Natural Resource Inventory

Norfolk, Connecticut

Natural Resource Inventory

Norfolk, Connecticut 2009

first edition

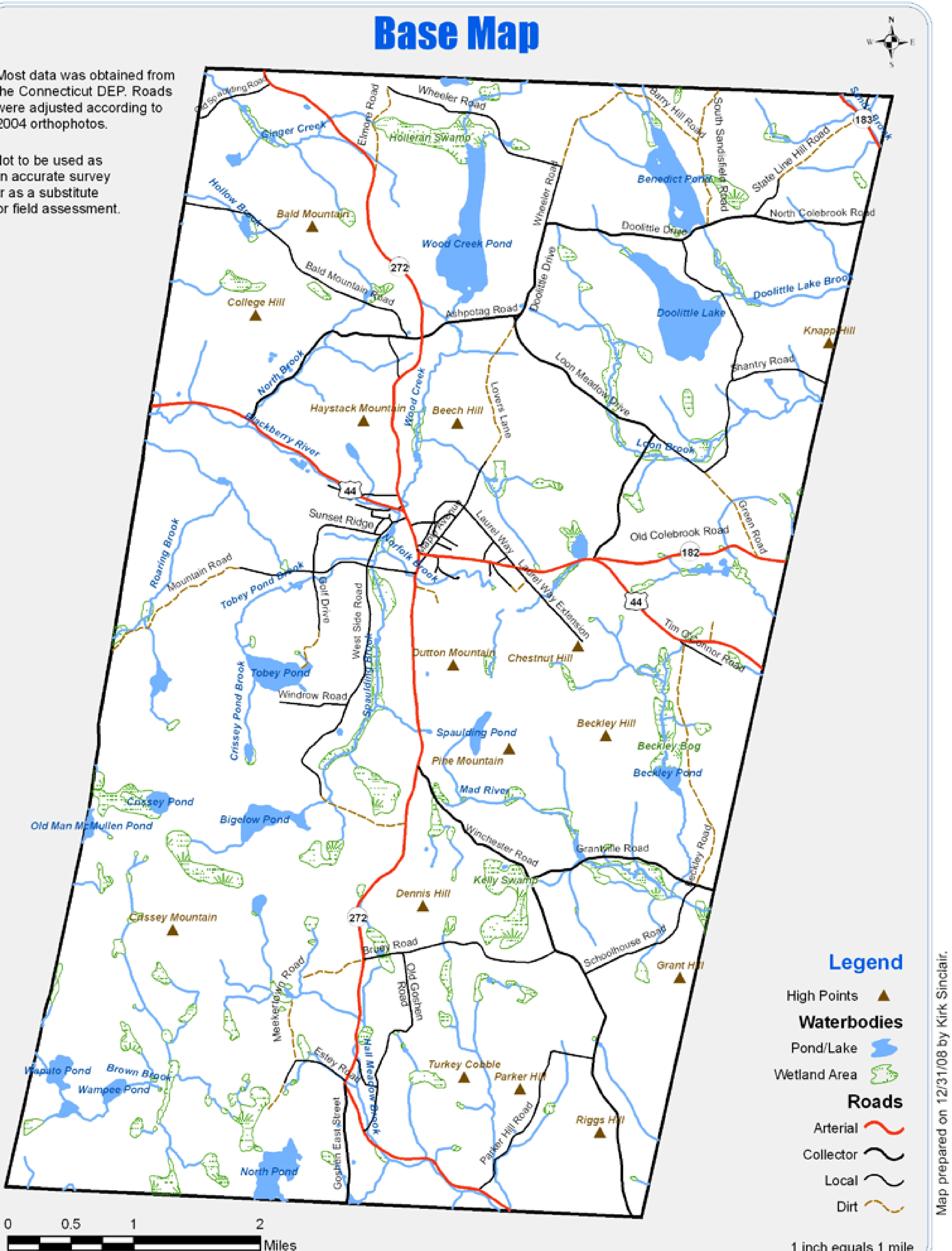
Front cover: Wild iris (Iris versicolor).
© Bruce Frisch
Inside front cover: Pink ladyslipper (Cypripedium acaule).
© Bruce Frisch
Inside back cover: Heron (Ardea herodias).
© Bruce Frisch
Back cover: Northern spring peeper (Pseudacris crucifer).
© Joel Pensley

This report is © copyright, Town of Norfolk, Connecticut. All rights reserved. Individual photographs are the property of the photographers and may not be used apart from this report without written permission from the photographer. Individual copies of this report may be made for personal or noncommercial educational purposes. All other uses must have written permission from the Town. Address the Office of Selectmen, PO Box 552, Norfolk CT 06058. Town Web site: **http://www.norfolkct.org.** Note: some corrections were made after the first printing.

Base Map

Most data was obtained from the Connecticut DEP. Roads were adjusted according to 2004 orthophotos.

Not to be used as an accurate survey or as a substitute for field assessment.



Introduction

The natural world—a web of animal, plant and mineral resources—sustains human existence. Our economies, our lifestyles, our very existence would not be possible without it. Both climate and human development have left many areas of the world relatively poor in natural resources, but Norfolk is fortunate to be rich in them. This inventory attempts to convey how many we have, to list what they are and to explain why they are important.

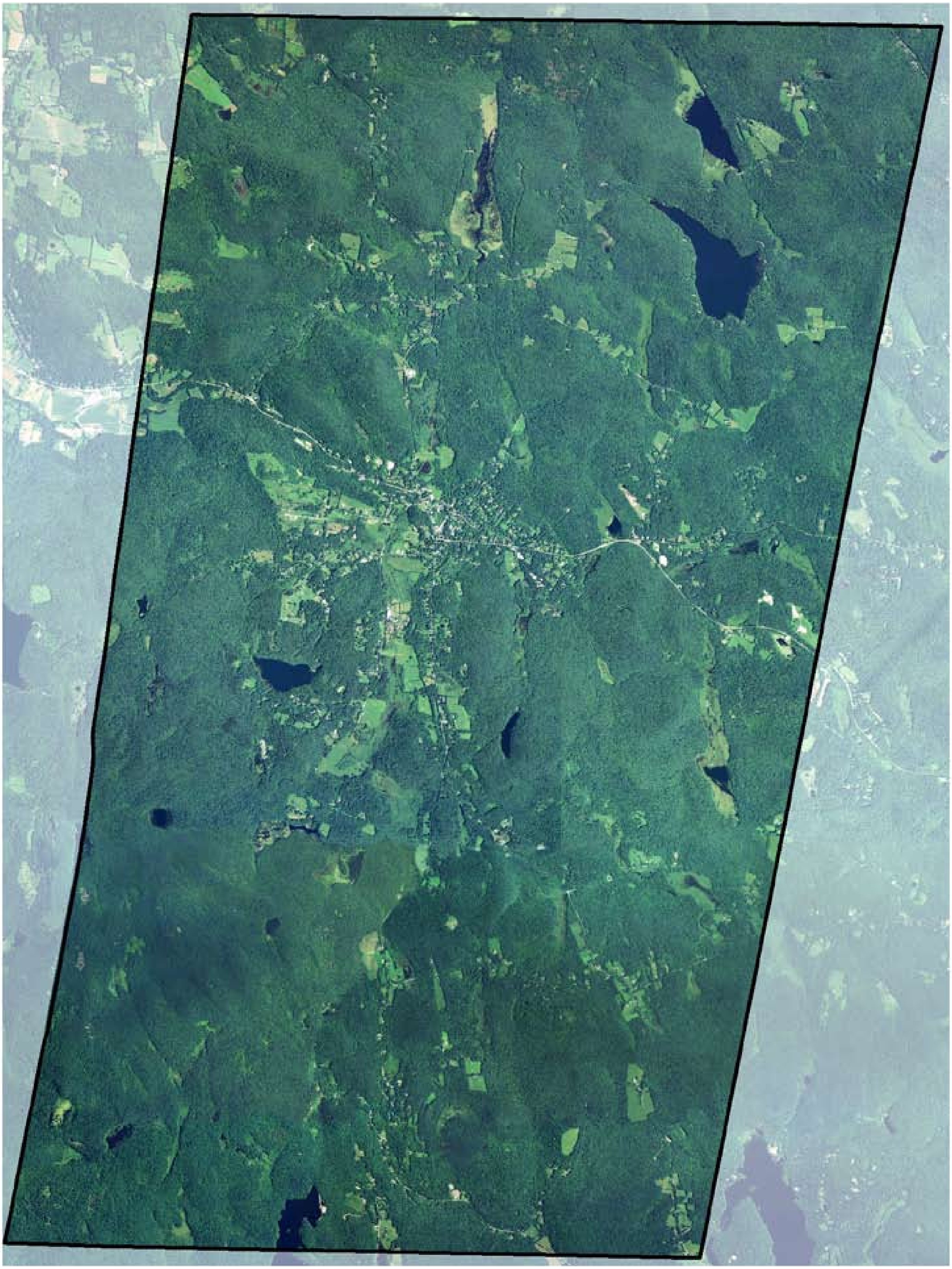
Each of the report's first eight chapters describes a type of resource and its importance. Chapter nine presents scenic resources; chapter ten, historic resources, and chapter eleven contains recommendations based upon the information in all the chapters. The first eight appendices present the meat of the inventory—the lists, tables and charts of data. The ninth is a bibliography and the tenth contains information about the report, its authors and its sources.

Although this project has gone on for more than three years and drawn on the talents of many people, we are still missing some significant portions, such as most of mycology and entomology, and air quality. We intend to produce periodic updates, which we hope will fill the gaps, and invite others to get in touch with the Conservation Commission to contribute information.

This work is being published on the town Web site (http://www.norfolkct.org), as well as in print.

Table of Contents *Natural Resource Inventory*

Sailboat on Tobey Pond.
© Alexandra Childs



Courtesy USDA Natural Resources Conservation Service

Aerial view of Norfolk, taken in 2008.

Geography and Geology of Norfolk

© Jean Grasmere

*T*he town of Norfolk lies in the northwest corner of Connecticut. Shaped like a parallelogram 9 miles tall and an average 4.5 miles wide, it covers a little more than 40 square miles or approximately 30,000 acres of land. The town is bordered on the west by North Canaan and Falls Village, on the south by Goshen, on the east by Winchester and Colebrook, and on the north by the Massachusetts towns of Sandisfield and New Marlborough. Norfolk's highest points are Bald Mountain and Crissey Mountain at 1,770 feet above sea level. Its lowest point is in the Blackberry River valley at just under 820 feet, for a total relief of 950 feet.

Geography

Norfolk is located in the southernmost foothills of the ancient Berkshire Mountains in the area known as the Northwest Highlands. The area, also called the Litchfield Hills and the Berkshire Plateau, is the area of the greatest elevation and coolest climate in the state. One of the last sections of the state to be settled, Norfolk lies along the old Albany Turnpike, established in the 1700's, the highway connecting Hartford, Connecticut, to Albany, New York. Winding in a more or less east-west direction, it is now known as U.S. Route 44. The other main highway through town is Connecticut Route 272 that links Norfolk with Torrington to the south and the Massachusetts towns of Southfield and New Marlborough to the north. A rail line once ran through town, but was abandoned in the 1950's; the railroad bed has now mostly been converted to hiking trails. Despite its location at this crossroads, the town's generally non-agricultural and poorly drained, stony soils; its partially limited natural resources, and its often harsh weather have kept it relatively remote and undeveloped.

Norfolk's hilly topography is primarily determined by its bedrock and secondarily by the erosional action of glaciers, streams and lakes. In the south central part of town is the dome-like Dennis Hill (1,627 feet), at the top of three watersheds. The north-south valley of the upper Blackberry River is the only considerable depression in the town. Significant hills in town are Bald Mountain, Crissey Mountain, Dennis Hill, Haystack Mountain (1,677 feet), Dutton Mountain (1,620 feet) and Pine Mountain (1,560 feet). These hilltops are the remnants of a relatively flat

© Bruce Frisch

View of western hills from Litchfield Road.

erosion plain that has been shaped by ice and water into its present contours. The bedrock is intensely folded as a result of past continental plate collisions; outcrops punctuate the countryside.

Norfolk sits at the top of the division between the watersheds of the two largest rivers in the state: the Connecticut and the Housatonic. Rain running off the summit of Dennis Hill reaches the Connecticut River to the east, the Housatonic River to the west and the Naugatuck River to the south (eventually joining the Housatonic farther down stream).

Of the many watercourses in Norfolk, both named and unnamed, the Blackberry River is the largest. Its headwater tributaries are Spaulding Brook, which flows over Buttermilk Falls and has as its tributaries Tobey Pond Brook and Norfolk Brook; Wood Creek, which drains Wood Creek Pond, and the Whiting River. The Whiting does not enter Norfolk but by the time it meets the Blackberry in Canaan it includes Ginger Creek, which drains Holleran Swamp; Hollow Brook, and another, unnamed Norfolk stream. North Brook and Roaring Brook are also tributaries of the Blackberry.

Next in size is Sandy Brook in the northeast corner of town. Only a short quarter-mile section lies within Norfolk, but two longer tributaries begin in town. Doolittle Lake Brook, also known as Brummagem Brook, drains Benedict Pond and Doolittle Lake, the two largest ponds in Norfolk. Loon Brook is the other tributary and both join Sandy Brook in Colebrook. The Mad River begins at Spaulding Pond near the middle of Norfolk and runs through Grant Swamp at the east edge of town, where it is joined by a tributary, Beckley Pond Brook. Hall Meadow Brook, which flows eventually to the Naugatuck River, drains land in South Norfolk and has several unnamed tributaries. Many of these rivers and streams have or have had dams and were used in the past for water power.

Norfolk has many ponds, most of which have had the water levels managed by landowners. Besides those already mentioned, Tobey Pond is an important deep cold-water pond, with minimum development; it is the location of the town beach. There is also a cold, acid bog next to the pond. Beckley Pond and the associated Beckley Bog are well-known in town, forming one of the oldest preserved natural areas owned by the Nature Conservancy. The state-owned Wood Creek Pond is man-made, but its wetlands include Holleran Swamp, a forested bog also owned by the Nature Conservancy. North Pond, partially in the south end of town, is owned by a water company. Norfolk's own town water comes from Wangum Lake, which lies entirely in the adjacent town of Falls Village and is owned by a private water company. Except in the center of town where public water and sewer service is available, most residents have ground water supplies from deep drilled wells, although a few people may still have water from spring-fed sources.

More information about Norfolk's aquatic resources appears in Chapter 4.

© Alexandra Childs

Typical rock with contorted banding.

Geology

A great array of forces shaped the topography and geology of the land we know as Norfolk. Beginning nearly a billion years ago, continental collisions and break-ups resulted in submerged marine deposits folding back upon themselves, creating high mountains with an elevation of perhaps as much as 30,000 feet. About 200 million years ago, these mountains began to erode until they largely disappeared, leaving Connecticut's bedrock behind. Then, around 60 million years ago, a phenomenon called tertiary uplift caused Connecticut's surface to tilt upward. The region around Norfolk, the Northwest Highlands, became the highest. It inclines a few degrees to the south-southeastward, accounting for the southerly flow of most of its rivers toward Long Island Sound.

Bedrock Geology

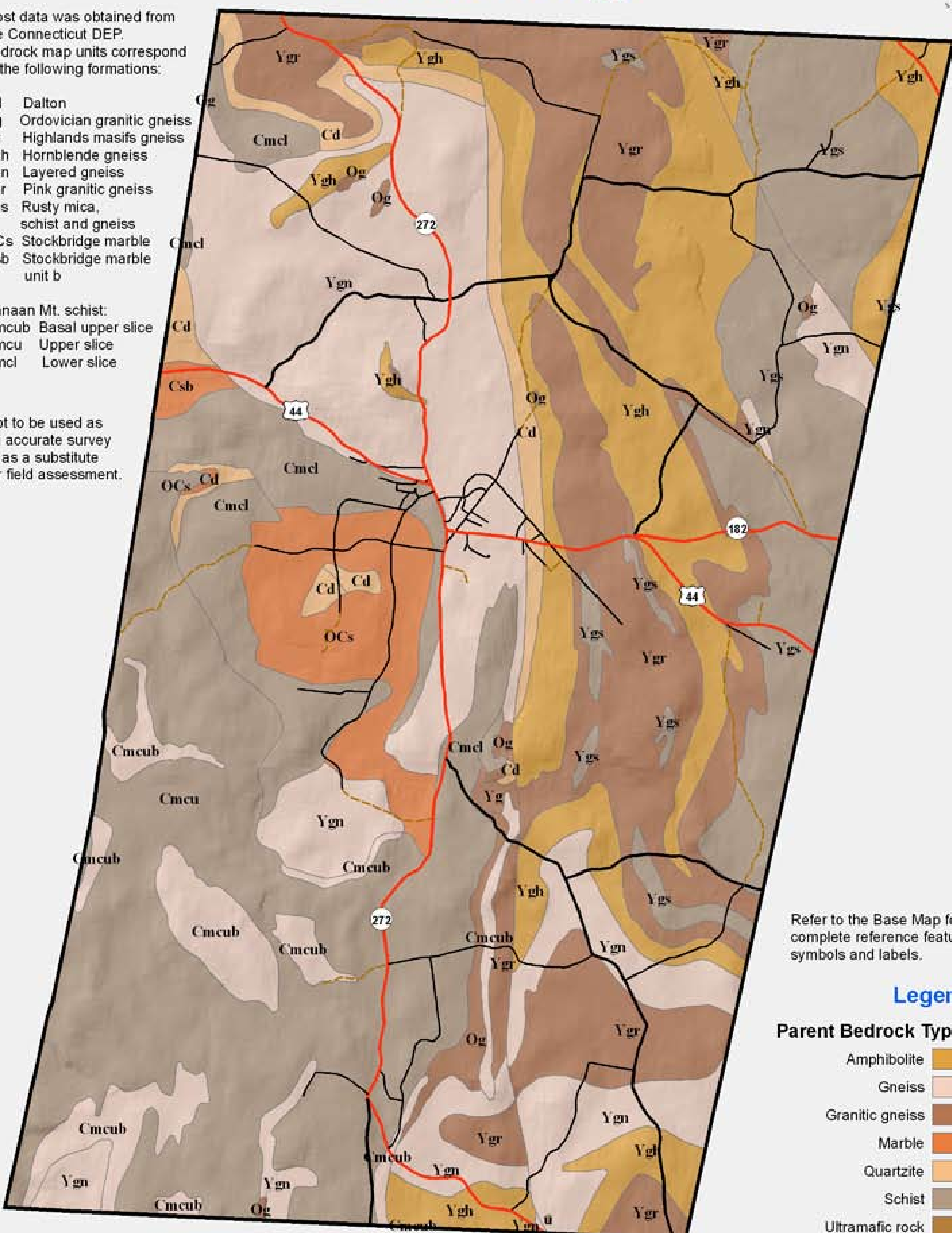
Most data was obtained from the Connecticut DEP. Bedrock map units correspond to the following formations:

Cd	Dalton
Og	Ordovician granitic gneiss
Yg	Highlands masifs gneiss
Ygh	Hornblende gneiss
Ygn	Layered gneiss
Ygr	Pink granitic gneiss
Ygs	Rusty mica, schist and gneiss
OCs	Stockbridge marble
Csb	Stockbridge marble unit b

Canaan Mt. schist:

Cmcub	Basal upper slice
Cmcu	Upper slice
Cmcl	Lower slice

Not to be used as an accurate survey or as a substitute for field assessment.



0 0.5 1 2 Miles

Refer to the Base Map for complete reference feature symbols and labels.

Legend

Parent Bedrock Types

- Amphibolite
- Gneiss
- Granitic gneiss
- Marble
- Quartzite
- Schist
- Ultramafic rock

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

The glacial epoch began approximately 3 million years ago and featured successive advances and retreats of deep ice cover. At the height of the last ice age, ice sheets up to a mile thick covered parts of New England. Advancing ice carried much of Norfolk's soil southward, replacing it with till and boulders. The ice moved from northwest to southeast, accentuating the northwest-southeast axis of Norfolk's hills. The glaciers left striations in the bedrock from material dragged by the ice, and large "erratics," boulders such as Meetinghouse Rock in Great Mountain Forest. As the ice melted, its front blocked the north end of the Blackberry River valley, damming the waters into a lake and forcing them to find a new outlet into the Mad River Valley. In this prehistoric Norfolk Lake, the ice deposited the delta-shaped terrace plain on the west of the present valley, at the north end of which are the Norfolk Downs.

Around 15,000 years ago, as the ice sheet retreated and floodwaters receded, vegetation reappeared. Water remained in beautiful "kettle holes" such as Tobey Pond.

Bedrock and Surficial Materials

Norfolk's underlying bedrock consists of igneous and metamorphic rock. The upland areas are underlain by crystalline rock such as granite, gneiss and schist. The prevailing rock is a gray, quartzose biotite gneiss, sometimes with straight but more frequently with much contorted banding. Over considerable areas, particularly in the western part of town, a similar rock occurs, but with abundant glistening scales of white mica and nodules of feldspar and garnet. On the weathered surface this rock presents a peculiarly knotted or knobby appearance. Associated with the gray biotitic gneiss are areas of hornblende gneiss, in many places with abundant minute red garnets. The ordinary gray and the hornblende gneiss are often intermingled. Gneiss is an acidic rock, resulting in soils that tend to have a low (acid) pH. Pegmatite, a coarsely crystalline granite, is also found in veins in the gneiss; one of the largest exposures of this rock occurs about a mile south of the village, uphill from Route 272.

Areas of marble occur around Crissey Mountain and in the broad valley of the Blackberry River. Some of this marble occurs buried under more recent (glacial) sediments and some groundwater may be of a higher pH if it passes through this buried layer. Because of its limited extent, however, marble bedrock generally contributes little to Norfolk's soils. Any occurrence of marble in Norfolk's soil is glacially transported material from the Housatonic Marble Valley farther north-west. Marble generally neutralizes soil acidity.

A small but noticeable area of talc serpentine, a rock formation that is very unusual for Connecticut, is located in the eastern wall of Hall Meadow Brook near the Goshen line. Serpentine is composed of magnesium silicate and appears green. Such rocks generally contain unusual minerals, including asbestos. Soils derived from these rocks are toxic and supply habitat for some unusual plants, ones that can survive such hostile environments. The vegetation over serpentine is generally low scrub or grasslands.

Materials above the stable base of bedrock, such as till, sand, gravel, silt, clay, swamp deposits, stones and boulders, are known as unconsolidated materials. Norfolk's till is stony, from 10 to 50 feet deep in most places and characterized by many boulders.

Our Geologic Heritage

Over the years, the geology of the region has provided an economic base for the town. Among the mineral resources found here are gneiss, granite, gravel, mica, semi-precious stones and a variety of soils. Many old granite and gravel quarries are present, including a granite quarry on the east side of Bald Mountain and a gravel quarry at Spaulding Pond. Two pits were also opened for the exploitation of iron, one on Dutton Mountain and the other northwest of Beckley (formerly known as Blakely) Pond. A portion of Norfolk's geologic heritage exists in the buildings, foundations, industrial structures and stone walls constructed in the eighteenth and nineteenth centuries.

Bedrock and past glacial action are the primary determinants that shaped Norfolk's present landscape, but its history has been complex. Norfolk sits atop a rise of an ancient continent's edge. Rocks originally laid down in horizontal layers on the continental margin have been compressed, folded, thrust over, fractured, shifted, deeply buried, uplifted and eroded like a canvas that has been repainted many times. What we see now is a rough slice of that composition; it provides the variety of terrain, minerals and materials that help make Norfolk unique.

Geologic features are a nonrenewable resource. Many are scenic, some provide habitat for sensitive lichens and mosses, as well as specialized habitat for animals, and some are an integral part of storage areas for drinking water. For recommendations based on the information in this chapter, see Chapter 11 on page 66. For a short bibliography, see Appendix 9.

© Jean Grasmere

Glacial erratic.

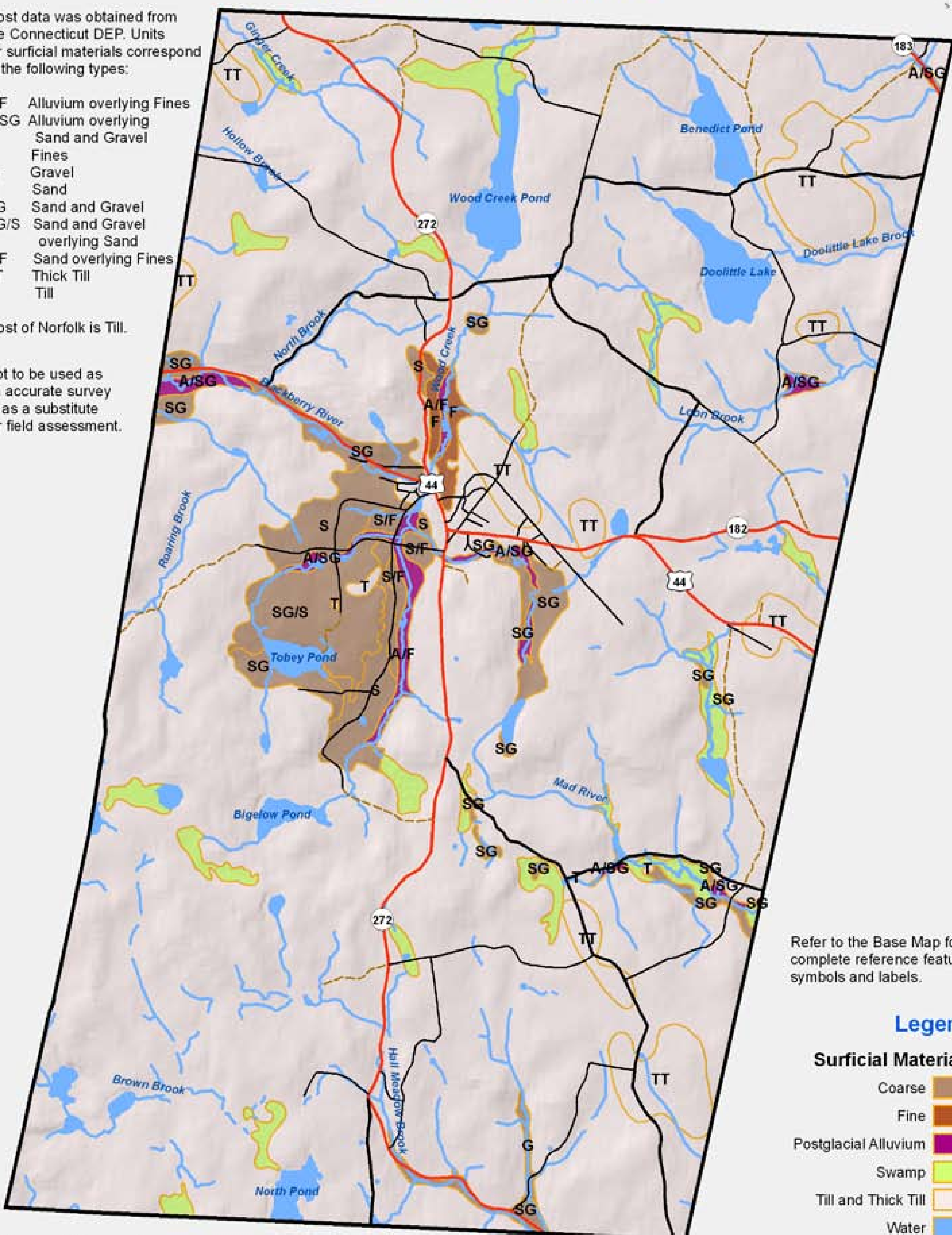
Surficial Materials

Most data was obtained from the Connecticut DEP. Units for surficial materials correspond to the following types:

A/F	Alluvium overlying Fines
A/SG	Alluvium overlying Sand and Gravel
F	Fines
G	Gravel
S	Sand
SG	Sand and Gravel
SG/S	Sand and Gravel overlying Sand
S/F	Sand overlying Fines
TT	Thick Till
T	Till

Most of Norfolk is Till.

Not to be used as an accurate survey or as a substitute for field assessment.



Refer to the Base Map for complete reference feature symbols and labels.

Legend

Surficial Materials

- Coarse
- Fine
- Postglacial Alluvium
- Swamp
- Till and Thick Till
- Water

0 0.5 1 2 Miles

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

Norfolk's Weather

© Bruce Frisch

*T*wo factors strongly contribute to Norfolk's standing as the coldest and snowiest town in the state and earn it its nickname "the Icebox of Connecticut." Because of its relatively high elevation, described in the previous chapter on geography and geology, along with its relative lack of built-up areas, Norfolk typically records temperatures 5 to 10 degrees Fahrenheit cooler than the regions that are lower and more built up, such as Torrington and Hartford. And its location more than 60 miles from the coast generally insulates Norfolk from the moderating influence of Long Island Sound. In fact, Norfolk's temperate continental climate is more similar to that of Albany, New York, or Pittsfield, Massachusetts, than it is to the rest of Connecticut.

It often is snowing in Norfolk while it is raining in Hartford, Torrington and Winsted. During winter nor'easter-type storms Norfolk can record snowfalls of 20 to 30 inches. It is fairly common for Connecticut's snow/rain borderline to be situated in the vicinity of Interstate 84 with heavier snowfall recorded as one moves higher in elevation and farther away from the coast. The Litchfield Hills often record the highest snow totals from these and other winter storms, with Norfolk frequently at the top of the list for snowfall amounts. When the snow/rain borderline moves north, as it does on occasion, Norfolk, with its higher elevation and cooler temperatures, can often be hit with freezing rain and damage to trees and power lines from heavy ice build-up.

Hurricane force winds are extremely uncommon this far from the coast, but hurricanes can bring record rainfalls to Norfolk. The Great Hurricane of 1938 produced 7.07 inches from September 21 to 22, part of a nine-day period in which 12.14 inches fell. In 1955, Hurricane Connie produced 9.02 inches from August 11 to 14, followed by Hurricane Diane, which produced 12.88 inches from August 17 to 19—21.90 inches of rain in nine days.

Weather Data

Norfolk's weather station, founded by Edward C. Childs, has recorded a comprehensive set of weather observations every day since January 1, 1932. The station is located on Windrow Road and is currently maintained and operated by the Great Mountain Forest Corporation. It is one of the few weather stations in a location that has changed very little over time, making its observations more consistent. More charts and more information about the station appear in Appendix 1.

Norfolk's annual average mean temperature is 44.7 degrees Fahrenheit. The warmest month of the year is July with an average mean temperature of 68.0 degrees Fahrenheit, and the coldest month is January with an average mean temperature of 20.8 degrees Fahrenheit. The average minimum temperature is 37.3 degrees Fahrenheit; the low month is February with 8.9 degrees Fahrenheit and the highest, July with 63.9 degrees Fahrenheit. The average maximum temperature is 51.9 degrees Fahrenheit; the low month is February with 31.0 degrees Fahrenheit and the highest is July with 72.1 degrees Fahrenheit. On average, the temperature in Norfolk reaches 90 degrees Fahrenheit or higher just 2.5 times per year.

Since January 1932, the highest temperature recorded at this station was 101 degrees Fahrenheit on June 29, 1933, and the lowest temperature was minus 26 degrees Fahrenheit recorded on February 16, 1943. Also on February 16, 1943, a temperature of minus 37 degrees Fahrenheit was recorded at a satellite station in the valley on Westside Road. According to the National Weather Service this was the coldest official temperature ever recorded in Connecticut.

Norfolk's average annual precipitation amount of 52.46 inches is well distributed throughout the year. The average annual snowfall of 91.2 inches usually produces a

© Bruce Frisch

View south from Bruey Road after ice storm.

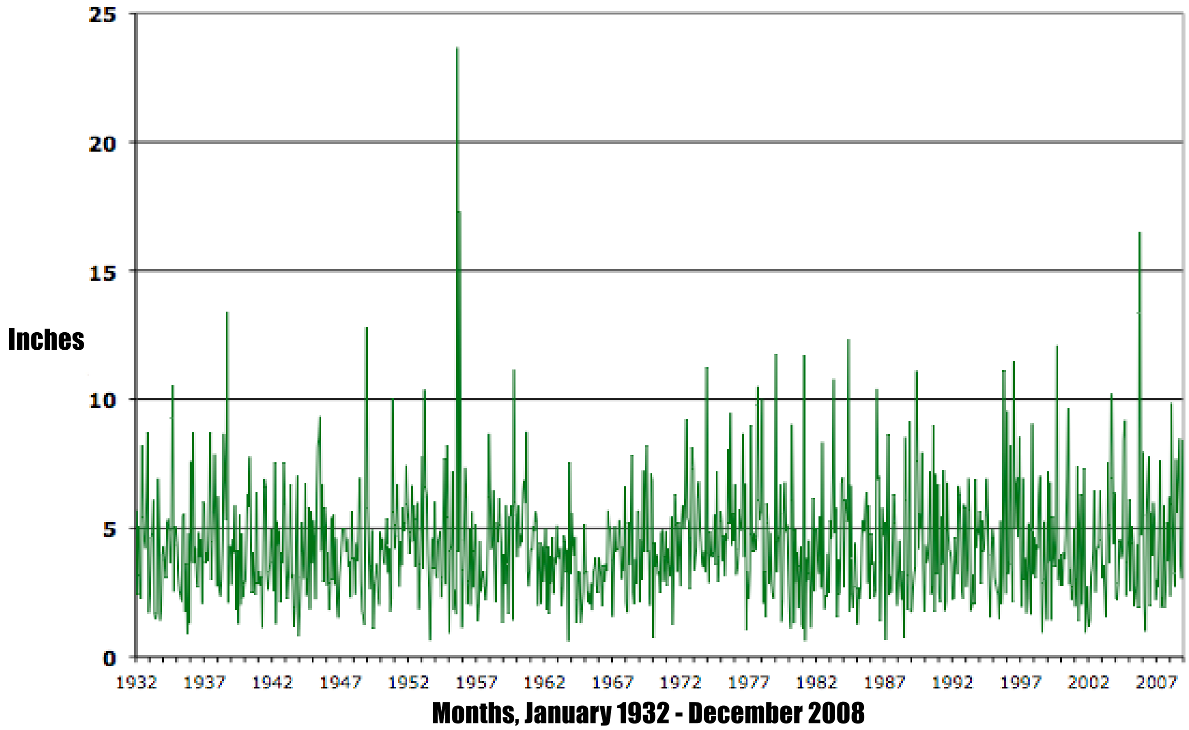
snow cover that typically lasts from early December well into April. It is not uncommon to have snow as early as October and as late as May.

The annual average mean barometric pressure is 30.02 inches, with the monthly average mean pressure ranging from 30.00 to 30.06. The prevailing wind direction is typically from the northwest during most of the year. During July, August and September the prevailing wind typically comes from the southwest.

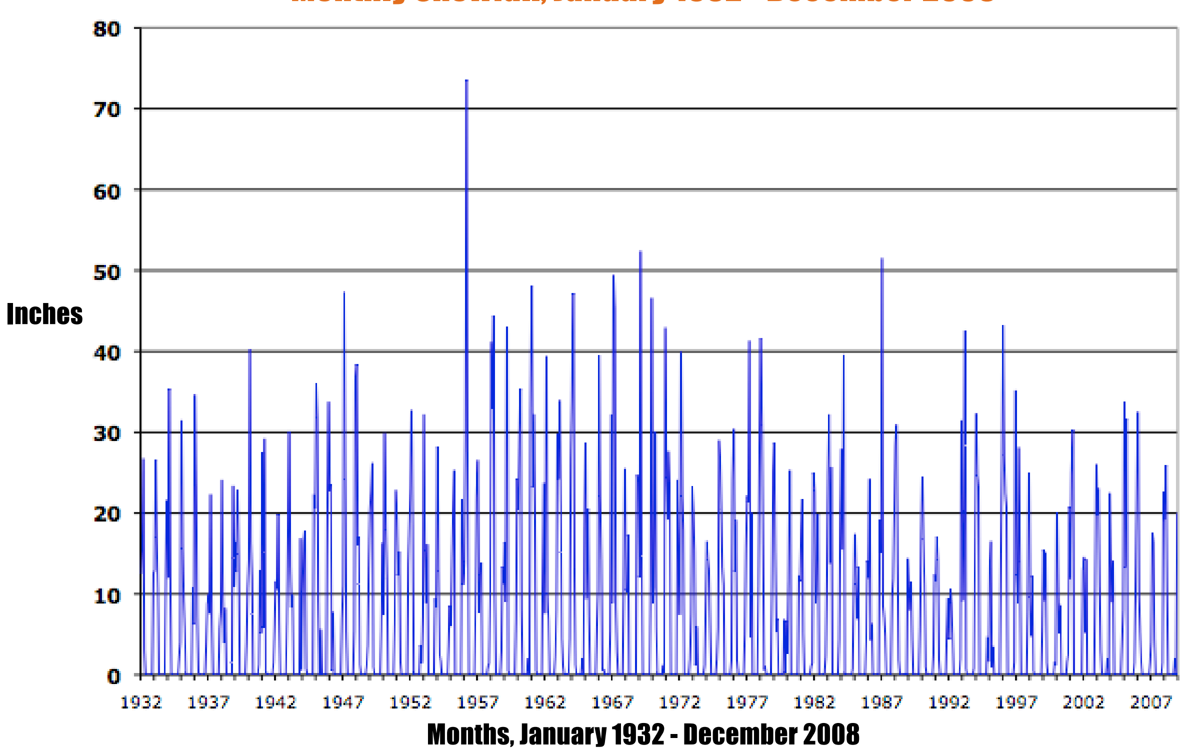
The graphs below show precipitation and snowfall trends from January 1932, when Edward Childs started keeping records, through December 2008. Precipitation includes rain and melted snow, sleet and freezing rain. More information, in the form of graphs and tables, appears in Appendix 1.

The recommendations that are based on the information in this chapter and Appendix 1 appear in Chapter 11 starting on page 66.

Precipitation, January 1932 - December 2008



Monthly Snowfall, January 1932 - December 2008



Soils of Norfolk

© Bruce Frisch

Soil is a vital part of Norfolk's natural environment. It is just as important as plants, animals, rocks and landforms. In fact, life as we know it could not exist without soil. Soils are important for growing food, disposing of our waste, supporting our buildings and roads, growing timber, providing habitat for wildlife and collecting and filtering all the drinking water we consume. Norfolk would be unlivable if not for the existence of healthy soils.

Soils not only reflect natural processes but also record human activities both at present and in the past and therefore make up part of our cultural heritage. The modifications of soils by agriculture and historical settlement patterns are well recorded in the soil profiles all over Norfolk.

Soil, together with the plant and animal life it supports, the rocks and glacial till on which it develops, its position in the landscape and the climate it experiences, forms an amazingly intricate natural system. It is constantly changing and developing through time, responding to changes in environmental factors, including the influence of human use. Some changes in the soil can be short lived and reversible, others can permanently degrade a soil's function; although it takes an average of 500 years for an inch of new soil to develop in Norfolk (Hollis soils take 1,000 years), it can be completely degraded in only a couple of minutes.

What is Soil?

Soil is a mixture of components, including rocks and minerals, air, water and organic matter in varying ratios. These soil components, acted upon by 15,000 years of weathering action from gravity, water, wind, and freeze-thaw cycles, have all played a role in the 100 or so soils that have been found and described in Norfolk.

Glacial processes make the soils of Norfolk relatively young. The most recent glacier age ended about 15,000 years ago and is responsible for the shape of the present land surface. As an immensely thick sheet of ice scraped, crushed, ground, compacted and washed its way across Norfolk, it extensively modified the landscape. When the glacier melted, material ranging in thickness from a few inches to hundreds of feet was deposited over the remains of the preglacial landscape. The glacial deposits make up the parent materials in which most of Norfolk's soils were formed.

The soils of Norfolk have been described mainly using their parent materials (the components from which the soil is formed), their textures and how well drained they are. Soil scientists have been collecting and describing these data, along with site information, for many years. These field and laboratory data are used to classify and map soils to produce a comprehensive soil survey.

Areas with similar soils are grouped and labeled as soil series because their similar origins and properties cause the soils to perform similarly for land use purposes. A soil series name generally is derived from a town or landmark in or near the area where the soil was first recognized. For example, the Loonmeadow soil series was named for the area of east Norfolk, historically called Loon Meadow, near Loon Meadow Drive and Loon Brook.

Courtesy USDA Natural Resources Conservation Service

Profile of Paxton soil, which is formed in glacial till.

Parent Material

Most of the soils of Norfolk are formed from one of six parent materials: till, glaciofluvial deposits, glaciolacustrine deposits, alluvium, loess or organic deposits.

Till or Glacial Till

Till is an unstratified heterogeneous mixture with varying amounts of sand, silt and clay along with angular shaped gravel, cobbles, stones and boulders that were deposited by the ice with little or no water transportation. Till ranges from very friable melt-out types to extremely firm and dense lodgement types. Dense tills are often informally described as hardpan. Compact, slowly permeable till will often cause a perched water table in the soil.

Most of the soils in Norfolk are formed in glacial till. These soil series include Gloucester, Westminster, Hollis, Chatfield, Millsite, Charlton, Canton, Bice, Paxton, Montauk, Shelburne, Sutton, Schroon, Woodbridge, Ashfield, Leicester, Ridgebury, Mudgepond, Loonmeadow, Whitman and Alden soils.

Glaciofluvial Deposits

These materials are sorted into stratified layers of contrasting textures by rivers and streams flowing from melting glaciers. Glaciofluvial soils are dominated by sandy textures, in some cases accompanied by surface mantles or thin strata of loamy or silty soil. The finer silt and clay particles generally were carried off and deposited separately by the flowing melt waters. Rock fragments in the soil are normally rounded and polished, and are often stratified by size. The coarse texture results in highly permeable soils that are important ground water aquifers.

Norfolk has many soils formed in glacial river deposits located near the town center. These include Hinckley, Merrimac, Agawam, Enfield, Haven, Copake, Sudbury, Ninigret, Tisbury, Walpole, Moosilauke, Raypol, Fredon and Scarboro soils.

Glaciolacustrine Deposits

These fine textured deposits are found in areas where glacial meltwaters formed quiet fresh water lakes that have subsequently drained. They typically lack rock fragments and are often laminated with varves, which are thin layers formed from annually deposited sediment. Soils formed in these deposits are slowly permeable and often have a shallow seasonal high water table.

Three Norfolk soils were formed in deposits from glacial Lake Norfolk: Brancroft, Raynham and Belgrade. They are located just east of Route 272 and north of Route 44, near the town center, underlying the Wood Creek dry dam area.

Alluvium

Alluvium is gravel, sand and sediment that is moved by flowing water and later deposited along stream banks by active flooding, forming the terraces found along many streams and rivers. Often soils formed on these materials are referred to as flood plain soils with a range of textures from sand to silt loams. These soils are often very fertile and some are prime agricultural soils.

The Norfolk soils that have formed in modern day alluvial deposits include Occum, Hadley, Pootatuck, Rippowam and Rumney. The extent of these soils is fairly limited in the community, occurring adjacent to streams and rivers.

Courtesy USDA Natural Resources Conservation Service

Hollis-Chatfield-Rock outcrop complex.

Eolian Deposits or Loess

Loess is relatively uniform, fine material, mostly silt loam, very fine sandy loam and fine sandy loam. It was transported by wind during periods of dry weather right after the melting of glacial ice. Sand dunes even formed in it and still exist today in the Windsor area. However, in Norfolk only thin layers of wind-blown soil deposited on tills and glaciofluvial deposits are still evident today.

The Norfolk soils that show evidence of this thin layer of wind-blown material include Agawam, Enfield, Haven, Ninigret, Raypol and Tisbury soils.

Organic Deposits

Because plants re-established quickly after the glaciers retreated, organic materials started accumulating in shallow water. As successive generations of plants died, the residues gradually filled the shallow, saucer-like depressions as either peat or muck deposits. Plant material that can still be identified is regarded as peat. Organic accumulations that have decomposed so as to make identification of the plant material impossible are called muck.

Two organic soils are found in Norfolk, Bucksport and Wonsqueak. There is a concentration of organic soils in the southwest section of Norfolk.

Soil Texture

Most of the soils in Norfolk are sandy loam or fine sandy loam texture. There is also a small amount of silt loam. Texture refers to a soil's coarseness or fineness. It is determined by the proportions of individual soil grains or particles in a specific size class: sand, silt or clay.

Sand particles are larger than those of silt and clay, with diameters from 0.05 to 2.0 millimeters; they feel gritty when rubbed between the fingers. The water-holding capacity of sand is low due to the large spaces between particles. Soils with large amounts of sand possess good drainage and aeration, and are usually referred to as "light soils" or "coarse soil." Most of the soils of Norfolk are dominated by the presence of sand.

Silt particles vary from 0.002 to 0.05 millimeters in diameter. These are so small that it is hard to identify single particles with the naked eye. Silt particles are similar in shape to the finer sands, but have a greater surface area. Like sand, silt takes little part in the chemical process of the soil. Soils in which silt predominates are fine texture, and water moves through them slowly. Soils high in silt are hard to work and are referred to as "heavy soils."

Clay has the finest of soil particles. These are smaller than 0.002 millimeters in diameter. Clay particles are the most chemically active, which can affect soil nutrient storage, water storage and the action of agricultural chemicals, such as fertilizers, in the soil. Of the three soil texture components, clay is the rarest in the soils of Norfolk.

Soil Catenas

A soil catena is a related sequence of soil profile types created by changes from one drainage condition to another. Looking at soil catenas makes it easier to group the soils by their similarities. The soil catenas of Norfolk are shown in a table in Appendix 2.

Soil Temperature

Soil temperature is very important because it affects the length of the growing season for plants, water movement and chemical processes. Most Connecticut soils are classed as being in the mesic (medium) soil temperature. Mesic soils have mean annual soil temperatures ranging from 47°F to 59°F, and a significant difference between mean summer and mean winter soil temperatures, at 50 centimeters (approximately 20 inches) below the surface.

