Town of Cornwall
Natural Resource Inventory and Assessment

Cornwall, Connecticut

Photo Credit: Alan Levere, DEP

King's Mark
Environmental Review Team Report

King's Mark Resource Conservation & Development area, Inc.

Town of Cornwall
Natural Resource Inventory and Assessment
Cornwall, Connecticut

Environmental Review Team Report

Prepared by the
King's Mark
Environmental Review Team
Of the
King's Mark
Resource Conservation and Development Area, Inc.

For the
Planning and Zoning Commission
Cornwall, Connecticut

December 2007

Report #344

Acknowledgments

This report is an outgrowth of a request from the Cornwall Planning and Zoning Commission to the King's Mark Resource Conservation and Development Area (RC&D) Council for their consideration and approval. The request was approved and the measure reviewed by the King's Mark Environmental Review Team (ERT).

The King's Mark Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field review took place on Tuesday, April 24, 2007.

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David Poirier	Staff Archaeologist State Historic Preservation Office (860) 566-3005
Larry Rousseau	Service Forester DEP – Western District Headquarters (860) 485-0226
Randolph Steinen	Geologist DEP – State Geological and Natural History Survey UCONN - Emeritus Professor, Geology Program (860) 486-1383
Judy Wilson*	Wildlife Biologist DEP – Eastern District Headquarters (860) 295-9523

*Report not yet received.

I would also like to thank Annie Kosciusko, chair, planning and zoning commission, Rick Lynn, Pat Hare and Emilie Pryor, members, planning and zoning commission, and Elaine LaBella, Housatonic Valley Association, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with various maps and a scope of work outlining the information desired from each Team member. During the field review Team members were given additional information such as additional maps and plans. Some Team members made additional field trips while others conducted a map review only. Following the review, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the town. This report identifies the existing resource base and evaluates its

significance to the proposed use, and also suggests considerations that should be of concern to the town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The King's Mark RC&D Executive Council hopes you will find this report of value and assistance in the update of the town plan of conservation and development.

If you require additional information please contact:

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Team members at a field review stop at Cream Hill Lake.

Table of Contents

Introduction

The Cornwall Planning and Zoning Commission have requested assistance from the King's Mark Environmental Review Team (ERT) in conducting a natural resource inventory and review of the town to be used in the preparation of an update to the town plan of conservation and development. The Planning and Zoning Commission recently prepared six natural resource maps with GIS technology to facilitate improved understanding of the resources in the community.(See following - Base Map, Development Constraints, Water Resources, Agricultural Resources, Open Space Recreation, Historical Sites and added later Protected Parcels.)

Objectives

The ERT is needed to further commission member understanding of the information presented on the maps through written descriptions of the community's natural resource base with an emphasis on identifying key resources that should be considered for conservation or protection. This information is critical to environmentally sound decision making in the town planning process. The ERT was asked to provide a report which identifies the natural resource base and highlights opportunities and limitations for future land use. It is anticipated that the ERT will provide a foundation for a more detailed inventory and evaluation work by the P&Z Commission. The general scope of the work requested includes: geology, soils, hydrology, agriculture, vegetation, wildlife, aquatics, recreation, land use and archaeological and historical significance.

The ERT Process

Through the efforts of the Cornwall Planning and Zoning Commission, this environmental review and report was prepared for the Town of Cornwall.

This report provides a broad array of natural resource and planning information, recommendations and guidelines which cover the topics requested by the Cornwall Planning and Zoning Commission. Team members were able to review maps, plans and supporting documentation provided by the town.

The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field review was conducted on Tuesday, April 24, 2007. The field review consisted of a driving tour of the town with stops made at significant points as determined by the Planning and Zoning Commission. The emphasis of the field review was on the exchange of ideas, concerns and

recommendations. Some Team members made separate and/or additional site visits, and other Team members conducted only map reviews. The field review allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

TOWN OF CORNWALL
Base Map

HVA

Resources Map Series
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and Cornwall Conservation Trust

0 1 2 Miles

1:50,000

Legend

- State Highway
- State Forest Road
- Paved Town Road
- Unpaved Town Road
- Private Road
- Railroad
- Public Access Trails
- Tax Parcels

CANAAN
SHARON
GOSHEN
KENT
WARREN
West Cornwall
Cornwall Bridge
Cornwall Village
Cream Hill Lake

JULY 2006

Map prepared on 7/18/06 by
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Housatonic Valley Association
150 Kent Road; PO Box 28
Cornwall Bridge, CT 06754

Phone: 860-672-6678
Email: hvamaps@optonline.net

Data Sources
Transportation and hydrography is based on the USGS transportation data obtained from the Environmental GIS Data distributed by Connecticut's DEP, and enhanced through the use of town review and digital orthophotos. Parcels were digitized from the Cornwall tax assessor maps. Public Access Trails were field checked by Dave Colbert in September 2005.

A large scale map of this information is available for review at the Cornwall Planning and Zoning Commission office.

Cornwall Village 1:16,000

Cornwall Bridge 1:16,000

West Cornwall 1:16,000

TOWN OF CORNWALL
Development Constraints

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0 1 2 Miles

1:50,000

Legend

- DEP Natural Diversity Database*
- Slopes >= 25%
- Wetlands
- Protected Lands

FEMA Flood Zones

- 100 Year
- 500 Year

CANAAN

SHARON

GOSHEN

KENT

WARREN

West Cornwall

Cornwall Village

Cornwall Bridge

Cream Hill Lake

JULY 2006

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Data Sources
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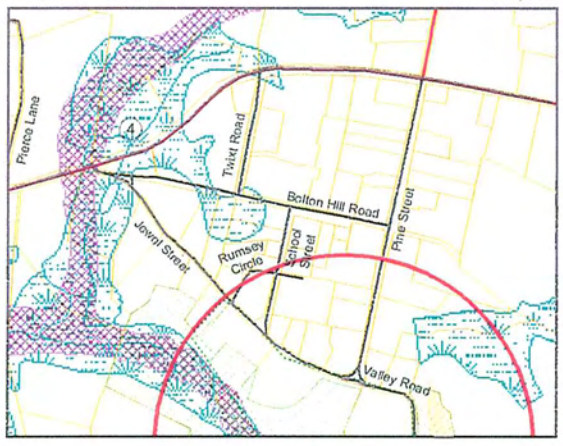
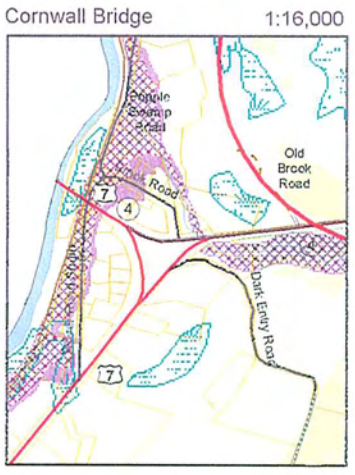
A larger scale map of this information is available for review at the Cornwall Planning and Zoning Commission office.

Cornwall Village 1:16,000



Cornwall Bridge 1:16,000



West Cornwall 1:16,000

TOWN OF CORNWALL
Water Resources

HVA

Resources Map Series
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and Cornwall Conservation Trust

0 — 1 — 2 Miles

1:50,000

Legend

- Wetlands
- Public Water Supply Watershed
- Wellhead Protection Area*

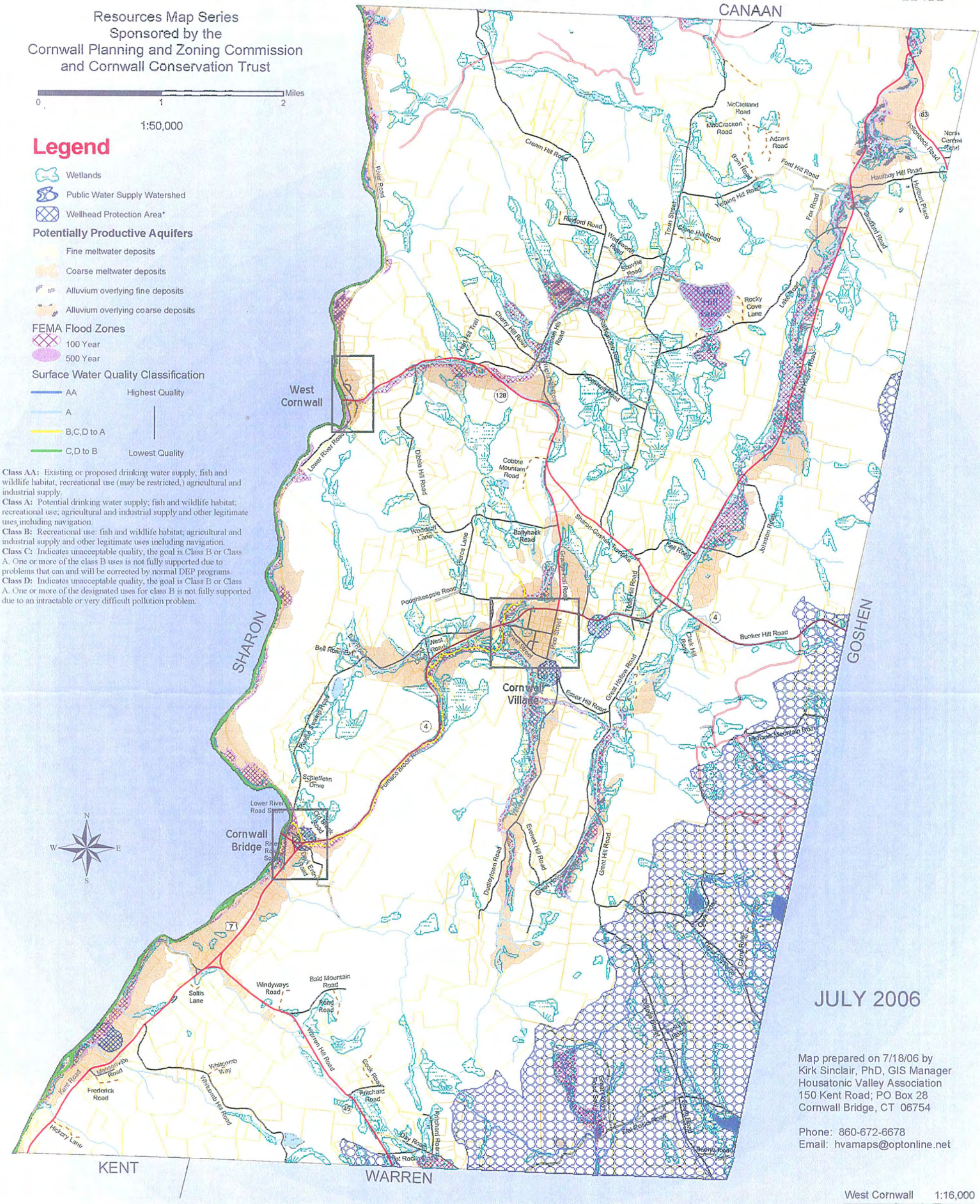
Potentially Productive Aquifers

- Fine meltwater deposits
- Coarse meltwater deposits
- Alluvium overlying fine deposits
- Alluvium overlying coarse deposits

FEMA Flood Zones
- 100 Year
- 500 Year

Surface Water Quality Classification
- AA — Highest Quality
- A
- B,C,D to A
- C,D to B — Lowest Quality

Class AA: Existing or proposed drinking water supply, fish and wildlife habitat, recreational use (may be restricted,) agricultural and industrial supply.
Class A: Potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply and other legitimate uses including navigation.
Class B: Recreational use: fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation.
Class C: Indicates unacceptable quality, the goal is Class B or Class A. One or more of the class B uses is not fully supported due to problems that can and will be corrected by normal DEP programs.
Class D: Indicates unacceptable quality, the goal is Class B or Class A. One or more of the designated uses for class B is not fully supported due to an intractable or very difficult pollution problem.



JULY 2006

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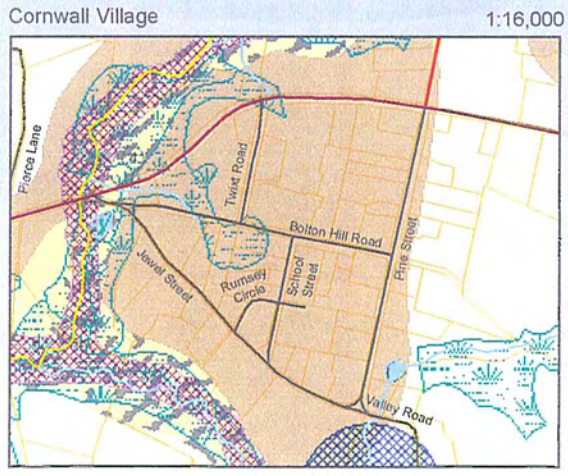
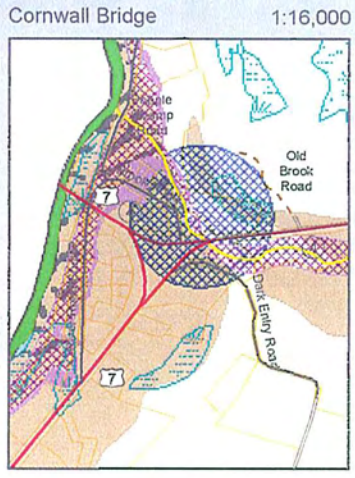
Cornwall Village 1:16,000



Cornwall Bridge 1:16,000



West Cornwall 1:16,000

Data Sources
Transportation and hydrography are based on the USGS transportation data obtained from the Environmental GIS Data distributed by Connecticut's DEP, and enhanced through the use of town review and digital orthophotos. Parcels were digitized from the Cornwall tax assessor maps. Wetlands are based on the USDA digital soil survey distributed by DEP. Other environmental data was obtained from the Environmental GIS dataset on CDs, distributed by the DEP. Potentially Productive Aquifers were selected from Surficial Materials suited best for holding water. Refer to the DEP site, www.dep.state.ct.us/gis/dataguides/dep/layers/wqsclas.htm, for further explanation of each water quality class.

A larger scale map of this information is available for review at the Cornwall Planning and Zoning Commission office.

TOWN OF CORNWALL
Agricultural Resources

HVA

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0 1 2 Miles

1:50,000

Legend

- Tax Parcels
- 490 Farm Land
- Farm and Field Landcover

Farmland Soils

- Important Farmland Soils
- Prime Farmland Soils

CANAAN

SHARON

GOSHEN

KENT

WARREN

West Cornwall

Cornwall Village

Cornwall Bridge

Cream Hill Lake

JULY 2006

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Data Sources
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A larger scale map of this information is available for review at Cornwall Planning and Zoning Commission office.

