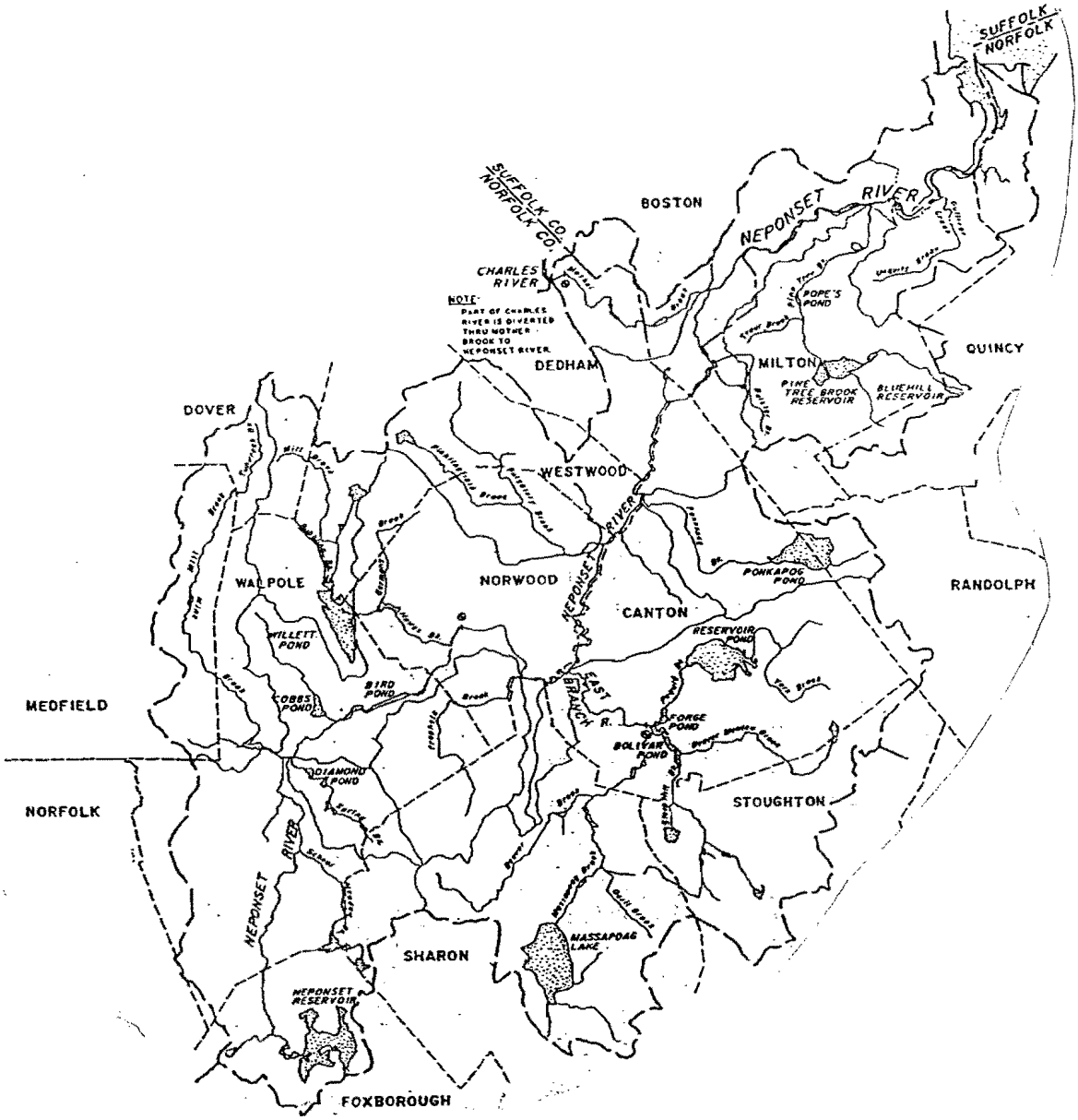
WETLAND STATUS AND RECENT TRENDS FOR THE NEPONSET WATERSHED, MASSACHUSETTS (1977-1991)



U.S. FISH AND WILDLIFE SERVICE
NATIONAL WETLANDS INVENTORY PROJECT
NORTHEAST REGION
APRIL 1998

Wetland Status and Recent Trends for the Neponset Watershed, Massachusetts (1977-1991)

R.W. Tiner, D.B. Foulis, C. Nichols,
S. Schaller, D. Petersen, K. Andersen,
and J. Swords

U.S. Fish and Wildlife Service
Ecological Services
National Wetlands Inventory Program
300 Westgate Center Drive
Hadley, MA 01035

and

University of Massachusetts
Department of Plant and Soil Sciences
Natural Resources Assessment Group
Stockbridge Hall
Amherst, MA 01003

Prepared for:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection
Worcester, MA 01608

and

U.S. Army Corps of Engineers
New England District
Concord, MA 01742

April 1998

Table of Contents

List of Figures and Tables

Wetland Status and Recent Trends for the Neponset Watershed, Massachusetts (1977-1991)

INTRODUCTION

The New England District of the U.S. Army Corps of Engineers was asked by the Massachusetts Department of Environmental Protection to perform a watershed encroachment study for the Neponset River in eastern Massachusetts. The Corps needed information on wetland trends for this analysis. The U.S. Fish and Wildlife Service's National Wetlands Inventory has been doing local and regional wetlands trends studies since the 1980s and had recently updated some NWI maps in eastern Massachusetts. Consequently, the Corps provided funding to the Service to perform a wetlands trends study for the Neponset watershed. The purpose of the study was to analyze historical aerial photographs to determine the extent of wetland change in the watershed from the late 1970s to the early 1990s. The study would also identify the causes of these changes and present a summary of the current status of wetlands and deepwater habitats in the watershed. This report presents the study findings.

