WETLAND TRENDS IN THE

CROTON WATERSHED, NEW YORK:

1960s to 1990s

A Report by the U.S. Fish and Wildlife Service's
National Wetlands Inventory Program

Prepared for
New York City Department of Environmental Protection
Bureau of Water Supply, Quality and Protection
Division of Drinking Water Quality Control
Natural Resources Section
465 Columbus Avenue
Valhalla, New York 10595

May 1999

WETLAND TRENDS IN THE CROTON WATERSHED, NEW YORK: 1960s to 1990s

by

Ralph Tiner, John Swords, and Susanne Schaller
U.S. Fish and Wildlife Service
National Wetlands Inventory Program

Prepared for
New York City Department of Environmental Protection
Bureau of Water Supply, Quality and Protection
Division of Drinking Water Quality Control
Natural Resources Section
465 Columbus Avenue
Valhalla, New York 10595

May 1999

Table of Contents

List of Figures

List of Tables

Introduction

The U.S. Fish and Wildlife Service (Service) is the principal federal agency performing nationwide wetland inventories and assessments of wetland changes. Through its National Wetlands Inventory Program (NWI), the Service has produced wetland maps for over 90 percent of the conterminous United States, all of Hawaii, and about 30 percent of Alaska. In addition, the NWI has published national reports on the changing status of wetlands (Frayer et al. 1983; Tiner 1984; Dahl and Johnson 1991) and is currently working on a Year 2000 report documenting wetland trends from the mid-1980s to mid- to late-1990s. The Northeast Region of the Service has been active in producing wetland trends reports for specific geographic areas. To date, the Regional NWI Program has published more than 30 such reports for areas of variable size, ranging from a single quad (1:24,000 map) to a 5-state region (Pennsylvania, Delaware, Maryland, Virginia, and West Virginia).

The Service with cooperative funding from the New York City Department of Environmental Protection (NYCDEP) completed an inventory of wetlands and deepwater habitats based on NWI mapping techniques in the mid-90s. NWI maps and digital data are available for this area. The maps were derived from 1984 color infrared photography (1:58,000). These maps were compiled into an atlas: "Atlas of National Wetlands Inventory Maps for the Watersheds of the New York City Water Supply System" (Tiner 1997).[1] A public information booklet summarizing the results of the NWI for the New York City water supply system has also been published and is available from NYCDEP.

In 1998, the NYCDEP contacted the Service about conducting a wetland trends study for the Croton Watershed. This watershed is one of three in southern New York that provide water to the City's public water supply system. The NYCDEP provided funding to the Service to perform a wetlands trends analysis study for the Croton Watershed. The purpose of the study was to determine the extent and nature of wetland changes in the watershed since the 1960s. This report presents the study findings.

[1]Copies of this atlas and NWI maps are available for viewing at county planning departments, Soil & Water Conservation District offices, Cornell Cooperative Extension offices, NYCDEP offices, and New York State Department of Environmental Conservation offices in New Paltz and Stamford (see the Appendix for list of addresses). NWI maps are available for purchase from the Institute of Resource Information Systems (IRIS) at Cornell University in Ithaca (607-255-4864).

Study Area

The Croton Watershed lies about 25 miles north of New York City. It is a 387-square mile watershed, east of the Hudson River (Figure 1). The watershed lies mostly in Westchester and Putnam Counties, with small portions in Dutchess County and in neighboring Connecticut. Towns in the watershed include Armonk, Bedford, Brewster, Carmel, Croton Falls, Katonah, Mahopac, Mount Kisco, Patterson, Pawling, Somers, Vallhalla, and Yorktown.

Aquatic Resources of the Croton Watershed

The results of the Service's NWI mapping project for this watershed were reported in Tiner (1996; 1997) and are summarized as follows. The general distribution of wetlands and deepwater habitats in this watershed is shown in Figure 2. The Great Swamp is the largest wetland complex in the watershed. It is located in the northern part of the watershed. Numerous reservoirs occur in this watershed, including Amawalk, Bog Brook, Boyd Corners, Cross River, Croton Falls, Diverting, East Branch, Kensico, Middle Branch, Muscoot, New Croton, Titicus, and West Branch.

Aquatic resources (wetlands and deepwater habitats) are relatively common features in the watershed. They occupy about 12 percent of the Croton Watershed (Figure 3): 15,809 acres of wetlands and 14,538 acres of deepwater habitats. Wetlands represent 6.4 percent of the watershed's land surface area, whereas deepwater habitats account for 5.9 percent of its acreage. Forested wetlands are the most abundant type totaling 11,194 acres (Figure 4).

Figure 1. Location of the Croton Watershed in southeastern New York.

