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Wetland Trends for Selected Areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89)

U.S. Department of the Interior
Fish and Wildlife Service
Region 5

U.S. Environmental Protection Agency
Chesapeake Bay Program

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Prepared for the
U.S. Fish and Wildlife Service
Chesapeake Bay Estuary Program
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INTRODUCTION

Wetlands are subjected to multiple impacts, both natural and human-induced. They may change from one type to another, e.g., emergent wetland to scrub-shrub wetland, due to natural succession or to minor filling or drainage. Timber harvest of palustrine forests also causes a change in wetland type to emergent and/or scrub-shrub wetlands. Wetlands are also destroyed directly or indirectly by human activities. Most wetlands, however, have relatively stable futures that change gradually over long periods of time. Knowledge of wetland losses and gains is important for evaluating the effectiveness of government programs and policies designed to protect wetlands, and for developing strategies to reverse undesirable trends.

The U.S. Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (FWS) provided funding to initiate quadrangle-based wetland trends studies for selected areas in the Chesapeake Bay watershed. These studies identify the extent and nature of small- and large-scale wetland alterations for selected local areas.

The purpose of this report is to present the findings of the wetland trends analysis study for selected areas of the Lower Eastern Shore of the Delmarva Peninsula. It is one of numerous study areas selected by the EPA and FWS for detailed wetland trends analysis.

STUDY AREA

The study site is located on the Lower Eastern Shore of the Delmarva Peninsula in Maryland and Delaware (Figure 1) and has a combined land surface area of approximately 293 square miles. The study area encompasses five large-scale (1:24,000) U.S. Geological Survey topographic quadrangles: Delmar, Pittsville, Princess Anne, Salisbury, and Wango.

METHODS

Wetland trends analysis involves comparing aerial photography from at least two time periods. For the present study, aerial photos from 1982 and from 1988-89 were examined and compared to determine the extent of the wetland changes (losses, gains, or changes in type) that occurred during that time period in the study area.

The 1982 photography was 1:58,000 scale color infrared (CIR) aerial photography acquired by the U.S. Geological Survey's National High-Altitude Photography Program (NHAP). The 1988-89 photography was 1:40,000 scale CIR aerial photography acquired by the National Aerial Photography Program (NAPP). Wetlands and deepwater habitats were interpreted on the 1:40,000 photography (1:58,000 for Princess Anne) and classified according to the Service's official wetland classification system (Cowardin, et. al. 1979) following

standard NWI mapping conventions (National Wetlands Inventory, 1990). These interpretations served as the basis for evaluating recent wetland trends.

The two sets of photographs were compared using an Ottico Meccanica Italiana stereo facet plotter. Changes and map refinements were transferred to an NWI map using this device. Cause of change was recorded for each polygon. The minimum mapping unit for wetlands was generally 1/2 acre, except for ponds, which were mapped when 1/10th of an acre or larger in size. Changes as small as 1/10th acre were detected. Field work was conducted in selected areas to verify changes in classification. These results were used to improve wetland mapping, especially for seasonally saturated forested wetlands, and small farmed wetlands that had difficult signatures. Quality control of all photointerpretation was performed by a second photointerpreter. Interpreted data were digitized and acreage summaries generated. Tables were then prepared to present the study's findings.

RESULTS

Current Status

In 1988-89, the study area possessed about 37,000 acres of wetlands, excluding linear fringing wetlands along narrow streams. This total amounts to roughly 20 percent of the study area's land surface. Table 1 summarizes the acreage of the different wetland types found in the study area. Palustrine wetlands predominate with about 36,000 acres. This represents 97 percent of the study area's total wetland acreage. Deciduous forested wetlands alone account for 70 percent of the palustrine wetlands. About 1,000 acres of estuarine wetlands were present, mostly emergent marshes. This represents less than 3 percent of the study area's wetlands.

Recent Wetland Trends

Wetland trends results are presented in Tables 2 through 8. The following discussion highlights the more significant or interesting findings.