Most Norfolk soils are cold enough to classify as frigid soil in the USDA classification, creating a unique ecosystem that is not found in other areas of Connecticut. Frigid soils have a mean annual soil temperature of between 32°F and 47°F, and also vary significantly from season to season. The identification of the frigid soils in the updated Soil Survey of the State of Connecticut (2005) is a big change from the information in the old USDA report, Soil Survey of Litchfield County (1970). There are new names for the frigid soils in the town.

A large area of predominantly frigid soils extends from northern New England to northern Connecticut and eastern New York State. Norfolk is the heart of the area of frigid soils in Connecticut. Some frigid soils extend into all of the Connecticut towns that border Norfolk, but are not the dominant soil types in those towns. Frigid soils do dominate in the towns to the north in the state of Massachusetts.

The frigid soils are located throughout Norfolk. The frigid soils include Ashfield, Bice, Boscawen, Brayton, Bucksport, Loonmeadow, Medomak, Millsite, Moosilauke, Rumney, Schroon, Shelburne, Westminster and Wonsqueak. Bice is the most common soil in Norfolk. The warmer soils (at mesic soil temperature) are concentrated along the Blackberry River in the west-central part of Norfolk and in lower elevations.

Prime Farmland Soils

The USDA Natural Resource Conservation Service uses the Prime Farmland Soil category to describe the most productive soils in the world for agriculture. Prime farmland soils have the best combination of physical and chemical properties for producing food and livestock feed. In general, prime farmland soils have an adequate and dependable moisture supply, favorable temperature and growing season, acceptable acidity and alkalinity, and relatively few rocks. USDA also classifies certain soils as Additional Farmland Soil of Statewide Importance. This is land that does not rate as prime farmland soil but is of statewide importance for the production of food, feed, fiber and forage crops. These soils may be wetter or on steeper slopes than prime farmland soils.

Prime farmland soils are also well suited to building construction for many of the same reasons they are good for crops.

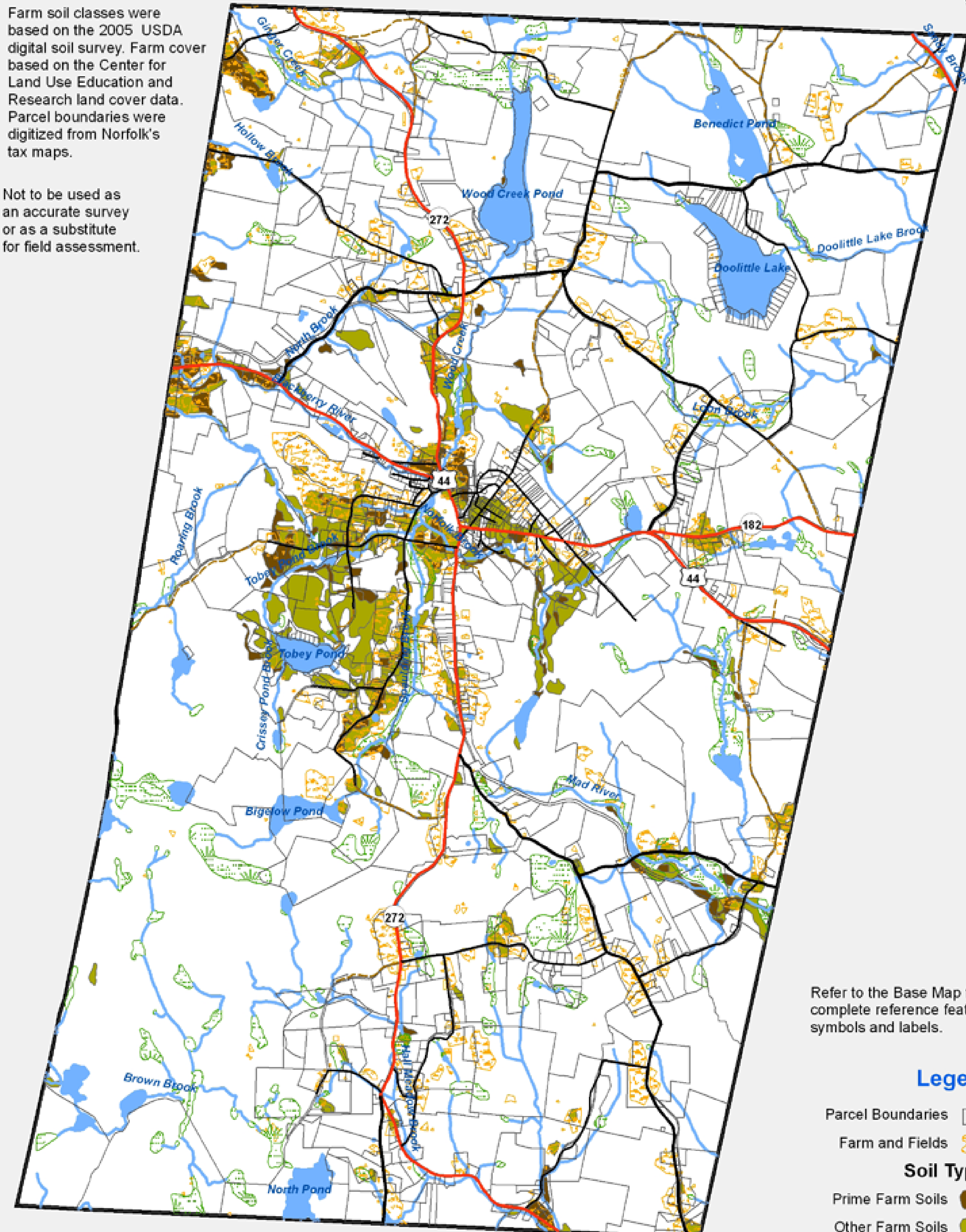
Approximately 13 percent of Litchfield County was classified by the USDA in 1970 as having prime farmland soils but Norfolk has less than 6 percent, or 1,718 acres, of prime farmland soil and farmland soil of statewide importance to agriculture. Other soils can be used for crop production but may have lower yields, or greater need for erosion controls or irrigation to produce a crop, or may have so much surface stone that use of farm equipment is limited.

See the Agricultural Resources map on the opposite page for Norfolk's farmland soils.

Agricultural Resources

Farm soil classes were based on the 2005 USDA digital soil survey. Farm cover based on the Center for Land Use Education and Research land cover data. Parcel boundaries were digitized from Norfolk's tax maps.

Not to be used as an accurate survey or as a substitute for field assessment.



0 0.5 1 2 Miles

Refer to the Base Map for complete reference feature symbols and labels.

Legend

Parcel Boundaries

Farm and Fields

Soil Types

Prime Farm Soils

Other Farm Soils

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

© Bruce Frisch

Ploughed, tilled and harrowed, this garden waits for seed.

Wetland Soils

The USDA also uses drainage classes as a large category to distinguish soils that are excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained and very poorly drained. The State of Connecticut defines wetlands in terms of soils that are poorly drained or very poorly drained. Connecticut also regulates use of all soils formed in flood plain deposits as wetland even though some of these soils are well drained.

Approximately 13 percent of Norfolk is currently classified as wetland or floodplain soils, compared to 16 percent in all of Litchfield County. The following soils are all wetland or floodplain soils: Brayton, Bucksport, Fluvaquents, Fredon, Hadley, Halsey, Leicester, Loonmeadow, Medomak, Mudgepond, Occum, Pootatuck, Raynham, Raypol, Ridgebury, Rippowam, Rumney, Saco, Scarboro, Walpole, Whitman and Wonsqueak.

Norfolk's wetland complexes perform important functions, with efficiency well above the average. These functions may include, but are not limited to, floodwater storage, wildlife habitat, nutrient retention, sediment trapping and water recharge to streams and ground water. Many of Norfolk's wetlands feed public drinking water supplies in towns downstream.

Slopes

Norfolk has many areas with steeply sloping soil. Soil slope affects the erosion risk and the rate of water flow.

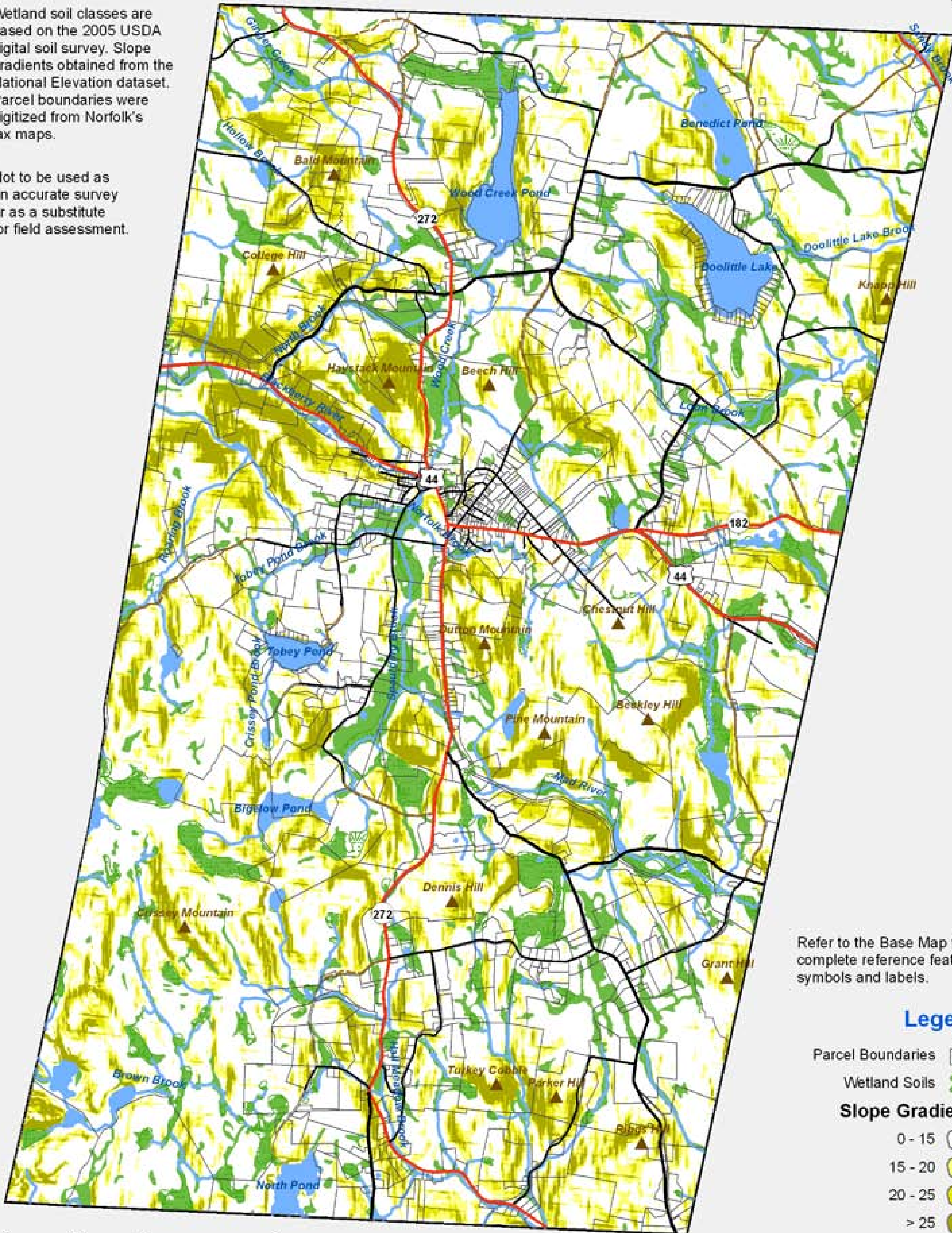
The soil survey maps show mapping unit symbols that combine a number and a letter. The number reflects the name of the dominant soil in the map unit. The letter, if listed, reflects how steep the soil map unit is. The letters range from A (indicating the flattest areas) to E (steepest). Soil mapping units with a C, D or E slope class have a high risk of erosion if they are disturbed, because of the steep slopes. The combination of many C, D and E class slopes and predominantly sandy soils leaves Norfolk with many areas that could readily be damaged by uncontrolled storm water, if left unprotected. The topographic map of Norfolk shows how steep the land is by how close together the topographic lines are. The map on the opposite page generally combines areas with similar slopes, highlighting extremely steep slopes.

For a complete list of Norfolk soils with USDA map symbols and acreages, for descriptions of every soil type, and for a chart showing soil family relationships, see Appendix 2. For recommendations based upon the information in this chapter, see Chapter 11 starting on page 66, and for a short bibliography see Appendix 9.

Wetland Soils and Slope Gradients

Wetland soil classes are based on the 2005 USDA digital soil survey. Slope gradients obtained from the National Elevation dataset. Parcel boundaries were digitized from Norfolk's tax maps.

Not to be used as an accurate survey or as a substitute for field assessment.



0 0.5 1 2 Miles

Refer to the Base Map for complete reference feature symbols and labels.

Legend

Parcel Boundaries

Wetland Soils

Slope Gradients

0 - 15

15 - 20

20 - 25

> 25

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

Aquatic Resources

© Christopher Little

The town of Norfolk has few lakes or rivers, but it is endowed with a diverse array of aquatic resources from open water to marshes and bogs, and an abundance of small streams. These resources form the headwaters for two major drainage basins and four regional watersheds that feed water to our neighboring towns, provide diverse habitats for both plant and animal communities, offer numerous recreational opportunities and are of a beauty that greatly enhances life in Norfolk.

Currently, the quality of the water within Norfolk's streams is second to none; only one short stretch of the Blackberry River has a "B" water quality designation. All remaining streams, lakes and ponds within the town's borders are classified as "A" or "AA" water quality, meaning that they provide excellent habitats for fish and wildlife and are potential contributors to public drinking water supplies.

This chapter outlines the importance of each type of aquatic environment, and any available data on the fauna using these resources is included in each segment. It is critical that Norfolk residents understand the importance of our aquatic resources and how humans affect them.

Watersheds

A watershed is a collection area for rainwater, snowmelt and ground water seeps, drained via networks of small perennial and intermittent streams that move the water to progressively larger streams. Within a watershed streams are classified by size. The smallest headwater streams are classified as first order and change to second, third, fourth and so on as more and more tributaries come together, ultimately forming the main outlet river/stream of the watershed.

As water flows through a drainage area, physical, chemical and biological changes occur. In a typical system, most headwater streams are steep, rocky, swift flowing and low in nutrients. As one moves along a watercourse, the steep, rocky "upland" streams often turn into "meadow" streams with higher flow volume, lower gradient and slower movement. As a stream changes from upland to meadow classification, its rocky substrate often turns into a softer stream bottom, rich in organic material. As stream size and nutrient accumulation increase, there is typically an increase in species diversity and a shift in aquatic insects from the hunter/gatherers of headwater streams to the detritivores/shredders of lower gradient streams.

Norfolk's elevation and topography, and its position between two river systems, combine to create a unique situation in which the town's streams and rivers drain into four regional watersheds and then again into 10 sub-regional basins, as shown on the map opposite this page.

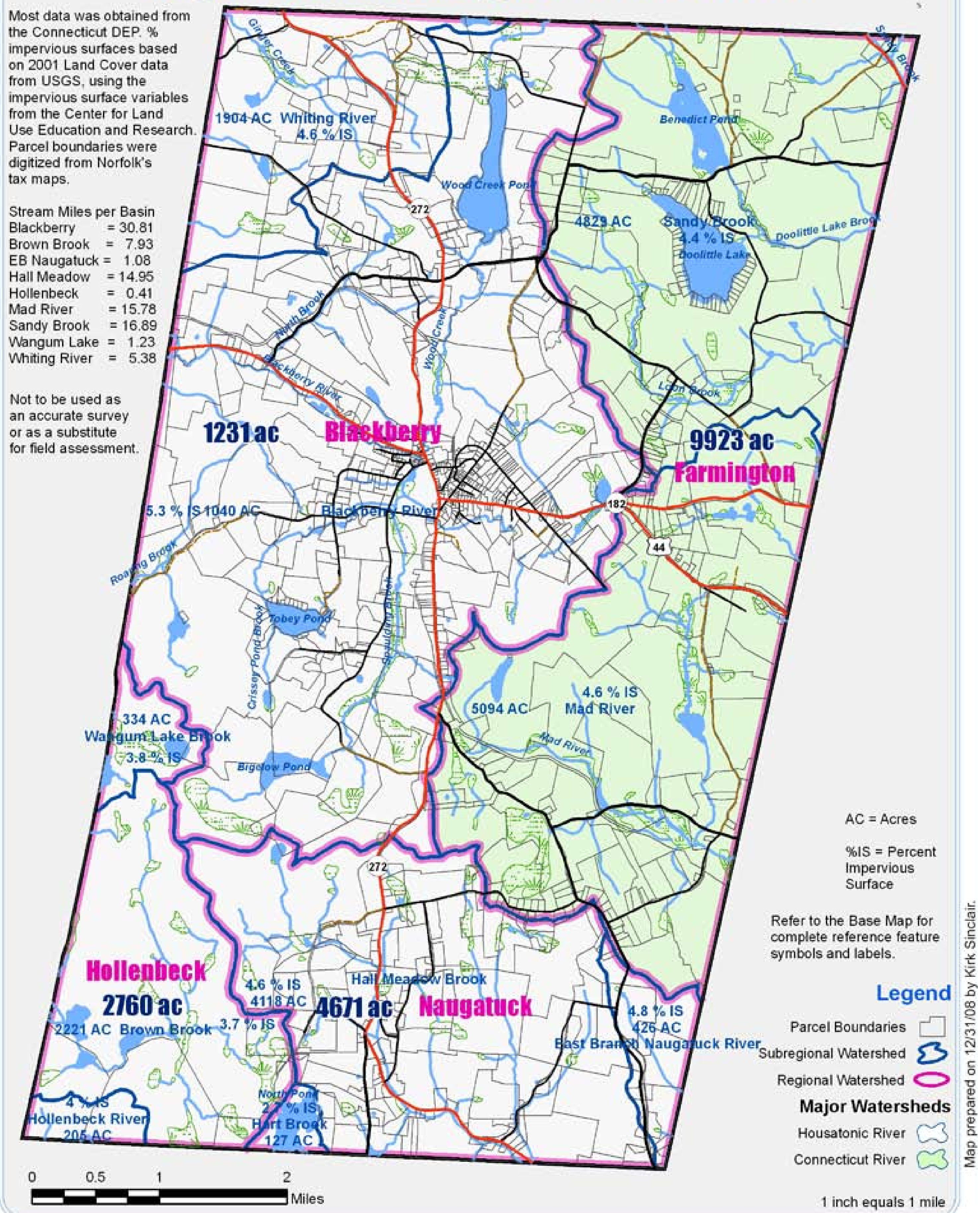
- *Blackberry River regional basin (to the west)*
  - Blackberry River sub-regional basin
  - Whiting River sub-regional basin
- *Hollenbeck River regional basin (to the southwest)*
  - Hollenbeck River sub-regional basin
  - Wangum Lake Brook sub-regional basin
  - Brown Brook sub-regional basin
- *Naugatuck River regional basin (to the southeast)*
  - Hart Brook sub-regional basin
  - Hall Meadow Brook sub-regional basin
  - East Branch Naugatuck River sub-regional basin
- *Farmington River regional basin (to the east)*
  - Sandy Brook sub-regional basin
  - Mad River sub-regional basin

Norfolk's aquatic resources are also unique in that they set the stage for water quality far from the town's boundaries. Wetlands and streams are products of the land they drain and their water quality reflects stream-side land use practices, both good and bad. It is therefore imperative that proper land use guidelines be identified, maintained and followed if wetlands are to protect drinking water supplies, protect and provide aquatic habitat for fish and wildlife, conserve especially sensitive habitats, filter pollutants and buffer against floods.

Streams and Rivers

Five main components make up a stream's ecosystem: connectivity, hydrology (flow), biology, water quality and geomorphology. Each one of these components can be, and often is, altered by human activity. Typically, both plant and animal stream species respond negatively to any human (and sometimes non-human) disturbances. Reductions in fish and/or insect abundance, reductions in species richness, and shifts in fish/insect assemblages to more tolerant species are common responses to human impacts within a stream. Stream alterations may also reduce habitat diversity, which has been shown to be directly and positively

Regional and Subregional Watersheds




© Peter Coffeen

Caught and eaten in Norfolk: largemouth bass (Micropterus salmoides).

correlated to species diversity; thus, species diversity is an attribute of a healthy stream ecosystem.

Small or intermittent streams are often considered ecologically insignificant. However, these streams are necessary for specific life stages of certain aquatic organisms. Many stream fish, for example, migrate into these small feeder streams to spawn. In turn, newly hatched fry then use them as nursery areas before migrating downstream to larger rivers.

There are two general types of riverine habitats: coldwater and warmwater. The most obvious distinction between the two is temperature. In fact, temperature and flow are the two variables that have the greatest effect on physical, chemical and biological parameters of any stream. Temperature can alone regulate fish and insect respiration and metabolism, timing and success of fish spawning, dissolved oxygen content in the water, water density and types of algae present, while fluctuations in flow may affect fish migration, fish spawning success, feeding behavior, amount and quality of available stream habitat, bank erosion and stream sedimentation. Each variable by itself or some combination of the two can greatly determine the fish and insect assemblages of any stream. Although a warmwater stream is in itself not necessarily bad, the health of an overall ecosystem is largely determined by the amount of coldwater stream habitat available.

In total there are approximately 95 miles of streams in Norfolk, ranging in size from unnamed intermittent streams to the Blackberry River and in habitat type from high gradient upland streams (North Brook) to low gradient meadow streams (lower reaches of Hall Meadow Brook). The town's streams not only have exceptional water quality but are, at present, relatively unaffected by dams, industrial pollutants and channelization. Although human activity does affect Norfolk's streams (with sedimentation from runoff, for example), the overall impacts are minor compared to other towns.

Norfolk has both warm- and coldwater stream communities but most of the town's riverine resources have been found to be coldwater. Data collected as part of a statewide stream survey conducted by the Connecticut DEP from 1988 to 1994, plus subsequent stream sampling efforts in 2007, show that most of the town's stream resources support diverse and healthy fish and insect communities reflective of coldwater habitats. See the map opposite, and Appendix 4 for tables summarizing the findings.

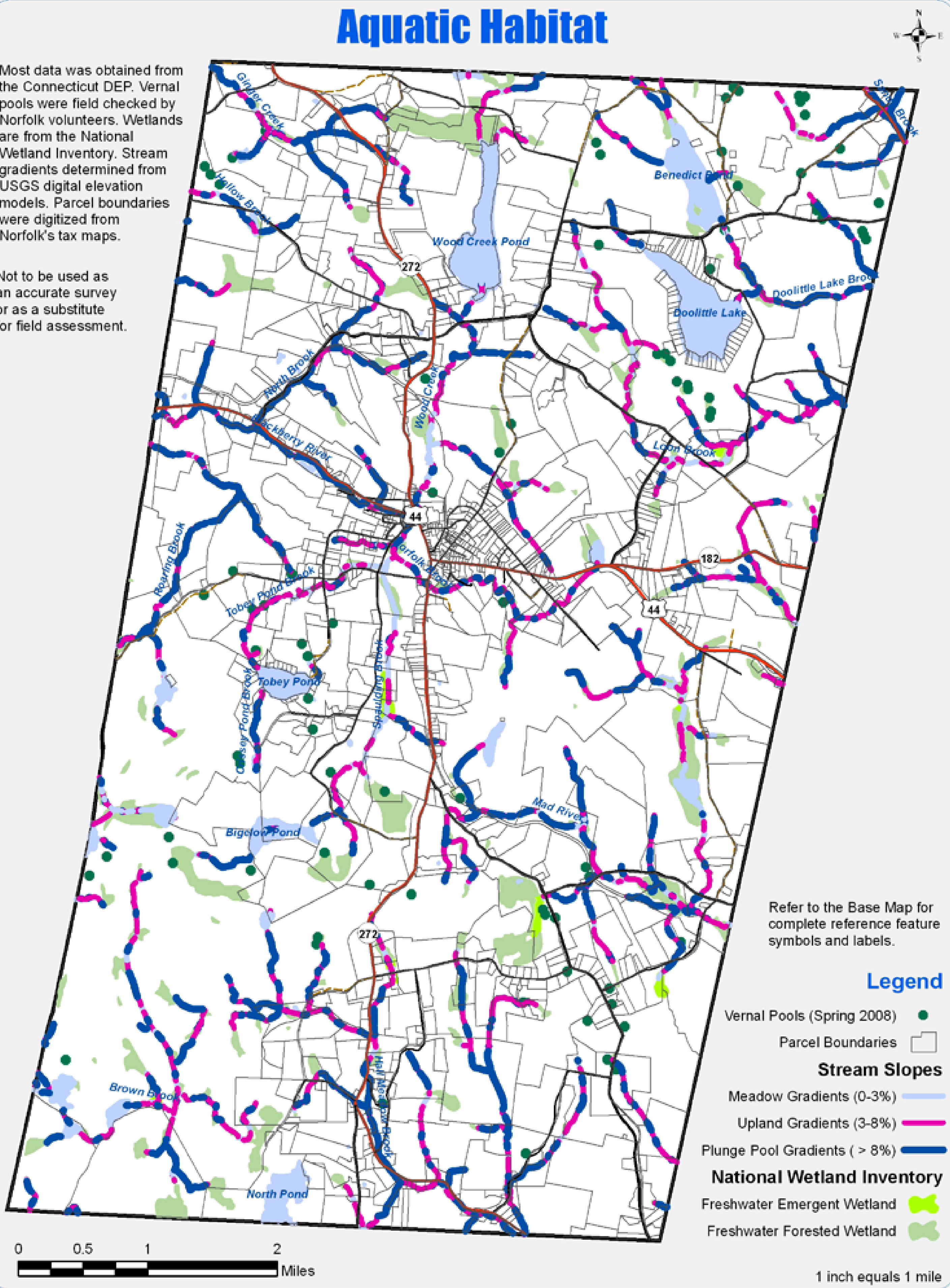
Of the stream sections sampled in Norfolk, 80 percent supported naturalized populations of brown trout (Salmo trutta) and/or native brook trout (Salvelinus fontinalis). In addition, 30 percent of the streams had slimy sculpin (Cottus cognatus) present. The sculpin (not a state listed species, but recognized as a species in decline) requires exceptional water quality (cold, well oxygenated water and clean gravel substrate) to survive. While by no means the only two aquatic organisms indicative of good water quality, the presence of both wild trout and sculpin strongly suggests that most of Norfolk's stream resources are exceptionally healthy. The fact that naturally reproducing populations of both brown and brook trout exist in such a high percentage of Norfolk's streams substantiates this fact even further.

Warm water fishes, such as bluegill and pumpkinseed sunfish (Lepomis macrochirus and L. gibbosus), largemouth bass (Micropterus salmoides) and yellow perch (Perca flavescens), were found in a small number of the town's streams. These fish were migrants from ponds either upstream or downstream of the sample areas. They are not ideal stream inhabitants, but their presence is not always an indicator of poor water quality.

Aquatic Habitat

Most data was obtained from the Connecticut DEP. Vernal pools were field checked by Norfolk volunteers. Wetlands are from the National Wetland Inventory. Stream gradients determined from USGS digital elevation models. Parcel boundaries were digitized from Norfolk's tax maps.

Not to be used as an accurate survey or as a substitute for field assessment.



Refer to the Base Map for complete reference feature symbols and labels.

Map prepared on 12/31/08 by Kirk Sinclair.

Lakes and Ponds

Most water bodies in Connecticut were formed some 11,000 years ago as runoff from retreating glaciers filled pockets and holes in the landscape. Many of Norfolk's lacustrine resources are remnants of that historic time, and the remaining ponds in town are manmade.

The difference between a lake and a pond is determined by both depth and surface acreage, with depth being the primary factor. Lakes are deeper than ponds, and this increased depth limits light penetration and allows them to thermally stratify.

Generally, most lakes in Connecticut thermally stratify if depths are greater than 20 feet. Thermal stratification occurs from July to September and simply means that water within the lake separates into distinct layers based on temperature with the warmest (lightest) water on top and the coldest (heaviest) water at the bottom. This stratification has many implications for fish species, especially those, such as trout, that require cold, well oxygenated water to survive.

The upper layer is well oxygenated, but temperatures are at times warm and may be stressful to fish. In contrast, the bottom layer is cold in temperature, but is usually very low in dissolved oxygen. The middle layer is where ideal conditions exist for many lake dwelling fish, but even this varies from lake to lake. Stratification does not exist during the spring, fall and winter when water temperatures are more homogeneous throughout the lake.

In shallower ponds, sunlight typically penetrates to the bottom allowing rooted plants to produce oxygen. However, unless the pond has adequate cold ground water inflows, summer temperatures may become very warm, limiting the types of aquatic organisms that can inhabit the pond to more temperature tolerant species.

In relative terms, even Norfolk's largest lake (Doolittle Lake, 190 acres) and three largest ponds (Wood Creek Pond, 145 acres; Benedict Pond, 98 acres; Tobey Pond, 53 acres) are small in overall surface acreage when compared to water bodies in other areas of the state. Of all the impoundments and natural bodies of water in Norfolk, Doolittle Lake is the town's only true lake. Doolittle Lake is a natural lake whose water has been elevated by a small dam. Although Doolittle Lake has some warmwater fish species—largemouth bass, yellow perch, bluegill and pumpkinseed sunfish and golden shiner (Notemigonus crysoleucas)—the lake is managed by the Doolittle Lake Company specifically for trout. Historically, native brook trout spawned every fall in the northwest arm of the lake. Currently, the lake is home to both brown and brook trout.

Norfolk has one state owned and managed pond. Wood Creek Pond, located off Ashpohtag Road, is a manmade, shallow, weedy, eutrophic waterbody. Fed by Holleran Swamp to the north, it drains into Wood Creek, which is a tributary to the Blackberry River. The pond has no special fisheries management, but fishing does exist for largemouth bass, chain pickerel (Esox niger), brown bullhead (Ameiurus nebulosus), black crappie (Pomoxis nigromaculatus) and yellow perch. The pond was drained for dam repairs in the late 1990's and fish populations are slowly rebuilding.

Benedict Pond is located off Doolittle Drive and is privately owned by the Doolittle Lake Company. This pond is natural in origin, but the water level has been raised by construction of a small concrete dam. Unlike its Doolittle Lake sister, the pond is a shallow, weedy and eutrophic home to a very robust population of largemouth bass and sunfish. Its outlet is a tributary to Doolittle Lake Brook (also known as Brummagem Brook) that eventually flows into Sandy Brook in Colebrook.

Tobey Pond is privately owned and is located within the Great Mountain Forest property. There is recreational access to the pond for town residents. Like Doolittle Lake, Tobey Pond is natural in origin, but a small dam was constructed to raise the water level. Surprisingly, Tobey Pond has a maximum depth of 45 feet, which is considerable given the surface acreage of the pond. Trout are not typically found in Tobey Pond although its cold, well-oxygenated water is capable of supporting them, but it does provide some fishing for largemouth bass, black crappie, yellow perch, sunfish and chain pickerel.

Each waterbody in Norfolk has ecological importance regardless of its size. Most lakes and ponds have some direct connection with either groundwater or surface water sources, and they also provide necessary habitats for a variety of aquatic organisms. Not only is each lake or pond part of a larger ecosystem, but also within each waterbody are numerous—in some cases countless—microhabitats. These specific habitat areas are home to different life stages of plants, animals and insects. Loss of these highly specific/sensitive areas or habitats could cause major shifts in the lake's ability to support sensitive species and allow more tolerant species to then thrive. As with streams, a shift in the fish and insect community from sensitive species to tolerant species indicates a decline in water quality and/or a loss of critical habitats. Loss of habitat is typically due to development pressures.

© Pat Harms

Paddlers on Wood Creek Pond.

Wetland Habitats

The term "wetland" may carry with it a meaning that is different from one group to another. Therefore, before describing the different types of wetlands and their importance, a clear definition must be adopted. An extensive wetland classification system was developed as part of the National Wetlands Survey conducted in 1979 (http://www.fws.gov/nwi/definition.htm). From this survey, the wetlands definition that has been accepted by the U.S. Fish and Wildlife Service (USFWS), and currently is the most widely accepted definition, reads as follows:

> *Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. . . wetlands must have one or more of the following three attributes: (1) At least periodically, the land supports predominately hydrophytes, (2) the substrate is predominately undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.*

It should be noted that the state of Connecticut has adopted a somewhat narrower definition of wetlands (although it separately defines watercourses, which includes swamps, bogs, etc., by hydrology and biology) that primarily focuses on soil type:

> *Land, including submerged land…which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial and floodplain by the National Cooperative Soils Survey…whether or not shown on the wetlands inventory map as issued. Such areas may include filled, graded or excavated sites which possess an aquic (saturated) soil moisture regime as defined by the USDA Cooperative Soil Survey.*

Even with these definitions, categorizing the different types of wetlands can be complex. For the purpose of this inventory, an elaborate wetlands classification system such as those used by the USFWS or the state is unnecessary, but it is impossible or at least difficult to "properly" manage any wetland or natural resource if that resource is not properly mapped and defined.

Wetland values are as numerous as the vast array of types of wetlands themselves. Wetlands provide crucial life cycle habitats for fish and wildlife, economic benefits in the form of fish and wildlife harvests, breeding areas for an estimated 80 percent of America's bird population, peat harvest, critical habitats for a disproportionate number of threatened and endangered species, natural water purification by the removal of organic and inorganic nutrients and toxins, and the pleasure conferred by their natural beauty.

The following list describes typical wetlands and wetland habitats found in Norfolk. Note that lakes, ponds and streams are not included; they are classified as watercourses, not wetlands, although changes affecting them are regulated by the town's wetlands agency.

© Alexandra Childs

Swamps are home to many kinds of life.

Marshes

Marshes are characterized by shallow water; emergent aquatic vegetation such as cattail, arrowhead, pickerelweed, reeds and a variety of grasses and sedges, and peat deposits that are generally shallow.
Example in Norfolk: Kelly Swamp off Winchester Road across from Grantville Road.

Swamps

A swamp is a wetland dominated by trees (typically red maple/Acer rubrum) and shrubs such as spicebush (Lindera benzoin), highbush blueberry (Vaccinium corymbosum) and alders (Alnus incana var. rugosa). A swamp is typically wet throughout the growing season and the dominant vegetation type found in any given swamp wetland will largely determine the diversity and types of wildlife in the area.
Example in Norfolk: Holleran Swamp.

Wet Meadows

A wet meadow is not as wet as a swamp or marsh. It may have standing water through some of the year, but has waterlogged soil and is dominated by grasses, sedges, rushes and other vegetation. It is generally kept open by periodic mowing, or is short lived.
Example in Norfolk: Meadow on the south side of the dirt section of Westside Road.

Courtesy USDA Natural Resources Conservation Service

Another of Norfolk's many beautiful wetlands.

Bogs

A bog is a peat-accumulating wetland, acidic and typically without a significant inflow or outflow. Acresidophilic mosses such as sphagnum (Sphagnum spp.) are common in bogs along with such shrubs as leatherleaf (Chamaedaphne calyculata) and stunted trees, such as black spruce (Picea mariana).

Examples in Norfolk are: Beckley Bog, Tobey Pond Bog.

Vernal Pools

A vernal pool is an ephemeral wetland that generally does not have standing water during the summer. Water accumulates in forested depressions via snowmelt or rain. Water depth is typically very shallow. Fish are not found in vernal pools, but these wetlands are host to certain animals that require this very specific habitat to complete their life cycle. Direct indicator or "obligate" species found in vernal pools are the wood frog, fairy shrimp and several salamanders.

Examples in Norfolk: see the vernal pools on the wetland habitats map on page 25.

Groundwater

Groundwater fills spaces between soil particles and fractures in rocks below the ground's surface. Water infiltrates the ground at recharge points and enters surface water ecosystems at discharge locations. Although groundwater may issue at natural springs, most of us obtain it by drilling into an aquifer—a porous geologic material that releases usable amounts of ground water. The pore spaces may be the tiny spaces between grains of sand or gravel in our shallow aquifers, in the narrow space between the walls of a fracture in the bedrock aquifers that underlie most of Norfolk or in solution-enlarged openings in those areas of town underlain by marble. See the bedrock map on page 11.

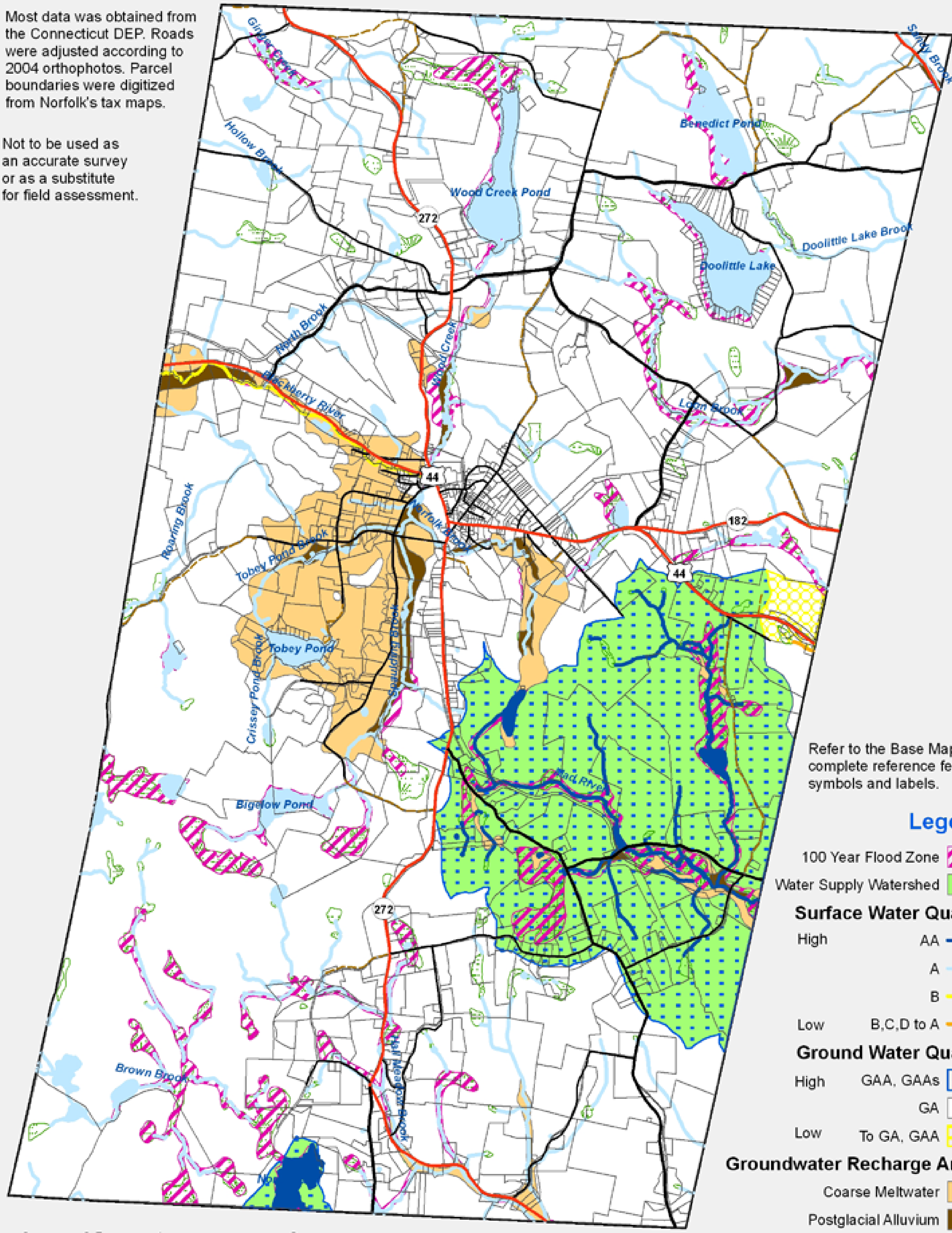
Shallow wells, which may be dug or drilled, produce groundwater from unconsolidated material, usually sand and gravel deposited at the end of the last Ice Age by glacial melt-water streams. A large area just west and southwest of Norfolk Village and a small area just south of the village are covered by deposits of sand and gravel (designated Coarse Meltwater Recharge Area on the water resources map on the opposite page). The deposits contain little or no mud, and hence are both porous and permeable. Most wells completed in shallow aquifers will produce high yields of groundwater if the aquifer is thick enough.

Deep wells must be drilled and most are drilled into bedrock (ledge). Norfolk's bedrock is composed of metamorphic and igneous rock formations with little or no intergranular porosity. The only place for groundwater in such formations is in fractures, which may be abundant in some areas. Fracture porosity is usually not as abundant as

Water Resources

Most data was obtained from the Connecticut DEP. Roads were adjusted according to 2004 orthophotos. Parcel boundaries were digitized from Norfolk's tax maps.

Not to be used as an accurate survey or as a substitute for field assessment.



Refer to the Base Map for complete reference feature symbols and labels.

Legend

100 Year Flood Zone

Water Supply Watershed

Surface Water Quality

High — AA

A

B

Low — B,C,D to A

Ground Water Quality

High — GAA, GAAs

GA

Low — To GA, GAA

Groundwater Recharge Areas

Coarse Meltwater

Postglacial Alluvium

0 0.5 1 2 Miles

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

© Bruce Frisch

Mergansers (Lophodytes cucullatus) enjoying a Norfolk swamp.

intergranular porosity and it is usually not as permeable. Nonetheless, there are usually enough water filled fractures to let wells drilled into metamorphic rocks fill with groundwater that can be pumped for domestic water supply.

In areas underlain by marble, such as parts of the Blackberry River valley where it leaves town, groundwater may dissolve and enlarge fractures as it moves through them. Solution-enlarged fractures have more room to store water and offer less hindrance to the flow of groundwater: they are more porous and permeable. Marble aquifers produce "hard" water that contains relatively high levels of dissolved calcium and/or magnesium; such water may have to be treated to avoid calcium build-up within pipes, faucets and appliances. However, groundwater rich in calcium increases the overall productivity of aquatic ecosystems and buffers the effects of acid rain.

Groundwater quality in Norfolk is generally good or excellent. There are few (only 15 reports in the state DEP files) areas of contamination from underground storage tanks or other potential sources of direct and non-point pollution, although agriculture and grounds care activities could threaten ground water quality if not carefully controlled and regulated.

Rain and melted snow (meteoric water) recharge groundwater as they infiltrate through the soil. The shallow aquifers are recharged directly by meteoric water infiltration. Bedrock aquifers may also be recharged in that manner during the wet seasons, but it is thought that the shallow aquifers recharge the bedrock more efficiently during both wet and dry seasons. Shallow aquifers may warrant protection for this reason.

Invasive Aquatic Animals and Plants

Most plant and animal assemblages in Connecticut have been strongly influenced by decades of planned and accidental introductions of non-native species. For example, in Connecticut there are 26 naturally occurring fish species and more than 50 fish species that have been introduced. Similarly, all of our crayfish and most of our snail species have been introduced. In fact, most Connecticut lakes and some streams are dominated by introduced species. It is likely that the reason that many introduced species have done so well in Connecticut waters is because of naturally low species diversity.

Over the years, planned introductions have created very popular fisheries resources, and other introductions have had very negative effects. Exotic plants and animals can be extremely prolific when introduced into environments where there are no predators or controls to keep their numbers in check. These species are invasive and once established will often extirpate many of the native species.

Examples of invasive aquatic animals: landlocked alewife, tench, zebra mussel, rusty crayfish and apple snail.

Examples of aquatic invasive plants: Eurasian and variable-leaved milfoil, purple loosestrife, curly pondweed, fanwort, water chestnut, eutrophic water nymph, hydrilla and Brazilian waterweed.

The town of Norfolk is fortunate that it currently has very few highly invasive invertebrates, fish or aquatic plant species. The quality of Norfolk's surface and ground water, and the diversity of its aquatic habitat are excellent. Not only do these resources support a diverse array of aquatic plants, invertebrates, fish and wildlife, but they also provide town residents with good drinking water, recreation and beautiful surroundings.

Recommendations based on the information in this chapter appear in Chapter 11, starting on page 66. Lists of fish and invasive species appear in Appendix 3, starting on page 91, and some suggested readings are included in the bibliography (Appendix 9). Some of Norfolk's flowering aquatic plants are included in Appendix 4; a complete list may be published at a later date.

The Norfolk Plantscape

© John Anderson

*M*ost people show a greater affinity for animals than plants, but the plant kingdom is crucial to our ecosystem. Plants clean the air and water, prevent erosion, help reduce greenhouse gases by absorbing and storing carbon, and are the greater part of the habitat providing food, water and shelter both for humans and for all those other, charismatic animals. Plants also are the source of many of the nutrients and medicines that sustain human health and supply a significant amount of material for construction and manufacturing.

A landscape is a repeating pattern of land forms and vegetation—the whole of all the plants living within a given area. This landscape is created by geology, climate and the compatible plant species. The vegetation, composed of many plant communities, is influenced by climate, soils, terrain, water availability and disturbances that include storms, wind, floods, fires and, of course, human intervention. Even the animals that live within the vegetation shape it, especially deer, which often eat much of the forest understory, including woodland flowers. In our region of high hills the landscape is composed of the sparse woodlands on dry hilltops; the shady, moist hillside forests; the marshes, swamps, streams and ponds that lie between the hills, and the various plants that clothe them.