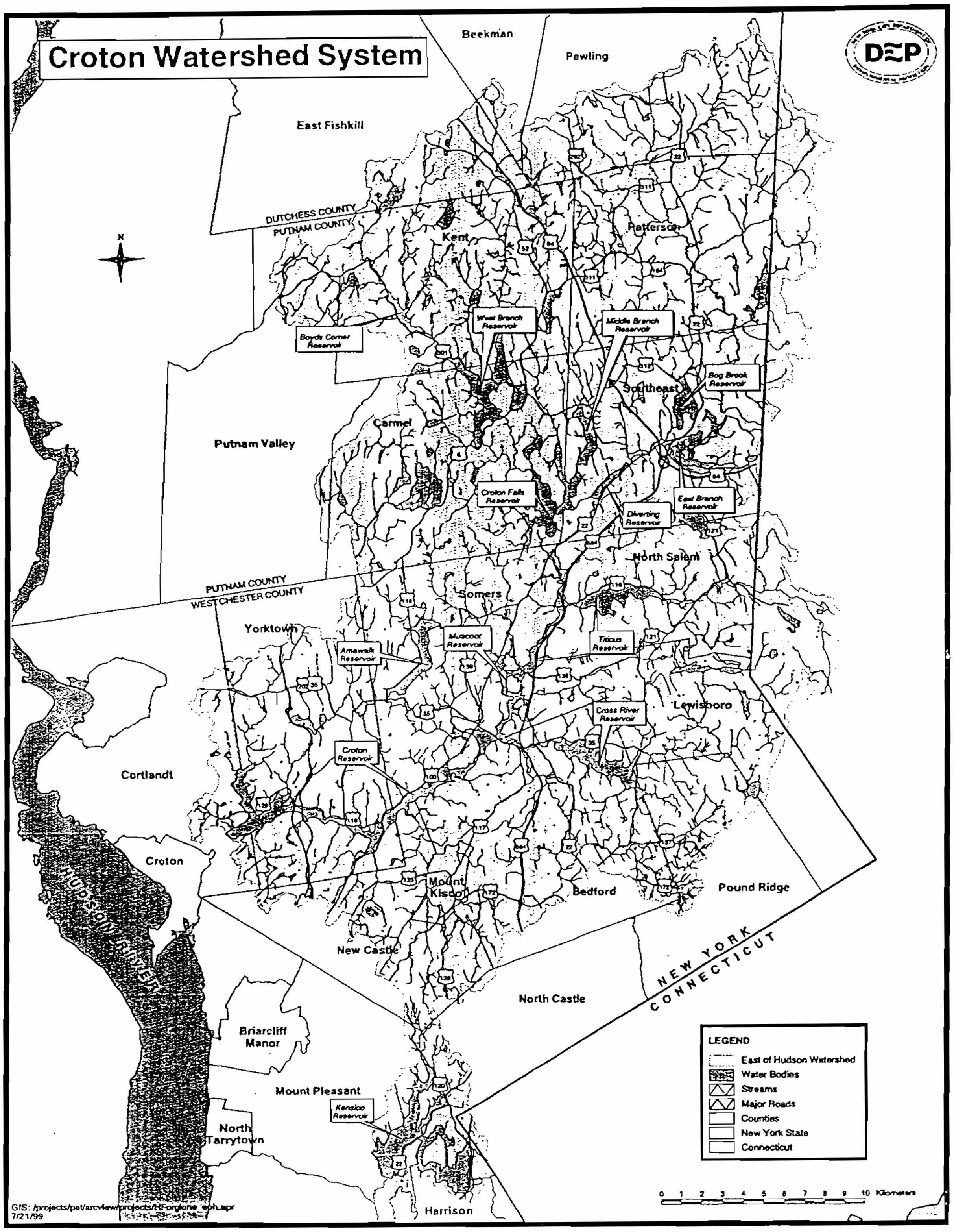
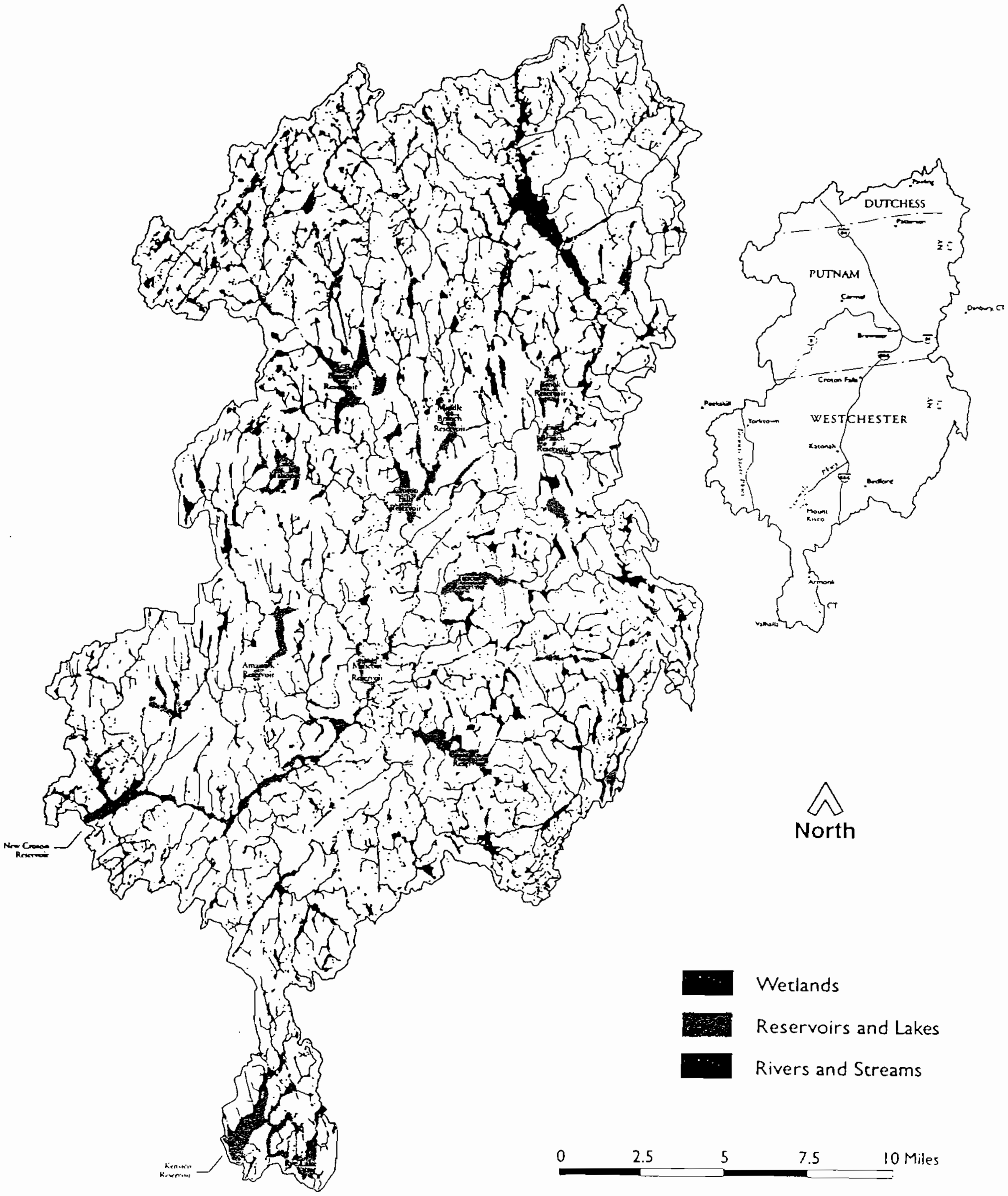


Figure 2. General distribution of wetlands and deepwater habitats in the Croton Watershed. (Source: Tiner 1997)