Vegetated Wetlands

Between 1982 and 1988-89, over 187 acres of vegetated wetlands were converted to upland (Table 2). Most of these losses affected palustrine forested wetland. Agriculture was the most significant cause of vegetated wetland loss (Table 3), with ditching also significant. Nearly 2,740 acres of vegetated wetland changed from one type to another, with palustrine forested wetlands being most affected. Ninety-five percent of these changes were due to silvicultural practices, including "windrow and bed" plantation management. Loblolly pine (Pinus taeda) is the principal commercial species cultivated in the study area. Upland conversion impacted the temporarily flooded palustrine wetland type significantly more than other types (Table 4). Table 5 shows changes in different types of forested wetlands. Most of the changes in forested wetlands resulted from forestry practices. Palustrine forests

became scrub-shrub or emergent wetlands after timber harvest. Less than two acres of vegetated wetland were created from upland (Table 6), whereas most of the gains in particular types of vegetated wetlands came from other vegetated wetland types (Table 6).

Nonvegetated Wetlands

Over 45 acres of new ponds were created from upland, and about two acres were constructed in vegetated wetlands (Table 7). Less than four acres of ponds were filled in, while less than three acres changed to vegetated wetlands. Approximately 28 percent of the new ponds were the result of farm pond construction (Table 8), but the majority were attributed to other causes.

Summary

The study area has approximately 20 percent of its land mass covered by wetlands. Wetlands totaling 37,000 acres (in 1988-89) were identified in the study area by the Service's National Wetlands Inventory. Palustrine wetland is the dominant type, representing 97 percent of the wetlands in the study area.

Between 1982 and 1988-89, the study area lost about 190 acres of vegetated wetlands, with roughly 187 acres converted to upland. Temporarily flooded forested wetland was the type most frequently converted to upland. Pond construction added about 45 acres of palustrine nonvegetated wetlands, but this gain was reduced to about 41 acres by pond losses to upland and vegetated wetlands.

The overall trend for the study area's wetlands was losses of vegetated wetlands and lesser gains in nonvegetated wetlands (mostly ponds). The significance of the increase in ponds to fish and wildlife species has not been assessed and remains a point for discussion. The losses of vegetated wetlands, however, represent known losses of valuable fish and wildlife habitats and areas providing other valued functions.

While this report documents recent trends in the study area's wetlands, it does not address changes in the quality of the remaining wetlands. As agricultural development increases, the quality of wetlands can be expected to deteriorate due to agricultural runoff, increased sedimentation, groundwater withdrawals, increased water pollution, and other factors, unless adequate safeguards are taken to protect not only the existence of wetlands, but their quality.

ACKNOWLEDGMENTS

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Wetland maps and digital data were compiled by the U.S. Fish and Wildlife Service's National Wetlands Inventory Office at St. Petersburg, Florida. Special appreciation is extended to Becky Stanley and Linda Shaffer for their assistance. Photointerpretation was performed by the junior author and quality controlled by Glenn Smith. We also acknowledge John Eaton for his able assistance in compiling trend statistics, tables and graphics for this report, Todd Nuerminger for the tabulation of raw data, and Pam Dansereau for manuscript word processing.

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Cowardin, L.M., V. Carter, F.C. Golet, and T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. 103 pp.

National Wetlands Inventory. 1990. Photointerpretation Conventions for the National Wetlands Inventory. U.S. Fish and Wildlife Service, St. Petersburg, FL. 45 pp. plus appendices.

Figure 1. **Location of Study Area - Selected Quadrangles in the Lower Eastern Shore of the Delmarva Peninsula shaded below.**