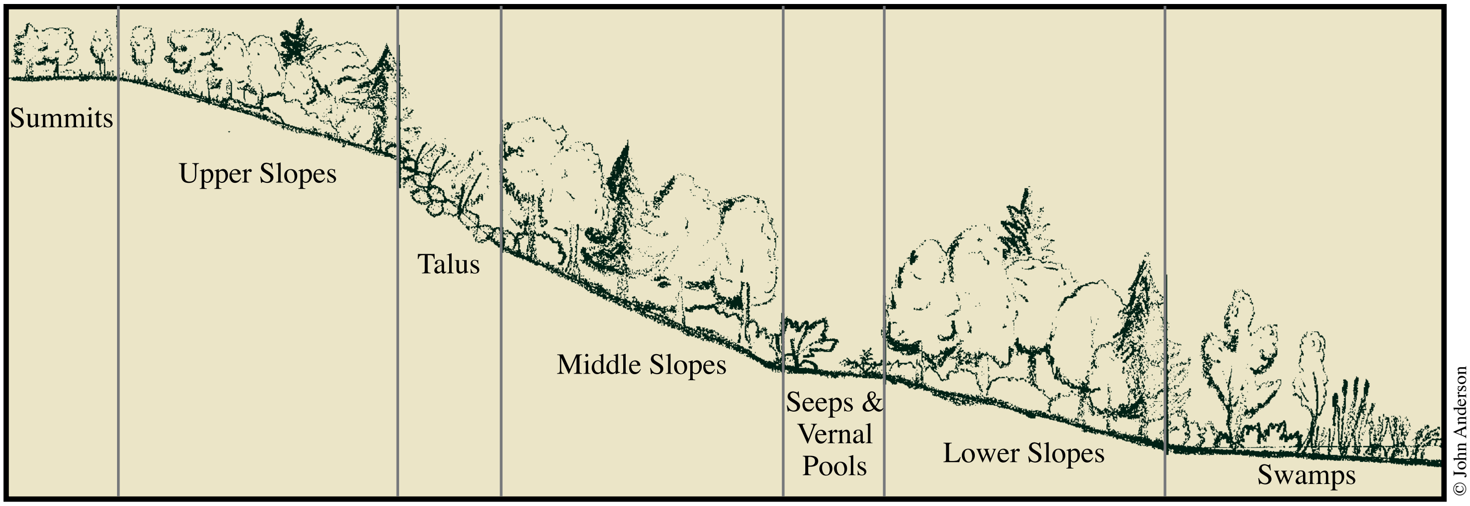
The native plants of Norfolk must endure the coldest climate in the state. Our soils are generally nutrient-poor and acidic, so the plants of the limestone region directly to our west are also uncommon or absent. The dominant deciduous hardwood tree species are sugar maple, American beech and yellow birch. Eastern hemlock is the most common evergreen component, generally mixed with these deciduous trees. Northern red oak is common and chestnut oak, shagbark hickory and bitternut hickory occur on dry sites. The wildflowers of Norfolk include many with- northern affinities (perhaps the greatest number in the state of Connecticut). Plants such as New England sedge, stiff clubmoss, wood sorrel and bluebead lily are often present. Common wildflowers include trilliums, trout lily, starflower, partridgeberry, wild sarsaparilla, goldenrods, and asters. Several species of ferns are also common and often dominate the ground cover in forests and wetlands.

Plant Communities

Summits and Upper Slopes

Plant communities of upper slopes tend to be dry sites covered by short forests, sparse woodlands or open non-forested communities.

The Hickory Woodland, as found on Bald Mountain and Knapp Hill, is an unusual type of plant community, not fully understood scientifically. These communities are found on very shallow soils of summits and crests as open woodlands. They contain dry-site species such as shagbark hickory, white ash, white oak and hop hornbeam, more commonly found to the south of, or at lower elevations than Norfolk, with a ground cover of early sedge. Spring ephemerals, such as Carolina spring beauty, trout lily, wood anemone and dwarf ginseng are often abundant. The marginal wood fern is common. Shrubs are generally absent.



Sections of an idealized hillside. Their plant communities are described in the text.

Painted trillium (Trillium undulatum).

The Chestnut Oak Woodland, such as the one on the summit of Haystack Mountain, is another uncommon plant community, also found on shallow soils of summits. Red and white oaks, white ash and white pine are common and there is often a shrub layer of black huckleberry, lowbush blueberry and mountain laurel. Grasses such as little bluestem and poverty grass occur in the herb layer. Early sedge and many spring ephemerals are also common.

The Red Oak Forest is a common type of our summits and upper slopes, especially on south and west facing slopes. Though red oak frequently dominates, there are many trees associated with this species: black birch, red and sugar maples, beech, white ash and shagbark hickory. A shrub layer is usually present and may be sparse or dense, low or high, often including maple-leaved viburnum, beaked hazelnut, witch-hazel and mountain laurel. Young trees are common in the understory, although the oaks and hickories are generally absent in all but recently cut-over areas. Woodland flowers likely to be found include spotted geranium, common wood aster and wild sarsaparilla. On very rocky sites wild columbine, early saxifrage and pale corydalis can be found. Occasionally on very shallow summits, steep slopes and north slopes, hemlock can dominate. Often there is no shrub or herb layer present here. White pine sometimes produces relatively pure stands on summits as well.

Non-forested sites, often areas of exposed bedrock, are generally dominated by the shrub species that co-exist in the previously described woodlands. Sometimes grasses like little bluestem or sedges are common.

Mid-slope

Mid-slope sites are the average or mesic landscape site, neither dry nor wet, between the upper and lower slopes. Many forest trees achieve their best growth in these areas.

A number of hardwood species can dominate the mid-slopes of our region. Generally these are referred to as mixed or transition hardwoods types. Forests dominated by red oak are common in town, many the result of past land clearing for agriculture, lumber and charcoal production. This is one of our fastest growing species, easily obtaining a diameter of three feet within 100 years. Many of our forests have an emergent tree layer of red oak, which is surpassed in height only by white pine. However, with the loss of farmland and the steady increase in mature forestland locally, these two species will have limited reproduction potential without active management. Common associates or co-dominants of the red oak include beech, red and sugar maple, black and paper birch, hemlock, big-tooth aspen, white pine and black cherry.

The Northern Hardwood plant community is common in Norfolk, although much less so in the rest of Connecticut. As its name suggests, this is the typical hardwood forest type of the North Woods. Here beech, sugar maple and yellow birch are the primary components and hemlock frequent or even co-dominant. The shrub layer, when present, includes striped maple, beech, hemlock and often hobblebush and American yew, which can survive under the shade of mature northern hardwoods. Christmas fern and wood ferns can be abundant in the herb layer and painted trillium and bluebead lily are typical wildflowers of the community.

Pink ladyslipper (Cypripedium acaule) is getting hard to find.

On richer or moister sites, a variation or Transition type occurs. Sugar maple, white ash and basswood dominate and red oak, beech, yellow birch and hemlock are frequent associates. Differing from the classic northern hardwoods, this community often has a richer shrub or herb layer. When shrubs are abundant, common species include red-berried elder, striped and mountain maples (which can develop into small trees), witch-hazel and round-leaved dogwood, along with sugar maple and beech, which commonly reproduce under the shrub layer. Winterberry is found on wetter sites, lower slopes and wetlands. Where shrubs are few, the herb layer can be thick with blue cohosh, wild leek, wild ginger, Dutchman's breeches, red trillium, bloodroot, trout lily, Carolina spring beauty, twin-leaf toothwort, maidenhair fern, Christmas fern, lady fern and wood ferns.

Old Fields

Following the abandonment of farm fields, the succeeding plant communities vary with the type of previous agricultural practice (ploughed land, hayfield, pasture), the seed sources available nearby, soil type and depth, soil moisture, and other factors (drought and other weather extremes, insect outbreaks, native herbivore pressure, etc.). Initially, fields are dominated by non-native grasses and wildflowers such as orchard grass, timothy, common milkweed, ox-eye daisy, ragged robin, hawkweeds and common buttercup. Soon many of our native perennial wildflowers such as goldenrods and asters come to dominate and more showy flowers may arrive, like Canada and wood lilies, wild bergamot and black-eyed susan. Little bluestem is the common old-field grass on drier sites. Eventually shrubs and young trees (which may have become established unseen early on) become the obvious feature of the field. Typical plants are low- and highbush blueberry, common juniper, meadowsweet, maleberry, chokecherry, black chokeberry, arrowwood, shadbush, staghorn sumac and musclewood. Tree species that can grow rapidly on such sites include white pine, white ash, red maple, red oak, black cherry, paper birch, quaking aspen and hop hornbeam. Red cedar and gray birch are not as common as they are in other parts of the state, but individuals may be found scattered throughout these sites. When there has been a good seed year for white pine following the succession of mowing in hayfields, this species can form dense stands and quickly dominate a field to the exclusion of any other plants. White pine, hemlock, mountain laurel, common juniper, Japanese barberry and multiflora rose may characterize old pasture lands, as livestock tend to avoid these species while consuming the coexisting hardwoods, grasses and wildflowers.

Talus Slope

Mesic talus slopes are areas covered by fallen rocks or boulders near the base of steep hills or cliffs. These are generally occupied by hardwoods typical of old fields or heavily logged sites, such as red oak, white ash and black birch, creating an open woodland. Witch-hazel, striped maple, Virginia creeper and bindweeds are common plants, while hemlock can also dominate these sites. On north slopes yellow birch may be common as well, with red-berried elder, mountain maple, blackberry and polypody ferns in the understory of the sparse tree cover.

© Bruce Frisch

Goldthread (Coptis groenlandica) likes saturated soil.

Lower Slope

Lower slope forests tend to be moister than the previously discussed sites and often are marginal to wetlands. These sites grade from moist hillsides to areas where the soils are sometimes saturated.

Hemlock dominated forests are very common on lower slopes, often mixed with white pine and hardwoods such as red oak, sugar maple, beech, yellow birch, red maple, white ash and black birch. The shrub layer in these evergreen-dominated sites is usually sparse but may include mountain laurel, maple-leaved viburnum and witch-hazel or hobblebush and American yew. Beech and striped maple also occur. The herb layer is also often sparse under these hemlock forests. Common wildflowers are wild sarsaparilla, starflower, partridgeberry, Indian pipe and Canada mayflower. Moister sites have a richer herb layer, which may include intermediate wood fern, marginal wood fern, shining clubmoss, partridgeberry, wild sarsaparilla, red trillium, whorled wood aster, wood-sorrel, bluebead lily, Indian cucumber, goldthread, blue cohosh, wild ginger, bloodroot, Dutchman's breeches and wild leeks.

© Bruce Frisch

Dutchman's breeches (Dicentra cucullaria).

Seeps, which are frequent within these lower slope sites, can create gaps in the forest canopy. Shrubs like red-berried elder and mountain maple occur on rocky sites and common herbs include wild leeks, maiden-hair fern, beech fern, oak fern and jewelweed.

Variants on the Northern Hardwoods and Mixed or Transition Hardwoods also occur on lower slopes. Red oak may be abundant and become massive trees. Tulip-poplar, a tree much more common in southern Connecticut, is occasionally found on these sites and can achieve great size. All the other Northern and Mixed Hardwoods commonly occur on lower slopes. Hobblebush, beech, striped maple, shadbush, red-berried elder and mountain maple may be found in the shrub layer. Intermediate wood fern, shining clubmoss, partridgeberry, wild sarsaparilla, red trillium, whorled wood aster, wood-sorrel, bluebead lily, Indian cucumber, goldthread, blue cohosh, wild ginger, bloodroot, Dutchman's breeches and wild leeks may be found in the herb layer.

Wetlands

Swamps are forested wetlands and Norfolk has not only an abundance of swamps, but some that are unusual types for Connecticut.

The extremely rare red spruce dominated swamps (such as Holleran Swamp) are mixed with hemlock, red maple and yellow birch. Dwarf mistletoe, a semi-parasitic species on red spruce, occurs in the upper canopy of this forest. The shrub layer includes mountain holly, mountain laurel, highbush blueberry and common winterberry. The herb layer has a base of sphagnum moss with cinnamon fern, bluebead lily, goldthread, lowbush blueberry and sedges common.

The rare black spruce dominated swamps (such as at Beckley Bog) are mixed with tamarack, red spruce and white pine. Common shrubs include mountain holly, highbush blueberry, withe-rod and common winterberry. Common plants of the herb layer include sheep laurel, leatherleaf, cranberry, round-leaf sundew, pitcher plant, sedges, rushes and sphagnum.

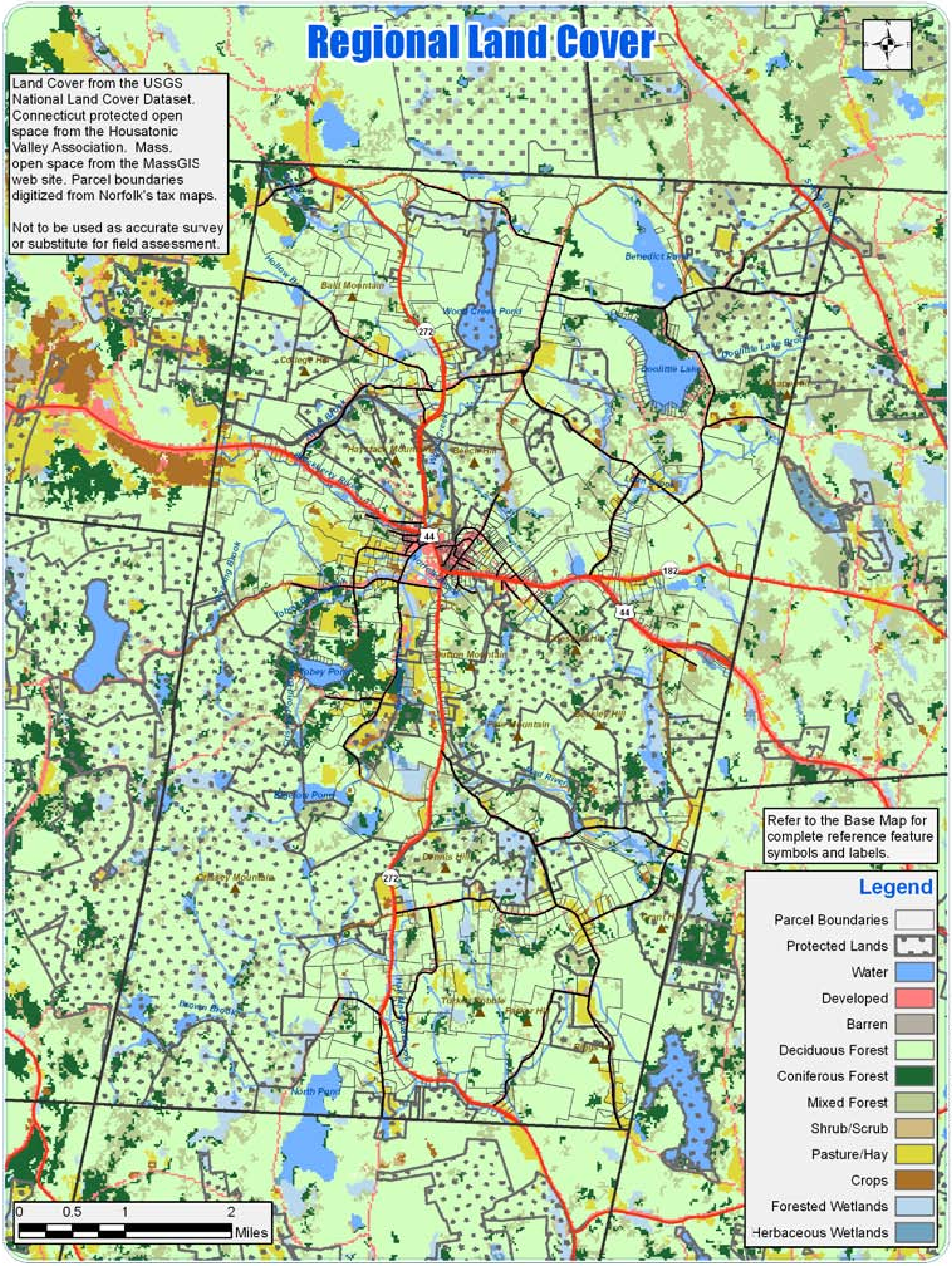
Red maple swamps are the most common types in town and probably the most familiar kind. Black ash and yellow birch are common associates in the tree layer. The shrub layer is often dense with several species easily found: spicebush, silky dogwood, speckled alder, arrowwood, poison sumac, willows, highbush blueberry and common winterberry. The herb layer may be equally developed and includes false hellebore, rue anemone, swamp saxifrage, sedges, jewelweed, sensitive fern, cinnamon fern, ostrich fern, royal fern, crested fern, Clinton's fern, false-nettle, clearweed, bunchberry and purple avens.

Hemlock swamps are very common also, and tend to be cool and deeply shaded, often with a sparse understory. Yellow birch, red maple and white pine are common associates in the tree layer. The shrub layer may include spicebush, common winterberry, highbush blueberry, mountain holly and mountain laurel. Common herbs include cinnamon fern, royal fern, goldthread, wood-sorrel, sensitive fern, painted trillium, jack-in-the-pulpit and sphagnum.

Forested floodplains occupy relatively small areas along the larger streams and rivers of Norfolk. Some high floodplain occurs along the Blackberry River where trees typical of such sites may be found: cottonwood, quaking aspen, black willow, red maple and white pine. A shrub understory is generally absent, but the herb layer is often rich in ferns and spring ephemerals. Riparian forests occur on

© Bruce Frisch

Staghorn sumac (Rhus typhina), typical of old fields.



Map prepared on 12/31/08 by Kirk Sinclair.

the banks of larger streams and rivers. Some of the floodplain species occur, with the addition of hemlock and yellow birch, while cottonwood and black willow tend to drop out. Shrubs such as shadbush, hobblebush and American yew may also occur.

Several types of shrub wetland communities can be found in town. They may be dominated by speckled alder, pussy willow, common winterberry, meadowsweet, steeplebush, buttonbush, or a mixture of any of these. Highbush blueberry, withe-rod, common elderberry, mountain azalea and mountain laurel may also be present, often at the margins. Many ferns, sedges and rushes are common associates in the herb layer.

One rare type is the Leatherleaf Bog (found within Beckley Bog). Leatherleaf, a shrub more common in northern New England wetlands, is a low plant growing in the herb layer alongside sheep-laurel, cranberry, roundleaf sundew, pitcher plant and sedges. Orchids are noteworthy species here, often restricted to these sites. In the shrub layer, commonly found plants include stunted black spruce, tamarack and white pine; mountain holly; highbush blueberry; withe-rod, and common winterberry.

Marshes tend to be wetter sites where most shrubs do not thrive. Some are long-stable communities, from tall stands of common cattail and common reed to short tussock sedge and bur weed marshes. Others may be more dynamic, especially where beaver are active and water levels change periodically. Other emergent species may dominate some sites, such as pickerel weed, arrowhead and smartweeds. In deeper water, floating aquatics dominate with species like yellow and white pond lilies, watershield and bladderworts.

Wet Meadow communities generally are not submerged during the growing season. These communities are variable and diverse. Reed canary grass can dominate large sections of these meadows, much like the common reed. Other species that may be present are joe-pye weed, boneset, green-headed coneflower, St. Johnsworts, swamp candles, blue-flag iris, fowl grass, fringed gentian, cardinal flower, marsh fern and sensitive fern.

Lists of trees, shrubs and vines, wildflowers and ferns appear in Appendix 4.

Notable Trees

Some of Norfolk's trees are remarkable because of their size, their beauty or their age. The Norfolk-Colebrook garden club and the NRI subcommittee cooperated on surveying the town for notable trees and came up with more than 20. See Appendix 4 for an explanation and a list.

Invasive Plants

Weeds and noxious plants have always been with us, but in recent years the scope of the problems caused by introductions of exotic species has become more evident. Wetlands have been dominated by non-native species, ponds choked by newly invading aquatic plants and local biodiversity diminished. This subject has now found its way into the public forum and has many people concerned.

© Bruce Frisch

Notable Northern red oak (Quercus rubra).

An invasive species is defined by the Invasive Plant Atlas of New England (IPANE) as "a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health." A non-native plant is one not native to the region where it occurs. A weed is an out-of-place plant that uses resources reserved for more desirable plants, such as agricultural crops.

Potentially invasive plants are introduced both unintentionally and intentionally—with unintended consequences. They are often transplanted with other plants; carried on tools, clothing and equipment to new sites, or distributed by birds and other animals. Most non-native species become established in disturbed sites: roadsides, lawns, gardens and agricultural fields. Wetlands are also susceptible because natural water fluctuations are constantly disturbing them. According to IPANE, the economic damages due to invasive plants in the United States in 1994 were estimated at $13 billion per year, but the problems caused by invasive plants are also environmental.

Many non-native plants are common species and widely distributed. There are approximately 6,000 introduced species (plants, animals and pathogens) thriving without human assistance in the US alone, and about 10 percent cause substantial economic and environmental damage. Unfortunately, it may take as much as a century before a species becomes a widespread problem and our track record predicting which are potentially invasive has not been good.

Most non-native species introduced to our environs do not cause obvious problems. Dandelions and Kentucky blue grass are not as much of a problem as the human disturbances and habitat manipulations that give these species a foothold. But the plants from even the short list of invasive non-native species are already significant pests in our landscape. Although it is now illegal to buy or sell many of the most common invasive plants, homeowners and gardeners often exchange and introduce plants without understanding the potential consequences of their actions.

Although non-native invasions have never been known to exterminate any native plant, human disturbance has led to extinctions. Worldwide, there has been an overall decline in plant biodiversity and an increase in homogeneity. Hybrids between non-native plants and native species are further changing our natural environment. And, although little is known about how or if invading exotic species damage the structure and function of ecosystems or how they affect local biodiversity, the net effect has been a loss of global biodiversity.

A list of invasive plants in Norfolk appears in Appendix 4. Sightings of additional invasives should be reported to IPANE at http://nbii-nin.ciesin.columbia.edu/ipane/earlydetection/sightings.jsp, to the state DEP or to the Norfolk Conservation Commission.

The Future Plantscape

Norfolk's plantscape has seen continual change. Throughout its history the region's climate has been in flux and, from the time of their arrival, humans have had a significant effect. Since the last glaciers melted about 12,000 to 10,000 years ago, pollen analysis studies tell us that the region has been in turn tundra-like, covered in cold boreal coniferous forest, predominantly hemlock forest and drier chestnut-oak forest. Hemlocks declined precipitously around 500 AD, probably due to an infestation of thrips, and American chestnut increased in this changed environment. Hemlock returned to dominance after 1,000 years.

The poor soils, lack of major rivers and thickness of the evergreen forests may have limited American Indian use of these lands. However, the new European settlers quickly cleared the land, in part for lumber and fuel, but also to create the kind of agrarian and village landscapes with which they were familiar from their homelands. They brought with them European livestock and plants to complete the transformation. The peak of deforestation occurred around the mid-nineteenth century. Later, easier farming in the American Midwest and other forms of fuel, including coal and eventually oil, decreased the pressure on the forests of New England and allowed them to start regenerating.

This was not the end of changes, however. People continued to influence the vegetation by logging the new forests, by purposeful or unintentional burning, and by purposeful or unintentional plant introductions. Additionally, following the new forest growth came some of the original denizens of the woods, but not the same blend and balance of the original forest. The feeding behavior of white-tailed deer in particular has significantly transformed the composition and structure of the region's vegetation. And scientists are only beginning to understand other influences, such as the often obligatory symbiotic relationships between plants and fungi.

We do not know yet what our landscape will become but we do know that we will be the primary influence on Norfolk's vegetation. Some changes will be intentional, as we try to preserve or enhance the natural environment, or when we decide to modify or destroy natural areas in exchange for other benefits. And there will be times when we will change the environment unintentionally, completely unaware of our heavy footprint on the earth. The saga of plant life here is not finished.

Extensive lists of native trees, notable trees, wildflowers and ferns, shrubs and vines, invasives and other plants are in Appendix 4. Recommendations based on the information in this chapter and on the lists in the appendix appear in Chapter 11, starting on page 66. A bibliography appears in Appendix 9.

© Bruce Frisch

Red-capped amanita.

Wildlife

© Pat Harms

The story of Norfolk's wildlife is one of change. During the Pleistocene and after the glaciers retreated, New England was populated with woolly mammoths, mastodons and saber-toothed lions. There were also bison, elk and caribou, in addition to many of our present-day animals. For thousands of years the Native Americans in New England coexisted with—and probably hunted—many of these species.

When Europeans first came to Norfolk, large predators such as mountain lion and eastern wolf, and large herbivores such as whitetail deer, moose and the now extirpated eastern elk may have been common. Deer, bear, rabbits and squirrels probably fed the first settlers until they cleared enough land to raise crops and rear livestock. Furs from these species, plus those of mink, beaver and others, certainly supplemented settlers' incomes as well.

The best-known wolves in Norfolk were those killed by townspeople on Haystack Mountain in 1787 and tales of encounters with mountain lions and black bears were well known. By the early 1800s the original native forests had been mostly cleared from the town, replaced by fields, or chards and cultivated land primarily containing European crop plants and weeds. When farms and land cut over for charcoal predominated, rabbits, foxes and raccoons would have been common, large predators would have been absent and even deer would have been rare (because of overhunting as well as loss of woodland cover). Until the mid 1800s, bounties were paid on foxes and bobcats, which were killing sheep and chickens.

After the Civil War much of New England was abandoned for more productive and easily cultivated land in the Midwest. As the landscape reforested, the common wildlife of the field became less abundant and others, such as deer, porcupine, beaver and bobcat, returned. In the 1950s the eastern coyote made its first appearance in New England, partially filling a niche left open by other large predators. The whitetail deer population exploded as laws protected these animals from excessive hunting, lands were set aside as wildlife refuges and farm fields grew into brush and forest lands, creating an abundance of feeding habitat. The opossum, a southern species, has extended its range into our region, probably in response to an increase in one of its preferred habitats, suburbia.

In the 1970s and 1980s wild turkeys and fisher were reintroduced in Connecticut into Norfolk and Falls Village at Great Mountain Forest. Turkeys have become common and fishers, mid-sized predators, seem to have established a stable population throughout much of the state. Black bear have extended their range south from Massachusetts and are now known to hibernate and rear their young in our area. In recent years even moose have been seen and may become regular denizens of our woods and wetlands.

On the other hand, we may lose some species due to forest fragmentation, disease, interspecies breeding and intraspecies competition, even the loss of farmland: eastern woodrat, northern flying squirrel and New England cottontail, for example. Some species, such as bear, moose and fisher, that have returned to our town as our forests matured may leave it once again. If hemlock woolly adelgid, an insect pest that can devastate eastern hemlocks, increases to the point that these conifers are wiped out, we will also lose the porcupine, which feeds exclusively on hemlocks during the winter in our area. Other animal species will be affected as well, and this could cause a cascade of losses.

Species whose presence is documented or likely in Norfolk are listed in Appendix 5.

© Shelley Harms

Bobcat (Lynx rufus) scans for hidden mice.

© Jim Jackson

Black bear (Ursus americanus).

Birds

Norfolk's varied habitats support birds during all seasons of the year. One hundred and seventy species have been observed in Norfolk.

The number and species of birds in Norfolk differ from much of the rest of Connecticut. Because of its northerly location and relatively high elevation, Norfolk is at the southern limit of the range of many northern species. Partners in Flight, an international bird conservation organization, places Norfolk in the Northern New England physiographic region of the country. For this reason, Norfolk is unusual in Connecticut with its healthy nesting populations of birds such as blue-headed vireo, slate-colored junco, purple finch and Canada warbler.

In addition, much of Norfolk remains undeveloped, so Norfolk has more intact habitat to support more birds. Species that are declining elsewhere, such as chestnut-sided warbler and American woodcock, remain relatively abundant in Norfolk.

© Julie Scharnberg

Wild turkeys (Meleagris gallopavo).

Eighteen of 50 state-listed bird species have been observed in Norfolk: common loon, American bittern, sharp-shinned hawk, northern harrier, American kestrel, bald eagle, bobolink, eastern meadowlark, northern parula, golden-winged warbler, savannah sparrow, northern saw-whet owl, barn owl, common nighthawk, common raven, alder flycatcher, eastern meadowlark and brown thrasher. Norfolk's birds also include species that environmental organizations are monitoring because they are in decline or in danger of declining, such as wood thrush, Canada warbler and American woodcock.

A study released by the National Audubon Society in 2007 showed that many common birds are in steep declines. Habitat loss, both in the U.S. and on the birds' wintering grounds, is believed to be the most significant factor in the declines. Grassland birds such as bobolinks and savannah sparrows, known to breed in Norfolk, are of concern because grassland in Connecticut is being lost rapidly to development. State plans of conservation are currently placing special emphasis on conserving grassland habitat for these birds.

© Barbara Gridley

Pine grosbeak (Pinicola enucleator) feasts on crabapples.

Norfolk is also the summer home to many migratory birds that require intact forests in order to breed. Forest fragmentation due to development is rapidly destroying habitat for deep-forest-nesting birds like the ovenbird, Canada warbler, blue-headed vireo and black-throated blue warbler. Early successional habitat (shrubby growth) is also disappearing in the state, creating concern for species such as the chestnut-sided warbler and ruffed grouse.

A list of Norfolk's birds appears in Appendix 5.

Luna moth (Actias luna) on tree.

Butterflies and Moths

The number of species of butterflies and moths in a given area is an indicator of the health of its environment. A 1995-1999 butterfly atlas survey of Connecticut found 110 species in the state; specimens or photos are housed at the Yale Peabody Museum in New Haven. Norfolk had 53 species and another was found later; they are all listed in Appendix 5.

More than 780 species of moths were caught in Norfolk. A list will be issued next year; specimens of more than 350 are housed at the headquarters of Aton Forest here in Norfolk. There are probably many more species in the area and a comprehensive survey needs to be done.

Most moths are beneficial as pollinators. The exceptions include imported species such as the gypsy moth, which have no natural predators and can multiply to the extent of completely defoliating vegetation. Moths and butterflies, and their larvae (caterpillars) are an important food source for birds.

The changing environment affects which species live in an area. For example, when the land was cleared for farming regal fritillary butterflies could be found in open grass areas. Now that the woodlands have recovered, there are no regal fritillaries in Connecticut. During the butterfly atlas survey the Arctic skipper was found in Norfolk, its first known appearance in northern Connecticut; it is a woodland species not usually found south of Canada.

Other Animal Life

Some of the more obvious and well-known animal species have been discussed above and more are listed in Appendix 5. However, there are many others that we know little to nothing about: beetles and flies, spiders and mites, worms and leeches, and innumerable microorganisms. It would be impossible to find and list every species in Norfolk, although the ongoing observations of amateur naturalists and professional scientists are expected to expand our knowledge and this inventory.

Natural ecosystems are extremely complex, made up of many parts—species and individuals—and operate through these parts by many processes. Every species depends on others to live, creating food chains that connect all things: an insect feeds on a plant, a bird eats the insect, a weasel catches the bird, a raptor devours the weasel. Every part of the web of life ultimately affects the whole: the extirpation of wolves leads to an overpopulation of deer, which results in the loss of flowering plants that many other species depend upon, as well as the elimination of tree seedlings, which affects other species and changes the landscape for decades or more.

We ourselves are parts of this system. To keep the whole system healthy and functional, we must actively learn to understand and protect the natural world around us.

Recommendations addressing concerns about Norfolk's wildlife appear in chapter 11 starting on page 66. See Appendix 5 for extensive lists of species and Appendix 9 for a bibliography.

The Conservation Commission would welcome new data for future publication. To contribute information about Norfolk wildlife or report sightings of the rare animals, please contact the Norfolk Conservation Commission. To send reports to the Connecticut DEP, see http://www.ct.gov/dep/cwp/view.asp?a=2702&q=323460&depNav_GID=1628&depNav=%7C.

Juvenile red eft (Notophthalmus viridescens).

Areas of Ecological Importance

© Bruce Frisch

The town of Norfolk is located in Connecticut's Northwest Highlands, an area characterized by topographical extremes ranging from wide, open valleys to the highest elevations in the state. It is no wonder that this region is considered by many to be the most beautiful area in our state. But beyond the beauty there is tremendous content. Few realize that this region is also one of the most biologically diverse places in New England.

One factor that contributes to the area's biodiversity is the combination of rugged terrain and the presence of limestone, a geology that is rare east of the Appalachian Mountains and limited to a narrow corridor running from southwestern Connecticut into northern Vermont. A second is the largely unfragmented landscape that is still ecologically functional, unlike most areas of our state where dense matrices of roads and developments confine nature into small, isolated islands of habitat where only the most adaptable species can survive.

Yet another is Norfolk's climate, which allows many northern and southern species to reach their range limits in this region. New York's Hudson Highlands and its Taconic Mountains, and the southern portion of Massachusetts' Berkshire Mountains extend into this part of the state. Other species are at or near their easternmost range limits, such as the prairie plants that spread into the region during a hypsithermal, or warming trend, after the last ice age, and remained as relicts after the temperatures adjusted to current levels.

This chapter explains the map on page 43 depicting Norfolk's known natural communities and habitats, as well as areas that are likely to support such features. Because the "potential" areas are derived mostly from secondary sources such as aerial photographs and topographic maps, it is very much a work in progress—really the beginning of a compilation of Norfolk's habitats and natural communities, most of which can only be verified in the field.

Natural Communities and Habitats

Norfolk has its share of rock outcrops, talus and ravines. The **rock outcrop** areas depicted on the map include rocky balds and cliffs on sparsely vegetated hilltops, one of Connecticut's natural community types. These sites tend to be dry and are usually associated with excessively drained soils. In this region of Connecticut, rock outcrop areas are one of the habitats used by the eastern smooth green snake (Liochlorophis vernalis), an uncommon, insectivorous species believed to have declined in their preferred meadow habitat due to the use of pesticides and power mowing equipment.

Cliff areas can have interesting plant communities with unusual ferns rooting in moist cracks; the state-threatened wall rue (Asplenium ruta-muraria) and maidenhair spleenwort (Asplenium trichomanes) are limestone associates. Cracks and crevices in acidic cliffs occasionally support mountain spleenwort (Asplenium montanum), another threatened species. Cliffs can also provide important nesting sites for birds of prey like the turkey vulture (Cathartes aura) and the endangered peregrine falcon (Falco peregrinus) that prefer the protection that high elevation locations afford. The warming rocks create columns of air called thermals that raptors can ride without expending much energy in their search for food.

The hickory summit plant community can be present on hilltops at higher elevations. A good example can be found on Bald Mountain and is characterized by an open understory with few shrubs and a groundcover layer comprised primarily of sedges with some grasses. The dominant trees in these slow-growing, sub-acidic forests are usually white ash (Fraxinus americana), hickory (Carya spp.) and hop hornbeam (Ostrya virginiana).

Norfolk also has many **ravines**. Ravines are narrow valleys with moderately steep to very steep, rocky sides, usually shaded by trees, and are associated with cold, fast flowing streams though sometimes the water can be intermittent. A ravine that is deep and carved out of rock by fast flowing water is known as a gorge. Streams in northwestern Connecticut's ravines are usually cold, highly oxygenated and contain pools. This is one of the habitats preferred by the native brook trout (Salvelinus fontinalis), a species requiring cold, well-oxygenated water. Heavy forest cover, usually dominated by hemlock (Tsuga canadensis), helps maintain a cool microclimate by blocking out sunlight. Ravines may also support unique plant communities such as old growth forest—one of New England's rarest natural communities—where inaccessible terrain helped to limit logging.

Talus is another ecologically important landscape feature that is usually present in areas with rugged terrain. These are sites where rock has accumulated at the base of cliffs and ledges. The rocky build-up can range in steepness according to terrain, or in depth depending on the number of rock fragments that are present. Aspect, canopy cover and the presence or absence of water sources, such as seeps or intermittent watercourses, determine the moisture regime of talus areas; they can be dry or moist. Soils of south-facing slopes are usually significantly drier and warmer than those oriented to the north.

The quantity and arrangement of rocks help create pockets of differing microclimates, that, in areas with rich soils, often support a diversity of plant species. The spaces between the rocks in talus can provide quality hibernaculae for an assortment of animal species, some of which are little known such as the long-tailed shrew (Sorax dispar), a tiny, secretive mammal restricted to talus habitats. Although it has been documented just over the border in adjacent Marlborough, Massachusetts, and suitable habitat exists, records from Norfolk are lacking; further research is needed to determine its presence in Norfolk and to shed additional light on its biology. Some snake species, like the black rat snake (Elaphe obsoleta), are known to spend the winter in communal hibernaculae with other species like the copperhead (Agkistrodon contortrix) deep within the talus. Black bear (Ursus americanus) will sometimes hibernate between rocks, even if fully exposed to the elements.

Old growth forests also can be present in talus areas. Here, old trees are often overlooked—they can be unexpectedly small when stressed by sites that have limited nutrients, water and space.

The cove forest, which is dominated by sugar maple (Acer saccharum) and white ash, is another example of a unique community that grows in moist talus. The rich nutrients needed to support this community are provided primarily by surficial run-off from the mineral-rich slope or from enriched groundwater discharge. Cove forests support a botanically diverse understory.

A small portion of **limestone bedrock** extends eastward into Norfolk from the northern marble valley along the Blackberry River. There is a larger area near the center of town, and a very small site lies approximately halfway between the two. Limestone or marble ledges overlain with **excessively drained soils** also have the potential to support unique plant communities. Rare species like side oats grama grass (Bouteloua curtipendula) and the prairie goldenrod (Oligoneuron album), examples of the previously mentioned hypsithermal relicts, are associated with eastern red cedar–hop hornbeam woodlands, an uncommon plant community that grows on marble ledges and in abandoned fields on **limestone-derived soils**. Reptiles prefer open, sunlit areas in dry, sandy soils for laying eggs. The substrate can be easily excavated for egg deposition; both drainage and heat-retention are good—characteristics that make for excellent incubation.

Areas with limestone-derived soils are limited to two sites in Norfolk. Both are associated with limestone bed rock areas; a relatively narrow strip flanks the western edge of Spaulding Pond and the other is located along the Blackberry River in west Norfolk. Norfolk's limestone features are Connecticut's easternmost extensions of this geology, which corresponds to the eastern range limits of rare limestone-dependent natural communities, including a suite of their insect associates.

Limestone-dependent communities may also occur at groundwater discharge sites (known as **seeps**), either on hillsides or on flat terrain. Although calcium-rich (calcareous) seeps sometimes appear to lack a direct connection to limestone, underground water dissolving calcium as it passes through limestone bedrock can surface in areas farther away. Known examples of seeps occur along the Blackberry River and on private property adjacent to Campbell Falls State Park. Seeps can also form seasonal, highly ephemeral wetland pockets, often identifiable solely by the plant species that are present. They are generally small and typically lack both indicator wetland soils and standing water. Soil scientists and others tend to overlook them during land-use site inspections. Due to the lack of data, this feature is not represented on the map.

Some groundwater discharge areas, however, are readily detectable. Those that have more significant and definable flows than seeps are evident in the landscape because they are the **origins of streams (headwaters)**, easy to locate on topographic maps. Often manifested as springs, they can remain open in winter, with water flowing year round. This is particularly important for wildlife during times when other upland water sources are either frozen or absent altogether. They can also provide a winter food source for birds and small mammals, when resources are scarce; insects can often be observed congregating around the unfrozen spots.

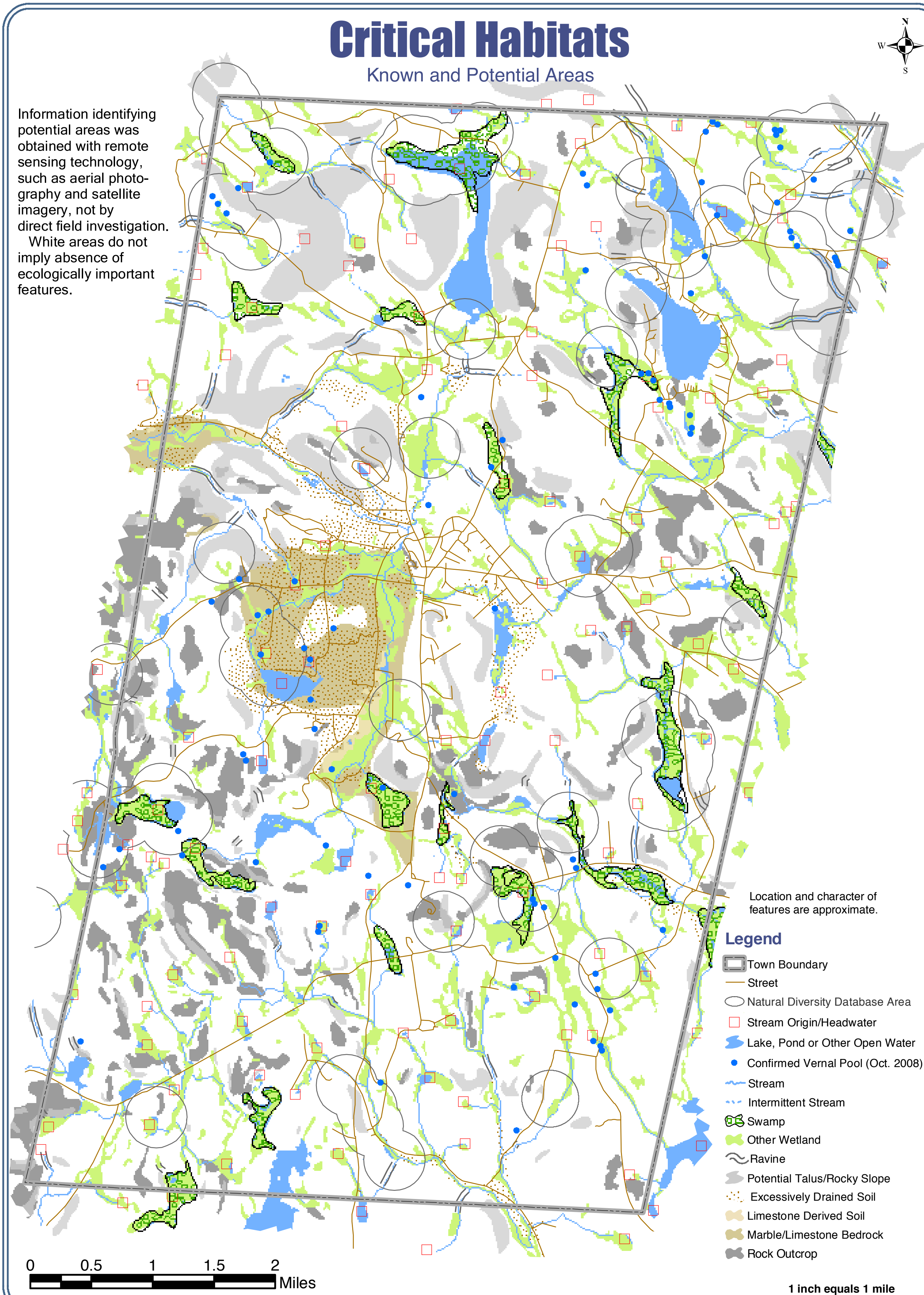
Non-calcareous cold-water discharge sites in steep, dark rocky areas may support rare plants like the Appalachian gametophyte (Trichomanes intricatum) a bizarre filamentous fern believed to perpetually remain in the juvenile stage. Cold springs and well-oxygenated brooks percolating from hillsides are the favored habitats of the northern spring salamander (Gyrinophilus porphyriticus), a species reaching the southern limit of its range in the Connecticut Highlands. State-listed as threatened, it is highly intolerant of disturbance and thermal pollution. The spring salamander can also be found in cold, well-oxygenated seeps. Native brook trout sometimes seek refuge in **intermittent stream** segments where water remains in pools

Headwater areas are represented on the map by small squares. The ponds shown as headwaters were probably originally wetlands or springs dug out by farmers. Brook trout may inhabit the cold, fast moving, well-oxygenated streams that can be found in ravines and high gradient landscapes. The wood turtle (Clemmys insculpta), a species of special concern, on the other hand, prefers low-gradient streams. It hibernates underwater and by the end of spring

Critical Habitats

Known and Potential Areas

Information identifying potential areas was obtained with remote sensing technology, such as aerial photography and satellite imagery, not by direct field investigation.
White areas do not imply absence of ecologically important features.



Map prepared on 11/07/2008 by Elizabeth Corrigan

Laurel blooms at the edge of Beckley Pond.

disperses into adjacent floodplains, upland woods and meadows. Its large home range, which is linear in shape due to its corresponding riparian habitat, makes the wood turtle particularly sensitive to landscape fragmentation and it has consequently been extirpated from many areas in our state. Low reproductive rates, habitat loss and road mortality are also contributing factors to the wood turtle's decline. Considered to be an intelligent and agile climber, the wood turtle can actually scale a six-foot chain link fence!

Norfolk has many **lakes and ponds**. Some ponds are anthropogenic, man-made from wetlands or groundwater seepage areas that have been excavated or from streams that have been dammed. Spring-fed ponds are potential sources of clean, cold water, another habitat for native brook trout. Tobey and Doolittle are clear, deep ponds that support a breeding native brook trout population.

There are also many other different kinds of **wetlands** in Norfolk, most of which are not differentiated on the map. Their diversity disproves the commonly held notion that all wetlands are the same. In fact, they are incredibly diverse. For map simplicity, the various communities are not represented according to type but most types are described below.

Lake and pond shores often support important wetland plant communities. For example, seasonally flooded grasslands throughout Connecticut support tussock sedge (Carex stricta) or, in the limestone region only, rare hairy sedge-cattail (Carex lacustris-Typha spp.).

Swamps and marshes are the most common types of wetland. Swamps are generally defined as wetlands dominated by trees and/or shrubs, while marshes are dominated by herbaceous vegetation. Basin swamps, for example, are found in depressions and are characterized by slow moving water over peat and muck soils and can be acidic or circumneutral in pH. Acidic eastern hemlock basin swamps develop, as the name implies, under acid conditions while circumneutral northern white cedar basin swamps occur in limestone areas.

Seepage swamps are another type of swamp. These, too, can be acidic or circumneutral but have minimal peat accumulation, are seasonally flooded and develop on gently sloping to sloping hillsides with surface flow. The dominant tree cover is red maple (Acer rubrum), but the understory varies and accordingly can be further classified. Like basin swamps, basin marshes are also found in depressions and again, depending on type, are dominated by certain plants such as swamp loosestrife (Dodecadon verticillatus) or tussock sedge.

