April 1994

Wetland Trends for Selected Areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88)

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

U.S. Environmental Protection Agency
Chesapeake Bay Program

Wetland Trends for Selected Areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88)

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Prepared for the
U.S. Fish and Wildlife Service
Chesapeake Bay Estuary Program
and the
U.S. Environmental Protection Agency
Chesapeake Bay Program Office
Annapolis, Maryland 21401

April 1994

This report should be cited as follows:

Tiner, R.W., D.B. Foulis, and T.W. Nuerminger. 1994. Wetland Trends for Selected Areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88). U.S. Fish and Wildlife Service, Hadley, MA. Ecological Services report R5-93/12, 13 pp.

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. Wetlands are also destroyed directly or indirectly by human activities. Most wetlands, however, 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 Northeast Glaciated Region of Pennsylvania, one of numerous study areas selected by the EPA and FWS for detailed wetland trends analysis.

STUDY AREA

The study sites are located in the Northeast Glaciated Region of Pennsylvania (Figure 1) and have a combined land surface area of approximately 712 square miles. The study area encompasses thirteen large-scale (1:24,000) U.S. Geological Survey topographic quadrangles: Center Moreland, Dalton, Factoryville, Great Bend, Harford, Lawton, Montrose East, Montrose West, Ransom, Sayre, Towanda, Tunkhannock, and Ulster.

METHODS

Wetland trends analysis involves comparing aerial photography from at least two time periods. For the present study, aerial photos from 1981-82 and from 1987-88 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 1981-82 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 1987-88 photography was 1:40,000 scale CIR aerial photography acquired by the National Aerial Photography Program (NAPP). Wetlands and deepwater habitats were initially interpreted on the 1:58,000 photography 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 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 wetlands that had been missed during the original interpretation. 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 1987-88, the study area possessed about 18,860 acres of wetlands, excluding linear fringing wetlands along narrow streams. This total amounts to roughly 4 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 18,226 acres. This represents 96 percent of the study area's total wetland acreage. Forested wetlands alone account for 38 percent of the palustrine wetlands. About 400 acres of riverine wetlands, and 200 acres of lacustrine wetlands were present, mostly nonvegetated. This represents 3 percent of the study area's wetlands.

Recent Wetland Trends

The results of the wetland trends analysis study are presented in Tables 2 through 9. The following discussion highlights the more significant or interesting findings.

Vegetated Wetlands

Between 1981-82 and 1987-88, over 57 acres of vegetated wetlands were converted to upland (Table 2). Most of these losses affected palustrine emergent wetland. Agriculture was the most significant cause of vegetated wetland loss (Table 3), with housing development also significant. Nearly 118 acres of vegetated wetland changed from one type to another, with palustrine scrub-shrub wetlands being most affected. Upland conversion impacted the seasonally flooded/saturated palustrine wetland type significantly more than other types (Table 4). Table 5 shows changes in different types of emergent wetlands. About 19 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. Beaver played an important role in wetland changes (Table 7).

Nonvegetated Wetlands

Over 109 acres of new ponds were created from upland, and 160 acres were constructed in vegetated wetlands (Table 8). About 26 acres of ponds were filled in, while over 222 acres changed to vegetated wetlands. Most of the new ponds were farm ponds (Table 9).

Summary

The study area has approximately 4 percent of its land mass covered by wetlands. Wetlands totalling 18,860 acres (in 1987-88) were identified in the study area by the Service's National Wetlands Inventory. Palustrine wetland is the dominant type, representing 96 percent of the wetlands in the study area.

Between 1981-82 and 1987-88, the study area lost about 229 acres of vegetated wetlands, with roughly 58 acres converted to upland. Seasonally flooded/saturated emergent wetland was the type most frequently converted to upland. Beaver activity affected over 207 acres of wetland. Pond construction added about 269 acres of palustrine nonvegetated wetlands, but this gain was reduced to about 21 acres by pond losses to upland and vegetated wetland.

The overall trend for the study area's wetlands was losses of vegetated wetlands and 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, represents known losses of valuable fish and wildlife habitats and areas providing other valued functions.

While this report documents recent wetland trends in the study area's wetlands, it does not address changes in the quality of the remaining wetlands. As 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

Funding for this project was provided by the U.S. Fish and Wildlife Service's Chesapeake Bay Estuary Program and the U.S. Environmental Protection Agency's Chesapeake Bay Program Office as part of a comprehensive study of wetland trends in the Chesapeake Bay watershed. Ed Pendleton and Carin Bisland were project coordinators for the respective programs.

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 authors and quality controlled by Glenn Smith. Photointerpretation of the base maps was performed by the junior authors and Irene Kenenski, 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 Danscreau for manuscript word processing.

