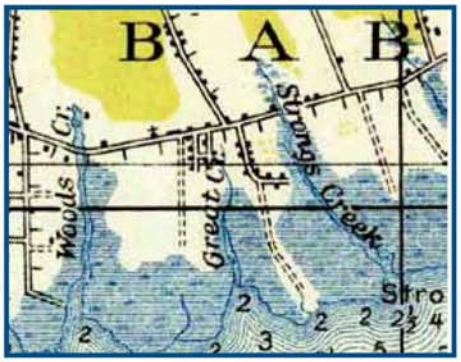
U.S. Fish & Wildlife Service

Changes in Long Island Wetlands, New York: Circa 1900 to 2004

1960



1919

1928

2011

Top cover photograph by Al Dole (U.S. Fish and Wildlife Service); other images from government sources. Note: By 2011, the entire marsh was developed; just Great Neck Creek remains (called Strongs Creek in 1919).

Changes in Long Island Wetlands, New York: Circa 1900 to 2004

Ralph W. Tiner[1], Kevin McGuckin[2], and Matthew Fields[2]

[1]U.S. Fish & Wildlife Service
National Wetlands Inventory Program
Northeast Region
300 Westgate Center Drive
Hadley, MA 01035

[2]Conservation Management Institute
Virginia Tech
1900 Kraft Drive, Suite 250
Blacksburg, VA 24061

April 2012

This report should be cited as: Tiner, R.W., K. McGuckin, and M. Fields. 2012. Changes in Long Island Wetlands, New York: Circa 1900-2004. U.S. Fish and Wildlife Service, Northeast Region, Hadley, MA. 12 pp.

Note: The findings and conclusions in the report are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

TABLE OF CONTENTS

This page is intentionally blank.

INTRODUCTION

The U.S. Fish and Wildlife Service (FWS) recently completed an update of its National Wetlands Inventory (NWI) data for Long Island (Tiner 2011). Nearly 51,000 acres of wetlands were mapped: 5,166 acres of marine wetlands, 32,100 acres of estuarine wetlands, 13,588 acres of palustrine wetlands, and about 5 acres of riverine/lacustrine wetlands. During this project, soil survey data from historic maps and current surveys (SURGO data) were examined to estimate the extent of wetland loss since the early 1900s for two counties (Nassau and Suffolk) that comprise 91 percent of Long Island. The findings from this analysis are presented in this report.

Study Area

Located in southeastern New York, Long Island is the longest and largest island in the coterminous United States (148th in the world; http://en.wikipedia.org/wiki/Long_Island). The island is 118 miles long and 23 miles wide at its widest point, beginning at New York Harbor and extending eastward to Montauk Point. Politically, Long Island is comprised of four counties: Kings, Queens, Nassau, and Suffolk (Figure 1). Nassau and Suffolk Counties were the focus of this study.

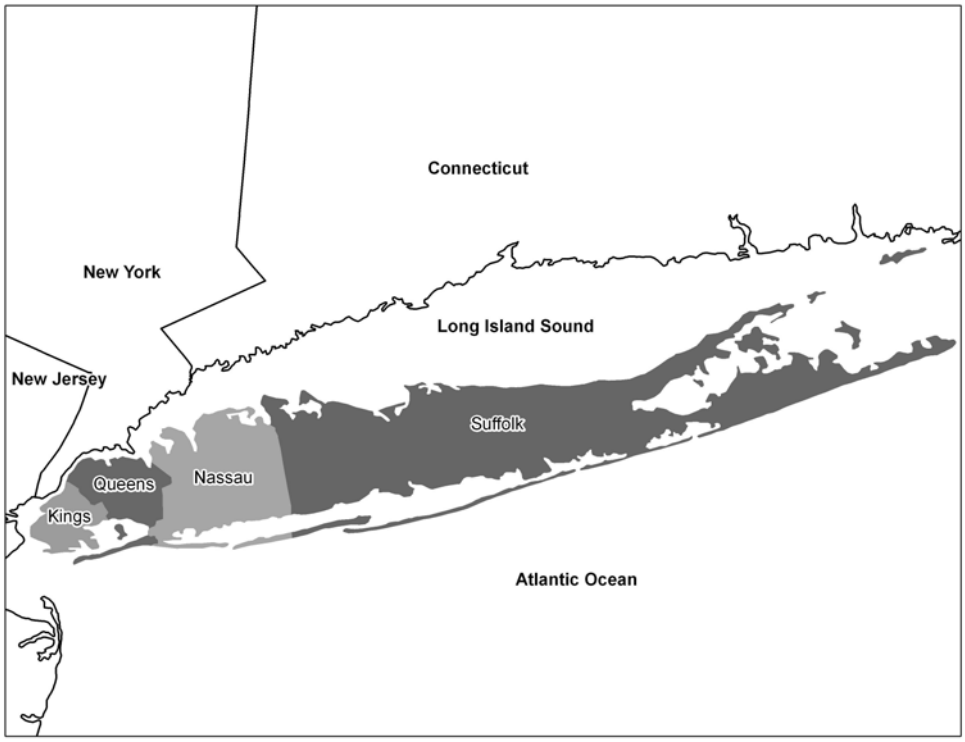


Figure 1. Long Island and its counties.