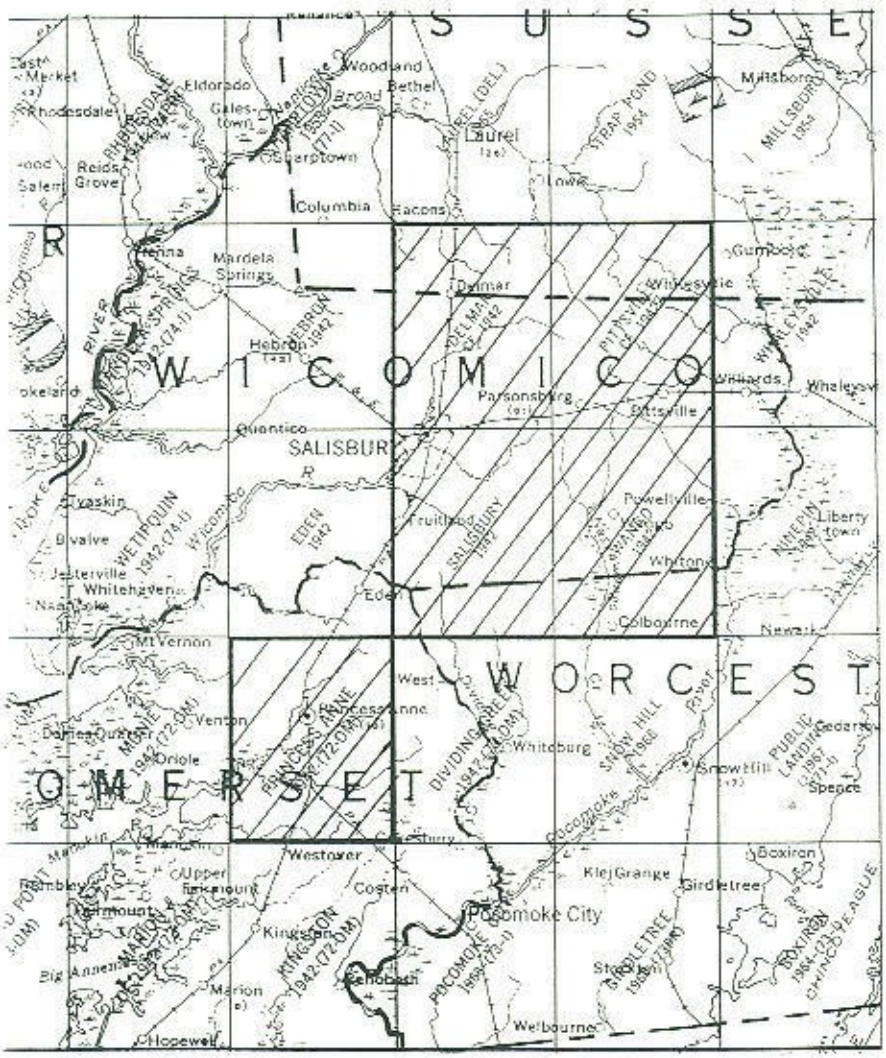

Table 1. Acreage of wetland types in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1988-89).

Wetland Types	Acres
PALUSTRINE WETLANDS	
Tidal Emergent	3.67
Nontidal Emergent	
Seasonally Flooded/Saturated	84.68
Seasonally Flooded	661.41
Temporarily Flooded	613.67
Semipermanently Flooded	20.77
Permanently Flooded	10.95
Saturated	0.61
Artificially Flooded	8.46
(Subtotal Nontidal)	*(1,400.55)*
Total Palustrine Emergent Wetlands	**1,404.22**
Tidal Forested	17.36
Nontidal Forested	
Evergreen, Broad-leaved	21.45
Evergreen, Needle-leaved	
Seasonally Flooded/Saturated	55.67
Seasonally Flooded	429.22
Temporarily Flooded	3,130.86
Saturated	3,231.49
Deciduous, Needle-leaved	331.10
Deciduous, Broad-leaved	
Seasonally Flooded/Saturated	2,801.50
Seasonally Flooded	8,783.72
Temporarily Flooded	9,472.26
Saturated	3,887.03
Semipermanently Flooded	9.87
Dead	41.84
(Subtotal Nontidal)	*(32,196.01)*
Total Palustrine Forested Wetlands	**32,213.37**
Tidal Scrub-Shrub	2.80
Nontidal Scrub-Shrub	
Seasonally Flooded/Saturated	48.71
Seasonally Flooded	224.99
Temporarily Flooded	1,443.62
Saturated	112.73