REFERENCES

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 Northeast Glaciated Region of Pennsylvania, shaded below.

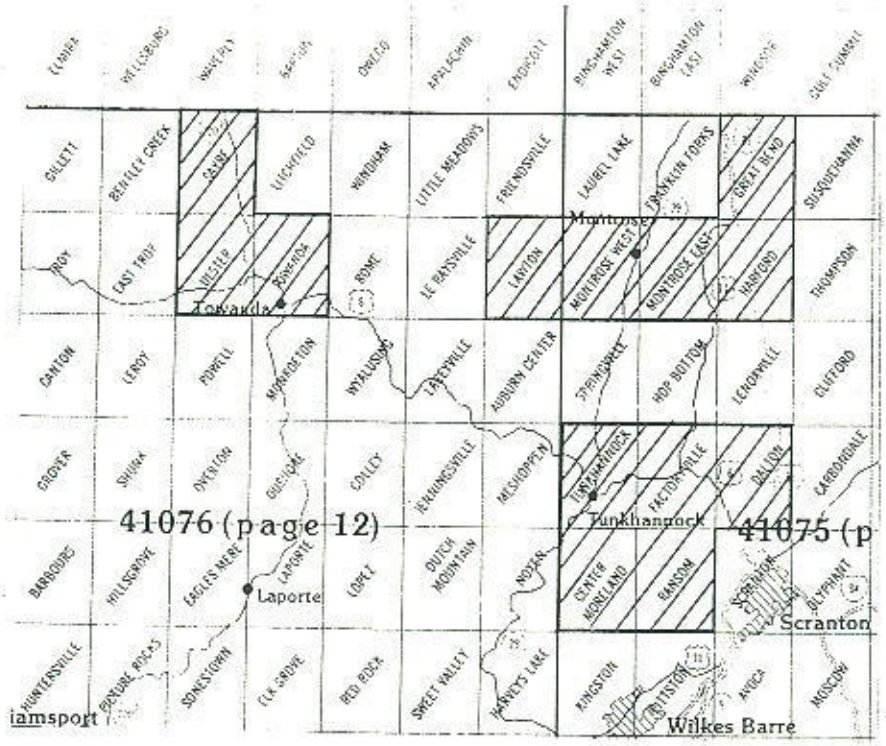

Table 1. Acreage of wetland types for selected areas of the Northeast Glaciated Region of Pennsylvania (1987-88).

Wetland Types	Acres
PALUSTRINE WETLANDS	
Emergent	
Seasonally Flooded/Saturated	2,282.95
Seasonally Flooded	575.61
Temporarily Flooded	532.26
Saturated	842.94
Semipermanently Flooded	387.79
Permanently Flooded	26.17
Total Palustrine Emergent Wetlands	**4,647.72**
Forested	
Deciduous, Broad-leaved	
Seasonally Flooded/Saturated	1,644.11
Seasonally Flooded	1,078.05
Temporarily Flooded	1,068.89
Saturated	153.67
Semipermanently Flooded	0.79
Evergreen, Needle-leaved	
Seasonally Flooded/Saturated	2,143.97
Seasonally Flooded	88.28
Temporarily Flooded	154.46
Saturated	509.52
Dead	99.76
Total Palustrine Forested Wetlands	**6,941.50**
Scrub-Shrub	
Deciduous, Broad-leaved	
Seasonally Flooded/Saturated	2,279.64
Seasonally Flooded	538.61
Temporarily Flooded	494.38
Saturated	446.54
Semipermanently Flooded	170.25
Evergreen, Broad-leaved	
Seasonally Flooded/Saturated	2.86
Evergreen, Needle-leaved	
Seasonally Flooded/Saturated	20.38

Table 1 *(Continued)*

Total Palustrine Scrub-Shrub Wetlands	**3,952.66**
Aquatic Bed	61.31
Total Palustrine Vegetated Wetlands	**15,603.19**
Unconsolidated Bottom (Ponds)	2,619.55
Unconsolidated Shore	3.70
Total Palustrine Nonvegetated Wetlands	**2,623.25**
GRAND TOTAL PALUSTRINE WETLANDS	**18,226.44**
RIVERINE WETLANDS	
Emergent	51.60
Total Riverine Vegetated Wetlands	**51.60**
Unconsolidated Shore	347.29
Total Riverine Nonvegetated Wetlands	**347.29**
GRAND TOTAL RIVERINE WETLANDS	**398.89**
LACUSTRINE WETLANDS	
Emergent	25.51
Aquatic Bed	176.97
Total Lacustrine Vegetated Wetlands	**202.48**
Unconsolidated Bottom	28.76
Unconsolidated Shore	0.46
Total Lacustrine Nonvegetated Wetlands	**29.22**
GRAND TOTAL LACUSTRINE WETLANDS	**231.70**
TOTAL WETLANDS	**18,857.03**