METHODS

Estimating the Circa 1900 Extent of Wetlands

Historic soil maps (1928) for Nassau and Suffolk Counties were obtained from the University of Alabama (http://alabamamaps.ua.edu/historicalmaps/soilsurvey/index.html). Certain soil map units were interpreted to be wetlands: 1) tidal marsh, 2) peat, 3) meadow, 4) beach sand, and 5) made land. More recent soil survey reports (Soil Survey of Nassau County, New York – 1987 and Soil Survey of Suffolk County, New York – 1975) and digital soil data (State Soil Survey Geographic [SSURGO] data) were also obtained. In addition to classifying soils by drainage classes and other typical soil properties, the modern soil surveys identified urban areas built on fill material that were likely deposited on wetlands as "urban land-Udipsamments, wet substratum," "Udipsamments, wet substratum," "Udorthents, refuse substratum" for Nassau County and "Fill land, dredged material," "Fill land, sandy," and "Made land" for Suffolk County. Nearly all of these map units represented filled tidal marshes (see Table 1 for specific soil map units used in this analysis). Soil areas were viewed in the context of more detailed wetland classifications. "Made land" was separated into tidal marsh and freshwater wetlands accordingly. Also where "Meadow" was located in an estuarine region, it was identified as tidal marsh. Using ESRI's ArcGIS 9.3 current NWI data and hydric soils data were merged and overlaid on the digital image of the historic maps to identify and digitize other areas that may likely have been lost wetlands.

Estimating Wetland Changes since the Early 1900s

The historic wetlands were compared to the 2004 NWI findings to produce an estimate of the extent of wetland loss during the past century. This step was done simultaneously with the reconstruction of the original wetland acreage as the numbers added to the 2004 acreage were simply the estimated losses. For this assessment, wetlands were placed in three broad categories: beach, tidal marsh, and freshwater (nontidal) wetlands.

Limitations of Analysis

This study involved building the circa 1900 wetland coverage from current wetland and hydric soil data and historic soil maps. During the basic interpretation of 2004 wetlands, hydric soil map units from recent soil surveys (posted online) were used to help identify and delineate wetlands. The modern soil surveys also classified former wetland areas that were filled as distinct soil map units such as "Udipsamments, wet substratum," "fill land, dredged material," and others listed in Table 1. According to the soil survey reports, these fills mostly impacted tidal wetlands, but also affected "a few inland freshwater wetlands." It is also likely that some tidal creeks, shallow bays, and possibly low-lying nontidal wetlands and uplands may be included in these numbers since soil map units typically contain inclusions of other soil types. The overwhelming majority of these soil map units were located along the bayshore and therefore likely tidal wetlands. For our analysis we initially considered all these map units to be former tidal wetlands, but reviewed their locations relative to the current wetlands and re-classified the few that

were located in nontidal areas as freshwater wetlands. In reconstructing the circa 1900 tidal wetlands, we used the 2004 wetlands as the base and added wetlands from other time periods. We did not subtract any wetlands that were not shown on the historic maps. We do not expect, however, that huge gains in these wetlands occurred as this has not been observed in coastal areas of the Northeast. Here the coastal zone is losing tidal wetland acreage naturally due to sea-level rise and coastal subsidence.

The results from this analysis should be considered general as the historic map data were not as detailed as the later surveys. Nonetheless the study findings do provide a sense of the magnitude of wetland changes. More detailed analyses (e.g., through interpretation of 1930s aerial photography) can be conducted to refine our findings.

Table 1. Soil map units used to identify historic wetlands. Units marked with two asterisks (**) are tidal marshes, while those with one asterisk (*) indicate soil map units interpreted as former tidal wetlands. Some "Made land" and "Meadow" were determined to be tidal marsh based on their location in estuarine waters.

Soil Map Unit	1928 Nassau	1987 Nassau	1928 Suffolk	1975 Suffolk
Beach sand	X		X	
Made land*	X		X	X
Meadow	X		X	
Peat	X		X	
Swamp			X	
Tidal marsh**	X		X	
Atsion		X		X
Beaches		X		X
Berryland		X		X
Canadice				X
Fill land, dredged material*				X
Fill land, sandy*				X
Freetown		X		
Ipswich**		X		
Manahawkin		X		
Matunuck**				
Muck				X
Pawcatuck**		X		
Raynham				X
Udipsamments, refuse*		X		
Udipsamments, wet substratum*		X		
Urban Land-Udipsamments,				
wet substratum*		X		
Walpole		X		X
Wareham				X
Whitman				X