Land and Water Resources of the Croton Watershed in 1994

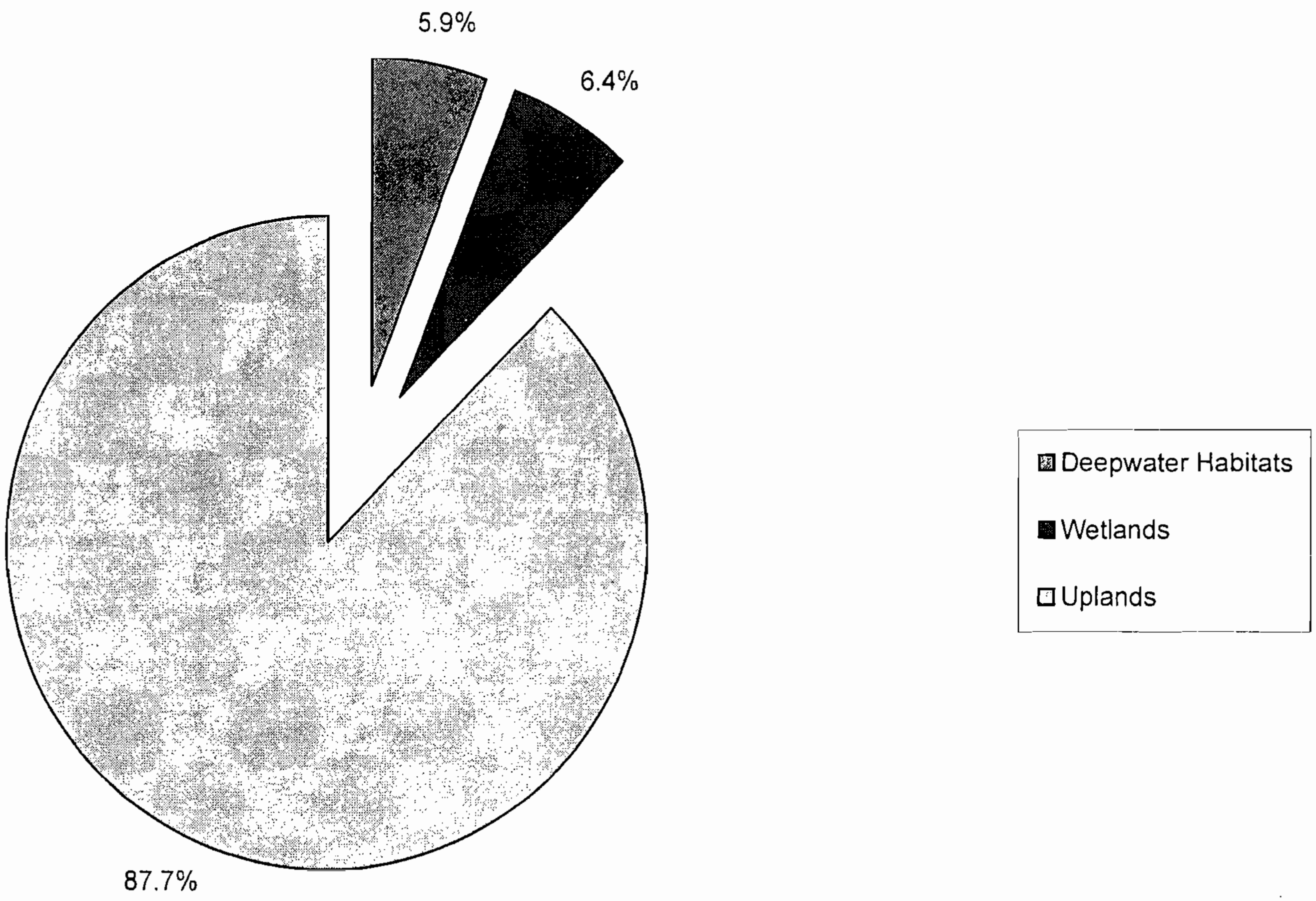
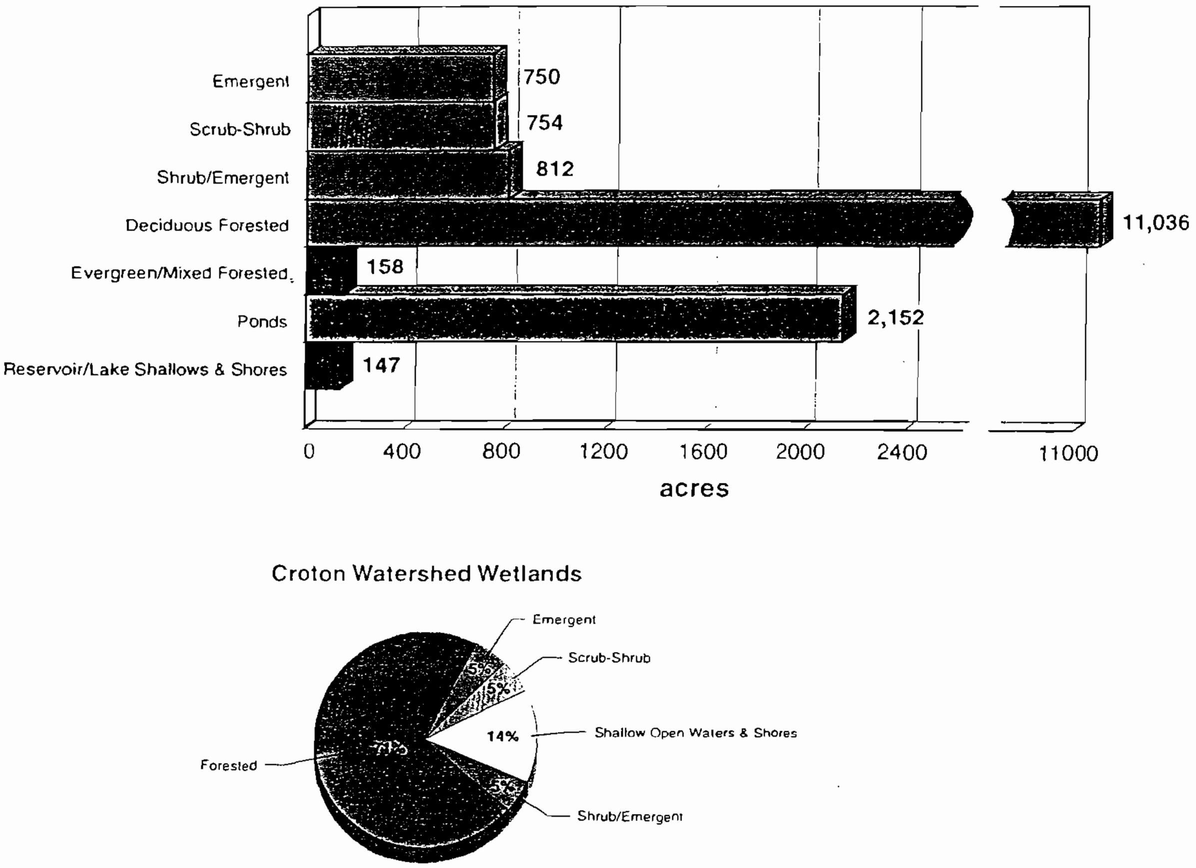


Figure 3

Figure 4. Extent of wetlands by type for the Croton Watershed in 1994. (Source: Tiner 1997)



Methods

Wetland trends studies require an examination of aerial photographs or other remotely sensed data from two or more time periods. For this study, three sets of aerial photos were examined to document wetland trends from the late 1960s to the mid-1990s: 1) 1968 black and white photographs (1:24,000; March 25, 1968), 2) 1984 color infrared photographs (1:58,000; March 16, 1984), and 3) 1994 color infrared photographs (1:40,000; April 4, 1994). Black and white photography is more limited than color infrared for detecting wetlands, especially forested wetlands and drier-end types (e.g., wet meadows), but it was the basic type of aerial photography acquired prior to the 1980s. The trends detected using this imagery, therefore, are likely to be conservative due to this limitation. In contrast, the 1:40,000 scale color infrared photography usually provides excellent spectral and spatial resolution for wetland detection, thereby making possible more accurate assessments of wetland changes. See Tiner (1999) for more in-depth discussion of inherent limitations of aerial photointerpretation for mapping wetlands.

Wetlands and deepwater habitats were classified according to the Service's wetland classification system (Cowardin et al. 1979)[2]. The target mapping unit for wetlands was 1-3 acres in size (Tiner 1996, 1997). The watershed boundary was derived from digital data provided by NYCDEP.

Wetland gains and wetland losses were identified through conventional photointerpretation techniques by comparing photos from one time period to those from another for the same geographic area. A Bausch and Lomb SIS-95 was used to perform the photo-analysis. Causes of wetland loss and gain were identified as either gains from uplands (e.g., new wetlands associated with ponds constructed in uplands), losses to upland (conversions of wetlands to various uses, such as residential house lots), or as changes in wetland type due to human activities (e.g., a forested wetland area excavated to create a pond) or to natural succession (e.g., emergent wetland to scrub-shrub wetland to forested wetland). Each wetland gain or loss was assigned a land use or land cover classification following the Anderson et al. classification system (Anderson et al. 1976). Causes of wetland trends were documented and grouped into (but not limited to) the following general categories: residential development, commercial development, industrial development, agriculture, and recreational development. Upland vegetation cover types included rangeland (open fields, shrub thickets, and mixes), forest, and barren lands (e.g., sand and gravel pits and transitional land that is being converted to some unknown use).

