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Wetland Status and Trends in Charles County, Maryland (1981 to 1988-89)

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

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Prepared for the
Maryland Department of Natural Resources
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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. 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 Maryland Department of Natural Resources, Water Resources Administration provided funding to initiate county-based wetland trends studies in Maryland. These studies identify the extent and nature of wetland alterations for designated local areas.

The purpose of this report is to present the findings of the wetland trends analysis study for Charles County, Maryland.

STUDY AREA

The study area is Charles County, Maryland situated on the Atlantic Coastal Plain and bordering Chesapeake Bay, the Patuxent River, the Potomac River, and Mattawoman Creek (Figure 1). The County has a land surface area of approximately 452 square miles (Hoffman 1992). The study area encompasses 22 large-scale (1:24,000) U.S. Geological Survey topographic quadrangles: Benedict, Brandywine, Charlotte Hall, Colonial Beach North, Colonial Beach South, Dahlgren, Fort Belvoir, Hughesville, Indian Head, King George, La Plata, Mathias Point, Mount Vernon, Nanjemoy, Passapatanzy, Piscataway, Popes Creek, Port Tobacco, Quantico, Rock Point, Stratford Hall, and Widewater.

METHODS

Wetland trends analysis involves comparing aerial photography from at least two time periods. For the present study, aerial photos from 1981 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 Charles County.

The 1981 photography was 1:58,000 scale color infrared aerial photography acquired by the National High Altitude Photography Program (NHAP). The 1988-89 photography was 1:40,000 scale color infrared aerial photography acquired by the National Aerial Photography Program (NAPP). Wetlands and deepwater habitats were interpreted on the NHAP photography and classified according to the Service's official wetland classification system

(Cowardin, et. al. 1979) following standard National Wetlands Inventory (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 a Bausch and Lomb SIS-95 zoom stereoscope. Changes were delineated on mylar overlays attached to the NAPP photographs. Cause of change was recorded for each polygon. The minimum mapping unit for wetlands was generally 0.5 acre, except for ponds, which were mapped when 0.1 acre or larger in size. Changes as small as 0.1 acre were detected. Wetland boundaries were improved and previously undetected wetlands were added to the original maps because the larger scale and more apparent signs of wetland hydrology of the NAPP photos improved our ability to detect and classify wetlands. Delineated changes and map refinements were then transferred to an NWI map using an Ottico Meccanica Italiana stereo facet plotter. Quality control of all photointerpretation was performed by a second photointerpreter. Tables were then prepared to present the study's findings.

RESULTS

Current Status

In 1988-89, Charles County contained about 27,010 acres of wetlands (roughly 9.3% of the County's land surface), excluding linear fringing wetlands along narrow streams. Table 1 summarizes the acreage of the different wetland types found in the County. Palustrine wetlands predominated, with 22,019 acres, representing 81.5% of the County's total wetland acreage. Nontidal deciduous forested wetlands accounted for 85.6% (18,859 acres) of all palustrine wetlands, and about 69.8% of the County's wetland total. Included within this total are significant portions of Zekiah Swamp, one of Maryland's largest freshwater wetlands. Tidal palustrine wetlands totaled 1,475 acres, representing 6.7% of the County's freshwater wetlands.

Estuarine wetlands comprised about 18.4% (4,969 acres) of the County's wetlands. Emergent wetlands (e.g., salt and brackish marshes) were the predominant type, accounting for almost 97% (4,804 acres) of the County's estuarine wetlands. These wetlands are located along tidal rivers and creeks emptying into Chesapeake Bay, and the Potomac, Patuxent, and Wicomico Rivers, among others. Slightly brackish marshes (oligohaline) are most common along Nanjemoy Creek, Port Tobacco Creek, Mattawoman Creek, and the Wicomico River (including Allens Fresh Marsh and Newport Marsh).

Recent Wetland Trends

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

Vegetated Wetlands

Between 1981 and 1988-89, approximately 122 acres of vegetated wetlands were converted to upland (Table 2). Most of these losses affected palustrine forested wetlands. Housing construction was the most significant cause of vegetated wetland loss, with losses due to unkown factors also significant (Table 3). About 140 acres of vegetated wetland changed from one type to another. Upland conversion impacted the temporarily flooded palustrine wetland type more than others (Table 4). Approximately 292 acres of palustrine forested wetlands were converted to upland or changed to other wetland types (Table 5). Vegetated wetland gain from upland approached 48 acres (Table 6). Most gains in particular types of vegetated wetlands came from other vegetated wetland types (Table 6). Beaver activity affected 93 acres of vegetated wetlands, and created 39 acres of new wetlands by impounding upland areas (Table 7).

