

# MONITORING WETLAND CHANGES - THE U.S. WETLANDS STATUS AND TRENDS STUDY

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## SUMMARY

The United States Wetland Status and Trends Study has the responsibility for developing and maintaining national level statistics on the status and trends of wetlands in the United States. This information is needed in order to provide information to the U.S. Congress and the Federal Government for the development or modification of Federal programmes and policies regarding wetlands. The Emergency Wetlands Resources Act of 1986 reaffirmed the importance of this information and provided mandates for completion of periodic status and trends reports. This paper outlines the need for and the purpose of the United States Wetlands Status and Trends Survey. It describes the method used, the impact the survey has had on wetland policy and management decisions and discusses plans for future monitoring.

## INTRODUCTION

It is most important to convey to an international audience the rationale used to measure wetland area changes in the United States rather than describe actual trends data specific to this country. (Specific data on trends have been presented by Dahl and Johnson 1991.) This can be done by addressing four questions relevant to wetland loss studies as follows

- i) Why do we care about wetland losses?
- ii) What are we doing to monitor changes over time?
- iii) Are the data generated having an impact on policy and management decisions?
- iv) What does the future hold?

The wetlands in the Wetland Status and Trends Study include all those defined by Cowardin *et al.* (1979) regardless of functional value, or size (one hectare and larger). Any trends data and operational specifications are applicable only to the conterminous United States (the 'lower 48' states).

## WHY CARE ABOUT WETLAND LOSSES?

Some in the United States have characterized wetland losses as being the equivalent of spilt milk. Why worry about what has transpired in the past? There are a variety of responses to this question; some of the most compelling include the following:

Wetland area losses influence other ecological interests - most notably migratory bird populations. The concept that habitat loss and degradation have direct consequences for fish and wildlife species is not new. Initiatives such as the North American Waterfowl Management Plan and recent efforts aimed at securing biodiversity recognize this relationship (US FWS and CWS 1986; International Assoc. Fish and Wildlife Agencies *et al.* 1991). In order to fully comprehend the ecological ramifications of wetland habitat loss, more complete

information on types of habitat, the location, and the extent of losses are needed.

Secondly, it is known that man is having an impact on the land. Some impacts may be beneficial or sustainable, while others are more damaging. There is a continuing need to quantify these impacts in terms of wetland losses and provide scientific data that can influence research, management and policy decisions regarding the remaining wetland base (Figure 1). This also relates directly to the development of successful policy goals at the national level. If for example, "no net loss" is a legitimate national policy goal, then there is a practical need to provide a measuring stick so that the base area is known when the policy goes into effect. Changes can then be monitored to assess the implementation and effectiveness of the policy.

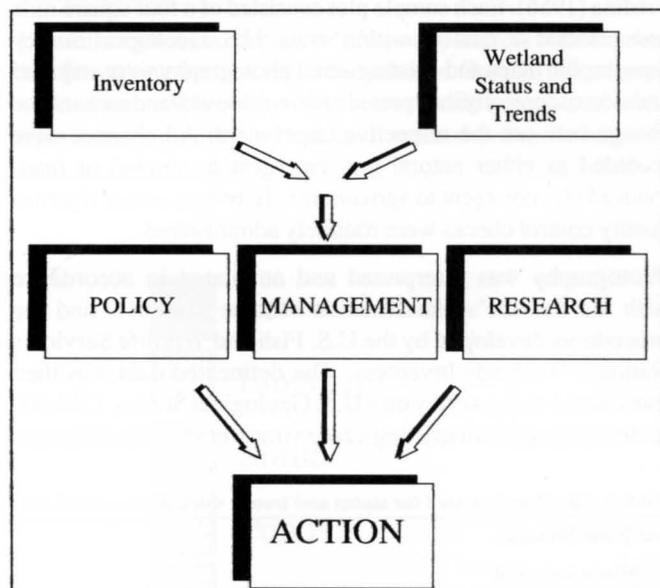


Figure 1. Flowchart indicating the need for quantified information on wetlands which can influence research, management and policy decisions regarding wetland resources.

Wetland status information may also be an important interim step until the preparation of wetland maps and inventories is completed. This is the case in the U.S. since the National Wetlands Inventory mapping project is not scheduled for completion until 1998 and the area summaries for the maps will not be completed until sometime after that date (Wilén and Pywell 1992).