RESULTS

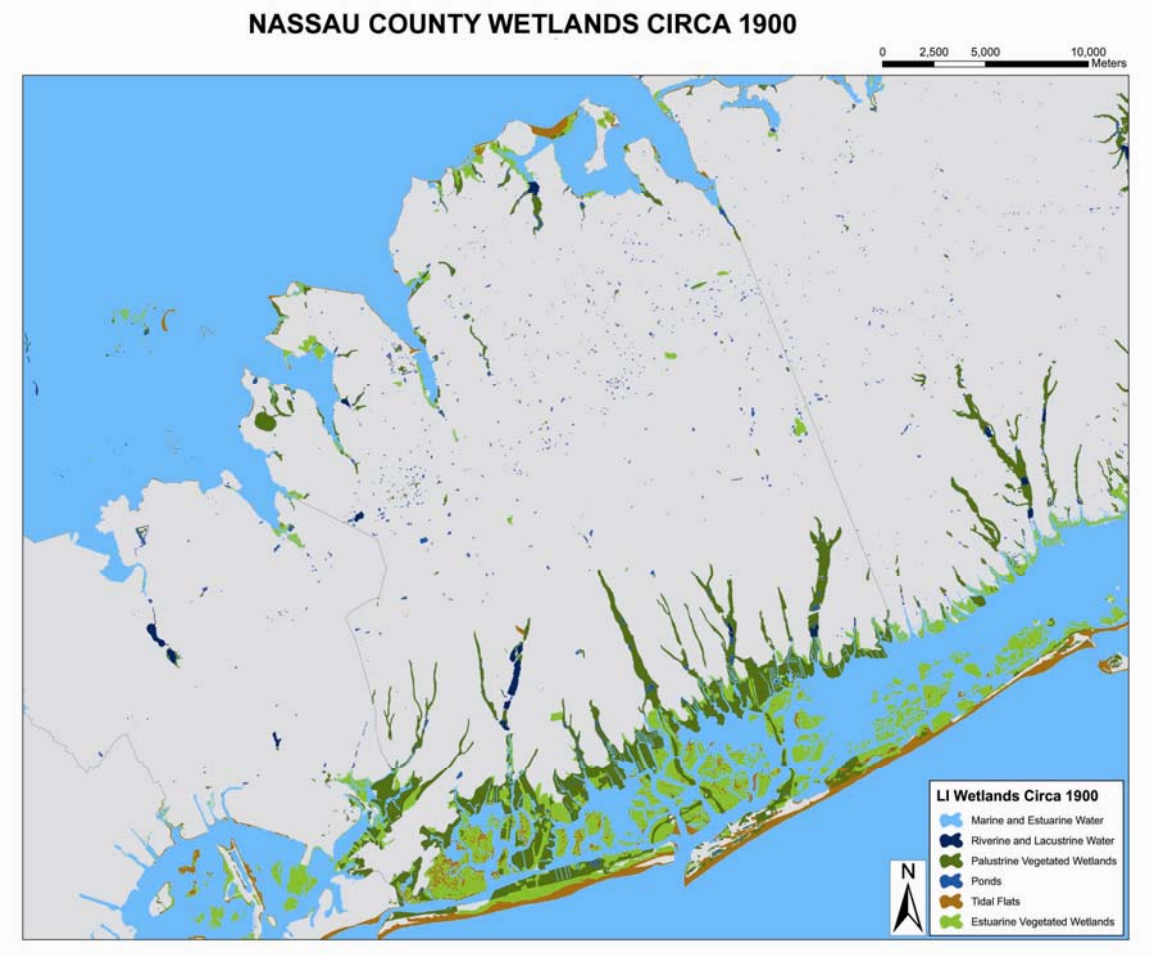
Wetland Extent Circa 1900

By combining three sources of wetland data, the estimated acreage of wetlands for Nassau and Suffolk Counties in the early 1900s was 30,387 acres and 51,618 acres, respectively (Table 2: Figures 2 and 3). Tidal marshes accounted for well over half of the area's wetlands (58% or 47,351 acres), while nontidal wetlands represented 26 percent and sandy beaches 16 percent. Three-quarters of Nassau County's wetlands were tidal marshes, with nearly equal amounts of beaches and freshwater nontidal wetlands. Tidal wetlands represented nearly half (48%) of Suffolk County's wetlands, while freshwater nontidal wetlands were almost twice as extensive as beaches in 1900.

Table 2. Estimates of early 1900s wetlands for Nassau and Suffolk Counties. Ponds were not included in the 2004 acreage in this table because many were created and were not separated into those built in wetlands from those constructed in streams or on upland. Also marine and estuarine nonsandy shores and aquatic beds were not included in the 2004 totals because they have no comparable type from the other data sources. In total these exclusions amounted to about 3,000 acres in Suffolk County and nearly 1,000 acres in Nassau County.