Another type of wetland present in Norfolk is the topogenic peatland. These, too, are confined to basins. They are groundwater-influenced and develop on poorly decomposed peats and are further classified according to pH. Highly acidic peatlands influenced by groundwater and dominated by ericaceous shrubs (those in the mountain laurel family) are known as bogs or poor fens. A well known Norfolk example is Beckley Bog. Medium fens are dominated by both ericaceous shrubs and sedges, and are flooded by surface water. Rich fens, on the other hand, are influenced by limestone enriched water and can be dominated by shrubby cinquefoil (Dasiphora floribunda) or woollyfruit sedge (Carex lasiocarpa).

Groundwater discharge sites with minimal peat accumulation in open woodlands are also considered to be a type of fen. Referred to as spring fens, they, too, can be either acidic or circumneutral. Acidic spring fens are dominated by golden saxifrage (Chrysosplenium americanum) while inland sedge (Carex interior), bristlystalked sedge (Carex leptalea) and yellow sedge (Carex flava) dominate circumneutral spring fens.

Vernal pools are temporary woodland ponds that usually fill with autumnal rains, not in the spring as the name implies. Unlike lakes and ponds where microscopic green plants (algae) form the basis of the food chain, they derive their energy from decaying leaf-litter from the surrounding forest. Energy from decomposing leaf litter cycles back out into the forest in the form of organisms, such as the metamorphosed salamanders whose larvae fed on the aquatic insects that broke down the leaves in the first place.

Vernal pools are fed directly by precipitation, surface run-off and/or groundwater and typically lack a permanent inlet or outlet. They cannot sustain fish populations because they tend to dry out, particularly during the drier summer months. Free from fish predation, vernal pool organisms can successfully complete their life-cycle. Those whose entire existence depends on these ephemeral waters are known as obligate species. Good examples are the wood frog (Rana sylvatica) and the fall breeding marbled salamander (Ambystoma opacum), an uncommon species in Norfolk as it is near the northern limit of its range.

Areas with vernal pools are extremely diverse and biologically productive. Mole salamanders and wood frogs spend more than 90 percent of their adult lives in the surrounding upland forest, returning to their natal pools only to breed. Insects and other invertebrates dependent on vernal pools for parts of their life cycle abound as well, attracting and sustaining a diversity of insectivorous forest dwelling songbirds. In addition, vernal pools serve as watering holes for other types of animals such as mammals in what may otherwise be dry uplands. The data layer on the map includes only those pools that have been verified by direct field inspection since 2006 or have been historically known to exist. Most of the pools are apparent on aerial photographs taken in early spring before leaf-out. Those associated with coniferous forests cannot be mapped from photos because the canopy obscures them.

Other critical habitats present in Norfolk include **grassland** and **early successional habitat**. Grasslands can range widely in plant composition and structure, consisting of nearly all grass as in hayfields, to the early stages of forest succession in which shrubs, trees and other woody growth like vines are becoming established.

© John Anderson

An example of early successional habitat.

Historically, natural grasslands in the Connecticut forested landscape were mostly restricted to floodplains, salt marshes, beaver meadows, coastal sand plains and areas burned either naturally by lightning or by fires deliberately set by Native Americans to clear undergrowth from their hunting grounds. But as settlers began to develop the land

© Tammy Andrews

Black spruce bog, South Norfolk.

© John Anderson

A typical woodland vernal pool.

and agriculture expanded, these natural areas gave way to larger expanses of open landscapes, providing widespread habitat for grassland-dependant birds and other wildlife. Eventually when the inevitable erosion and depletion of farmland soils occurred in steep and rocky areas like those of northwestern Connecticut and the prospect of better economic opportunities in cities prompted many to abandon farming, grassland habitats began to decline. Agricultural land reverted to forest or, like natural grassland communities, eventually succumbed to development, and disturbance factors such as fires are prevented and or rapidly extinguished for safety reasons. Today, grassland habitats in Connecticut are, for the most part, limited to remnant agricultural lands, many of which are small and isolated; grassy areas associated with airports and landfills, and to the remnant sand plains of North Haven.

Good examples of grassland bird habitat in Norfolk are at Yale and Broadfield farms. Both have extensive acreage that has been traditionally devoted to hayfields and both support a breeding population of bobolink (Dolichonyx oryzivorous), a Connecticut species of special concern. The eastern meadowlark (Stumella magna), another grassland specialist, has been documented in Norfolk but is not known to nest here. The brown thrasher (Toxostoma rufum), also state-listed as special concern, prefers early successional growth and is just one example of a species dependent on this type of habitat.

It is important to note that grassland habitats are not limited to birds—they are also critical to other organisms such as insects and even certain plants. Certain species of butterflies and moths as well as dragonflies require these habitats to complete their life cycle.

Grassland bird and early successional habitats are not depicted on the map, as they are indistinguishable in the aerial photographs that were used for this report. Please refer to the Agricultural Resources map on page 19 instead.

The **Natural Diversity Data Base** (NDDB) is a compilation of the State's imperiled flora and fauna. NDDB circles on the map represent locations of state-listed species and/or rare habitats. Each circle is one-half mile wide and may contain more than one species or rare habitat. This convention is used to flag their presence while protecting exact locations; sometimes, rare species are the victims of poaching or are deliberately destroyed by the uninformed. It is important to realize that the circles represent only those species and habitats that are mappable; the NDDB has many additional records on file that lack sufficient locational information and therefore cannot be represented on a map.

© Bruce Frisch

Pitcher plant (Sarracenia purpurea).

© John Anderson

Woodland bog (Knox Swamp).

Plants and animals can be rare for a variety of reasons, the most common ones being habitat loss from outright destruction, habitat change due to natural succession and over-collecting. Non-native invasive species also cause species declines by direct competition for resources and alteration of habitat. Some species are restricted to rare habitat types and are therefore regionally rare. One example is Labrador tea (Ledum groenlandicum), a plant that was abundant in New England during the last ice age, but has become restricted to peat bogs since the glaciers retreated.

Clearly, Norfolk has a variety of ecologically important features, some of which are more common than others. However, little is known about the "potential" areas shown on the map. Areas that may support important natural communities and habitats are just as important to consider as known areas because they, too, may have ecologically valuable elements. By not exploring all Norfolk's natural communities and habitats, we could be losing a wealth of scientific information that would help us better understand the distribution and needs of our flora and fauna. We could also be losing the chance to preserve and encourage the biodiversity that is so important to the health and character of our town.

For recommendations based on the information above, see Chapter 11, starting on page 66. See Appendix 6 for a short discussion of biodiversity and Appendix 9 for a short bibliography.

© John Anderson

Tussock sedge marsh on Doolittle Lake Brook.

Open Space

© Bruce Frisch

Norfolk's abundant natural resources and biodiversity depend on the quality of its open space—largely a mosaic of unfragmented forests, undisturbed wetlands and fields. Open space is land that has not been developed or built on. Some think of it as space for recreation. For others, it means wildlife habitat, tranquil lakes and woods, beautiful views over forested hills—or that our children have the good fortune to be surrounded by the natural world, to be able to explore a marsh, catch fireflies on summer nights and hear owls calling over a field. All of these are important aspects of open space but certainly not the whole story. Open space also determines the feel of a place and it can protect our environment by affecting air quality and the local climate, helping to keep streams and watersheds clean and diminishing erosion. It can even have an economic value by reducing the need for town services, enhancing property values and supporting forestry and agriculture.

Norfolk is rich in open spaces, and we have grown used to having them as part of our daily lives. The school athletic field, the baseball field, the town green, the snake fence meadow, the meadows along Westside Road, the wooded ridge of Canaan Mountain, Haystack State Park, Barbour Woods, Great Mountain Forest and Tobey Pond Beach are just a few. Norfolk would be a very different place without them.

As of 2006, according to the University of Connecticut's Center for Land Use Education and Research, about 7 percent of the state was agricultural land; 59 percent was forested, but only 18 percent of that land was the unfragmented, interior forest best suited for wildlife habitat. Together, the towns of the northwest corner contain most of the state's remaining unfragmented forest; Norfolk's large forest tracts represent a rare and disappearing resource.

The state of Connecticut has established the modest goal of preserving 20 percent of the state as open space, much of that effort being directed at farmland. In contrast, in Massachusetts the Harvard Forest has proposed a sweeping program calling for the protection of 50 percent of the state's forested land, most of which is in the western part of the state. This would protect extensive wildlife habitat, plant communities and watersheds; connect forest preserves and reduce fragmentation, and offer opportunities for scientific study, education, sustainable timber harvesting and recreation.

Maintaining open space

Open space can be vulnerable to development, depending on its ownership and legal status. There are three main categories, with various levels of protection: permanently protected open space, managed open space and Public Act 490 land.

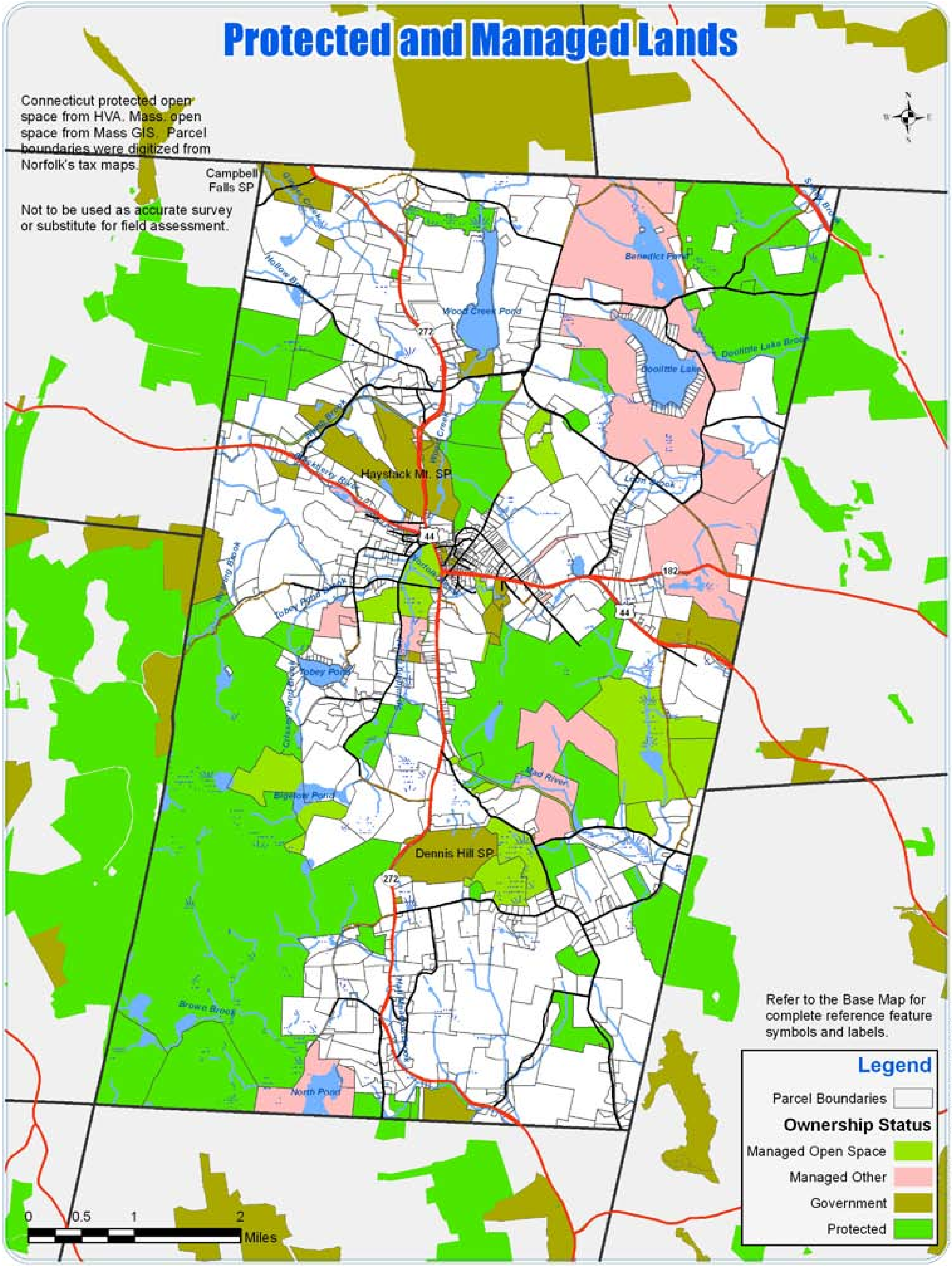
Permanent open space is protected at the highest level, through a conservation easement or deed restriction. It is land on which development is limited or prohibited and can include properties with public access as well as properties for private use only. Conservation easements that limit development of a property offer the most enduring level of protection because the easement is transferred with the deed to each subsequent owner. Organizations that hold such easements are responsible for their enforcement and include the federal government, the state of Connecticut, the Connecticut Conservation Association and the Norfolk Land Trust. Although development rights are given up under conservation easements, the land itself remains the property of the owner.

In Norfolk, owners of these lands include many private individuals, Aton Forest and the Great Mountain Forest Corporation. Such land continues to produce economic value for the community through timber harvest, research opportunities, hunting, public recreation or reduced costs

© Shelley Harms

Girl meets frog.

Protected and Managed Lands



Map prepared on 12/31/08 by Kirk Sinclair.

© Bruce Frisch

City meadow seen from above, with Haystack Mountain in the distance.

of town services and, at the same time, protects watersheds, air quality, many different types of habitat and the rural character of the town. Almost all land that is currently under conservation easement in Norfolk also carries a PA-490 designation (see below), so there has been very little change in tax status due to easement. And studies by the Trust for Public Land and the American Farmland Trust (see bibliography) suggest that preserving open space can actually be a net gain for a town.

Managed open space is land that is currently used as open space and will probably remain so, but which has no permanent protection. This includes property that belongs to a wide variety of organizations such as the Doolittle Lake Company, the Old Newgate Coon Club, the Norfolk Land Trust, the Nature Conservancy and the Housatonic Girl Scouts.

PA-490 land is tax abated, but not protected. The state of Connecticut established this program under Public Act 490 (PA 490) to encourage preservation of agricultural, forested and open lands. Such land is taxed at a lower rate to reflect its current use, not its potential value as developed property. It is important to know that PA-490 lands have no protection beyond the intentions of the owner, who can sell or develop it at any time, albeit with a penalty in some circumstances. Although the PA-490 statute established open space as a category of land that should be promoted through reduced property tax rates, Norfolk's regulations do not designate it as such. By doing so, the town could encourage open space preservation without having to acquire it.

Maps

The map on page 49 shows protected and managed open space with varying levels of protection, and the map on the opposite page shows both PA-490 forest and farm lands.

Protected open space map

Lands with a conservation easement, marked with green hatching, have the highest level of protection. The acreage under this level of protection is approximately 8,778 acres or about 29 percent of the town.

Solid green indicates managed open space that is owned by nonprofit conservation organizations such as the Nature Conservancy, the Norfolk Land Trust and the Connecticut River Watershed Council. Although these organizations were formed to preserve open space, their properties do not have the protection that a conservation easement supplies. This level of protection covers approximately 1,139 acres or about 4 percent of the town.

Other managed open space is shown in pink and covers approximately 3,208 acres or about 11 percent percent of the town.

Areas marked in tan indicate acreage under the control of a government entity, either federal, state, or town and include state parks, the town meadow, Botelle School, the Old Inn site and the town farm. Together these add up to 1,639 acres or 5 percent of the town.

PA-490 land map

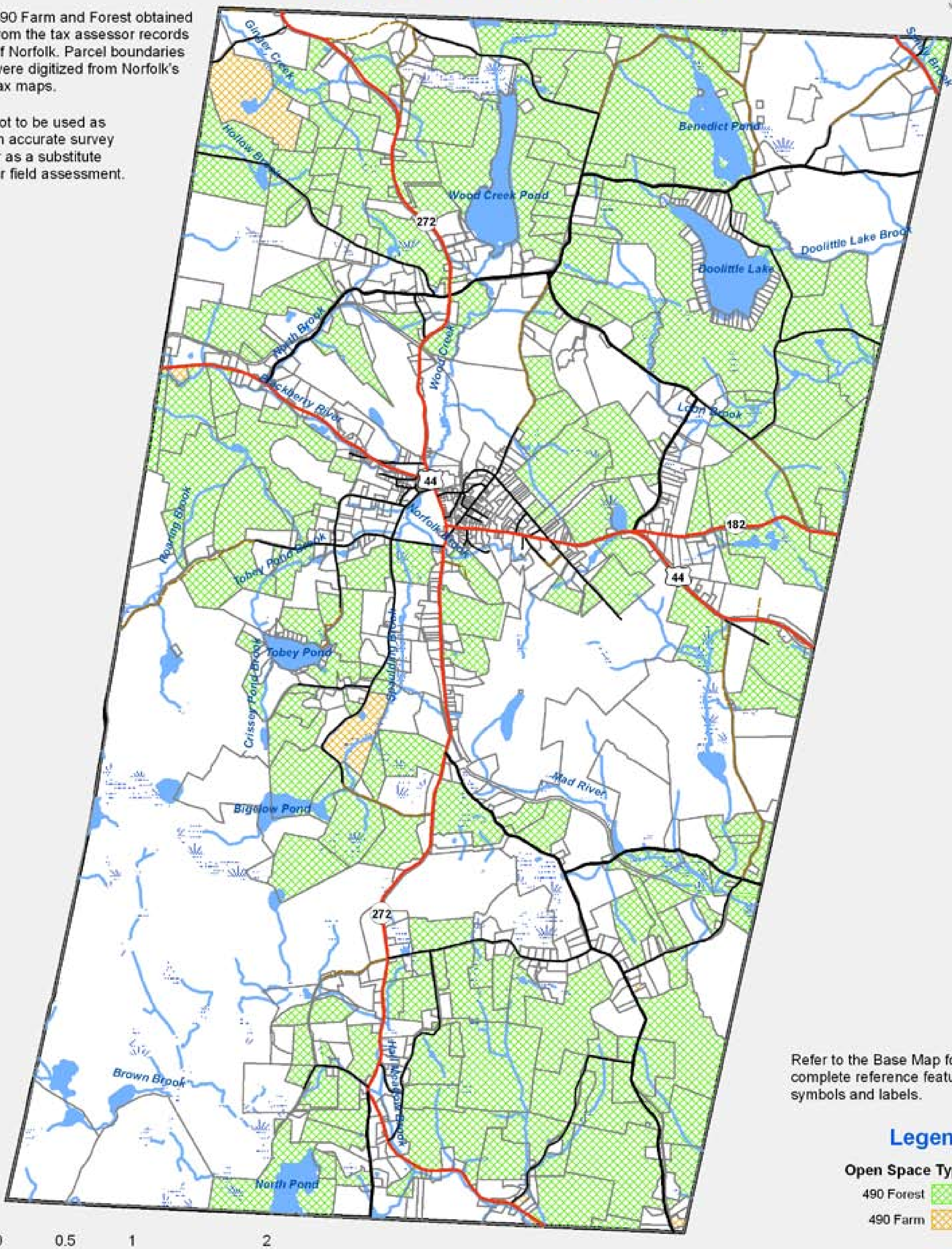
The second map shows acreage that has been designated as agricultural land (orange hatching) or forest land (green hatching) under Public Act 490 of the state of Connecticut. There are approximately 14,444 acres of PA-490 land in Norfolk or about 48%, almost all of it in forest designation.

For recommendations see chapter 11 starting on page 66. A list of lands open to public recreational use appears in Appendix 7, and Appendix 9 contains a short bibliography.

Public Act (PA) 490 Lands

490 Farm and Forest obtained from the tax assessor records of Norfolk. Parcel boundaries were digitized from Norfolk's tax maps.

Not to be used as an accurate survey or as a substitute for field assessment.



Refer to the Base Map for complete reference feature symbols and labels.

Legend

Open Space Type

490 Forest

490 Farm

0 0.5 1 2 Miles

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

Scenic Resources

© Katherine Griswold

Norfolk's Scenic Views

When traveling throughout Norfolk, one cannot help noticing its natural beauty. The myriad hills surrounding the village offer views to ridges and across valleys, fields and woods. The many unfettered views help give one a sense that nature here in Norfolk is accessible to all who want to enjoy it.

A 1911 article from the Winsted Evening Citizen says, "If there is one place upon this green earth where one cannot help gaining light and inspiration from nature, living face to face with her, upon whose quiet heights 'day unto day uttereth speech and night unto night showeth knowledge,' where the tranquil earth rejoices continually in the beauty of her being, and one has time to realize how good life is, that is none other than the beautiful Village of Norfolk." Norfolk's natural beauty has changed very little since that article was written almost 100 years ago.

What makes a view scenic can be very subjective. Everyone has his or her own ideas about beauty. To identify scenic views, committee members held meetings with groups of local people. When two or more people picked the same view, it was accepted as a scenic view provided that its viewpoint (the point from which it could be seen) was accessible by a paved road.

After the views and their viewpoints were determined, the information was used to create a map showing scenic resources. It appears on the opposite page.

The scenic features were then used to determine and map gateway views (views seen along the roads where they enter Norfolk), scenic views of high visibility and scenic views of high prominence. The resulting map appears on page 57. A prominent scenic view is a view that envelops most of one's field of view, such as Haystack Mountain seen from downtown above the city meadow. Traveling north on Route 272, before entering town, there is a beautiful gateway view up Hall Valley. Looking west and south from Litchfield Road across the open fields in the Westside Road valley toward Crissey Mountain is a beautiful, changeless view that perfectly represents Norfolk's natural beauty. Ridgelines, of which Norfolk has many, are both highly visible and highly prominent scenic features.

These uncluttered views—of open fields, forested hills and ridges that have been left mostly in their natural state—are an integral part of what makes Norfolk special.

Norfolk's Rural Roads

Norfolk's roads form a 56-mile network that has remained relatively unchanged over the years (13.31 miles remain unpaved). Residents and visitors using them can still enjoy a wealth of wildflowers, shady forests, streams and ponds, fields, stone walls and boulders, wildlife and historic places while walking, running, cycling, riding on horseback or in a carriage, or simply going somewhere in a car.

According to Norfolk's 2000 town plan, both its town roads and state highways "are an important aspect of the overall attractiveness of the town." In 2005, the town adopted a scenic road ordinance stating that "the scenic and rural roads of the Town of Norfolk are irreplaceable resources," and providing that, either in response to a petition from property owners who live along a road or on its own initiative, the Planning and Zoning Commission may designate a road or road segment as a scenic road. This designation means that the road must be maintained in a way that preserves its scenic characteristics. Any road work beyond routine or emergency maintenance requires the town to notify landowners along the road and give them a hearing. Thus far, two roads, South Sandisfield Road and Winchester Road, have been designated town scenic roads.

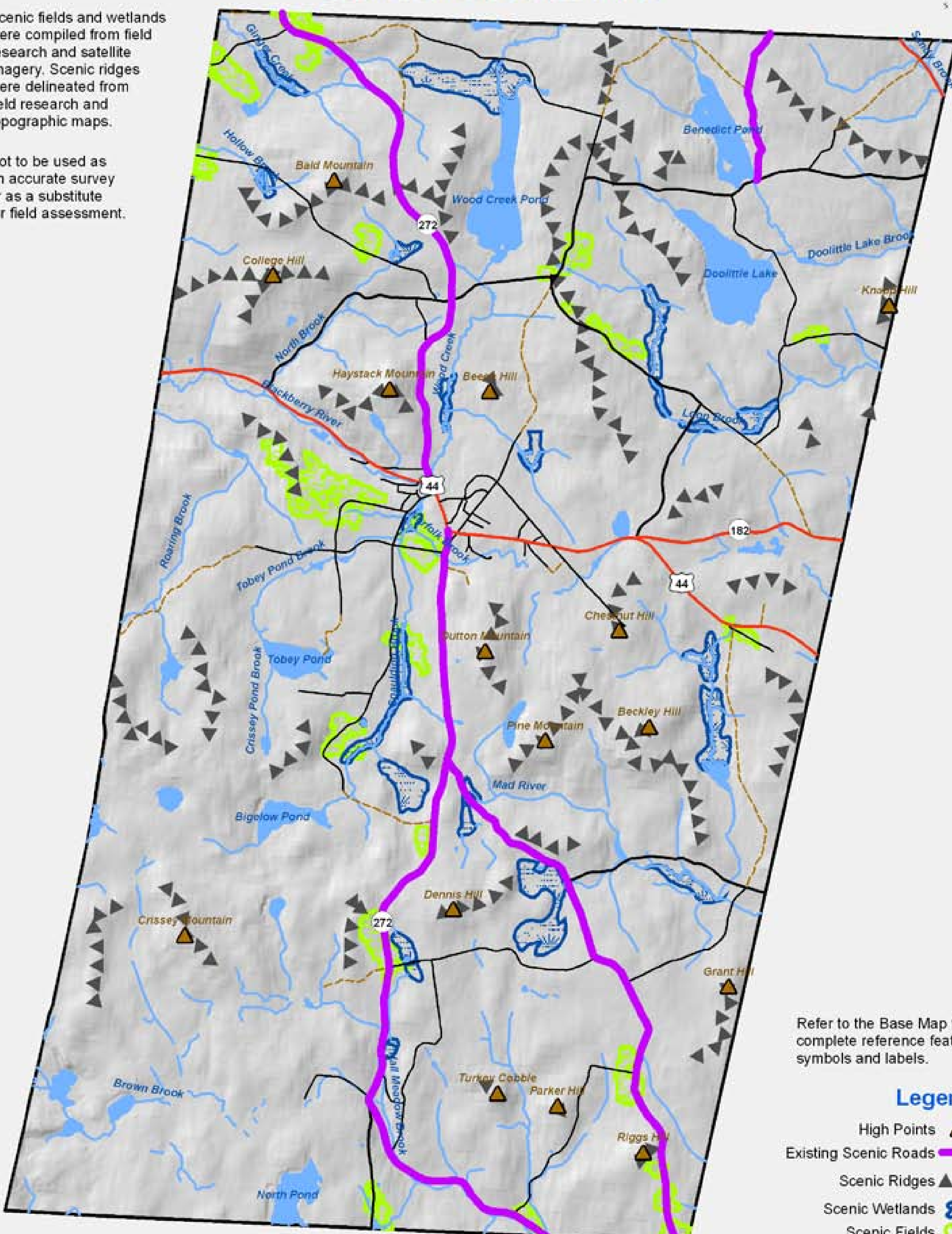
© Katherine Griswold

Clouds mirrored in sunlit water.

Scenic Resources

Scenic fields and wetlands were compiled from field research and satellite imagery. Scenic ridges were delineated from field research and topographic maps.

Not to be used as an accurate survey or as a substitute for field assessment.



0 0.5 1 2 Miles

Refer to the Base Map for complete reference feature symbols and labels.

Legend

High Points
Existing Scenic Roads
Scenic Ridges
Scenic Wetlands
Scenic Fields

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

© Katherine Griswold

View of Kelly Swamp from Winchester Road, with Dennis Hill in the background.

The state scenic highway statute is similar. Route 272 from Goshen to the Massachusetts line was designated a state scenic highway in 1996.

The town ordinance specifies that, to qualify for scenic road status, a road must possess at least one of the following characteristics:

- It is unpaved.
- It is bordered by mature trees or stone walls.
- It is 20 feet wide or less.
- It offers scenic views.
- It blends naturally into the surrounding terrain.
- It parallels or crosses over streams or other water.

Other features that must be considered are:

- Historic significance.
- Recreational uses.
- Whether the road is near open space, farm or forest land.
- Wildflowers and attractive vegetation.
- Notable geologic or other natural features.

Survey of Roads

In 2007, subcommittee members and other volunteers surveyed all Norfolk's rural town roads to determine whether they have any or all of the characteristics listed in the scenic road ordinance. They also surveyed all of Norfolk's state highways, to ascertain whether they possess the characteristics that would qualify them as state scenic highways. They drove the length of each road and checked for each of the qualifying characteristics listed in the ordinance or the statute, and measured the width of the town roads to determine whether they were 20 feet wide or less. The list of roads also was reviewed by Richard Byrne of the Norfolk Historical Society for features of historic interest. The 15 private roads in Norfolk are not included; they are owned and maintained by individuals.

The inventory, which appears in Appendix 8, found that all Norfolk's rural roads possess most of the characteristics that qualify a road for scenic designation.

© Shelley Harms

Roadside stone walls often shelter wildlife.

Blue highway, Norfolk-style (Mountain Road, facing west).

Four roads have all 13 characteristics listed in the ordinance, both essential and discretionary: Beckley Road, Elmore Road, Meekertown Road and South Sandisfield Road. An additional three roads have all seven qualifying characteristics and only lack one of the secondary characteristics: Barry Hill Road, Gamefield Road and Lovers Lane.

In addition, the survey conducted by the subcommittee concludes that all the state highways passing through Norfolk possess most of the characteristics required of a state scenic highway. Characteristics that qualify a state highway for scenic status are similar to those for scenic roads.

Dark Night Sky

Stargazing, counting falling stars, finding the Big Dipper and wishing on a star are part of humankind's connection with the universe. A National Park Service survey found that 94 percent of park visitors agreed that "a dark night sky is important to that park's purpose and visitor experience."

Much of Norfolk is still dark at night. Residents can view the stars and events such as meteor showers and the northern lights. However, the lights of Winsted and Torrington are visible in parts of Norfolk, and the lights of Norfolk's town center impede viewing of the stars.

The proliferation of artificial outdoor light use, particularly light projecting into the sky, has caused a new form of environmental degradation: light pollution. Light pollution is the scattering of light into places and the sky where it is not wanted or needed. It is caused by unshielded lights, spotlights, and ornamental lights that direct light up or at wide angles.

Under ideal conditions, about 2,500 stars are still visible in the night sky in the United States but only 10 percent of Americans can see the majority of these stars regularly from where they live, according to the National Parks and Conservation Association. NASA says that two-thirds of the world's population can no longer see the Milky Way, and within 10 years, the stars could fade from view entirely in all but the most remote locations.

Migratory birds and sea turtles are known to rely on the moon and stars for guidance, and many are killed when attracted by artificial light sources. Studies have shown that artificial light may adversely affect foraging, reproduction and hormone levels in other wildlife. Norfolk's dark night sky is an important resource.

A bibliography appears in Appendix 9 and recommendations based on the data in this chapter and Appendix 8 appear in Chapter 11 starting on page 66.

Winter scene along Westside Road.

Town Character and Gateway Viewpoints

Map Key*	Viewpoints	Scenic Views
G1	North Colebrook Road	West to Benedict Pond
G2	Colebrook Road (Route 182)	West to tree-lined rural road
G3	Greenwoods Road East (Route 44)	West to farm field, winter view of Chestnut Hill and Beckley Hill
G4	Grantville Road	West to rural road, old farm, stone walls
G5	Winchester Road	North on rural road and houses, winter view west
G6	Litchfield Road (Route 272)	North to farm fields and forested hills
G7	Goshen East Street	North to Hoover Pond and Arcadia Farm, winter views east to Turkey Cobble, Parker and Riggs Hills
G8	Mountain Road	East to unpaved rural road through forest
G9	Greenwoods Road West (Route 44)	East to Haystack across field, College Hill and unnamed north central ridge
G10	North Street (Route 272)	South across farm field to Haystack, College Hill and Bald Mountain
V1	Wheeler Road	Winter view north to unnamed ridge; east to unnamed north-central ridge
V2	Bald Mountain Road	Winter views to Bald Mountain and distant western ridges, views of Haystack, farm fields, winter view to unnamed north-central ridge
V3	Route 272 north of Ashpohtag Road	Haystack
V4	Doolittle Dr. north of Ashpohtag Road	Unnamed north-central ridge, farm fields, orchard, stone walls
V5	Ashpohtag Road west of Bald Mountain Road near North Brook crossing	Haystack
V6	Route 272 south of Ashpohtag Road	Eastern view of unnamed north-central ridge
V7	Loon Meadow	Loon Brook wetland
V8	North Street (Route 272) at dry dam	View across dry dam to Beech Hill & Loon Meadow unnamed north-central ridge
V9	Route 44 at Memorial Green	Panoramic views to Haystack, Buttermilk Falls
V10	Sunset Ridge	Winter views to Dutton Mt., Haystack, Beech Hill & unnamed north-central ridge
V11	Station Place, downtown	Haystack, College Hill
V12	Laurel Way	Historic houses, winter views of Chestnut Hill and Dutton Mountain
V13	Town Green, Routes 44 and 272	Historic district, Haystack
V14	Yale gazebo	Yale school grounds, distant western ridges
V15	Near Botelle School	View across fields to Dutton Mountain
V16	Rtes 44 & 182 (George's Garage)	Pond Hill Pond, south to wetland, unnamed north-central ridge
V17	Mountain Road at Westside Road	Haystack and Dutton Mountain
V18	Mountain Road at Yale school	Winter views south, open fields, Swift Hill, Dennis Hill, Dutton Mt., Haystack
V19	Route 272 south of Mountain Road	Winter views southwest to Crissey Ridge
V20	Westside Road	Numerous views to Dutton Mt., Haystack, Swift Hill; stone walls & farm fields
V21	Route 272 north of Winchester Road	Western view to Crissey Mountain across Westside valley
V22	Westside Road	North view across farm fields to Dutton Mountain and Swift Hill
V23	Route 272 at Dennis Hill	Panoramic view northwest, Swift Hill
V24	Grantville and Winchester Roads	Kelly Swamp, Dennis Hill
V25	Bruey Road at Old Goshen Road	Panoramic view south across field toward Turkey Cobble and Parker Hill
V26	Bruey Road	Stone walls, fields, winter views to Grant Hill and Dennis Hill
V27	Bruey Road at Winchester Road	Dennis Hill
V28	Old Goshen Road at Smith Road	Stone walls, fields, pine woods
V29	Winchester Road south of Parker Hill	Panoramic view south across Broadfield Farm field to Parker and Riggs Hills

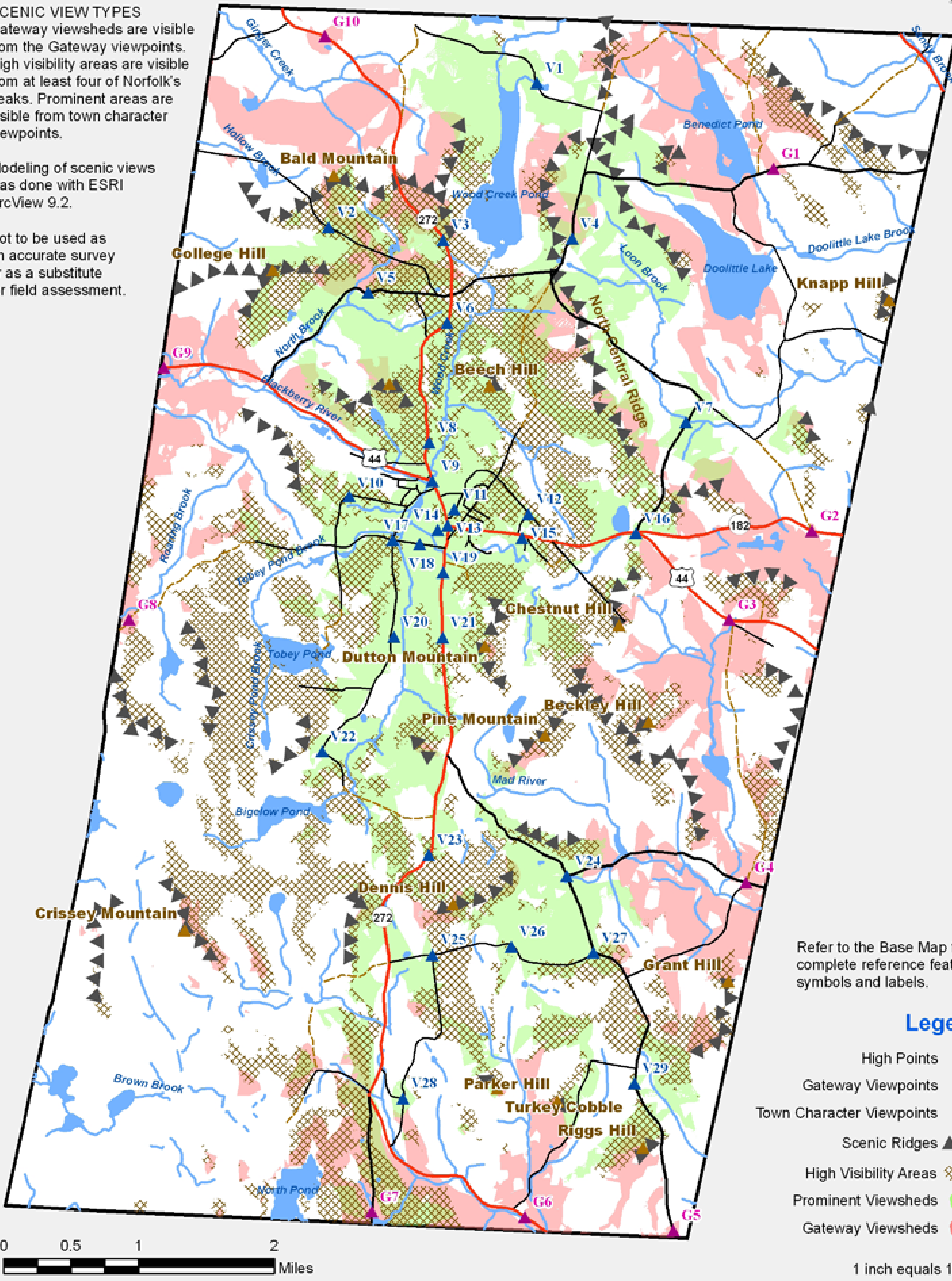
* G = Gateway viewpoint   * V = Town character viewpoint

Scenic Views

SCENIC VIEW TYPES
Gateway viewsheds are visible from the Gateway viewpoints. High visibility areas are visible from at least four of Norfolk's peaks. Prominent areas are visible from town character viewpoints.

Modeling of scenic views was done with ESRI ArcView 9.2.

Not to be used as an accurate survey or as a substitute for field assessment.



Refer to the Base Map for complete reference feature symbols and labels.

Legend

- High Points
- Gateway Viewpoints
- Town Character Viewpoints
- Scenic Ridges
- High Visibility Areas
- Prominent Viewsheds
- Gateway Viewsheds

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

Historic Resources

© Alexandra Childs

When the tract of land that would become the township of Norfolk was divided into 53 rights of 400 acres each and offered for sale by the Colony of Connecticut in 1738, few buyers were interested. The Green Woods, a dense hemlock forest riddled with swamps and rock ledge, did not appeal to prospective settlers.

It took six years for the first of the original proprietors, as the buyers of these rights were called, to settle in Norfolk. In 1744 Cornelius Brown built his log dwelling just east of the Norfolk-North Canaan town line, probably choosing that location (**A-1** on the Historic Resources map oppositeXX) for its proximity to the relatively well-established community of Canaan. Although settlement was slow, by 1758 with 43 families in residence the community was sizable enough to petition the General Assembly for town privileges. On October 12, 1758, Norfolk was incorporated and the business of civic life began in earnest.

In one of the first actions the town took following its incorporation, villagers voted to build a meeting house and hire a preacher. The meeting house was raised in 1759, its chosen location carefully calculated and measured to be near the geographical center of all the settlements. In 1760 the Church of Christ was gathered, and the following year Ammi Ruhamah Robbins accepted the call. The small wooden church, painted peach-blow pink, was not fully completed for 10 years. By the end of Rev. Robbins' pastorate in 1813, it had become too small for the growing population of Norfolk, and a more commodious and elegant church designed by noted church architect David Hoadley was built; it overlooks the Green today (**H-1**).

For (H-1)-(H-23), see Norfolk Center map on page 65. For all other letters refer to the map opposite.

In 1757 the oldest of the town's burial grounds, Center Cemetery (**M-1**), was established on Old Colony Road. Here can be found the grave of James Mars, who in 1798 at the age of eight years was the last slave bought or sold in Norfolk. The gravesite is now a stop on the African-American Freedom Trail in Connecticut. Other cemeteries include Pond Town (**M-2**), located near Doolittle Lake; South Norfolk Cemetery (**M-3**), opened in 1790, and Grantville Cemetery (**M-4**) on Winchester Road near the hamlet of Grantville. Remnants of a burial ground can also be found in Meekertown (**A-2**), once a well-populated settlement in the southwest corner of the township.

Schools

Education was an early priority for the residents of Norfolk. Town leaders voted in 1767 to cover the expense if 10 or more families would set up an approved school. Given Norfolk's widely scattered settlement, this was intended to encourage the building of neighborhood schools; later the required number of families was reduced to three. The district school system eventually grew to include 11 grammar schools, each managed by a local school committee. Schoolhouses were simple one-room structures with a wood stove providing heat. The district schools served a varying number of children, and teachers were usually boarded in neighboring homes.

The West Norfolk Schoolhouse (**S-1**), now a private residence, opened in 1839. After an addition was built in 1900, it was the only two-room schoolhouse in the outlying districts. Also still standing as private residences are the South Norfolk School (**S-2**); the East Middle District School (**S-3**), known as Pond Hill School, and the Crissey District School (**S-4**). The North Middle School (**S-5**) has been restored as the Little Red Schoolhouse. Foundations remain of the Norton District School (**S-6**), sometimes called the Curtiss Family School; the South Middle School (**S-7**); the Pond District School (**S-8**), and the North Norfolk District School (**S-9**). The South End School, also known as the Grantville School, was moved from its original site on the southeast corner of Winchester and Schoolhouse Roads to a site farther north on Winchester Road and was altered to a private residence.

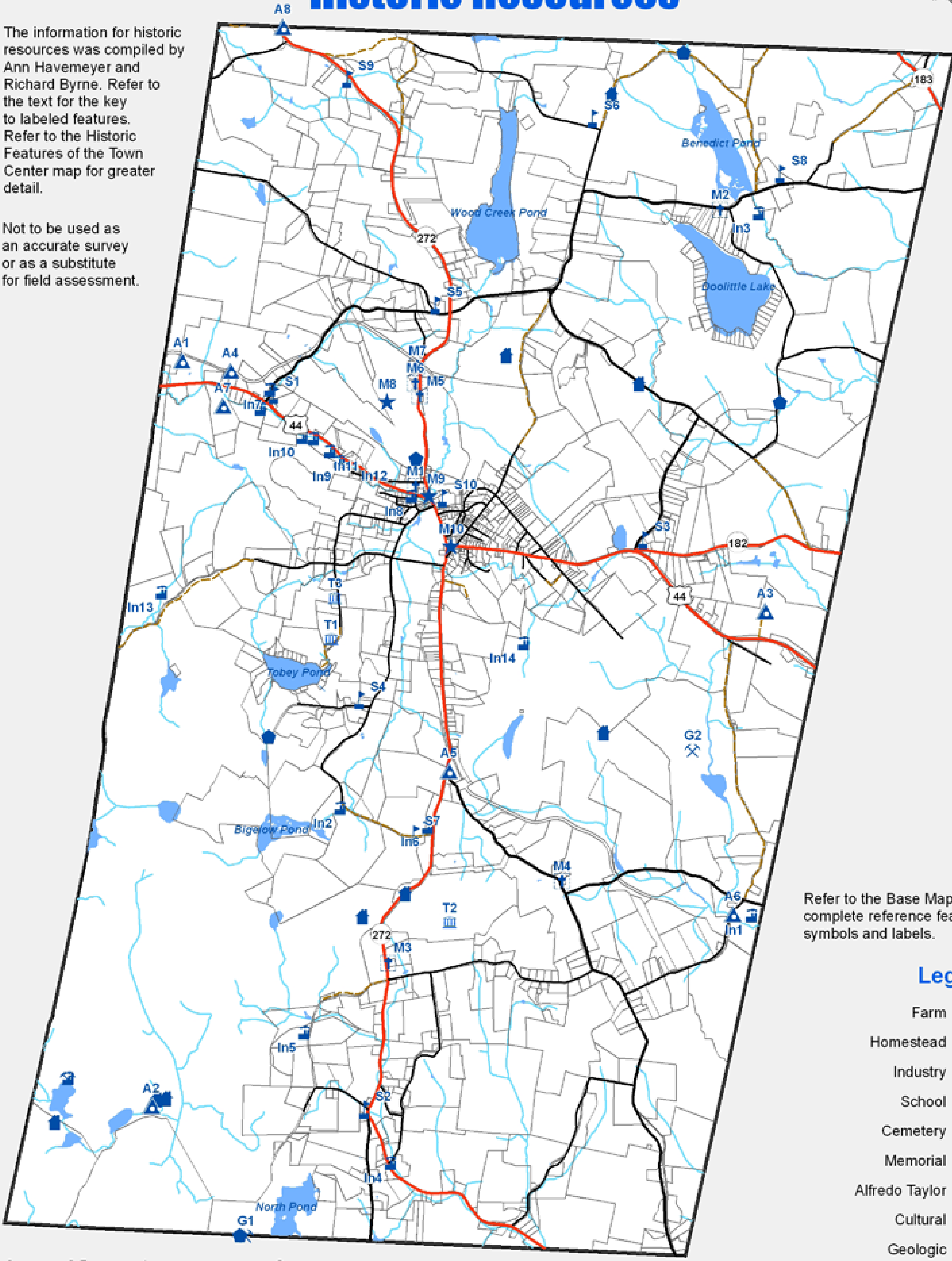
The most populated of the school districts, the Center District required the construction of increasingly larger facilities. The original schoolhouse built on the east side of the Green in 1777 was replaced in 1819 with a building known as the Schoolhouse and Conference Room just south of the Church of Christ. In 1886 a four-room schoolhouse was built on Shepard Road. When it became too small, a two-story brick building was built just south and east of the Catholic Church. Center School (**S-10**) was demolished following the opening of Botelle Elementary School in 1970. A commemorative fountain is all that remains.