With the aerial photography used, wetland changes 0.25-acre and larger were typically

---

[2]This classification system was adopted by the Federal government (i.e., the Federal Geographic Data Committee) as the national standard for collecting digital data. As such, it should be used to report on the status and trends of wetlands in the United States in all official government documents.

detected. In some cases, smaller changes may have been recorded. Wetland trends data derived from this photo-analysis were compiled onto 1:24,000 overlays matching the original NWI maps using a Bausch and Lomb zoom transfer scope. These overlays show trends from 1968 to 1984 and from 1984 to 1994. They were subsequently digitized for geographic information system (ARC/INFO) application. Statistics on wetland gains, losses, and changes in type were generated and are presented in this report.

Results

Wetland Trends 1968-1984

During this 16-year period, nearly 1 percent of the watershed's vegetated wetlands were destroyed. A net loss of 146.29 acres of vegetated wetlands took place with most of these wetlands converted to ponds, commercial development, highways/roads, and residential housing (Table 1; Figure 5).

Conversion to ponds was the leading cause of vegetated wetland loss. This activity was responsible for nearly half (45%) of the losses of these wetlands. Twenty-five percent of this loss occurred in residential areas, while the cause of 33 percent of this loss was unknown (e.g., pond constructed in forest wetland with no associated development surrounding it). Table 2 summarizes the causes of pond conversion of wetlands.

Several other factors were responsible for the remaining wetland losses (Table 1). Commercial development and highway/road construction were the second- and third-ranked causes of vegetated wetland loss, with each contributing to about 17 percent of the losses. Residential housing accounted for 8.5 percent of the losses. Golf course conversion of vegetated wetlands affected 8.03 acres, mostly seasonally flooded palustrine emergent wetlands. Almost half (46%) of the losses of vegetated wetlands impacted forested wetlands (Table 1). The rest of the losses were more or less evenly divided among emergent, scrub-shrub, and mixed emergent/shrub wetlands.

Vegetated wetland gains were nearly zero for this time period. Only 2.34 acres of vegetated wetlands became established in former ponds (Table 1). Consequently, during the study period, there was an annual net loss of 9.1 acres of vegetated wetlands.

Ponds (essentially nonvegetated wetlands) experienced a net increase of 126.45 acres for a 6.4 percent gain from 1968. The new ponds were created nearly equally in both uplands and wetlands with roughly 9 more acres coming from the former (75.30 vs. 66.40; Table 3; Figure 6). Most of the gains in ponds from uplands came from forests (47%), fields and thickets (20%), and agricultural lands (21%). Considering wetland impacts, most of the new ponds were built in forested wetlands (44%), whereas nearly equal amounts were constructed in emergent (23%) and mixed emergent/shrub wetlands (21%). Overall, there was a slightly greater net gain from wetlands versus uplands (64.06 vs. 62.39 acres, respectively). A total of 12.91 acres of ponds were converted to uplands, with about 38 percent of this acreage being filled for residential housing. Only 2.34 acres of ponds became colonized with emergent herbaceous plants and/or woody vegetation. Over the 16-year period, there was an annual net gain of 7.9 acres of ponds.

Table 1. Overview of vegetated wetland trends in the Croton watershed: 1968-1984. Changes were detected only in palustrine wetlands. Nearly all of the changes are losses (designated by a minus "-" sign); gains are marked by a plus (+) sign.

Cause of Change	Acreage Change in Affected Wetland Type				
	Emergent	Scrub-Shrub	Mixed Emer/Shrub	Forested	Total
Conversion to Pond	-15.08	-9.45	-14.11	-27.76	-66.40
Commercial Dev.	-1.40	-8.40	-0-	-15.30	-25.10
Highway/Road	-0-	-2.20	-7.17	-15.42	-24.79
Residential Housing	-2.76	-3.19	-0-	-6.49	-12.44
Industrial Dev.	-0-	-6.15	-2.89	-0-	-9.04
Recreation*	-7.59	-0-	-0-	-0.64	-8.23*
Upland Field	-0-	-0-	-0.74	-0-	-0.74
Upland Forest	-0.55	-0-	-0-	-0-	-0.55
Agriculture	-0-	-0-	-0-	-0.69	-0.69
Sand/Gravel Mining	-0.65	-0-	-0-	-0-	-0.65
Wetld Type Change					
PEM	NA	-0.54	-0-	-1.44	-1.98
PSS	+0.54	-0-	-0-	-0-	+0.54
PFO	+1.44	-0-	-0-	NA	+1.44
Gain from Pond	+0.14	+0.33	+1.19	+0.68	+2.34
Net Change	-25.91	-29.60	-23.72	-67.06	-146.29

*Mostly golf course construction (98% of this change).

Changes in Wetlands for the Croton Watershed: 1968-1984

Note: There were also 1.98 acres of changes in vegetated wetland types.