County	General Type	2004 Acres	Soil Survey + Acres	Soil Map + Acres	Total Circa 1900 Acres
Nassau	Beach	2,515	17	1,155	3,687
	Tidal Marsh	8,775	10,627	3,406	22,808
	FW Wetland	1,174	1,548	1,170	3,892
	Total	12,464	12,192	5,731	30,387
Suffolk	Beach	6,936	194	2,141	9,271
	Tidal Marsh	14,926	5,247	4,370	24,543
	FW Wetland	8,724	6,971	2,109	17,804
	Total	30,586	12,412	8,620	51,618

Figure 2. Wetlands of Nassau County circa 1900. Note: The overwhelming majority of the ponds shown were probably not present in the early 1900s - they were built more recently and are included since some ponds are natural. The focus of attention should, however, be on the vegetated wetlands.



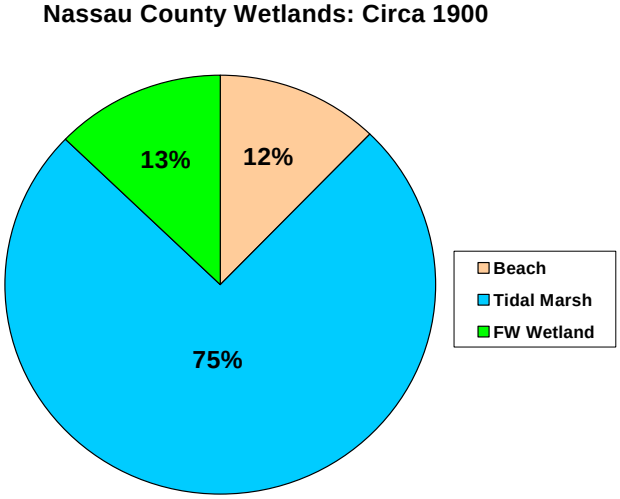
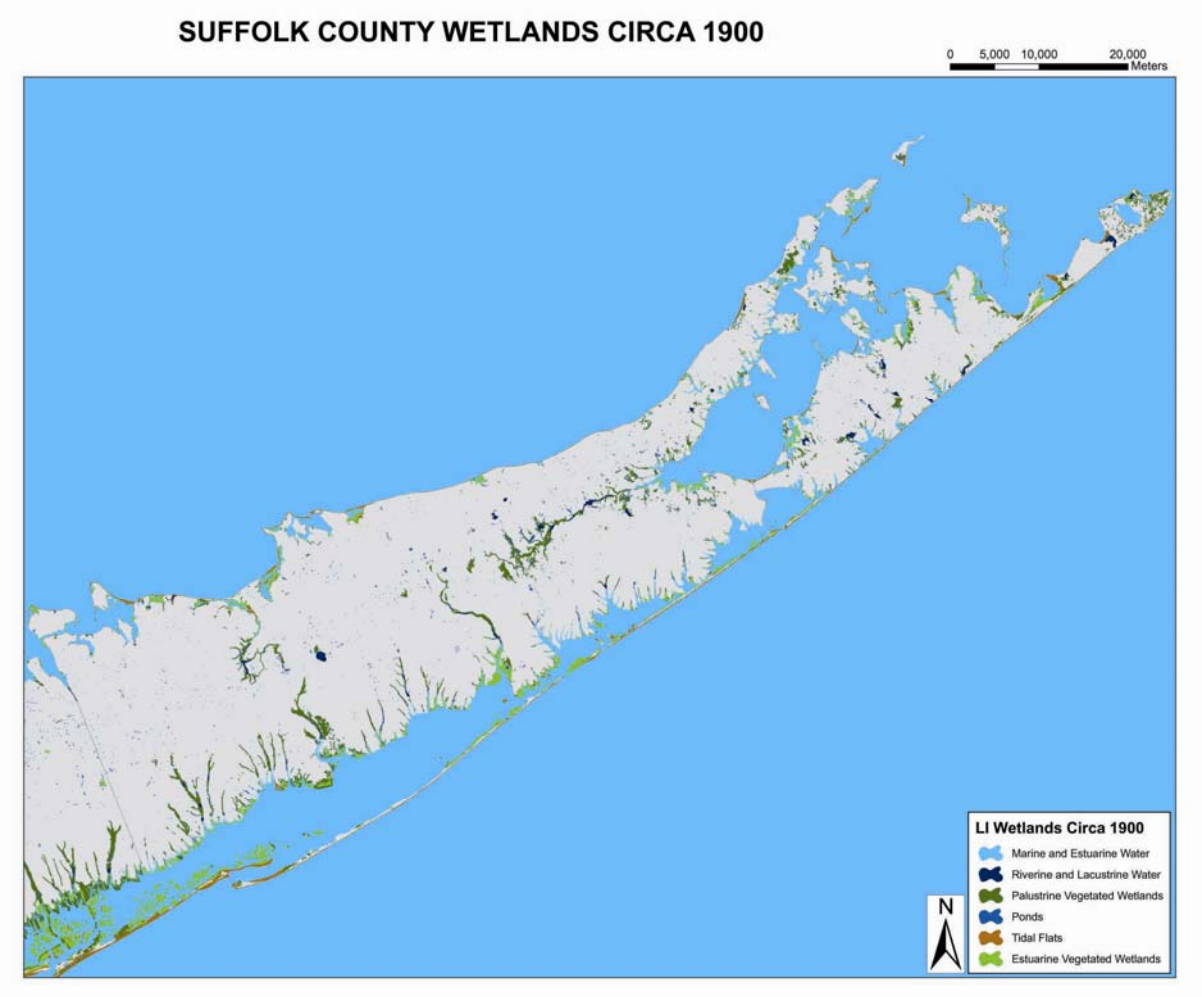
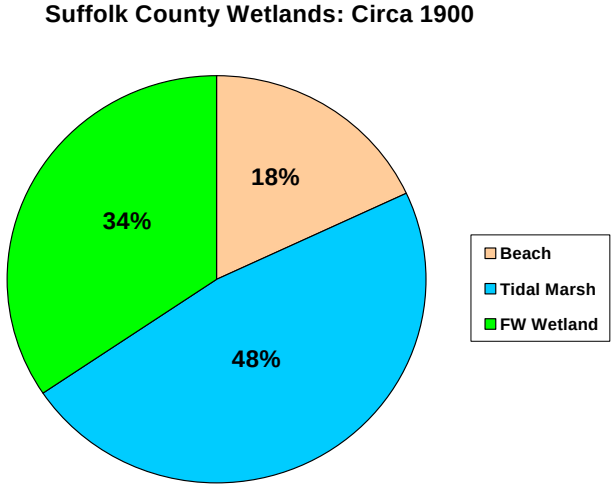