For those going beyond grammar school, the Norfolk Academy (**H-2**), now the Norfolk Historical Museum, was built on the east side of the Green in 1840. The first floor of this building also functioned as the Town Hall. In 1884 the

Historic Resources

The information for historic resources was compiled by Ann Havemeyer and Richard Byrne. Refer to the text for the key to labeled features. Refer to the Historic Features of the Town Center map for greater detail.

Not to be used as an accurate survey or as a substitute for field assessment.



Refer to the Base Map for complete reference feature symbols and labels.

Legend

- Farm
- Homestead
- Industry
- School
- Cemetery
- Memorial
- Alfredo Taylor
- Cultural
- Geologic

0 0.5 1 2 Miles

1 inch equals 1 mile

Map prepared on 12/31/08 by Kirk Sinclair.

Robbins School, a private secondary school, was founded in memory of Norfolk's first pastor, Ammi Ruhamah Robbins. Located on the site of the original Robbins Parsonage, it closed its doors in 1912. The former headmaster's residence (**H-4**) and schoolhouse (**H-3**) are now private dwellings.

Churches

Although the Church of Christ initially served the needs of the entire community, it was not long before other religious groups began to make an appearance. An Episcopal Society was organized as early as 1786 with five members. Served by itinerant missionaries who faced difficult travel to the isolated town, the congregation remained small, and it was not until 1885 that regular services were held. The erection of the Church of the Transfiguration (**H-22**), a summer chapel on Mills Way, followed in 1894.

Baptists had been active in the north part of town since the First Baptist Society was organized in 1812 with members from Colebrook, Canaan, New Marlboro and Norfolk. In 1876 they built the North Norfolk Chapel in the northwest corner of the township (**A-8**).

© Julie Scharnberg

Church of Christ Congregational.

The first Catholic mass was held in Norfolk in 1836 following the arrival of the Ryan family, who established a woolen mill in town. The handful of Catholics worshipped in the Ryan home and in the woolen mill until 1859 when the Church of the Immaculate Conception (**H-21**) was built. By then Roman Catholics numbered 18 percent of the town population. The adjacent rectory was constructed only after Norfolk became an independent parish in 1889. As Catholicism flourished, the church was enlarged and transformed in 1924 by architect Alfredo Taylor. The church acquired three cemetery areas on North Street: the Old Cemetery (**M-5**) given to the parish by the Ryan family, St. Mary's Cemetery (**M-6**) located across the street and additional land given in memory of William O'Connor (**M-7**).

1840 marked the beginning of Methodist worship in Norfolk. The church, built on North Street in 1841, was a mission church served by a circuit minister until about 1900 when it acquired its own pastor. Methodist services were also held at Pond Hill and North Norfolk. Sunday afternoon church services were held on the steps of the Aetna Silk Mill for families who lived on what was known as Patmos Island, the site of several factories. Financial difficulties brought an end to Methodist worship in Norfolk, and in 1918 the congregation merged with that of the Church of Christ. The church is now a private residence (**H-23**).

Industry

The growth of both the Catholic and Methodist congregations in the second half of the nineteenth century reflects the rise of industry in Norfolk. The early settlers of Norfolk had established a sawmill (1750) and a grist mill (1757) to provide for the necessities of shelter and food. Both were located at Buttermilk Falls. Tanneries were built to convert hides into leather. The Blackberry River provided a source of power enhanced by water wheels and dams. Settlers in outlying areas took advantage of the many brooks running through the Norfolk hills to build their own mills and tanneries. Scattered throughout town are the foundations of several sawmills (**In-1, In-2, In-3**) and tanneries (**In-4, In-5**).

The region was rich in ore (**G-2**), and ample forests provided fuel for the iron industry. In 1770 an iron works was established near the foot of Buttermilk Falls. Blacksmiths (**In-6**) produced horseshoes, parts for farm implements, hardware, nails and other essential tools for building. Legend has it that Norfolk iron was used to manufacture some of the links of the chain that was stretched across the Hudson River near White Plains in an unsuccessful attempt to thwart advancing British troops during the Revolutionary War. Decades later, when the War of 1812 threatened the young republic, Hanchett's Iron Works on the shore of Lake Wangum manufactured anchors for the United States Navy.

The plentiful supply of water power, primarily along the Blackberry River, allowed industry to flourish and by the mid-nineteenth century Norfolk was in its heyday as a manufacturing town. Dams were built along the river and water wheels were installed to harness that power. Initially, most industries were small and individually owned: the Ryan brothers manufactured shears and operated a woolen factory, Jonathan Kilbourn's carding machine produced rolls of wool and, in West Norfolk, Captain John Dewell built the Stone Shop to produce grass and grain scythes. West Norfolk became an industrial hub of sorts, as several large tanneries (**In-7**) and an iron works were located there. Another sizable tannery, the S.D. Northway Manufacturing Company, operated in South Norfolk. The foundation of the old mill wheel is visible today (**In-4**). Among the many items manufactured in Norfolk were wooden bowls and dishes, cheese boxes, clocks and clock plates, scythes, shears, planters' hoes and axles.

As the century progressed, local men organized and financed large companies employing a workforce that increasingly brought immigrant families to Norfolk. Boarding houses were established to accommodate the workers. The Ryan brothers built a large boarding house, later known as Sunset Lodge, now a private residence (**H-18**) on Aetna Lane. The foundations of the Ryan Brothers factory (**In-8**) built in 1850 can still be seen on the south side of the Blackberry River. This site was later occupied by the Aetna Silk Company, organized in 1878, manufacturing silk thread. The Lawrence Machine Company was situated nearby. It occupied the Long Stone Shop, built in 1854. The complex included a foundry and a 42-foot diameter iron water wheel, reported to be the second largest water wheel in the country at the time. The foundations of both the Long Stone Shop and the water wheel can be found today (**In-9**). The plant later housed the Connecticut Arms Company, which produced Springfield rifle muskets for the United States Army during the Civil War. The E.G. Lawrence Iron Works (**In-10**) and Stevens Hoe Factory (**In-11**), formerly a silk mill, were located on Patmos Island, a strip of land surrounded by man-made water channels, just west of the Long Stone Shop.

The Norfolk Manufacturing Company was founded in 1852 for the manufacture of cotton warp, knitting cotton and warping twine. Its factory, known as the Stone Mill, with its iron water wheel was later sold to the Norfolk Hosiery Company whose founder, Edward E. Kilbourn, invented an automatic knitting machine that revolutionized the manufacture of underwear and hosiery. The factory (**In-12**) still stands as part of what was more recently the General Electric Plant. With additional investors and the purchase of a mill in New Brunswick, New Jersey, the company expanded to become the Norfolk and New Brunswick Hosiery Company, at one time a giant in the manufacture of knitted garments, and Norfolk's largest industrial concern.

During the course of the nineteenth century, Norfolk's rich forests were tapped for industry. Hemlock stands were felled to provide bark for the local tanneries. Broad swaths

© Rebecca Ward

Infinity Hall, built as the Village Hall in 1883.

of woodland were cleared and the lumber produced charcoal to smelt iron ore. Some wooded areas still bear traces of the circular hearths (**In-14**) where piles of lumber smoldered. By the late-nineteenth century, vistas that no longer exist today had been opened, while much of the forestland had been reduced to burned-over scrub and brush. Through the careful stewardship and sustainable forest management of such properties as the Great Mountain Forest, the Green Woods have regenerated, and timber harvesting is once more an economically viable business.

An 1828 census recorded that 191 of 232 families in Norfolk lived on farms. Many operated sawmills and grist mills to supplement income. Some were even more enterprising. In South Norfolk, about two dozen families raised mulberry trees on their farms, harvesting silk from silk worms. Sheep provided wool for domestic industry. Butter and cheese were made in great quantity and were an important source of income to farmers whose land was not suitable for cultivation. In 1844 Auren Roys wrote in A Brief History of the Town of Norfolk that an average of 200,000 pounds of cheese was made in Norfolk annually, shipped to market in locally made cheese casks. The foundations of a cheese box factory (**In-13**) can be found off Mountain Road. Dairy farming remained a thriving enterprise in Norfolk well into the twentieth century. Breezy Hill Farm on Winchester Road, Bruey Farm and Mapleside Farm operated by the Spaulding brothers on Litchfield Road were among the many farms that delivered fresh bottled milk and cream. The Town Farm (**A-3**) was established in the nineteenth century to provide food and shelter for Norfolk's indigent population.

Transportation

Transportation was critical to the success of both farming and industry. By 1800 the Greenwoods Turnpike (now Route 44) had been completed and became the principal route between the Connecticut and Hudson Rivers for travel and trade. Merchant Joseph Battell strategically placed his store on the turnpike and made a fortune selling thousands of pounds of cheese across the eastern seaboard. His stately residence (**H-12**) known as Whitehouse overlooks the Village Green. Taverns also sprang up along the turnpike to service the needs of travelers. Among the many taverns in Norfolk, three were located at stagecoach stops on the Greenwoods Turnpike: the widow Wilcox operated a tavern at the junction of Greenwoods Road and Laurel Way, once the business center of town known as Beech Flats; the Pettibone Tavern (**H-5**) faced the Village Green, and the Lawrence Tavern (**H-6**) was found at the corner of Greenwoods Road and Mill Street. The Lawrence Tavern also housed the post office where mail was delivered twice weekly. All three taverns still stand and are private residences.

The railroad arrived in Norfolk in 1871. In an effort to boost industry and prevent Norfolk from becoming an abandoned mill town, Egbert T. Butler, then president of the Norfolk Bank (**H-7**), proposed building a railroad through the hill towns of northwest Connecticut. Unlike the north-south rails, an east-west route across the state would have to be circuitous and often at steep grade, two factors that had made its construction seem impractical. Butler paid for a survey to be done and applied for a charter for the Connecticut Western Railroad Company; this was granted by the Connecticut State Legislature in 1866. Ground was broken in Winsted in October of 1869.

The route to Norfolk brought the line through the Grantville hamlet in the southeast part of town and then north along Litchfield Road to the town center where engineers had set the easiest, and least expensive, route across the Village Green. Thanks to the efforts of the Reverend Joseph Eldridge, an alternate route to the east was selected, sparing the Village Green an intrusion that would have destroyed it. Beyond the village center, the tracks wound around Haystack and Bald Mountains, passed through a blasted-out rocky gorge known as Stoney Lonesome (**A-4**) and skirted the precipitous side of Ragged Mountain on the way to East Canaan. A celebration was held on the Village Green in September of 1871 shortly before the last rail was spiked.

The original station in the village center was a simple wooden structure. In 1898 a new station (**H-8**) was constructed of native granite. A sign in brass letters read: Norfolk, the Highest Railroad Station in Connecticut. Two years later another station was built at what was in fact the highest elevation reached by the railroad. Situated a mile south of the Green on Litchfield Road just before the Winchester Road turn-off, it was appropriately called the Summit Station (**A-5**). It later burned down. The train also made a stop in Grantville (**A-6**) and near Ashpohtag Road in West Norfolk. Known for most of its existence as the Central New England, the railroad was never financially successful and ceased to run through Norfolk in 1938.

Summer visitors

The railroad did not prevent the demise of industry in Norfolk, but it did bring an influx of vacationers enticed by company booklets describing the attractive scenery of the Litchfield Hills. This steady stream of summer visitors changed the character of the town, and by the end of the nineteenth century Norfolk had become a fashionable summer resort celebrated for its pure mountain air and fresh spring water. Large hostelries were built. The Stevens House, later known as the Norfolk Inn, opened in 1874 with 57 guest rooms. Many people would spend the entire summer at the Hillhurst Hotel on Laurel Way, some returning year after year. Boarding houses were a popular alternative to the large hotels. Miss Louise Rowland was the proprietor of Fairlawn on Maple Avenue and Cora Brown operated Crissey Place (**H-9**) at the south end of the Village Green. Although the hotels are gone, the two boarding houses are now private residences.

© Rebecca Ward

Yale Music Shed.

Norfolk's appeal only increased with the building of the Eldridge Gymnasium (**H-10**) in 1892, the opening of the Norfolk Downs Golf Links (**T-1**) in 1897, and the building of a country club (**T-3**) in 1916. Carl and Ellen Battell Stoeckel founded the Norfolk Music Festival, attracting thousands of concert-goers to the Music Shed (**H-11**) in the first quarter of the twentieth century. Special trains brought visitors to the Norfolk Agricultural Fair and Horse Show, an annual three-day event held at the fairgrounds on Mountain Road. Swimming at Tobey Pond and carriage rides to the lodge at Lake Wangum on Canaan Mountain or to Tipping Rock (**G-1**) near the Norfolk-North Goshen town line were other popular activities. Sportsmen came for the hunting and fishing opportunities. Many vacationers stayed on, calling upon architectural firms to design country houses. Some built camps bordering Doolittle Lake.

Three state parks were established helping to ensure the preservation of the town's rural beauty: Ellen Battell Stoeckel sold her property on Haystack Mountain to the state, building a stone lookout tower (**M-8**) and a roadway for access; the White Memorial Foundation created Campbell Falls State Park Reserve in 1923; and Dr. and Mrs. Frederic Dennis gave their 240-acre estate known as Dennis Hill (**T-2**) to the state in 1935.

Summer was not the only recreational season in Norfolk. In the 1930's the town became known as the winter sports center of Connecticut. Following the 1932 Olympics held in Lake Placid, the newly-formed Norfolk Winter Sports Association sponsored an annual ski-jump competition, which drew some of the nation's best skiers to compete on the natural slope jump (**A-7**) built without scaffolding on the side of Canaan Mountain.

Notable buildings

By 1900 Norfolk had an unusual number of public services that made it an especially attractive place to call home. It was one of the first towns in Connecticut to have telephone (1894) and electrical service (1897). In 1896 the water system was installed, piping fresh water from Lake Wangum to the center of town, and in 1899 a public sewer system was completed. The town center had been enhanced with the construction of an attractive railroad station (**H-8**). A Village Hall (**H-13**) was built in 1883 and provided commercial space as well as a theater upstairs. With the completion of the Royal Arcanum building (**H-19**) in 1904, housing the newly-founded Norfolk Volunteer Fire Department, and of the Hardware Store in 1906, it was reported in the local press that Norfolk could boast one of the finest business districts of a town of its size in Connecticut.

The Royal Arcanum building (**H-19**) is one of more than 50 buildings and houses built in the early years of the twentieth century that were designed by architect Alfredo Samuel Guido Taylor, who arrived in Norfolk just as the town entered its heyday as a popular summer resort.

© Rebecca Ward

Norfolk Library, built in 1888 as a gift to the town.

Of the many architects who worked in Norfolk, no one left a greater imprint on this small village, and his work in Norfolk has been designated a Thematic Group on the National Register of Historic Places. Along with residential commissions and commercial projects, Taylor designed the Norfolk Country Club (**T-3**), the Dennis Pavilion (**T-2**), the Norfolk Downs Shelter (**T-1**), the remodeling of the Church of the Immaculate Conception (**H-21**) and, in 1921, the War Memorial (**M-9, H-20**) on the small triangle of green opposite the Catholic Church. Other monuments built to honor Norfolk's sons and daughters who gave their lives for their country are the Revolutionary War Memorial (**M-9**) near Buttermilk Falls and the Soldiers Monument (**M-10**), erected in 1868 on the Village Green.

When Frederic Dennis wrote his book The Norfolk Village Green in 1917, he hoped that it would inspire future generations to preserve the beauty of what had become a magnificent visual centerpiece of the town and the epitome of the classic New England green: a broad expanse of grass shaded by majestic trees and dotted with monuments over which soared the elegant white steeple of a historic church. The Green had been the center of communal life and a place of gathering since the town was founded. Although the triangle that was to become the Green had been cleared of the original growth of hemlock and maple, plowed and leveled, and planted with elms as early as 1788, it was not until the second half of the nineteenth century that it began to take on its distinctive appearance. When the town voted in 1849 to enclose the Green with a fence, those who had been accustomed to driving their vehicles across it objected. In compromise, the north was fenced and the south left open. The following year William Rice, principal of the Norfolk Academy (**H-2**), began a program of tree planting that included one of every species of tree native to Norfolk. In the late nineteenth century winding footpaths, rustic twig furniture, and covered gateways gave the Green a particular charm as townsfolk gathered for mid-summer concerts and Fourth of July fireworks. A new library (**H-14**), built in 1888 through the generosity of Isabella Eldridge, and Battell Chapel (**H-15**), erected by the Battell family in memory of Joseph and Sarah Battell, provided an attractive backdrop. At the southern tip of the triangle, Battell Fountain (**H-16**), carved in granite and designed by Stanford White with bronze-work attributed to Augustus Saint-Gaudens, was the gift of the Eldridge sisters, whose house and gardens faced the Green. The Village Green is now the center of the Norfolk Historic District (see Historic Features map on the opposite page).

After the Eldridge sisters died, their cousin Ellen Battell Stoeckel remodeled their home as a community center known as Battell House (**H-17**). In her will she provided for the creation of a trust that would enable music, art, and literary offerings to be carried on under the auspices of Yale University on her property. Following Ellen's death in 1939, Alfredo Taylor was engaged to transform the bucolic Stoeckel estate into a campus for the Norfolk Music School of Yale University. This evolved into the Yale Summer School of Music and Art where the arts continue to flourish today (**H-11, H-12, H-17**).

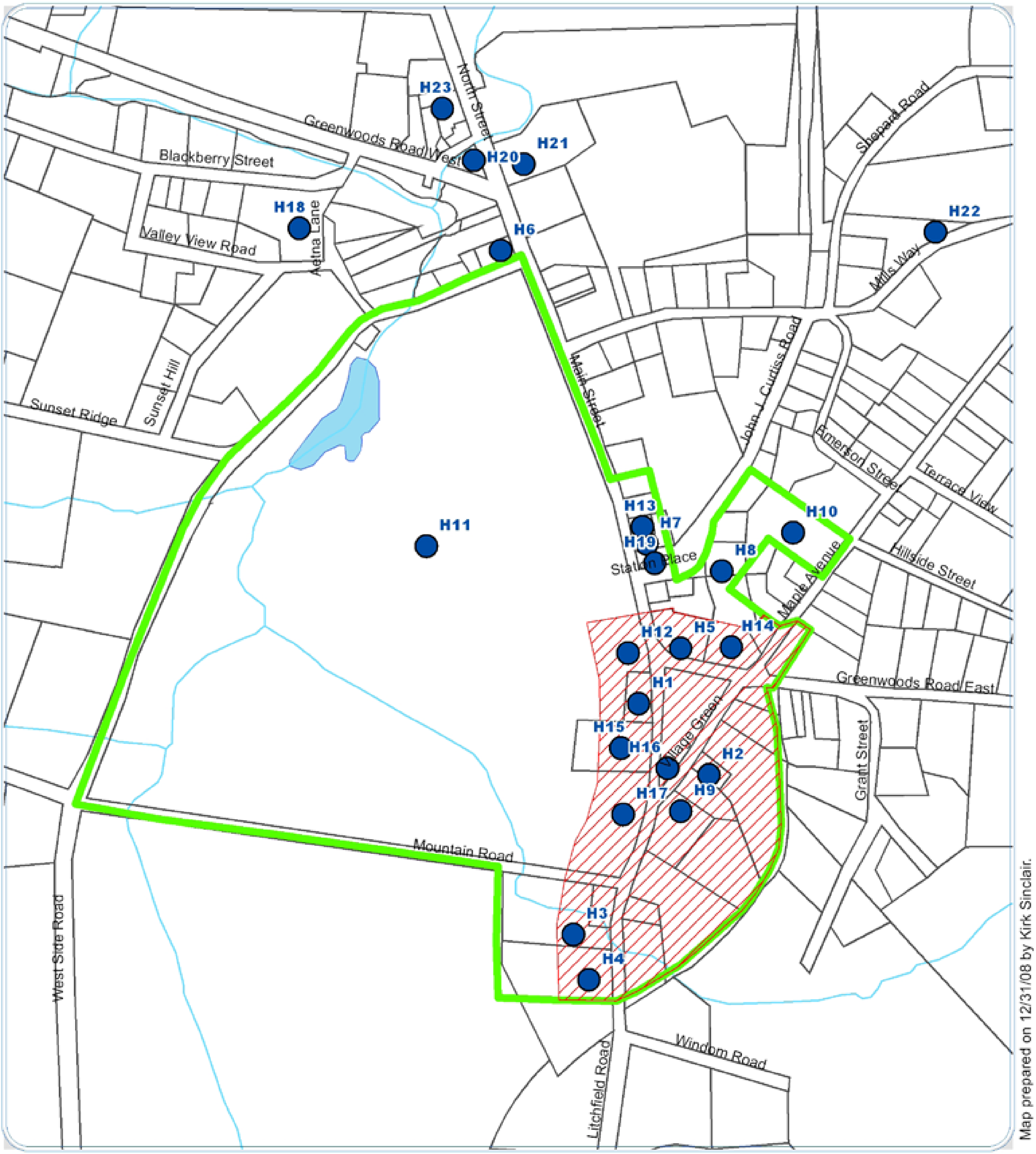
Norfolk's rich historic resources testify to the town's vibrant past and bring new life to the many different people who shaped our town.

For recommendations, see Chapter 11, starting on page 66, and for a short list of readings about Norfolk's history, see Appendix 9.

© Alexandra Childs

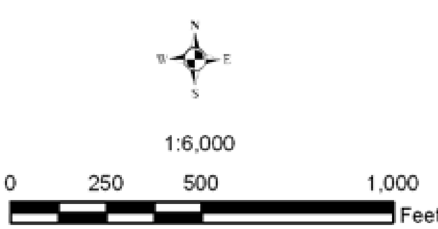
White House, formerly the home of Carl and Ellen Battell Stoeckel.

Historic Features of Norfolk Center



Historic features compiled by Ann Havemeyer and Richard Byrne. Refer to the text for the key to labeled features. The Local Historic District was approved by the Town of Norfolk. The National Historic District is listed in the National Register of Historic Places. Parcel boundaries were digitized from Norfolk's tax maps.

Not to be used as an accurate survey or as a substitute for field assessment.



Legend

- Historic Features
- Parcel Boundaries
- Local Historic District
- National Historic District

© Eileen Fitzgibbons

Geography and geology

Geologic features are a nonrenewable resource. Many are scenic, some provide habitat for sensitive lichens and mosses as well as specialized habitat for animals, and some are an integral part of storage areas for drinking water.
The information used as a basis for these recommendations appears in chapter 1 on Norfolk's geology and geography, starting on page 9.

Recommendations:

1. Control or avoid development within talus slope and rock outcrop areas to minimize land disturbance, conserve sensitive habitats and water storage areas, and preserve the area's scenic character.

2. Create zoning regulations to afford greater protection for neighbors, and especially wells, from possible adverse effects of blasting, such as requiring pre-blast surveys, submission of professionally prepared reports evaluating the potential impacts of and alternatives to blasting, and requiring detailed reclamation plans for all mining operations.

3. Protect Norfolk's geologic heritage, such as kettle holes, glacial terraces and outwash deltas, moraines, glacial erratics and balancing rocks, rock outcrops, springs, unconstrained streams and natural ponds.

Norfolk's weather

Based on weather patterns observed at Great Mountain Forest since January 1932, Norfolk is significantly colder and wetter than most of the state. This means that design requirements for building site runoff, septic systems and road drainage, etc., will generally be different from the rest of the state.

Climate models for the northeastern United States suggest that changes associated with global warming can be expected, affecting Norfolk's weather and vegetation.
The information upon which these recommendations are based appears in chapter 2 on Norfolk's climate and weather, starting on page 14, and in Appendix 1 starting on page 74.

Recommendations:

1. Educate business owners and residents on the effects of climate change and encourage them to use energy conservation measures whenever possible.

2. Reduce atmospheric pollutants in general by minimizing carbon dioxide, nitrous oxide, sulfur dioxide, black carbon and other manmade emissions. Monitor air quality to detect local pollution problems and, when necessary, regulate. Enforce existing burning regulations.

3. Use energy alternatives (solar, geothermal, hybrid vehicles, etc.) where feasible for all town buildings and vehicles.

4. Conserve greenways and wildlife corridors, to minimize stress of climate changes on plants and wildlife, and to allow for northward migration of species.

5. Adopt regulations requiring the use of local Norfolk weather data in any calculations used for application and permit requirements, and in approving project start dates and project work periods.

Soils

It can take as long as 1,000 years to form one inch of soil, and vegetation is the most important factor in creating soils. Simply removing vegetation from the soil will expose it to erosion, and as much as a foot of soil can be lost in one rain storm. The best way to keep soil resources from degrading is to nurture the vegetation that is growing on it.

Additional information used as a basis for these recommendations appears in chapter 3 on Norfolk's soils, starting on page 16.

Recommendations:

1. Research and publish best management practices for preventing erosion, and encourage the town and its residents to follow them when removing vegetation and exposing soil to erosion.

2. Restrict development on slopes of greater than 15 percent and require engineered site plans for any such development. Exclude land with slopes of 25 percent or greater from buildable lot size calculations and do not allow development on such slopes.

3. Consider soil-based or natural resource-based zoning regulations.

4. Strictly enforce erosion and sedimentation control plans for activities permitted by the town and require detailed restoration plans for activities that are not completed properly.

5. Require performance bonds to ensure proper and timely completion of permitted activities and to provide funding for any necessary restoration due to improperly conducted activities.

6. Use easements or other property restrictions to permanently protect prime agricultural soils and existing farmlands.

Aquatic resources

Norfolk is at the top of four watersheds, making the quality of most of its water dependent on our own actions. These actions will also affect many downstream areas elsewhere in Connecticut. Currently all but one of the streams that leave Norfolk are pristine (AA or A) in quality, and scientific evidence shows that maintaining vegetative buffers and limiting impermeable surfaces can preserve water quality.

Regardless of the size of water body, each has ecological importance. Most lakes and ponds have some direct connection with either groundwater or surface water sources, and they also provide specialized habitats for a variety of aquatic organisms. Loss of these highly specific habitats could cause major shifts in the water body's ability to support sensitive species and allow more tolerant species to then thrive. Such a shift from sensitive species to tolerant species usually indicates a decline in water quality and/or a loss of critical habitats, and is often the result of development pressures.

The information used as a basis for these recommendations appears in chapter 4 on Norfolk's aquatic resources, starting on page 22.

Recommendations:

1. Require or encourage landowners to maintain or restore an undisturbed natural vegetative buffer of at least 100 feet for lakes, ponds and streams.

2. Water quality should be protected by identifying and addressing sources of pollution.

3. Limit the impermeable surfaces that can be created. Studies show that impermeable surfaces covering more than 12 percent of a watershed diminishes water quality.

4. Protect Norfolk's groundwater and aquifer recharge areas.

5. Require engineering plans for construction in and around watercourses and wetlands to preserve aquatic habitats, and especially to avoid habitat segmentation. Identify specific situations in Norfolk (such as perched culverts or dams) where habitat continuity is disrupted and provide guidance to address these issues.

6. Protect vernal pools and surrounding habitats, and provide education on the ecological importance of vernal pool habitats. (For more recommendations on vernal pools, see areas of ecological importance below.)

7. Minimize or prevent damaging impacts to wetlands due to sedimentation, salt and other pollution, and excessive runoff by following the best road maintenance and construction practices, such as proper placement and maintenance of ditches, drains and sedimentation basins following engineered standards; minimizing winter salt applications or finding alternatives to salt; early spring road sweeping, and timely roadbed stabilization practices, especially for gravel roads.

© Katherine Griswold

Queen Anne's lace (Daucus carota) fringes the edge of a pond.

8. Preserve wetlands, especially valuable and unique wetlands, and upland buffers, through conservation acquisitions and easements.

9. Make sure the Wetlands Agency has adequate resources to enforce its regulations. Ensure that other town regulations, ordinances and guidelines are compatible with wetlands protection.

10. Amend zoning regulations to exclude wetland acreage from buildable lot size calculations.

11. Require those conducting commercial logging or forest harvest activities in wetlands or watercourses or within 100 feet or wetlands or watercourses to submit detailed erosion and sedimentation control plans. Require bonds to ensure adherence to such plans and to fund any necessary restoration.

12. Require a permit for irrigation of areas greater than one acre. Limit large volume pumping of groundwater for nonessential uses, to avoid impacts on groundwater levels, wetlands and watercourses.

13. Encourage farmers to use practices that protect wetlands and watercourses, such as maintaining natural stream buffers and limiting livestock access to wetlands and watercourses.

14. Explore ways to control fertilizer and pesticide applications adjacent to or within wetlands or watercourses, over stratified drift aquifers and within 100 feet of wells.

The Norfolk plantscape

Humans will continue to be a significant influence on Norfolk's plantscape in numerous ways, from their changing use of land to their influence on climate. Vegetation may be enhanced or destroyed by these changes, whether they are intentional or unintentional, natural or man-made. An important unintentional consequence of human activity is the appearance of non-native invasive plants.

The biodiversity of plants is extremely significant to the maintenance of existing plant communities and for moderating future changes, such as those associated with climate change. The depletion of species not only diminishes our present ecosystems, but can result in a cascade of additional losses of species and ecosystem functions that depended on them. Invasive plants such as garlic mustard, Japanese barberry, purple loosestrife and Asian bittersweet are known to aggressively crowd out native plants, and even take over large areas and greatly reduce diversity. Invasive animal species, such as the hemlock woolly adelgid and the Asian long-horned beetle, could potentially devastate our plantscape.

© Bruce Frisch

Fringed gentian (Gentianopsis crinita).

Norfolk's notable trees also remind us of the importance of trees and forests. Old trees are homes to many birds and other animals, including microorganisms. They produce or harbor large quantities of food for wildlife. It is important to actively preserve these survivor trees, as their DNA may be needed in the future: they may possess one or more attributes that have given them a competitive advantage. Trees can live for a very long time and our venerable trees help us appreciate the value of life; they have withstood so much and are still surviving.

The information used as a basis for these recommendations appears in chapter 5 on Norfolk's plantscapes, starting on page 31.

Plant communities Recommendations:

1. Educate the public about protecting rare plant communities and species.
2. Encourage the use of native plants.
3. Encourage the use of smaller lawns and organic lawn care.

Invasive species Recommendations:

1. Develop plans and procedures for eradicating harmful invasives and for preventing the establishment of new invasive species.
2. Prevent new occurrences of recognized invasive plant species and when possible eradicate existing populations of the most troublesome species.
3. Provide information on invasive species, especially state prohibited species and existing populations of the most troublesome species in Norfolk, and offer educational programs on invasives.
4. Encourage all town residents and employees to report highly or potentially injurious invasive species to the Conservation Commission.
5. Inventory invasive plant sites in Norfolk to identify native species at risk, set priorities for removal efforts and assess the role of road and driveway maintenance practices that promote the establishment of invasive plants.

Notable trees Recommendations:

1. Preserve Norfolk's notable trees (see Appendix 4 for a list of trees recorded as of January 2009) in particular, and old trees in general; they are a valuable resource.

Wildlife

Norfolk's wildlife is abundant, but not all species are thriving. Like our native plants, some animal species are threatened by habitat loss, invasions of non-native species and human activity. We should strive to preserve the full range of our town's animal species and minimize the introduction of exotics, primarily to protect the diversity that helps to maintain a stable ecosystem, but also to keep our world more interesting.

These recommendations are based upon information in chapter 6 on Norfolk's wildlife, starting on page 38, and in Appendix 5 starting on page 108.

Recommendations:

1. Develop and implement conservation plans for town-owned open space, as appropriate, to provide protection for wildlife species and to preserve and enhance open space for wildlife use.

2. Compile guidelines for ecologically sound land management and agricultural practices. Provide them to the public and to town officials and employees, and encourage the use of these practices on public and private lands.

3. Follow sound conservation practices, such as protecting grassland birds by mowing hayfields late to allow fledging of young or by leaving large uncut patches until birds have fledged; minimizing disturbance to wildlife breeding, nesting or cover by scheduling maintenance, like tree removal, when these will be least affected whenever possible; minimizing outside lighting, so as not to disturb wildlife behavior, such as bird migration; using native plants as natural food sources for wildlife, and preserving standing and fallen dead wood to provide feeding and nesting sites for many species.

4. Protect lands that provide or potentially provide wildlife habitat. Especially important are large blocks of mature forest interior; grasslands; wet meadows, vernal pools and other wetlands; floodplains and riparian habitats; old fields, shrublands, sapling stands and low-intensity agricultural hayfields and grazing lands.

5. Protect potential wildlife corridors that link core wildlife habitats, especially those that connect critical habitats or large permanently preserved properties.

6. Consult the map of areas of known and potential ecological importance (see page 43) whenever a land use application is presented. Give exceptional consideration to endangered, threatened and special-concern species and their critical habitats, as listed by the Connecticut Department of Environmental Protection.

7. Encourage townspeople to report rare species to the Conservation Commission.

8. Balance management of beaver and their activities with maintaining a healthy and active local beaver population. Manage water levels without destroying beaver dams whenever possible.

Areas of ecological importance

Norfolk is biologically diverse. Its landscape is largely unfragmented and it generally has a high degree of ecological integrity. To continue to preserve this biodiversity, land use decisions require scientifically based planning that considers an ecologically functioning landscape.

In particular, vernal pools provide breeding and nursery habitat for diverse animal species, several of which are obligated to use these habitats for their survival. Many of these species then go on to disperse over a much wider upland habitat, which must be protected along with the pools themselves if they are to persist as healthy, functioning biological systems.

© Shelley Harms

American Robin (Turdus migratorius) on her nest.

The map on page 43 is only the beginning of a compilation of Norfolk's habitats and natural communities. A complete compilation will require extensive field work over a significant amount of time, but should be done.

The information on ecologically significant areas used as a basis for these recommendations appears in chapter 7, starting on page 41. See page 116 for an essay on biodiversity.

Recommendations:

1. Use the map on page 43 to determine large areas and/or corridors of land with potential ecological significance, and attempt to keep them intact. Carry out the necessary fieldwork to verify the actual value of "potential" areas already mapped, and to determine others.

2. When approving changes in land use, investigate the known and potential ecological significance of a parcel or portion(s) thereof. Parcels that appear to lie within sensitive areas depicted on the map should be field checked by a qualified biologist.

3. Encourage the preservation of open space by the town, the state, land trusts, conservation organizations and private landowners, with a particular emphasis on grasslands, large forest blocks and other critical habitats. Develop and maintain a record of town land preservation needs, desires and priorities, with the assistance of the local land trust and other conservation organizations.

4. Require thorough and professional biological inventories for large development proposals, to be conducted at least once during the growing and breeding season, to evaluate possible impacts. Require applicants to prove that such development will not cause long-term negative impacts to areas of ecological significance or to plant and animal populations.

5. Through land use decisions, maintain a balance of forest cover, meadow and other potentially significant habitats (such as those named in Wildlife recommendation number 4). There should be a sufficient amount of each to adequately support Norfolk's plant and animal life.

6. Ensure enforcement of town regulations that protect environmental quality and provide adequate resources to permit their enforcement. Regularly consider additions or modifications to the regulations to ensure the high quality and integrity of the environment.

7. Consider natural resource-based or soil-based zoning regulations.

8. Educate town employees, commissioners and the general public in the importance of and protection needs for vernal pools.

9. Locate, authenticate and map all vernal pools in town.

10. Require all applicants for land use permits to locate, map and protect any vernal pool. These sites should be inspected and authenticated by an appropriate agent for the town.

11. Monitor a selection of vernal pools in town based on their indicator potential or threat of disturbance due to human activities.

12. Protect vernal pools by leaving a naturally vegetated 100-foot buffer around them, and by leaving at least 70 percent of a 750-foot upland buffer area intact.

Open space

Open space protects the environment in many ways. Forest and meadow buffers around ponds and streams reduce degradation of watersheds by minimizing pollution, absorbing run-off and securing habitat for wetland plants and animals. This affects both our immediate environment and that of surrounding communities because our upland streams harbor spawning grounds for native fish species and our healthy watersheds and wetlands reduce flooding and preserve water quality.

Open space is critical to maintaining biodiversity. Large forest tracts, for example, increase the survival of woodland songbirds. Norfolk's woodlands shelter many vernal pools where amphibians breed in early spring, species that are losing ground in much of their territory due to changing land use. Forest and contiguous open land form corridors that allow for the daily and seasonal movements not only of large animals such as bear, deer and bobcat but also, in the long term, shifts in the ranges of plants and all the smaller members of the animal kingdom

© Bruce Frisch

Heron (Ardea herodias) soaring over rookery.

that we hardly notice. As global warming makes itself felt, such passageways may become increasingly important.

Norfolk's citizens place high value on conservation and open space. While much of Norfolk's land remains undeveloped (approximately 83 percent), only a relatively small portion of it is permanently protected (approximately 29 percent). Other towns have obtained significant funding and succeeded in protecting places that are important to townspeople by actively engaging in open space planning.

The information used as a basis for these recommendations appears in chapter 8 on Norfolk's open space, starting on page 48.

Recommendations:

1. Develop an open space plan that identifies conservation goals, including the preservation of areas of ecological significance, wildlife corridors, large unfragmented habitats and open space that connects these areas, with the goal of having 75 percent of the land in the rural residential zone permanently protected.

2. Include recreational areas in developing the open space plan.

3. Create a fund or other means for acquiring targeted land or development rights for conservation purposes.

4. Pursue open space acquisitions, development rights, conservation easements and other legal instruments with willing landowners.

5. Prohibit or restrict activities that result in forest or grassland fragmentation and regulate development to favor open space (such as cluster development, set-asides and buffer zones for lands adjacent to existing protected open space).

6. Educate town officials and the public about the value of protected open space, natural ecosystems and biodiversity, including economic values and forest stewardship.

7. Establish assessment categories for open space and unbuildable land and create incentives for landowners to preserve them, especially in ecologically important areas.

Scenic resources

Norfolk's ridgelines are largely undeveloped, which contributes to the scenic quality of the town. A ridgeline protection regulation would help to protect highly visible, highly prominent scenic views.

Norfolk's rural roads possess many scenic qualities. Connecticut's scenic highway statute and Norfolk's scenic road ordinance provide mechanisms for protecting scenic roads, but only a few have been designated as scenic under these laws so far.

Norfolk's dark night sky is also a resource that should be protected.

The information used as a basis for these recommendations appears in chapter 9 on Norfolk's scenic resources, starting on page 52, and in Appendix 7 starting on page 117.

Ridgelines Recommendations:

1. Enact a ridgeline protection regulation, which would help to protect these highly visible, highly prominent scenic views.

2. Identify areas best suited for telecommunications towers and windmills, and encourage all concerned to only use those sites.

Scenic views Recommendations:

1. Consider scenic views in making decisions regarding any structure that might impede these views and require a viewshed analysis for building and subdivision applications.

2. Identify and protect those scenic views that are especially associated with Norfolk's character.

3. Protect waterfalls for their scenic and ecological values.

Scenic roads Recommendations:

1. Maintain Norfolk's rural roads so as to preserve their scenic characteristics.

2. Use Norfolk's scenic road ordinance to protect rural roads that have a majority of the characteristics listed.

3. Develop or compile information about best management practices for rural road maintenance and improvement, such as limiting drainage work/ditching alongside roads to a minimum, getting approval of the tree warden before removing live trees from town rights-of-way, retaining some young trees for future replacements, protecting large boulders and leaving greenbelts along scenic road frontage.

4. Preserve stone walls along roads, as both scenic and boundary features.

5. Explore designation of additional segments of state highways as scenic highways.

Dark night sky Recommendations:

1. Preserve Norfolk's dark night sky by promoting use of downward directional lighting on town buildings and residential homes while maintaining public safety.

2. Review and adopt appropriate outdoor lighting ordinances modeled after the Dark Night Sky Association's recommendations (see www.darksky.org).

Historic resources

The information used as a basis for this recommendation appears in chapter 10 on Norfolk's historic and cultural resources, starting on page 58.

Recommendations:

1. Protect stone walls, foundations and other archaeological remnants of Norfolk's history from disturbance.

© Christopher Little

Moss Hill, Alfredo Taylor's first Norfolk house.

Appendices

© Bruce Frisch

Each of the first 10 chapters described a type of resource and explained its importance, and chapter 11 listed recommendations for conserving them. The appendices that follow present the data themselves, a bibliography and an explanation of how this inventory was compiled. Use this guide to locate specific information.

© Bruce Frisch

© Bruce Frisch

© Pat Harms

© Bruce Frisch

© Jim Jackson

© Tammy Andrews

© Bruce Frisch

© Katherine Griswold

Appendix 1: Norfolk's Weather

The description of Norfolk's climate in Chapter 2 is based on weather data recorded over 77 years at the National Weather Service Cooperative Weather Observer Station, Norfolk 2 SW. The database of information generated by members of the Cooperative Weather Observer Program (which Congress enacted in 1890) is the cornerstone of our nation's weather history and also serves as the primary data for research into global climate change. This station is one of about 12,000 in the United States and about 170 in Connecticut. Of the 170 Connecticut stations Norfolk 2 SW is one of only 25 that send readings to the National Climatic Data Center to be archived on a national level.

A comprehensive set of weather observations has been recorded every day since January 1, 1932, by a small group of observers following the same recording procedures and using, for the most part, the same instruments. The station is located on Windrow Road and, at 1,340 feet, is the station with the highest elevation in Connecticut. It was founded by Edward C. Childs and is currently maintained and operated by the Great Mountain Forest Corporation.

In 1964 Norfolk 2 SW became one of the first seven reference climatological stations in the country. There were eventually 21 such stations located all across the country. These special stations were used as benchmarks, because they were seen as places that were, and would remain, untouched by the ever-increasing development of the country. Sometime during the 1980's the government stopped singling out these stations and threw Norfolk 2 SW into the mix with all other cooperative observer stations, but Norfolk is still relatively unchanged.

Norfolk 2 SW also is part of the Eastern North American Phenology Network. Phenology is the science of periodic biological events in the animal and plant world as influenced by the environment, especially weather and climate. It is a critical contributor to global climate change research. Beginning in 1968 the dates of five phenophases, or stages, of three Persian lilac bushes located near the station have been recorded. The data from this station and many more stations across the country are compiled by the Phenology Network.

The tables on the accompanying pages present weather data from Norfolk 2 SW records.

