What Makes Wetlands "Wet?" Understanding the Disputes Over Wetlands

"Twenty Democratic House members, led by Billy Tauzin (D-LA), urged President Clinton to convene a summit to reform federal wetlands policies. The legislators, in a letter to Clinton, said: 'We have heard from our constituents that the regulatory program has caused severe hardships and has greatly diminished their property values. ... [A summit] could generate sound measures for accomplishing the goals of wetland protection.' Pam Goddard from the Sierra Club said she would not object to such a forum, provided it was not restricted to those who think that federal wetland regulations are too stringent. 'These members are saying wetland protection is going too far when, in fact, we are still losing 300,000 acres of wetlands every year.'" (*New Orleans Times-Picayune*, 2/25/93).

By Caryl Waggett

The Thorny Side of Wetland Protection

Over the last several years, widespread attention has been given to wetlands. Having earned a reputation as one of the most valued and most threatened ecosystems, an intense dispute now rages over the extent of wetlands protection. On one side, environmentalists call for strict preservation of what they consider to be an exceptionally valuable resource. They point to the fact that the number of wetlands in existence in the contiguous United States is half of what was once documented. On the other side, developers, farmers, politicians and private citizens, while agreeing that wetlands must be protected, assert that the existing legislation has gone overboard, leaving too much land guarded. They are often miffed at the regulations that hold them back from utilizing natural resources to their maximum extent.

Recently, the debate has been brought to the forefront by the Congressional subcommittee hearings on the re-authorization of the 1972 Federal Water Pollution Control Act (more commonly known as the Clean Water Act or CWA). While the Clean Water Act does not specifically address the issue of wetlands, for the past twenty years it has provided the guidelines by which wetlands have been administered. The CWA—which lays down maximum allowable levels of effluent dumping and thermal pollution in the nation's different water bodies—is likely to be the first environmental act re-authorized by the Clinton administration. Activists (from all sides of the environmental fence) are using this opportunity to take up the soapbox and vent their feelings, hoping to set the tone for future environmental debates, such as the not too distant re-authorization of Superfund.

Disputes over wetlands have brought out a Dr Jekyll and Mr Hyde split personality in the public at large—a schizophrenia that is a common refrain around many environmental issues. Apparently, most people feel that wetlands are a valuable ecosystem and require some protection. However, when an extension to a house cannot be added on because of wetland regulations or when farmers discover that they are unable to expand their tillable land, the regulations are quickly challenged as too restrictive.

So, What is A Wetland?

Wetlands as an ecosystem are as diverse as people: salt water tidal marshes, river flood plain zones, prairie potholes, cypress swamps, red maple swamps, bogs, and moors. Generally speaking, wetlands are defined as "a habitat that is inundated or saturated with water for a long enough time during the growing season to support hydrophytic vegetation." Hydrophytic vegetation refers to two types of plants: plants

A New England hardwood swamp during early spring showing the extent of flooding. [Caryl Waggett]

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that have developed adaptations to survive periodic anoxia (lack of oxygen) due to water saturation of both the soil and the plants' roots, and also plants that can exist equally well in saturated as well as normal environments, but which must modify their morphology (physical appearance and structure) in order to survive the periods of saturation.