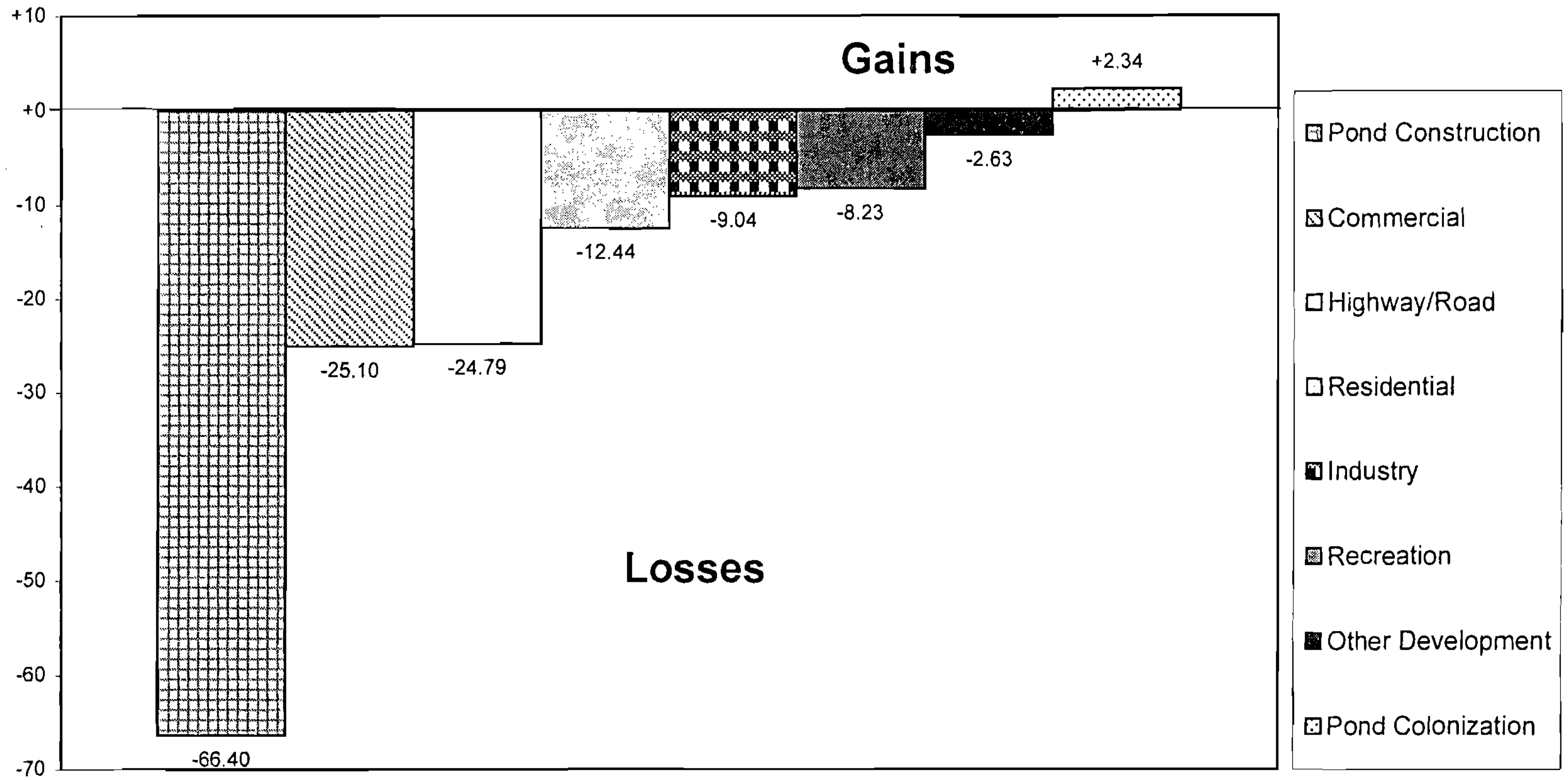


Figure 5

Table 2. Causes of vegetated wetland conversion to ponds in the Croton Watershed: 1968-1984.

Land Use	Percent of the Loss
Unknown	33%
Residential Development	25%
Agriculture	14%
Golf Course	11%
Sand and Gravel Pits	7%
Other Recreational Land	6%
Industrial Development	4%

Table 3. Changes in ponds in the Croton Watershed: 1968-1984. (* = transitional land is cleared land that is undergoing change in land cover and/or land use)

	Pond Acreage Gained from	Pond Acreage Converted to
Uplands		
Residential Land	-0-	4.95
Highway/Road	-0-	0.50
Recreation Land (Golf Course)	-0-	0.31
Industrial Land	-0-	0.47
Cropland	3.68	0.23
Pasture	8.79	-0-
Idle Cropland	3.17	-0-
Herbaceous Field	0.63	-0-
Shrub Thicket	0.96	-0-
Mixed Field/Thicket	13.51	3.97
Deciduous Forest	31.18	1.98
Mixed Forest	4.02	-0-
Sand/Gravel Pit	0.47	0.50
Transitional Land*	8.89	-0-
Subtotal	+75.30	-12.91
NET CHANGE FROM UPLAND = +62.39 acres (gain)		
Wetlands		
Emergent (Temporarily flooded)	1.64	0.14
Emergent (Seasonally flooded)	13.44	-0-
Mixed Emergent/Shrub (Seasonally flooded)	14.11	1.19
Mixed Shrub/Forested (Seasonally flooded)	4.45	-0-
Deciduous Forested (Temporarily flooded)	5.80	0.68
Deciduous Forested (Seasonally flooded)	18.99	-0-
Deciduous Scrub-Shrub (Seasonally flooded)	7.38	0.33
Deciduous Scrub-Shrub (Temporarily flooded)	0.59	-0-
Subtotal	+66.40	-2.34
NET CHANGE FROM WETLAND = +64.06 acres (gain)		
GRAND TOTAL OF CHANGES	+141.70	-15.25
NET CHANGE FROM ALL SOURCES = +126.45 acres (gain)		

Changes in Pond Acreage for the Croton Watershed: 1968-1984

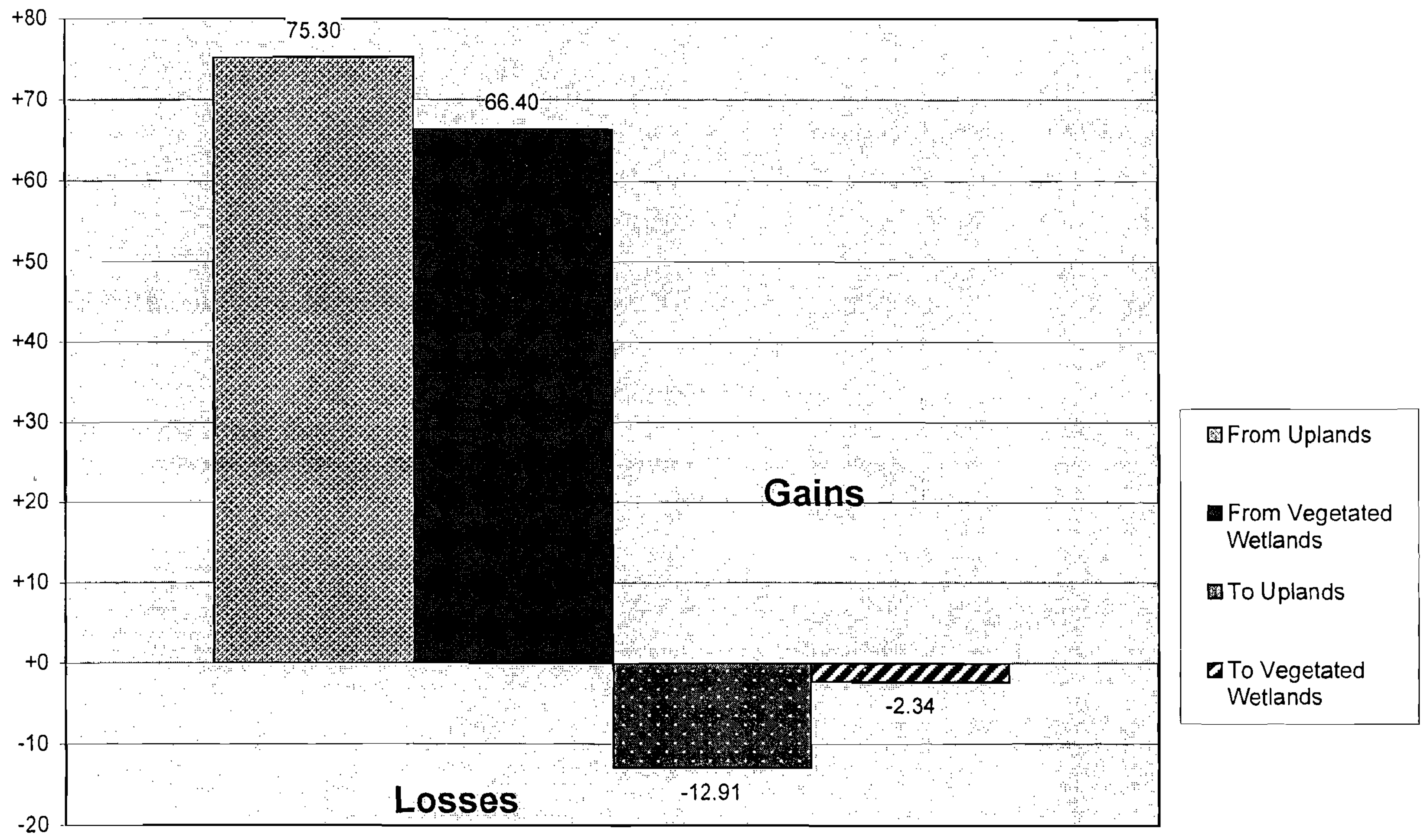


Figure 6

Wetland Trends 1984-1994

During this decade, palustrine vegetated wetlands continued to be lost, but at a lower rate. A net loss of 42.99 acres was recorded. Over two-thirds of the losses were attributed to conversion to ponds (29.59 acres; Table 4; Figure 7). Residential development was the primary cause of these losses, accounting for 73 percent of these new ponds (Table 5).