Norfolk Weather: Record Warmest and Coolest Years, 1932-2008

Average annual mean temperature: 44.7

10 Warmest years			10 Coolest years		
Rank	Year(s)	Average mean temperature	Rank	Year(s)	Average mean temperature
1	1998	48.4	1	1940	41.9
2	2001	48.3	2	1963	42.5
3	2006,'02	47.8	3	1978,'58	42.7
4	1990	47.2	4	1962	42.8
5	1949	47.1	5	1972	42.9
6	1999,'91	46.8	6	1967	43.1
7	1953	46.7	7	1976	43.2
8	1973,'38	46.1	8	1992,'65	43.4
9	2008,'07	46.0	9	1989,'56	43.5
10	2005	45.7	10	1980,'68,'43	43.6

Norfolk Weather: Years by Average Annual Mean Temperature, 1932-2008

Average annual mean temperature for the entire period: 44.7

Year(s)	Average mean temperature
1998	48.4
2001	48.3
2006, 2002	47.8
1990	47.2
1949	47.1
1999, 1991	46.8
1953	46.7
1973, 1938	46.1
2008, 2007	46.0
2005	45.7
1932	45.6
1957, 1946, 1937	45.5
1983, 1933	45.4
1959, 1952	45.3
1951, 1995	45.1
1984	45.0
1975	44.9
1945	44.8
2004, 2000, 1994, 1985, 1979, 1955, 1954, 1942	44.7
1987, 1986	44.6
2003, 1997, 1939	44.5
1996, 1993, 1936, 1935	44.4
1981, 1944, 1941	44.3
1988, 1961, 1934	44.2
1982, 1948, 1947	44.1
1977, 1971, 1966, 1964, 1950	44.0
1974	43.9
1969, 1960	43.8
1970	43.7
1980, 1968, 1943	43.6
1989, 1956	43.5
1992, 1965	43.4
1976	43.2
1967	43.1
1972	42.9
1962	42.8
1978, 1958	42.7
1963	42.5
1940	41.9

Norfolk Weather: Monthly Averages, January 1932-December 2008

Month	Mean Temperature	Low Temperature	High Temperature	Precipitation	Snow
January	20.8	11.7	32.4	4.07	21.0
February	21.8	8.9	31.0	3.62	20.2
March	30.5	21.2	40.9	4.49	18.4
April	42.9	36.7	48.7	4.35	6.3
May	54.6	46.8	59.7	4.35	0.4
June	63.3	58.8	68.3	4.70	0.0
July	68.0	63.9	72.1	4.25	0.0
August	66.2	61.5	71.0	4.53	0.0
September	58.7	53.6	64.6	4.66	0.0
October	47.6	42.0	55.3	4.20	0.6
November	36.9	30.7	43.2	4.76	6.8
December	25.3	11.5	36.0	4.48	17.5
Annual	44.7	37.3	51.9	52.46	91.2

Temperature in degrees Fahrenheit, precipitation in inches of rain plus melted snow, snow in inches

Norfolk Weather: Record Precipitation, 1932-2008

Normal annual precipitation: 52.45

10 Wettest Years			10 Driest Years		
Rank	Year	Total	Rank	Year	Total
1	1955	76.04	1	1965	33.89
2	1996	73.76	2	1935	38.06
3	1945	69.31	3	1946	39.52
4	2008	68.21	4	1964	39.59
5	1977	64.66	5	1957	40.61
6	1938	63.97	6	1949	40.76
7	1975	63.62	7	1939	42.07
8	1983	63.60	8	1980	42.17
9	1951	60.87	9	1933	42.33
10	1960	60.66	10	1943	42.53

Precipitation = inches of rain and melted snow, sleet or hail

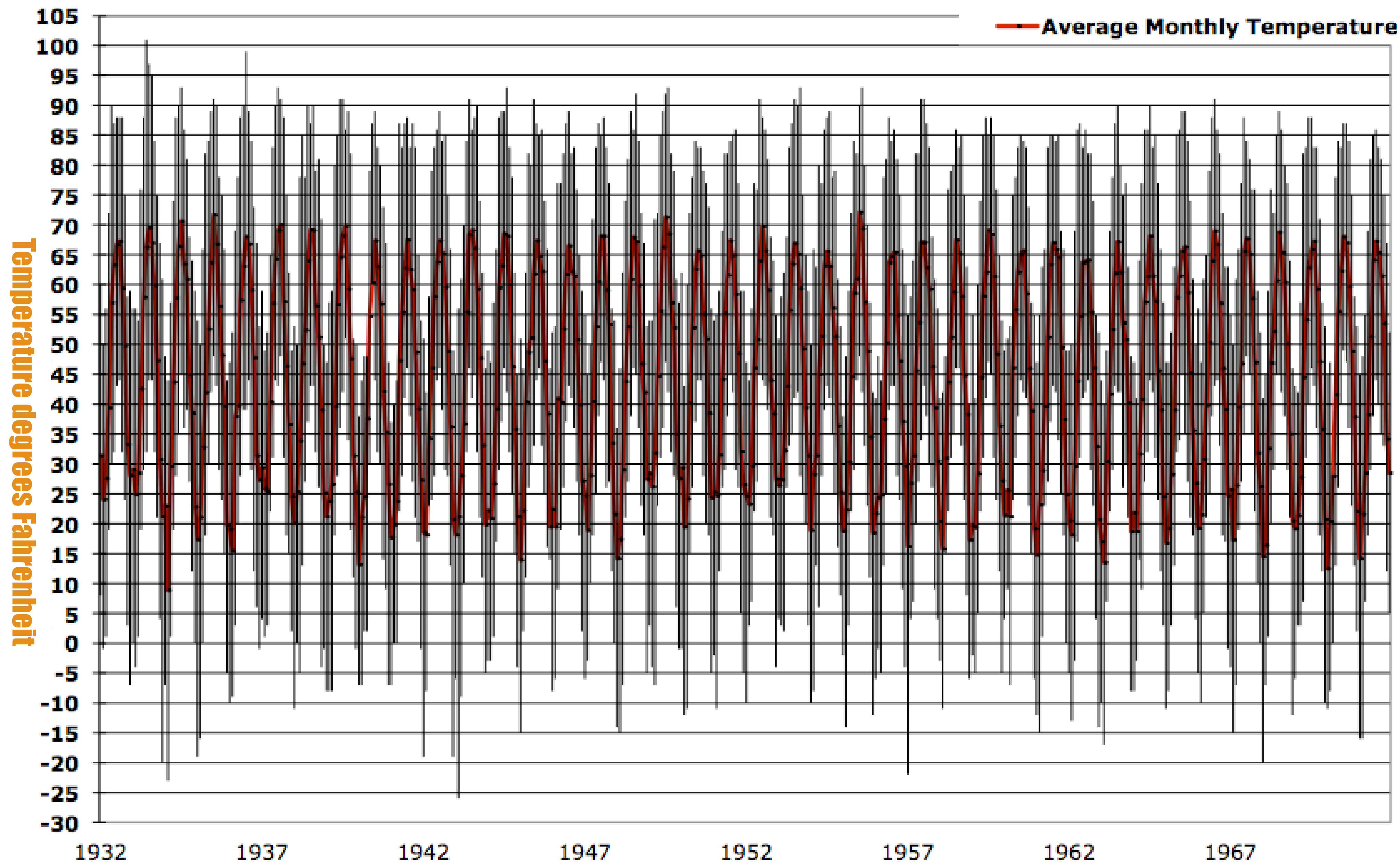
Norfolk Weather: Record Snowfall, 1932-2008

Normal annual snowfall: 91.3

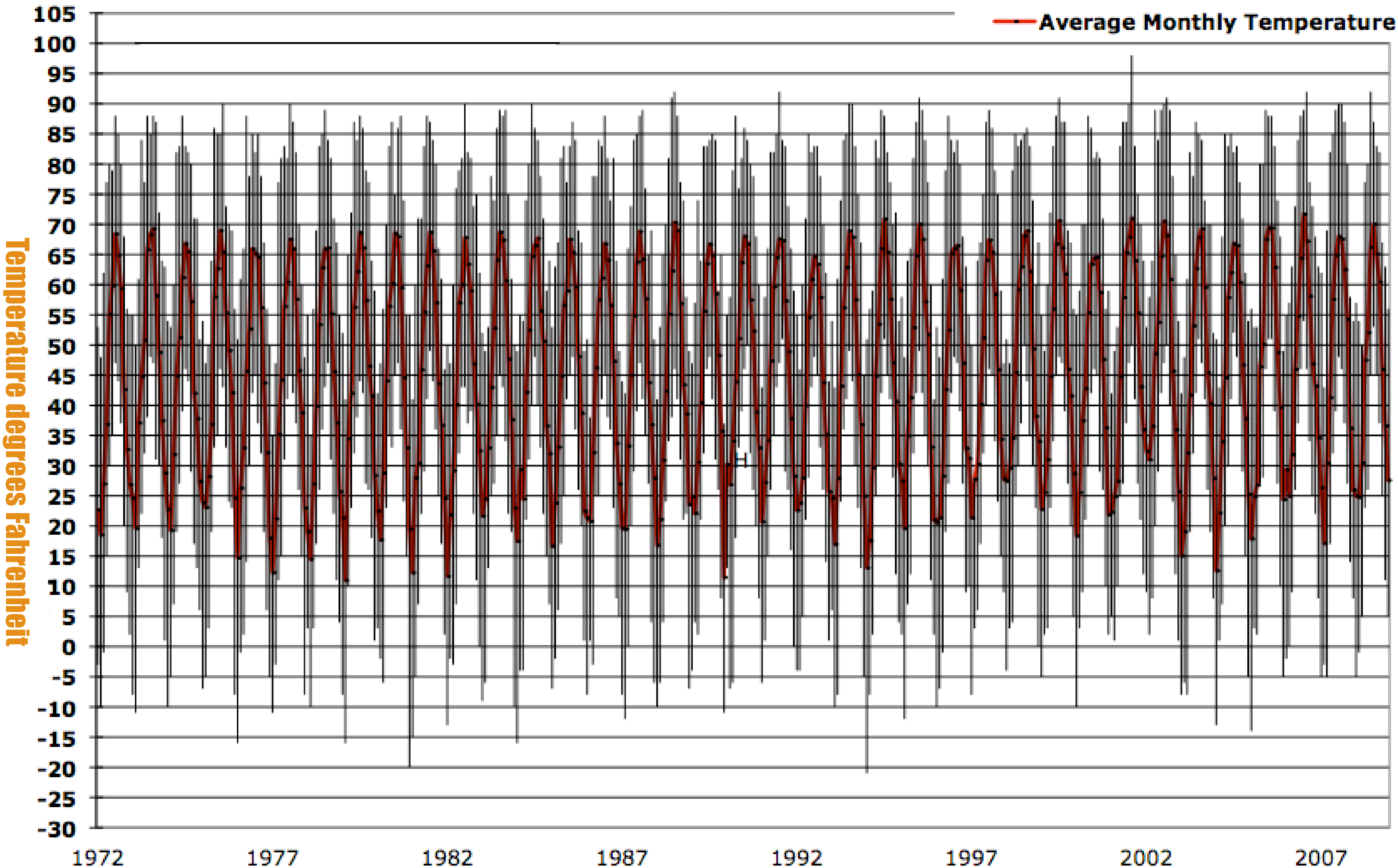
10 Snowiest Years			10 Least Snowy Years		
Rank	Year	Total	Rank	Year	Total
1	1956	175.1	1	1998	33.0
2	1961	160.0	2	1999	44.1
3	1958	156.3	3	2004	49.5
4	1996	150.4	4	2006	50.4
5	1967	150.2	5	1973	53.4
6	1977	147.6	6	1954	57.7
7	1969	137.4	7	1989	58.3
8	1945	136.8	8	1991	59.6
9	1971	136.6	9	1937	60.3
10	1947	130.1	10	1946	61.8

In inches, January-December

Monthly temperature highs, lows and average means



Monthly temperature highs, lows and average means



Appendix 2: Soils of Norfolk

Brief Soil Series Descriptions

The soils found in Norfolk are briefly described below. The depth to a restrictive feature indicates the depth to hardpan or rock that might limit rooting depth or water flow. The available water capacity is the capacity of the soil to store water that is available for plants to use. The seasonal water table depth is the depth to saturated soil; it varies over the seasons due to rainfall amounts and evaporation. Frigid soil has an annual average soil temperature of between 32°F and 47°F, wide variation between mean summer and winter temperatures, and warm summer temperatures. One of these frigid soils, Bice, is Norfolk's most common soil.

Most Norfolk soils have three features in common. Except as noted, they typically do not have very much salt in them; in localized areas, a high-sodium test probably indicates the presence of pollution, such as road salt. There is no calcium carbonate within 40 inches of the surface in most Norfolk soils except for Alden, Copake, Fredon, Loonmeadow, Mudgepond and Raynham soils. The weighted average shrink-swell potential within 10 to 60 inches of the soil surface is low except for Brancroft and Wonsqueak soils, which have moderate potentials and Bucksport, which has a very high potential.

"Drumlin," "esker," "flood plain," "kame," "lodgement till," "outwash plain" and "terrace" are defined at the end of this set of descriptions. The chart of Norfolk soils starting on page 88 lists them by their symbols on the USDA Natural Resources Conservation Service map, soil type including percentages of slope, wetland classification, farmland classification and acreage. The soil catenas chart shows how they are grouped into families, by characteristics.

Agawam soils

This soil occurs on valleys and outwash plain terraces. The parent material consists of wind blown deposits over deposits left by melting glaciers derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 4.8 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. In Norfolk, some Agawam soils have a frigid temperature regime.

Alden soils

This soil occurs on upland drainageways and depressions. The parent material consists of till derived from schist, limestone and dolomite. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.20 inches per hour (moderately slow), with about 9.7 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is occasional. The minimum depth to a seasonal water table is about 9 inches. The maximum calcium carbonate within 40 inches is about 5 percent.

Ashfield soils

This soil occurs on upland hills and drumlins. The parent material consists of lodgement till derived from granite, gneiss and schist. The depth to a restrictive feature is 20 to 33 inches to firm or very firm material. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 3.4 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 18 inches. This soil has a frigid soil temperature regime.

Bash soils

This soil occurs on flood plains. The parent material consists of deposits left by present day streams and rivers derived from sandstone and shale. The depth to a restrictive feature is greater than 60 inches. The drainage class is somewhat poorly drained. The slowest permeability within 60 inches is about 0.20 inches per hour (moderately slow), with about 11.0 inches (very high) available water capacity. The flooding frequency is frequent. The ponding hazard is none. The minimum depth to a seasonal water table is about 12 inches.

Belgrade soils

This soil occurs on lake plain terraces. The parent material consists of silty glacial lake bed deposits. The slope ranges from 0 to 5 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 10.8 inches (very high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 30 inches.

Bice soils

This soil occurs on upland hills. The parent material consists of loamy melt-out till derived from granite, gneiss and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 7.0 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. This is the most common soil in Norfolk. This soil has a frigid soil temperature regime.

Boscawen soils

This soil occurs on valley outwash plains, terraces, eskers and kames. The parent material consists of sandy and gravelly deposits left by melting glaciers derived from gneiss, schist and granite. The depth to a restrictive feature is greater than 60 inches. The drainage class is excessively drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 1.5 inches (very low) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. This soil has a frigid soil temperature regime.

Brancroft soils

This soil occurs on lake plain terraces. The parent material consists of silty and clayey glacial lake bed deposits. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 13.2 inches (very high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 3.0 LEP (moderate). The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 21 inches.

Brayton soils

This soil occurs on upland depressions and drainageways. The parent material consists of lodgement till derived from phyllite and schist. The depth to a restrictive feature is 10 to 20 inches to firm or very firm material. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 1.5 inches (very low) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches. This soil has a frigid soil temperature regime.

Bucksport soils

This soil occurs on depressions. The parent material consists of woody organic material. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.20 inches per hour (moderately slow), with about 20.8 inches (very high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 10.0 LEP (very high). The flooding frequency is rare. The ponding hazard is frequent. The minimum depth to a seasonal water table is about 9 inches. This soil has a frigid soil temperature regime.

Canton soils

This soil occurs on upland hills. The parent material consists of melt-out till derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 5.6 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Charlton soils

This soil occurs on upland hills. The parent material consists of melt-out till derived from granite, schist and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.4 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Chatfield soils

This soil occurs on upland hills and ridges. The parent material consists of melt-out till derived from gneiss, granite and schist. The depth to a restrictive feature is 20 to 40 inches to bedrock (lithic). The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 3.3 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Copake soils

This soil occurs on valley kames, outwash plains and terraces. The parent material consists of deposits left by melting glaciers derived from schist, limestone and dolomite. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.3 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. The maximum calcium carbonate within 40 inches is about 2 percent.

Enfield soils

This soil occurs on valley outwash plains and terraces. The parent material consists of wind blown deposits over deposits left by melting glaciers derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.8 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Fluvaquents soils

This soil occurs on depressions and flood plains. The parent material consists of deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 7.2 inches (high) available water capacity. The flooding frequency is frequent. The ponding hazard is none. The minimum depth to a seasonal water table is about 4 inches.

Fredon soils

This soil occurs on outwash plain depressions, drainageways and terraces. The parent material consists of loamy deposits left by melting glaciers derived from schist, limestone and dolomite over sand and gravel. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 5.7 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches. The maximum calcium carbonate within 40 inches is about 5 percent. In Norfolk, Fredon soils have a frigid temperature regime.

Gloucester soils

This soil occurs on upland hills. The parent material consists of sandy and gravelly melt-out till derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is somewhat excessively drained. The slowest permeability within 60 inches is about 5.95 inches per hour (rapid), with about 4.4 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Hadley soils

This soil occurs on flood plains. The parent material consists of silty deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 11.0 inches (very high) available water capacity. The flooding frequency is occasional. The ponding hazard is none. The minimum depth to a seasonal water table is about 66 inches.

Halsey soils

This component occurs in depressions and drainageways on valley outwash plains and terraces. The parent material consists of loamy glacial deposits derived from schist, limestone and dolomite over sand and gravel. The slope ranges from 0 to 3 percent. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.2 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is occasional. The minimum depth to a seasonal high water table is about 4 inches. In Norfolk, this soil has a frigid temperature regime.

Haven soils

This soil occurs on valley outwash plains and terraces. The parent material consists of wind blown deposits over deposits left by melting glaciers derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 5.1 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Hinckley soils

This soil occurs on valley outwash plains, terraces, kames and eskers. The parent material consists of sandy and gravelly deposits left by melting glaciers derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is excessively drained. The slowest permeability within 60 inches is about 5.95 inches per hour (rapid), with about 2.3 inches (very low) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Hollis soils

This soil occurs on upland hills and ridges. The parent material consists of melt-out till derived from granite, gneiss and schist. The depth to a restrictive feature is 10 to 20 inches to bedrock. The drainage class is somewhat excessively drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 1.8 inches (very low) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet.

Leicester soils

This soil occurs on upland drainageways and depressions. The parent material consists of melt-out till derived from granite, schist and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 7.4 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 9 inches.

Loonmeadow soils

This soil occurs on upland depressions and drainageways. The parent material consists of lodgement till derived from dolomite, phyllite, granite, gneiss and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.06 inches per hour (slow), with about 7.3 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is frequent. The minimum depth to a seasonal water table is about 9 inches. The maximum calcium carbonate within 40 inches is 5 percent. This soil has a frigid soil temperature regime. This soil series is named for the Loon Meadow area of east Norfolk.

Medomak soils

This soil occurs on flood plains and depressions. The parent material consists of silty deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 11.3 inches (very high) available water capacity. The flooding frequency is frequent. The ponding hazard is frequent. The minimum depth to a seasonal water table is about 3 inches. This soil has a frigid soil temperature regime.

Merrimac soils

This soil occurs on valley outwash plains, terraces and kames. The parent material consists of sandy deposits left by melting glaciers derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is somewhat excessively drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 4.0 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. In Norfolk, some Merrimac soils have a frigid temperature regime.

Millsite soils

This soil occurs on upland hills and ridges. The parent material consists of melt-out till derived from gneiss, granite and schist. The depth to a restrictive feature is 20 to 40 inches to bedrock (lithic). The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 3.8 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. This soil has a frigid soil temperature regime.

Montauk soils

This soil occurs on upland hills and drumlins. The parent material consists of sandy lodgement till derived from granite and gneiss. The depth to a restrictive feature is 20 to 38 inches to firm or very firm material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 3.3 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 27 inches.

Moosilauke soils

This soil occurs on valley outwash plains, drainageways, depressions and terraces. The parent material consists of sandy deposits left by melting glaciers derived from granite, gneiss and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 5.1 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches. This soil has a frigid soil temperature regime.

Mudgepond soils

This soil occurs on upland drainageways and depressions. The parent material consists of till derived from schist, limestone and dolomite. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 8.9 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches. The maximum calcium carbonate within 40 inches is about 25 percent.

Ninigret soils

This soil occurs on valley and outwash plain terraces. The parent material consists of wind blown deposits over deposits left by melting glaciers derived from schist, granite and gneiss. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.2 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches. In Norfolk, some Ninigret soils have a frigid soil temperature regime.

Occum soils

This soil occurs on flood plains. The parent material consists of deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 5.7 inches (high) available water capacity. The flooding frequency is occasional. The ponding hazard is none. The minimum depth to a seasonal water table is about 63 inches.

Paxton soils

This soil occurs on upland hills and drumlins. The parent material consists of dense unsorted material deposited by a glacier (lodgement till) derived from granite, gneiss and schist. The depth to a restrictive feature is 20 to 40 inches to firm or very firm material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 3.4 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches.

Pootatuck soils

This soil occurs on flood plains. The parent material consists of deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 5.9 inches (high) available water capacity. The flooding frequency is frequent. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches.

Rainbow soils

A compilation error has been found on the digital soil survey map. The area known as Holleran Swamp at the north end of Woodcreek Pond is currently mapped as 43B (Rainbow silt loam, 3 to 8 percent slopes). This should actually be mapped as 438, Bucksport muck. There is no Rainbow soil in Norfolk. The maps accompanying this report have been adjusted accordingly.

Raynham soils

This soil occurs on lake plain terraces, drainageways and depressions. The parent material consists of silty glacial lake bed deposits. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.06 inches per hour (very slow), with about 11.5 inches (very high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches. The maximum calcium carbonate within 40 inches is about 5 percent.

Raypol soils

This soil occurs on outwash plain terraces, depressions and drainageways. The parent material consists of wind blown deposits over sandy and gravelly deposits left by melting glaciers. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 7.3 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches.

Ridgebury soils

This soil occurs on upland drainageways and depressions. The parent material consists of lodgement till derived from granite, schist and gneiss. The depth to a restrictive feature is 20 to 30 inches to firm or very firm material. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 2.6 inches (low) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 3 inches.

Rippowam soils

This soil occurs on depressions and flood plains. The parent material consists of deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.2 inches (high) available water capacity. The flooding frequency is frequent. The ponding hazard is none. The minimum depth to a seasonal water table is about 9 inches.

Rumney soils

This soil occurs on flood plains and depressions. The parent material consists of loamy deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 8.8 inches (high) available water capacity. The flooding frequency is frequent. The ponding hazard is none. The minimum depth to a seasonal water table is about 9 inches. This soil has a frigid soil temperature regime.

Saco soils

This soil occurs on flood plains, depressions and drainageways. The parent material consists of silty deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 10.1 inches (very high) available water capacity. The flooding frequency is frequent. The ponding hazard is frequent. The minimum depth to a seasonal water table is about 3 inches.

Scarboro soils

This soil occurs on outwash plain terraces, depressions and drainageways. The parent material consists of organic material over sandy deposits left by melting glaciers derived from gneiss, granite and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 4.8 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.8 LEP (low). The flooding frequency is none. The ponding hazard is occasional. The minimum depth to a seasonal water table is about 4 inches. In Norfolk, some Scarboro soils have a frigid temperature regime.

Schroon soils

This soil occurs on upland hills. The parent material consists of melt-out till derived from granite, gneiss and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 7.3 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches. This soil has a frigid soil temperature regime.

Shelburne soils

This soil occurs on upland hills and drumlins. The parent material consists of loamy lodgement till derived from granite, gneiss and schist. The depth to a restrictive feature is 20 to 30 inches to firm or very firm material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 3.5 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches. This soil has a frigid soil temperature regime.

Sudbury soils

This soil occurs on valley outwash plains and terraces. The parent material consists of sandy and gravelly deposits left by melting glaciers derived from granite, gneiss and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 4.2 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 27 inches. In Norfolk, Sudbury soils have a frigid temperature regime.

Sutton soils

This soil occurs on upland hills. The parent material consists of melt-out till derived from granite, gneiss and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 7.5 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches.

Tisbury soils

This soil occurs on valley and outwash plain terraces. The parent material consists of wind blown deposits over sand and gravel. The depth to a restrictive feature is greater than 60 inches. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 6.6 inches (high) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches.

Udifluvents soils

This soil occurs on flood plains. Parent material is deposits left by present day streams and rivers. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 inches per hour (moderate), with about 4.0 inches (high) available water capacity. The flooding frequency is frequent. The ponding hazard is none. The minimum depth to a seasonal water table is about 72 inches.

Udorthents soils

This soil occurs on cuts (road, railroad, etc.), railroad or road beds, urban land, fill and spoil piles. The depth to a restrictive feature varies, but is commonly greater than 60 inches. The drainage class is typically well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 9.0 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.4 LEP (low). The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 60 inches.

Urban Land

Urban land is land mostly covered by streets, parking lots, buildings and other structures of urban areas. The runoff class is very high.

Walpole soils

This soil occurs on outwash plain terraces, depressions and drainageways. The parent material consists of sandy and gravelly deposits left by melting glaciers from gneiss, granite and schist. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 5.2 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 6 inches.

Westminster soils

This soil occurs on upland hills and ridges. The parent material consists of melt-out till derived from schist, granite and gneiss. The depth to a restrictive feature is 10 to 20 inches to bedrock (lithic). The drainage class is somewhat excessively drained. The slowest permeability within 60 inches is about 1.98 inches per hour (moderately rapid), with about 2.2 inches (very low) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.0 LEP (low). The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 6 feet. This soil has a frigid temperature regime.

Whitman soils
This soil occurs on upland drainageways and depressions. The parent material consists of lodgement till derived from gneiss, schist and granite. The depth to a restrictive feature is 12 to 20 inches to firm or very firm material. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 1.9 inches (very low) available water capacity. The flooding frequency is none. The ponding hazard is occasional. The minimum depth to a seasonal water table is about 0 inches.

Wonsqueak soils
This soil occurs on depressions. The parent material consists of woody organic material over loamy unsorted rock debris left by glaciers. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.20 inches per hour (moderately slow), with about 6.8 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 3.6 LEP (moderate). The flooding frequency is rare. The ponding hazard is frequent. The minimum depth to a seasonal water table is about 2 inches. This soil has a frigid soil temperature regime.

Woodbridge soils
This soil occurs on upland drumlins and hills. The parent material consists of lodgement till derived from schist, granite and gneiss. The depth to a restrictive feature is 20 to 40 inches to firm or very firm material. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.00 inches per hour (very slow), with about 3.9 inches (moderate) available water capacity. The flooding frequency is none. The ponding hazard is none. The minimum depth to a seasonal water table is about 24 inches.

Definitions:

Drumlin
A low, smooth, elongated oval hill, mound or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Esker
A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Flood plain
A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Kame
An irregular, short ridge or hill of stratified glacial drift.

Lodgement till
Dense unsorted material deposited by a glacier.

Outwash plain
A landform of mainly sandy or coarse-textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Terrace
A step-like surface, bordering a stream that represents the former position of a flood plain or lake. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remnants of an abandoned flood plain, stream bed or valley floor produced during a former state of erosion or deposition.

Soil Catenas of Norfolk

Deposit	Lithology	Texture	Other	Drainage Class						
				Excessively Drained	Somewhat Excessively Drained	Well Drained	Moderately Well Drained	Somewhat Poorly Drained	Poorly Drained	Very Poorly Drained
Glacial Till (Unsorted Sand, Silt and Rock)	Granite and Schist	Sandy			Gloucester					
	Schist, Granite and Gneiss	Loamy	Shallow soil, less than 20 inches to bedrock		Westminster Hollis					
			Moderately deep soil, 20 to 40 inches to bedrock			Chatfield Millsite				
			Underlain by melt-out till			Charlton Canton Bice	Sutton Schroon		Leicester	Loonmeadow
			Underlain by compact till			Paxton Montauk Shelburne	Woodbridge Ashfield		Ridgebury Brayton	Whitman
	Shale, Sandstone, Basalt and Crystalline Rocks	Loamy	Underlain by compact till				Rainbow*			
	Mixed Limestone and Crystalline Rocks	Loamy							Mudgepond	Alden
Glaciofluvial (Stratified Sand and Gravel)	Acidic Crystalline Rocks	Sandy and Gravelly		Hinckley Boscawen	Merrimac*		Sudbury		Walpole Moosilauke	
		Sandy								Scarboro*
		Loamy/ Sand and Gravel				Agawam*	Ninigret*			
		Silty/Sand and Gravel				Enfield Haven	Tisbury		Raypol	
	Mixed Limestone and Crystalline Rocks	Loamy/ Sand and Gravel				Copake			Fredon	Halsey
Glaciolacustrine (Glacial Lake Deposit)	Mixed Crystalline and Sedimentary Rocks	Silty Silty and Clayey					Belgrade Brancroft		Raynham	
Alluvial (River Deposits)	Gneiss, Schist, Granite and Quartzite	Loamy				Occum	Pootatuck		Rippowam Rumney	
	Mixed Crystalline and Sedimentary Rocks	Silty				Hadley		Bash		Saco Medomak
Organic		Variable Substrate								Bucksport
		Loamy Substrate								Wonsqueak

Note-Blue type indicates a mean annual soil temperature less than 8º C (>1,300 ft in elevation in Litchfield County, Connecticut)–Frigid Soil Temperature Regime
* Some areas of these soils are frigid (cold) soils and some areas are not frigid. For example, unit 15 is Scarboro muck and unit 435 is Scarboro muck, cold (frigid). See the accompanying list of Norfolk soils for a detailed breakdown. *There is no Rainbow soil in Norfolk; Rainbow (43B) was mistakenly mapped instead of Bucksport muck (438).

Norfolk Soils Table

All Soils of Norfolk

USDA Map Symbol	Soil Type	Frigid	Wetland Classification	Farmland Classification	Acres
2	Ridgebury fine sandy loam		Poorly drained soils	Farmland of statewide importance	5.3
3	Ridgebury, Leicester, and Whitman soils, extremely stony		Poorly & very poorly drained soils	Not prime farmland	31.3
7	Mudgepond silt loam		Poorly drained soils	Farmland of statewide importance	3.9
8	Mudgepond and Alden soils, extremely stony		Poorly & very poorly drained soils	Not prime farmland	1.8
10	Raynham silt loam		Poorly drained soils	Farmland of statewide importance	22.9
12	Raypol silt loam		Poorly drained soils	Farmland of statewide importance	29.4
13	Walpole sandy loam		Poorly drained soils	Farmland of statewide importance	6.3
15	Scarboro muck		Very poorly drained soils	Not prime farmland	3.4
21A	Ninigret and Tisbury soils, 0 - 5% slopes		Non-wetland soils	All areas are prime farmland	18.0
25C	Brancroft silt loam, 8 - 15% slopes		Non-wetland soils	Farmland of statewide importance	4.0
27A	Belgrade silt loam, 0 - 5% slopes		Non-wetland soils	All areas are prime farmland	16.8
29A	Agawam fine sandy loam, 0 - 3% slopes		Non-wetland soils	All areas are prime farmland	8.9
29B	Agawam fine sandy loam, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	5.3
29C	Agawam fine sandy loam, 8 - 15% slopes		Non-wetland soils	Farmland of statewide importance	5.6
31A	Copake fine sandy loam, 0 - 3% slopes		Non-wetland soils	All areas are prime farmland	11.4
32B	Haven and Enfield soils, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	2.1
34B	Merrimac sandy loam, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	12.3
34C	Merrimac sandy loam, 8 - 15% slopes		Non-wetland soils	Farmland of statewide importance	12.5
38C	Hinckley gravelly sandy loam, 3 - 15% slopes		Non-wetland soils	Farmland of statewide importance	16.1
38E	Hinckley gravelly sandy loam, 15 - 45% slopes		Non-wetland soils	Not prime farmland	6.1
43B	Rainbow silt loam - should be mapped as 438		see 438	see 438	82.3
45A	Woodbridge fine sandy loam, 0 - 3% slopes		Non-wetland soils	All areas are prime farmland	2.5
45B	Woodbridge fine sandy loam, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	0.6
45C	Woodbridge fine sandy loam, 8 - 15% slopes		Non-wetland soils	Farmland of statewide importance	1.0
46B	Woodbridge fine sandy loam, 2 - 8% slopes, very stony		Non-wetland soils	Not prime farmland	57.3
46C	Woodbridge fine sandy loam, 8 - 15% slopes, very stony		Non-wetland soils	Not prime farmland	85.1
47C	Woodbridge fine sandy loam, 2 - 15% slopes, extremely stony		Non-wetland soils	Not prime farmland	13.7
50B	Sutton fine sandy loam, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	11.8
52C	Sutton fine sandy loam, 2 - 15% slopes, extremely stony		Non-wetland soils	Not prime farmland	4.5
57B	Gloucester gravelly sandy loam, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	2.9
57C	Gloucester gravelly sandy loam, 8 - 15% slopes		Non-wetland soils	Farmland of statewide importance	2.2
58B	Gloucester gravelly sandy loam, 3 - 8% slopes, very stony		Non-wetland soils	Not prime farmland	3.0
58C	Gloucester gravelly sandy loam, 8 - 15% slopes, very stony		Non-wetland soils	Not prime farmland	25.9
59C	Gloucester gravelly sandy loam, 3 - 15% slopes, extremely stony		Non-wetland soils	Not prime farmland	8.9
59D	Gloucester gravelly sandy loam, 15 - 35% slopes, extremely stony		Non-wetland soils	Not prime farmland	61.5

USDA Map Symbol	Soil Type	Frigid	Wetland Classification	Farmland Classification	Acres
60B	Canton and Charlton soils, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	5.2
60D	Canton and Charlton soils, 15 - 25% slopes		Non-wetland soils	Not prime farmland	6.0
61C	Canton and Charlton soils, 8 - 15% slopes, very stony		Non-wetland soils	Not prime farmland	34.1
62C	Canton and Charlton soils, 3 - 15% slopes, extremely stony		Non-wetland soils	Not prime farmland	6.0
62D	Canton and Charlton soils, 15 - 35% slopes, extremely stony		Non-wetland soils	Not prime farmland	92.0
73C	Charlton-Chatfield complex, 3 - 15% slopes, very rocky		Non-wetland soils	Not prime farmland	4.2
73E	Charlton-Chatfield complex, 15 - 45% slopes, very rocky		Non-wetland soils	Not prime farmland	34.3
75E	Hollis-Chatfield-Rock outcrop complex, 15 - 45% slopes		Non-wetland soils	Not prime farmland	52.5
84B	Paxton and Montauk fine sandy loams, 3 - 8% slopes		Non-wetland soils	All areas are prime farmland	32.8
84C	Paxton and Montauk fine sandy loams, 8 - 15% slopes		Non-wetland soils	Farmland of statewide importance	19.1
84D	Paxton and Montauk fine sandy loams, 15 - 25% slopes		Non-wetland soils	Not prime farmland	2.7
85B	Paxton and Montauk fine sandy loams, 3 - 8% slopes, very stony		Non-wetland soils	Not prime farmland	21.6
85C	Paxton and Montauk fine sandy loams, 8 - 15% slopes, very stony		Non-wetland soils	Not prime farmland	17.8
86D	Paxton and Montauk fine sandy loams, 15 -35% slopes, extremely stony		Non-wetland soils	Not prime farmland	16.9
101	Occum fine sandy loam		Alluvial and floodplain soils	All areas are prime farmland	3.6
102	Pootatuck fine sandy loam		Alluvial and floodplain soils	All areas are prime farmland	7.3
103	Rippowam fine sandy loam		Alluvial and floodplain soils	Farmland of statewide importance	5.2
104	Bash silt loam		Alluvial and floodplain soils	Farmland of statewide importance	1.0
105	Hadley silt loam		Alluvial and floodplain soils	All areas are prime farmland	9.4
108	Saco silt loam		Alluvial and floodplain soils	Not prime farmland	26.1
109	Fluvaquents-Udifluvents complex, frequently flooded		Alluvial and floodplain soils	Not prime farmland	160.7
302	Dumps		Non-wetland soils	Not prime farmland	23.6
306	Udorthents-Urban land complex		Non-wetland soils	Not prime farmland	88.5
307	Urban land		Non-wetland soils	Not prime farmland	6.7
308	Udorthents, smoothed		Non-wetland soils	Not prime farmland	50.3
309	Udorthents, flood control		Non-wetland soils	Not prime farmland	2.6
	Mesic (warm) soils, total acres				1356.7
409B	Brayton mucky silt loam, 0 - 8% slopes, very stony	x	Poorly drained soils	Not prime farmland	5.3
412B	Bice fine sandy loam, 3 - 8% slopes	x	Non-wetland soils	All areas are prime farmland	231.0
412C	Bice fine sandy loam, 8 - 15% slopes	x	Non-wetland soils	Farmland of statewide importance	119.2
412D	Bice fine sandy loam, 15 - 25% slopes	x	Non-wetland soils	Not prime farmland	74.7
413C	Bice-Millsite complex, 3 - 15% slopes, very rocky	x	Non-wetland soils	Not prime farmland	5175.4
413E	Bice-Millsite complex, 15 - 45% slopes, very rocky	x	Non-wetland soils	Not prime farmland	3545.9
414	Fredon silt loam, cold	x	Poorly drained soils	Farmland of statewide importance	47.3
415C	Westminster-Millsite-Rock outcrop complex, 3 - 15% slopes	x	Non-wetland soils	Not prime farmland	1665.6
415E	Westminster-Millsite-Rock outcrop complex, 15 - 45% slopes	x	Non-wetland soils	Not prime farmland	1988.9
416E	Rock outcrop-Westminster complex, 8 - 45% slopes	x	Non-wetland soils	Not prime farmland	162.4
416F	Rock outcrop-Westminster complex, 45 - 70% slopes	x	Non-wetland soils	Not prime farmland	125.4
417B	Bice fine sandy loam, 3 - 8% slopes, very stony	x	Non-wetland soils	Not prime farmland	646.3

Norfolk Soils Table

All Soils of Norfolk

USDA Map Symbol	Soil Type	Frigid	Wetland Classification	Farmland Classification	Acres
417C	Bice fine sandy loam, 8 - 15% slopes, very stony	x	Non-wetland soils	Not prime farmland	1566.0
417D	Bice fine sandy loam, 15 - 25% slopes, very stony	x	Non-wetland soils	Not prime farmland	1229.7
418C	Schroon fine sandy loam, 2 - 15% slopes, very stony	x	Non-wetland soils	Not prime farmland	1074.3
420B	Schroon fine sandy loam, 3 - 8% slopes	x	Non-wetland soils	Farmland of statewide importance	52.4
421A	Ninigret fine sandy loam, cold, 0 - 3% slopes	x	Non-wetland soils	All areas are prime farmland	54.0
423A	Sudbury sandy loam, cold, 0 - 3% slopes	x	Non-wetland soils	All areas are prime farmland	73.4
424B	Shelburne fine sandy loam, 3 - 8% slopes	x	Non-wetland soils	Not prime farmland	355.6
424C	Shelburne fine sandy loam, 8 - 15% slopes	x	Non-wetland soils	Not prime farmland	116.6
424D	Shelburne fine sandy loam, 15 - 25% slopes	x	Non-wetland soils	Not prime farmland	18.8
425B	Shelburne fine sandy loam, 3 - 8% slopes, very stony	x	Non-wetland soils	Not prime farmland	440.6
425C	Shelburne fine sandy loam, 8 - 15% slopes, very stony	x	Non-wetland soils	Not prime farmland	1037.5
426D	Shelburne fine sandy loam, 15 - 35% slopes, extremely stony	x	Non-wetland soils	Not prime farmland	450.4
427B	Ashfield fine sandy loam, 2 - 8% slopes, very stony	x	Non-wetland soils	Not prime farmland	785.0
427C	Ashfield fine sandy loam, 8 - 15% slopes, very stony	x	Non-wetland soils	Not prime farmland	1539.0
428A	Ashfield fine sandy loam, 0 - 3% slopes	x	Non-wetland soils	Not prime farmland	55.3
428B	Ashfield fine sandy loam, 3 - 8% slopes	x	Non-wetland soils	Not prime farmland	226.1
428C	Ashfield fine sandy loam, 8 - 15% slopes	x	Non-wetland soils	Not prime farmland	75.0
429A	Agawam fine sandy loam, cold, 0 - 3% slopes	x	Non-wetland soils	All areas are prime farmland	6.6
429B	Agawam fine sandy loam, cold, 3 - 8% slopes	x	Non-wetland soils	All areas are prime farmland	58.2
429C	Agawam fine sandy loam, cold, 8 - 15% slopes	x	Non-wetland soils	Farmland of statewide importance	14.1
433	Moosilauke sandy loam	x	Poorly drained soils	Farmland of statewide importance	98.2
434A	Merrimac sandy loam, cold, 0 - 3% slopes	x	Non-wetland soils	All areas are prime farmland	4.1
434B	Merrimac sandy loam, cold, 3 - 8% slopes	x	Non-wetland soils	All areas are prime farmland	65.4
434C	Merrimac sandy loam, cold, 8 - 15% slopes	x	Non-wetland soils	Farmland of statewide importance	32.2
435	Scarboro muck, cold	x	Very poorly drained soils	Not prime farmland	98.5
436	Halsey silt loam, cold	x	Very poorly drained soils	Not prime farmland	6.9
437	Wonsqueak mucky peat	x	Very poorly drained soils	Not prime farmland	575.2
438	Bucksport muck	x	Very poorly drained soils	Not prime farmland	691.2
440A	Boscawen gravelly sandy loam, 0 - 3% slopes	x	Non-wetland soils	Farmland of statewide importance	48.8
440C	Boscawen gravelly sandy loam, 3 - 15% slopes	x	Non-wetland soils	Farmland of statewide importance	485.7
440E	Boscawen gravelly sandy loam, 15 - 45% slopes	x	Non-wetland soils	Not prime farmland	367.6
442	Brayton loam	x	Poorly drained soils	Not prime farmland	44.7
443	Brayton-Loonmeadow complex, extremely stony	x	Poorly drained soils	Not prime farmland	1744.9
503	Rumney fine sandy loam	x	Alluvial and floodplain soils	Farmland of statewide importance	21.5
508	Medomak silt loam	x	Alluvial and floodplain soils	Not prime farmland	158.4
	Frigid soils, total acres				27459.1
W	Water		Water	Not prime farmland	838.7

Fish Abundance in Norfolk

Abundance data for fish collected in streams using electrofishing samples taken by Connecticut DEP Fisheries Division personnel, Norfolk, Connecticut (1988-1994).

Location / Fish Species	Fish Abundance Blackberry River BR Inn	Blackberry River above North Brook	Blackberry River STP bridge	Ginger Brook Spaulding Road	Roaring Brook Mountain Road	North Brook Ashpohtag Road	Wood Creek Ashpohtag Road	Spaulding Brook Mountain Road	Hall Meadow Brook Route 272	Hall Meadow Brook behind cemetery
Coldwater Species										
Brook trout (stocked)	--	P	--	--	--	P	--	--	p	--
Brook trout (wild)	--	--	--	--	--	C	C	C	P	A
Rainbow trout (stocked)	P	--	--	--	--	P	--	--	--	--
Brown trout (stocked)	C	P	P	P	--	P	--	--	--	--
Brown trout (wild) b	VA	A	A	--	--	--	--	--	--	--
Blacknose dace	A	A	VA	VA	VA	A	VA	VA	A	A
Longnose dace	A	C	VA	--	--	--	--	P	C	P
Common shiner	--	--	--	--	--	--	--	C	--	P
Fallfish	--	--	--	--	--	--	--	--	--	--
Tesselated darter	P	--	--	--	--	--	--	--	P	--
White sucker	C	C	C	--	--	--	--	A	C	P
Slimy sculpin	C	P	--	--	--	--	--	--	P	P
Warmwater Species										
Creek chub	P	--	P	VA	--	--	--	A	--	P
Largemouth bass	--		P	--	--	--	--	--	--	P
Bluegill sunfish	--	--	--	--	--	--	--	--	--	P
Pumpkinseed sunfish	P	--	P	--	--	--	P	--	--	P
Redbreast sunfish	--	P	--	--	--	--	--	--	--	--
Rock bass	--	--	--	--	--	--	--	--	--	--
Chain pickerel	--	--	--	--	--	--	P	--	--	--
Yellow perch	--	--	--	--	--	--	--	--	--	--
Golden shiner	--	--	--	--	--	--	--	--	--	--
Migratory Species										
American eel	--	--	--	--	--	--	--	--	--	--

Fish abundance coding:

--- = non-existent in samples
P = present, but in low abundance
C = common
A = abundant
VA = very abundant
b naturalized brown trout (naturally reproducing, but not native)

Freshwater Fishes Found in the Major Drainage Basins of the Housatonic or Farmington Rivers

Native Fish Species	Common name
**Ameiurus nebulosus*	Brown bullhead
**Catostomus commersonii*	White sucker
Erimyzon oblongus	Creek chubsucker
Esox americanus vermiculatus	Grass pickerel
**Esox niger*	Chain pickerel
**Etheostoma olmstedi*	Tessellated darter
Fundulus diaphanus	Banded killifish
Lepomis auritus	Redbreast sunfish
**Lepomis gibbosus*	Pumpkinseed
**Luxilus cornutus*	Common shiner
**Notemigonus crysoleucas*	Golden shiner
Notropis bifrenatus	Bridle shiner
Notropis hudsonius	Spottail shiner
**Perca flavescens*	Yellow perch
**Rhinichthys atratulus*	Blacknose dace
**Rhinichthys cataractae*	Longnose dace
**Salvelinus fontinalis*	Brook trout
Semotilus corporalis	Fallfish
**Cottus cognatus*	Slimy sculpin
**Semotilus atromaculatus*	Creek chub
Exoglossum maxillingus	Cutlips minnow

Native Anadromous Species	Common name
Alosa aestivalis	Blueback herring
Alosa pseudoharengus	Alewife
Alsoa sapidissima	American shad
**Anguilla rostrata*	American eel
Morone americana	White perch
Osmerus mordax	Rainbow smelt
Petromyzon marinus	Sea lamprey
**Salmo salar*	Atlantic salmon

Non-native Fish Species	Common name
Ambloplites rupestris	Rock bass
Ameiurus catus	White catfish
Ameiurus natalis	Yellow bullhead
Cyprinus carpio	Common carp
Esox lucius	Northern pike
Dorosoma cepedianum	Gizzard shad
Ictalurus punctatus	Channel catfish
Lampetra appendix	American brook lamprey
**Lepomis cyanellus*	Green sunfish
**Lepomis macrochirus*	Bluegill
Lota lota	Burbot
Micropterus dolomieu	Smallmouth bass
**Micropterus salmoides*	Largemouth bass
**Oncorhynchus mykiss*	Rainbow trout
**Salmo trutta*	Brown trout
Oncorhynchus nerka	Sockeye salmon
Pimephales notatus	Bluntnose minnow
Pimephales promelas	Fathead minnow
Pomoxis annularis	White crappie
**Pomoxis nigromaculatus*	Black crappie
Prosopium cylindraceum	Round whitefish
Tinca tinca	Tench
Culaca inconstans	Brook stickleback
**Ctenopharyngodon idella*	Grass carp
Sander vitreus	Walleye
Umbra limi	Central mudminnow
Ameiurus melas	Black bullhead
Catostomus catastomus	Longnose sucker

* Species known to occur in Norfolk

Aquatic Invasives Currently Found in Connecticut Waters

Plants	
**Lythrum salicaria*	Purple loosestrife
**Phragmites australis*	Phragmites
Cabomba caroliniana	Fanwort
Hydrilla verticillata	Hydrilla
**Iris pseudacorus*	Yellow iris
Myriophyllum heterophyllum	Variable-leaved water milfoil
Myriophyllum spicatum	Eurasian water milfoil
Najas flexilis	Eutrophic water-nymph
Potamogeton crispus	Curly pondweed
Egeria densa	Brazilian waterweed
Trapa natan	Water chestnut
Fish	
Alosa pseudoharengus	Alewife
Tinca tinca	Tench
Invertebrates	
Ampullariidae (family)	Apple snail
Dreissena polymorpha	Zebra mussel
**Oronectes rusticus*	Rusty crayfish

* Invasives known to occur in Norfolk as of March 2009
See page 107, Appendix 4, for non-aquatic invasives.

Appendix 4: Norfolk Plantscape

This appendix contains lists of the many trees, shrubs, vines, wildflowers, ferns, clubmosses and tree fungi to be found in Norfolk. Probably none of these lists is complete, but all the species presented are known to exist in Norfolk. Norfolk's notable trees and a list of invasive species are also included.

The Conservation Commission would welcome any information about the species in this appendix and especially invites new listings or lists for future publication.

Trees, shrubs and vines

Plants may have two forms of growth determined by the location of growth cells or meristems. All plants, herbaceous or woody, have primary growth that allows the extension of roots and branches. Secondary growth allows plants to put on girth that can result in stronger, long-lived stems and roots. Trees and shrubs have secondary growth, or wood, and are perennial; that is, they can persist for up to hundreds of years. They may be further divided as gymnosperms or conifers (cone-bearing, often referred to as softwoods) and angiosperms or flowering trees (often referred to as hardwoods).

