WETLANDS OF THE INTERIOR SOUTHEASTERN UNITED STATES: CONFERENCE SUMMARY STATEMENT

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Abstract. The wetland resources in the southern United States are diverse, being characterized by bottomland hardwoods, forested riparian zones, swamps, marshes, bogs, and fens. Recognizing the importance of the wetland resource, the need to develop information on the diversity of wetland types, and the evolving public debate regarding the protection and management of wetlands, this conference was organized to (1) provide a forum for the presentation and discussion of current research and information on wetland ecosystems, (2) to develop a basis on which to improve wetland conservation and management, (3) to provide a forum to encourage collaboration in the study and management of wetland resources, and (4) to suggest actions that would benefit wetland conservation and management. Twenty-three invited technical papers and three working group sessions addressed topics encompassing the full spectrum of wetland issues, including resource status, ecological and hydrological processes, management and conservation, and restoration and creation. Major findings discussed at the conference included the need to distinguish between functions and values, the development of a hydrogeomorphic classification system for assessing wetland functions, and assessment methodologies for planning and implementing effective wetland restoration projects. Papers summarizing the current understanding of wetland soil and vegetation processes in the region highlighted the important role wetlands play in landscape function, yet the understanding of those processes is incomplete. Insights developed from the study of wetlands in the interior southeastern United States have widespread applicability to other regions because of similarities in hydrogeomorphic setting and vegetation communities, and the management and conservation issues.

1. Motivation for the Conference

The wetland resources in the southern United States are diverse, being characterized by bottomland hardwoods, forested riparian zones, swamps, marshes, bogs, and fens. There is no reliable estimate of the area of these individual wetland types; however, the current estimate of the total wetland area demonstrates that the resource is large and that the cumulative wetland loss has been significant (Table I). Wetlands in the these southern states comprise approximately 24% of the wetland resource in the U.S (Cubbage and Flather, 1993). Although most wetlands in the southern states are located in the coastal plain, wetlands in the piedmont, ridge and valley, and mountain physiographic provinces are an important component of the landscape. Recognizing the importance of the wetland resource, the need to develop information on the diversity of wetland types, and the evolving public debate regarding the protection and management of wetlands, this conference was organized to (1) provide a forum for the presentation and discussion of current research and information on wetland ecosystems, (2) to develop a basis on which to improve wetland conservation and management, (3) to provide a forum to encourage collaboration in the study and management of wetland resources, and (4) to suggest actions that would benefit wetland conservation and management.

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Table I. Estimates of the area of wetland loss during the last 200 years in the south-central U.S. (from Dahl, 1990).

State	Wetland Area -1780's X 10^6 ha	Wetland Area -1980's X 10^6 ha	Proportion of Wetlands Destroyed (%)
Alabama	3.0	1.5	50
Georgia	2.7	2.1	23
Mississippi	4.0	1.7	59
North Carolina	4.5	2.3	49
South Carolina	2.6	1.8	27
Tennessee	0.8	0.3	59
Virginia	0.7	0.4	42
West Virginia	0.04	0.04	24

This conference was organized by the Southern Appalachian Man and the Biosphere Program (SAMAB) in two parts. The first was the presentation of invited technical papers. These papers were selected to provide a current assessment of wetland functions, wetland regulation and assessment, management effects, and wetland restoration and creation. The second part of the conference consisted of three working group sessions (1-Research and Information Needs; 2 -Wetland Functional Assessment and Restoration; and 3-Wetland Protection and Conservation) which were designed to summarize the topic and provide recommendations to scientists, resource managers, and regulators.

This paper provides a summary of the major findings and research recommendations presented at the technical session of the conference and the working group sessions.

2. Conference Summary

The following discussion summarizes important findings reported at the technical sessions of the conference.

2.1 WETLAND FUNCTIONS AND VALUES

• Distinctions must be made between wetland functions and values, they are not synonymous terms. Wetland functions are derived from inherent ecosystem processes. Five basic functions can be recognized: hydrology, productivity, biogeochemistry, decomposition, and community dynamics. Each comprise biotic and abiotic processes that affect the structure, composition and dynamics of the wetland ecosystem. While these basic functions are common to all wetlands, they will be expressed differently among wetland types. Value is an anthropocentric interpretation of the quality or importance of an ecosystem function or process. Examples of values ascribed to wetlands include: hunting, fishing, timber production, assimilation of nutrients in waste water or runoff, and flood control, to name a few. (see Richardson, 1994).

• A hydrogeomorphic classification system provides the basis for functional classification of wetlands. Because wetlands require saturated soil to sustain anaerobic conditions, a hydrogeomorphic system provides the means to incorporate geomorphic, hydrologic, and edaphic information into a classification system which reflects properties or processes that affect wetland functions and values (see Brinson, 1993).

