

Wetlands of Florida,  
1950's to 1970's

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TABLES

Table 1. Categories of wetlands and deepwater habitats used in the national wetlands survey.

Table 2. Florida wetland acreage and net change estimates.

## ABSTRACT

The U.S. Fish and Wildlife Service recently completed a survey designed to develop wetland acreage estimates for the conterminous United States during the 1950's and 1970's. A stratified random sample of 3,635 plots of four square miles each was used. Aerial photography for each period was interpreted, wetland acreages measured, and changes recorded. Due to the stratification design for sample selection, 18 percent (656) of the sample plots were located in Florida. Some statistically meaningful estimates of Florida wetland acreages could be developed because of this relatively large sample size.

Statistical analysis revealed that in the 1970's Florida contained over 11 percent (11.3 million acres) of all wetlands in the U.S. and that nearly a third of the land surface of Florida could be described as wetland. The average annual net loss of wetlands in Florida was approximately 72,000 acres for the study period. Wetland losses were concentrated in the Everglades Region of South Florida. Most of the losses could be directly attributed to agricultural development.

## INTRODUCTION

Since 1976, the National Wetlands Inventory of the U.S. Fish and Wildlife Service has prepared detailed maps showing the location and classification of wetlands and deepwater habitats for special interest areas of the United States. Over 40 percent of the conterminous United States has been mapped, including 80 percent of the coastal zone. Ten percent of Alaska also has been mapped. Nine states have been completed. At present, large scale maps are available for two-thirds of Florida. It is anticipated that maps will be available for the entire state by the end of 1987.

By 1979 it became clear that national statistics on the current status of wetlands and changes that have occurred since the last inventory was conducted in the 1950's (Shaw and Fredine, 1956) were needed to provide information for evaluation of wetlands protection programs and policies. Because the mapping program does not readily provide this information, a statistically sound sampling procedure was devised for this purpose. Aerial photography from the 1950's and the 1970's was interpreted, and wetland measurements were taken for 3,635 sample sites throughout the U.S. These measurements have been analyzed and comprehensive reports published (Frayner et al., 1983, and Tiner, 1984). The results of the national study revealed that less than half

(99 million acres) of the original 215 million acres of wetlands (Roe and Ayres, 1954) in the conterminous United States were extant in the mid-1970's. A subset of the data was also analyzed for the Southeast. It was determined that nearly 50 percent of the Nation's wetland resources were found in the southeastern states and wetland losses in the Southeast accounted for 84 percent of the losses nationwide (Hefner and Brown, 1985).

As a result of the sampling design, more sample plots were evaluated in Florida than in any other state. Of a total sample of 3,635 plots, 656 were located in Florida. Analysis of the data from this relatively large sample makes it possible to generate statistically valid estimates of wetland acreages for Florida. As with the national and regional acreage estimates, the Florida acreage information can provide a baseline to which future estimates can be compared and an historical rate of change against which the effectiveness of wetlands protection programs might be evaluated.

#### PROCEDURE

The National Wetlands Inventory, with assistance from the U.S. Forest Service, the U.S. Soil Conservation Service, and the U.S. Army Corps of Engineers, selected W.E. Frayer, T.S. Monahan, D.C. Bowden, and F.A. Graybill of Colorado State University to construct a statistical

design for a national wetland survey and to analyze the data. The design required a stratified random sample of 3,635 units, with the basic strata being formed by state boundaries and the 35 physical subdivisions described by E.H. Hammond (U.S. Geological Survey, 1970). Sample units were allocated to strata in proportion to the expected wetland and deepwater habitat densities as determined by earlier work, including the Fish and Wildlife Service's wetlands inventory of the 1950's (Shaw and Fredine, 1956). Some 656 sample plots were identified within Florida.