The division between trees and shrubs is somewhat arbitrary. Shrubs are woody plants that have one to many stems and grow to a height of no more than 15 feet (to take a commonly accepted limit). Trees tend to have one stem or trunk and tend to grow to over 15 feet at maturity. Trees that have been injured or cut or live in poor soils may have multiple trunks and grow to less than 15 feet, but they are still trees. However, from a vegetation or habitat perspective these would exist within a shrub or subcanopy layer.

Trees and shrubs are ecologically important for several reasons: they dominate the vegetation of our New England landscape; they create the niches and habitats for our regions plants and animals, including important sources of food and cover for wildlife; they help keep our air and water clean; they help regulate the hydrologic cycle, produce oxygen and sequester carbon dioxide, a significant greenhouse gas. They also supply us with building and landscape materials, fuel, food and other products. Trees in particular have special places in our history and have inspired people aesthetically, emotionally and spiritually.

Vines may be woody or herbaceous. If herbaceous, they will lack secondary growth and the above-ground parts will die back at the end of the growing season. Woody vines may be thought of as climbing shrubs, although they often exceed 15 feet.

Wildflowers and ferns

Wildflowers may be any woody or herbaceous plants with showy flowers. These include monocots (such as lilies and orchids) and dicots (such as asters, roses and our flowering shrubs), collectively Angiosperms. Gymnosperms do not have showy flowers and include our conifers, such as pines, junipers and spruces.

Shrubs, which are woody plants, are discussed with trees. Herbaceous plants are not woody; that is, they only have primary growth that allows the extension of roots and branches. They may be annuals, which develop, flower and die in one growing season; biennials, which take two years to develop before they flower and then die, or perennials, which can live and flower for many years.

Our native wildflowers are important ecologically; they provide food and cover for many animals, especially insects, which in turn pollinate flowers or are food themselves. A few of our wildflowers supply us with food or medicine, or are important in the landscape trade. Many more wildflowers and other native plants could be used to landscape our yards instead of exotics.

Ferns are non-flowering plants that reproduce by spores rather than seeds. They are classified as Pteridophytes, which also includes clubmosses and horsetails. Their leaves are highly divided, sometimes lacy, fronds that unfurl from their coils in the spring. These plants can dominate wetlands and are common in our woodlands. Many are very attractive and are used for ornamental gardens and house plants.

Notable trees

Witnesses to Norfolk's history, some very old trees still stand here today, having escaped being cut down by farmers or charcoal burners—perhaps spared to shade houses or pastured animals, or to mark land boundaries. Some of them are listed in this appendix, along with others that are notable because of their beauty or size.

To find notable trees, the committee invited nominations from townspeople. The diameter of the trunk at breast height, the height of the tree and the spread of its crown were measured for each tree nominated, and the trees that were remarkable in these categories were selected for the list below. Two from the state's list of notable trees were then verified and added.

The list in this appendix probably could be much longer. Norfolk residents who want to nominate their trees for a future edition are invited to get in touch with the Conservation Commission.

Native Trees

Species	Common Name	Comments*
Abies balsamea	Balsam fir	Connecticut endangered
Acer negundo	Ashleaf maple, Boxelder	
Acer pensylvanicum	Striped maple, Moosewood	
Acer rubrum	Red maple	
Acer saccharum	Sugar or Hard maple	
Acer saccharinum	Silver maple	
Acer spicatum	Mountain maple	
Amelanchier arborea	Shadbush	
Amelanchier canadensis	Shadbush	
Amelanchier laevis	Shadbush	
Amelanchier x *intermedia*	Shadbush	
Betula alleghaniensis	Yellow or Bronze birch	*(Betula lutea)*
Betula lenta	Black or Sweet birch	
Betula papyrifera	White or Paper birch	
Betula populifolia	Gray birch	
Carpinus caroliniana	Ironwood, American hornbeam, Bluebeech, Musclewood	
Carya cordiformis	Bitternut hickory	
Carya ovalis	Sweet pignut	
Carya ovata	Shagbark hickory	
Castanea dentata	American chestnut	
Fagus grandifolia	American beech	
Fraxinus americana	White ash	
Fraxinus nigra	Black ash	
Juglans cinerea	Butternut	
Juniperus virginiana	Eastern red cedar	
Larix laricina	Tamarack	
Liriodendron tulipifera	Tulip tree, Yellow poplar, Whitewood	
Nyssa sylvatica	Black tupelo, Sour-gum, Pepperidge	
Ostrya virginiana	Hop hornbeam	
Picea mariana	Black spruce	
Picea rubens	Red spruce	
Pinus rigida	Pitch pine	historic occurences
Pinus strobus	Eastern white pine	
Platanus occidentalis	Sycamore	
Populus deltoides	Cottonwood	
Populus grandidentata	Big-tooth aspen	
Populus tremuloides	Quaking aspen	
Prunus pensylvanica	Pin cherry	
Prunus serotina	Black cherry	
Prunus virginiana	Choke cherry	
Quercus alba	White oak	
Quercus prinus	Chestnut oak	
Quercus rubra	Northern red oak	
Quercus velutina	Black oak	
Salix nigra	Black willow	
Sassafras albidum	Sassafras	
Sorbus americana	Mountain ash	
Tilia americana	American basswood	
Tsuga canadensis	Eastern hemlock	
Ulmus americana	American elm	
Ulmus rubra	Slippery or Red elm	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Ornamental & Naturalized Trees

Species	Common Name	Comments*
Acer platanoides	Norway maple	non-native, invasive
Acer pseudoplatanus	Sycamore maple	non-native, invasive
Castanea crenata	Japanese chestnut	non-native
Castanea mollissima	Chinese chestnut	non-native
Catalpa speciosa	Western catalpa	non-native
Chamaecyparis thyoides	Atlantic white cedar	non-native
Cornus florida	Flowering dogwood	native nearby, *Benthamidia florida*
Fagus sylvatica	European or Copper beech	non-native
Juglans nigra	Black walnut	non-native
Larix decidua	European larch	non-native
Liquidambar styraciflua	Sweetgum	native farther south
Magnolia soulangiana	Saucer magnolia	non-native
Magnolia stellata	Star magnolia	non-native
Malus prunifolia/baccata	Crabapple	non-native
Malus pumila	Apple	non-native
Metasequoia glyptostroboides	Dawn redwood	non-native
Morus alba	White mulberry	non-native
Picea abies	Norway spruce	non-native
Picea glauca	White spruce	non-native
Picea pungens	Blue or Colorado spruce	non-native
Pinus nigra	Austrian or European black pine	non-native
Pinus resinosa	Red pine	native nearby
Pinus sylvestris	Scotch pine	non-native
Pinus thunbergiana	Japanese black pine	non-native
Populus nigra italica	Lombardy or Black poplar	non-native
Populus x *jackii*	Balm-of-Gilead	non-native
Pseudotsuga menziesi	Douglas-fir	non-native
Pyrus communis	Pear	non-native
Quercus coccinea	Scarlet oak	native nearby
Quercus palustris	Pin oak	non-native
Rhamnus cathartica	Buckthorn	non-native
Robinia pseudoacacia	Black locust	non-native, invasive
Salix x *sepulcralis*	Weeping willow	non-native *(Salix babylonica)*
Sorbus aucuparia	Rowan tree	non-native
Thuja occidentalis	Northern white cedar	native nearby
Tilia cordata	Littleleaf linden	non-native
Tilia x *europaea*	Common linden	non-native

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Notable Trees of Norfolk

Species	Common Name	DBH+	Height	Spread	Location
Acer pensylvanicum	Striped maple	8.15 inches	35 feet	20 feet	Aton Forest
Acer pseudoplatanus	Sycamore maple	33.75 inches	73 feet	49.5 feet[A]	Old Colony Rd
Acer pseudoplatanus	Sycamore maple	32.8 inches	61 feet	63.5 feet[A]	Old Colony Rd
Acer saccharinum	Silver maple	66.4 inches	69.3 feet	82.7 feet	Route 44
Acer saccharum	Sugar maple	53.4 inches	77.2 feet	67.2 feet	Route 272
Acer saccharum	Sugar maple	52.9 inches	81.6 feet	64.7 feet	Winchester Rd
Carpinus caroliniana	American hornbeam	8.54 inches			Aton Forest
Cercidiphyllum japonicum	Katsura	61 inches*	60 feet	69 feet	Laurel Way
Fagus grandifolia	American beech	52.5 inches	64 feet	70 feet	Route 272
Fagus grandifolia	American beech	77.2 inches	65.3 feet	77.5 feet	Sunset Ridge
Fagus sylvatica	European beech	51 inches	72 feet	81 feet	Roughland Rd
Fraxinus americana	White ash	40.9 inches	64.7 feet	60.4 feet	Route 272
Juglans nigra	Black walnut	32.5 inches	65.3 feet	55.7 feet	Roughland Rd
Liriodendron tulipifera	Tulip tree, Yellow poplar	54.7 inches	76.5 feet	91.1 feet	Village Green
Malus pumila	Common apple	42 inches	21.1 feet	32 feet	Laurel Way
Picea abies	Norway spruce	37.1 inches	75.9 feet	42.4 feet	Mountain Rd
Picea rubens	Red spruce	38.3 inches	80.5 feet	45.7 feet	Mountain Rd
Pinus strobus	Eastern white pine	69.8 inches	95.7 feet	42 feet	Mountain Rd
Pinus strobus	White pine (natural dwarf)	18 inches**	40 feet	20 feet	Aton Forest
Platanus occidentalis	American sycamore	35.7 inches	60.7 feet	53.8 feet	Mountain Rd
Quercus rubra	Red oak	61.8 inches	40.9 feet	22 feet	Old Goshen Rd
Quercus rubra	Red oak	57.5 inches	75.9 feet	97 feet	Shepard Rd
Robinia pseudoacacia	Black locust	59.7 inches	100.9 feet	57.8 feet	Route 272
Tilia americana	Basswood	22 inches	49 feet	20 feet	Aton Forest
Ulmus americana	American elm	30.9 inches	64.7 feet	64 feet	Winchester Rd

+ diameter at breast height (4.5 feet)
A averaged; others are largest in one direction
* measured at 2 feet
** measured at base

Native Shrubs

See invasives list for other, non-native shrubs

Species	Common Name	Comments*
Alnus incana var. *rugosa*	Speckled alder	*(Alnus rugosa)*
Andromeda polifolia	Bog-rosemary	Connecticut threatened *(Andromeda glaucophylla)*
Aronia arbutifolia	Red chokeberry	*Photinia pyrifolia (Pyrus arbutifolia)*
Aronia melanocarpa	Black chokeberry	*Photinia melanocarpa (Pyrus melanocarpa)*
Cephalanthus occidentalis	Buttonbush	
Chamaedaphne calyculata	Leatherleaf	*(Cassandra calyculata)*
Comptonia peregrina	Sweetfern	
Cornus alternifolia	Alternate-leaved dogwood	*Svida alternafolia*
Cornus amomum	Silky dogwood	*Svida amomum*
Cornus rugosa	Round-leaved dogwood	
Cornus sericea	Red-osier dogwood	*Svida sericea (Cornus stolonifera)*
Corylus americana	American hazelnut	
Corylus cornuta	Beaked hazelnut	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Native Shrubs

See invasives list for other, non-native shrubs

Species	Common Name	Comments*
Crataegus spp.	Hawthorn	
Dasiphora floribunda	Shrubby cinquefoil	*(Potentilla fruticosa, Pentaphylloides floribunda)*
Decodon verticillata	Swamp loosestrife, Water-willow	
Diervilla lonicera	Bush-honeysuckle	
Gaylussacia baccata	Black huckleberry	
Gaylussacia dumosa var. *bigeloviana*	Dwarf huckleberry	Connecticut threatened
Hamamelis virginiana	Witch-hazel	
Ilex laevigata	Smooth winterberry	
Ilex montana	Mountain winterberry	
Ilex verticillata	Common winterberry, Black alder	
Juniperus communis	Common or Pasture juniper	
Kalmia angustifolia	Sheep laurel	
Kalmia latifolia	Mountain laurel	
Kalmia polifolia	Bog laurel, Swamp or Pale laurel	
Ledum groenlandicum	Labrador-tea	Connecticut threatened
Lindera benzoin	Spicebush	
Lonicera canadensis	Fly honeysuckle	
Lyonia ligustrina	Maleberry	
Myrica gale	Sweet gale	
Nemopanthus mucronata	Mountain-holly	
Rhododendron prinophyllum	Mountain, Fragrant pink or Early azalea	*(Rhododendron roseum)*
Rhododendron viscosum	Swamp, Clammy or Summer white azalea	
Rhus typhina	Staghorn sumac	
Ribes cynosbati	Prickly gooseberry, Dogberry	
Ribes glandulosa	Skunk gooseberry	Conn. species of special concern
Ribes triste	Swamp red currant	Connecticut endangered
Ribes spp.	Currant, Gooseberry	
Rosa caroliniana	Pasture rose	
Rosa palustris	Swamp rose	
Rosa virginiana	Wild rose	
Salix bebbiana	Beaked or Bebb willow	
Salix discolor	Pussy willow	
Salix sericea	Silky willow	
Salix serissima	Autumn willow	Conn. species of special concern
Salix spp.	Willow	
Sambucus nigra ssp. *canadensis*	Common or American black elderberry	*(Sambucus canadensis)*
Sambucus racemosa	Red-berried elder	*(Sambucus pubens)*
Spiraea alba var. *latifolia*	Meadowsweet	*(Spiraea latifolia)*
Spiraea tomentosa	Steeplebush	
Taxus canadensis	American yew	
Toxicodendron vernix	Poison sumac	*(Rhus vernix)*
Vaccinium angustifolium	Lowbush or Late sweet blueberry	
Vaccinium corymbosum	Highbush blueberry	
Vaccinium macrocarpon	Large cranberry	
Vaccinium oxycoccus	Small cranberry	
Viburnum acerifolium	Maple-leaved viburnum	
Viburnum dentatum	Southern arrowwood	
Viburnum lantanoides	Hobblebush	*(Viburnum alnifolium)*
Viburnum lentago	Nannyberry	
Viburnum nudum var. *cassinoides*	Witherod, Northern wild raisin	*(Viburnum cassinoides)*

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Native Woody Vines

See invasives list for other, non-native vines

Species	Common Name	Comments*
Parthenocissus quinquefolia	Virginia creeper, Woodbine	
Toxicodendron radicans	Poison-ivy	*(Rhus radicans, R. toxicodendron)*
Vitis labrusca	Grape	

Wildflowers

See invasives list for other, non-native species

Species	Common Name	Comments*
Achillea millefolium	Yarrow	
Acorus calamus	Sweetflag	
Actaea pachypoda	White baneberry, Doll's eyes	
Actaea rubra	Red baneberry	
Agrimonia spp.	Agrimony	
Alisma triviale	Large water-plantain	
Allium tricoccum	Ramps	
Ambrosia artemisiifolia	Common ragweed	
Amphicarpaea bracteata	Hog-peanut	
Anaphalis margaritacea	Pearly everlasting	
Anemone canadensis	Canada anemone	Connecticut endangered
Anemone quinquefolia	Common cinquefoil	
Anemone virginiana	Thimbleweed, Tall anemone	
Apocynum androsaemifolium	Spreading dogbane	
Aquilegia canadensis	Columbine	
Aralia hispida	Bristly sarsaparilla	
Aralia nudicaulis	Wild sarsaparilla	
Arceuthobium pusillum	Dwarf mistletoe	Connecticut endangered
Arctium minus	Common burdock	non-native
Arethusa bulbosa	Dragon's-mouth	Conn. species of special concern
Arisaema triphyllum	Jack-in-the-pulpit	
Asclepias exaltata	Poke milkweed	
Asclepias incarnata	Swamp milkweed	
Asclepias syriaca	Common milkweed	
Asparagus officinalis	Asparagus	non-native
Aster acuminatus	Whorled white aster	*Oclemena acuminata*
Aster divaricatus	White heart-leaved or wood aster	*Eurybia divaricata*
Aster dumosus	Heart-leaved or bushy aster	*Symphyotrichum dumosum*
Aster ericoides	Heath aster	*Symphyotrichum ericoides*
Aster lanceolatus	Panicled aster	*Symphyotrichum lanceolatum (Aster simplex)*
Aster lateriflorus	Calico aster	*Symphyotrichum lateriflorum*
Aster novae-angliae	New England aster	*Symphyotrichum novae-angliae*
Aster novi-belgii	New York aster	*Symphyotrichum novi-belgii*
Aster puniceus	Purple-stemmed aster	
Aster umbellatus	Flat-topped white aster	*Doellingeria umbellata*
Barbarea vulgaris	Common winter cress	non-native
Bidens connata	Swamp beggar-ticks	
Bidens spp.	Beggar-ticks, bur-marigold, tickseed	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Wildflowers

See invasives list for other, non-native species

Species	Common Name	Comments*
Boehmeria cylindrica	False nettle	
Brasenia schreberi	Water-shield	
Calla palustris	Wild calla, water arum	
Calopogon tuberosus	Grass pink	*(Calopogon pulchellus)*
Caltha palustris	Marsh-marigold	
Calystegia sepium	Hedge bindweed	*(Convolvulus sepium, C. arvensis)*
Campanula rapunculoides	Bellflower	non-native
Capsella bursa-pastoris	Shepherd's purse	non-native
Cardamine diphylla	Toothwort	*(Dentaria diphylla)*
Cardamine impatiens	Narrow-leaf bittercress	non-native
Cardamine pensylvanica	Pennsylvania bittercress	
Cardamine pratensis var. *pratensis*	Cuckoo flower	non-native
Caulophyllum giganteum	Giant blue cohosh	
Caulophyllum thalictroides	Common blue cohosh	
Cerastium fontanum	Mouse-ear chickweed	non-native
Chelone glabra	Turtlehead	
Chenopodium album	Lamb's-quarters	non-native
Chimaphila maculata	Spotted wintergreen	
Chimaphila umbellata	Pipsissewa	
Chrysosplenium americanum	Golden saxifrage	
Cicuta bulbifera	Bulb-bearing water-hemlock	
Cicuta maculata	Spotted water-hemlock	
Circaea alpina ssp. *alpina*	Small enchanter's nightshade	
Circaea lutetiana	Enchanter's nightshade	*(Circaea quadrisulcata)*
Claytonia caroliniana	Carolina spring-beauty	
Clematis virginiana	Virgin's-bower	
Clinopodium vulgare	Wild basil	*(Satureja vulgaris)*
Clintonia borealis	Bluebead-lily	
Convallaria majalis	Lily-of-the-valley	non-native
Coptis groenlandica	Goldthread	
Corallorhiza maculata	Spotted or Large coral root	
Corallorhiza trifida	Early coral root	Conn. species of special concern
Cornus canadensis	Bunchberry, Dwarf cornel	a sub-shrub
Coronilla varia	Crown vetch	non-native
Corydalis sempervirens	Pink corydalis, Rock harlequin	*(Capnoides sempervirens)*
Cypripedium acaule	Pink lady's-slipper, Pink moccasin-flower	
Cypripedium parviflorum	Yellow lady's-slipper	Conn. species of special concern
Daucus carota	Queen Anne's-lace, Wild carrot	non-native
Decodon verticillatus	Swamp loosestrife, Water-willow	
Dianthus deltoides	Maiden pink	non-native
Dicentra canadensis	Squirrel corn	Connecticut threatened
Dicentra cucullaria	Dutchman's breeches	
Drosera intermedia	Spatulate-leaved sundew	
Drosera rotundifolia	Round-leaved sundew	
Duchesnea indica	Indian strawberry	non-native
Epifagus virginiana	Beechdrops	
Epipactis helleborine	Broad-leaved helleborine	non-native
Erigeron annuus	Daisy fleabane	
Erigeron philadelphicus	Common fleabane	
Erigeron pulchellus	Blue fleabane	
Erigeron strigosus	Daisy fleabane	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Wildflowers

See invasives list for other, non-native species

Species	Common Name	Comments*
Erythronium americanum	Trout-lily	
Eupatorium maculatum	Spotted Joe-Pye-weed	
Eupatorium perfoliatum	Boneset	
Eupatorium rugosum	White snakeroot	*Ageratina altissima*
Euthamia graminifolia	Grass-leaved goldenrod	*(Solidago graminifolia)*
Fragaria virginiana	Wild strawberry	
Galearis spectabilis	Showy orchis	*(Orchis spectabilis)*
Galium mollugo	Wild madder, White bedstraw	non-native
Galium trifidum	Small bedstraw	
Galium triflorum	Sweet-scented bedstraw	
Galium verum	Yellow bedstraw	non-native
Gaultheria hispidula	Creeping snowberry	a sub-shrub, Connecticut threatened
Gaultheria procumbens	Winterberry, Teaberry	a sub-shrub
Gentiana clausa	Closed or Bottle gentian	
Gentianopsis crinita	Greater fringed gentian	*(Gentiana crinita)*
Geranium maculatum	Wild geranium	
Geranium robertianum	Herb-Robert	
Geum aleppicum	Yellow avens	
Geum canadense	White avens	
Geum rivale	Purple or water avens	
Geum urbanum	Herb-Bennet	non-native, invasive
Goodyera pubescens	Downy rattlesnake plantain	
Helianthus decapetalus	Forest sunflower	
Helianthus tuberosus	Jerusalem artichoke	
Hemerocallis fulva	Orange day-lily	non-native
Hepatica nobilis var. *acuta*	Sharp-lobed hepatica, Liverleaf	Connecticut species of special concern, *(Hepatica acutiloba, Anemone acutiloba)*
Hepatica nobilis var. *obtusa*	Round-lobed hepatica, Liverleaf	*(Hepatica americana, Anemone americana)*
Hieracium aurantiacum	Orange hawkweed, Devil's paintbrush	non-native, *(Pilosella aurantiaca)*
Hieracium caespitosum	Yellow hawkweed	non-native, *(Hieracium pratense, Pilosella caespitosum)*
Hieracium canadense	Canada hawkweed	
Houstonia caerulea	Bluets	
Hydrocotyle americana	Water pennywort	
Hypericum canadense	Canada St. Johnswort	
Hypericum ellipticum	Pale St. Johnswort	
Hypericum mutilum	Dwarf St. Johnswort	
Hypericum perforatum	Common St. Johnswort	non-native
Hypericum punctatum	Spotted St. Johnswort	
Impatiens capensis	Jewelweed, Spotted touch-me-not	
Impatiens pallida	Pale jewelweed	
Iris versicolor	Larger blue flag	
Lactuca canadensis	Tall wild lettuce	
Laportea canadensis	Wood-nettle	
Leucanthemum vulgare	Ox-eye daisy	non-native *(Chrysanthemum leucanthemum)*
Lilium canadense	Canada lily	
Lilium philadelphicum	Wood lily	
Linnaea borealis var. *americana*	Twinflower	Connecticut endangered
Lindernia dubia var. *dubia*	False pimpernel	
Lobelia cardinalis	Cardinal flower	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Wildflowers

See invasives list for other, non-native species

Species	Common Name	Comments*
Lobelia inflata	Indian-tobacco	
Lobelia spicata var. *spicata*	Spiked or Palespike lobelia	
Lotus corniculatus	Birdfoot trefoil	non-native
Ludwigia palustris	Water purslane, Marsh seedbox	
Lycopus uniflorus	Northern bugleweed	
Lycopus virginicus	Water horehound, Bugleweed	
Lysimachia ciliata	Fringed loosestrife	
Lysimachia quadrifolia	Whorled loosestrife	
Lysimachia terrestris	Swamp-candles	
Maianthemum canadense	Canada mayflower	
Maianthemum racemosum	Large false Solomon's-seal	*(Smilacina racemosa)*
Maianthemum trifolium	Three-leaved false Solomon's-seal	Connecticut threatened, *(Smilacina trifolia)*
Malva moschata	Musk-mallow	non-native
Matricaria discoidea	Pineapple-weed	non-native
Medeola virginiana	Indian cucumber-root	
Medicago lupulina	Black medick	non-native
Melampyrum lineare	Cow-wheat	
Melilotus officinalis	White sweet clover	non-native *(Melilotus albus)*
Mentha arvensis	Wild mint	
Menyanthes trifoliata	Buckbean, Bogbean	
Mimulus ringens	Square-stemmed monkey flower	
Mitchella repens	Partridge-berry	
Mitella diphylla	Miterwort	
Mitella nuda	Naked miterwort	Connecticut species of special concern
Monarda fistulosa	Wild bergamot	
Moneses uniflora	One-flowered wintergreen	Connecticut endangered
Monotropa uniflora	Indian pipe	
Nuphar lutea ssp. *variegata*	Yellow pond-lily, Spatter-dock, Bullhead-lily, Water-lily	*(Nuphar variegata)*
Nymphaea odorata	Fragrant white water-lily, Pond-lily	
Oenothera biennis	Common evening-primrose	*(Oenothera perennis)*
Oenothera fruticosa	Sundrops	Connecticut species of special concern
Osmorhiza claytonii	Sweet Cicely	
Osmorhiza longistylis	Anise-root	
Oxalis montana	White wood-sorrel	*(Oxalis acetosella)*
Oxalis stricta	Showy yellow wood-sorrel	
Packera aurea	Golden ragwort	*(Senecio aureus)*
Panax trifolius	Dwarf ginseng	
Parnassia glauca	Grass-of-Parnassus	
Pilea pumila	Dwarf clearweed	
Plantago lanceolata	English plantain, Narrow-leaved plantain	non-native
Plantago major	Plantain, Broad-leaved plantain	non-native
Platanthera blephariglottis	White fringed orchid	Connecticut endangered
Platanthera clavellata	Small green woodland orchid	*(Habenaria clavellata)*
Platanthera dilatata	Tall white bog orchid	Connecticut species of special concern, believed extirpated
Platanthera grandiflora	Large purple fringed orchid	
Platanthera hookeri	Hooker orchid	Connecticut species of special concern, believed extirpated
Platanthera orbiculata	Large roundleaf orchid	Connecticut species of special concern, believed extirpated

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Wildflowers

See invasives list for other, non-native species

Species	Common Name	Comments*
Podophyllum peltatum	Mayapple	
Pogonia ophioglossoides	Rose pogonia, Snakemouth orchid	
Polygonatum biflorum	Smooth or Great Solomon's-seal	
Polygonatum pubescens	Northern Solomon's-seal	
Polygonum arifolium	Halberd-leaved tearthumb	
Polygonum cilinode	Fringed black bindweed	
Polygonum persicaria	Spotted lady's-thumb	*(Persicaria maculosa)*
Polygonum sagittatum	Arrow-leaved tearthumb	*(Persicaria sagittata)*
Polygonum scandens	Climbing false buckwheat	
Pontederia cordata	Pickerelweed	
Potentilla canadensis	Early cinquefoil	
Potentilla recta	Sulphur-flowered cinquefoil	
Potentilla simplex	Common cinquefoil	
Prenanthes altissima	Tall white letuce, Rattlesnake-root	
Proserpinaca palustris	Mermaid-weed	
Prunella vulgaris	Self-heal	non-native
Pyrola americana	Round-leaved pyrola	*(Pyrola rotundifolia)*
Pyrola elliptica	Shinleaf	
Ranunculus abortivus	Small-flowered crowfoot	
Ranunculus acris	Tall buttercup	non-native
Ranunculus hispidus var. *caricetorum*	Northern swamp-buttercup	*(Ranunculus septentrionalis)*
Ranunculus recurvatus	Hooked buttercup	
Rubus allegheniensis	Common blackberry	
Rubus canadensis	Smooth blackberry	
Rubus flagellaris	Northern dewberry	
Rubus hispidus	Bristly dewberry	
Rubus idaeus	Red raspberry	non-native
Rubus occidentalis	Black raspberry	
Rubus odoratus	Flowering raspberry	
Rubus pubescens	Dwarf raspberry	
Rudbeckia hirta	Black-eyed Susan	non-native
Rudbeckia lanciniata	Green-headed coneflower	
Rumex crispus	Curly dock	non-native
Rumex obtusifolius	Bitter dock	non-native
Sagittaria latifolia	Broadleaf arrowhead	
Sanguinaria canadensis	Bloodroot	
Sanicula marilandica	Black snakeroot	
Sarracenia purpurea	Northern pitcher-plant	
Saxifraga pensylvanica	Swamp saxifrage	
Saxifraga virginiensis	Early saxifrage	
Scutellaria galericulata	Common or Marsh skullcap	*(Scutellaria epilobiifolia)*
Silene vulgaris	Bladder campion	non-native, *(Silene cucubalus)*
Sisyrinchium angustifolium	Stout or Narrowleaf blue-eyed grass	
Sisyrinchium montanum	Mountain or Strict blue-eyed grass	*(Sisyrinchium angustifolium)*
Sium suave	Water-parsnip	
Smilax herbacea	Carrion flower	
Solidago bicolor	Silverrod	
Solidago caesia	Blue-stemmed or Wreath goldenrod	
Solidago canadensis	Common, Canada or Tall goldenrod	*(Solidago altissima)*
Solidago flexicaulis	Zigzag goldenrod	
Solidago gigantea	Giant goldenrod	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Wildflowers

See invasives list for other, non-native species

Species	Common Name	Comments*
Solidago gigantea	Giant goldenrod	
Solidago juncea	Early goldenrod	
Solidago nemoralis var. *nemoralis*	Gray goldenrod	
Solidago odora	Anise-scented or Sweet goldernrod	
Solidago patula	Rough-leaved goldenrod	
Solidago rugosa	Wrinkle-leaved goldenrod	
Solidago squarrosa	Rough-stemmed goldenrod	
Sparganium americanum	Bur-reed	
Sparganium fluctuans	Floating bur-reed	Connecticut endangered
Spiranthes cernua	Nodding ladies'-tresses	
Spiranthes lacera	Slender ladies'-tresses	*(Spiranthes gracilis)*
Stellaria graminea	Common stitchwort	
Streptopus roseus	Rose mandarin	
Symplocarpus foetidus	Skunk cabbage	
Taraxacum officinale	Common dandelion	non-native
Thalictrum pubescens	Tall meadow-rue	*(Thalictrum polygonum)*
Tiarella cordifolia	Foamflower	
Tragopogon pratensis	Showy goat's beard	non-native
Triadenum virginicum	Marsh St. Johnswort	*(Hypericum virginicum)*
Trientalis borealis	Star flower	
Trifolium arvense	Rabbit-foot clover	non-native
Trifolium aureum	Yellow clover	non-native
Trifolium pratense	Red clover	non-native
Trifolium repens	White clover	non-native
Trillium erectum	Red trillium	
Trillium undulatum	Painted trillium	
Typha latifolia	Common cattail	
Urtica dioica ssp. *dioica*	Stinging nettle	non-native
Urtica dioica ssp. *gracilis*	Slender nettle	non-native
Utricularia cornuta	Horned bladderwort	*(Stomoisia cornuta)*
Utricularia geminiscapa	Twinscape bladderwort	*(Utricularia clandestina)*
Utricularia gibba	Humped bladderwort	*(Utricularia biflora)*
Uvularia sessilifolia	Wild oats	
Veratrum viride	False hellebore	
Verbascum thapsus	Common mullein	non-native
Verbena hastata	Blue vervain, Swamp verbena	
Veronica officinalis	Common speedwell	non-native
Veronica serphyllifolia	Thyme-leaved speedwell	non-native
Vicia cracca	Common or Cow vetch	non-native
Vinca minor	Periwinkle	non-native
Viola blanda	Sweet white violet	
Viola canadensis	Canada violet	Connecticut species of special concern
Viola conspersa	Dog violet	
Viola cucullata	Marsh blue violet	
Viola labradorica	Greenland violet	
Viola macloskeyi ssp. *pallens*	Northern white violet	*(Viola pallens)*
Viola pubescens	Downy yellow violet	
Viola rotundifolia	Round-leaved violet	
Viola sororia	Woolly or Common blue violet	
Xyris montana	Northern yellow-eyed grass	Connecticut threatened
Zizia aurea	Golden Alexanders	

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Ferns

Species	Common Name	Comments*
Adiantum pedatum	Northern maidenhair fern	
Athyrium filix-femina	Lady fern	
Botrychium dissectum	Cut-leaved grapefern	
Botrychium matricariifolium	Daisyleaf grapefern	
Dennstaedtia punctilobula	Hay-scented fern	
Deparia acrostichoides	Silvery spleenwort	*(Athyrium thelypteroides, Asplenium acrostichoides)*
Diplazium pycnocarpon	Narrow-leaved glade fern	Connecticut endangered
Dryopteris carthusiana	Spinulose wood fern	*(Dryopteris spinulosa, Dryopteris austriaca* var. *spinulosa)*
Dryopteris clintoniana	Clinton's shield fern	*(Dryopteris cristata* var. *clintoniana)*
Dryopteris cristata	Crested wood fern	*(Aspidium cristata)*
Dryopteris goldiana	Goldie's fern	Connecticut species of special concern
Dryopteris intermedia	Evergreen wood fern	
Dryopteris marginalis	Marginal wood fern	
Gymnocarpium dryopteris	Common oak fern	*(Phegopteris dryopteris, Dyopteris disjuncta)*
Matteuccia struthiopteris	Ostrich fern	
Onoclea sensibilis	Sensitive fern	
Osmunda cinnamomea	Cinnamon fern	
Osmunda claytoniana	Interrupted fern	
Osmunda regalis	Royal fern	
Phegopteris connectilis	Narrow or Long beech fern	*(Thelypteris phegopteris, Dryopteris phegopteris)*
Phegopteris hexagonoptera	Broad beech fern	*(Thelypteris hexagonoptera, Dryopteris hexagonoptera)*
Polypodium appalachianum	Appalachian polypody	*(Polypodium virginianum)*
Polypodium virginianum	Common polypody	
Polystichum acrostichoides	Christmas fern	
Pteridium aquilinum	Bracken	
Thelypteris noveboracensis	New York fern	*(Dryopteris noveboracensis, Aspidium noveboracensis)*
Thelypteris palustris	Marsh fern	*(Dyropteris thelypteris, Aspidium thelypteris)*
Trichomanes intricatum	Weft fern	Connecticut species of special concern

Clubmosses

Species	Common Name	Comments*
Lycopodium annotinum	Bristly clubmoss	*Spinulum annotinum*
Lycopodium clavatum	Running clubmoss	
Lycopodium complanatum	Ground-cedar, Southern running-pine	*Diphasiastrum complanatum*
Lycopodium inundatum	Bog club-moss	*Lycopodiella inundata*
Lycopodium lucidulum	Shining clubmoss	*Huperzia lucidula*
Lycopodium obscurum var. *dendroideum*	Ground-pine, Flat-branched tree clubmoss	*Dendrolycopodium dendroideum*
Lycopodium obscurum var. *isophyllum*	Hickey's tree club-moss	*Dendrolycopodium hickeyi*

* Latin name in ( ) indicates older, synonymous name; name without ( ) indicates a new name, not yet familiar to most; non-native indicates that the plant is not native to the Northeastern habitats found in Norfolk.

Tree Fungi Identified in Norfolk

This list of saprophytic and parasitic fungi identified in Norfolk between 2003 and 2008 is a first, partial survey of fungi that consume trees and affect their structural health. It does not include fungi that affect shoots and leaves, nor does it include lichens or fungi that live in the soil.

Latin Name	Common Name	Trees Affected
Apiosporina morbosa	Black knot	
Armillaria mellea	Shoestring root rot	
Ceratocystis ulmi	Dutch elm disease	American elm
Cerrena unicolor	Canker rot	
Climacodon septentrionalis	Northern tooth	
Cryphonectria parasitica	Chestnut blight	American chestnut
Eutypella parasitica	Eutypella canker	
Fomes fomentarius	Tinder fungus	
Ganoderma applanatum	Artist's conk	
Ganoderma tsugae	Hemlock varnish shelf	Hemlock
Hericium coralloides		
Hydnochaete olivacea		
Hypoxylon deustum	Butt rot	
Inonotus dryadeus		
Inonotus obliquus	Clinker polypore	
Laetiporus sulfureus	Chicken of the woods	
Lentinellus ursinus		
Morganella pyriforme		
Nectria coccinea var. *faginata*	Beech bark disease	Beech
Nectria galligena	Nectria canker	
Omphalotus illudens	Jack o' lantern	
Perenniporia fraxinophila	Ash heart rot	Ash
Phaeolus schweinitzii		
Phellinus pini	Red heart of pine	Pine
Phellinus punctatus		
Phellinus robineae		Locust
Phellinus tremulae	White heartwood rot	
Piptoporus betulinus	Birch polypore	Birch
Polyporus frondosus	Hen of the woods	
Polyporus squamosus	Dryad's saddle	
Schizophyllum commune	Wood decay	
Stereum complicatum	Crowded parchment	
Trametes versicolor	Turkey tail	
Xylobolus frustulatus	Ceramic parchment fungus	

Invasive Non-native Plant Species

Of particular concern in Norfolk

Species	Common Name
Acer platanoides	Norway maple
Aegopodium podagraria	Goutweed
Alliaria petiolata	Garlic mustard
Berberis thunbergii	Japanese barberry
Celastrus orbiculatus	Oriental bittersweet
Euonymus alatus	Winged euonymus
Frangula alnus	Glossy buckthorn
Lonicera japonica, L. morrowii, L. tatarica, L. x bella	Honeysuckles
Lythrum salicaria	Purple loosestrife
Phragmites australis	Common reed
Polygonum cuspidatum	Japanese knotweed
Rosa multiflora	Multiflora rose

Also found invasive in Norfolk

Species	Common Name	Species	Common Name
Acer pseudoplatanus	Sycamore maple	*Lychnis flos-cuculi*	Ragged robin
Akebia quinata	Five-leaved akebia	*Lysimachia nummularia*	Moneywort
Ampelopsis brevipedunculata	Porcelainberry	*Lysimachia vulgaris*	Garden loosestrife
Berberis vulgaris	European barberry	*Myosotis scorpioides*	Forget-me-not
Cardamine impatiens	Narrowleaf bittercress	*Onopordum acanthium*	Scotch thistle
Centaurea biebersteinii	Spotted knapweed	*Ornithogalum umbellatum*	Star-of-Bethlehem
Cirsium arvense	Canada thistle	*Phalaris arundinacea*	Reed canary grass
Cynanchum louiseae	Black swallow-wort	*Poa compressa*	Canada bluegrass
Datura stramonium	Jimsonweed	*Polygonum caespitosum*	Oriental lady's-thumb
Elaeagnus umbellatus	Autumn-olive	*Ranunculus ficaria*	Lesser celandine
Geum urbanum	Herb-Bennet	*Rhamnus cathartica*	Common buckthorn
Glechoma hederacea	Ground-ivy	*Robinia pseudoacacia*	Black locust
Heracleum mantegazzianum	Giant hogweed	*Rosa rugosa*	Rugosa rose
Hesperis matronalis	Dame's rocket	*Rumex acetosella*	Sheep sorrel
Iris pseudacorus	Yellow iris	*Solanum dulcamara*	Bittersweet nightshade
Ligustrum ovalifolium	California privet	*Syringa reticulata*	Japanese lilac
Ligustrum vulgare	European privet	*Tussilago farfara*	Coltsfoot

See page 93, Appendix 3, for aquatic invasives.