Cornwall Village 1:16,000

Cornwall Bridge 1:16,000

West Cornwall 1:16,000

TOWN OF CORNWALL
Open Space and Recreation Resources

HVA

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and Cornwall Conservation Trust

0 1 2 Miles

1:50,000

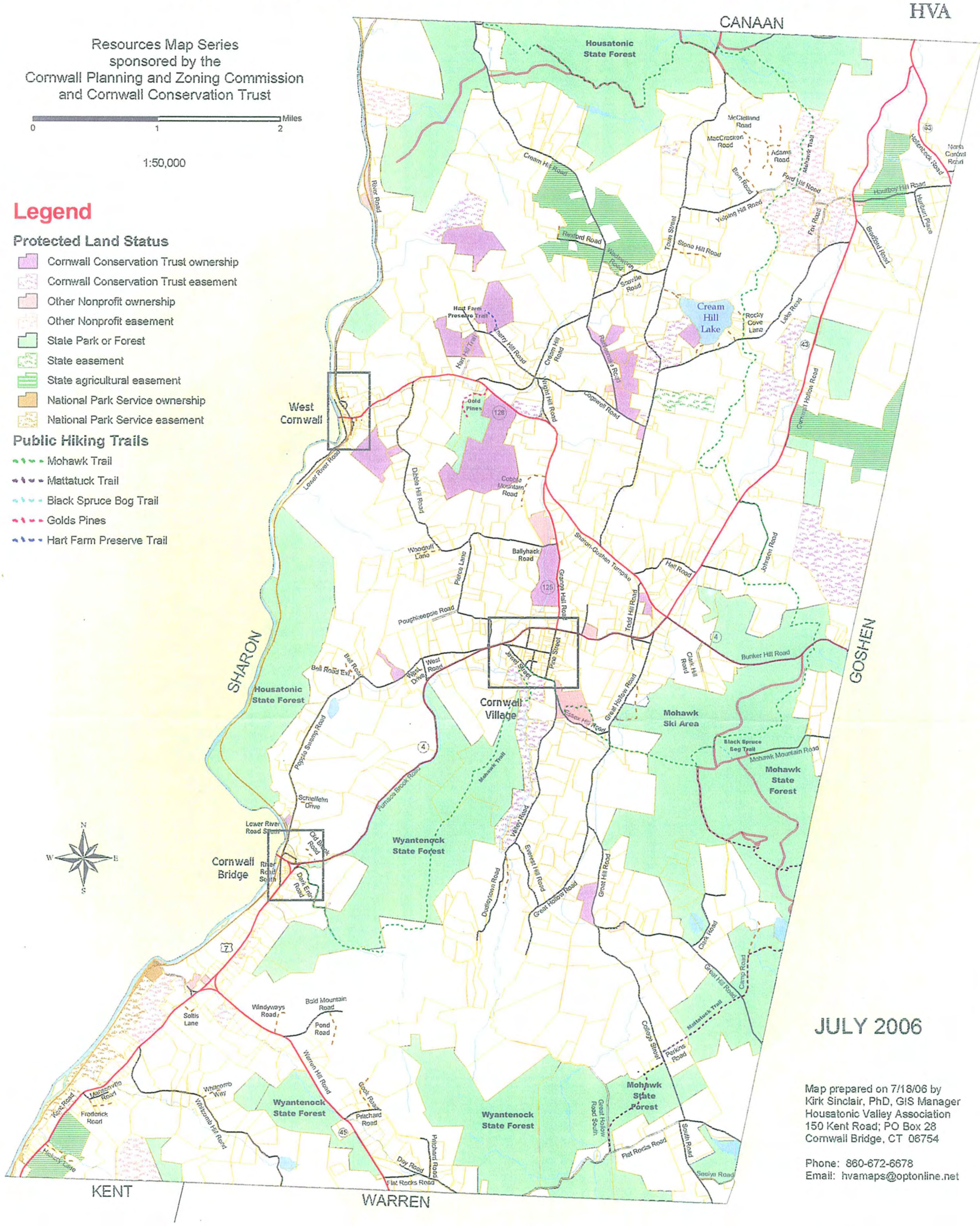
Legend

Protected Land Status

- Cornwall Conservation Trust ownership
- Cornwall Conservation Trust easement
- Other Nonprofit ownership
- Other Nonprofit easement
- State Park or Forest
- State easement
- State agricultural easement
- National Park Service ownership
- National Park Service easement

Public Hiking Trails

- Mohawk Trail
- Mattatuck Trail
- Black Spruce Bog Trail
- Golds Pines
- Hart Farm Preserve Trail



CANAAN
SHARON
GOSHEN
KENT
WARREN
Housatonic State Forest
Wyantenock State Forest
Mohawk State Forest
Mohawk Ski Area
West Cornwall
Cornwall Village
Cornwall Bridge
Cream Hill Lake
Black Spruce Bog Trail
Mohawk Trail
Mattatuck Trail
Gold Pines
Hart Farm Preserve Trail
River Road
Lower River Road
Cream Hill Road
Town Street
Yelping Hill Road
Stone Hill Road
Cogswell Road
Dibble Hill Road
Sharon-Goshen Turnpike
Bunker Hill Road
Great Hollow Road
Popple Swamp Road
Furnace Brook Road
Warren Hill Road
Kent Road
Flat Rocks Road
College Street
Great Hill Road
Mohawk Mountain Road
Cornwall Hollow Road

JULY 2006

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Cornwall Village 1:16,000

Cornwall Bridge 1:16,000

West Cornwall 1:16,000

Data Sources
Transportation and hydrography is based on the USGS transportation data obtained from the Environmental GIS Data distributed by Connecticut's DEP, and enhanced through the use of town review and digital orthophotos. Parcels were digitized from the Cornwall tax assessor maps. Protected lands in Cornwall were originally compiled in 1997 by HVA, and last updated in 2004 with assistance from the Cornwall Conservation Trust. Trails were field checked by Dave Colbert in September 2005.

A larger scale map of this information is available for review at the Cornwall Planning and Zoning Commission.

TOWN OF CORNWALL
Historical Sites

HVA

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and Cornwall Conservation Trust

0 1 2 Miles

1:50,000

CANAAN

SHARON

GOSHEN

KENT

WARREN

West Cornwall

Cornwall Village

Cornwall Bridge

Cream Hill Lake

Legend

- Historic Thoroughfare
- State Highway
- State Forest Road
- Paved Town Road
- Unpaved Town Road
- Private Road
- Railroad
- Public Access Trails
- Tax Parcels

Cultural Features

- Bridge
- Cemetery
- Church
- Home
- Industry
- School
- Other

JULY 2006

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Data Sources
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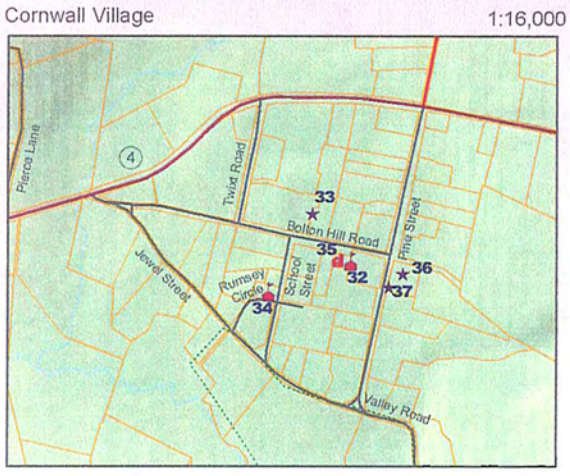
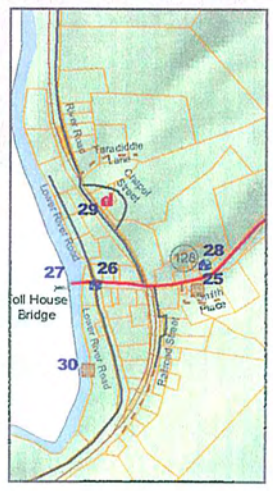
A larger scale map of this information is available for review at the Cornwall Planning and Zoning Commission office. Historical site information available on separate spreadsheet.

Cornwall Village 1:16,000



Cornwall Bridge 1:16,000

West Cornwall 1:16,000



Protected Parcels Cornwall, CT

0 1 2 Miles

1:50,000

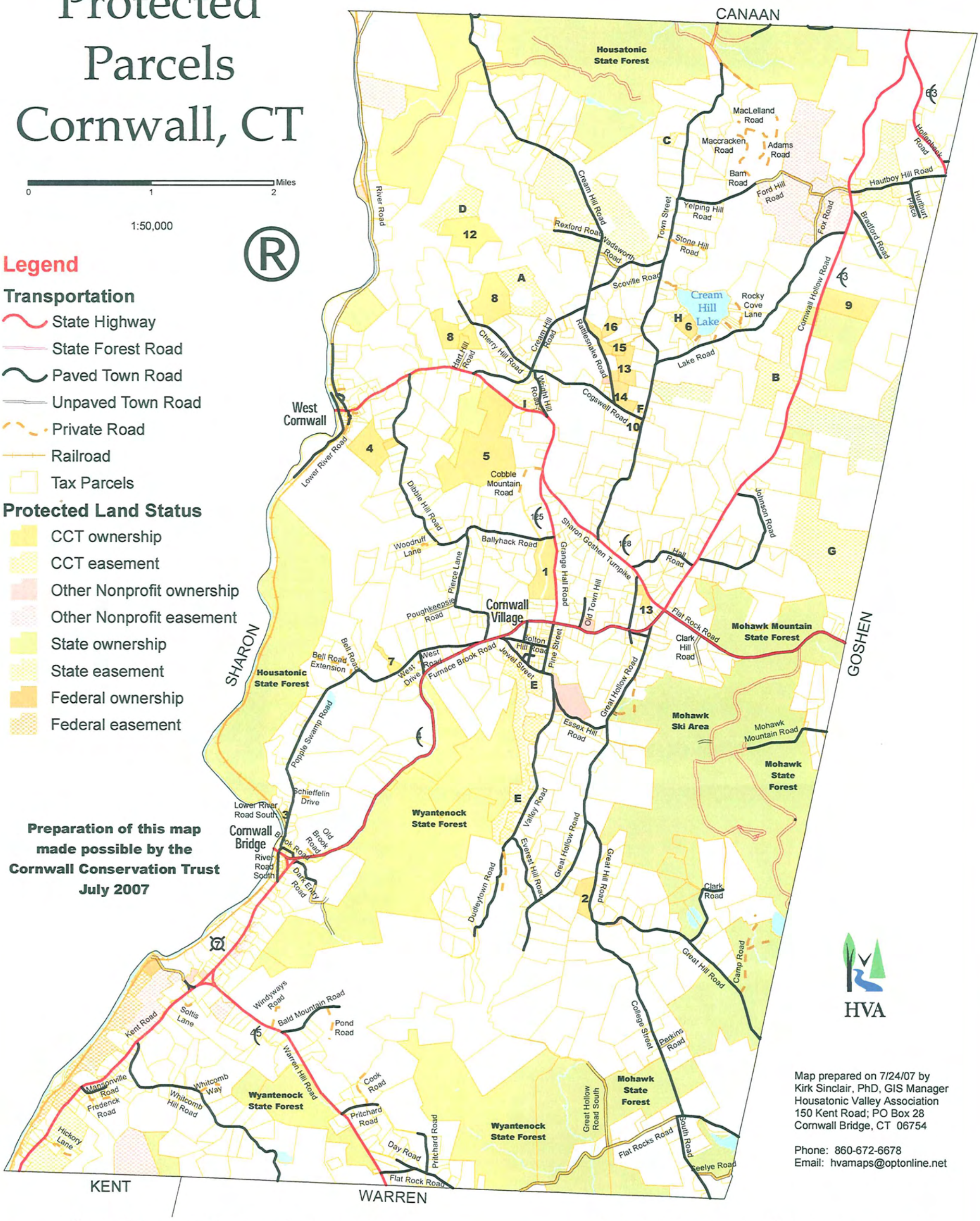
Legend

Transportation

- State Highway
- State Forest Road
- Paved Town Road
- Unpaved Town Road
- Private Road
- Railroad
- Tax Parcels

Protected Land Status

- CCT ownership
- CCT easement
- Other Nonprofit ownership
- Other Nonprofit easement
- State ownership
- State easement
- Federal ownership
- Federal easement



HVA

Preparation of this map made possible by the Cornwall Conservation Trust July 2007

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Cornwall Conservation Trust Ownership Lands

Label	Name	Address	Acres
1	Ballyhack Preserve	Route 125	55
2	Blake Preserve	Great Hill Road	25
3	Bradley Preserve	Popple Swamp Road	3
4	Brokaw Preserve	Dibble Hill Road	53
5	Day Preserve	Route 125	181
6	Dodd Preserve	Lake Road	13
7	Hare Preserve	Popple Swamp Road	10
8	Hart-Cherry Hill Farm	Cherry Hill Road	96
9	Hofer Preserve	Route 43	49
10	Ives Preserve	Town Street	4
11	Walker Preserve	Todd Hill Road	8
12	Vogel Preserve	Waller Hill	77
13	Gloeckner Preserve	Rattlesnake Road	35
14	Rogers Preserve	Rattlesnake Road	17
15	Paul Preserve	Rattlesnake Road	10
16	Van Valkenburgh Preserve	Rattlesnake Road	9

Cornwall Conservation Trust Easement Lands

Label	Name	Address	Acres
A	Bennett Easement	Cream Hill Road	51
B	Chubb Easement	Cornwall Hollow Road	101
C	Clark Easement	Town Street	8
D	Cohen-Congress Easement	Waller Hill	57
E	Coltsfoot Valley Easement	Valley Road	96
F	Fox/Lane Easement	Town Street	4
G	Nuese Easement	Johnson Road	200
H	Prud'homme Easement	Town Street	10
I	Scott Easement	Route 128	13

This map is not to be used as an accurate survey and is subject to change.

Observations on the Geology of Cornwall

Cornwall lies within parts of three different quadrangles published by the U.S. Geological Survey and the U.S. Coast and Geodetic Survey. The majority of Cornwall lies within the Cornwall Quadrangle and the South Canaan Quadrangle. Both were mapped and described by Gates (1961 and 1975). The southwestern most part of Cornwall lies within the Ellsworth Quadrangle.

Bedrock

According to Gates, four major metamorphic rock associations are found in Cornwall: 1) gneisses of pre-Cambrian age, 2) marble, 3) schist and gneiss, and 4) granite. These rocks are described in this report as pre-Cambrian rocks, rocks of the continental shelf, rocks of the continental slope, and granite. The distribution of the various rock formations is shown on Figure 1.

Pre-Cambrian Rocks. The most ancient rocks were formed about billion years ago during a mountain-building episode, called the Grenville Orogeny. These rocks consist of a complex of gneisses that are relatively resistant to erosion. Consequently they typically form the highlands in New England and neighboring New York and southern Canada. These older rocks underlie the high areas the northwestern half of Cornwall. They are designated on the geologic map with symbols starting with the letter Y (Ygh, Ygn, Ygr, and Ygs). These rocks are typically granitic gneiss, hornblende schist and amphibolite. Many of the layers weather rusty; some of the schistose layers contain graphite and presumably iron sulfide minerals. They were formed when igneous and sedimentary rocks that were part of the ancient nucleus of the North American continent (referred to as Laurentia) were metamorphosed during a continental collision with the ancient core of the South American continent (referred to as Amazonia). At that time, about one billion years ago, many of the existing continental masses had had drifted together to form a large continental land mass referred to as Rodinia (see Coleman, 2005, for an easy to read compilation of the history of Connecticut's bedrock).

Paleozoic Rocks. When the supercontinent, Rodinia, broke apart about 600 million years ago, an ocean basin was created. Geologists have given the name Iapetus to that ancient, now vanished, ocean. Two rock groups had their origins as sediments deposited in the Iapetus Ocean: marble associated with the continental shelf and schist associated with the continental slope.