Figure 3. Wetlands of Suffolk County circa 1900. Note: Most of the ponds shown were probably not present in the early 1900s - they were built more recently and are included since some ponds are natural. The focus of attention, however, should be on the vegetated wetlands.



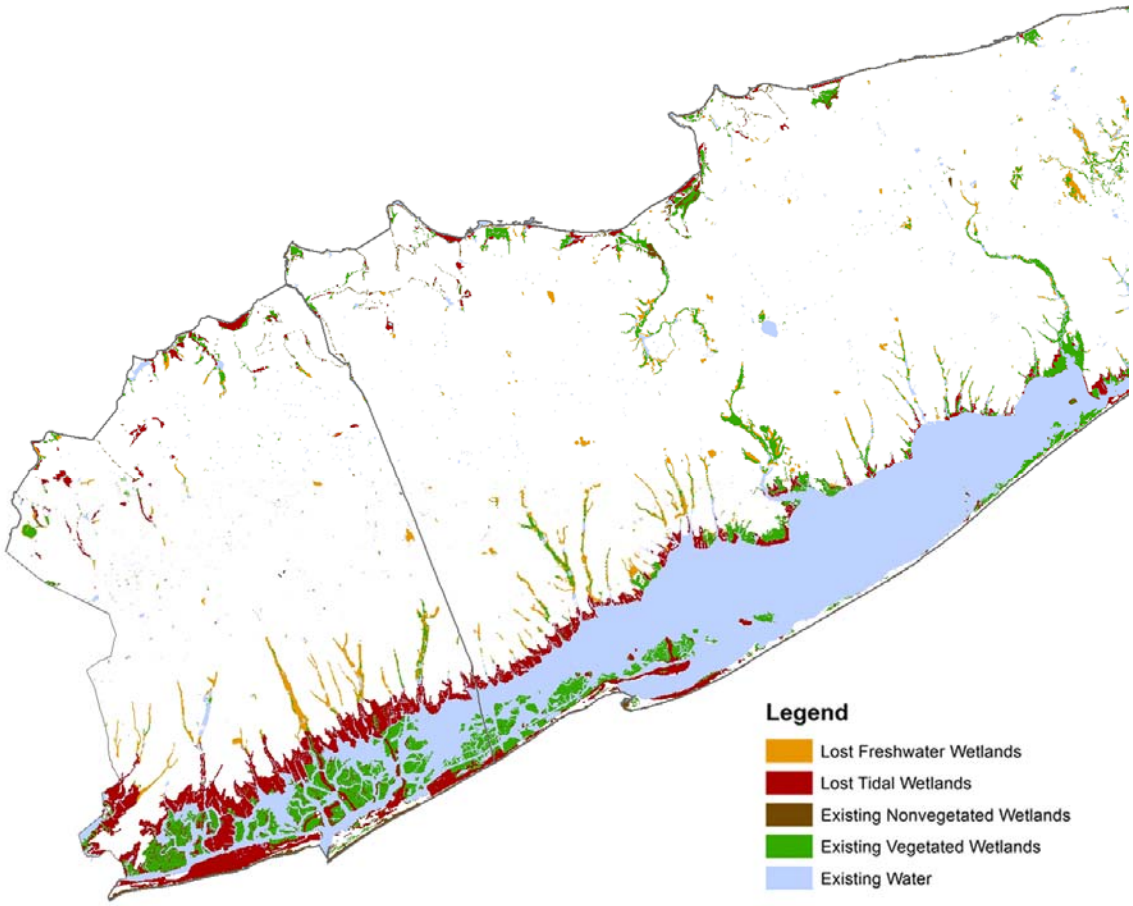


Historic Wetland Losses

When compared to the 2004 acreage, significant losses of Long Island wetlands were found. Nassau and Suffolk Counties may have lost almost 39,000 acres or about 48 percent of its wetlands since the early 1900s: about 3,500 acres of beaches (27% loss), 11,798 acres of freshwater (nontidal) wetlands (54% loss), and nearly 24,000 acres of tidal marshland (50% loss). Nassau County lost over half (59%) of its wetlands including 62 percent of its tidal wetlands (14,033 acres; Figure 4). Suffolk County lost more wetland acreage (21,032 acres) than Nassau County. This amounted to 41 percent of Suffolk County's turn-of-the-century wetlands and 39 percent of its tidal marshlands (Figure 5).

