

APPROACHES TO MANAGING AND MONITORING WETLANDS

(Partially) Annotated Bibliography:

Bartoldus, C.C. 1999. **A Comprehensive Review of Wetland Assessment Procedures: A Guide for Wetland Practitioners.** Environmental Concern Inc., St. Michaels, Maryland.

Breaux, A. and F. Serefidin. 2001. **Validity of performance criteria and a tentative model for regulatory use in compensatory wetland mitigation permitting.** *Env. Man.* 24(3):327-336.

Wetland policy in the United States is guided by the goal of no net loss of wetland habitat and is enforced primarily through the permitting requirements instituted under the Clean Water Act, which regulates the waters of the United States. Under these regulations, a permit applicant may be required to provide compensatory mitigation or restoration when wetland loss cannot be avoided or minimized. The practice has been to measure gains and losses primarily in terms of functions and values, the assessment of which has been rendered difficult because the agencies operate under limitations of time and experience, and because there are large areas of uncertainty in wetland science itself. The purpose of this paper is to develop the principles for a manageable and practical set of performance criteria that will reasonably assure no net loss in a situation in which it cannot be absolutely assured. To this end, the performance criteria proposed for 116 compensatory wetland projects on file with the Army Corps of Engineers in San Francisco, between 1988 and 1995, were examined. The trends discerned in the project proposals were analyzed and evaluated in light of the current state of wetland science. Specific suggestions for the development of uniform criteria in each of four major wetland types-riparian, perennial tidal, perennial non-tidal, and seasonal-are discussed, and a system of regulation tying qualitative assessment with quantitative requirements is outlined as a reasonable solution to the enforcement of the no-net-loss policy.

Brinson, M.M. 1993. **A Hydro geomorphic Classification for Wetlands.** U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, USA. Technical Report WRP-DE-4.

The report outlines a classification of wetlands based on the wetland hydrogeomorphic properties of geomorphic setting, water source, and hydrodynamics. Indicators of function are discussed as derivatives of the three basic properties, along with the ecological significance of each of the properties. Development of "profiles" that reveal the functions that wetlands are likely to perform are discussed.

Firehock, K., Graff, L., Middleton, J.V., Starinchak, K.D., and C. Williams. 1998. **Handbook for Wetlands Conservation and Sustainability.** Izaak Walton League of America, Gaithersburg, Maryland.

The handbook introduces the functions and values of wetlands and guides the reader through planning and implementing a community wetlands project. The book features guidelines and tips for an effective project, monitoring techniques, case studies of restoration projects, and extensive contacts and resources lists.

Karr, J.R. and E.W. Chu. 1998. **Restoring Life in Running Waters: Better Biological Monitoring**. Island Press, Washington, D.C.

Biological monitoring and assessment programs do not exist in most aquatic environments. This book seeks to change that by providing practical and effective tools for scientists, managers, citizens, and students for use in developing information that can be readily integrated into policy. The authors believe that healthy aquatic ecosystems are maintained by focusing on the biological integrity of the system

Kentula, M.E., Brooks, R.P., Gwin, S.E., Holland, C.C., Sherman, A.D., and J.C. Sifneos. 1992. **An Approach to Improving Decision Making in Wetland Restoration and Creation**. Island Press, Washington, DC.

Reports on a five-year study, mostly in Connecticut, Florida, and Oregon, comparing the populations of natural and created wetlands to determine whether restored wetlands can successfully replace those lost to development and other pressures. Designed to meet the needs of EPA regions and the Office of Water, but the information can be used by resource managers to inform their decisions about wetland restoration. The research for this publication was funded by the United States Environmental Protection Agency.

Kusler, J.A., D.E. Willard, and H.C. Hull, Jr., eds. 1996. **Wetlands and Watershed Management: Science Applications and Public Policy, A Collection of Papers from a National Symposium and Several Workshops**. Association of State Wetland Managers, Berne, New York.

This collection of papers has been assembled to provide helpful insights to water resource planners, regulators, scientists, nonprofits, and others into the integration of wetland protection and restoration in water and watershed management. It is the first collection of papers to address this important topic. 12 chapters, 74 papers.

Leibowitz, S.G., B. Abbruzzese, P.R. Adamus, L.E. Hughes, J.T. Irish. 1992. **A Synoptic Approach to Cumulative Impact Assessment**. EPA/600/R-92/167. U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, Oregon.

The report provides resource managers and technical staff with an approach for evaluating the cumulative environmental effects of individual human impacts on the environment, particularly with respect to wetlands. The document is intended to give the reader a general understanding of cumulative impacts and to describe how a synoptic assessment is produced. Specifically designed for use in wetland permit evaluation under the Clean Water Act (CWA). A second objective of the report is to encourage resource managers responsible for wetland protection to consider and view wetlands within a landscape context.