Rocks of the Continental Shelf. The North American continental margin at the edge of the Iapetus Ocean was eroded to a low relief during several tens of millions of years after the continental break up. Gradually the continental margin was flooded by seawater and during the Cambrian and Ordovician periods of geologic time shallow water depositional environments existed on the continental shelf of the ancient North America. The actual shore-line migrated westward as the flooding progressed, depositing a beach of quartz sand as it went. When the shore-line was located several hundreds of miles to the west of the

continental margin very little sand and mud could be transported to the area, and lime, formed by skeletal remains (shells) of organisms that lived and died there, accumulated on the shelf. Over the millennia the lime was lithified into limestone and later was metamorphosed into marble (OCs and Owm on the geologic map). The marble belt is interpreted to be the eastern edge of the ancient North American continental shelf.

Marble is composed of carbonate minerals which are soluble in rain water. This makes them erode more readily than non-carbonate bearing rocks such as granite or schist. Thus, areas underlain by marble today form the prominent valleys in Cornwall and elsewhere in the region. (Figure 2) The Housatonic River takes advantage of this over much of its course, including the southwestern part of Cornwall.

Rocks of the continental slope and deeper water. Schist and schistose gneiss crop out over the south and eastern part of Cornwall. They are in fault contact with the marble and marble-like rock. They were likely formed about the same time as the marbles but geographically and depositionally in different environments. They are mapped as the Waramaug Formation by Gates (1961, 1975) but where included, as part of the Manhattan Schist by Rodgers (1985). In actuality they have a chemical composition very similar to the Manhattan Schist, as noted by Gates (1961, p. 23). They are referred to as the Manhattan Schist on the map presented herein (Cm and Cma).

The rocks consist of mica-feldspar-quartz gneiss and schist and amphibolite. Some are rusty weathering. (Figure 3) They apparently were deposited as muddy sandstone and shale that were later intruded by basaltic igneous rock. They are inferred to have been deposited in deeper water on the continental slope at about the same time that lime (now marble) was being deposited on the continental shelf of Laurentia, the ancestral North American continent. Metamorphism occurred during later orogenic (mountain-building) events. The earliest event is termed the Taconic Orogeny and resulted not only in metamorphism of the sediments but also thrusting of the continental slope rocks onto the shelf rocks. The feature shown as Logan's Line on the geologic map of Cornwall is the fault beneath the continental slope rocks along which they were thrust over the marble and other rocks that formed the continental shelf.

Granite. An irregularly-shaped granite mass (Og) occurs in the southeastern part of Cornwall. Granite formed as an igneous rock that intruded or forced its way, in a molten state, into the schists and gneisses of the continental slope. The granite is fine- to medium-grained, white and structureless (massive, lacking in foliation). It contains some pegmatite (very coarse grained granite) near its borders and is clearly intrusive. The lack of foliation (layering) in the granite leads Gates to suggest it was intruded after the metamorphism had concluded. It is, therefore, the youngest rock in this area.

Bedrock Lithochemistry

Robinson et al. (1999) compiled the chemical characteristics of near surface rocks in portions of western New England as part of the National Water Quality Assessment program. The data set presented by Robinson et. al. characterizes the rock units in terms of mineralogic and

chemical characteristics relevant to surface and well water quality and ecosystem analysis. This map is published digitally and may be accessed at the following web-site. http://water.usgs.gov/lookup/get?wrir994000

Table 1 compiles lithochemical characteristics and their anticipated affects for the rock units that occur in Cornwall. Most domestic water wells are completed in rock near the surface (upper 300 feet). The chemical characteristics of the rock will likely impact the groundwater recovered from those wells.

Mines

There are no active mines within the town of Cornwall. In the past, however, rock has been extracted from several sites in Cornwall (Altamura, 1987). This reviewer was able to find one site (immediately north of Rte. 4 near base of Red Mtn.) during this review. The rock is very rusty weathering so it is imagined that some of the rock may have been assayed for iron. The rock, however, was excavated for construction purposes rather than iron ore. Warren and Colton (1974) found two additional sites (south of Rte. 4 near Quarry Hill). Other mine sites have been located through older reports. Many of the old quarries and mines excavated granite or granitic rock for foundation stones or other construction purposes. These include the granite quarry in the southeastern part of town off Mattatuck Road and the two quarries, one of which was referred to as the Benedict Quarry by Dale, 1923 (as reported by Altamura), south of Rte. 4 on or near Quarry Hill. Marble apparently was excavated for agricultural lime from a quarry immediately east of Cornwall Bridge. Other excavations on Mine Mountain, Green Mountain, and Cream Hill prospected for and perhaps even produced graphite, pegmatite, gold, and silver.

A site, referred to as the Botallock Iron Mine by Altamura (1987), could not be geographically located. Perhaps it is because the Botallock Iron Mine is located in Cornwall, England rather than Cornwall, CT. If not, there is a lost iron mine in Cornwall, CT.

Surficial Geology

The surficial geology of the Cornwall Quadrangle was mapped by Warren and Colton (1974) and published by the U.S. Geological Survey. More than 90% of the surficial deposits in Cornwall consist of glacial till deposited during one or more glacial stages (Ice Ages) of the Pleistocene Epoch. Most of the remaining deposits consist of stratified drift, deposits of sand and gravel from meltwater streams at the end of the last glacial episode. Stratified drift was deposited in most of the major valleys. The drift is porous and permeable and where thick enough makes a good shallow aquifer.

During the last ice age two or more kilometers of ice covered northwestern Connecticut. The ice extended as far south as Long Island at its maximum. The glacial ice formed in response to a much colder global climate. About 20,000 years ago the climate began warming and the glaciers began melting. As a response to the melting the southern edge of the ice began to disappear.

When ice is thicker than a few 100 meters it flows from areas where the ice is thicker toward areas where the ice is thin. For most of New England, the ice flowed generally toward the south and southeast. Because glacial ice freezes around soil and rock particles, it carries them in its flow. This has two important effects. First, it moves tons of material of all sizes southward. Second, the soil and rock particles act as abrasives in the bottom of the glacier and help the glacier to erode the underlying bedrock.

Glacial Deposits

Till is a poorly sorted glacial soil, composed of mud, sand and pebbles, cobbles or even boulders that is deposited by the glacier. Till may be deposited in two ways. It may be deposited beneath the glacier forming a bed over which the glacier moves. This type of till has been compacted by the weight of the over-riding glacier and is relatively impermeable. It may be referred to as "hard-pan" by local drillers, but it is referred to as basal till by geologists. Till may also be deposited when the ice melts, leaving all the debris it was carrying on the ground surface much the way road sand is left by the side of the road when sand laden snow, plowed to the side of the road during a storm, melts. Most of the till in Cornwall is this second type of till. It is generally fifty feet or less in thickness. Indeed, large areas of town have little or no soil and bedrock is exposed. Many of the higher mountains in town (Mohawk Mountain, Coltsfoot Mountain, Green Mountain, Mine Mountain) have thin or no soil on their highlands.

Thick till is found in several locations and probably consists largely of basal till. Notable locations are Dean Hill, an area near Kellogg Corners, and a former channel of the ancestral Housatonic River just south of West Cornwall. A well there penetrated 225' of till without reaching bedrock. Dean Hill may be thicker still, perhaps as much as 650' (Warren and Colton, 1974). Steep slopes developed on thick deposits of till, such as along the north side of Rte. 4 adjacent to Dean Hill, may be unstable during spring thaws and/or heavy rains and subject to land-sliding.

Stratified Drift. As the glaciers began melting 20,000 years age, meltwater eventually collected in streams that flowed toward the sea. During the summers, torrents of water flowed seaward at very high velocities. Because water power depends on the velocity of the water (as well as the volume), high-velocity meltwater streams were able to transport large volumes of sediment, and also, sedimentary particles of large sizes. When water velocity in the meltwater streams diminished, due either to changes in channel characteristics or seasonal changes in the rate of melting, sand and gravel was deposited. Most of the sand and gravel in Cornwall was deposited in valleys once occupied by meltwater streams.

The drift deposits consist of pebble- to boulder-gravel and sand. A deposit at Tanner Brook consists mostly of sand; another at Cornwall Bridge consists mainly of boulders, 1-14 feet in diameter. Deposits are generally stratified and contain rounded stones (river-rocks). Most deposits do not contain mud because mud does not settle from moving water.

Because stratified drift deposits lacks mud, most are porous and permeable. Where stratified drift is below the water table it provides a high yielding aquifer when developed. Hence,

areas underlain by water-saturated stratified drift should receive aquifer protection. They generally yield high quality, good tasting water.

Glacial Erosion Features

Meltwater was capable of considerable erosion and several rock gorges in town were likely cut or deepened by glacial meltwater. The rock channel in Birdseye Brook was likely deepened in a pre-existing valley. Birdseye Brook today carries sufficient volume to continue eroding its gorge. A spectacular gorge is located immediately south of Rte. 4 near the Goshen town-line that has a very low volume stream flowing through it. (Figure 4) It is up to 40 feet deep and partially filled with chaotic rock debris on its bottom. Clearly a higher volume stream cut that gorge. The rocks in the bottom of the gorge appear to have collapsed into the chasm. Perhaps there was a rock tunnel in sulfidic schist that collapsed. Warren and Colton map several other gorges and meltwater channels.

Striations and grooves are mapped on numerous hill and mountain tops by Warren and Colton, 1974). A prominent groove is illustrated by Figure 5.

Topography

Cornwall is hilly: elevations range from just less than 400 feet where the Housatonic River flows out of Cornwall to 1683 feet at the summit of Mohawk Mountain. A drainage divide runs northeasterly from the southerly town boundary. South and east of the divide slopes are generally gentle to moderate and streams flow into the Shepaug River drainage. West of the divide, slopes are moderate to steep and streams flow into the Housatonic River drainage. A prominent set of marble valleys cut through central part of Cornwall. (Figure 2) Valley Brook and Furnace Brook flow into the Housatonic through one valley and Great Hollow and Johnson Hollow occupy the other valley. Both valleys owe their presence to the solubility of the marble bedrock that underlies them. The high areas tend to be underlain by either Manhattan Schist or granite gneisses of pre-Cambrian age.

REFERENCES.

Altamura, R.J., compiler, 1987, *Bedrock Mines and Quarries of Connecticut*, with citation list and references cited. State Geol. and Nat'l Hist. Surv. of Connecticut, CT Atlas Series, 1:125,000.

Coleman, M. E., 2005, *The Geologic History of Connecticut's Bedrock.* State Geol. and Nat'l. Hist. Surv. of Connecticut, Spec Pub. #2, 30p.

Gates, R. M., 1961, The Bedrock Geology of the Cornwall Quadrangle, with map. State Geol. and Nat'l. Hist. Surv. of Connecticut, Quad. Rpt. #11, 35p

Gates, R. M., 1975, The Bedrock Geology of the South Canaan Quadrangle, with map. State Geol. and Nat'l. Hist. Surv. of Connecticut, Quad. Rpt. #32, 33p..

Robinson, G.R., Peper, J.D., Steeves, P.A., and DeSimone, L.A., 1999. Lithochemical character of near-surface bedrock in the Connecticut, Housatonic, and Thames River Basins. U.S. Geol. Surv. Water-Resources Invest. Rpt. 99-4000. http://water.usgs.gov/lookup/get?wrir994000

Rodgers, John, 1985, Bedrock Geological Map of Connecticut. State Geological and Natural History Survey of Connecticut, Nat'l. Resource Atlas Series, 1:125,000

Warren, C.R., and Colton, R.B., 1974, Surficial geologic map of the Cornwall Quadrangle, Litchfield County, Connecticut. U.S. Geol. Surv. Map. #GQ-1148.

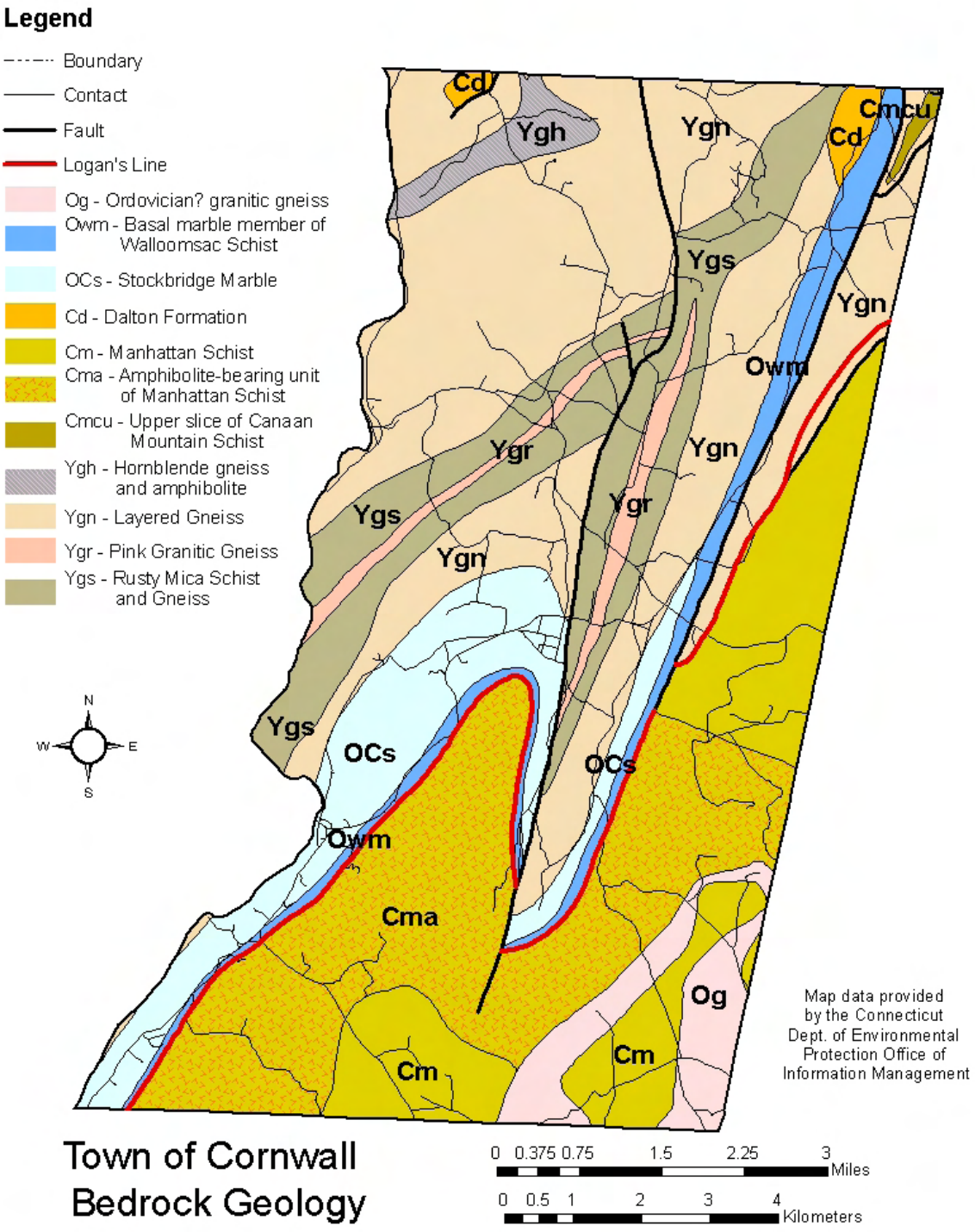


Figure 1. Bedrock geologic map of the Town of Cornwall (from Rodgers, 1985). (Thanks to J. Mickiewicz, CT-DEP, who constructed this map for the author.)