Agricultural use of the vegetated wetlands accounted for 6.15 acres of loss, representing 14.3 percent of the total net loss. Residential housing was only responsible for 2.87 acres of loss (or 6.7%). Forested wetlands experienced the greatest losses, with 22.70 acres lost (Table 4). Most of the remaining losses of palustrine vegetated wetlands affected mixed emergent/shrub wetlands (19.55 acres). Emergent wetlands had a net gain of 1.29 acres due to a 8.75-acre gain from palustrine forested wetland. This gain overshadowed the conversion of 7.46 acres to ponds and uplands when net change was calculated. There were no gains in wetlands from pond succession or other factors. The annual change rate for vegetated wetlands was a net loss of 4.3 acres.

Pond acreage continued to increase as it did during the previous period with an overall net rise of 70.88 acres. Slightly more of this increase came from uplands which produced a net gain of 41.29 acres from uplands (Table 6; Figure 8). Conversion involving wetlands also yielded a net increase of 29.59 acres from wetlands. Nearly 60 percent of the pond gain from uplands came from forests. Gains from wetlands were mostly from mixed emergent/shrub wetlands (45.3%) and forested wetlands (32.2%). From 1984-1994, no pond acres became vegetated wetlands, while only 1.32 acres were converted to upland. The annual change in ponds was a net gain of 7.1 acres.

Sometime between 1984 and 1994, 3.84 acres of lacustrine deepwater habitat was filled for an airport runway in Black Pond (on the Putnam County-Dutchess County line).

Table 4. Overview of vegetated wetland trends in the Croton Watershed: 1984-1994. Changes were detected only in palustrine wetlands. Nearly all of the changes are losses (designated by a minus "-" sign); gains are marked by a plus (+) sign.

Cause of Change	Acreage Change in Affected Wetland Type				
	Emergent	Scrub-Shrub	Mixed Emer/Shrub	Forested	Total
Conversion to Pond	-3.91	-2.03	-13.40	-10.25	-29.59
Residential Housing	-0.27	-0-	-0-	-2.60	-2.87
Recreation	-0-	-0-	-0-	-1.10	-1.10
Upland Field	-1.93	-0-	-0-	-0-	-1.93
Agriculture	-0-	-0-	-6.15	-0-	-6.15
Sand/Gravel Mining	-1.35	-0-	-0-	-0-	-1.35
Wetld Type Change					
PEM	NA	-0-	-0-	-8.75	-8.75
PFO	+8.75	-0-	-0-	NA	+8.75
Net Change	+1.29	-2.03	-19.55	-22.70	-42.99

Changes in Wetlands for the Croton Watershed: 1984-1994

Note: There was also a 8.75-acre change in vegetated wetland type (PFO to PEM). No gains were recorded.

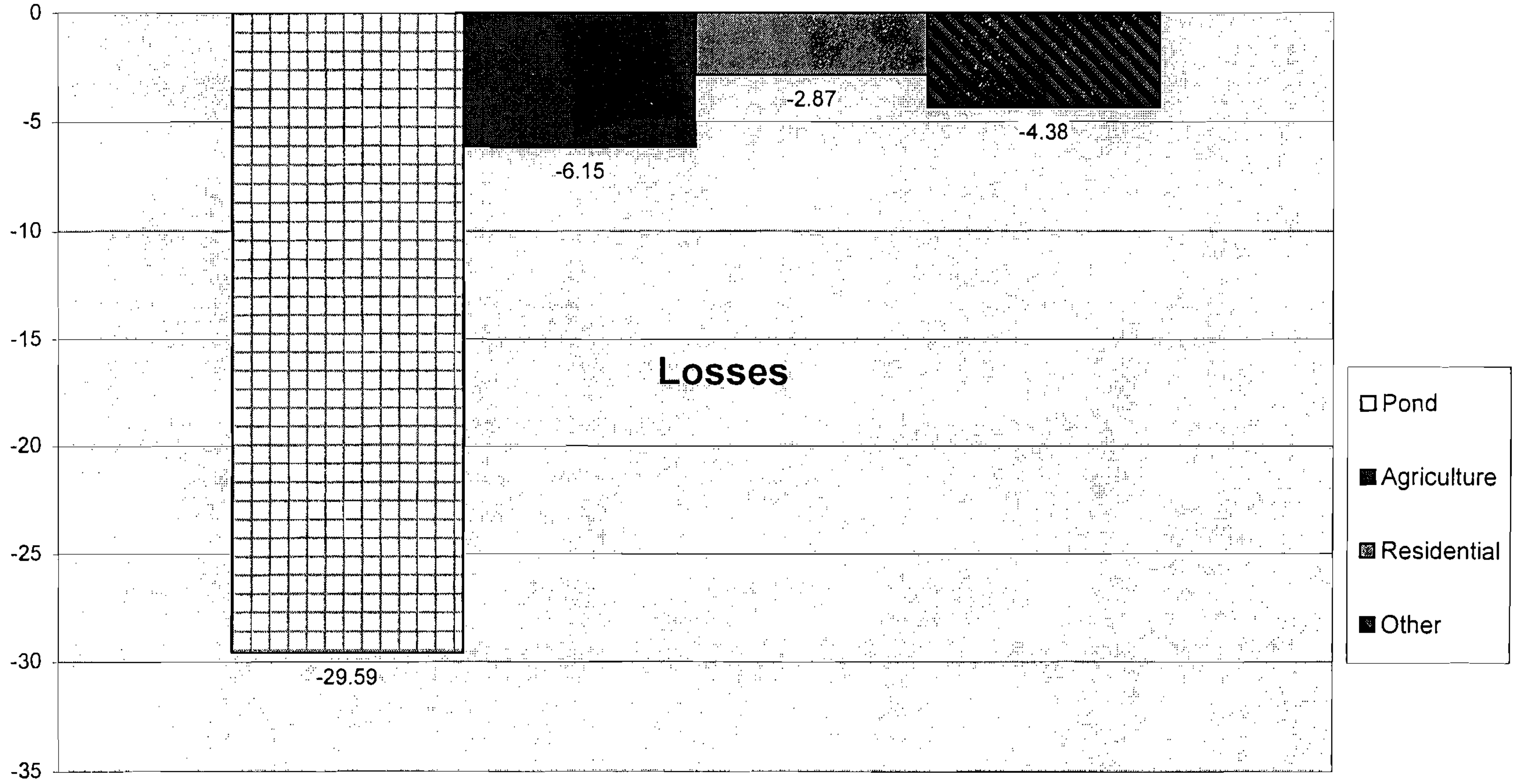


Figure 7

Table 5. Causes of vegetated wetland conversion to ponds in the Croton Watershed: 1984-1994.