Table 2. Changes of vegetated wetlands in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

Wetland Type	Converted to Upland (acres)	Changed to Other Vegetated Wetlands* (acres)	Changed to Nonvegetated Wetlands (acres)	Changed to Deepwater Habitat (acres)
Palustrine Emergent	38.47	35.27	116.68	6.81
Palustrine Forested	6.59	33.31	8.97	2.20
Palustrine Scrub-Shrub	12.75	49.12	34.21	1.99
Total	**57.81**	**117.70**	**159.86**	**11.00**

*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 vegetated wetland loss to upland in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

Cause of Loss	Acres
Agriculture	30.01
Housing	12.73
Industrial Development	4.65
Aquaculture	3.24
Recreation Facilities	2.89
Commercial Development	2.27
Unknown	1.39
Dam Construction for Ponds	0.63
Total	**57.81**

Table 4. Conversion of hydrologically similar palustrine vegetated wetlands to upland in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

Palustrine Wetland Type	Acres
Temporarily Flooded	5.48
Saturated	4.68
Seasonally Flooded	4.50
Seasonally Flooded/Saturated	37.51
Semipermanently Flooded	5.64
Total	**57.81**

Table 5. Changes in palustrine emergent wetlands in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

Emergent Wetland Type	Converted to Upland (acres)	Changed to Other Wetland Types* (acres)	Total Loss (acres)
Temporarily Flooded	2.52	7.38	9.90
Saturated	3.08	7.79	10.87
Seasonally Flooded	2.26	43.63	45.89
Seasonally Flooded/Saturated	28.60	139.04	167.64
Semipermanently Flooded	2.01	72.98	74.99
Total	**38.47**	**270.82**	**309.29**

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

Table 6. Gains in vegetated wetlands in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

Wetland Type	Gain from Palustrine Nonvegetated Wetlands (acres)	Gain from Other Vegetated Wetlands* (acres)	Gain from Upland (acres)	Gain from Riverine Nonvegetated Wetlands (acres)	Gain from Lacustrine Nonvegetated Wetlands (acres)	Gain from Deepwater Habitat (acres)
Palustrine Emergent	185.47	55.43[@]	11.89	---	2.35	26.13
Palustrine Scrub-Shrub	4.97	41.28[††]	0.49	15.79	---	24.16
Palustrine Forested	2.04	10.33[†]	6.56**	1.31	---	1.31
Palustrine Aquatic Bed	29.56	10.66	---	---	---	---
Total	**222.04**	**117.70**	**18.94**	**17.10**	**2.35**	**51.60**

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

**Represents deadwood swamps created by beaver or man-made impoundments.

[†]All due to natural succession.

[††]All but 1.91 acres due to natural succession.

[@]38.75 acres due to beaver activity.

Table 7. Changes in palustrine wetlands in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88) due to beaver.

Palustrine Wetland Type	Change in Water Regime Only (acres)	Change in Vegetated Class (acres)	Gain from Upland (acres)	Change to Nonvegetated Wetland (acres)
Palustrine Emergent	43.49	---	9.25	35.87
Palustrine Scrub-Shrub	10.58	38.91	0.49	23.12
Palustrine Forested	42.06*	9.90	3.65	2.32
Palustrine Unconsolidated Bottom	0.97	---	9.77	---
Total	**97.10**	**48.81**	**23.16**	**61.31**

*This figure represents beaver-flooded deadwood swamps.

Table 8. Gains and losses in palustrine nonvegetated wetlands in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

	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	103.96	159.86	25.25	193.86
Palustrine Unconsolidated Shore	5.07	---	0.58	28.18
Total	109.03	159.86	25.83	222.04

Table 9. Causes of recently constructed ponds on upland sites in selected areas of the Northeast Glaciated Region of Pennsylvania (1981-82 to 1987-88).

Causes	Pond Acreage Created
Farm Ponds	58.85
Sand & Gravel Pit Ponds	15.36
Beaver Ponds	9.77
Ponds in Undeveloped Areas	9.59
Mining Ponds	1.92
Sewer	1.68
Urban Ponds	1.18
Reservoir Ponds	1.01
Aquaculture Ponds	0.87
Impoundments	0.82
Ponds at Recreation Facilities	0.78
Ponds of Unknown Purpose	0.77
Ponds Created by Rising Water Levels	0.46
Excavations	0.43
Man-Induced Successional Change	0.36
Stormwater Detention Basins	0.11
Total	**103.96**