Figure 2. Marble valley just south of Cornwall Village. Fault at base of hills on left side of picture truncates the marble in the distance and effectively ends the valley.

Figure 3. Rusty weathering Manhattan Schist along Route 4 just west of entrance to Mohawk Mountain State Forrest. Rock quarry on Rte. 4 removed rock of this type.

Figure 4. Water worn rock in gorge just south of Route 4 at border with town of Goshen.

Figure 5. Glacial grooves in Manhattan Schist on Mohawk Mountain.

Table 1. Lithochemical rock types and expected characteristics. (From Robinson et al 1999.) Groundwater recovered from specific rocks may expect to have similar chemical characteristics.

Geologic formation symbol (see Fig. 1)	Chemical characteristics of near surface rock	Sensitivity to acid deposition	Soil characteristics	Topographic expression
Og	generally low solute concentrations, low pH, Fl, U, and Ra concentrations may be high	high sensitivity	sandy soils	tendency toward higher elevations
Owm, OCs	high alkalinity, hard water, high concentrations of metals, such as Ar and U, where complexed by HCO_3	low sensitivity, productive aquatic faunas, alkaline favoring flora.	generally thin alkaline clay soils, high Ca, low K	generally lowlands and topographic depressions; may be sites of stream channels, lakes, and springs.
Cm	low/moderate solute concentrations	moderate to high sensitivity	clayey soils	moderate hills
Cma	high Ca+Mg to Na ratio, high Fe and Mn where Eh and pH are low	low sensitivity; may have endemic flora in high Mg, high pH and low K soils; productive aquatic fauna where Ca is high in surface waters	thin, rocky, clayey Mg-rich and K-poor soils	moderate ridges and hills.
Ygs, Ygr	low/moderate solute concentrations, Fe may be high, sulfate may be high.	moderately sensitive, endemic floras mnay occur in low pH metal rich soils over sulfide rich horizons.	rocky acidic metal-rich soils may occur	uplands and ridges (Ygr); low hills (Ygs)
Ygn, Ygh	high Ca+Mg to Na ratio, high Fe and Mn where Eh and pH are low	low sensitivity; may have endemic flora in high Mg, high pH and low K soils; productive aquatic fauna where Ca is high in surface waters	Fe-rich, neutral to basic soils	moderate rolling hills

Soil Resources

The Town of Cornwall encompasses approximately 46 square miles of sloping to steep land in central Litchfield County. Cornwall, by Connecticut standards, is quite mountainous and is underlain by primarily by layered gneiss and schist bedrock. The Town has numerous watercourses, including the Housatonic River, Hollenbeck River, Furnace Brook, Reed Brook, Valley Brook and Tanner Brook. The Town is rural in nature, sparsely populated and is dominated by forestland and limited residential development corridors.

Soils Discussion

1. Overall Soils

The soils of Cornwall primarily developed from glacial till deposits (Western Highland) with two major soil associations (catenas): (ablation till) Hollis, Chatfield, Charlton, Canton, Sutton, and Leicester mapping units and (compact till) Paxton, Montauk, Woodbridge, Ridgebury and Whitman mapping units. A small percentage of the glacial till soils are derived from mixed limestone and crystalline rocks (parent material) and include the following soil associations: Stockbridge, Farmington, Nellis, Georgia, Amenia, Mudgepond and Alden mapping units.

Within the valleys and terraces along the larger watercourses, such as the Housatonic River, glaciofluvial (stratified sand and gravel) and alluvial (stratified sand and silt) soils have developed and include the following associations: (glaciofluvial) Hinckley, Merrimac, Sudbury, Walpole, and Scarboro mapping units; Enfield, Haven, Ninigret, Tisbury and Raypol mapping units; and Groton, Copake, Hero, Fredon and Halsey mapping units; (alluvial) Occum, Hadley, Pootatuck, Rippowam, Limerick and Saco. I have included a soil map and list for the section of Cornwall in the vicinity of the confluence of the Housatonic River and Furnace Brook.

2. Soils/Development

The main landscape features in Cornwall affecting soils, and development thereof, include slope (steepness) on the highlands and the occurrence of wetlands and floodplains in the watercourse valleys and terraces.

Slope (steepness)

Approximately 40% of the Town has soils with greater than 15% slope (see map entitled "Steep Slope. Cornwall, Connecticut", dated May 31, 2007 and prepared by CTDEP). These soils occur on ridgelines and mountains, such as: Mine Mountain, Coltsfoot Mountain, Green Mountain, Whitcomb Hill, White Rock, Mohawk Mountain and Red Mountain. Development on any of these steep sloped soils would be extremely difficult and problematic for erosion and sediment control. Due to textural and structural characteristics some soils have severe erosion potential even at 8% - 15% slope, including Armenia, Enfield, Georgia, Haven, Merrimac, Nellis and

Stockbridge series. Soils with severe erosion potential at 15% - 45% slope include: Canton, Charlton, Chatfield, Groton, Hinckley, Hollis, Montauk and Paxton series. It is critical that erosion and sedimentation controls be properly designed, implemented, monitored and enforced for development on these aforementioned steep soils.

Inland Wetland (including Alluvial/Floodplain) Soils

Wetland soils have developed uniformly across the Town within drainageways, valleys and lowlands (see map entitled Wetland Soils, Cornwall, Connecticut," dated May 31, 2007 and prepared by CTDEP). The list of soil series/mapping units designated at “Inland Wetlands” is attached and detailed in the following document: http://www.ct.nrcs.usda.gov/Soil Pages/inland wetland_soils.html

Large wetland complexes, located at higher elevations, serve as headwaters to watercourses such as Heffers Brook, Reed Brook, Bonney Brook and Preston Brook. Lowland and floodplain wetland complexes are associated with watercourses, including Birdseye Brook, Furnace Brook, Valley Brook, Tanner Brook and the Hollenbeck River. Development of these soils are problematic since they are regulated by the Town of Cornwall and US Army Corps of Engineers permitting programs and are generally unsuitable for construction activities due to flooding, excessive fines and organic matter, high water tables, poor drainage/permeability and overall poor soil stability. Further, inland wetland soils support ecosystems which provide a myriad of beneficial function and values for the Town, including groundwater recharge/discharge, floodflow alteration, fish and shellfish habitat, sediment/toxicant retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wildlife habitat, recreation, education/scientific value, uniqueness/heritage and visual quality/aesthetics. Consequently, the Town of Cornwall should continue its protection and preservation of its inland wetland soils.

Farmland Soils

The list of soil series/mapping units that have been designated in Connecticut as "Prime Farmland" and "Farmland of Statewide Importance" is attached and detailed in the following document: ftp://ftp-fc.sc.egov.usda.gov/CT/soils/20Q7_prime-important.pdf. These farmland soils in Cornwall are shown on the map entitled "Farmland Soils, Cornwall, Connecticut", dated May 31, 2007 and prepared by CTDEP.

The same characteristics that make these farmland soils desirable for agriculture uses (gentle slopes, moderate drainage and moisture capacity, permeability, fertility, non-erodible, etc...) are what make these soils prime areas for future development. Adding to their suitability for development, most of these soils are usually open field or lightly forested, accessible and large tracts of land (farms) with one owner. These farmland soils and any adjacent suitable (non-

wetland and gentle sloped soils) soils would be at a high risk. Consequently, the Town should prioritize protection of these soils in any planning efforts.

Conclusions

- The main limiting factors for development in Cornwall is steepness and inland wetlands.
- Development on soils with 15% slopes or greater should be discouraged due to significant potential for erosion and resultant sedimentation of water resources.
- Development within or immediately adjacent to Inland Wetland soils should be avoided.
- The protection and preservation of Farmland Soils should be a Town priority.
- Development pressures will be greatest on the non-wetland soils with gentle slopes (0% - 15%), which include the aforementioned Farmland Soils.

Soils of Cornwall, CT

Cornwall's Dominant Soil Types (covering 49% of the town)

- 3 - Ridgebury, Leicester and Whitman soils, extremely stony (5% of Cornwall)
- 62C - Canton and Charlton soils, 3 to 15 percent slopes, extremely stony (8% of Cornwall)
- 62D - Canton and Charlton soils, 15 to 35 percent slopes, extremely stony (13% of Cornwall)
- 73C - Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky (6% of Cornwall)
- 73E - Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky (8% of Cornwall)
- 75E - Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes (9% of Cornwall)

Class 1 Soils

- 29A -Agawam fine sandy loam, 0 to 3 percent slopes, 17.4 acres
- 31A -Copake fine sandy loam, 0 to 3 percent slopes, 24.4 acres
- 32A -Haven and Enfield soils, 0 to 3 percent slopes, 59.1 acres
- 34A -Merrimac sandy loam, 0 to 3 percent slopes, 65 acres
- 101 -Occum fine sandy loam, 20.3 acres
- 105 -Hadley silt loam, 11.8 acres
- 428A -Ashfield fine sandy loam, 0 to 3 percent slopes, 2.6 acres

Class 2 - Wetness Limitation

- 21A -Ninigret and Tisbury, 0 to 5 percent slopes, 308.7 acres
- 22A -Hero gravelly loam, 0 to 3 percent slopes,11.4 acres
- 22B -Hero gravelly loam, 3 to 8 percent slopes, 8.9 acres
- 45A -Woodbridge fine sandy loam, 0 to 3 percent slopes, 5.6 acres
- 50B -Sutton fine sandy loam, 3 to 8 percent slopes, 27.7 acres
- 420B -Schroon fine sandy loam, 3 to 8 percent slopes, 2.6 acres
- 102 -Pootatuck fine sandy loam, 45.4 acres
- 106 -Winooski silt loam, 5.6 acres

Class 2 - Shallow, Drought, or Stony Limitation

- 36A Windsor loamy sand, 0 to 3 percent slopes, 19.6 acres
- 36B Windsor loamy sand, 3 to 8 percent slopes, 14.4 acres
- 100 Suncook loamy fine sand, 43.6 acres
- 424B Shelburne fine sandy loam, 3 to 8 percent slopes, 19.1 acres

Class 2 - Erosion Limitation

- 29B Agawam fine sandy loam, 3 to 8 percent slopes, 63.3
- 30B Branford silt loam, 3 to 8 percent slopes, 1.1 acres
- 31B Copake fine sandy loam, 3 to 8 percent slopes, 48.7 acres
- 32B Haven and Enfield soils, 3 to 8 percent slopes, 139 acres
- 34 B Merrimac sandy loam, 3 to 8 percent slopes, 489.4 acres
- 45B Woodbridge fine sandy loam, 3 to 8 percent slopes, 174.7 acres
- 48B Georgia and Amenia silt loams, 2 to 8 percent slopes, 32.3 acres
- 60B Canton and Charlton soils, 3 to 8 percent slopes, 242.1 acres
- 84B Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, 590 acres
- 90B Stockbridge loam, 3 to 8 percent slopes, 32.7 acres
- 412B Bice fine sandy loam, 3 to 8 percent slopes, 3.2 acres
- 428B Ashfield fine sandy loam, 3 to 8 percent slopes, 0.3 acres

Class 3- Erosion Limitation

- 29C Agawam fine sandy loam, 8 to 15 percent slopes, 22.1 acres
- 31C Copake gravelly loam, 8 to 15 percent slopes, 11.9 acres
- 32C Haven and Enfield soils, 8 to 15 percent slopes, 88.6 acres
- 34C Merrimac sandy loam, 8 to 15 percent slopes, 195.6 acres
- 36C Windsor loamy sand, 8 to 15 percent slopes, 4.5 acres
- 39C Groton gravelly sandy loam, 3 to 15 percent slopes, 27.6 acres
- 45C Woodbridge fine sandy loam, 8 to 15 percent slopes, 40.7 acres
- 48C Georgia and Amenia silt loams, 8 to 15 percent slopes, 2.5 acres
- 57C Gloucester gravelly sandy loam, 8 to 15 percent slopes, 0.8 acres
- 60C Canton and Charlton soils, 8 to 15 percent slopes, 248 acres
- 84C Paxon and Montauk fine sandy loam, 8 to 15 percent slopes, 423.2 acres
- 90C Stockbridge loam, 8 to 15 percent slopes, 61.7 acres
- 306 Udorthents-Urban land complex, 82 acres
- 412C Bice fine sandy loam, 8 to 15 percent slopes, 6.4 acres
- 424C Shelburne fine sandy loam, 8 to 15 percent slopes, 26.3 acres

Class 3 - Shallow, Drought, or Stony Limitation

- 38A Hickley gravelly sandy loam, 0 to 3 percent slopes, 16.8 acres

Class 4- Wetness Limitation

- 4 Leicester fine sandy loam, 19 acres
- 7 Mudgepond silt loam, 29.9 acres
- 12 Raypol silt loam, 246.5 acres
- 13 Walpole sandy loam, 92.2 acres
- 14 Fredon silt loam, 29.7 acres
- 103 Rippowam fine sandy loam,76.6 acres
- 107 Limerick and Lim soils, 51.3 acres
- 503 Rumney fine sandy loam, 0.7 acres

Class 4 - Erosion Limitation

- 38C Hinckley gravelly sandy loam, 3 to 15 percent slopes, 470.9 acres
- 57D Gloucester gravelly sandy loam, 15 to 25 percent slopes, 1.5 acres
- 60D Canton and Charlton soils, 15 to 25 percent slopes, 57.8 acres
- 84D Paxton and Montauk fine sandy loam, 15 to 25 percent slopes,127.8 acres
- 90D Stockbridge loam, 15 to 25 percent slopes,6.1 acres
- 305 Udorthents-Pits complex, gravelly, 16.6 acres
- 308 Udorthents, smoothed, 76.6 acres
- 412D Bice fine sandy loam, 15 to 25 percent slopes, 2.8 acres
- 424D Shelburne fine sandy loam, 15 to 25 percent slopes,6.3 acres