STUDY AREA

The Neponset watershed lies just south of Boston, between the Charles River and Taunton River and South Coastal watersheds (see Figure 1). The watershed occupies about 117 square miles. The lower portion of the Neponset is tidal from Dorchester Bay to a dam in Milton. Much of the watershed's estuarine wetlands were filled in the past, including those lost by the disposal of dredged material from the river between the 1950s and 1970s (R. Tiner, observations of historical photography). Some parts of the existing salt marshes have a layer of dredged material on them. This activity has promoted the growth of common reed (*Phragmites australis*) in many places. The majority of the watershed is nontidal. Figure 1 shows the many tributaries and waterbodies that comprise the Neponset watershed.

The Neponset basin falls within two counties--Suffolk and Norfolk--with most of the watershed in the latter. Numerous towns fall within the watershed: Boston, Quincy, Milton, Dedham, Westwood, Randolph, Canton, Stoughton, Norwood, Walpole, Dover, Medfield, Sharon, and Foxborough. The acreage and percent of the watershed occupied by these towns is shown in Table 1.

Figure 1. Neponset River watershed. (Source: U.S. Army Corps of Engineers 1997).

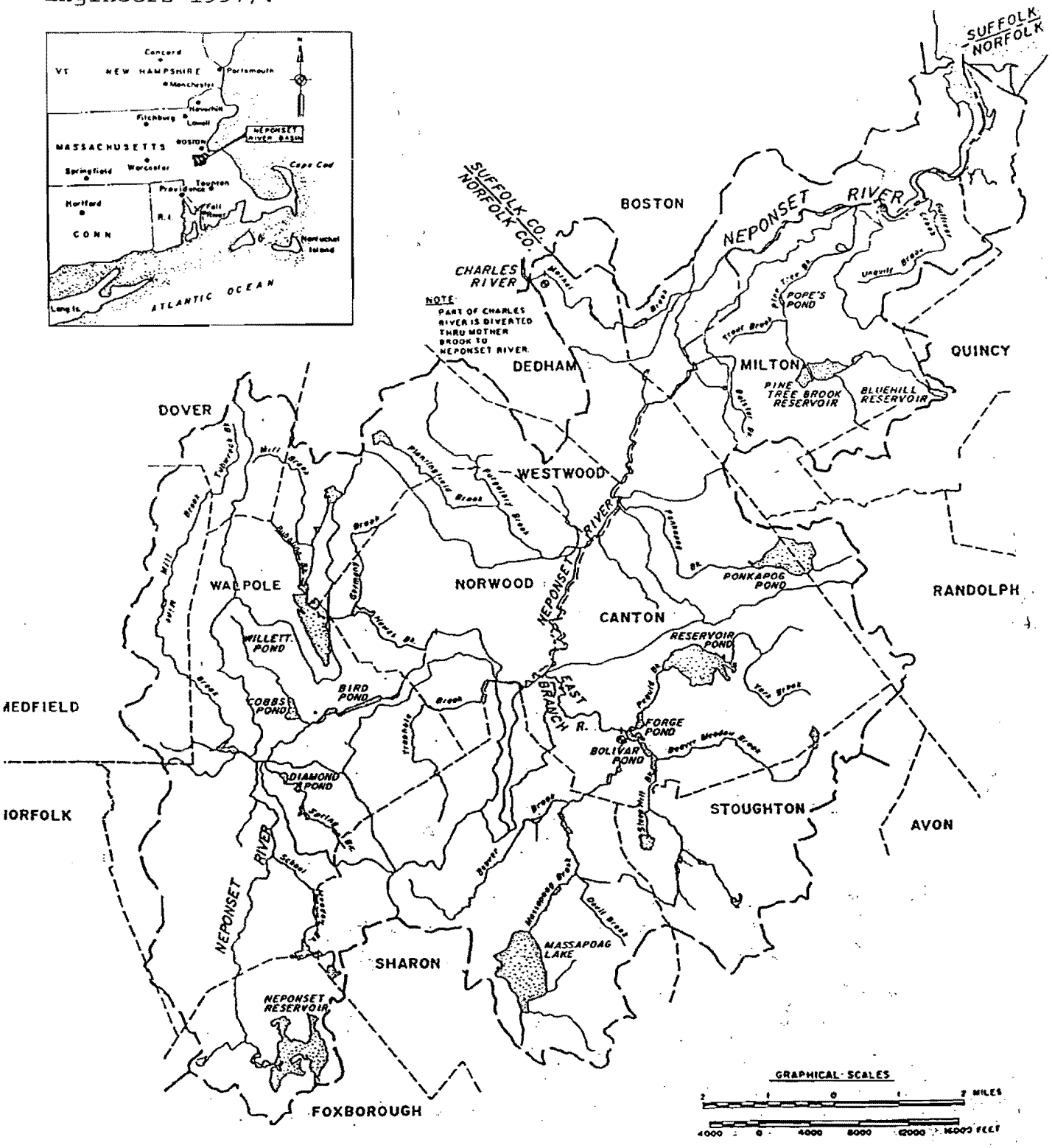


Table 1. Acreage and percent of the Neponset watershed in each town. Town acreages were derived from MassGIS.

Town (Total Acreage)	Acreage in Watershed	Percent of Watershed	Percent of Town in Watershed
Boston (31,690.78)	5320.67*	7.08	16.79
Canton (12,487.37)	12218.95	16.27	97.85
Dedham (6,832.99)	2048.43	2.73	29.98
Dover (9,879.17)	1498.05	1.99	15.16
Foxborough (13,343.35)	2685.53	3.58	20.13
Medfield (9,374.59)	2102.73	2.80	22.43
Milton (8,446.58)	7386.00	9.83	87.44
Norwood (6,696.50)	6696.54**	8.92	100.00
Quincy (10,706.06)	2187.27	2.91	20.43
Randolph (6,690.07)	944.06	1.26	14.11
Sharon (15,626.16)	10176.25	13.55	65.12
Stoughton (10,529.99)	4599.32	6.12	43.68
Walpole (13,509.57)	12055.99	16.05	89.24
Westwood (7,118.70)	4776.18	6.36	67.09

*Excludes 405.62 acres of estuarine habitat assigned to Boston during the study.