Appendix 5: Wildlife

Norfolk Mammals, by group

Species	Common Name	Status
MARSUPIALS		
Didephis marsupialis	Opossum	
INSECTIVORES		
Blarina brevicauda	Northern short-tailed shrew	
Condylura cristata	Star-nosed mole	
Parascalops breweri	Hairy-tailed mole	
Scalopus aquaticus	Eastern mole	
Sorex cinereus cinaereus	Masked shrew	
Sorex dispar dispar	Long-tailed shrew	? R
Sorex fumeus	Smoky shrew	
Sorex palustris albibarbis	Water shrew	
BATS		
Eptesicus fuscus	Big brown bat	
Myotis keeni septemtrionalis	Keen’s myotis	
Myotis leibii leibii	Small-footed myotis	
Myotis lucifugus	Little brown bat	
Pipistrellus subflavus	Eastern pipistrelle	
RABBITS		
Lepus americanus	Snowshoe hare	
Sylvilagus floridanus	Eastern cottontail	
Sylvilagus transitionalis	New England cottontail	
RODENTS		
Castor canadensis	Beaver	
Clethrionomys gapperi	Boreal red-backed vole	
Erethizontidae dorsatum	Porcupine	
Glaucomys sabrinus	Northern flying squirrel	? H R
Glaucomys volans	Southern flying squirrel	
Marmota monax	Woodchuck	
Microtus pennsylvanicus	Meadow vole	
Microtus pinetorum	Wood or Pine vole	
Napaeozapus insignis	Woodland jumping mouse	
Ondatra zibethicus	Muskrat	
Peromyscus leocopus	White-footed mouse	
Peromyscus maniculatus	Deer mouse	
Rattus norvegicus	Norway rat	
Sciurus carolinensis	Gray squirrel	
Tamias striatus	Eastern chipmunk	
Tamiascirius hudsonicus	Red squirrel	
Zapus hudsonius	Meadow jumping mouse	

? - Possibly   H - Historically from Norfolk   R - Reported nearby in Massachusetts

Norfolk Mammals, by group

Species	Common Name	Status
CARNIVORES		
Canis latrans	Eastern coyote	
Lutra canandensis	Otter, river	
Lynx rufus	Bobcat	
Martes pennanti	Fisher	
Mephitis mephitis	Striped skunk	
Mustela erminea	Short-tailed weasel	
Mustela frenata	Long-tailed weasel	
Mustela vison	Mink	
Procyon lotor	Raccoon	
Urocyon cinereoargenteus	Gray fox	
Ursus americanus	Black bear	
Vulpes fulva	Red fox	
DEER		
Alces alces	Moose	
Odocoileus virginianus	White-tail deer	

Other species that might occur, but are rare or are known from the historical record:

Species	Common Name	Status
Canis lupus	Gray or Eastern timber wolf	***+^
Puma concolor ssp. *couguar*	Eastern mountain lion or Cougar	***+^
Lasionycteris noctivagans	Silver-haired bat	***
Lasiurus borealis	Red bat	***
Lasiurus cinereus	Hoary bat	***
Lynx canadensis	Lynx	+
Myotis leibii leibii	Eastern small-footed bat	***^
Myotis sodalis	Indiana bat	*+
Neotoma magister	Alleghany woodrat	***^
Synaptomys cooperi	Southern bog lemming	***+

*State-listed endangered species
**State-listed threatened species
***State-listed species of special concern

+Federal endangered or threatened species
^ Extirpated from Connecticut

Norfolk Amphibians and Reptiles

Species	Common Name	Status
AMPHIBIANS		
Ambystoma jeffersonianum	Jefferson salamander	
Ambystoma j. complex	Jefferson complex	***
Ambystoma laterale	Blue-spotted salamander	
Ambystoma l. complex	Blue-spotted complex	**
Ambystoma maculatum	Spotted salamander	
Bufo americanus	American toad	
Desmognathus fuscus	Northern Dusky salamander	
Eurycea bislineata	Two-lined salamander	**
Gyrinophilus porphyriticus	Northern Spring salamander	
Hemidactylium scutatum	Four-toed salamander	
Hyla versicolor	Gray treefrog	
Notophthalmus viridescens	Red-spotted newt, Red eft	
Plethodon cinereus	Redbacked salamander	
Plethodon cinereus ethryistic	Ethryistic red-backed salamander	
Pseudacris crucifer	Northern spring peeper	
Rana catesbeiana	Bullfrog	
Rana clamitans melanota	Green frog	
Rana palustris	Pickerel frog	
Rana pipiens	Northern Leopard frog	***
Rana sylvatica	Wood frog	
REPTILES		
Agkistrondon contortrix	Northern copperhead	
Chelydra serpentine	Common snapping turtle	
Chrysemys picta	Painted turtle	
Clemmys guttata	Spotted turtle	***
Clemmys insculpta	Wood turtle	*
Coluber constrictor	Northern black racer	
Crotalus horridus	Timber rattlesnake	***
Diadolphis punctatus edwardsii	Northern ringneck snake	
Heterodon platirhinos	Eastern hognose snake	
Lampropeltis triangulum	Eastern milk snake	
Liochlorophis vernalis	Smooth green snake	
Nerodia sipedon	Northern water snake	
Sterotheru odoratus	Common musk turtle	
Storeria dekayi	Northern brown snake	***
Storeria occipitomaculata	Northern redbelly snake	
Terrapene carolina	Eastern box turtle	
Thamnophis sauritus	Eastern ribbon snake	
Thamnophis sirtalis	Eastern garter snake	*

*State-listed endangered species
**State-listed threatened species
***State-listed species of special concern
+Federal endangered or threatened species
^ Extirpated from Connecticut

Birds of Norfolk

Species	Common Name	Season observed: Spring	Summer	Fall	Winter
Gavia immer	Common loon*	x	x	x	
Phalacrocorax auritus	Double-crested cormorant		x		
Botaurus lentiginosus	American bittern**	x	x		
Ardea herodias	Great blue heron*		x		
Butorides virescens	Green heron*		x		
Branta canadensis	Canada goose*	x	x	x	
Aix sponsa	Wood duck*	x	x	x	
Anas rubripes	American black duck*		x		
Anas platyrhynchos	Mallard duck*	x	x	x	
Aythya collaris	Ring-necked duck	x			
Anas discors	Blue-winged teal#**	x	x		
Lophodytes cucullatus	Hooded merganser*	x	x		
Mergus merganser	Common merganser*	x	x		
Oxyura jamaicensis	Ruddy duck	x			
Coragyps atratus	Black vulture#		x		
Cathartes aura	Turkey vulture*	x	x	x	
Pandion haliaetus	Osprey	x	x		
Haliaeetus leucophalus	Bald eagle	x	x	x	x
Aquila chrysaetos	Golden eagle#				x
Accipiter gentilis	Northern goshawk*#		x	x	x
Circus cyaneus	Northern harrier	x		x	x
Accipiter striatus	Sharp-shinned hawk**	x	x	x	
Accipiter cooperii	Cooper's hawk*	x	x	x	
Buteo lineatus	Red-shouldered hawk*	x	x		
Buteo platypterus	Broad-Winged hawk*	x	x	x	
Buteo jamaicensis	Red-tailed hawk*	x	x	x	x
Buteo lagopus	Rough-legged hawk#		x		
Falco sparverius	American kestrel*	x	x	x	
Falco columbarius	Merlin	x		x	
Phasianus colchicus	Ring-necked pheasant	x	x	x	x
Bonasa umbellus	Ruffed grouse*	x	x	x	x
Meleagris gallopavo	Wild turkey*	x	x	x	x
Rallus limicola	Virginia rail**		x		
Grus canadensis	Sandhill crane#	x		x	
Charadrius vociferus	Killdeer*	x	x		
Actitis macularia	Spotted sandpiper*	x	x		
Calidris minutilla	Least sandpiper			x	
Gallinago gallinago	Common snipe	x			
Scolopax minor	American woodcock*	x	x	x	
Larus argentatus	Herring gull				x
Columba livia	Rock dove*	x	x	x	x
Zenaida macroura	Mourning dove*	x	x	x	x
Coccyzus erythropthalmus	Black-billed cuckoo**	x	x		
Coccyzus americanus	Yellow-billed cuckoo**	x	x		
Otus asio	Eastern screech owl	x			

*confirmed breeder; ** probable breeder; # uncommon/rare

Spring = March to May, Summer = June to August, Fall = September to November, Winter = December to February

Birds of Norfolk

Species	Common Name	Season observed Spring	Summer	Fall	Winter
Bubo virginianus	Great horned owl*	x	x	x	x
Strix varia	Barred owl*	x	x	x	x
Aegolius acadicus	Northern saw-whet owl**	x	x	x	x
Tyto alba	Barn owl#	x	x		
Nyctea scandiaca	Snowy owl#				x
Asio otus	Long-eared owl#				x
Caprimulgus vociferus	Whippoorwill#	x			
Chordeiles minor	Common nighthawk		x		
Chaetura pelagica	Chimney swift*	x	x		
Archilochus colubris	Ruby-throated hummingbird*	x	x	x	
Ceryle alcyon	Belted kingfisher*	x	x		
Melanerpes carolinus	Red-bellied woodpecker	x	x		x
Sphyrapicus varius	Yellow-bellied sapsucker*	x	x	x	x
Picoides pubescens	Downy woodpecker*	x	x	x	x
Picoides villosus	Hairy woodpecker*	x	x	x	x
Colaptes auratus	Northern flicker*	x	x	x	
Dryocopus pileatus	Pileated woodpecker*	x	x	x	x
Myiarchus crinitus	Great crested flycatcher*	x	x	x	
Cantopus cooperi	Olive-sided flycatcher#*		x		
Contopus virens	Eastern wood-pewee*	x	x	x	
Empidonax virescens	Acadian flycatcher#*		x		
Empidonax alnorum	Alder flycatcher#**		x		
Empidonax traillii	Willow flycatcher#**	x	x		
Empidonax minimus	Least flycatcher*	x	x		
Sayornis phoebe	Eastern phoebe*	x	x	x	
Tyrannus tyrannus	Eastern kingbird*	x	x		
Empidonax fluviventris	Yellow-bellied flycatcher		x		
Tachycineta bicolor	Tree swallow*	x	x	x	
Stelgidopteryx serripennis	Northern rough-winged swallow**		x		
Riparia riparia	Bank swallow*		x		
Petrochelidon pyrrhonota	Cliff swallow		x		
Hirundo rustica	Barn swallow*	x	x	x	
Progne subis	Purple martin#	x			
Cyanocitta cristata	Blue jay*	x	x	x	x
Corvus brachyrhynchos	American crow*	x	x	x	x
Corvus corax	Common raven*	x	x	x	x
Poecile atricapilla	Black-capped chickadee*	x	x	x	x
Baeolophus bicolor	Tufted titmouse*	x	x	x	x
Sitta canadensis	Red-breasted nuthatch*		x	x	x
Sitta carolinensis	White-breasted nuthatch*	x	x	x	x
Certhia americana	Brown creeper*	x	x	x	
Thyrothorus ludovicianus	Carolina wren			x	x
Troglodytes aedon	House wren*	x	x		
Troglodytes troglodytes	Winter wren*	x	x		

*confirmed breeder; ** probable breeder; # uncommon/rare

Spring = March to May, Summer = June to August, Fall = September to November, Winter = December to February

Birds of Norfolk

Species	Common Name	Season observed Spring	Summer	Fall	Winter
Regulus satrapa	Golden-crowned kinglet				x
Regulus calendula	Ruby-crowned kinglet	x		x	x
Polioptila caerulea	Blue-gray gnatcatcher**	x	x		
Sialia sialis	Eastern bluebird*	x	x	x	x
Catharus fuscescens	Veery*	x	x	x	
Catharus guttatus	Hermit thrush*	x	x	x	x
Hylocichla mustelina	Wood thrush*	x	x	x	
Turdus migratorius	American robin*	x	x	x	x
Catharus ustulatus	Swainson's thrush#			x	
Dumetella carolinensis	Gray catbird*	x	x	x	
Mimus polyglottos	Northern mockingbird#*	x	x	x	x
Toxostoma rufum	Brown thrasher#**		x		
Bombycilla cedrorum	Cedar waxwing*	x	x	x	x
Lanius excubitor	Northern shrike#				x
Sturnus vulgaris	European starling*	x	x	x	x
Vireo griseus	White-eyed vireo		x		
Vireo solitarius	Blue-headed vireo*	x	x	x	
Vireo flavifrons	Yellow-throated vireo*		x	x	
Vireo gilvus	Warbling vireo*	x	x	x	
Vireo olivaceus	Red-eyed vireo*	x	x	x	
Vermivora pinus	Blue-winged warbler*	x	x		
Vermivora chrysoptera	Golden-winged warbler**	x	x		
Vermivora leucobronchialis	Brewster's warbler *	x	x		
Vermivora ruficapilla	Nashville warbler*	x	x		
Parula americana	Northern parula**	x	x		
Dendroica petechia	Yellow warbler*	x	x		
Dendroica pensylvanica	Chestnut-sided warbler*	x	x		
Dendroica magnolia	Magnolia warbler*	x	x		
Dendroica caerulescens	Black-throated blue warbler*	x	x		
Dendroica coronata	Yellow-rumped warbler*	x	x		
Dendroica virens	Black-throated green warbler*	x	x		
Dendroica fusca	Blackburnian warbler*	x	x		
Dendroica pinus	Pine warbler*	x	x	x	
Dendroica discolor	Prairie warbler	x	x		
Dendroica palmarum	Palm warbler	x			
Dendroica castanea	Bay-breasted warbler	x			
Mniotilta varia	Black-and-white warbler*	x	x		
Dendroica striata	Blackpoll warbler#	x		x	
Setophaga ruticilla	American redstart*	x	x		
Helmitheros vermivora	Worm-eating warbler**	x	x		
Seiurus aurocapillus	Ovenbird*	x	x		
Seiurus novaboracensis	Northern waterthrush*	x	x		
Seiurus motacilla	Louisiana waterthrush*	x	x		
Oporornis formosus	Kentucky warbler#		x		
Geothlypis trichas	Common yellowthroat*	x	x		

*confirmed breeder; ** probable breeder; # uncommon/rare

Spring = March to May, Summer = June to August, Fall = September to November, Winter = December to February

Birds of Norfolk

Species	Common Name	Spring	Season observed Summer	Fall	Winter
Wilsonia citrina	Hooded warbler#		x		
Wilsonia canadensis	Canada warbler*	x	x		
Piranga olivacea	Scarlet tanager*	x	x	x	
Cardinalis cardinalis	Northern cardinal*	x	x	x	x
Pheucticus ludovicianus	Rose-breasted grosbeak*	x	x		
Passerina cyanea	Indigo bunting*	x	x		
Pipilo erythrophthalmus	Eastern towhee*	x	x		
Spizella passerina	Chipping sparrow*	x	x	x	x
Spizella pusilla	Field sparrow	x	x	x	
Passerculus sandwichensis	Savannah sparrow**		x		x
Melospiza melodia	Song sparrow*	x	x	x	
Melospiza georgiana	Swamp sparrow*	x	x	x	x
Zonotrichia albicollis	White-throated sparrow*	x	x	x	
Junco hyemalis	Dark-eyed junco*	x	x	x	x
Plectrophenax nivalis	Snow bunting#				x
Zonotrichia leucophrys	White-crowned sparrow	x		x	
Spizella arborea	American tree sparrow	x		x	x
Passerella iliaca	Fox sparrow	x		x	x
Dolichonyx oryzivorus	Bobolink*	x	x		
Agelaius phoeniceus	Red-winged blackbird*	x	x	x	x
Sturnella magna	Eastern meadowlark*#	x	x		
Euphagus carolinus	Rusty blackbird	x			
Quiscalus quiscula	Common grackle*	x	x	x	x
Molothrus ater	Brown-headed cowbird*	x	x	x	
Icterus galbula	Baltimore oriole*	x	x	x	
Carpodacus purpureus	Purple finch*	x	x	x	x
Carpodacus mexicanus	House finch*	x	x	x	x
Pinicola enucleator	Pine grosbeak#				x
Carduelis flammea	Common redpoll#				x
Carduelis hornemanni	Hoary redpoll#				x
Carduelis pinus	Pine siskin*	x	x	x	x
Carduelis tristis	American goldfinch*	x	x	x	x
Coccothraustes vespertinus	Evening grosbeak#				x
Passer domesticus	House sparrow*	x	x	x	x
Loxia curvirostra	Red crossbill#				x
Loxia leucoptera	White-winged crossbill#				x

*confirmed breeder; ** probable breeder; # uncommon/rare
Spring = March to May, Summer = June to August, Fall = September to November, Winter = December to February

Norfolk Butterflies

Species	Common Name	Species	Common Name
Amblyscirtes hegon	Pepper and salt skipper	*Nymphalis vau-album*	Compton tortoiseshell
Ancyloxypha numitor	Least skipper	*Papilio glaucus*	Eastern tiger swallowtail
Anatrytone logan	Delaware skipper	*Papilio polyxenes*	Black swallowtail
Battus philenor	Pipevine swallowtail	*Papilio troilus*	Spicebush swallowtail
Boloria bellona	Meadow fritillary	*Phyciodes tharos*	Pearl crescent
Boloria selene	Silver-Bordered fritillary	*Pieris rapae*	Cabbage white
Carterocephalus palaemon	Arctic skipper***	*Pieris virginiensis*	West Virginia white
Celastrina ladon	Spring azure	*Poanes hobomok*	Hobomok skipper
Cercyonis pegala	Common wood nymph	*Poanes massasoit*	Mulberry wing
Coenonympha tullia	Common ringlet	*Poanes viator*	Broad-Winged skipper
Colias eurytheme	Orange sulphur	*Polites mystic*	Long dash
Colias philodice	Clouded sulphur	*Polites origenes*	Crossline skipper
Danaus plexippus	Monarch	*Polites peckius*	Peck's skipper
Enodia antheodon	Northern pearly eye	*Polites themistocles*	Tawny-Edged skipper
Epargyreus clarus	Silver-spotted skipper	*Polygonia interrogationis*	Question mark
Euphydryas phaeton	Baltimore checkerspot	*Pompeius verna*	Little glassy wing
Euphyes bimacula	Two-Spotted skipper	*Satyrium liparops*	Striped hairstreak
Euphyes vestris	Dun skipper	*Satyrium titus*	Coral hairstreak
Everes comyntas	Eastern tailed blue	*Satyrodes appalachia*	Appalachian brown
Feniseca tarquinius	Harvester	*Satyrodes eurydice*	Eyed brown*
Incisalia niphon	Eastern pine elfin	*Speyeria aphrodite*	Aphrodite fritillary
Limenitis archippus	Viceroy	*Speyeria atlantis*	Atlantis fritillary
Limenitis arthemis	Red-Spotted purple/ White admiral	*Speyeria cybele*	Great spangled fritillary
		Thymelicus lineola	European skipper
Lycaena phlaeas	American copper	*Vanessa aatalanta*	Red admiral
Megisto cymela	Little wood satyr	*Vanessa virginiensis*	American lady
Nymphalis antiopa	Mourning cloak	*Wallengrenia egeremet*	Northern broken-dash
Nymphalis milberti	Milbert's tortoiseshell		

* Connecticut species of special concern
*** Previously unknown in Connecticut

Appendix 6: Areas of Ecological Importance

What is Biodiversity?

The word "biodiversity" is often used. You may hear people say, "We must preserve biodiversity" or "The biodiversity of this area is poor." But what does that mean?

"Biodiversity" stems from "bio-" (life, living) and "diverse" (differing, distinct). It is used to refer to the overall spectrum of living things and to the diverse living organisms of a specific area. Although some important habitats are naturally sparse, its value is generally measured by the number of different species present within a given area.

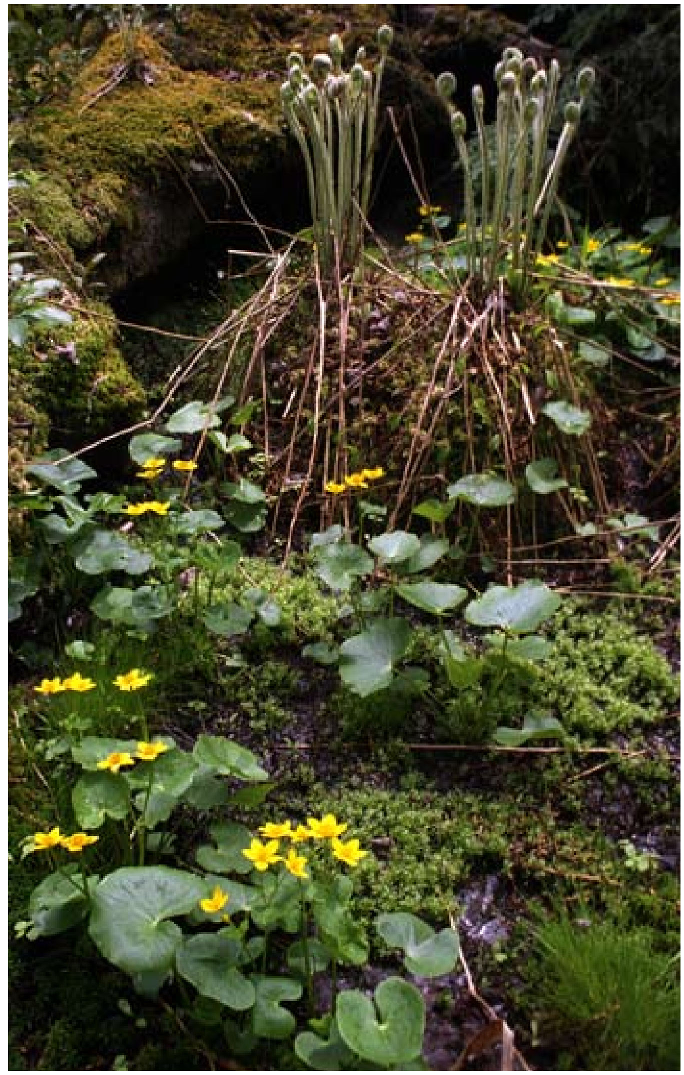
Biodiversity can include the entire range of all living things, from the largest to the smallest microscopic organism. It can refer to the genetic components of these species, or to larger units composed of many species, such as communities or ecosystems. Sometimes only native species are counted towards an area's biodiversity; sometimes all species are included. The full, world wide variation in a single group of organisms, such as birds, may be described and sometimes it is used for the known or estimated species-richness of an area. One could measure the biodiversity of an area as large as the whole earth or smaller than a clump of moss.

Healthy ecosystems—complex groups of living things interacting with their environments—depend on having a multitude of organisms. An ecosystem is more stable and more adaptable to change when it has widely diverse life forms. It can restore itself more easily after a disaster, such as external flood and drought, or internal plagues and diseases. At the genetic level, diversity means not only that there are greater varieties of organisms to fill the niches in the existing environment; it also means that new organisms will fill any niches added as the environment changes. More, more diverse niches will allow more species to survive.

Humans themselves are important parts of the global ecosystem. We are living creatures that depend on the other organisms for food, medicine, energy and shelter as well as for clean air, water and soil, and yet we can have serious impacts on them. As a result of some human activities, ecosystems, species and genetic diversity are being eroded at rates much greater than ever before; species extinction is thought to be many times faster today than it was before people became a factor. This accelerated decline in biodiversity threatens the many benefits we currently derive from the Earth's living resources.

For example, the energy cycle (photosynthesis, the conversion of sunlight into carbohydrates, and respiration, the use of energy), the water cycle (circulation by precipitation, flow and evaporation), the carbon and oxygen cycles (exchanges of carbon and oxygen through living organisms, the earth, water, and atmosphere) and the nitrogen cycle (from atmospheric nitrogen to plant nutrients and back), are all mediated by diverse animals and plants. We need all these living things to sustain our environment. Unfortunately, in many cases we do not understand, or only partly understand, the roles these species play. There also is much we do not even know about and will never know about before we destroy it. We do know this: we cannot survive without our co-inhabitants of this earth.

Norfolk is fortunate to have a rich biodiversity. Its forests, wetlands, fields and rocky hills support many different balanced ecosystems. There are some problems but, with care and attention, we can keep our land and ourselves healthy.



© Bruce Frisch

Swamp tussocks support marsh marigolds (Caltha palustris), moss, ferns and countless other living things.

Appendix 7: Open Space

Land Open for Recreation

This list of land open to the public for recreation does not include very small or isolated parcels. The map of protected open space on page 49 shows the general location of the areas listed below, and a larger map showing all public land is on display at town hall.

State Parks

Campbell Falls State Park: Located in the northwest corner of the town off Route 272. Consists of 65 acres with a hiking trail to the falls.

Dennis Hill State Park: Located south of town on Route 272. Consists of 240 acres, trails, a shelter and views.

Haystack State Park: Located just north of town center on Route 272. Consists of 355 acres and has several hiking trails leading to a stone tower with a 360-degree view.

Connecticut DEP Lands

North Swamp Flood Control Area: Access is behind Botelle School. Consists of 28 acres and provides access to the North Swamp Trail (see below).

Spaulding Brook Flood Control Area: Access is on Westside Road. Consists of 11 acres and offers walking, views over wetlands.

Wood Creek Flood Control Area: Access by the state garage on Route 272 and opposite Haystack State Park on Route 272. Consists of 250 acres and offers hiking and (on one portion) hunting.

Wood Creek Pond: Access from Ashpohtag Road north of Route 272. Its boat ramp allows fishing, canoeing, and kayaking.

Town of Norfolk

Public beach on Tobey Pond leased by town of Norfolk from Great Mountain Forest: Open to residents in summer; fee pays for lifeguards.
Baseball and soccer fields, tennis courts next to Botelle School: On Route 44 east of the Green.

Baseball and soccer field leased by town of Norfolk from the Battell-Stoeckel Estate: On Mountain Road.

Conservation Organizations

Aton Forest: Headquarters on State Line Hill Road. Consists of 1,247 acres that are open by appointment for scientific and educational purposes. For information, call 860-542-5125 or send e-mail to contact@atonforest.org.

Barbour Woods (Norfolk Land Trust): Entrances on Lover's Lane, Shepherd's Road, behind the state garage on Route 272 and across the flood control dam off Route 272. Consists of 205 acres with extensive trail system.

Billings Trail (Norfolk Land Trust): Several sections of this hiking and ski trail follow an old railroad right of way.

The Stoney Lonesome Section goes 1.5 miles from a gate on Ashpohtag Road through several rock cuts to a parking area on Locust Hill Road.

The Mad River Section goes 1.6 miles from the trail head on Grantville Road just west of Smith Pond to Winchester Road just south of Route 272.

North Swamp Trail (Connecticut River Watershed Assn., maintained by Norfolk Land Trust): Located behind Botelle School, beyond the flood control dam. Trail is about 1.5 miles long.

Great Mountain Forest (Forest Legacy easement held by USDA Forest Service): Headquarters on Windrow Road. Consists of 6,041acres with hiking and ski trails, and some ponds that are open for non-motorized boats. See the Forest's Web site at http://www.greatmountainforest.org for regulations or call 860-542-5422.

© Bruce Frisch

A quiet day.

Appendix 8: Scenic Resources

Norfolk Scenic Road Characteristics

Town Roads	Unpaved	Mature trees	Stone walls	20 feet or less wide	Scenic views	Blends into terrain	Water features	Historic significance	Recreational uses	Near open space	Farm or forest	Attractive vegetation	Notable natural features
Ashpohtag Road	no	x	x	part	x	x	x	x	x	x	x	x	x
Bald Mountain Road	no	x	x	most	x	x	x	x	x	x	x	x	x
Barry Hill Road	x	x	x	x	x	x	no	x	x	x	x	x	x
Beckley Road	x	x	x	x	x	x	x	x	x	x	x	x	x
Bruey Road	no	x	x	x	x	x	x	x	x	x	x	x	x
Colebrook Road	no	x	x	no	x	x	x	no	x	x	x	x	no
Doolittle Drive	no	x	x	x	x	x	x	x	x	x	x	x	x
Elmore Road	x	x	x	x	x	x	x	no	x	x	x	x	x
Estey Road	part	x	x	x	x	x	x	x	x	x	x	x	x
Gamefield Road	x	x	x	x	x	x	x	no	x	x	x	x	x
Golf Drive	no	x	no	x	x	x	x	x	x	x	x	x	no
Goshen East Street	no	x	x	part	x	x	x	x	x	x	x	x	x
Grantville Road	no	x	x	part	x	x	x	x	x	x	x	x	x
Green Road	x	x	x	x	no	x	x	x	x	x	x	x	no
Loon Meadow Drive	no	x	x	x	x	x	x	x	x	x	x	x	no
Lovers Lane	x	x	x	x	x	x	x	no	x	x	x	x	x
Meekertown Road	x	x	x	x	x	x	x	x	x	x	x	x	x
Mountain Road	part	x	x	x	x	x	x	x	x	x	x	x	x
North Colebrook Road	no	x	x	x	x	x	x	x	x	x	x	x	no
Old Goshen Road	no	x	x	x	x	x	x	x	x	x	x	x	x
Old Spaulding Road	no	x	x	most	x	x	x	x	x	x	x	x	x
Parker Hill Road	no	x	x	most	x	x	x	no	x	x	x	x	x
Roughland Road	no	x	x	part	x	x	x	no	x	x	x	x	no
Schoolhouse Road	no	x	x	part	x	x	x	x	x	x	x	x	x
Shantry Road	no	x	x	x	x	x	x	x	x	x	x	x	no
Smith Road	no	x	x	no	x	x	x	no	x	x	x	x	x
South Sandisfield Road	x	x	x	x	x	x	x	x	x	x	x	x	x
State Line Hill Road	no	x	x	x	no	x	no	no	x	x	x	x	no
Westside Road	part	x	x	part	x	x	x	x	x	x	x	x	x
Wheeler Road	part	x	x	x	x	x	x	x	x	x	x	x	x
Winchester Road	no	x	x	part	x	x	x	x	x	x	x	x	x
Windrow Road	part	x	x	part	x	x	x	x	x	x	x	x	no

A road must have at least one of the boldface characteristics to qualify as a scenic road.
Other listed characteristicsmay be taken into account.

Norfolk Scenic Road Characteristics

State Roads	Forests with mature trees	Stone walls	Marshes	Scenic views	Compatible development	Water features	Historic significance (state)	Agricultural land	Attractive vegetation	Notable natural features
Greenroads Road East (Route 44)	x	x	x	x	x	x	x	x	x	no
Greenroads Road West (Route 44)	x	x	x	x	x	x	x	x	x	no
Litchfield Road (Route 272)	x	x	x	x	x	x	x	x	x	no
North Street (Route 272)	x	x	x	x	x	x	x	x	x	x
Sandy Brook Road (Route 183)	x	x	x	x	x	x	x	x	x	x

The state considers all of the above characteristics in approving scenic highway status.

Notes on Norfolk's Roads

Ashpohtag Road
History: Shepard & Adams tannery foundations and water supply dam, one-room schoolhouse, West Norfolk railroad station, North Norfolk green
Geology: Boulders, deep ravine with creek
Open space: Wood Creek Pond, entrance to Norfolk Land Trust trail through Stoney Lonesome
View: Fields, Haystack Mountain

Bald Mountain Road
History: Little Red Schoolhouse, land grant to Yale University (Yale Farm)
View: Forest, water and farm fields, Haystack Mountain

Barry Hill Road
History: Old farmhouse foundations, one (Mills) with hand built stone-lined well
View: Mostly forested

Beckley Road
History: Plane crash site, exploration pits for possible iron mines
Geology: Boulders
Open space: The Nature Conservancy borders both sides
View: Mostly forested, brief view of Beckley Bog Pond

Bruey Road
History: Bruey farmhouse
View: Open views, swamp and pond, winter views to Grant Hill and Dennis Hill, panoramic view south to Turkey Cobble and Riggs Hill

Doolittle Drive
History: Pond Town Cemetery, Great Pond (Doolittle Lake), original (1758) proposed site for iron works, historic farm foundations
Geology: Huge glacial erratic boulder near North Colebrook Road
View: North-central ridge, farm fields, orchard, stone walls

Elmore Road
Geology: Large boulders
View: Woods, nice swamp view

Estey Road
History: One-room schoolhouse, historic farmhouse (Deacon Minor)
Geology: Leads to Tipping Rock (in Goshen) Unpaved for .2 mile from south end.

Gamefield Road
View: Brook, views of Tobey Pond, hemlocks

Golf Drive
History: Norfolk Downs, one of the first golf courses in the state
Geology: Sheep Rock
Recreation: Leads to golf, curling, Tobey Pond beach

Goshen East Street
History: One of the two oldest structures in Norfolk, many foundations of early nineteenth century community
View: Arcadia Farm and Hoover Pond

Grantville Road
History: Old farmhouses, Grantville railroad section
Open space: Norfolk Land Trust rail trail, Nature Conservancy land
View: Dennis Hill State Park, Smith Pond, Maple View farm, Kelly swamp, attractive houses

Green Road
History: Old foundations
View: Heavily wooded, no houses

Loon Meadow Drive
History: First known recorded road into Norfolk
View: Open fields, Loon Brook wetlands

Lovers Lane
View: Swamp and field near town, otherwise wooded

Meekertown Road
History: Old tannery foundation (Waterbury Leather), community foundations
Geology: Town House boulder visible from road, boulders and rock outcroppings
Open space: Adjoins Great Mountain Forest; road does not go all the way through

Mountain Road
History: 1897 public water supply system, historic farmhouse, shanty town, cheese box mill, Battell Stoeckel estate, old split-rail fence
Geology: Large boulders
View: Swamp and fields, Haystack and Dutton Mountains
Recreation: Playing field

North Colebrook Road
History: One-room schoolhouse foundation, old farm foundations, flume and mill remnants, Egler home and museum

Old Goshen Road
History: Foundation and dam (Waterbury Leather), early farmhouses, Torrington House
View: Stone walls, fields, pine woods

Old Spaulding Road
History: Old farm foundations
Geology: Cliff and boulders
Open space: Campbell Falls state park
View: Fields, woods

Parker Hill Road
View: Woods

Roughland Road
View: Woods, old houses

Schoolhouse Road
History: Grant homestead, Grantville railroad station, one-room schoolhouse location, foundation of railroad bridge
View: Mad River

Shantry Road
History: Old farmhouse

Smith Road
View: Wooded hillside, fields

South Sandisfield Road *Town-designated scenic road*
History: Old farm foundations

State Line Hill Road
View: Woods, stream

Westside Road
History: Site of first grist and saw mills, old farm foundations, Pupin estate, one-room schoolhouse, saw mill foundation
View: Outstanding wildflowers, stone walls and farm fields, views to Dutton and Haystack Mountains and Swift Hill

Wheeler Road
History: One-room schoolhouse location, historic site of steam saw mill Open space: Doolittle Club
View: Winter view to north-central ridge

Winchester Road *Town-designated scenic road*
History: Grantville cemetery, old farmhouses
Open space: Norfolk Land Trust rail trail; properties of Connecticut River Watershed, Norfolk Land Trust, Connecticut Conservation Association, Girl Scouts, Connecticut Audubon easement
View: Dennis Hill State Park, panorama south across Broadfield farm field to Parker and Riggs hill, Kelly swamp

Windrow Road
History: One-room schoolhouse, Childs pond (early curling), Tobey pond ice industry, old farmhouses
Open space: Great Mountain Forest

State and Federal Highways

Colebrook Road (Route 182)
History: Registered historic house, one-room schoolhouse, Old Newgate Coon Club, historic foundations

Greenwoods Road East and West (Route 44)
History: Historic district, historic homes, ice industry site, town farm site, Greenwoods Turnpike, old industrial area along Blackberry River (11 dam sites), Iron Heritage Trail, tanner site, site of original settler for town of Norfolk, old farmhouses
View: Pond Hill Pond, Haystack Mountain, Buttermilk Falls

Litchfield Road (Route 272 south) *State-designated scenic highway*
History: Historic District. Many grand old homes, Summit train station (highest in the state), old farmhouses
Open space: Land Trust rail trail, Dennis Hill state park
View: Westside Road valley and forested hills, panoramic view northwest, Swift Hill, winter views southwest to Crissey Ridge

North Street (Route 272 north) *State-designated scenic highway*
History: Catholic church, Methodist church, historic registered homes, old farmhouses, stone quarry site
Open space: Haystack state park, Campbell Falls state park, Norfolk Land Trust rail trail
View: Across dry dam to Beech Hill and Loon Meadow, north-central ridge, Haystack Mountain

Sandy Brook Road (Route 183)
History: Registered historic house, old farmhouses
Open space: Sandy Brook

Appendix 9: Bibliography

Geology and Geography

Bell, Michael, The Face of Connecticut. State Geological and Natural History Survey, Hartford, Conn., 1985.

Hobbs, William, Physiology and Geology of Norfolk. From Theron Crissey, History of Norfolk, Massachusetts Publishing Company, Everett, Mass., 1900, pp. 494-497.

Soils of Norfolk

2002 Connecticut Guidelines for Soil Erosion and Sediment Control. Connecticut DEP, Hartford, Conn., 2002.

Connecticut DEP 2004 Stormwater Quality Manual: http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325704

Connecticut Low Impact Development Inventory: http://clear.uconn.edu/tools/lid/index.htm

Erosion and Sediment Control Guidelines (Maryland): http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/erosionsedimentcontrol

NEMO (Nonpoint Education for Municipal Officials): http://nemo.uconn.edu/index.htm

Small Site Erosion and Sediment Control Guidance (Indiana): http://www.stormwatercenter.net/Model%20Ordinances/esc_small_site_ordinance.htm

Soil Science Society of America, Internet Glossary of Soil Science Terms: https://www.soils.org/publications/soils-glossary

University of Connecticut Cooperative Extension Rain Garden Manual: www.sustainability.uconn.edu/landscape/05-rain_gardens.html

University of New Hampshire Stormwater Center: www.unh.edu/erg/cstev

USDA Natural Resources Conservation Service, Online Connecticut Soil Survey Information: http://www.ct.nrcs.usda.gov/soils.html

Aquatic Resources

Annear, T., et al., Instream Flows for Riverine Resource Stewardship, revised edition. Instream Flow Council, Cheyenne, Wyo., 2004.

Gadwa, S., Preliminary Assessment of Habitat and Historic Resources in North Cheshire, West of Rte. 10 and Recommended Protection Measures, first review edition. Cheshire Land Trust and the Habitat Workgroup of the Watershed Partnership, Cheshire, Conn., 2004.

Jacobs, R., and O'Donnell, E., A Fisheries Guide to Lakes and Ponds of Connecticut, Including the Connecticut River and Its Coves. Connecticut DEP, Hartford, Conn., 2002.

Mitsch, W., and Gosselink, J., Wetlands, third edition. Wiley, New York 2000.

Whitworth, W., Freshwater Fishes of Connecticut, second edition. State Geological and Natural History Survey of Connecticut, DEP Bulletin 114, 1996.

Wilde, C., A Fishery Survey of the Lakes and Ponds of Connecticut. Connecticut State Board of Fish and Game, Hartford, Conn., 1959.

The Norfolk Plantscape

Trees native to Norfolk
Graves, Arthur, Illustrated Guide to Trees and Shrubs. Harper & Row, New York, 1956.

Harlow, William, Trees of the Eastern and Central United States and Canada. Dover, New York, 1957.

Harlow, William, and Harrar, Ellwood, Textbook of Dendrology, third edition. McGraw-Hill, New York, 1950.

Magee, Dennis, and Ahles, Harry, Flora of the Northeast. University of Massachusetts Press, Amherst, Mass., 1999.

Silvics of North America: http://www.na.fs.fed.us/Spfo/pubs/silvics_manual/table_of_contents.htm

Venerable trees
Dreyer, Glenn, Connecticut's Notable Trees. Memoirs of the Connecticut Botanical Society, No. 2, 1998.

Invasives
Brown, J., et al., Roundtable: Aliens among us. Conservation 8(2):14-21, 2007.

Invasive Plant Atlas of New England (IPANE): http://www.nbii-nin.ciesin.columbia.edu/ipane/

Invasive Plant Atlas of New England communication form: http://nbii-nin.ciesin.columbia.edu/ipane/earlydetection/sightings.jsp

New England Wildflower Society invasive plants page: http://www.newenglandwild.org/protect/invasive-plants

Williams, S., and Ward, J., Exotic Seed Dispersal by White-tailed Deer in Connecticut. Natural Areas Journal, 26:383-390, 2006.

Wildlife

Connecticut Comprehensive Wildlife Strategy, 2006: http://www.ct.gov/dep/cwp/view.asp?a=2723&q=329520&depNav_GID=1719

Godin, Alfred, Wild Mammals of New England. Johns Hopkins University Press, Baltimore, 1977.

Mammal Collection, Ecology and Evolutionary Biology, University of Connecticut, Storrs: http://collections2.eeb.uconn.edu/collections/mammals/mammals.html

Birds
Connecticut Audubon Society, Connecticut State of the Birds: http://www.ctaudubon.org/SOTB/2008.html

Connecticut's State-Listed Bird Species, 2004: http://www.ctbirding.org/nddb/birdlist.pdf

Harms, S., et al., 21st Century Breeding-Season Birds of Aton Forest. Connecticut Warbler, April 2008, 66-72.

Monitoring Avian Productivity and Survivorship (MAPS): http://www.birdpop.org/nbii/NBIIHome.asp

National Audubon Society, Common Birds in Decline: http://www.stateofthebirds.audubon.org/CBID/

Partners in Flight Conservation Plan for Northern New England: http://www.blm.gov/wildlife/pl_27sum.htm

U.S. Fish & Wildlife Service Division of Migratory Birds: http://www.fws.gov/migratorybirds/

Areas of Ecological Importance

Endangered, Threatened and Special Concern Species in Connecticut: http://www.ct.gov/Dep/cwp/view.asp?a=2702&q=323486&depNav_GID=1628&depNav=|

Vernal pools
Colburn, Elizabeth, Vernal Pools: Natural History and Conservation. McDonald and Woodward Publishing Co., Blacksburg, Va., 2004.

Kenney, Leo, and Bume, Matthew, A Field Guide to the Animals of Vernal Pools. Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, Westborough, Mass., 2001.

Open Space

American Farmland Trust, information on cost of open space and preservation: http://farmland.org

Center for Land Use Education and Research (CLEAR): http://clear.uconn.edu

Donohue, Brian, Reclaiming the Commons: Communal Farms and Forests in a New England Town. Yale University Press, New Haven, 1999.

Forest stewardship: http://www.canr.uconn.edu/ces/forest

Gaining Ground, an Internet library of land use planning innovations: http://www.environment.yale.edu/topics/policy_economics_and_law/

Highlands Coalition: http://www.highlandscoalition.org/blog/

Johnson, E., and Klemens, M., eds., Nature in Fragments: The Legacy of Sprawl. Columbia University Press, New York, 2005.

Louv, Richard, Last Child in the Woods, updated edition. Algonquin Books of Chapel Hill, Chapel Hill, N.C., 2008.

Public Act 490: http://www.ct.gov/doag/cwp/view.asp?a=1366&q=259834

Trust for Public Land: http://tpl.org

Wildlands and Woodlands: http://www.wildlandsandwoodlands.org/

Scenic Resources

Roads
Arendt, Randall, et al., Rural By Design: Maintaining Small Town Character. American Planning Association, 1994.

Connecticut Department of Transportation criteria for scenic highway designation: http://www.ct.gov/dot/cwp/view.asp?a=2094&q=305520

List of state scenic highways: http://www.ct.gov/dot/lib/dot/documents/dscenicroads/scenic_roads_2003.pdf

Thorson, Robert, Stone By Stone, the Magnificent History of New England's Stone Walls. Walker & Co., New York, 2004.

Dark sky
Dark Night Sky Association: http://www.darksky.org

New England Light Pollution Advisory Group: http://www.nelpag.org

Crelin, Bob, There Once Was a Night Full of Stars. Sky Publishing, Cambridge, Mass., 2003.

Historic Resources

Crissey, Theron, ed., History of Norfolk, 1744-1900. Higginson Book Co., Salem, Mass., 1992 (facsimile edition).

Dennis, Frederic, The Norfolk Village Green. Burr Publishing Co., New York, 1917.

Roys, Auren, A Brief History of the Town of Norfolk, from 1738-1844. Henry Ludwig, New York, 1847.

Waldecker, Alice, ed., Norfolk, Connecticut, 1900-1975. Norfolk Bicentennial Commission, Norfolk, Conn., 1976.

Appendix 10: About This Inventory

This inventory of Norfolk's natural resources was conceived in 2005 by the Conservation Commission/Wetlands Agency, which was then a joint commission. A subcommittee—Elizabeth Borden, Stanley Civco, Sue Frisch, Shelley Harms, Edward Machowski, Adair Mali, Elizabeth Potter and Alnasir (Nash) Pradhan—was appointed and charged with researching and writing the inventory, and producing recommendations based upon the data. William Couch was appointed to the subcommittee as a representative of the Planning & Zoning Commission and John Anderson, invited to participate as an adviser, became a major contributor.

The subcommittee was disbanded in March 2009 and Anderson, Borden, Frisch, Harms, Machowski, Potter and Pradhan were appointed to the newly separate Conservation Commission.

It is the Conservation Commission's hope that the information in this inventory will help town officials, its agencies and individuals appreciate the wealth of resources Norfolk is fortunate enough to have. It is also our hope that the recommendations will influence decisions about land use on all levels, and introduce the town and individuals to conservation methods they can use.

This inventory is just the beginning of an ongoing effort to understand Norfolk's flora and fauna. The commission invites everyone to help it gather more information for what it intends will be yearly supplements to this printed document and frequent additions to the town Web site. It also invites public comment and suggestions for its future direction.

Methods

Subcommittee members and all other contributors were chosen for their expertise in the areas covered by the projected inventory. The chapters were written as context for the data in the appendices. In the appendices, whenever possible, we used information that already existed, such as the butterfly list, which derives from Yale's Butterfly Atlas project but was reviewed and added to by an outside expert. Other lists were prepared specially for the inventory and derive from many sources; they also were reviewed by outside experts.

Acknowledegements

This work was planned, written and edited by John Anderson, Elizabeth Borden, Stanley Civco, William Couch, Sue Frisch, Shelley Harms, Edward Machowski, Adair Mali, Elizabeth Potter and Nash Pradhan.

Elizabeth Corrigan, Marjorie Faber, Ronald Harms, Ann Havemeyer, Sean Hayden, Ted Hinman, Kathleen Johnson, Russell Russ, Randolph Steinen and Susannah Wood also wrote portions, and others helped by reviewing chapters and lists, contributing missing pieces of information and otherwise making this publication possible, as follows:

Geography and Geology

Randolph Steinen helped write the Geography and Geology chapter.

Norfolk's Weather

Russell Russ wrote the Norfolk Weather chapter and supplied weather data; Josh and Ann DeCerbo helped with the weather graphs in Appendix 1.

Soils of Norfolk

Sean Hayden wrote the Soils chapter, with help from Kathleen Johnson, Marjorie Faber and Donald Parizek. Kathleen Johnson wrote the soil descriptions in Appendix 2, assisted by Marjorie Faber, who updated the two soils tables.

Aquatic Resources

Randolph Steinen contributed information on groundwater to the Aquatic Resources chapter and Vince Long assembled groundwater contamination data from DEP files.

The Norfolk Plantscape

The Norfolk-Colebrook Garden Club helped to publicize the notable trees project mentioned in the chapter on the Norfolk plantscape, and William Moorhead, Kenneth Metzler and Leslie Mehrhoff reviewed it and the plant lists in Appendix 4. Ted Hinman contributed the list of tree fungi, Jody Bronson helped with the list of native trees and Glenn Dreyer gave permission to use two notable Norfolk trees he had documented for his state-wide list.

Wildlife

Ronald Harms contributed information about butterflies and moths to the Wildlife chapter and was the main contributor to the butterfly list in Appendix 5. Also in the appendix, David Wagner reviewed the butterfly list, Ayerslea Denny contributed information about snakes and birds, and Ronald Harms, Stan Civco and Susannah Wood also contributed their bird observations. Other sources for bird material include Great Mountain Forest and Aton Forest.

Areas of Ecological Importance

Elizabeth Corrigan wrote the chapter on Areas of Ecological Importance and reviewed the definition of biodiversity in Appendix 6. Alex Persons mapped the vernal pool field data gathered by many Norfolk volunteers.

Open Space

Susannah Wood wrote the chapter on open space and compiled the list of public recreational spaces in Appendix 7.

Scenic Resources

Daniel and Meredith Torrey and Stella and Anya Wareck helped with the Scenic Resources survey of Norfolk's rural roads in Appendix 8, and Richard Byrne contributed information about their historic features.

Historic Resources

Ann Havemeyer wrote the chapter on Historic Resources. Richard Byrne worked with her on the data for the maps.

Recommendations

Elizabeth Corrigan and Susannah Wood suggested some of the Recommendations that appear in Chapter 11.

Maps, photographs, design

Kirk Sinclair created 15 of the inventory's 16 maps. The Critical Habitats map is by Elizabeth Corrigan.

Many of the photographs were entries in a year-long contest won by Alexandra Childs, Eileen Fitzgibbons, Katherine Griswold (best in show), Adela Hubers and Leila Javitch. The rest came from other Norfolk photographers, including John Anderson, Tammy Andrews, Peter Coffeen, Bruce Frisch, Jean Grasmere, Pat Harms, Shelley Harms, Jim Jackson, Christopher Little, Joel Pensley, Julie Scharnberg and Rebecca Ward. The USDA Natural Resources Conservation Service contributed the aerial view of Norfolk and two photographs in the soils chapter.

Bruce Hanke designed this inventory and prepared the document for printing and posting on the town Web site.

About the contributors

John Anderson is executive director and a fellow of Aton Forest. He holds degrees in natural resource conservation and geography.

Elizabeth Borden is a retired teacher and publisher, and holds a degree in environmental management.

Jody Bronson is forest manager of Great Mountain Forest.

Richard Byrne is vice president of the Norfolk Historical Society and assistant municipal historian.

Stanley Civco is a retired Connecticut game warden; he holds a degree in wildlife ecology.

Elizabeth Corrigan is co-chair of the Connecticut Invasive Plant Working Group and consulting biologist at the Northwest Conservation District in Torrington.

William Couch is an alternate member of Norfolk's Planning and Zoning Commission. He holds a degree in geography.

Ayerslea Denny is a local naturalist.

Ann and Joshua DeCerbo are design and computer consultants as DeCerbo Designs.

Glenn Dreyer is director of the Connecticut College Arboretum and author of Connecticut's Notable Trees.

Marjorie Faber is Assistant State Soil Scientist (Connecticut) for the USDA Natural Resources Conservation Service, based in Tolland.

Sue Frisch is a retired editor and publisher.

Ronald Harms is a federally licensed bird-bander and an amateur lepidopterist.

Shelley Harms is a federally licensed bird-bander and has led the breeding bird studies for Aton Forest since 2002.

Ann Havemeyer is curator of the Norfolk Historical Museum and assistant municipal historian.

Sean Hayden is Resource Conservationist and Soil Scientist for the Northwest Conservation District, Torrington.

Ted Hinman is a local arborist.

Kathleen Johnson is District Conservationist at the USDA Natural Resources Conservation Service Center in Torrington.

Edward Machowski is a fisheries biologist who works for the Connecticut DEP.

Adair Mali is a trained ecologist. She currently is Northwest Highlands Program Director for the Nature Conservancy.

Leslie Mehrhoff is director of the Invasive Plant Atlas of New England (IPANE).

Kenneth Metzler is an ecologist with the Connecticut Geological and Natural History Survey.

William Moorhead is an independent consulting field botanist with a special interest in rare species of plants.

Alex Persons is a geographic information systems (GIS) specialist who has done work for the Farmington River Watershed Association.

Elizabeth Potter taught science for 30 years at Chapin School in New York City.

Donald Parizek is a USDA Natural Resources Conservation Service soil scientist, based in Windsor.

Alnasir Pradhan is a biologist and horticulturalist.

Russell Russ is a forester at Great Mountain Forest and a cooperative weather observer for the National Weather Service.

Kirk Sinclair is GIS Manager for the Housatonic Valley Association. He holds a Ph.D. in Natural Resource Planning and Management.

Randolph Steinen is Professor Emeritus of Geology at the University of Connecticut and a volunteer with the Connecticut Geological and Natural History Survey.

Daniel and Meredith Torrey are the children of Shelley Harms.

David Wagner is Professor of Ecology and Evolutionary Biology at the University of Connecticut; he has a special interest in lepidoptera.

Anya and Stella Wareck are the grandchildren of Elizabeth Borden.

Susannah Wood has written many books and articles on natural history.