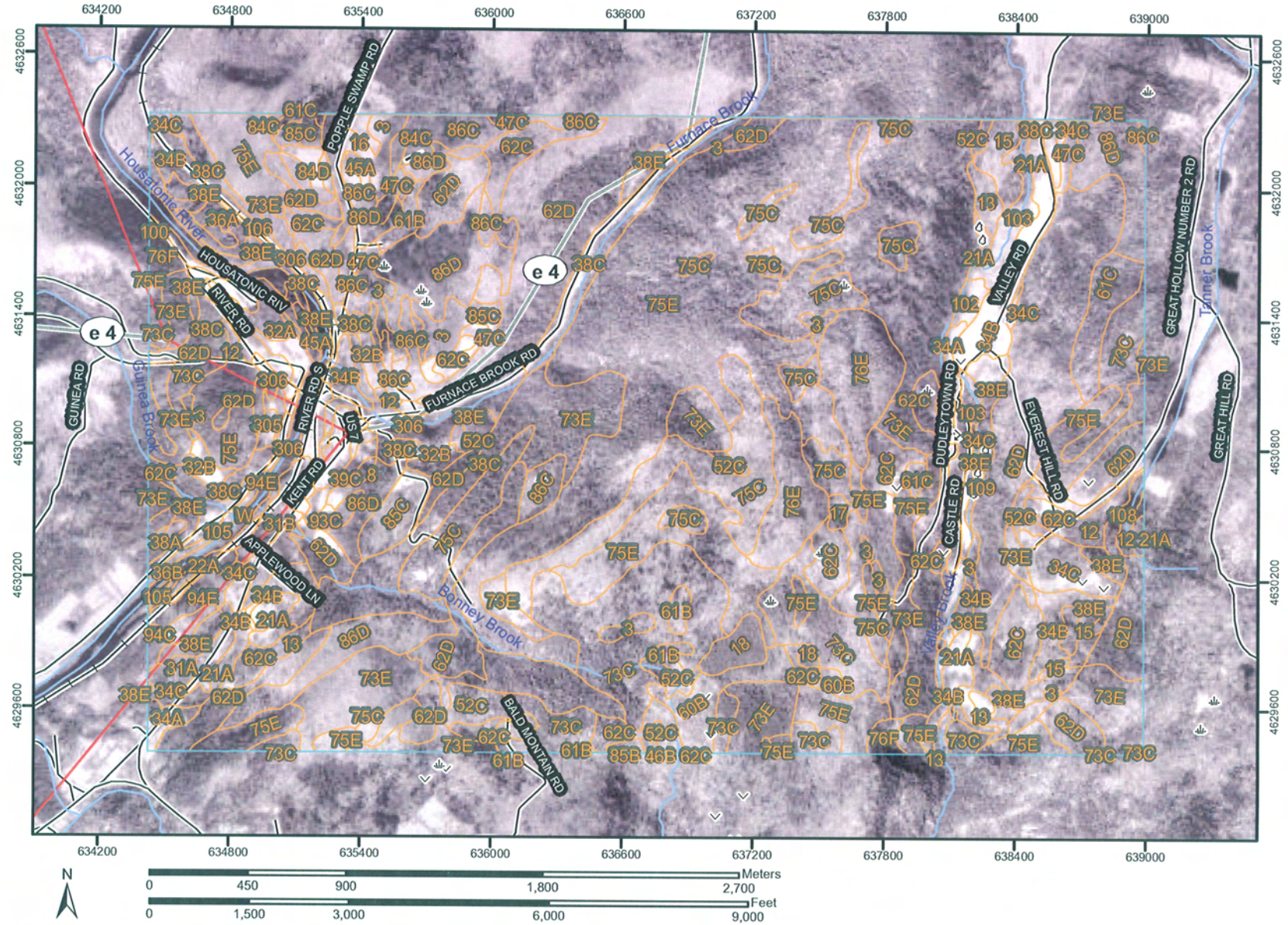
Class 6 – erosion limitation

- 38E Hinckley gravelly sandy loam, 15 to 45 percent slopes, 760.5 acres
- 39E Groton gravelly sandy loam, 15 to 45 percent slopes, 30.3 acres

Class 6 – shallow, droughty or stony limitation

- 46B Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony, 97.2 acres
- 46C Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony,33.6 acres
- 49B Georgia and Amenia silt loams, 3 to 8 percent slopes, very stony, 4.7 acres
- 49C Georgia and Amenia silt loams, 8 to 15 percent slopes, very stony, 75.1 acres
- 51B Sutton fine sandy loam, 2 to 8 percent slopes, very stony, 25.8 acres
- 58B Gloucester gravelly sandy loam, 3 to 8 percent slopes, very stony, 1.6 acres
- 58C Gloucester gravelly sandy loam, 8 to 15 percent slopes, very stony, 7.3 acres
- 61B Canton and Charlton, 3 to 8 percent slopes, very stony, 232.6 acres
- 61C Canton and Charlton, 8 to 15 percent slopes, very stony, 347.8 acres
- 73C Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky, 1775.6 acres
- 75C Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes, 813.4 acres
- 85B Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony, 193.6 acres
- 85C Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony,222.1 acres
- 91B Stockbridge loam, 3 to 8 percent slopes, very stony, 5.2 acres
- 91C Stockbridge loam, 8 to 15 percent slopes, very stony, 34.5 acres
- 93C Nellis fine sandy loam, 3 to 15 percent slopes, very stony, 12.1 acres
- 94C Farmington-Nellis complex, 3 to 15 percent slopes, very rocky, 10.9 acres
- 95C Farmington-Rock outcropcomplex, 3 to 15 percent slopes, 8.7 acres
- 413C Bice-Millsite complex, 3 to 15 percent slopes, very rocky, 333.2 acres
- 417B Bice fine sandy loam, 3 to 8 percent slopes, very stony, 4 acres
- 417C Bice fine sandy loam, 8 to 15 percent slopes, very stony, 190.2 acres
- 417D Bice fine sandy loam, 15 to 25 percent slopes, very stony, 260.1 acres
- 418C Schroon fine sandy loam, 2 to 15 percent slopes, very stony, 50.3 acres
- 425B Shelburne fine sandy loam, 3 to 8 percent slopes, very stony, 15.3 acres
- 425C Shelburne fine sandy loam, 8 to 15 percent slopes, very stony, 214.9 acres
- 427B Ashfield fine sandy loam, 2 to 8 percent slopes, very stony, 8.1 acres
- 427C Ashfield fine sandy loam, 8 to 15 percent slopes, very stony, 112 acres

Soil Map–State of Connecticut



USDA Natural Resources Conservation Service

Web Soil Survey 2.0
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 3/31/1991

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
3	Ridgebury, Leicester, and Whitman soils, extremely stony	65.7	2.0%
8	Mudgepond and Alden soils, extremely stony	2.3	0.1%
12	Raypol silt loam	18.0	0.5%
13	Walpole sandy loam	15.3	0.5%
14	Fredon silt loam	0.2	0.0%
15	Scarboro muck	20.7	0.6%
16	Halsey silt loam	3.5	0.1%
17	Timakwa and Natchaug soils	3.5	0.1%
18	Catden and Freetown soils	14.3	0.4%
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	35.6	1.1%
22A	Hero gravelly loam, 0 to 3 percent slopes	3.8	0.1%
31A	Copake fine sandy loam, 0 to 3 percent slopes	6.7	0.2%
31B	Copake fine sandy loam, 3 to 8 percent slopes	15.2	0.5%
32A	Haven and Enfield soils, 0 to 3 percent slopes	18.4	0.6%
32B	Haven and Enfield soils, 3 to 8 percent slopes	14.8	0.4%
34A	Merrimac sandy loam, 0 to 3 percent slopes	10.9	0.3%
34B	Merrimac sandy loam, 3 to 8 percent slopes	105.1	3.2%
34C	Merrimac sandy loam, 8 to 15 percent slopes	47.9	1.4%
36A	Windsor loamy sand, 0 to 3 percent slopes	5.9	0.2%
36B	Windsor loamy sand, 3 to 8 percent slopes	2.6	0.1%
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	2.9	0.1%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	77.8	2.4%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	156.8	4.7%
39C	Groton gravelly sandy loam, 3 to 15 percent slopes	6.2	0.2%

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
39E	Groton gravelly sandy loam, 15 to 45 percent slopes	0.8	0.0%
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	4.3	0.1%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	1.7	0.1%
46B	Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony	1.1	0.0%
47C	Woodbridge fine sandy loam, 2 to 15 percent slopes, extremely stony	19.4	0.6%
49B	Georgia and Amenia silt loams, 3 to 8 percent slopes, very stony	2.5	0.1%
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	1.5	0.0%
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	36.9	1.1%
60B	Canton and Charlton soils, 3 to 8 percent slopes	28.4	0.9%
60C	Canton and Charlton soils, 8 to 15 percent slopes	3.4	0.1%
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	19.4	0.6%
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	32.4	1.0%
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	120.5	3.6%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	473.6	14.3%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	212.5	6.4%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	295.8	9.0%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	213.8	6.5%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	701.2	21.2%
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	80.2	2.4%
76F	Rock outcrop-Hollis complex, 45 to 60 percent slopes	12.1	0.4%

State of Connecticut (CT600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	1.5	0.0%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	7.3	0.2%
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	7.1	0.2%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	3.5	0.1%
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	26.7	0.8%
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	43.5	1.3%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	146.2	4.4%
93C	Nellis fine sandy loam, 3 to 15 percent slopes, very stony	2.8	0.1%
94C	Farmington-Nellis complex, 3 to 15 percent slopes, very rocky	7.4	0.2%
94E	Farmington-Nellis complex, 15 to 35 percent slopes, very rocky	12.7	0.4%
95C	Farmington-Rock outcrop complex, 3 to 15 percent slopes	2.1	0.1%
100	Suncook loamy fine sand	3.2	0.1%
102	Pootatuck fine sandy loam	5.5	0.2%
103	Rippowam fine sandy loam	21.6	0.7%
105	Hadley silt loam	10.8	0.3%
106	Winooski silt loam	3.9	0.1%
108	Saco silt loam	5.9	0.2%
109	Fluvaquents-Udifluvents complex, frequently flooded	5.0	0.2%
305	Udorthents-Pits complex, gravelly	3.1	0.1%
306	Udorthents-Urban land complex	34.5	1.0%
W	Water	35.0	1.1%
Totals for Area of Interest (AOI)		3,304.6	100.0%

Agricultural Land

Cornwall's Agricultural System

According to the Connecticut Economic Resource Center (CERC), 12.5% of the businesses in the Town of Cornwall are agricultural. Agricultural businesses employ 2.9% of the total workforce. These agricultural businesses include production of beef, pork, lamb, milk, eggs, vegetables, flowers, herbs, hay, maple syrup, wood products, and llamas as well as horse boarding. Most of the food produced, including dairy products, is sold locally, directly to consumers. Grain crops for human consumption are not currently produced in any significant quantity in Cornwall, but could be grown if desired.

There are several farms in town that have been preserved. Both the Ridgeway Farm and the Hammond Farm are protected by a landowner donated easements held by the Northwest Conservation District. Cream Hill Farm is protected by an easement held by the State of CT, and purchased through a combined effort of the State's Purchase of Development Rights program with the USDA Farm and Ranchland Protection Program. Stone Wall Dairy has been protected by an easement held by the State of CT through the combined efforts of the Town of Cornwall, the USDA Farm and Ranchland Protection Program and the Trust for Public Land.

Cornwall's Soil Capability

There are 29,911.6 acres in Cornwall (roughly 49 square miles), shown on the soil map. Acreage errors may occur in digitizing the town boundary. Some areas have already been built on and are not available for farming or forestry. The size of these other use land areas has not been determined.

A mixture of steep rocky slopes and wetland soils cover about half the town's land area. The Ridgebury, Leicester and Whitman soils (mapping unit 3) are classed as Inland Wetland soils in Connecticut. This soil mapping unit covers 5% of Cornwall. The other dominant soils, (mapping units 62C, 62D, 73C, 73E, and 75E) covering 44% of Cornwall, are well drained, sloping to steep, very rocky to extremely stony soils. These dominant soils are not well suited to agriculture. The dominant soils are listed in the appendix of this report.

The Land Capability Classification shows the suitability for most types of field crops. This system rates soils as class 1 through 8, with class 1 being best for agriculture and 8 being worst. Soils in classes 1 through 3 are well suited to agriculture and classes 6, 7 and 8 are not well suited to agriculture. The Agricultural Limitations lists the reason certain soils are not rated as well for agriculture. Lists of soils showing capability class, limitation, and acreage is shown in the appendix of this report.

Soils with capability class 1 are the best soils for crop land. There are only 200.6 acres of class 1 soils in Cornwall. Class 1 soils have few limitations that restrict their use. These are the best soils for vegetable crops and other annually tilled crops and nursery stock.

Soils with capability class 2 have moderate limitations that reduce the choice of plants or that require conservation practices. There are 2,329.4 acres of class 2 soil in Cornwall. They can be used for annually tilled crops if limitations are managed. Erosion control measures such as crop rotations, cover crops, and planting along the contour are used where slopes range from 3 to 8 percent. Irrigation may be needed for soils with limitations of doughtiness. Crop type and variety choices can reduce loss due to wetness. Ridge tillage may also be helpful on wet soils.

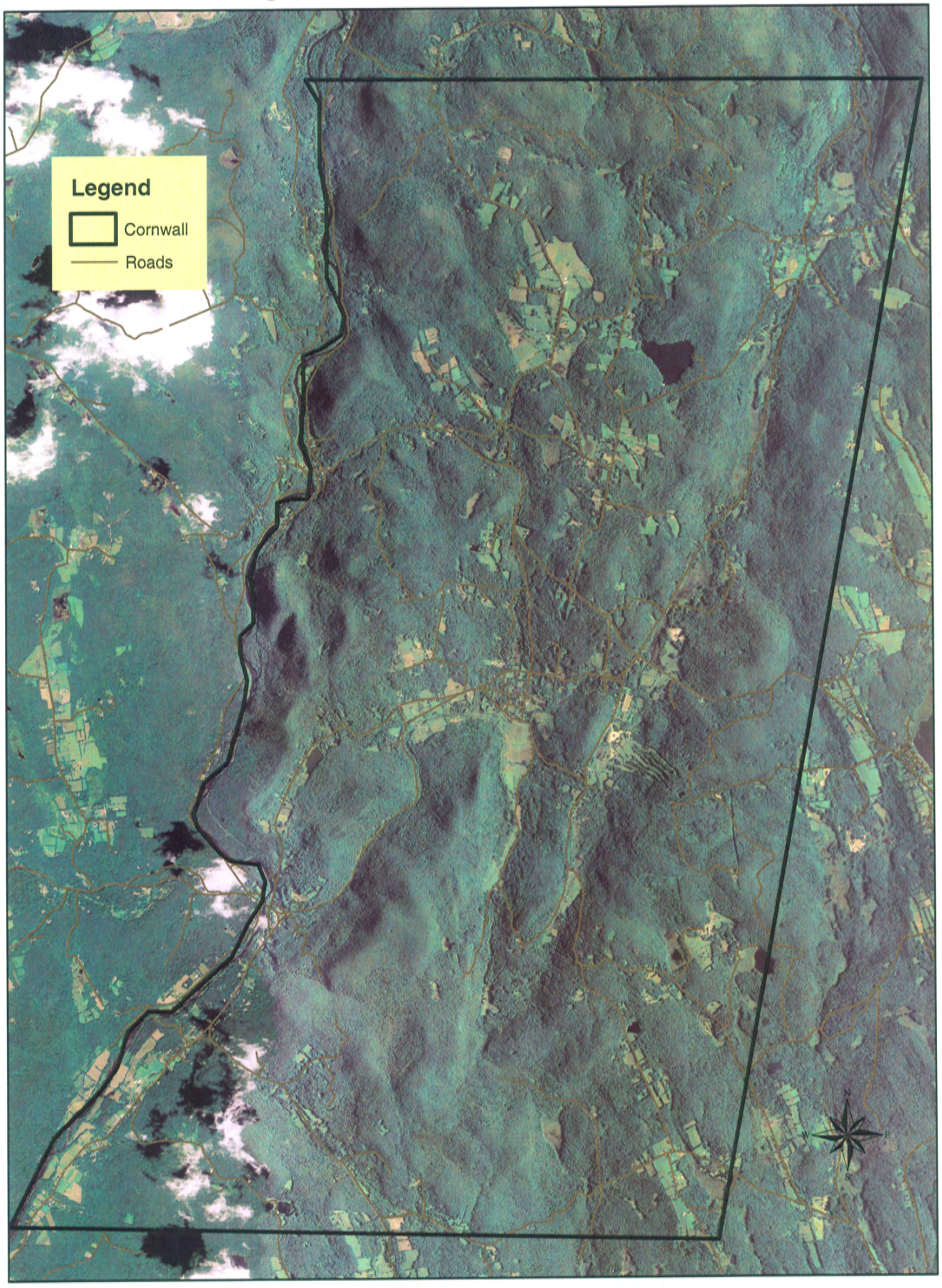
Capability class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices or both. There are 1258.7 class 3 soils in Cornwall. Because of the erosion risk on most of these soils, the soil should be kept in perennial sod. Tree fruits, vineyards, hay and pasture crops all can be grown.