**Difference from total town acreage is due to computer round-off as the entire town is within the watershed.

METHODS

Wetland trends studies require an examination of aerial photographs from two time periods. For this study, 1977 black and white photographs (1:80,000; April 1977) and 1991 color infrared photographs (1:40,000; April 1991) were used. Analysis of this imagery provided a 14-year evaluation of the status of wetlands in the Neponset watershed. The black and white photography was not the best for detecting forested wetlands, but it represented typical aerial photography available for this era. In addition, the 1:80,000-scale was also limiting for detection of smaller wetlands, so the trends may be considered a conservative estimate, especially for forested wetlands. In contrast, the 1:40,000 photography should yield a fairly comprehensive assessment of wetlands for the Neponset watershed. The target mapping unit for wetlands was an acre, with some conspicuous smaller wetlands designated.

The Commonwealth of Massachusetts instituted statewide wetland protection for both coastal (salt marshes) and inland wetlands in the early to mid-1960s. Many towns passed local wetland protection ordinances (by-laws) to further prevent wetland loss and degradation. Federal wetland regulations were significantly strengthened in the mid-1970s and again in the late 1980s. The study period therefore represented a period during which wetlands were regulated by federal, state, and local governments. Consequently, any losses of wetlands detected by this study should fall into one of three categories: permitted activities, exempt activities, or unauthorized (illegal) alterations. The subject study did not examine the status of permits or exemptions, but was intended solely to document the amount of wetland change in the watershed.

Wetland gains (due to mitigation projects, pond construction, and other activities) and wetland losses were identified through conventional photointerpretation techniques. Causes of wetland trends (1977-1991) were documented and grouped in, but not limited to, the following categories: residential development, commercial development, industrial development, utilities, agriculture, excavated sites, and recreation/open space areas.

Besides identifying changes, the current status of wetlands (by type) was determined. Wetlands were classified according to the Service's official wetland classification system "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al. 1979). This system was recently adopted as the federal digital data standard, which means that all federal agencies should be using this system to report wetland acreages and trends. Note that for this study, all riverine waters were considered deepwater habitats, although shallow headwater streams actually may be regarded as a shallow water wetland type.

Wetland overlays showing wetland status and trends were compiled from the interpreted aerial photographs following conventional cartographic techniques. These overlays were then digitized for geographic information system applications. The watershed boundary was derived from digital data provided by the U.S. Army Corps of Engineers. The lower boundary (estuary) was modified slightly to include the estuarine waters at the mouth of the river[1]. Town and county boundaries were derived from MassGIS. These data were used to generate town boundaries on the report's maps and for compiling wetland and deepwater habitat acreage summaries for each town. Wetland acreage data for the 1991 status and for 1977-1991 trends were analyzed and tabulated using ARC-VIEW and ARC-INFO. These systems were used to produce two computer-generated maps for the Neponset watershed: 1) 1991 wetland/deepwater habitat status map, and 2) 1977-1991 wetland trends map.

[1]This added estuarine acreage (405.62 acres) was assigned to the City of Boston for purposes of this study.

RESULTS

Wetland Types

The wetlands of the Neponset watershed fall into two ecological systems: 1) palustrine and 2) estuarine. The Palustrine system is dominated by freshwater wetlands. It includes freshwater marshes, bogs, swamps, and ponds. These wetlands are mostly nontidal, with the exception of tidal freshwater wetlands. The latter are not present in the Neponset watershed. The Estuarine system is associated with the estuary where saltwater from the ocean mixes with freshwater runoff from rivers. This mixing zone is a very productive ecological system. The mixing of salt and fresh water creates brackish water conditions. The Neponset estuary that includes salt marshes and the salt-laden tidal reach of the Neponset River.

Palustrine wetlands are represented by four major types: 1) forested wetlands, 2) scrub-shrub wetlands, 3) emergent wetlands, and 4) mixed shrub/emergent wetlands. In contrast, estuarine wetlands are mostly emergent types (e.g., "salt marshes"), with some nonvegetated types ("tidal flats") also inventoried. Table 2 provides examples of wetland plant communities in the Neponset watershed.

Table 2. Examples of wetland plant communities in the Neponset watershed. (Data collected by David Foulis, Christine Nichols, John Swords, Chris Hatfield, and Kristen Andersen)

Wetland Type (map code)	**Dominant Species**	**Associated Vegetation**
Estuarine Emergent, Regularly Flooded (E2EMN)	Smooth Cordgrass (tall form)	
Estuarine Emergent, Irregularly Flooded (E2EMP)	Smooth Cordgrass (short form) - Sea Blite	Salt grass, Common Glasswort, Salt-hay grass
	Common Reed	
	Prairie Cordgrass	Rough-stemmed goldenrod, identified grass, Grass-leaved goldenrod
Estuarine Scrub-Shrub, Irregularly Flooded (E2SS1P)	High-tide Bush	Common glasswort, Sea blite, Smooth cordgrass (short form), Salt grass, Seaside goldenrod, Black grass, Marsh orach, Stiff-leaf quackgrass
Palustrine Emergent, Semipermanently Flooded (PEM1F)	Purple Loosestrife	Bittersweet Nightshade, Tussock sedge, Common winterberry, Buttonbush, Broad-leaved meadowsweet, Swamp rose, Mild water pepper, Silky dogwood, Arrow arum, Red maple, Speckled alder, Royal fern
Palustrine Emergent, Seasonally Flooded (PEM1C)	Reed Canary Grass	False nettle, Purple loosestrife, Wool-grass, Jewelweed, Straw sedge

