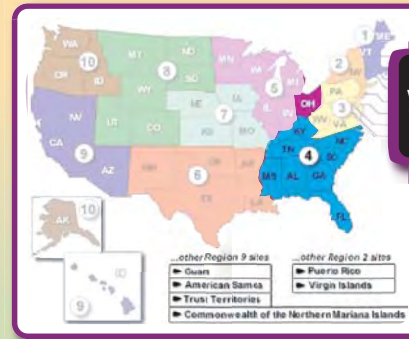
SOLUTION

To address these challenges, the following research is proposed: Within a region,

1) Develop a probabilistic sampling design that stratifies wetlands by type and size (also targeting reference conditions);
2) Collect biotic (macroinvertebrates, macrophytes, and diatoms) and abiotic (water and soil chemistry) data to establish baseline conditions;
3) Assess wetland condition with Level 1 (GIS) and Level 2 (rapid assessment) characterization methods;
4) Develop metrics and correlate biotic signature to local and landscape assessments;
5) Report on the condition of systems across region and recommend assessment methods to states and tribes;
6) Provide means to measure wetland contribution to landscape nutrient sequestration.

COLLABORATIVE EFFORTS

We are currently planning research to develop a spectral library for monitoring and assessment of wetlands of the Cuyahoga basin in Ohio using visual and near infrared spectrometry. In order to leverage resources, this work involves collaboration with key personnel from Kenyon College and the Ohio Environmental Protection Agency, with sample processing by the Wetland Biogeochemistry Lab at the University of Florida. In addition, a pilot study is planned in collaboration with EPA Region IV to develop assessment methods for isolated wetlands at multiple levels of effort (GIS, rapid, and biological).

...other Region 9 sites
- Guam
- American Samoa
- Trust Territories

...other Region 2 sites
- Puerto Rico
- Virgin Islands
- Commonwealth of the Northern Mariana Islands

identify wetlands on the regional landscape

Stratification

Palustrine, Emergent Marsh

Palustrine, Forested Wetland

Palustrine, Shrub Scrub

probabilistic site selection; also select reference condition

sample to characterize condition

A Macrophytes Macroinvertebrates Diatoms

B Soil:
nutrients and physical characteristics;
Visual and Near Infrared Reflectance Spectrometer (VNIRS) data library
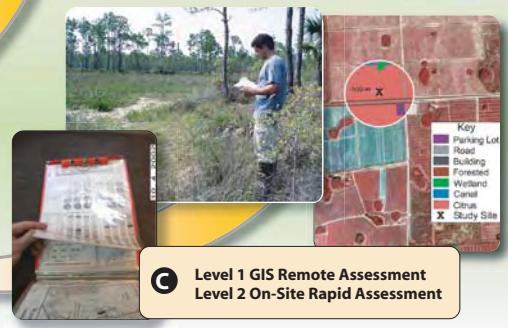
Water:
nutrients and physical characteristics

OUTCOMES

A Ability to assess biological condition of wetlands using a regional index of biotic integrity (IBI) for wetland assessment, based on baseline biotic data and taxonomic tolerance information. Possible development of diagnostic relationships using biological data.

B Ability to conduct rapid functional assessment of wetland contribution to landscape nutrient dynamics, based on VNIRS library and baseline soil and water nutrient data not currently available.

C Ability to conduct GIS-based assessment of wetlands, with knowledge of relationship between rapid and GIS assessments, as well as development of anthropogenic disturbance gradient.

The research described will provide a region-wide understanding of wetland condition and contribution to landscape nutrient dynamics. This will contribute to a fuller understanding of not only wetland condition, but also the use of wetlands in restoration, and the functions and benefits of wetlands with respect to regional environmental health.

Key
- Parking Lot
- Road
- Building
- Forested
- Wetland
- Canal
- Citrus
- X Study Site

C Level 1 GIS Remote Assessment
Level 2 On-Site Rapid Assessment

prepared by CSC Inc., for USEPA/ORD August 2005