It is important to emphasize that these estimates are derived from existing data and do not represent an exact accounting of losses, but they do show a significant downward trend which is not unexpected given the amount of dredge and fill development that occurred on the island after World War II (Figures 4 and 6). Also detected were two conversions of floodplain wetlands to artificial lakes in Suffolk County: one on the Carmans River and another on the Peconic River (Figure 7). Other river impoundments were created by earlier dams.

Figure 4. Contemporary wetlands for western Long Island (Nassau County and the western end of Suffolk County) showing major losses since the early 1900s.



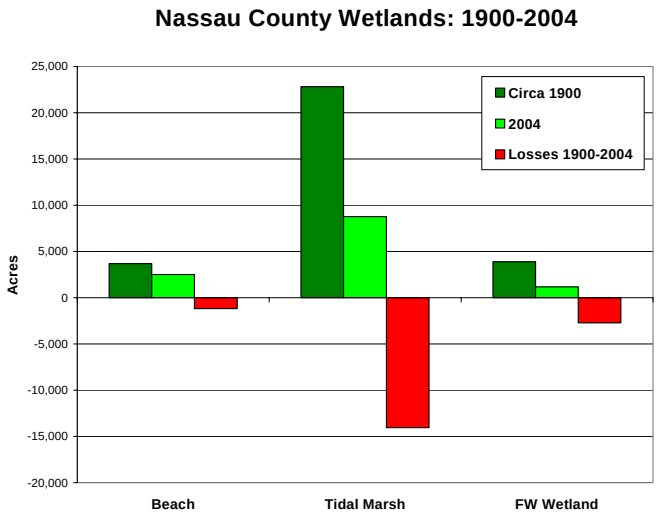
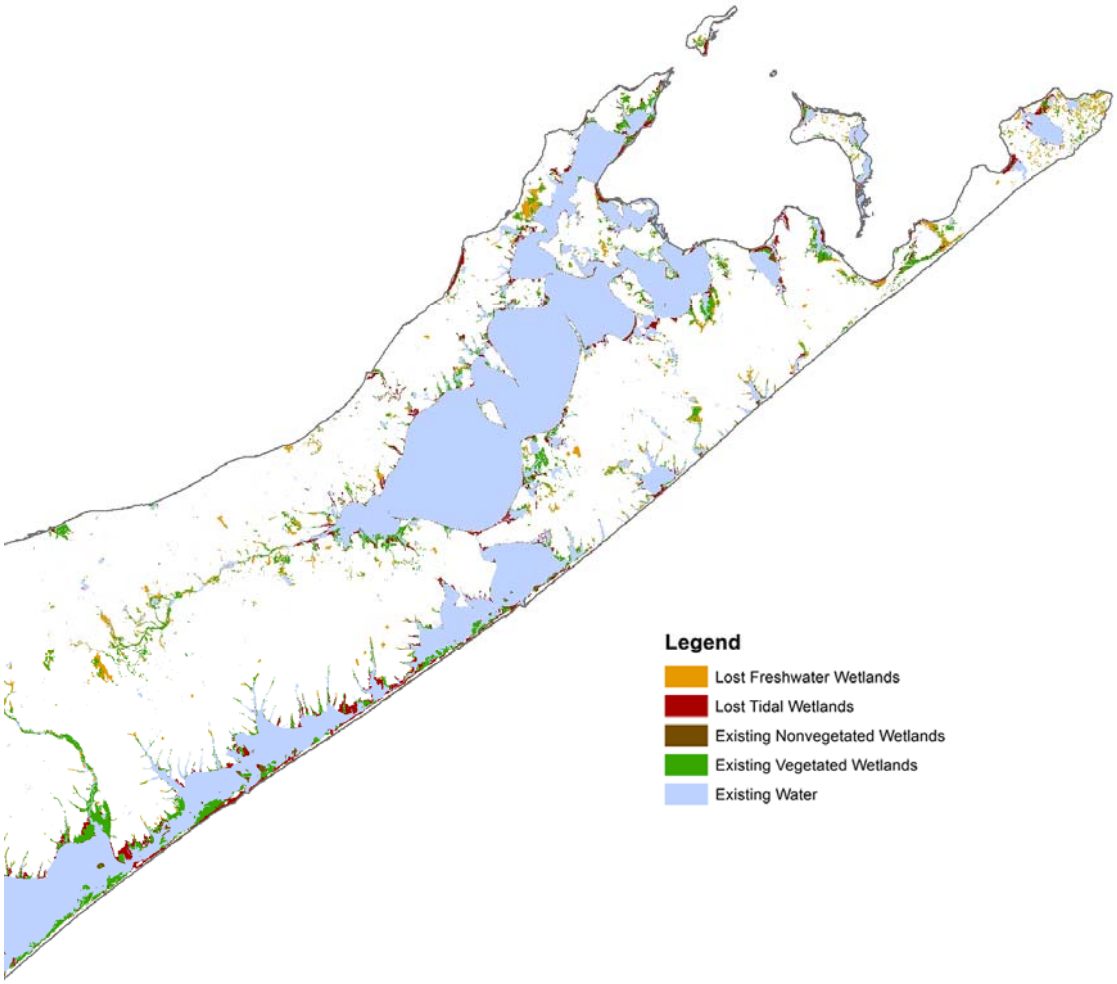