Palustrine Forested, Seasonally Flooded/Saturated (PF04E)	Atlantic White Cedar	Sweet pepperbush, Red Maple, Peat moss, Swamp azalea, Highbush blueberry, Sheep laurel, Common winterberry, Water-willow, Arrow arum, Virginia chain fern
Palustrine Forested, Seasonally Flooded/ Saturated (PF01E)	Red Maple	Sweet pepperbush, Highbush blueberry, Common winterberry, Southern arrowwood, Soft rush, Royal fern, Sedge (Carex sp.), Peat moss, Marsh fern, Atlantic white cedar, Ash
Palustrine Forested, Seasonally Flooded (PF01C)	White Ash-Red Maple	Southern arrowwood, American elm, Jewelweed, Skunk cabbage, Bluejoint, Yellow birch, Virginia creeper, Morrow's honeysuckle, Japanese barberry, Common greenbrier, Multiflora rose, Silky dogwood, Poison ivy, Common winterberry, Withe-rod, Rough-stemmed goldenrod, Jack-in-the-pulpit, Sweet pepperbush, Sensitive fern, Aster, Watercress
Palustrine Forested, Seasonally Flooded (PF01C)	Red Maple	Yellow birch, Southern arrowwood, Cinnamon fern, Poison ivy, American elm, Spicebush, Wild sarsaparilla, Asters, Multiflora rose, Common sorrel, Black cherry, Smartweed, Jewelweed, Tall meadow-rue, Bluejoint, Red oak, Silky dogwood, Withe-rod, Common elderberry, Chokecherry, Crabapple

Palustrine Scrub-Shrub, Saturated (PSS3B)	Leatherleaf	Peat moss, Atlantic white cedar, Cotton-grass, Sweet gale, Beak-rush, Marsh St. John's-wort, Large Cranberry, Highbush blueberry, Mountain holly, Canada rush, Red maple, Speckled alder, Sheep laurel, Three-way sedge
Palustrine Scrub-Shrub, Saturated (PSS1B)	Fetterbush-Sweet Pepperbush	Buttonbush, Peat moss, Marsh St. John's-wort, Highbush blueberry, Swamp azalea, Red maple, Black chokeberry, Virginia chain fern
Palustrine Scrub-Scrub, Seasonally Flooded (PSS1C)	Common Winterberry-Swamp Rose	Silky dogwood, Swamp saxifrage, Willow-herb, Jewelweed, American golden-saxifrage, Arrow-leaved tearthumb, Water pepper, Cinnamon fern, Sensitive fern, Skunk cabbage, Tussock sedge, Crowfoot, Dwarf St. John's-wort, Bitter dock, Common elderberry, Poison sumac, Red maple, Glossy buckthorn, Willow, White Turtlehead, Peat moss, Marsh fern, Southern arrowwood, Swamp milkweed, Boneset, Swamp aster, Lurid sedge

Current Status of Wetlands

Watershed Totals

In 1991, the Neponset watershed possessed 9,970 acres of wetlands and 2,229 acres of deepwater habitats. These aquatic resources represented about 16 percent of the watershed, with wetlands alone occupying roughly 13 percent.

The watershed's wetlands fall into two major ecological systems: 1) Palustrine (97% or 9,658.58 acres), and 2) Estuarine (3% or 311.64 acres) (see Map 1 for locations of wetlands and deepwater habitats for the Neponset watershed).

An acreage summary of wetland and deepwater habitat resources for the Neponset watershed is provided in Table 3. The Neponset watershed's wetlands are mostly palustrine forested wetlands (6,236.59 acres or 63% of the watershed's wetlands). The distribution of the watershed's wetlands and deepwater habitats is shown in Map 1 (insert).

Table 3. Wetland and deepwater habitat acreage summaries for the Neponset watershed as of April 1991. Totals have been rounded off to nearest hundredth.

	Acres
Estuarine Wetlands	
Nonvegetated	25.92
Emergent (salt marsh)	265.67
Emergent (common reed marsh)	20.05
Total Estuarine Wetlands	311.64
Palustrine Wetlands	
Emergent (nontidal)	1109.98
Deciduous Scrub-shrub	1303.71
Evergreen Scrub-shrub	70.69
Mixed Shrub	95.60
Mixed Shrub-Forested	87.26
Mixed Shrub-Emergent	102.67
Deciduous Forested	5644.99
Evergreen Forested	368.84
Mixed Forested	222.76
Open Water	652.08
Total Palustrine Wetlands	9658.58
TOTAL WETLANDS	9970.22
---	---
Estuarine Waters	435.58
Lacustrine Waters	1647.57
Riverine Waters	145.57
TOTAL DEEPWATER HABITATS	2228.72

Town Totals[2]

Wetlands were most abundant in Canton and Walpole, with 2,546 acres and 1,852 acres, respectively. These towns contained about 44 percent of the watershed's wetlands. They also represented about 32 percent of the watershed's land surface area. Other towns with more than 1,000 acres of wetlands included Norwood (1,206) and Sharon (1,252). Together these four towns possessed nearly 70 percent of the Neponset's wetlands.

Wetland and deepwater habitat acreage data for each town are presented below. These data are for wetlands mapped as polygons identified on the NWI maps. Linear wetlands and stream data are not given. Towns are listed alphabetically. The acreage totals presented are only for the Neponset watershed portion of the town. Only Norwood lies wholly within the watershed, while other towns fall within other watersheds as well (see Table 1). Major portions of Canton, Walpole, Milton, Westwood, and Sharon occur within the Neponset drainage area.

Boston

The City of Boston occupied only 7 percent of the Neponset watershed. Nearly 17 percent of the city lies within the basin. This portion of the city contained 142.87 acres of wetlands and 469.28 acres of deepwater habitats. Estuarine and palustrine wetlands were nearly equally abundant, representing 3 percent of the Boston portion of the Neponset watershed. Deepwater habitats were mostly estuarine (422.60 acres), with 37.60 acres of riverine and 9.08 acres of lacustrine deepwater habitats.