Land Use	Percent of the Loss
Residential Development	73%
Unknown	20%
Industrial Development	4%
Recreational Land	2%
Agriculture	1%

Table 6. Changes in ponds in the Croton Watershed: 1984-1994. (* = transitional land is cleared land that is undergoing change in land cover and/or land use)

	Pond Acreage Gained from	Pond Acreage Converted to
Uplands		
Recreational Land	5.0	-0-
Residential Land	-0-	0.89
Cropland	3.56	-0-
Idle Cropland	0.82	-0-
Shrub Thicket	3.33	-0-
Deciduous Forest	25.50	-0-
Mixed Forest	3.23	-0-
Sand/Gravel Pit	-0-	0.43
Transitional Land*	1.17	-0-
Subtotal	+42.61	-1.32
NET CHANGE FROM UPLAND = +41.29 acres (gain)		
Wetlands		
Emergent (Semipermanently flooded)	0.46	-0-
Emergent (Seasonally flooded)	3.45	-0-
Mixed Emergent/Shrub (Seasonally flooded)	13.40	-0-
Mixed Shrub/Forested (Seasonally flooded)	0.73	-0-
Deciduous Forested (Temporarily flooded)	0.40	-0-
Deciduous Forested (Seasonally flooded)	9.12	-0-
Deciduous Scrub-Shrub (Seasonally flooded)	2.03	-0-
Subtotal	+29.59	0
NET CHANGE FROM WETLAND = +29.59 acres (gain)		
GRAND TOTAL OF CHANGES	+72.20	-1.32
NET CHANGE FROM ALL SOURCES = +70.88 acres (gain)		

Changes in Pond Acreage for the Croton Watershed: 1984-1994

Note: No losses to vegetated wetlands were recorded.

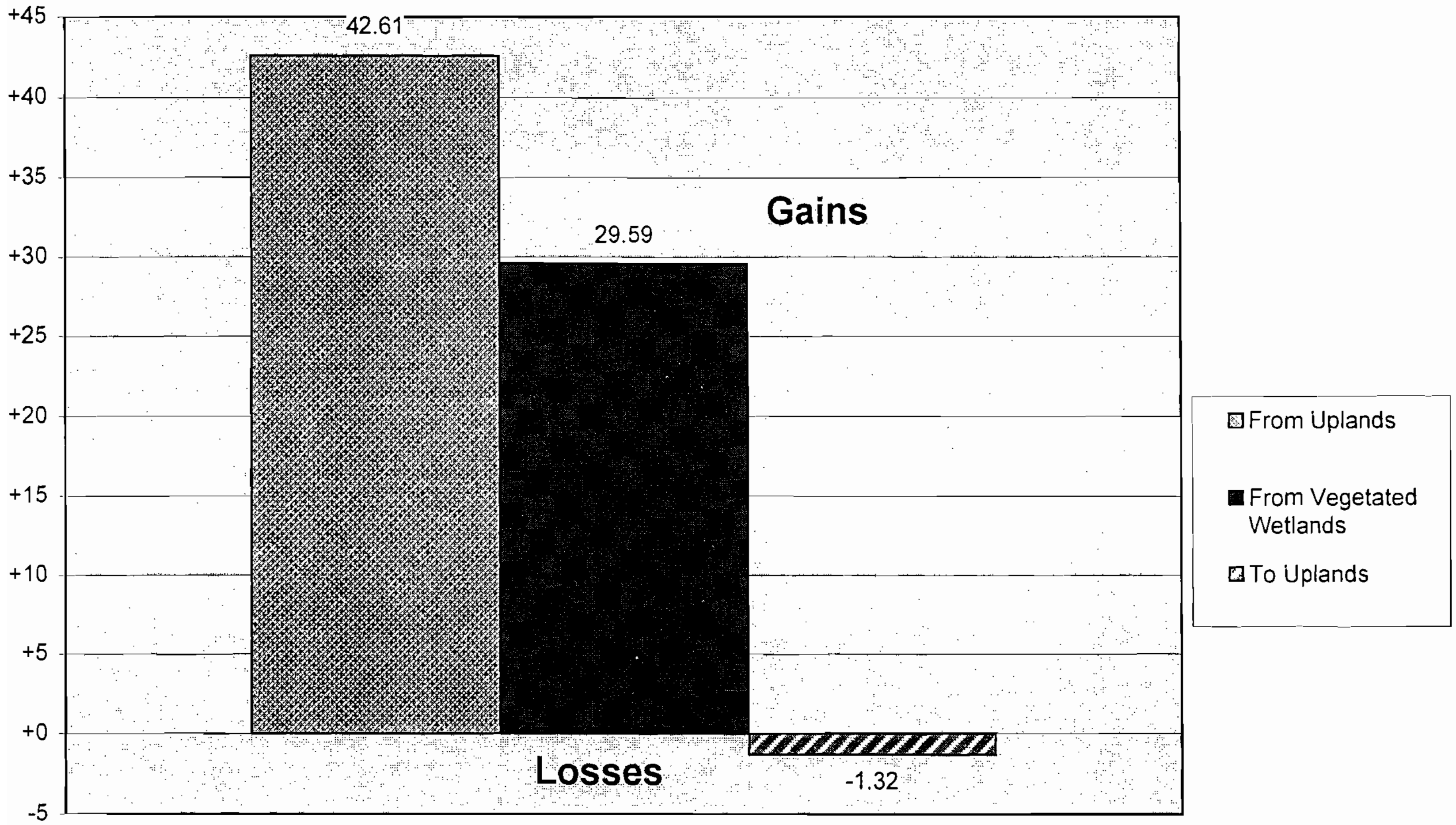


Figure 8

Conclusion

The annual loss rate of vegetated wetlands in the Croton Watershed declined since the 1968-84 period, dropping by slightly more than 50 percent. From 1968-1984, the annual loss of vegetated wetlands was 9.1 acres. During the 1984-1994 period, the rate dropped to 4.3 acres. This decline in the loss rate may be due to improved wetland regulation at the Federal, state, and local levels, increased public awareness of wetland values, incorporation of environmental considerations into project designs by developers and engineers, or other factors.

From the late 1960s to the present, approximately 190 acres of vegetated wetlands were converted to uplands or ponds. This figure represents about a 1.2 percent loss of the 1968 base acreage of these wetlands.

The leading factor responsible for wetland loss in the watershed was pond construction. Over the 26-year period, almost 100 acres of vegetated wetlands were converted to shallow open water ponds. Forested wetlands experienced the greatest losses with roughly 90 acres altered. Residential development was the principal cause of wetland conversion to ponds. From 1968-1984, it was responsible for 25 percent of these losses, but from 1984-1994, it was the major factor accounting for 73 percent of these losses. Nearly 40 acres of vegetated wetlands were converted to ponds in residential areas from 1968-1994.

Over the course of the study period, there was a noticeable decline in vegetated wetland loss due to urban and suburban developments, while a slight increase in conversion of wetland for agricultural purposes was detected (0.69 acres from 1968-84 v. 6.15 acres from 1984-94). Despite a significant drop in the annual rate of wetland loss, there was still a net loss of palustrine vegetated wetlands during the 1984-1994 interval.

Consistent with national and regional trends, pond acreage continued to rise from 1968 to 1994. Ponds were constructed in both uplands and wetlands. The annual increase, however, fell slightly during the more recent time period, dropping from 7.9 acres (for 1968-84) to 7.1 acres (from 1984-1994).

In addition to the changes in wetlands, 3.84 acres of lacustrine deepwater habitat were filled for an airport runway. This alteration took place in Black Pond on the Putnam-Dutchess county line.

References

Anderson, J.R., E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. A Land Use and Land Cover Classification System for Use with Remote Sensor Data. U.S. Geological Survey, Reston, VA. Prof. Paper 964.

Cowardin, L.M., V. Carter, F.C. Golet, and E.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.