• Wetlands are disproportionally important in providing landscape diversity, maintaining biological diversity, and providing refugia for threatened and endangered species. Management and conservation of these wetland ecosystems should involve

landscape-level analyses that consider interactions between the upland and aquatic communities at different spatial and temporal scales. Conservation of individual wetlands is largely ineffective without an understanding of the landscape functions of the ecosystem. (see Pearson, and Weakley and Schafale, this volume).

• Much more research is needed to understand the relationships between biogeochemical and hydrological processes, and how those processes affect wetland vegetation dynamics. (see Walbridge, and Weakley and Schafale this volume).

• Wetlands are important habitat for endangered and threatened species, and maintenance of wetland quality is necessary to sustain the refugia. Habitat for some species requires continual maintenance, which is probably impractical in perpetuity. Improved understanding of hydrologic and biogeochemical affects on habitat are needed. (see Murdock, this volume).

2.2 WETLAND MANAGEMENT

• A functional assessment system is needed to assess impacts from management and conservation efforts, or consequences of wetland loss. An assessment approach using a hydrogeomorphic classification and regional reference data on wetland functions offers the opportunity to assess functions before and after planned activities in the wetland. (see Brinson, 1993).

• Disturbance either within the wetland or in adjoining uplands may adversely affect wildlife habitat quality, vegetation structure, and vegetation composition. (see Wigley and Roberts, and Weakley and Schafale, this volume).

• Riparian zones are important areas for improving runoff water quality. (see Hubbard and Lowrance, this volume).

• Best Management Practices (BMPs) have been developed for all states in the Southeastern United States. However, the specific content of the BMPs and their implementation varies by state. No data is available for comparing the effectiveness of different systems, although evidence suggests that there is no difference between mandated and voluntary BMPs. (see Aust, this volume).

• Regulatory contexts are evolving to effect wetland conservation through training and application of statutes. (see Ainslie, and Wakeley this volume).

2.3 WETLAND ASSESSMENT AND RESTORATION

• Functional mitigation of unavoidable loss of wetlands is possible. Newly established assessment methodologies provide an effective basis for planning, designing, and implementing wetland restoration and creation projects. The three critical components to successful wetland restoration and creation are siting, design criteria, plan development and implementation. (see Davis, Bartoldus, and McCuskey et al., this volume).

3. WORKING GROUP SUMMARIES AND RECOMMENDATIONS

The working groups were organized to summarize the current status of the topic and to develop recommendations to further scientific advancement, technology transfer, and policy and program development. Panelists delivered their perspectives on the topic, and that was followed by a facilitated discussion session among all working group participants. The following discussion provides a summary of the discussions and recommendations developed by each working group.

3.1 RESEARCH AND INFORMATION NEEDS (Working group panelists: Mike Aust, Bill McKee, Jr., Dan Smith).

Studies on the ecology and management of wetland ecosystems have occurred predominately in the last 10 years. Despite that relatively short period, considerable information has been developed documenting hydrological processes, biogeochemical cycles, and vegetation dynamics. Because of the diversity of wetland types, geomorphic setting, and management regimes, available information is not adequate to understand interrelated biotic and abiotic wetland ecosystem processes. The following were research

and information needs identified by the working group participants:

• Characterization (hydrology, soils, vegetation communities) of wetland types, particularly forested riparian zones and mountain bogs.

• Processes affecting wetland functions are poorly understood and require further research. This is particularly necessary to support the functional assessment of wetlands.

• Establish common research sites throughout the south-central US in which hydrology, soil and vegetation processes could be studied using a common protocol.

• Landscape functions of wetlands have not been adequately considered, particularly with respect to landscape diversity, habitat, biological diversity.

These research needs could be facilitated by (a) increased emphasis on cooperative, inter-disciplinary research, (b) overcoming disciplinary boundaries or jurisdictions among agencies to enhance opportunities for cooperation in research and technology transfer, and (c) utilization of applied journals and publications to disseminate information.

The working group participants further recommended that:

• SAMAB serve as a clearing house of information on wetland resources, research, and funding opportunities. Such a function may include an Information Center, a Data Management Center, or electronic bulletin board.

• SAMAB serve as a catalyst for jointly funded, cooperative research among states, federal agencies, and universities. SAMAB is uniquely positioned to provide a synergetic basis for helping to secure research funds and to encourage cooperation among participants.

• SAMAB and its members work to encourage the expansion of the mission of the National Wetland Inventory to include the study of functional processes, and to explore opportunities for the National Biological Survey to serve a clearing house of wetland information and data that would be available for regional assessments or study.

3.2 WETLAND FUNCTIONAL ASSESSMENT AND RESTORATION (Working group panelists: Mary Davis, Clif Amundesen, Edward Houser, Sue McCuskey, and Tom Roberts).