Estuarine Wetlands	
Emergent	
Phragmites-dominated	11.84
Other	37.62
Unconsolidated Shore	17.71
Subtotal	67.17
Palustrine Wetlands	
Emergent	42.34
Deciduous Scrub-shrub	0.70
Deciduous Forested	11.96
Open Water	20.70
Subtotal	75.70
Total Wetland Acreage	142.87

[2] Town statistics are for the portion of the town that falls within the Neponset watershed.

Canton

Nearly all of Canton lies within the Neponset watershed. This portion of Canton had 2545.91 acres of palustrine wetlands and 398.91 acres of deepwater habitat. Wetlands occupy about 21 percent of the town's land area in the Neponset drainage. Forested wetlands were most abundant with 1659.52 acres. They represented 65 percent of Canton's wetlands in the watershed. Deepwater habitats were mostly lacustrine (380.56 acres), with some riverine (18.35).

Emergent	297.16
Deciduous Scrub-shrub	327.68
Mixed Shrub	66.88
Mixed Deciduous Shrub-Emergent	38.54
Deciduous Forested	1590.51
Evergreen Forested	49.32
Mixed Forested	19.69
Mixed Shrub-Forested	43.18
Open Water	112.95
Total Wetland Acreage	2545.91

Dedham

Almost 30 percent of Dedham occurs within the Neponset watershed. This part of Dedham had 329.55 acres of palustrine wetlands and 17.46 acres of deepwater habitat. About 16 percent of the town's land area in the Neponset watershed is represented by wetlands. Palustrine forested wetlands were most abundant with 147.04 acres. They represented 45 percent of Dedham's wetlands in the Neponset watershed. Riverine deepwater habitats were the predominant type (17.27 acres), with only 0.19 acres of lacustrine habitat.

Emergent	93.89
Deciduous Scrub-shrub	67.89
Mixed Shrub-Emergent	7.29
Deciduous Forested	147.04
Open Water	13.44
Total Wetland Acreage	329.55

Dover

About 15 percent of Dover is within the Neponset drainage system. This area of Dover had 148.37 acres of palustrine wetlands and no acres of deepwater habitat. Wetlands comprise about 10 percent of the town's land area in the Neponset watershed. Forested wetlands were most abundant with 114.72 acres. They represented 77 percent of Dover's wetlands in the Neponset watershed.

Emergent	2.55
Deciduous Scrub-shrub	18.07
Deciduous Forested	100.76
Evergreen Forested	11.80
Mixed Forested	2.16
Open Water	13.03
Total Wetland Acreage	148.37

Foxborough

About 20 percent of Foxborough occurs in the Neponset basin. This part of Foxborough had 200.28 acres of palustrine wetlands and 324.87 acres of lacustrine deepwater habitat. About 7 percent of the town's land area in the Neponset drainage is occupied by wetlands. Forested wetlands were most abundant with 111.89 acres. They represented 56 percent of Foxborough's wetlands in the watershed.

Emergent	27.06
Deciduous Scrub-shrub	20.92
Evergreen Scrub-shrub	7.74
Mixed Shrub	1.36
Deciduous Forested	106.23
Evergreen Forested	3.82
Mixed Forested	1.84
Open Water	31.31
Total Wetland Acreage	200.28

Medfield

Roughly 22 percent of Medfield falls within the Neponset watershed. This area of Medfield had 419.30 acres of palustrine wetlands and 8.95 acres of lacustrine deepwater habitat. Wetlands represented about 20 percent of the town's land area in the Neponset watershed. Forested wetlands were most abundant with 298.51 acres. They represented 71 percent of Medfield's wetlands in the watershed.

Emergent	20.53
Deciduous Scrub-shrub	65.43
Evergreen Scrub-shrub	.81
Mixed Scrub-shrub	3.39
Mixed Shrub-Forested	6.77
Deciduous Forested	290.36
Mixed Forested	8.15
Open Water	23.86
Total Wetland Acreage	419.30

Milton

About 87 percent of Milton lies within the Neponset drainage. This portion of Milton occupied only 9.83 percent of the Neponset watershed. It contained 593.27 acres of wetlands and 33.80 acres of deepwater habitats (25.84 acres of riverine and 7.96 acres of estuarine). About 8 percent of the town's land area is comprised of wetlands. Forested wetlands were most abundant, representing 50 percent of the Milton's wetlands in the watershed.

Estuarine Wetlands	
Emergent	
Phragmites-dominated	8.21
Other	117.85
Unconsolidated Shore	1.15
Subtotal	127.21
Palustrine Wetlands	
Emergent	78.16
Deciduous Scrub-shrub	29.65
Mixed Shrub-forested	10.52
Deciduous Forested	296.36
Open Water	51.37
Subtotal	466.06
Total Wetland Acreage	593.27

Norwood

Norwood occurs wholly within the Neponset basin. Norwood had 1206.44 acres of palustrine wetlands and 66.69 acres of deepwater habitat (35.19 acres of riverine and 31.50 acres of lacustrine). Roughly 18 percent of the town's land area is occupied by wetlands. Forested wetlands were most abundant with 745.27 acres. They represented 62 percent of Norwood's wetlands.

Emergent	164.38
Deciduous Scrub-shrub	230.83
Mixed Deciduous Shrub-Emergent	30.42
Mixed Shrub-Forested	11.01
Deciduous Forested	736.28
Mixed Forested	8.99
Open Water	25.53
Total Wetland Acreage	1206.44

Quincy

About 20 percent of Quincy falls within the Neponset watershed. This portion of the city contained 213.95 acres of wetlands and 5.02 acres of estuarine deepwater habitats. Ten percent of Quincy's land area in the Neponset drainage was comprised by

wetlands. Estuarine wetlands were most abundant, representing more than half of Quincy's wetlands in the watershed.