Capability class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both. There is a total of 1312.3 acres of class 4 soils in Cornwall. These areas are suited to pasture, however maintenance of the fields may be restricted due to slope or wetness. There are 545.9 class 4 soils with severe wetness limitations and 766.4 acres with severe erosion limitations due to the steep slopes.

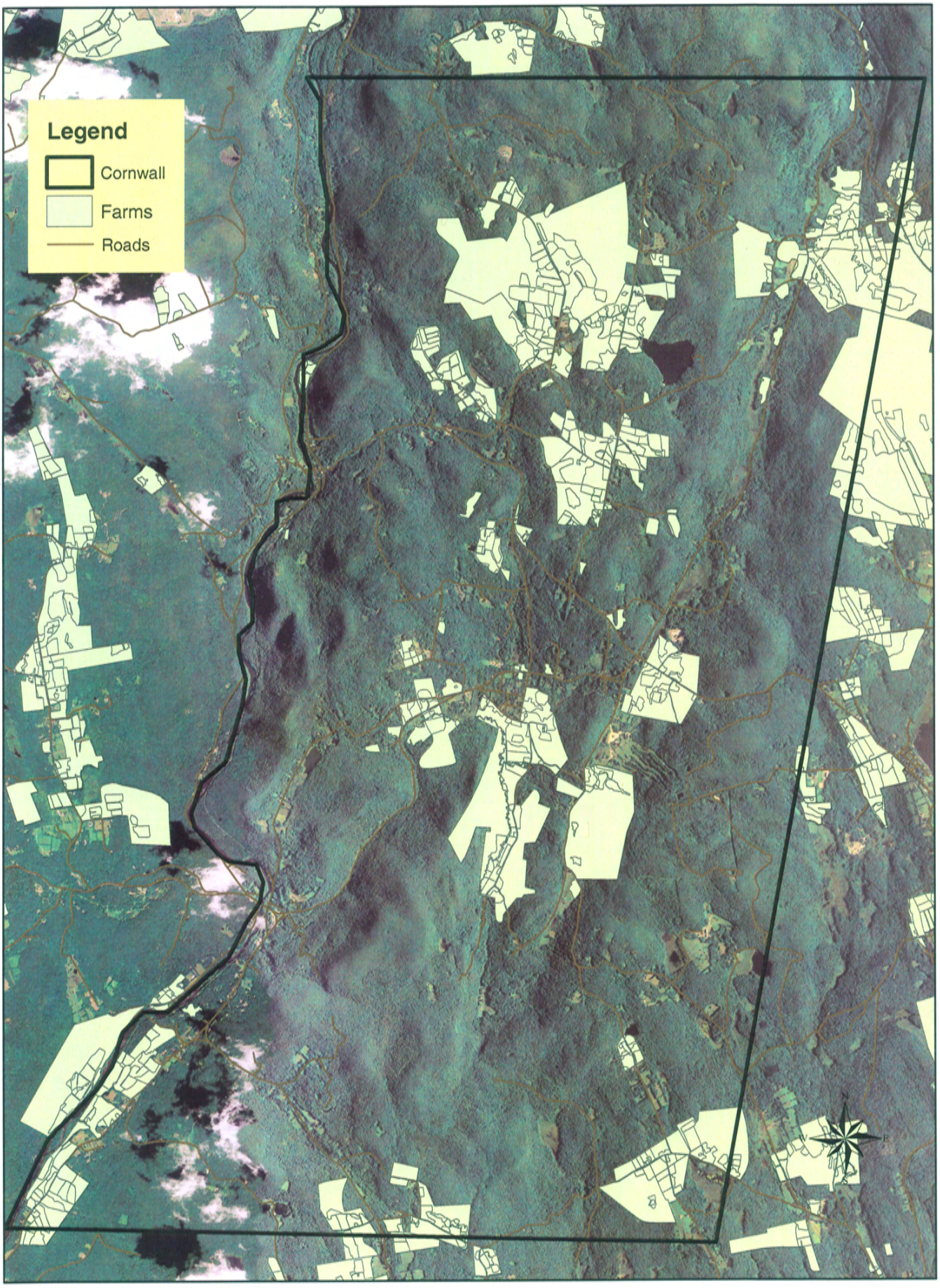
The capability class 5 soils in Cornwall are all Inland Wetland soil types. While some of these areas might be pastured, these soils are not included in any calculation of agricultural soils for Cornwall.

The capability class 6 soils are not well suited to agriculture. Where wetness is not a limitation, these soils can be used for wood harvesting. There are 5880.7 acres of class 6 soils, without a wetness limitation.

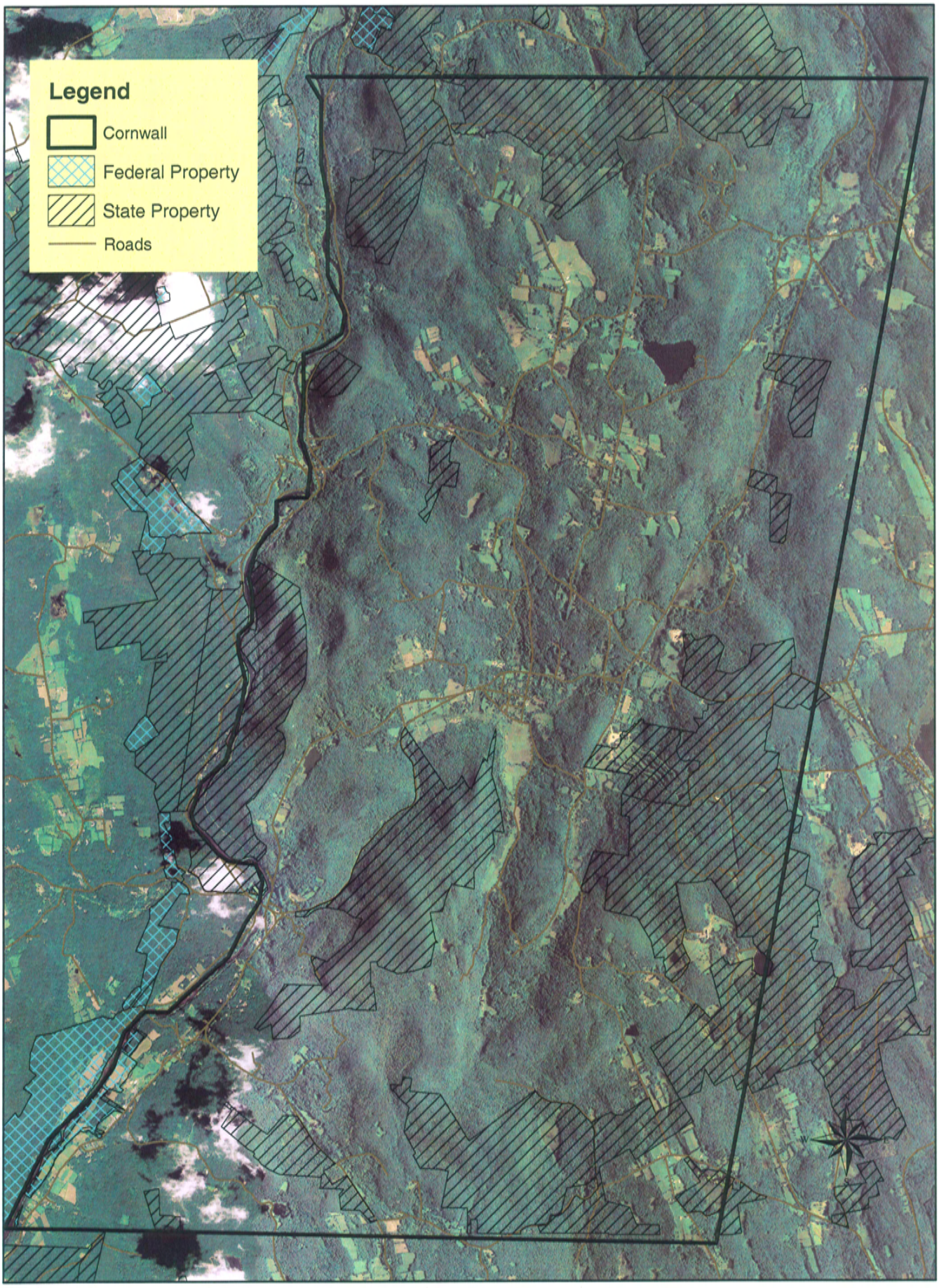
Cornwall - Aerial View



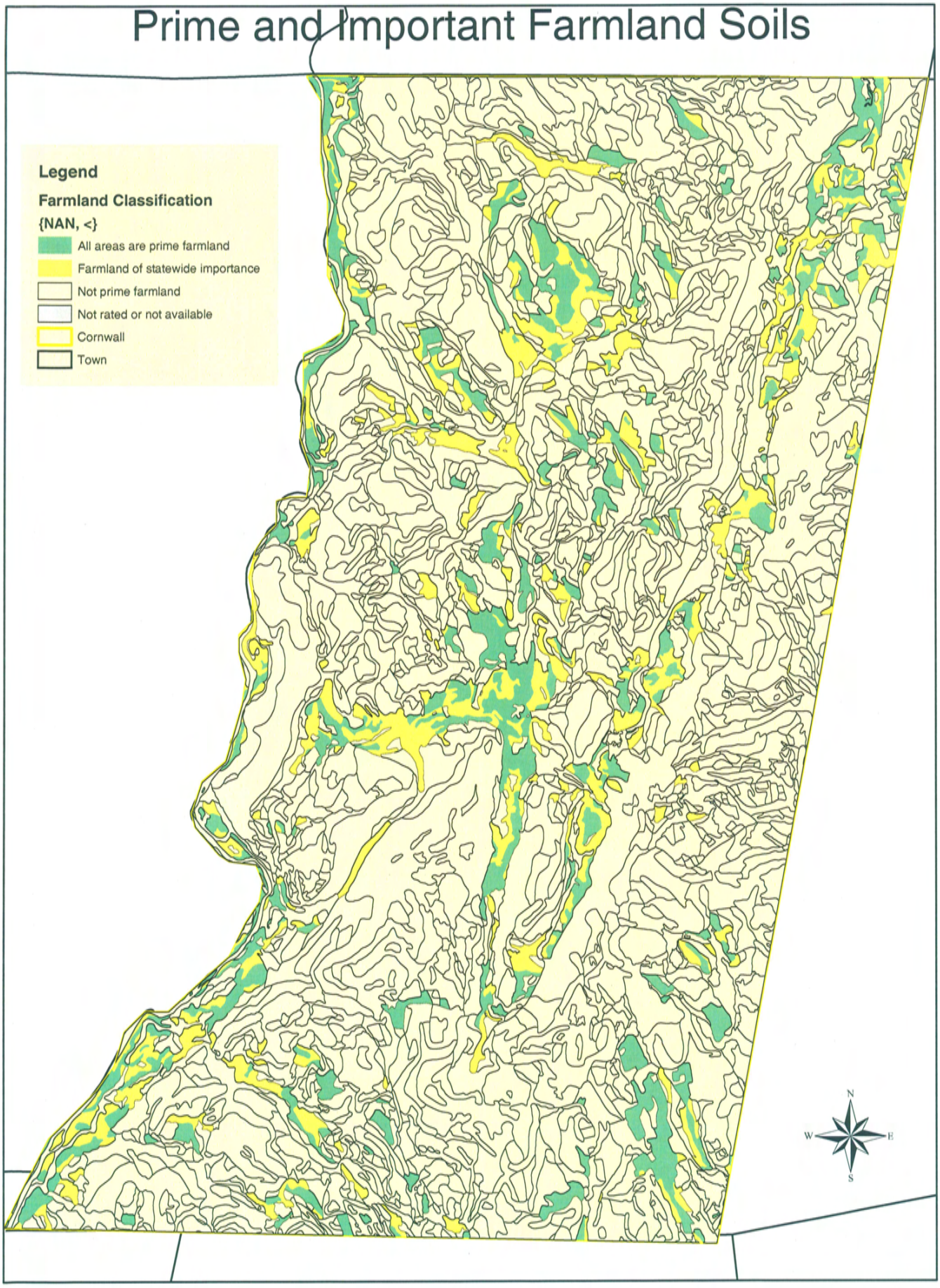
Cornwall Farms



Cornwall - State and Federal Land



Cornwall
Prime and Important Farmland Soils



Farmland Classification

Aggregation Method: No Aggregation Necessary
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
2	Ridgebury fine sandy loam	Farmland of statewide importance
3	Ridgebury, Leicester, and Whitman soils, extremely stony	Not prime farmland
4	Leicester fine sandy loam	Farmland of statewide importance
7	Mudgepond silt loam	Farmland of statewide importance
8	Mudgepond and Alden soils, extremely stony	Not prime farmland
12	Raypol silt loam	Farmland of statewide importance
13	Walpole sandy loam	Farmland of statewide importance
14	Fredon silt loam	Farmland of statewide importance
15	Scarboro muck	Not prime farmland
16	Halsey silt loam	Not prime farmland
17	Timakwa and Natchaug soils	Not prime farmland
18	Catden and Freetown soils	Not prime farmland
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	All areas are prime farmland
22A	Hero gravelly loam, 0 to 3 percent slopes	All areas are prime farmland
22B	Hero gravelly loam, 3 to 8 percent slopes	All areas are prime farmland
29A	Agawam fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
29B	Agawam fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
29C	Agawam fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
30B	Branford silt loam, 3 to 8 percent slopes	All areas are prime farmland
31A	Copake fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
31B	Copake fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
31C	Copake gravelly loam, 8 to 15 percent slopes	Farmland of statewide importance
32A	Haven and Enfield soils, 0 to 3 percent slopes	All areas are prime farmland
32B	Haven and Enfield soils, 3 to 8 percent slopes	All areas are prime farmland
32C	Haven and Enfield soils, 8 to 15 percent slopes	Farmland of statewide importance
34A	Merrimac sandy loam, 0 to 3 percent slopes	All areas are prime farmland
34B	Merrimac sandy loam, 3 to 8 percent slopes	All areas are prime farmland
34C	Merrimac sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
36A	Windsor loamy sand, 0 to 3 percent slopes	Farmland of statewide importance
36B	Windsor loamy sand, 3 to 8 percent slopes	Farmland of statewide importance
36C	Windsor loamy sand, 8 to 15 percent slopes	Farmland of statewide importance
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	Farmland of statewide importance
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	Not prime farmland
39C	Groton gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
39E	Groton gravelly sandy loam, 15 to 45 percent slopes	Not prime farmland