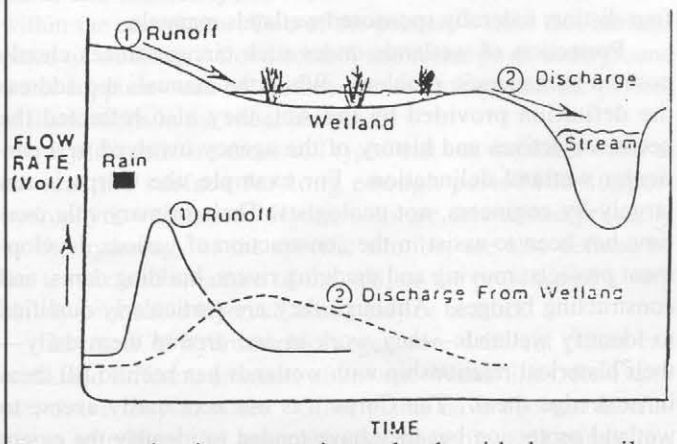
Despite this definition, however, most wetland scientists agree that the delineation of what constitutes a wetland is problematic. In many ways "wetlands" is a misnomer of the worst kind. A wetland does not need to have standing water on the surface to be a wetland, nor to have water on the surface each year. There are often no clear boundaries between habitat types. Some people do not even consider wetlands to be a unique habitat in their own right, but rather a "half-way world between terrestrial and aquatic ecosystems that exhibit some of the characteristics of each." Yet, not all wetlands fall between aquatic and upland ecosystems (many are low points within an otherwise "terrestrial" habitat). Nevertheless, the concept of a spectrum of wetland types is particularly descriptive and provides some basis for understanding the extreme difficulty that scientists have encountered in finding a single definition that encompasses all of the land that they would like to consider "wetlands."

Regulating such a varied set of communities is, quite clearly, a remarkable challenge. Many of the conflicts over wetland protection arise from the absence of a universally accepted definition of exactly what a wetland is. This scientific debate centers on what combination of criteria determines a wetland from an upland and, when out in the field, what delineates the boundaries of a wetland. If the "experts" are unable to settle on how to demarcate a wetland, the public certainly does not have an easy time learning either.

This confusion has led, in turn, to an administrative dispute. The process of day-to-day regulation is overseen by multiple governmental agencies and has led to all sorts of jurisdictional problems and an atmosphere of inter-agency confrontation.

Figure I-1

The role of wetlands in flood control—the effects of wetlands on stream flow from runoff



Water retention is greatest in wetlands with dense soils, bumpy grounds, and extensive vegetative cover.

*Source: Mitsch, WJ and JG Gosselink; **Wetlands**; (New York: Van Nostrand Reinhold, 1986).*

The Value of Wetlands

Over the course of the past twenty-five years, scientists and the community at large have come to realize that wetlands serve several valuable functions both within an ecosystem and for the human communities in which they exist. Wetlands provide a constant source of groundwater recharge, often during the driest seasons. Most communities receive their water from either surface reservoirs (natural ones or from rivers that have been dammed) or from ground water (wells, for example). During the wettest seasons, wetlands absorb flood waters (from both rivers and precipitation) and then slowly release the water over time, long after the floods have receded. A constant recharge of water is a necessity for wells to maintain not only their quantity but also their quality of water. If the water level drops too low, well water tends to become salty and filled with particles from the ground below.

Wetlands also provide a substantial flood control mechanism, buffering the surrounding areas from the true impact of the wettest seasons. Water that arrives in large quantities, either through storms or increased river flow, can flood substantial areas. However, wetlands have the ability to slow the water flow rate, and can retain much of the water from the initial impact and slowly drain over a longer period of time [See Fig. I-1].

Thousands of homeowners realize each year the full extent of wetland buffering potential when normally dry backyards and basements become damp or flooded. In the case of houses which have been built on drained wetlands, the natural blocker has been eliminated. These houses may seem dry for four out of five years, but since the ground water table remains the same even with the wetlands gone, large periodic variations in the water cycle can cause long-term flooding problems. The ability of wetlands to buffer flood waters has recently been recognized in the public policy arena. Rather than build a series of flood control dams, the Army Corps of Engineers chose to acquire wetlands in order to protect the cities of Cambridge and Boston.

Wetlands further serve an important function in sediment and nutrient retention During extreme flooding, the sedimentation that occurs in rivers is filtered in wetlands. Sedimentation is the build-up of sediments and soil in water that has been scoured by heavy precipitation or other similar events. It can be harmful for water bodies because the sediment particles floating in the water block much of the sunlight necessary for plants to photosynthesize.