Nonvegetated Wetlands

About 105 acres of new ponds were created from upland, and close to 40 acres were constructed in vegetated wetlands (Table 8). More than 22 acres of ponds were converted to upland, while roughly 28 acres changed to vegetated wetlands. Approximately 27% of the new ponds built in uplands were constructed in urban areas, but the majority were attributed to other causes (Table 9).

CONCLUSION

The County had approximately 9.3% of its land mass covered by wetlands. Wetlands totaling 27,010 acres (in 1988-89) were identified in the County by the Service's National Wetlands Inventory. Palustrine wetland was the dominant type, representing 81.5% of the wetlands in the County.

Between 1981-82 and 1988-89, the County lost about 163 acres of vegetated wetlands, with roughly 122 acres converted to upland. Temporarily flooded wetland was the type most frequently converted to upland. Pond construction added about 135 acres of palustrine nonvegetated wetlands, but this gain was reduced to about 88 acres by pond losses to upland and vegetated wetlands.

The overall trend for the County'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, represent known losses of valuable fish and wildlife habitats and areas providing other valued functions, including flood water storage, water quality enhancement, and local water supply.

While this report documents recent trends in the County'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

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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.

Hoffman, M.S. (editor). 1992. The World Almanac and Book of Facts. Newspaper Enterprise Association, Inc., New York, NY. 960 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 - Charles County, Maryland.