Each sample unit consisted of a plot of four square miles. After sample units were located and outlined on U.S. Geological Survey topographic maps, aerial photography from the 1950's and the 1970's was obtained. The median and mode interval, as well as the average interval between the dates of photography, was 20 years. The majority of the 1950's photographs were black and white at a scale of 1:40,000. The earlier photographs were interpreted for each sample unit. Wetlands were delineated and classified in accordance with the wetlands classification system now in use by the Fish and Wildlife Service (Cowardin et al., 1979). This information was transferred to 1:24,000 scale map bases. The 1970's photography was then interpreted, and an overlay depicting changes was produced to fit the 1950's map. Scales were adjusted using stereo zoom transfer scopes. All changes in wetlands or deepwater habitats were identified as to

cause, both natural and man-induced. The wetlands on the 1950's era map and the 1970's era overlay were measured and recorded for statistical analysis.

Eleven categories of wetlands and deepwater habitats were identified for measurement in the national study (Table 1). Other land acreages within the sample plots were categorized as agricultural land, urban land, and other land. Statistical acreage estimates were generated for Florida using the same procedure used for producing the national estimates (Frayer et al., 1983). Various groupings of the data were attempted in order to improve statistical reliability.

Table 1. Categories of wetlands and deepwater habitats used in the national wetlands survey.

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Marine Intertidal

Estuarine Subtidal

Estuarine Intertidal Emergent

Estuarine Intertidal Forested and Scrub-Shrub

Estuarine Intertidal Unconsolidated Shore

Palustrine Forested

Palustrine Scrub-Shrub

Palustrine Emergent

Palustrine Unconsolidated Shore

Palustrine Open Water

Lacustrine

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## RESULTS

Mid-1950's and mid-1970's acreages for selected wetland categories are shown in Table 2. Some non-vegetated wetland categories and all deepwater habitats have been excluded from this report. The standard error for each entry is expressed as a percentage of the entry (SE%). In general, the smaller the SE%, the higher the reliability of the estimate. The reader may wish to consult Frayer et al. (1983) for additional explanation.

The results show that by the mid-1970's, 11 percent (11.3 million acres) of the 99 million acres of wetland remaining in the lower 48 states were found in Florida. Over a fifth of all estuarine (saltwater) wetlands and nearly all (96 percent) of the estuarine forested and scrub-shrub wetlands (mangroves) of the conterminous U.S. were located here. The overall wetland density of Florida, 30.2 percent of the land surface, and total wetland acreage was greater than any other of the lower 48 states. It is likely that only Alaska will be found to have a greater wetland acreage and density than Florida.

Estimated within Florida were nearly ten times more acres of palustrine (freshwater) wetlands than estuarine wetlands. The most

Table 2. Florida wetland acreage and net change estimates.

Wetland Type	Mid-1950's			Mid-1970's			Net Change			
	Acres (1000)	SE%	% of Nat'l Total	Acres (1000)	SE%	% of Nat'l Total	Acres (1000)	SE%	% of Type Florida	% of Nat'l Change
All Wetlands	12,779	3.6	12	11,334	3.8	11	-1,445	14.2	-11	15
All Estuarine Wetlands	1,244	9.0	22	1,169	9.5	22	-75	31.6	-6	20
Estuarine Intertidal Emergent	382	17.1	9	342	17.7	9	-40	40.5	-10	11
Estuarine Intertidal Scrub-Shrub and Forested	571	14.1	99	549	15.0	96	-22	79.1	-4	116*
All Palustrine Wetlands	11,535	3.8	11	10,165	4.1	11	-1,370	15.0	-12	16
Palustrine Emergent	4,499	7.9	14	3,434	9.1	12	-1,065	17.8	-24	22
Palustrine Forested and Scrub-Shrub	6,939	4.9	10	6,580	4.9	11	-358	38.1	-5	6
Palustrine Open Water	77	13.2	3	118	8.7	6	+41	22.9	+53	2

\*Percentage greater than 100% may be the result of the high standard error for these estimates.

extensive type of wetland in Florida is the palustrine forested and scrub-shrub wetland. Palustrine forested and scrub-shrub acreage estimates were combined, since both are comprised of woody vegetation, for improved statistical reliability. These areas include what are locally referred to as cypress heads, strands, swamps, bottomland hardwoods, and hydric hammocks. Relatively small losses of this type were experienced. Palustrine emergent wetland, which includes freshwater marshes, wet prairies, and everglades, suffered the greatest loss. Over one million acres of this type were destroyed, accounting for nearly three-quarters (74 percent) of the total wetland loss in the state. The average annual net loss for all wetland types combined was estimated at 72,000 acres. The primary cause of wetland conversion was drainage for agriculture, accounting for 79 percent of the overall change. In estuarine areas, however, dredging and filling for urban development and navigation were the principal causes of the loss.