In recent years, wetlands have become highly valued because they contain the right combination of airation and vegetation to disperse and breakdown on a large scale many of the pathogens and nutrients (nitrates and phosphates) found in septic waste.from housing developments as well as in excess fertilizers from agricultural runoff and golf courses—pathogens which would typically degrade water quality. In fact, artificial wetlands specifically designed to act as a surrogate for septic tanks are beginning to receive wide acclaim.

Furthermore, wetlands are among the most diverse ecosystems in the world [diversity refers to the number and variety of differing species within a given ecosystem], comparing only with tropical rainforests and coral reef ecosystems. Significantly, wetlands support 5% of the endangered or threatened

Figure I-2

Threatened or endangered species that are associated with wetlands

TAXON	NUMBER OF SPECIES IN WETLAND (OUT OF 1331)	THREATENED/ ENDANGERED IN U.S. (TOTAL)
Total	151	5 %
Plants	95	3 %
Mammals	5	15 %
Birds	22	31 %
Reptiles	4	31 %
Amphibians	3	50 %
Fish	22	54 %

Source: Williams JD and CK Dodd, Importance of wetlands to endangered and threatened species, in ***Wetland Functions and Values: the State of Our Understanding****, PE Greeson, et al, eds., (Minneapolis: American Water Resources Assoc., 1979).*

species that are listed in the United States, including over half of the protected fish and amphibian species, and nearly one-third the bird and reptile species [See Fig. I-2].

The wetlands of North America are of vital importance to migratory birds. Primary flight paths, critical for the birds' survival, cross above the entire Northeast region. Long after the ground is frozen, wetlands with moving water are still able to support a remarkable amount of life that will sustain the birds. Recent studies suggest that the declining loss of migratory birds in the last several decades is not a result of the disappearance of habitat in the equator and southern hemisphere—as previously blamed on the deforestation and development of Central and South America—but rather is due to the loss of available habitats along the migratory pathways and in the North during their summer stays.

Perhaps one of the most valuable aspects of wetlands is the network of contiguous habitats that they support. Although isolated wetlands do exist, the large majority part of a larger lake and riverine system. The value of this network is unquestionable as a corridor of protected wildlife, but is also necessary to maintain the continuity of intra-species genetic variation. In order to maintain the healthiest variety of a species, the mechanism by which they breed and germinate with other varieties of their species must be maintained.

Wetland Protection: Before Congressional Environmentalism

Despite what has recently been discovered, wetlands have not always been viewed as a resource of value. For the majority of the existence of the United States, they have been scorned as bearers of disease (often through mosquitoes) and other pathogens; an eyesore to local communities; and a hindrance to rapid development—although numerous wetlands were filled in to form the basis for cities as well as housing developments, shopping malls, and cities (in fact, the majority of large cities along the East Coast were once marshes that have since been filled in. Much to everyone's consternation, numerous buildings in Washington D.C. are presently sinking back into the ground due to improper construction). Only in the last several decades has there been widespread acceptance of the importance of even coastal wetlands for their role in maintaining commercial fisheries. Any protection that was granted prior to the enactment of the Clean Water Act in 1972 was by towns and states who actually looked to ecosystems as indicators and causal agents in their own community's health.

In 1970, hundreds of thousands of people celebrated Earth Day, in one of the first wide scale environmental initiatives that made Congress aware of the public need for an environmental ethic. This, combined with the publication of the landmark book *Silent Spring* which documented the health effects of pesticide use, spurred the government on to the formation of a federal agency. The National Environmental Protection Act and the formation of the Environmental Protection Agency began the onslaught of huge environmental efforts at regulating and protecting the environment.

The Clean Water Act and the Rise of Inter-Agency Confusion

In 1972, Congress enacted the Clean Water Act to restrict the degradation of water resources and regulate the transport of pollutants through waterways. Despite the fact that wetlands were not specifically regulated in the 1972 Act or in the 1977 Amendments, it nevertheless became the primary tool for protecting wetlands. Wetlands have been interpreted as part of the "waters of the United States" and the filling of a wetland for development purposes is covered under the "discharge of pollutants."