Table 1 *(Continued)*

Saturated	112.73
Semipermanently Flooded	34.35
(Subtotal Nontidal)	*(1,864.40)*
Total Palustrine Scrub-Shrub Wetlands	**1,867.20**
Aquatic Bed	0.45
Farmed Wetlands	97.70
Total Palustrine Vegetated Wetlands	**35,582.94**
Unconsolidated Bottom (Ponds)	314.85
Unconsolidated Shore	1.28
Total Palustrine Nonvegetated Wetlands	**316.13**
GRAND TOTAL PALUSTRINE WETLANDS	**35,899.07**
ESTUARINE WETLANDS	
Emergent	
Persistent, Irregularly Flooded	970.26
Scrub-Shrub	
Deciduous, Irregularly Flooded	25.09
Forested	
Evergreen, Irregularly Flooded	0.12
Total Estuarine Vegetated Wetlands	**995.47**
Unconsolidated Shore	8.42
Total Estuarine Nonvegetated Wetlands	**8.42**
GRAND TOTAL ESTUARINE WETLANDS	**1,003.89**
RIVERINE WETLANDS	
Tidal Emergent	
Nonpersistent, Regularly Flooded	34.55
GRAND TOTAL RIVERINE WETLANDS	**34.55**
TOTAL WETLANDS	**36,937.51**

Table 2. Changes of palustrine vegetated wetlands in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

Wetland Type	Converted to Upland (acres)	Changed to Other Vegetated Wetlands* (acres)	Changed to Nonvegetated Wetlands (acres)
Palustrine Emergent	11.55	579.11	---
Palustrine Forested	173.53	1,678.22	2.19
Palustrine Scrub-Shrub	2.76	481.83	---
Total	**187.84**	**2,739.16**†	**2.19**

†2,606.97 acres of this total (95%) changed due to silvicultural practices.

*Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

Table 3. Causes of palustrine vegetated wetland loss to upland in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

Cause of Loss	Acres
Agriculture	106.08
Ditching	51.89
Public Facilities	13.96
Housing	9.20
Timber Operations	2.50
Construction of Pond Dams	1.91
Junkyard Expansion	0.99
Unknown	0.73
Road Construction	0.58
Total	**187.84**

Table 4. Conversion of hydrologically similar palustrine vegetated wetlands to upland in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

Palustrine Wetland Type	Acres
Temporarily Flooded	165.55
Seasonally Saturated	10.71
Seasonally Flooded	11.00
Seasonally Flooded - Tidal	0.58
Total	**187.84**

Table 5. Changes in palustrine forested wetlands in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

Forested Wetland Type	Converted to Upland (acres)	Changed to Other Wetland Types* (acres)	Changed to Nonvegetated Wetlands (acres)	Total Loss (acres)
Temporarily Flooded	154.00	1,668.20	1.77	1,823.97
Seasonally Saturated	10.71	272.37	---	283.08
Seasonally Flooded	8.24	228.39	---	236.63
Seasonally Flooded/Saturated	---	9.92	0.42	10.34
Seasonally Flooded - Tidal	0.58	---	---	0.58
Total	**173.53**	**2,178.88**	**2.19**	**2,354.60**

*Includes both changes in class (e.g., forested to emergent) and changes in water regime within a given class.

Table 6. Gains in palustrine vegetated wetlands in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

Wetland Type	Gain from Nonvegetated Wetlands (acres)	Gain from Other Vegetated Wetlands* (acres)	Gain from Upland (acres)
Palustrine Emergent	2.73	872.26	1.12
Palustrine Scrub-Shrub	---	1,163.98	0.58
Palustrine Forested	---	702.00	---
Palustrine Farmed	---	1.58	---
Total	**2.73**	**2,739.82**	**1.70**

*Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

Table 7. Gains and losses in palustrine nonvegetated wetlands in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

	GAINS		LOSSES	
Wetland Type	Created From Upland (acres)	Created in Vegetated Wetlands (acres)	Converted to Upland (acres)	Changed to Vegetated Wetlands (acres)
Palustrine Unconsolidated Bottom	44.97	2.19	3.73	2.73
Palustrine Unconsolidated Shore	0.58	---	---	---
Total	**45.55**	**2.19**	**3.73**	**2.73**

Table 8. Causes of recently constructed ponds on upland sites in selected areas of the Lower Eastern Shore of the Delmarva Peninsula (1982 to 1988-89).

Causes	Pond Acreage Created
Farm Ponds	12.81
Urban Ponds	9.11
Ponds in Undeveloped Areas	7.75
Sand & Gravel Pit Ponds	6.60
Airport Ponds	3.90
Detention Basins	2.18
Unknown Cause	1.46
Waste Treatment Ponds	1.16
Total	**44.97**