Farmland Classification

Aggregation Method: No Aggregation Necessary
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
46B	Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony	Not prime farmland
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	Not prime farmland
47C	Woodbridge fine sandy loam, 2 to 15 percent slopes, extremely stony	Not prime farmland
48B	Georgia and Amenia silt loams, 2 to 8 percent slopes	All areas are prime farmland
48C	Georgia and Amenia silt loams, 8 to 15 percent slopes	Farmland of statewide importance
49B	Georgia and Amenia silt loams, 3 to 8 percent slopes, very stony	Not prime farmland
49C	Georgia and Amenia silt loams, 8 to 15 percent slopes, very stony	Not prime farmland
50B	Sutton fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	Not prime farmland
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	Not prime farmland
57C	Gloucester gravelly sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
57D	Gloucester gravelly sandy loam, 15 to 25 percent slopes	Not prime farmland
58B	Gloucester gravelly sandy loam, 3 to 8 percent slopes, very stony	Not prime farmland
58C	Gloucester gravelly sandy loam, 8 to 15 percent slopes, very stony	Not prime farmland
59C	Gloucester gravelly sandy loam, 3 to 15 percent slopes, extremely stony	Not prime farmland
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	Not prime farmland
60B	Canton and Charlton soils, 3 to 8 percent slopes	All areas are prime farmland
60C	Canton and Charlton soils, 8 to 15 percent slopes	Farmland of statewide importance
60D	Canton and Charlton soils, 15 to 25 percent slopes	Not prime farmland
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	Not prime farmland
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	Not prime farmland
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	Not prime farmland
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	Not prime farmland
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	Not prime farmland
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	Not prime farmland
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	Not prime farmland
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	Not prime farmland
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	Not prime farmland
76F	Rock outcrop-Hollis complex, 45 to 60 percent slopes	Not prime farmland
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	All areas are prime farmland
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	Farmland of statewide importance
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	Not prime farmland
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	Not prime farmland
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	Not prime farmland
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	Not prime farmland
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	Not prime farmland
90B	Stockbridge loam, 3 to 8 percent slopes	All areas are prime farmland
90C	Stockbridge loam, 8 to 15 percent slopes	Farmland of statewide importance
90D	Stockbridge loam, 15 to 25 percent slopes	Not prime farmland
91B	Stockbridge loam, 3 to 8 percent slopes, very stony	Not prime farmland

Farmland Classification

Aggregation Method: No Aggregation Necessary
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
91C	Stockbridge loam, 8 to 15 percent slopes, very stony	Not prime farmland
91D	Stockbridge loam, 15 to 35 percent slopes, very stony	Not prime farmland
93C	Nellis fine sandy loam, 3 to 15 percent slopes, very stony	Not prime farmland
94C	Farmington-Nellis complex, 3 to 15 percent slopes, very rocky	Not prime farmland
94E	Farmington-Nellis complex, 15 to 35 percent slopes, very rocky	Not prime farmland
95C	Farmington-Rock outcrop complex, 3 to 15 percent slopes	Not prime farmland
100	Suncook loamy fine sand	Farmland of statewide importance
101	Occum fine sandy loam	All areas are prime farmland
102	Pootatuck fine sandy loam	All areas are prime farmland
103	Rippowam fine sandy loam	Farmland of statewide importance
105	Hadley silt loam	All areas are prime farmland
106	Winooski silt loam	All areas are prime farmland
107	Limerick and Lim soils	Farmland of statewide importance
108	Saco silt loam	Not prime farmland
109	Fluvaquents-Udifluvents complex, frequently flooded	Not prime farmland
303	Pits, quarries	Not prime farmland
305	Udorthents-Pits complex, gravelly	Not prime farmland
306	Udorthents-Urban land complex	Not prime farmland
308	Udorthents, smoothed	Not prime farmland
412B	Bice fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
412C	Bice fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
412D	Bice fine sandy loam, 15 to 25 percent slopes	Not prime farmland
413C	Bice-Millsite complex, 3 to 15 percent slopes, very rocky	Not prime farmland
413E	Bice-Millsite complex, 15 to 45 percent slopes, very rocky	Not prime farmland
415C	Westminster-Millsite-Rock outcrop complex, 3 to 15 percent slopes	Not prime farmland
415E	Westminster-Millsite-Rock outcrop complex, 15 to 45 percent slopes	Not prime farmland
416E	Rock outcrop-Westminster complex, 8 to 45 percent slopes	Not prime farmland
417B	Bice fine sandy loam, 3 to 8 percent slopes, very stony	Not prime farmland
417C	Bice fine sandy loam, 8 to 15 percent slopes, very stony	Not prime farmland
417D	Bice fine sandy loam, 15 to 25 percent slopes, very stony	Not prime farmland
418C	Schroon fine sandy loam, 2 to 15 percent slopes, very stony	Not prime farmland
420B	Schroon fine sandy loam, 3 to 8 percent slopes	Farmland of statewide importance
424B	Shelburne fine sandy loam, 3 to 8 percent slopes	Not prime farmland
424C	Shelburne fine sandy loam, 8 to 15 percent slopes	Not prime farmland
424D	Shelburne fine sandy loam, 15 to 25 percent slopes	Not prime farmland
425B	Shelburne fine sandy loam, 3 to 8 percent slopes, very stony	Not prime farmland
425C	Shelburne fine sandy loam, 8 to 15 percent slopes, very stony	Not prime farmland
426D	Shelburne fine sandy loam, 15 to 35 percent slopes, extremely stony	Not prime farmland
427B	Ashfield fine sandy loam, 2 to 8 percent slopes, very stony	Not prime farmland
427C	Ashfield fine sandy loam, 8 to 15 percent slopes, very stony	Not prime farmland
428A	Ashfield fine sandy loam, 0 to 3 percent slopes	Not prime farmland
428B	Ashfield fine sandy loam, 3 to 8 percent slopes	Not prime farmland
437	Wonsqueak mucky peat	Not prime farmland
438	Bucksport muck	Not prime farmland

Farmland Classification

Aggregation Method: No Aggregation Necessary
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
440C	Boscawen gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
443	Brayton-Loonmeadow complex, extremely stony	Not prime farmland
503	Rumney fine sandy loam	Farmland of statewide importance
W	Water	Not prime farmland

Farmland Classification

Rating Options

Attribute Name: Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No. 21, January 31, 1978.

Aggregation Method: No Aggregation Necessary

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

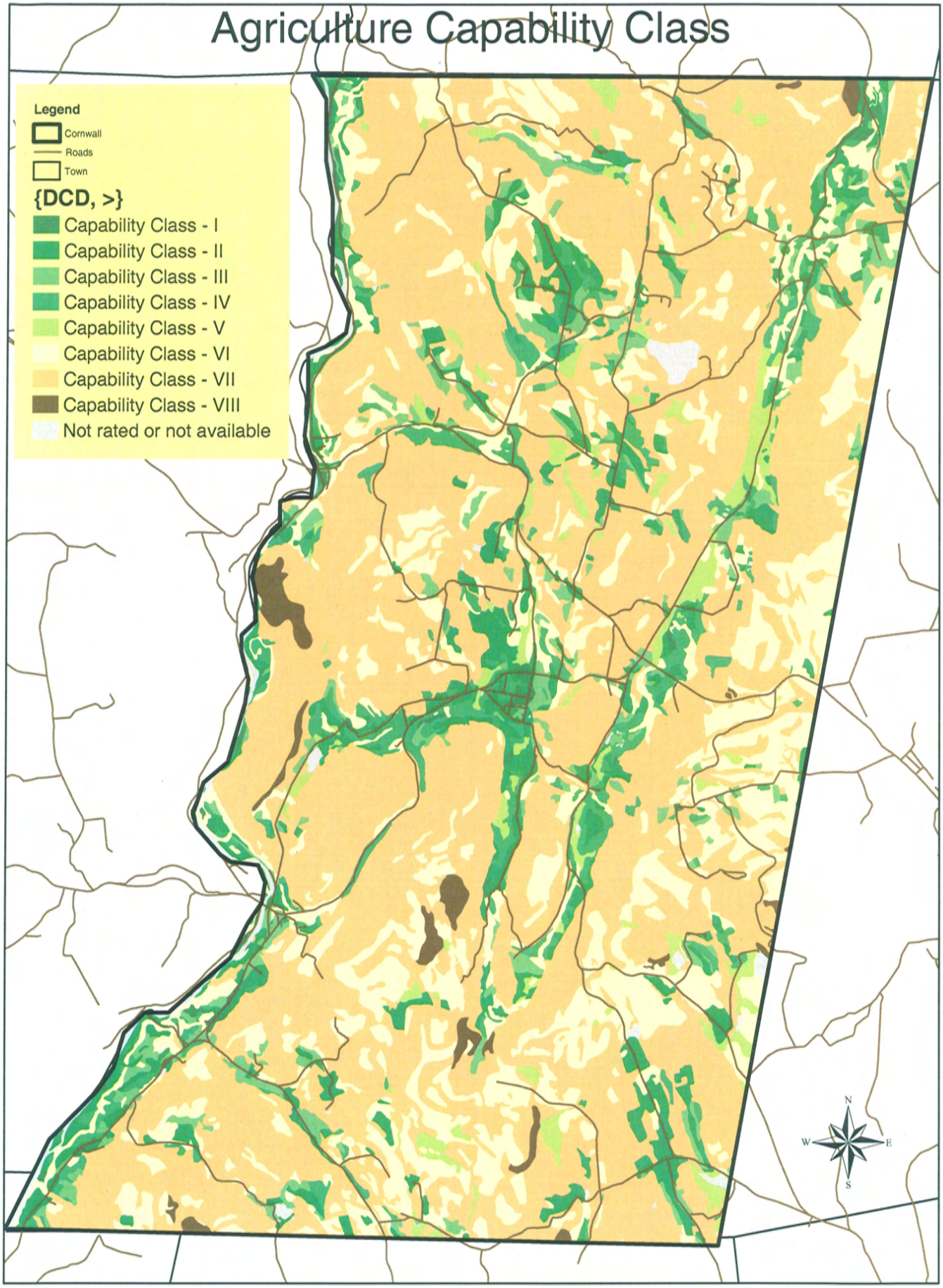
For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not.The majority of soil attributes are associated with a component of a map unit, and such an attribute has to be aggregated to the map unit level before a thematic map can be rendered. Map units, however, also have their own attributes. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the "aggregation method" for any attribute of a map unit is referred to as "No Aggregation Necessary".

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Cornwall
Agriculture Capability Class



Nonirrigated Capability Class

Aggregation Method: Dominant Condition
Tie-break Rule: Higher

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
2	Ridgebury fine sandy loam	4
3	Ridgebury, Leicester, and Whitman soils, extremely stony	7
4	Leicester fine sandy loam	4
7	Mudgepond silt loam	4
8	Mudgepond and Alden soils, extremely stony	7
12	Raypol silt loam	4
13	Walpole sandy loam	4
14	Fredon silt loam	4
15	Scarboro muck	5
16	Halsey silt loam	5
17	Timakwa and Natchaug soils	5
18	Catden and Freetown soils	5
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	2
22A	Hero gravelly loam, 0 to 3 percent slopes	2
22B	Hero gravelly loam, 3 to 8 percent slopes	2
29A	Agawam fine sandy loam, 0 to 3 percent slopes	1
29B	Agawam fine sandy loam, 3 to 8 percent slopes	2
29C	Agawam fine sandy loam, 8 to 15 percent slopes	3
30B	Branford silt loam, 3 to 8 percent slopes	2
31A	Copake fine sandy loam, 0 to 3 percent slopes	1
31B	Copake fine sandy loam, 3 to 8 percent slopes	2
31C	Copake gravelly loam, 8 to 15 percent slopes	3
32A	Haven and Enfield soils, 0 to 3 percent slopes	1
32B	Haven and Enfield soils, 3 to 8 percent slopes	2
32C	Haven and Enfield soils, 8 to 15 percent slopes	3
34A	Merrimac sandy loam, 0 to 3 percent slopes	1
34B	Merrimac sandy loam, 3 to 8 percent slopes	2
34C	Merrimac sandy loam, 8 to 15 percent slopes	3
36A	Windsor loamy sand, 0 to 3 percent slopes	2
36B	Windsor loamy sand, 3 to 8 percent slopes	2
36C	Windsor loamy sand, 8 to 15 percent slopes	3
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	3
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	4
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	6
39C	Groton gravelly sandy loam, 3 to 15 percent slopes	3
39E	Groton gravelly sandy loam, 15 to 45 percent slopes	6
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	2
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	2
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	3
46B	Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony	6
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	6
47C	Woodbridge fine sandy loam, 2 to 15 percent slopes, extremely stony	7
48B	Georgia and Amenia silt loams, 2 to 8 percent slopes	2
48C	Georgia and Amenia silt loams, 8 to 15 percent slopes	3
49B	Georgia and Amenia silt loams, 3 to 8 percent slopes, very stony	6
49C	Georgia and Amenia silt loams, 8 to 15 percent slopes, very stony	6
50B	Sutton fine sandy loam, 3 to 8 percent slopes	2

Nonirrigated Capability Class

Aggregation Method: Dominant Condition
Tie-break Rule: Higher

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	6
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	7
57C	Gloucester gravelly sandy loam, 8 to 15 percent slopes	3
57D	Gloucester gravelly sandy loam, 15 to 25 percent slopes	4
58B	Gloucester gravelly sandy loam, 3 to 8 percent slopes, very stony	6
58C	Gloucester gravelly sandy loam, 8 to 15 percent slopes, very stony	6
59C	Gloucester gravelly sandy loam, 3 to 15 percent slopes, extremely stony	7
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	7
60B	Canton and Charlton soils, 3 to 8 percent slopes	2
60C	Canton and Charlton soils, 8 to 15 percent slopes	3
60D	Canton and Charlton soils, 15 to 25 percent slopes	4
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	6
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	6
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	7
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	7
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	6
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	7
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	6
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	7
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	8
76F	Rock outcrop-Hollis complex, 45 to 60 percent slopes	8
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	2
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	3
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	4
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	6
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	6
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	7
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	7
90B	Stockbridge loam, 3 to 8 percent slopes	2
90C	Stockbridge loam, 8 to 15 percent slopes	3
90D	Stockbridge loam, 15 to 25 percent slopes	4
91B	Stockbridge loam, 3 to 8 percent slopes, very stony	6
91C	Stockbridge loam, 8 to 15 percent slopes, very stony	6
91D	Stockbridge loam, 15 to 35 percent slopes, very stony	7
93C	Nellis fine sandy loam, 3 to 15 percent slopes, very stony	6
94C	Farmington-Nellis complex, 3 to 15 percent slopes, very rocky	6
94E	Farmington-Nellis complex, 15 to 35 percent slopes, very rocky	7
95C	Farmington-Rock outcrop complex, 3 to 15 percent slopes	6
100	Suncook loamy fine sand	2
101	Occum fine sandy loam	1
102	Pootatuck fine sandy loam	2
103	Rippowam fine sandy loam	4
105	Hadley silt loam	1
106	Winooski silt loam	2
107	Limerick and Lim soils	4
108	Saco silt loam	6
109	Fluvaquents-Udifluvents complex, frequently flooded	6