Until the late 1980s, four agencies: the Environmental Protection Agency (EPA), the Department of Defense's Army Corps of Engineers (the Corps), the Department of the Interior's Fish and Wildlife Service, and the Department of Agriculture's Soil Conservation Service (SCS) were directly involved in the regulation of U.S. wetlands. Despite the fact that each agency utilized the same definition of wetlands as the foundation for their work, they also developed their own criteria to identify which lands were to be considered wetlands and which were not. These criteria were separately codified into at least four distinct federally sponsored wetlands manuals.

Protection of wetlands under such circumstances clearly posed a bureaucratic problem. While the manuals did address the definition provided by the Act, they also reflected the needs, objectives and history of the agency involved in a particular wetland delineation. For example, the Corps is run largely by engineers, not ecologists. Their primary role over time has been to assist in the construction of various development projects: moving and dredging rivers, building dams, and constructing bridges. Although they are particularly qualified to identify wetlands—they work in and around them daily—their historical relationship with wetlands has been to fill them in or dredge them. The Corps was not necessarily averse to wetland protection but they have tended to identify the extent of a wetland more narrowly than other agencies might.

At the same time, when the EPA was created in 1970, it did not have a great deal of technical expertise—a fact that both hindered and helped them in their efforts to delineate the

extent of wetlands. On one hand, the young staff brought new ideas, perspectives, methodologies, and an optimism that were not restricted by the traditional processes by which legislation takes place. On the other hand, the fledgling EPA was immediately barraged by vocal lobbying groups—farmers, developers, industrialists, homeowners—who challenged legislation as an infringement on personal property. Since the new agency lacked a long-term perspective on wetlands issues, they were often easily swayed by these large constituencies to the detriment of the scientific aspects of the debate.

Collaboration: the 1989 Manual and the Current Regulatory Framework

In order to combat the confusion of multiple agency regulation, the four agencies came together in 1989 to create a uniform wetland delineation manual which continued to meet the accepted definition while combining portions of each of the agencies' previous manuals. There was little public discussion while the new manual was being drawn up and it was designed for trial use for a year or two in order to evaluate its effectiveness both for the agencies directly involved and for the public in general.

The agencies identified three technical criteria—hydrophytic vegetation, hydric soils, and wetland hydrology—to jurisdictionally delineate wetlands. While all three criteria are mandatory and must be met for an area to be identified as a wetland, the hydrology is the primary determinant. The hydrology, or the frequency and duration of water saturation (from precipitation, surface runoff, groundwater, and flooding processes), actually determines whether an area is wet or not. It can affect the basic structure of the soils and is a major factor in determining the flora, and ultimately the fauna within the ecosystem. Two of the primary values that humans place on wetlands—flood control and recharge of underground water supplies—can be attributed to hydrology and the periodic fluctuations in the water budget.

The same New England hardwood swamp showing a red maple's root modification to survive annual flooding. [Caryl Waggett]

Hydric soils are those soil types that can maintain water at or near the surface for long enough periods to support hydrophytic vegetation. Hydric soils are determined primarily by the hydrology of the specific site, but are also defined by the texture and structure of the soil, or the presence of a very slowly permeable layer, such as a clay or bedrock.

In terms of hydrotrophic vegetation, different plants can withstand different amounts of anoxia. Water lilies, for example, thrive only in water. Other plants have evolved mechanisms to endure the anaerobic (without oxygen) conditions associated with saturated or temporarily saturated soils. These include: pneumatophores, or "breathing roots,"(*e.g.* mangroves); prop roots, that extend from the trunk and have increased surface area above the surface (*e.g.* mangroves, tupelo and cypress); and aerenchymous roots where the plant sends oxygen down to its roots to modify the immediate surroundings and to provide an aerobic atmosphere (*e.g.* sedges, including Spartina alterniflora).

Other plants have maintained the ability to respond to environmental conditions, as they may become flooded. Red maples, for example, send up multiple sapling sprouts. Certain plants, including many ferns, have adapted their life cycle to the periodic flooding familiar to their ecosystems. These plants can survive in their germinated spore stage while the flood waters are high, then grow when the flood waters recede.