## WHAT IS BEING DONE TO MONITOR WETLAND CHANGE OVER TIME?

In 1979 the National Wetlands Inventory began to develop statistically valid estimates of wetland area for the conterminous United States. Until that time, the information of the existing wetland resource base was limited and scattered and some of it

was merely speculative. The work of Shaw and Fredine (1956) was widely recognized as one of the more complete published studies to present wetland status information on a national basis. However, that study was intentionally biased toward estimating wetland areas of importance to waterfowl. Additionally, by the late 1970s, the information was over 20 years old and more comprehensive and current data were needed.

The Fish and Wildlife Service recognized this need and, with help from interagency statisticians, designed and completed a new study that estimated the extent of wetland resources in the conterminous United States. The "Status and Trends of Wetlands and Deepwater Habitats" main objective was to produce statistically valid estimates of the total area of wetlands and certain deepwater habitats, categorised by wetland type, for the lower 48 states. The sample design for the study involves a stratified random sample of 3,629 plots distributed within strata being formed by state boundaries and 35 physical subdivisions described by Hammond (1970). A coastal zone stratum was added in order to encompass those wetlands in close proximity to coastal influence. Sample plots were allocated to strata in proportion to the expected amount of wetland acreage as estimated by the earlier work of Shaw and Fredine (1956). Each sample plot consisted of a four square mile area selected at random within strata. U.S. Geological Survey topographic maps and existing aerial photography were acquired and stereoscopically interpreted to determine wetland area and the change between the respective target dates. All changes were recorded as either natural (eg. emergent to shrubs) or man-induced (eg. emergent to agriculture). To reduce errors, rigorous quality control checks were routinely administered.

Photography was interpreted and annotated in accordance with the Service's classification scheme (Table 1) and the procedures developed by the U.S. Fish and Wildlife Service's National Wetlands Inventory. The delineated data was then transferred to an overlay on a U.S. Geological Survey 1:24,000 scale topographic map using a zoom transfer scope and changes

in classification were recorded. Quality control checks were built into the process to reduce the chance of false changes being recorded and to provide confirmation of the interpretation of the photography. Acreage determinations and data entry provide further quality assurance to the raw plot data. The concept of establishing long-term trend plots is similar to those being established to monitor long-term biodiversity in protected tropical forests as described by Dallmeier (1992).

It should be noted that the Wetland Status and Trends Study was designed to generate statistical estimates on physical gains or losses - not to provide information on wetland quality.

The Wetland Status and Trends goals are simple and straightforward:

- i) to produce comprehensive, statistically valid status information;
- ii) to repeat study procedures in order to produce updated trend information at various intervals.

The wetland Status and Trends Study is now entering its third iteration of producing information on wetland status in the United States. The first cycle was completed in 1982 when wetland area changes between the mid-1950s and the mid-1970s were measured with the use of aerial photography. The results of that study have been described by Frayer *et al.* (1983) and Tiner (1984). That information has recently been updated by measuring wetland area changes from the mid-1970s to the mid-1980s (Dahl and Johnson 1991).

It should also be recognized that the Status and Trends Study was developed to be independent of the wetland inventory mapping activity. There is generally a misconception that wetland loss studies are dependent upon a complete wetlands inventory. In the United States they are autonomous, each with separate goals and objectives, but with shared technologies and procedures.

**Table 1 Classification used for status and trends work in the united states**

<u>Salt Water habitats*</u>	<u>Common Description</u>
Marine Intertidal	Nearshore
Estuarine Subtidal	Open water/bay bottoms
Estuarine Intertidal Emergents	Salt Marsh
Estuarine Intertidal Forested/Shrub	Mangroves or other estuarine shrubs
Estuarine Intertidal Unconsolidated Shore	Beaches/bars/flats
Estuarine Intertidal Aquatic Bed	Floating aquatic or submerged vegetation
Riverine (may be tidal or non-tidal)	River systems
<u>Freshwater Habitats*</u>	
Palustrine Forested	Forested swamps
Palustrine Shrub	Shrub wetlands
Palustrine Emergents	Inland marshes/wet meadows
Palustrine Unconsolidated Shore	Beaches/bars/flats
Palustrine Unconsolidated Bottom	Open water ponds
Palustrine Aquatic Bed	Floating aquatic or submerged vegetation
Lacustrine	Lakes/reservoirs
<u>Upland Land Use</u>	
Agriculture	Agriculture/Pasture
Urban	Built-up/developments
Forested Plantations	Planted Forests, Christmas tree farms
Rural Development	Isolated development away from urban infrastructure
Other Uplands	All areas not included in the categories above

\*Adapted from Cowardin *et al.* 1979.