Palustrine open water was the only wetland type to show an increase during the study period. This wetland type includes small open water bodies of less than 20 acres. Presumably, this resulted from the construction of farm ponds and small lakes in residential communities.

## DISCUSSION

Based on the estimates developed in this study, the wetlands of Florida were being impacted in ways and rates similar to those of the remainder of the lower 48 states during the two-decade study period. Estuarine wetland was lost to filling for residential development and dredging for navigation. Severe losses occurred to palustrine wetlands primarily as a result of drainage for agriculture. As in other parts of the United States, the greatest losses of wetlands took place in particular localized regions. The Everglades Region of southern Florida was one of four specific areas within the Southeast, including the Lower Mississippi Valley, coastal Louisiana, and eastern North Carolina, in which wetland losses were most severe. However, although the remainder of the Southeast suffered severe losses of palustrine forested and scrub-shrub wetland, relatively minor losses of this type occurred in Florida.

Since the early 1970's much has happened to benefit efforts in wetland protection. In my opinion, first and foremost has been an ever increasing understanding, through research, of the values wetlands provide to the public. It has been this increased understanding that has lead to the eventual implementation of wetland regulatory activity on the part of the Federal Government and the State of Florida. In contrast, prior to the 1970's, there were virtually no constraints on wetland destruction.

It is generally recognized that Federal and State regulatory efforts have not been completely successful in protecting wetlands (Center for Governmental Responsibility, 1982). Large scale urban development of estuarine wetlands has been slowed dramatically; however, small urban and industrial projects continue to impact wetlands. More importantly, farm drainage, the single most important cause of wetland loss, has been little affected by regulation.

The estimates presented in this report should serve as a "yardstick" by which the effectiveness of wetland regulatory programs might be measured. The U.S. Fish and Wildlife Service is now preparing to generate mid-1980's estimates using this study design. By comparing the rate of change from the 70's to the 80's, the influence of current regulatory programs can be analyzed.

The future of wetlands in Florida beyond the middle 1980's has the promise for being much brighter. With the passage of the Warren S. Henderson Wetlands Protection Act of 1984, Florida is the first state in the Southeast to take legislated regulatory authority over freshwater wetlands. Furthermore, the act is a landmark in that farming operations may no longer be ignored. Wetland managers and scientists now wait to see how the law will be applied and what its eventual effect will be.

## SUMMARY

The Fish and Wildlife Service recently completed a wetlands trend study of the conterminous United States comparing the extent of wetlands present in the mid-1950's to those present in the mid-1970's. The study included analysis of 3,635 sample plots of four square miles each. Eighteen percent of the plots were located in Florida. Estimates on the current status of Florida's wetlands and changes that had occurred during the study period were developed from the evaluation of this subsample.

The analysis showed that 11 percent of the wetlands of the United States were located in Florida in the mid-1970's. Nearly one-third of the State's landscape can be classified as wetland. Palustrine wetlands were nearly ten times as abundant as estuarine wetlands. The most common wetland type was the palustrine forested and scrub-shrub wetlands.

The average annual net loss of wetland in Florida was approximately 72,000 acres. Most of these losses could be attributed to drainage for agricultural purposes. The area with the greatest loss concentrations was the Everglades Region of South Florida. The wetland change information in this report reflects a period when there was virtually no regulation of activities which affect wetlands. The

Fish and Wildlife Service is now preparing to update these estimates to the mid-1980's. By comparing loss rate from the mid-1970's to mid-1980's with the rate reported here, an evaluation of the effectiveness of wetland regulatory programs will be possible.

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