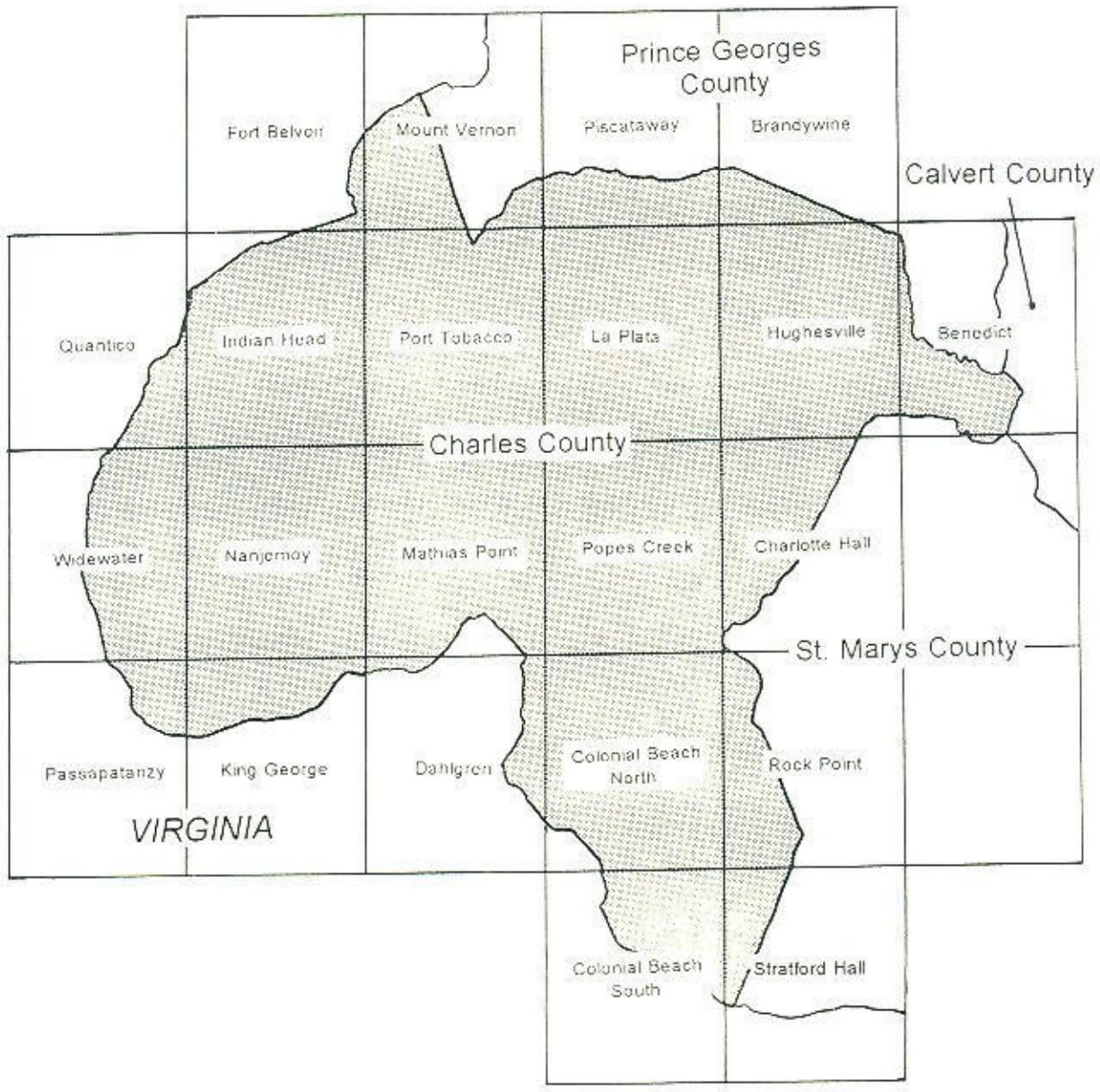

Table 1. Acreage of wetland types in Charles County, Maryland (1988-89).

Wetland Type	Acres	% of Total
PALUSTRINE WETLANDS		
Tidal Emergent		
Seasonally Flooded-Tidal	214.4	
Nontidal Emergent		
Semipermanently Flooded	102.7	
Seasonally Flooded/Saturated	154.3	
Seasonally Flooded	126.5	
Temporarily Flooded	109.1	
(Subtotal Nontidal)	*(492.6)*	1.8
Total Palustrine Emergent Wetlands	**707.0**	2.6
Tidal Forested		
Deciduous, Broad-leaved		
Semipermanently Flooded-Tidal	4.6	
Seasonally Flooded-Tidal	903.5	
Temporarily Flooded-Tidal	173.9	
Evergreen, Needle-leaved		
Seasonally Flooded-Tidal	4.4	
Temporarily Flooded-Tidal	1.7	
(Subtotal Tidal)	*(1,088.1)*	4.0
Nontidal Forested		
Evergreen, Needle-leaved		
Temporarily Flooded	59.3	
Seasonally Flooded	19.3	
Deciduous, Broad-leaved		
Seasonally Flooded/Saturated	1,741.9	
Seasonally Flooded	4,014.8	
Temporarily Flooded	12,774.5	
Semipermanently Flooded	324.8	
Dead	2.7	
(Subtotal Nontidal)	*(18,937.3)*	70.1
Total Palustrine Forested Wetlands	**20,025.4**	74.1

Table 1, continued

Wetland Type	Acres	% of Total
Tidal Scrub-Shrub	172.5	
Nontidal Scrub-Shrub		
Deciduous, Broad-leaved		
Seasonally Flooded/Saturated	168.0	
Seasonally Flooded	113.3	
Temporarily Flooded	143.0	
Semipermanently Flooded	30.5	
Permanently Flooded	1.0	
(Subtotal Nontidal)	*(455.8)*	1.7
Total Palustrine Scrub-Shrub Wetlands	**628.3**	2.3
Aquatic Bed	6.4	
Total Palustrine Vegetated Wetlands	**21,367.1**	79.1
Unconsolidated Bottom (Ponds)	626.9	
Unconsolidated Shore	25.1	
Total Palustrine Nonvegetated Wetlands	**652.0**	2.4
GRAND TOTAL PALUSTRINE WETLANDS	**22,019.1**	81.5
ESTUARINE WETLANDS		
Emergent		
Regularly Flooded	6.7	
Irregularly Flooded	1,178.5	
Regularly Flooded, Oligohaline	119.7	
Irregularly Flooded, Oligohaline	3,499.1	
Total Estuarine Emergent Wetlands	**4,804.0**	17.8

Table 1, continued

Wetland Type	Acres	% of Total
Scrub-Shrub		
Irregularly Flooded	23.1	
Irregularly Flooded, Oligohaline	82.7	
Total Estuarine Scrub-Shrub Wetlands	**105.8**	0.4
Forested, Irregularly Flooded	0.6	
Total Estuarine Forested Wetlands	**0.6**	
Total Estuarine Vegetated Wetlands	**4,910.4**	18.2
Total Estuarine Unconsolidated Shore	**58.2**	0.2
GRAND TOTAL ESTUARINE WETLANDS	**4,968.6**	18.4
RIVERINE WETLANDS		
Tidal Emergent	13.5	
Tidal Unconsolidated Shore	8.7	
GRAND TOTAL RIVERINE WETLANDS	**22.2**	0.1
TOTAL WETLANDS	**27,009.9**	**100.0**

Table 2. Changes of vegetated wetlands in Charles County, Maryland (1981 to 1988-89).