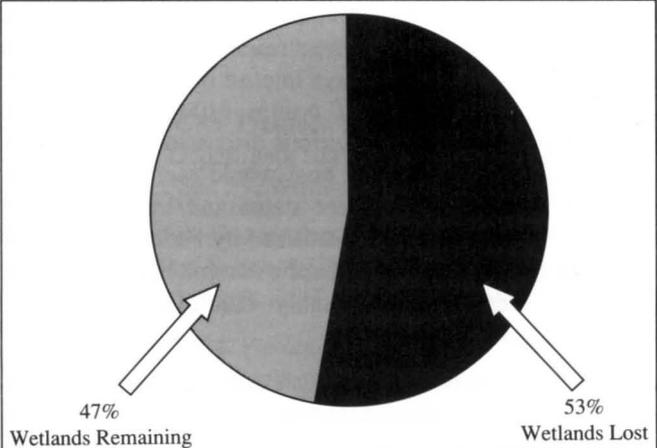


Figure 2. Status information for the mid-1980s in the conterminous US indicates 47% of the original wetland area remains. Estimated loss rates through 1980s were 121,000ha/yr.

The Status and Trends Study utilizes the U.S. Fish and Wildlife Service definition of wetlands and deepwater habitats.

Upland features are placed in five broad categories composed of agricultural land use; urban areas; forested plantation; rural development and other land use not qualifying in another category. Several of these categories follow those described by Anderson *et al.* (1976). The forested plantations and rural development categories were added in 1991.

There is also a widely held belief that conducting physical wetland loss studies is an “easy” task. It is the contention of this author that almost anything dealing with wetlands on a large scale is never “easy” or inexpensive. A more correct interpretation may be that determining physical loss of wetland area is more easily done than other value assessments or functional loss studies.

**THE IMPACT ON WETLAND POLICY AND MANAGEMENT DECISIONS**

Real data on wetland area and the trends of wetland losses provided the U.S. with critical information. Wetland trend information provided accurate data about loss (or gain) rates and thus numbers replaced emotional rhetoric. Base wetland area information was available for the conterminous U.S. and an estimated annual loss rate was produced (Figure 2).

Other vital information indicated that over half (52%) of the remaining wetlands in the U.S. are forested (Figure 3). In total, wetlands compose 5% of the surface area in the conterminous United States.

This information has provided U.S. policy makers with baseline data for making wetland resource decisions. Overall, these data on wetland area and loss rates have been cited in a number of major reports dealing with wetlands and wetland policy formulation