Estuarine Wetlands	
Emergent	110.20
Unconsolidated Shore	7.06
Subtotal	117.26
Palustrine Wetlands	
Emergent	5.16
Deciduous Scrub-shrub	15.74
Mixed Shrub-Forested	.36
Deciduous Forested	56.40
Evergreen Forested	.97
Open Water	18.05
Subtotal	96.68
Total Wetland Acreage	213.94

Randolph

About 14 percent of Randolph occurs in the Neponset basin. This part of Randolph had 72.73 acres of palustrine wetlands and 113.57 acres of lacustrine deepwater habitat. About 8 percent of the town's land area in the Neponset watershed was represented by wetlands. Forested wetlands were most abundant with 63.22 acres. They comprised 87 percent of Randolph's wetlands in the watershed.

Emergent	.21
Deciduous Scrub-shrub	7.05
Evergreen Scrub-shrub	2.25
Deciduous Forested	55.04
Evergreen Forested	8.18
Total Wetland Acreage	72.73

Sharon

Nearly two-thirds of Sharon lies within the Neponset drainage system. This area of Sharon had 1252.06 acres of palustrine wetlands and 390.46 acres of deepwater habitat (390.01 acres of lacustrine; 0.45 acres of riverine). Wetlands made up about 12 percent of the town's land area in the Neponset watershed. Forested wetlands were most abundant with 911.70 acres, representing 73 percent of Sharon's wetlands in the watershed.

Emergent	92.62
Deciduous Scrub-shrub	85.11
Evergreen Scrub-shrub	7.44
Mixed Shrub	12.69
Mixed Deciduous Shrub-Emergent	48.44

Deciduous Forested	850.92
Evergreen Forested	15.10
Mixed Forested	45.68
Open Water	94.06
Total Wetland Acreage	1252.06

Stoughton

Almost 44 percent of Stoughton falls within the Neponset basin. This portion of Stoughton had 422.31 acres of palustrine wetlands and 34.06 acres of lacustrine deepwater habitat. About 9 percent of the town's land area in the Neponset drainage was comprised of wetlands. Forested wetlands were most abundant with 206.60 acres. They represented 49 percent of Stoughton's wetlands in the watershed.

Emergent	52.30
Deciduous Scrub-shrub	85.92
Evergreen Scrub-shrub	3.55
Mixed Shrub	3.58
Mixed Shrub-Forested	5.92
Deciduous Forested	184.18
Evergreen Forested	2.27
Mixed Forested	20.15
Open Water	64.44
Total Wetland Acreage	422.31

Walpole

Almost 90 percent of Walpole lies within the Neponset drainage system. This part of Walpole had 1851.80 acres of palustrine wetlands and 280.83 acres of deepwater habitat (277.95 acres of lacustrine and 2.88 acres of riverine). About 15 percent of the town's land area in the Neponset watershed was occupied by wetlands. Forested wetlands were most abundant with 1151.60 acres. They represented 62 percent of Walpole's wetlands in the watershed.

Emergent	205.51
Deciduous Scrub-shrub	305.68
Evergreen Scrub-shrub	10.36
Mixed Shrub	6.85
Mixed Shrub-Forested	9.50
Mixed Deciduous Shrub-Emergent	15.98
Deciduous Forested	762.41
Evergreen Forested	273.09
Mixed Forested	116.10
Open Water	146.32
Total Wetland Acreage	1851.80

Westwood

Slightly more than two-thirds of Westwood occurs within the Neponset basin. This area of Westwood had 571.39 acres of palustrine wetlands and 84.82 acres of deepwater habitat (76.83 acres of lacustrine and 7.99 acres of riverine). Wetlands comprised about 12 percent of the town's land area in the Neponset drainage. Forested wetlands were most abundant with 461.83 acres. They represented 81 percent of Westwood's wetlands in the watershed.

Emergent	28.65
Deciduous Scrub-shrub	43.04
Mixed Shrub	.85
Deciduous Forested	457.54
Evergreen Forested	4.29
Open Water	37.03
Total Wetland Acreage	571.39

Wetland Trends (1977-1991)

During the study interval, approximately 92 acres of wetlands were destroyed. The majority of this total represented filled wetlands (75.07 acres), whereas 17.41 acres of forested wetland were converted to a freshwater impoundment (in Walpole). The losses amounted to slightly less than 1 percent of the wetlands present in 1977. During this 14-year study period, no changes in estuarine wetlands were identified, while some changes in palustrine wetlands took place. Wetland trends results are presented in Tables 4-7 and in the following paragraphs. Map 2 (insert), the wetland trends map, shows the location of altered wetlands and new ponds.

A total of 75.07 acres of palustrine vegetated wetlands was lost to development (Tables 4 and 5), whereas a mere 5.80 acres of palustrine vegetated wetlands were constructed in former uplands or developed from nonvegetated wetlands, mainly ponds (Table 8). Most of the palustrine vegetated wetlands did not change, but some were converted to upland or deepwater habitat, or changed to other wetland types (Table 4).

Over half of the vegetated wetland losses detected were attributed to industrial development, while residential housing was responsible for about 21 percent of the losses (Table 5). Losses were detected in seven towns: Norwood (7 sites; 49.30 acres), Walpole (4 sites; 13.40 acres), Canton (6 wetland sites; 9.23 acres), Westwood (2 sites; 1.91 acres), Medfield (1 site; 0.47 acres), Stoughton (1 site; 0.43 acres), and Quincy (1 site; 0.33 acres) (Table 6). Norwood's losses were mostly loss of forested wetland (22.63 acres) and emergent wetland (12.32 acres) to industrial development. Walpole's vegetated wetland losses involved filling of wetlands mostly for other urban development. About half of Canton's vegetated wetland losses were to commercial development with another third going to residential housing.

Ninety-four percent of the losses of vegetated wetlands affected seasonally flooded/saturated wetlands (Table 7). Most of these losses were forested wetlands and some emergent wetlands (Table 6).