Wetland Type	Converted to Upland (acres)	Changed to Other Vegetated Wetlands* (acres)	Changed to Nonvegetated Wetlands (acres)	Converted to Deepwater Habitat (acres)
Palustrine Emergent	8.7	35.8	4.1	0.0
Palustrine Scrub-Shrub	5.8	16.4	0.3	0.0
Palustrine Forested	106.1	86.9	25.4	0.0
Estuarine Emergent	1.8	1.4	10.0	0.0
Estuarine Scrub-Shrub	0.0	0.0	0.0	0.3
Total	**122.4**	**140.5**	**39.8**	**0.3**

*Represents changes in wetland 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 Charles County, Maryland (1981 to 1988-89).

Cause of Loss	Acres
Housing Construction	44.9
Unknown Cause	30.9
Commercial Development	17.4
Road Construction	12.3
Agriculture	4.2
Industrial Development	1.9
Ditching	1.1
Total	**122.6**

Table 4. Conversion of hydrologically similar palustrine vegetated wetlands to upland in Charles County, Maryland (1981 to 1988-89).

Palustrine Wetland Type	Acres	% Total Loss
Temporarily Flooded	77.8	64.5
Seasonally Flooded	34.9	28.9
Seasonally Flooded/Saturated	1.1	0.9
Seasonally Flooded-Tidal	0.4	0.3
Semipermanently Flooded	1.7	1.4
Permanently Flooded	4.9	4.0
Total	**120.8**	**100.0%**

Table 5. Changes in palustrine forested wetlands in Charles County, Maryland (1981 to 1988-89).

Forested Wetland Type	Converted to Upland (acres)	Changed to Other Wetland Types* (acres)	Total Loss (acres)
Seasonally Flooded/Saturated	0.0	15.8	15.8
Seasonally Flooded	33.2	50.6	83.8
Temporarily Flooded	67.6	30.0	97.6
Semipermanently Flooded**	4.9	60.2	65.0
Seasonally Flooded-Tidal	0.4	23.4	23.8
Temporarily Flooded-Tidal	0.0	5.7	5.7
Total	**106.1**	**185.7**	**291.7**

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

**Represents dead forested wetlands.

Table 6. Gains in vegetated wetlands in Charles County, Maryland (1981 to 1988-89).

Wetland Type	Gain from Nonvegetated Wetlands (acres)	Gain from Upland (acres)	Gain from Other Vegetated Wetlands (acres)*
Palustrine Emergent	23.7	17.0	58.9
Palustrine Scrub-Shrub	2.1	3.2	65.4
Palustrine Forested	0.0	27.4**	0.0
Palustrine Aquatic Bed	2.0	0.0	12.2
Estuarine Scrub-Shrub	0.0	0.0	4.0
Total	**27.8**	**47.6**	**140.5**

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

**Largely the result of beaver activity (all but 7.1 acres of this total, which were created as a result of man-made impoundments).

Table 7. Changes of wetlands in Charles County, Maryland due to beaver activity (1981 to 1988-89).

Wetland Type	Change in Water Regime Only (acres)	Change in Vegetated Class (acres)	Gain from Upland (acres)
Palustrine Emergent	12.1	2.4	3.3
Palustrine Scrub-Shrub	0.4	6.5	2.9
Palustrine Forested	63.3	8.7	20.3
Palustrine Unconsolidated Bottom	0.0	0.0	12.5
Total	**75.8**	**17.6**	**39.0**

Table 8. Gains and losses in nonvegetated wetlands in Charles County, Maryland (1981 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)	Changed to Other Nonvegetated Wetlands (acres)
Palustrine Unconsolidated Bottom	104.8	39.7	18.2	17.5	0.3
Palustrine Unconsolidated Shore	0.0	0.0	0.0	10.3	0.0
Estuarine Unconsolidated Shore	0.0	0.0	4.1	0.0	0.0
Total	**104.8**	**39.7**	**22.3**	**27.8**	**0.3**

Table 9. Causes of recently constructed upland ponds in Charles County, Maryland (1981 to 1988-89).

Causes	Pond Acreage
Urban Ponds	28.2
Farm Ponds	25.4
Sand and Gravel Pit Ponds	19.2
Beaver Ponds	12.5
Other Ponds	9.6
Ponds in Undeveloped Areas	5.8
Stormwater Detention Basins	4.1
Total	**104.8**