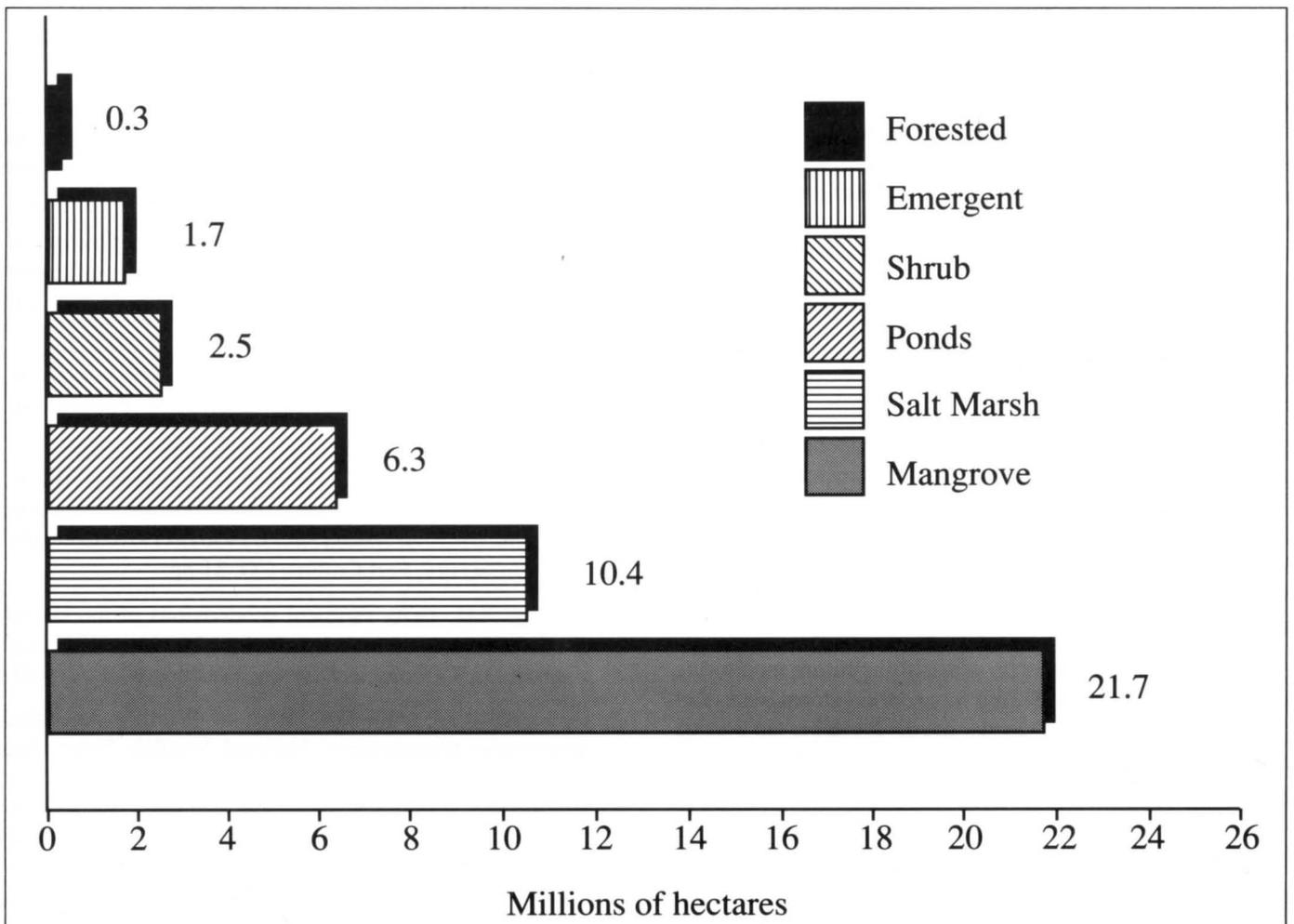


Figure 3. Extent of different wetland types remaining in the conterminous US.

(Office of Technology Assessment 1984; Feierabend and Zelazny 1987; U.S. Department of the Interior 1988; The Conservation Foundation 1988). The information was instrumental in enacting such Federal legislation measures as the following:

- i) Food Security Act of 1985 and 1990 - (Swampbuster and other conservation provisions);
- ii) Emergency Wetlands Resources Act of 1986;
- iii) Tax Reform Act of 1986;
- iv) Water Resources Development Act of 1986.

The Swampbuster provision of the Food Security Act of 1985 is particularly notable. This addressed the conversion of wetlands for the purpose of producing an agricultural commodity and provided disincentives for such actions. It was hoped that this would help reduce wetland losses attributed to agricultural practices because this was identified as the cause for 87% of total wetland losses from the 1950s to the 1970s in the U.S.

In addition, a number of states have enacted some form of wetland protection measure as a broadened recognition of wetland values and continued wetland losses provides a political basis for protection. Whether or not these factors have significantly reduced wetland loss rates cannot be determined until an updated status and trends study is completed.

## WHAT DOES THE FUTURE HOLD?

In 1991 the Wetland Status and Trends effort became a continuous monitoring process with the goal of measuring changes in wetland area and reporting these findings every five years. Regionalized intensification studies are also underway to monitor more closely the wetland changes in particular parts of the United States. These intensification studies involve adding additional sample plots to specified geographical units in order to yield more accurate, regionalized trend data. Initially the U.S. Fish and Wildlife Service has identified the Atlantic and Gulf coastal zones, the Great Lakes Watershed, the Lower Mississippi Alluvial Plain and the Prairie Pothole Region as areas where intensification information is needed.

Additionally, the U.S. Fish and Wildlife Service has entered into active discussions with the U.S. Environmental Protection Agency over an interagency effort to monitor wetland area changes in combination with changes in wetland quality. The Environmental Monitoring and Assessment Programme (EMAP) would combine the expertise of two or more Federal agencies to monitor wetland quantity and quality in the long-term.

This also has implications for establishing future monitoring networks worldwide. As we move to address global issues that may affect ecosystems, a standardized, repeatable monitoring network to measure long-term changes in wetland quantity and quality is desirable.

## CONCLUSIONS

In recent years the use of wetland trends information has been institutionalized in discussions or initiatives dealing with

wetlands and other resource issues. National legislation and Congressional reports make direct reference to the status and trends data, and there is always intense interest in both the scientific and government communities for updated information. More recently, serious discussion of a national "no net loss" wetland policy goal would seem to hinge on obtaining accurate and current status and trends data for wetlands. This information is utilized by Federal, State and local governments, and the scientific community, making the Status and Trends Study a highly visible and technically challenging area.

It is the intention of the U.S. Fish and Wildlife Service to continue to produce national updates on wetland area status as well as more rigorous regionalized information on wetlands trends. This information should contribute to policy evaluation and help guide future management and research decisions.

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