Pacific Estuarine Research Laboratory. 1990. **A manual for assessing restored and natural coastal wetlands with examples from southern California**. Report Number T-CSGCP-021. California Sea Grant Program, La Jolla, California.

Pennsylvania State University College of Agricultural Sciences Cooperative Extension. 1996. **Managing Your Restored Wetland**.

Many people realize the value of wetlands and are coming together to restore lost wetland acreage. This manual for landowners describes where wetland restoration is possible and how it is done. This 48-page publication covers the basic wetland concepts, ecological concepts and terms, wetland restoration, general management and maintenance, managing for wildlife, and troubleshooting.

Rubey, J. and S. O'Connor. 1996. **Exploring Wetland Stewardship, a reference guide for assisting Washington landowners**. Washington State Department of Ecology publication #96-120.

This guide describes wetland stewardship techniques and ways technical agents (Conservation District officers, for example) can help landowners get assistance with planning or implementing stewardship on their property. It features a complete directory of assistance programs available in Washington State.

Smith, R.D., A Ammann, C. Bartoldus, and M.M. Brinson. 1995. **An Approach for Assessing Wetland Functions Using Hydro geomorphic Classification, Reference Wetlands, and Functional Indicators**. Technical Report WRP-DE-9. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

This report outlines an approach for assessing wetland functions in the 404 Regulatory Program as well as other regulatory, planning, and management situations. The approach includes a development and application phase. The application phase includes the characterization of the wetland, assessing its functions, analyzing the results of the assessment, and applying them to a specific project.

Thayer, G.W., et al. 2003. **Science Based Restoration Monitoring of Coastal Habitats; Volume One: A Framework for Monitoring Plans Under the Estuaries and Clean Waters Act of 2000**. NOAA Coastal Oceans Program, Decisions Analysis Series No. 23, Volume 1, Silver Springs, MD.

The volume begins with definitions and background information. Topics such as restoration, restoration monitoring, estuaries, and the role of socioeconomics in restoration are discussed. In addition, the selected habitats are briefly described. Volume One continues with a framework for developing a monitoring plan. The first element in this framework is an explanation of the stages of restoration and monitoring- project conception and design; monitoring plan development; data collection before, during, and after construction; and export of data.

Second in this framework is the process of developing a monitoring plan through twelve steps: 1) identify the goals of the project; 2) collect information on similar restoration monitoring projects; 3) identify and describe the habitats within the project area; 4) define basic structural and functional characteristics for those habitat types; 5) consult experts; 6) determine the hypotheses; 7) collect historical data; 8) identify reference sites; 9) identify monitoring time span; 10) identify monitoring techniques; 11)

design a monitoring review and revision process; and 12) develop a cost estimate for implementation of the monitoring plan.

Third in this framework is an explanation for the basic elements that should be considered when writing a restoration monitoring plan. These critical elements include: background material; project goals and objectives; monitoring components (metrics, hypotheses, reference sites, pre-construction sampling plans, plans for sampling during and after construction, statistical analysis, data handling, report preparation, and review plans); projected budget; and participants' contact information.

The manual also offers a series of three-parameter matrices to help practitioners choose which habitat characteristics may be most appropriate to monitor for their project.

U.S. Army Corps of Engineers. 1996. **Planning Aquatic Ecosystem Restoration Monitoring Programs**. IWR Report 96-R-23, <http://www.wrsc.usace.army.mil/iwr/currpt.htm>.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 1998. **Goal Setting and Success Criteria for Coastal Habitat Restoration (compilation of papers and abstracts)**. Office of Habitat Conservation, Silver Spring Maryland.

U.S. Environmental Protection Agency. 1998. **Wetland Bioassessment Fact Sheets**. EPA 843-F-98-001. U.S. Environmental Protection Agency, Washington DC.

A collection of fact sheets that are an outgrowth of the increasing interest among wetland and water quality professionals to develop sound methods that measure the biological condition of wetlands: Assessing Biological Integrity of Surface Waters, Applications of Biological Assessments in Wetlands, Biological Assessment of Wetlands Workgroup, Wetland Bioassessment Projects, Developing an Index of Biological Integrity, Wetland Biological Assessments and HGM Functional Assessments, Water Quality Standards, Evaluating Performance of Wetland Restoration, Involvement of Volunteers in Wetland Monitoring, Glossary of Bioassessment Terms.

Yozzo, D., J. Titre, and J. Sexton. 1996. **Planning and Evaluating Restoration of Aquatic Habitats from an Ecological Perspective**. IWR Report 96-EL-4. Institute for Water Resources, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

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