Scientific Critiques of the 1989 Manual: Regionalization Issues

During the first two years of its use, the wetland manual came under criticism from the scientific community. Wide divergences in wetland characteristics and indicators exist over the more than four million square mile expanse of the United States—a fact that poses certain difficulties in the creation of a national standard for wetland protection. It became clear that the manual took too little account of the diversity of wetlands and their regional variations.

The geology differs widely across the country, ranging from glaciated areas, such as the Midwest and northeast to areas that have never experienced the scouring and erratics of glaciers. Moreover, the climate varies dramatically. While the Boreal Rainforest exists in the south Alaskan latitudes, most of the continental states are covered with temperate forests. The westernmost states are more constant in temperature and higher in precipitation, while the Atlantic coastal states receive wider temperature fluxes. The variations between ecosystems within the States is also great. Wetland norms in the southern states, with cypress swamps and the Everglades, differ widely from those in the Northeast, with peat bogs and red maple swamps.

Although widespread agreement exists about the need to construct regional standards for wetland delineation, the most scientifically logical solution—separate regional manuals—has been derided as politically unfeasible because (a) some localities have no interest in maintaining the strength of the Act and (b) regional organizations resist the expansion of federal input into the program (inter-regional communication would have to be exceptionally strong to provide equal protection between regions). The result has been what many call a second-best attempt to identify wetlands by certain aspects regional input, and has been attacked by both proponents and opponents of wetland conservation.

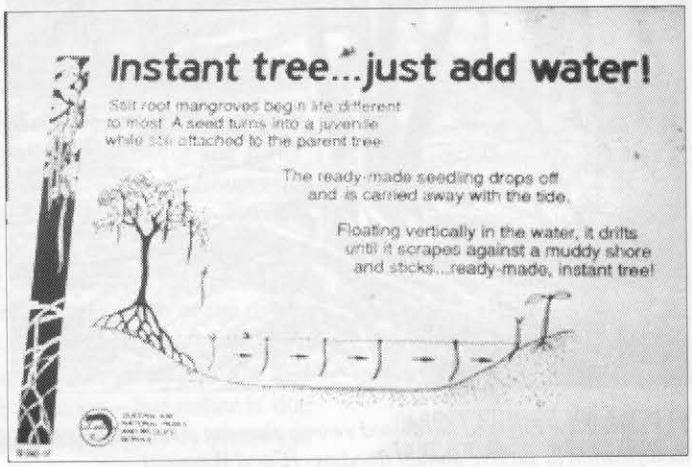
Wetland Boundary Succession and Wetland Migration

A further problem not addressed by the 1989 Manual is the dif-

ficulty of putting a permanent boundary around a wetland. Wetlands, by nature, move, grow, and change. They are created and depend upon a succession of ecosystems. Many lakes will in time fill in with decaying matter and form various stages of wetlands, eventually becoming a successional forest. Within the next several decades, the possibility that global warming will create large changes in coastal estuaries and precipitation patterns will also alter the existing wetland locations and areal extent. Moreover, many rivers will naturally become flooded by beaver dams, forming small ponds that will experience similar successional patterns. Some of these progressions can take as little as 50 or 60 years.

Defining a specific area in which a wetland exists, and allowing extensive development up to its edge, restricts natural patterns of wetland movement. Moreover, it sets that development up for severe problems down the road as the wetland tries to follow its natural course of movement. In order to prevent large economic losses and bureaucratic litigation, this fundamental problem must be taken into consideration as the goals and strategies of wetland protection evolve.