Figure 5. Contemporary wetlands for the eastern end of Long Island showing major losses since the early 1900s based on interpretation of historic soil data.



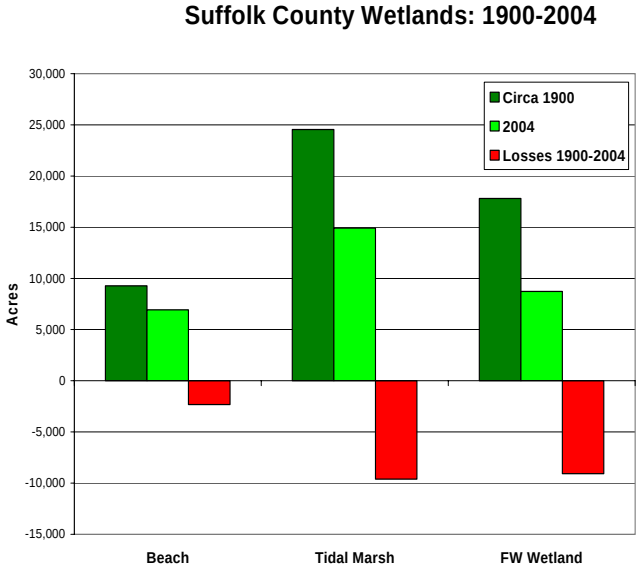
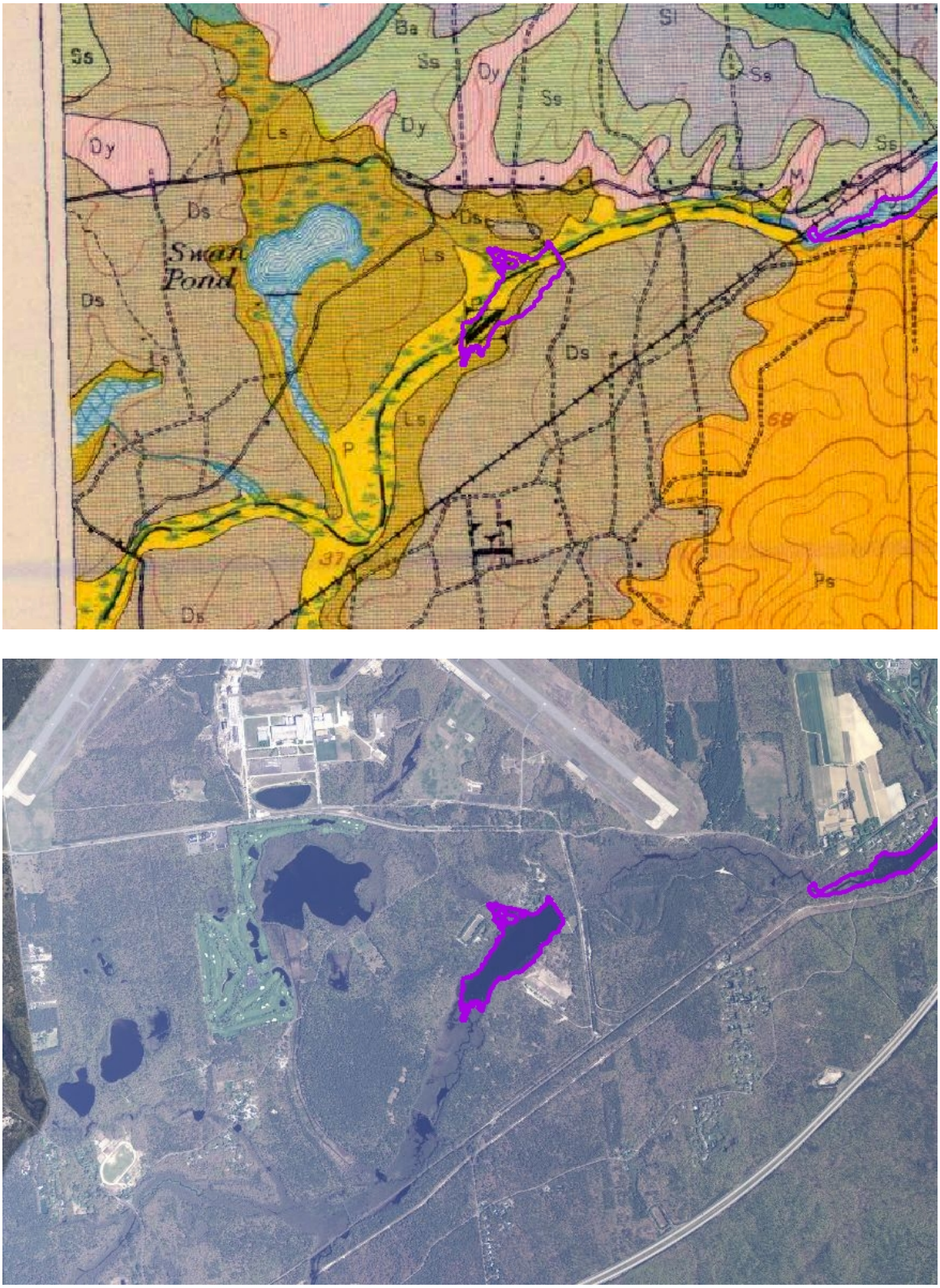