Dahl, T.E., and C.E. Johnson. 1991. Status and Trends of Wetlands in the Conterminous United States, Mid-1970's to Mid-1980's. U.S. Fish and Wildlife Service, Washington, DC.

Frayer, W.E., T.J. Monahan, D.C. Bowden, and F.A. Graybill. 1983. Status and Trends of Wetlands and Deepwater Habitats in the Conterminous United States, 1950s to 1970s. Department of Forest and Wood Sciences, Colorado State University, Ft. Collins, CO.

Tiner, R.W. 1984. Wetlands of the United States: Current Status and Recent Trends. U.S. Fish and Wildlife Service, National Wetlands Inventory Program, Washington, DC.

Tiner, R.W. 1996. Wetlands in the Watersheds of the New York City Water Supply System. Results of the National Wetlands Inventory. U.S. Fish and Wildlife Service, Ecological Services, Northeast Region, Hadley, MA. Prepared for New York City Department of Environmental Protection, Valhalla, NY.

Tiner, R.W. (compiler). 1997. Atlas of National Wetlands Inventory Maps for the Watersheds of the New York City Water Supply System. U.S. Fish and Wildlife Service, Ecological Services, Hadley, MA. Prepared for New York City Department of Environmental Protection, Bureau of Water Supply, Quality, and Protection, Division of Drinking Water Quality Control, Natural Resources Section, 465 Columbus Avenue, Suite 190, Valhalla, NY.

Tiner, R.W. 1999. Wetland Indicators - A Guide to Wetland Identification, Delineation, Classification, and Mapping. Lewis Publishers, CRC Press, Boca Raton, FL.

Appendix

List of sites where NWI maps and the "Atlas of NWI maps for the Watersheds of the New York City Water Supply System" can be viewed. (Source: Tiner 1996)

Wetland Resource Guide

For information on federal, state and watershed wetland regulations and programs, contact the following agencies:

FEDERAL

U.S. Army Corps of Engineers [A],[M]
Regulatory Branch
New York District
Jacob K. Javits Federal Building
New York, NY 10278-0090
(212) 264-3996

U.S. Environmental Protection Agency
Region II [A],[M]
Wetlands Protection
290 Broadway
New York, NY 10007-1866
(212) 637-3801

EPA Wetlands Information Hotline
1-800-832-7828

U.S. Fish and Wildlife Service [A],[M]
New York Field Office
3817 Luker Road
Cortland, NY 13045
(607) 753-9334

STATE

New York State Department of
Environmental Conservation [A],[M]
Wetlands Program
50 Wolf Road
Albany, NY 12233-4756
(518) 457-9713

NYSDEC Region 3 [A],[M]
21 South Putt Corners Road
New Paltz, NY 12561
(914) 256-3000

NYSDEC Region 4 Sub-Office [A],[M]
Route 10, Jefferson Road
Stamford, NY 12167
(607) 652-7364

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Drinking Water Quality Control [A],[M]
Natural Resources Section
465 Columbus Avenue, Suite 190
Valhalla, NY 10595
(914) 773-4422

Watershed Planning and Community Affairs [A],[M]
Ashokan Reservoir
Route 28A, P.O. Box 370
Shokan, NY 12481
(914) 657-5772

Catskill District Office [A],[M]
Ashokan Reservoir
Route 28A, P.O. Box 370
Shokan, NY 12481
(914) 657-2304

Delaware District Offices [A],[M]
Routes 55 & 42
Grahamsville, NY 12740
(914) 985-2275

Route 30 [A],[M]
Downsville, NY 13755
(607) 363-7501

Croton District Office [A],[M]
5 Jay Street
Katonah, NY 10536
(914) 232-5171

DELAWARE COUNTY

County Planning Board [A],[M]
Page Avenue, P.O. Box 367
Delhi, NY 13753
(607) 746-2944

Soil & Water Conservation District [A]
44 West Street, Suite 1
Walton, NY 13856
(607) 865-7161

Cornell Cooperative Extension [A]
44 West Street
Walton, NY 13856
(607) 865-7090

DUTCHESS COUNTY

Department of Planning and Development [A],[M]
27 High Street
Poughkeepsie, NY 12601
(914) 486-3600

Soil & Water Conservation District [A]
Farm & Home Center
P.O. Box 37, Route 44
Millbrook, NY 12545
(914) 677-8011

Cornell Cooperative Extension [A]
P.O. Box 259
Millbrook, NY 12545
(914) 677-8223

GREENE COUNTY

County Planning Department [A],[M]
County Office Building
HCR3, Box 909
Cairo, NY 12413
(518) 622-3251

Soil & Water Conservation District [A]
County Office Building
HCR3, Box 907
Cairo, NY 12413-9502
(518) 622-3620

Cornell Cooperative Extension [A]
HCR3, Box 906
Cairo, NY 12413
(518) 622-9820

PUTNAM COUNTY

Division of Planning [A],[M]
RR #9, Fair Street
Carmel, NY 10512
(914) 878-3480

Soil & Water Conservation District [A]
RR #9, Fair Street
Carmel, NY 10512
(914) 878-7918

Cornell Cooperative Extension [A]
Terravest Corporate Park
10 Geneva Road
Brewster, NY 10509
(914) 278-6738

SCHOHARIE COUNTY

Planning & Development Agency [A],[M]
RD 1, Box 12
6 Mineral Spring Road
Cobleskill, NY 12043
(518) 234-3751

Soil & Water Conservation District [A]
Agricultural HQ, 41 South Grand Street
Cobleskill, NY 12043
(518) 234-4092

Cornell Cooperative Extension [A]
41 South Grand Street
Cobleskill, NY 12043
(518) 234-4303

SULLIVAN COUNTY

Division of Economic Development,
Promotion & Planning [A],[M]
Government Center
100 North Street
Monticello, NY 12701
(914) 794-3000 ext. 5028

Soil & Water Conservation District [A]
69 Ferndale-Loomis Road
Liberty, NY 12754
(914) 292-6552

Cornell Cooperative Extension [A]
69 Ferndale-Loomis Road
Liberty, NY 12754
(914) 292-6552

ULSTER COUNTY

Planning Board [A],[M]
244 Fair Street, Box 1800
Kingston, NY 12401
(914) 340-3340

Soil & Water Conservation District [A]
380 Washington Avenue
Kingston, NY 12401
(914) 334-8465

Cornell Cooperative Extension [A]
74 John Street
Kingston, NY 12401
(914) 338-3494

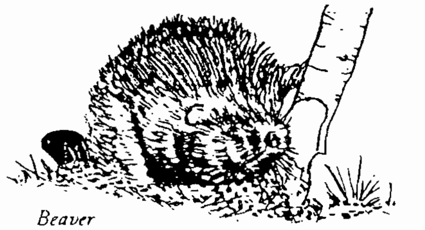
WESTCHESTER COUNTY

Department of Planning [A],[M]
Soil & Water Conservation District
148 Martine Avenue
Michaelian Office Bldg., Room 432
White Plains, NY 10601
(914) 285-4422

Cornell Cooperative Extension [A]
26 Legion Drive
Valhalla, NY 10595
(914) 285-4630

[A] Agency locations for the *Atlas of National Wetlands Inventory Maps for the Watersheds of the New York City Water Supply System.*

[M] Agency locations for full-sized *National Wetlands Inventory* maps.



Beaver