The 1989 manual was further critiqued for not taking into account *inter*-annual variations. For example, in the state of Rhode Island over a year long period, the water table is highest in the early spring and lowest during the late fall—an *intra*-seasonal variation addressed by 1989 delineation methods. Even during a dry fall, many of the plants that have adapted to survive during the spring are still around and have visible signs of their adaptations (*e.g.*, red maples show their prop roots even during the dry fall). However, *inter*-annual variations are not as vivid in the field, so that a wetland might not be considered as such under dry conditions one year. To determine whether or not a given year is unusually dry or whether an area of land becomes flooded on a cyclical basis requires many years of study—years that developers, farmers, and bureaucrats do not want to, and often cannot, afford.



An explanation of how plants such as ferns and mangroves survive in their germinated spore stage while flood waters are high, then grow once flood waters recede. [Josephine King]

Have Permits Been Defining Wetlands More than the Manual?

At the same time it was also becoming apparent that the process by which permits were being given out to develop wetlands was in many cases usurping the manual's authority. An area determined to be a wetland may only be developed if it receives a variance through the permitting process. The bureaucratic structure surrounding the granting of permissions is tangled between different agencies.

Officially, wetlands are protected by Congressional mandate, and are to be administered jointly by the four agencies. The Corps and EPA share the bulk of the responsibility under the CWA. However, the Corps is responsible for the day-to-day administration of permit decisions to develop, fill, or dredge in wetlands, including permit issuance. The EPA has authority to make the final determination on the extent of CWA jurisdiction, which effectively gives it veto power over the Corps.

Despite the structure, wetlands are not being protected very stringently. Seventy-five thousand activities are authorized every year and require no special application on the part of the land-owner. In addition, of 15,000 applicants, 10,000 individual permits are issued by the Corps, and only 500 are denied (the remaining are accepted through general permits). Overwhelmingly, the Corps approves permits in wetlands at a rate almost equal to having no protection at all, with only 1 in 30 applications being denied. One of the greatest problems with this rate is that the permits, and not the wetland delineation manual, are effectively defining what constitutes wetlands.

The Delineation Dispute: 1991 to Today

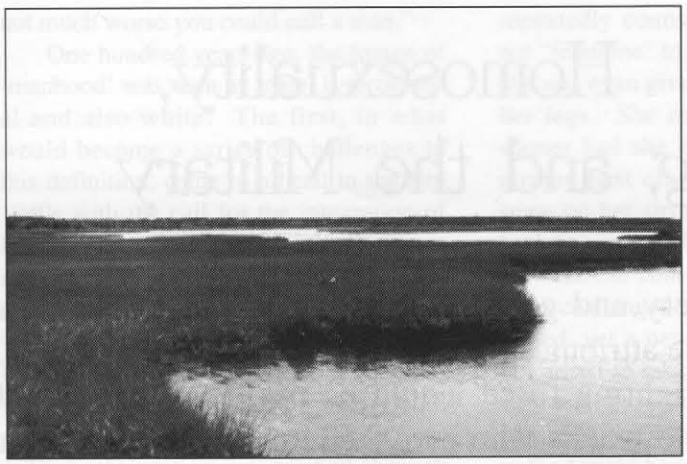
After two years of field use, both the scientific and political communities believed that the 1989 manual needed to be revised for further clarity. Many argued that the Manual was over-inclusive both in word and in practice. Others asserted, with equal forcefulness, that it was under-inclusive.

The three technical criteria used to delineate wetlands were widely accepted by the scientific community as the essential characteristics defining a wetland. However, debate raged over the specific combination of these criteria required. According to Former EPA Administrator William Reilly, farmers, developers and property owners who were upset with federal interference in property rights, had all expressed concern that too much land was being delineated as wetlands. According to Reilly (1991): "Although the 1989 manual appeared solid technically, it contained confusing language that led to inconsistent, sometimes over-inclusive assertions of jurisdiction. As a result, the government appeared to claim jurisdiction under this manual over areas it had never before considered wetlands."

Dan Quayle Recommends a New Manual

In August of 1991, the Executive Council of Competitiveness (ECC), headed by Former Vice President Dan Quayle and under the auspices of the EPA, proposed an alternative manual that had a much narrower interpretation of the combination of criteria needed to delineate a wetland. To the dismay of many, the arrival of this proposed second manual later in 1991 immediately caused as many problems as it set out to resolve.