Figure 6. Aerial photos of Copaigue, New York: one showing former tidal wetlands filled in the 1960s in Copaigue, New York (top) and the area today (bottom). All the wetlands were filled prior to tidal wetland regulations in the 1970s. (Al Dole, U.S. Fish and Wildlife Service – top photo)

Figure 7. Dams along rivers caused loss of floodplain wetlands: Peconic River example near Calverton - 1928 soil map (top) and 2004 aerial image (bottom). Note: Alignment issue due to scale; this was corrected during analysis.



SUMMARY

This cursory assessment of wetland changes on Long Island from 1900 to 2004 was based on a comparison between updated National Wetlands Inventory data (U.S. Fish and Wildlife Service) and two sources of soil data (SSURGO data produced by the U.S.D.A. Natural Resources Conservation Service and historic soil maps). This study estimated that Nassau and Suffolk Counties may have had a total of 82,000 acres of wetland at the turn of the century. Since then much wetland loss has occurred. By 2004, these two counties had only about 43,000 acres which is 52 percent of its 1900 acreage. Freshwater (nontidal) wetlands experienced the heaviest losses (11,798 acres or 54%), while tidal marsh acreage declined by nearly 24,000 acres - a 50 percent loss. Nassau County lost over half (59%; 17,923 acres) of its wetlands including 62 percent of its tidal wetlands (14,033 acres). Suffolk County lost more wetland acreage (21,032 acres) – 41 percent of its turn-of-the-century acreage, including 39 percent of its tidal marshlands (9,617 acres) and 51 percent of its freshwater wetlands (9,080 acres).

ACKNOWLEDGMENTS

This study was conducted jointly by the U.S. Fish and Wildlife Service (FWS), Northeast Region and the Conservation Management Institute (CMI) of Virginia Tech (Blacksburg, VA). Ralph Tiner (FWS) was responsible for overall study design, interpretation of data, and preparation of the report. Kevin McGuckin (CMI) was the team leader for Virginia Tech's mapping and GIS operation which performed the image and GIS analyses. Matt Fields (CMI) was the lead interpreter for this project. Pamela Swint also did some of the preliminary work on this project. Peer review of the draft report was performed by John Swords (FWS Region 4), William Kirchner (FWS Region 1), and Jennifer Connolly (FWS Region 5, Southern New England/New York Bight Coastal Ecosystems Program).

REFERENCES

Tiner, R.W. 2011. Wetlands and Deepwater Habitats of Long Island, New York: Status 2004 – Results of the National Wetlands Inventory. U.S. Fish and Wildlife Service, Northeast Region, Hadley, MA.

Warner, J.W., Jr., W.E. Hanna, R.J. Landry, J.P. Wulforst, J.A. Neeley, R.L Holmes, and C.E. Rice. 1975. Soil Survey of Suffolk County, New York. U.S.D.A. Soil Conservation Service, Washington, DC. In cooperation with Cornell University Agricultural Experiment Station.

Wulforst, J.P. 1987. Soil Survey of Nassau County, New York. U.S.D.A. Soil Conservation Service, Washington, DC. In cooperation with Cornell University Agricultural Experiment Station.