The integrity, functions, and values of wetlands of the southern Appalachian region are impacted directly and indirectly by housing development, golf courses, roads, agriculture, mining, and other activities. Although the ecology of many of these wetlands is poorly understood, it is evident that their capacities to provide wildlife habitat, water quality improvement, and other valuable functions are being severely impacted. As the remaining wetland areas continue to be impacted, it is increasingly important that we are able to 1) evaluate what functions and values are being lost, 2) assess whether there has been functional replacement of wetlands in restoration/creation projects in the area, and if not, 3) develop an approach to achieve functional mitigation of the losses. The findings of the working group session were the following:

• Functional assessment methods have been developed for wetlands and modified for regional uses. Although North Carolina and Tennessee have assessment methods, no consistent method exist for the south-central U.S.

• Functional assessment methods often lack sensitivity to degree of pristine condition (i.e., a highly impacted wetland can be rated similarly to an intact, mature system).

• Actual functional assessments are commonly based on "Best Professional Judgment." There is little quality control on or consistent quantification of the functional capacities of wetlands.

• There is inadequate understanding of the roles of decomposer-producer-consumer processes in wetland functions, and simple assessment methods for estimating levels those processes are needed.

• Available information indicates that bottomland hardwood forests are the most commonly mitigated wetland type in the south-central United States.

• Information about the distribution and characterization of natural and restored/created wetlands in the Southern Appalachians is necessary to evaluate impacts

on wetlands.

• Little information is available to determine whether functional wetland replacement is being achieved. Hydrology of a restored wetland is the most critical factor to establish and the most difficult to obtain.

• Technical information is needed on methods, equipment, and materials to restore and create the hydrology, sediments, and vegetation in wetland projects.

• Information about wetland restoration is difficult to access. Exchange of such information usually occurs at meetings and through personal contacts.

• Limited data bases exist on wetland mitigation, some of which probably pertain to wetlands in the south central U.S. A repository of wetland restoration/creation information would be a valuable aid for future wetland projects in the SAMAB and other regions.

The working group participants recommended the following:

• Hydrogeomorphologic-based functional assessment models need to be developed for wetlands that are sensitive to degree of impact and that are relatively easy to apply.

• The functional assessment models should be sensitive to wetland producer-decomposer-consumer processes.

• A systematic method to access data about wetland restoration/creation projects and natural wetlands is essential.

• Wetland protection varies within the SAMAB region due to differences in mitigation requirements and it should be made more consistent.

• Establish a data base for regional exchange of wetland information. The format should be a computerized data base that is easily accessible to a wide range of users. Information should be acquired from existing data bases, agencies, consultants, engineers, and others.

3.3 WETLAND PROTECTION AND CONSERVATION (Working group panelists: Alan Weakley, Dan Pittillo, Bob Johnson).

Major concerns expressed about the protection and conservation of wetland resources included adequacy of wetland inventory data, especially those with special or sensitive resources, land ownership, and capabilities for protection. To further develop a regional perspective on this subject, because not all states were represented at the workshop, a post-conference survey of six state agencies was conducted. Results from that survey indicate that while some wetland inventory information is available, the adequacy of data on sensitive wetland resources is incomplete (Table II). Regarding wetland protection, the survey response indicated the capability of protection is greatest if the land is held in public ownership as compared to private. However, some states (South Carolina, Tennessee, and Virginia) indicated that funds could be made available if additional matching moneys were organized.

Another major problem that was addressed was the historic loss and degradation of mountain fens and bogs. These are unique wetland communities in mountain regions that exhibit some similarities to northern wetlands. These wetlands provide important habitat for many sensitive plants and animals. Conservation of these wetlands is imperative, yet a vexing problem due to management and land ownership constraints. Other wetland types are also important and have not been adequately protected. Headwater riparian systems are common, however their importance to the maintenance of the hydrologic regime and water quality has not been recognized.

Recommendations from the working group were:

• Develop a detailed inventory and qualitative assessment of mountain bogs and fens as a basis for evolving conservation priorities.

• The current inventory of wetlands is inadequate for assessing protection strategies or assessing the distribution of wetland types. SAMAB is encouraged to take leadership the role in developing a regional wetland classification system, and states

should take leadership in wetlands inventory.

• SAMAB should continue efforts to develop educational materials and programs for the public and policy-makers about the importance of wetland resources to ecosystem health and landscape processes.

• SAMAB should facilitate research focused on understanding ecosystem processes as a basis for improved wetland conservation and management.

Table II. Results from a survey of state agencies responsible for wetland protection in Alabama (AL), Georgia (GA), North Carolina (NC), South Carolina (SC), Tennessee (TN), and Virginia (VA) to determine status of wetlands inventories, unique ecological areas, and wetland conservation and protection programs. (Survey conducted by J. D. Pittillo and A. S. Weakley, unpublished data 1994).

	AL	GA	NC	SC	TN	VA
To what degree have wetland communities been inventoried?	very limited	very limited	extensive	limited	limited	moderate
Probability of locating new, ecologically significant wetlands?	very high	very high	moderate	high	low for large sites; high for sites < 1 ha	very high
What is the degree of protection for public lands?	moderate	moderate	excellent	very good	very good	moderate
What is the degree of protection for private lands?	low	low	very low	low	low	very low

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