Field testing of the proposed manual suggested that, if enacted, more than 500,000 acres of current wetlands would no longer fall under federal protection. More than 60,000 people



A coastal salt marsh that is both tidally flooded and annually flooded by winter coastal storms (Waquoit Bay, MA) [Caryl Waggett]

commented in response to the proposed manual, in what turned out to be a very heated debate. Even the regional branches of federal agencies involved in wetland delineation found the new manual ineffective. After field testing, the New England Review Team claimed that the new manual delineated approximately half the wetlands of the 1989 Manual, complicated the field methods, was not based on scientific evidence, utilized invalid field indicators and criteria, and in general lacked clarity. In distinction to the 1989 manual which took a "define as wetland first, ask questions later" approach, the 1991 manual assumed that a particular area was not a wetland without specific proof and, instead, required an indication that it was indeed a wetland.

Many argue that the 1991 manual was a political and economic move designed to spur growth and bring the U.S. out of its recession and did not necessarily take environmental considerations into account. An alliance of home developers and mall builders, supported by the logging industry, proposed to the ECC that a less inclusive definition of wetlands would provide incentive for a building spurt. Since home building and construction are typically used as the primary indicators of the economy's health, this seemed a very promising avenue to instigate growth. It was also inexpensive. A change in the legislation would free up hundreds of thousands of acres for development purposes and would cost the government little in time or investment.

Wetlands' Protected Future

While the 1991 proposed manual is widely accepted as having no scientific validity, the 1989 Manual is still under fire as being over-inclusive. The delineation debate is far from over as the different agencies have reverted to using older versions of manuals including the 1989 Manual, a draft 1987 version, and even ones used prior to 1989 by individual agencies. The dilemma of accurate wetland delineation has been sent to the Scientific Advisory Board. The Board will provide a series of proposed revisions for public review, and several issues in addition to the over-inclusive nature of the current 1989 Manual will be examined. As the Clean Water Act comes up for reauthorization later this year, there is little possibility that it will pass without rectifying the mechanism for wetland delineations.

Suggestions for Further Reading

These sources provide a solid and clear understanding of the scientific basis of wetland ecology and may have some focus on wetland valuation and management:

Good, RE et al, eds., *Freshwater Wetlands: Ecological Processes and Management Potential.* (Academic Press, 1978).

Larson, JS, ed., *A Guide to the Important Characteristics and Values of Freshwater Wetlands in the Northeast.* (DOI Office of Water Resources Research, 1973).

Miller, GT, *Living in the Environment.* (Wadsworth Publishing Co., 1990).

Mitsch, WJ, and JG Gosselink, *Wetlands.* (Van Nostrand Reinhold, 1986).

Salvesen, D, *Wetlands: Mitigating and Regulating Development Impacts.* (Urban Land Institute, 1990).

Scodari, PF, *Wetlands Protection.* (Environmental Law Institute, 1990).

The following sources focus on the regulatory initiatives involved in wetland protection, considering the various steps in protecting ecosystems, as well as public participation in these processes:

Broadway, JE, "Practicable alternatives under Section 404 of the Federal Clean Water Act after Bersani v. Robichaud [850 F.2d 36]" in *Syracuse Law. Review.* 825 (1990).

Duggins, RE, "Notes: National Wildlife Federation v. Hanson: Content-based review of Corps wetlands determinations under the citizens' suit provision of the Clean Water Act," 67 in *North Carolina Law Review* 695 (1989).

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Fulton, W, "Planning Practice: The wetland morass," in *Planning*, Aug., 1991.

Greeson, PE, et al, eds.; Wetland Functions and Values: The State of Our Understanding, *Proceedings of the National Symposium on Wetlands.* (American Water Resources Association, 1978).

Reiser, A, "Ecological preservation as a public property right: An emerging doctrine in search of a theory," 15 *Harvard. Environmental. Law. Review* 393, (1991).