There were a few gains in some wetland types for a total of 24.75 acres of vegetated wetland gains in all types (Table 8). Most of these "gains" were actually wetland type changes (from one type to another) with no net change in total wetland acreage for the watershed. Nearly 15 acres of forested wetlands came from former shrub and emergent wetlands through natural succession (3.94 acres and 10.8 acres, respectively). Actual gains in vegetated wetlands from other habitats were limited: 1.38 acres from nonvegetated wetlands (ponds) and 4.42 acres from upland. The

former change probably resulted from increased sedimentation which led to pond in-filling with a subsequent change in vegetation. The latter might have been the result of constructed wetlands for mitigation or for other purposes (e.g., stormwater detention or recreational ponds). Beaver contributed to the making of a 1-acre palustrine scrub-shrub wetland in Stoughton.

Gains in vegetated wetlands are summarized by town in Table 9. Most of the gains achieved from changes in vegetated wetland types occurred in Norwood (11.62 acres), while most of the increases in wetland acreage from upland came from Walpole (2.03 acres).

Pond acreage increased during the study interval (Table 10). A total of 64.69 acres were created from former upland or wetland areas, while only 0.68 acres were lost (filled in). An additional 1.73-acre ponded area was created by damming Mother Brook in Boston. New ponds were created by either impoundment or excavation or a combination of these methods. Of the new ponds built elsewhere, 31.95 acres came from upland (excavated or diked/impounded), while 32.74 acres came from vegetated wetlands. Most of the converted wetlands were emergent wetlands (12.88 acres or 39% of the new pond acreage built in wetlands) or shrub wetlands (12.17 acres or 37%). Almost 8 acres of ponds were created from forested wetlands (24%). Ponds constructed in uplands were mostly associated with sand and gravel pit operations (26.09 acres or 82% of the upland-built ponds). These ponds are likely to be temporary features due to active strip mining. Only 1.74 acres came from cropland or pastures, while the remaining 4.12 acres were built in former upland forests.

Table 4. Changes of vegetated wetlands in the Neponset watershed (1977-1991). EM-Emergent, SS-Scrub-shrub, FO-Forested. Note that no changes in estuarine emergent wetlands were detected.

Wetland Type	Converted to Upland (acres)	Changed to Other Veg. Wetlands (acres)	Changed to Nonveg. Wetlands (acres)	Converted to Deepwater Habitats (acres)
Palustrine EM	14.12	22.60	3.20	0
Palustrine SS	2.10	3.93	12.16	0
Palustrine FO	58.85	2.07	7.70	17.41

Table 5. Causes of vegetated wetland loss to upland in the Neponset watershed (1977-1991).

Cause of Loss	Acres
Residential Development (PFO=15.40; PSS=0.47)	15.87
Commercial Development (PFO=9.95)	9.95
Industrial Development (PEM=14.12; PFO=22.63; PSS=1.63)	38.38
Utilities (PFO=1.41)	1.41
Other Urban (PFO=9.46)	9.46
Total	75.07

Table 6. Causes of vegetated wetland loss to upland in the Neponset watershed by tow (1977-1991). Note that an additional 17.41 acres of PFO1E was converted to lacustrine water (impoundment) in Walpole. (See Table 2 for wetland type codes and examples of wetland plant communities.)

Town	Wetland Type (# Sites)	Acres Lost	Cause of Loss
Canton	PFO1E (2)	3.03	Residential
	PFO1C (1)	0.84	Commercial
	PFO1E (2)	3.73	Commercial
	PSS1C (1)	1.63	Industrial
	(Subtotal)	(9.23)	
Medfield	PSS1/3B (1)	0.47	Residential
Norwood	PFO1E (2)	7.56	Residential
	PFO1E (2)	5.38	Commercial
	PFO1E (1)	22.63	Industrial
	PEM1E (1)	12.32	Industrial
	PFO1E (1)	1.41	Utilities
	(Subtotal)	(49.30)	
Quincy	PEM1F (1)	0.33	Industrial
Stoughton	PFO1E (1)	0.43	Other Urban
Walpole	PFO1E (1)	2.90	Residential
	PFO1E (2)	9.03	Other Urban
	PEM1F (1)	1.47	Industrial
	(Subtotal)	(13.40)	
Westwood	PFO1E (2)	1.91	Residential

Table 7. Conversion of hydrologically similar palustrine vegetated wetlands to upland in the Neponset watershed (1977-1991).

Palustrine Wetland Type	**Acres**
Saturated	0.47
Seasonally Flooded	2.47
Seasonally Flooded/Saturated	70.33
Semipermanently Flooded	1.80
Total	75.07

Table 8. Gains in vegetated wetlands in the Neponset watershed (1977-1991). EM-Emergent, SS-Scrub-shrub, and FO-Forested.

Wetland Type	Gains from Nonveg. Wetlands (acres)	Gain from Upland (acres)	Gain from Other Veg. Wetlands (acres)
Palustrine EM	0.28	2.74	1.05
Palustrine SS	1.10	1.68	3.16
Palustrine FO	0	0	14.74
Total	1.38	4.42	18.95

Table 9. Causes of vegetated wetland gain in the Neponset watershed by town (1977-1991). (See Table 2 for map codes for wetland types.)

Town	Wetland Type (# Sites)	Acres Gained	Previous Habitat/Land Use
Canton	PEM1F (1)	0.85	Agricultural Land
	PEM1F (1)	0.23	PFO1E
	PSS1E (1)	1.10	PUBHx (excavated pond)
	(Subtotal)	(2.18)	
Norwood	PEM1F (1)	0.82	PFO1E
	PFO1E (2)	10.80	PEM1E
	(Subtotal)	(11.62)	
Quincy	PEM1E (1)	1.54	Utility
Stoughton	PSS1C	2.14	PEM1E
	PSS1Eb (1)	1.02)	PFO1C*
	(Subtotal)	(3.16)	
Walpole	PEM1F (1)	0.35	Upland Forest
	PEM1C (1)	0.28	PUBHh (impounded pond)
	PSS1Eh (1)	0.80	Upland Forest**
	PSS1F	0.49	Upland Forest
	PSS1B	0.39	Sand-Gravel Pit
	(Subtotal)	(2.31)	
Westwood	PFO1C (2)	3.94	PSS1C

*Change due to beaver activity
**Impounded

Table 10. Increase in pond (nonvegetated wetland) acreage in the Neponset watershed by town (1977-1991).

Town/City	Pond Acres Gained (Subtotal)	Source of Gain (# Sites)
Boston	3.63	PEM1C (1)
	2.05	PEM1E (1)
	(5.68)*	
Canton	0.16	PEM1C (1)
	0.35	PEM1Eh** (1)
	0.15	PFO1E (1)
	2.90	Sand-Gravel Pit (2)
	(3.56)	
Dover	0.20	Agriculture Land (1)
	6.95	PSS1F (2)
	(7.15)	
Foxborough	0.15	Upland Forest (1)
	0.53	PFO1C (1)
	(0.68)	
Medfield	0.20	Upland Forest (1)
	0.21	PEM1E (1)
	0.35	PFO1E (1)
	0.84	PSS1/3B (1)
	(1.60)	
Norwood	0.18	Upland Forest (1)
	2.02	PEM1E (1)
	5.18	PFO1E (6)
	(7.38)	
Quincy	13.04	Sand-Gravel Pit (1)
	(13.04)	
Sharon	0.50	Agricultural Land (2)
	2.85	PEM1Fh** (1)
	0.40	PSS1E (1)
	(3.75)	
Stoughton	0.31	Agricultural Land (1)
	0.23	PEM1C (1)
	0.42	PFO1E (1)
	(0.96)	

Table 10. Continued

Town/City	Pond Acres Gained (Subtotal)	Source of Gain (# Sites)
Walpole	0.73	Agricultural Land (2)
	3.38	Upland Forest (4)
	1.38	PEM1E (1)
	0.91	PFO1E (2)
	1.98	PSS1E (3)
	2.00	PSS1F (1)
	10.15	Sand-Gravel Pit (11)
	(20.53)	
Westwood	0.21	Upland Forest (1)
	0.15	PFO1E (1)
	(0.36)	

*Figure does not include the 1.73-acre ponded area created by damming Mother Brook.
**May be a temporal change since this wetland is impounded.

SUMMARY FINDINGS

In 1991, the Neponset watershed possessed 9,970 acres of wetlands and 2,229 acres of deepwater habitats. Wetlands represented approximately 13 percent of the watershed. Forested wetlands were the predominant type accounting for 63 percent of the basin's wetlands.

From 1997 to 1991, less than 100 acres of vegetated wetlands were converted to nonwetlands by various development activities. Slightly more than half of the losses were attributed to industrial development, while conversion of vegetated wetlands to residential housing was also significant. During the study period, less than 6 acres of new vegetated wetlands were created.

Pond acreage increased by almost 65 acres. This new acreage was created from wetlands and uplands in nearly equal amounts. Most of the ponds built from uplands were associated with sand and gravel operations and may be temporary features.

RECOMMENDATIONS

The scope of work for this study also called for making suggestions on how to avoid wetland losses. The study findings showed that vegetated wetland losses between 1977 and 1991 were relatively small (less than 100 acres) for a study interval of this length (14 years). It appears that government regulatory programs at Federal, state, and local levels are minimizing wetland impacts by development in the Neponset watershed. These efforts should continue.

To further improve the wetland resources, wetland restoration initiatives should be undertaken. The Neponset estuary offers significant opportunities to restore salt marshes as tens of acres have been used in the past (1950s and 1960s) for the disposal of dredged material. These once productive tidal marshes are now overlain with varying amounts of dredged material and have become colonized by common reed (*Phragmites australis*). The Massachusetts Wetlands Restoration and Banking Program and the Metropolitan District Commission are already pursuing some salt marsh restoration in this area. Elsewhere in the watershed, other opportunities for wetland restoration exist. Many such sites were identified by the Corps of Engineers in the inventory of potential wetland restoration sites in the Neponset watershed (U.S. Army Corps of Engineers 1997). Government agencies and others interested in wetland conservation should seek to restore as many of these sites as technically and financially possible.

Improving water quality in the watershed would also benefit wetlands and their wildlife. Revegetation of the 300-foot buffer (at least 100-foot) along stream corridors would likely lead to significant improvements in water quality by helping reduce nonpoint source pollution. Such action would also provide important habitat for wildlife. Forested and shrubby stream borders approximately 300-feet wide serves as significant habitat for neotropical migratory birds. Reestablishing such vegetated buffers would also furnish natural corridors to facilitate wildlife movement from one large wetland complex to another.

While the Neponset wetlands seem to be well protected spatially by existing regulatory programs, their quality could be improved by various means including reestablishing vegetated buffers along streams wherever possible and initiating type 2 wetland restoration projects (improving the functions of existing wetlands by restoring hydrology, removing minor fill, etc.). Type 1 wetland restoration projects (former wetlands, now nonwetlands suitable for returning to wetlands) are more limited, but would add wetland acreage to the current resource base. These types of projects will help improve the quality and quantity of the Neponset's wetland resources.

ACKNOWLEDGMENTS

The U.S. Army Corps of Engineers, New England District provided funding for this project. Chris Hatfield served as project officer for the Corps, while Ralph Tiner coordinated the project for the U.S. Fish and Wildlife Service.

Photointerpretation and preliminary map preparation were performed by staff at the Natural Resources Assessment Group at the University of Massachusetts: David B. Foulis and Christine Nichols. Kristen Andersen also assisted in data compilation.

John Swords of the Service performed quality control on the photointerpretation and assisted in field work. Digital data compilation and analysis were performed by Sue Schaller and Donna Petersen of the Service. Report typing was done by Paula Botch and Karen Gallant.

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.

U.S. Army Corps of Engineers. 1997. Neponset River Watershed Wetland Restoration Analysis. New England District, Waltham, MA.