Nonirrigated Capability Class

Aggregation Method: Dominant Condition
Tie-break Rule: Higher

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
303	Pits, quarries	8
305	Udorthents-Pits complex, gravelly	4
306	Udorthents-Urban land complex	3
308	Udorthents, smoothed	4
412B	Bice fine sandy loam, 3 to 8 percent slopes	2
412C	Bice fine sandy loam, 8 to 15 percent slopes	3
412D	Bice fine sandy loam, 15 to 25 percent slopes	4
413C	Bice-Millsite complex, 3 to 15 percent slopes, very rocky	6
413E	Bice-Millsite complex, 15 to 45 percent slopes, very rocky	7
415C	Westminster-Millsite-Rock outcrop complex, 3 to 15 percent slopes	7
415E	Westminster-Millsite-Rock outcrop complex, 15 to 45 percent slopes	7
416E	Rock outcrop-Westminster complex, 8 to 45 percent slopes	8
417B	Bice fine sandy loam, 3 to 8 percent slopes, very stony	6
417C	Bice fine sandy loam, 8 to 15 percent slopes, very stony	6
417D	Bice fine sandy loam, 15 to 25 percent slopes, very stony	6
418C	Schroon fine sandy loam, 2 to 15 percent slopes, very stony	6
420B	Schroon fine sandy loam, 3 to 8 percent slopes	2
424B	Shelburne fine sandy loam, 3 to 8 percent slopes	2
424C	Shelburne fine sandy loam, 8 to 15 percent slopes	3
424D	Shelburne fine sandy loam, 15 to 25 percent slopes	4
425B	Shelburne fine sandy loam, 3 to 8 percent slopes, very stony	6
425C	Shelburne fine sandy loam, 8 to 15 percent slopes, very stony	6
426D	Shelburne fine sandy loam, 15 to 35 percent slopes, extremely stony	7
427B	Ashfield fine sandy loam, 2 to 8 percent slopes, very stony	6
427C	Ashfield fine sandy loam, 8 to 15 percent slopes, very stony	6
428A	Ashfield fine sandy loam, 0 to 3 percent slopes	1
428B	Ashfield fine sandy loam, 3 to 8 percent slopes	2
437	Wonsqueak mucky peat	5
438	Bucksport muck	5
440C	Boscawen gravelly sandy loam, 3 to 15 percent slopes	4
443	Brayton-Loonmeadow complex, extremely stony	7
503	Rumney fine sandy loam	4
W	Water	

Nonirrigated Capability Class

Rating Options

Attribute Name: Nonirrigated Capability Class

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels-capability class, subclass, and unit. Only class and subclass are included in this data set.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not.The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

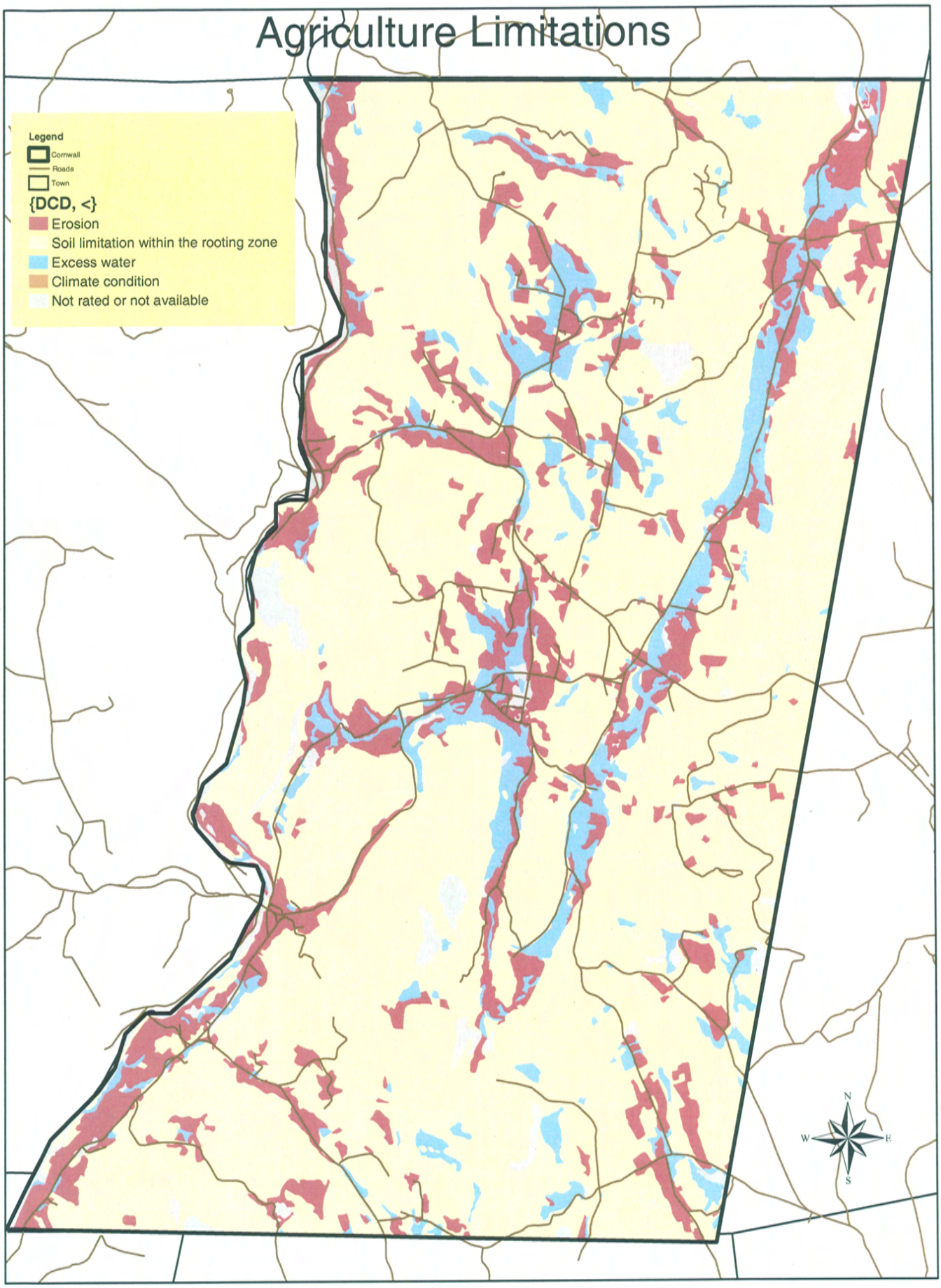
The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Tie-break Rule: Higher

Nonirrigated Capability Class

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Cornwall
Agriculture Limitations



Nonirrigated Capability Subclass

Aggregation Method: Dominant Condition
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
2	Ridgebury fine sandy loam	w
3	Ridgebury, Leicester, and Whitman soils, extremely stony	s
4	Leicester fine sandy loam	w
7	Mudgepond silt loam	w
8	Mudgepond and Alden soils, extremely stony	s
12	Raypol silt loam	w
13	Walpole sandy loam	w
14	Fredon silt loam	w
15	Scarboro muck	w
16	Halsey silt loam	w
17	Timakwa and Natchaug soils	w
18	Catden and Freetown soils	w
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	w
22A	Hero gravelly loam, 0 to 3 percent slopes	w
22B	Hero gravelly loam, 3 to 8 percent slopes	w
29A	Agawam fine sandy loam, 0 to 3 percent slopes	
29B	Agawam fine sandy loam, 3 to 8 percent slopes	e
29C	Agawam fine sandy loam, 8 to 15 percent slopes	e
30B	Branford silt loam, 3 to 8 percent slopes	e
31A	Copake fine sandy loam, 0 to 3 percent slopes	
31B	Copake fine sandy loam, 3 to 8 percent slopes	e
31C	Copake gravelly loam, 8 to 15 percent slopes	e
32A	Haven and Enfield soils, 0 to 3 percent slopes	
32B	Haven and Enfield soils, 3 to 8 percent slopes	e
32C	Haven and Enfield soils, 8 to 15 percent slopes	e
34A	Merrimac sandy loam, 0 to 3 percent slopes	
34B	Merrimac sandy loam, 3 to 8 percent slopes	e
34C	Merrimac sandy loam, 8 to 15 percent slopes	e
36A	Windsor loamy sand, 0 to 3 percent slopes	s
36B	Windsor loamy sand, 3 to 8 percent slopes	s
36C	Windsor loamy sand, 8 to 15 percent slopes	e
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	s
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	e
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	e
39C	Groton gravelly sandy loam, 3 to 15 percent slopes	e
39E	Groton gravelly sandy loam, 15 to 45 percent slopes	e
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	w
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	w
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	e
46B	Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony	s
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	s
47C	Woodbridge fine sandy loam, 2 to 15 percent slopes, extremely stony	s
48B	Georgia and Amenia silt loams, 2 to 8 percent slopes	e
48C	Georgia and Amenia silt loams, 8 to 15 percent slopes	e
49B	Georgia and Amenia silt loams, 3 to 8 percent slopes, very stony	s
49C	Georgia and Amenia silt loams, 8 to 15 percent slopes, very stony	s
50B	Sutton fine sandy loam, 3 to 8 percent slopes	w

Nonirrigated Capability Subclass

Aggregation Method: Dominant Condition
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	s
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	s
57C	Gloucester gravelly sandy loam, 8 to 15 percent slopes	e
57D	Gloucester gravelly sandy loam, 15 to 25 percent slopes	e
58B	Gloucester gravelly sandy loam, 3 to 8 percent slopes, very stony	s
58C	Gloucester gravelly sandy loam, 8 to 15 percent slopes, very stony	s
59C	Gloucester gravelly sandy loam, 3 to 15 percent slopes, extremely stony	s
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	s
60B	Canton and Charlton soils, 3 to 8 percent slopes	e
60C	Canton and Charlton soils, 8 to 15 percent slopes	e
60D	Canton and Charlton soils, 15 to 25 percent slopes	e
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	s
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	s
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	s
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	s
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	s
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	s
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	s
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	s
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	
76F	Rock outcrop-Hollis complex, 45 to 60 percent slopes	
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	e
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	e
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	e
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	s
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	s
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	s
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	s
90B	Stockbridge loam, 3 to 8 percent slopes	e
90C	Stockbridge loam, 8 to 15 percent slopes	e
90D	Stockbridge loam, 15 to 25 percent slopes	e
91B	Stockbridge loam, 3 to 8 percent slopes, very stony	s
91C	Stockbridge loam, 8 to 15 percent slopes, very stony	s
91D	Stockbridge loam, 15 to 35 percent slopes, very stony	s
93C	Nellis fine sandy loam, 3 to 15 percent slopes, very stony	s
94C	Farmington-Nellis complex, 3 to 15 percent slopes, very rocky	s
94E	Farmington-Nellis complex, 15 to 35 percent slopes, very rocky	s
95C	Farmington-Rock outcrop complex, 3 to 15 percent slopes	s
100	Suncook loamy fine sand	s
101	Occum fine sandy loam	
102	Pootatuck fine sandy loam	w
103	Rippowam fine sandy loam	w
105	Hadley silt loam	
106	Winooski silt loam	w
107	Limerick and Lim soils	w
108	Saco silt loam	w
109	Fluvaquents-Udifluvents complex, frequently flooded	w

Nonirrigated Capability Subclass

Aggregation Method: Dominant Condition
Tie-break Rule: Lower

State of Connecticut
Survey Area Version and Date: 6 - 03/22/2007

Map symbol	Map unit name	Rating
303	Pits, quarries	
305	Udorthents-Pits complex, gravelly	e
306	Udorthents-Urban land complex	e
308	Udorthents, smoothed	e
412B	Bice fine sandy loam, 3 to 8 percent slopes	e
412C	Bice fine sandy loam, 8 to 15 percent slopes	e
412D	Bice fine sandy loam, 15 to 25 percent slopes	e
413C	Bice-Millsite complex, 3 to 15 percent slopes, very rocky	s
413E	Bice-Millsite complex, 15 to 45 percent slopes, very rocky	s
415C	Westminster-Millsite-Rock outcrop complex, 3 to 15 percent slopes	s
415E	Westminster-Millsite-Rock outcrop complex, 15 to 45 percent slopes	s
416E	Rock outcrop-Westminster complex, 8 to 45 percent slopes	
417B	Bice fine sandy loam, 3 to 8 percent slopes, very stony	s
417C	Bice fine sandy loam, 8 to 15 percent slopes, very stony	s
417D	Bice fine sandy loam, 15 to 25 percent slopes, very stony	s
418C	Schroon fine sandy loam, 2 to 15 percent slopes, very stony	s
420B	Schroon fine sandy loam, 3 to 8 percent slopes	w
424B	Shelburne fine sandy loam, 3 to 8 percent slopes	s
424C	Shelburne fine sandy loam, 8 to 15 percent slopes	e
424D	Shelburne fine sandy loam, 15 to 25 percent slopes	e
425B	Shelburne fine sandy loam, 3 to 8 percent slopes, very stony	s
425C	Shelburne fine sandy loam, 8 to 15 percent slopes, very stony	s
426D	Shelburne fine sandy loam, 15 to 35 percent slopes, extremely stony	s
427B	Ashfield fine sandy loam, 2 to 8 percent slopes, very stony	s
427C	Ashfield fine sandy loam, 8 to 15 percent slopes, very stony	s
428A	Ashfield fine sandy loam, 0 to 3 percent slopes	
428B	Ashfield fine sandy loam, 3 to 8 percent slopes	e
437	Wonsqueak mucky peat	w
438	Bucksport muck	w
440C	Boscawen gravelly sandy loam, 3 to 15 percent slopes	e
443	Brayton-Loonmeadow complex, extremely stony	s
503	Rumney fine sandy loam	w
W	Water	

Nonirrigated Capability Subclass

Rating Options

Attribute Name: Nonirrigated Capability Subclass

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels-capability class, subclass, and unit. Only class and subclass are included in this data set.

Capability subclasses are soil groups within one capability class. They are designated by adding a small letter, "e," "w," "s," or "c," to the class numeral, for example, 2e. The letter "e" shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; "w" shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); "s" shows that the soil is limited mainly because it is shallow, droughty, or stony; and "c," used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by "w," "s," or "c" because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, or wildlife habitat.

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not.The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Soils Inventory Report

CORNWALL

Map Unit Symbol	Acres	Percent
100	43.6	0%
101	20.3	0%
102	45.4	0%
103	76.6	0%
105	11.8	0%
106	5.6	0%
107	51.3	0%
108	126.7	0%
109	75.8	0%
12	246.5	1%
13	92.2	0%
14	29.7	0%
15	88.4	0%
16	141.2	0%
17	153.1	1%
18	460.1	2%
2	81.1	0%
21A	308.7	1%
22A	11.4	0%
22B	8.9	0%
29A	17.4	0%
29B	63.3	0%
29C	22.1	0%
3	1597.9	5%
303	1.7	0%
305	16.6	0%
306	82	0%
308	76.6	0%
30B	1.1	0%
31A	24.4	0%
31B	48.7	0%
31C	11.9	0%
32A	59.1	0%

32B	139	0%
32C	88.6	0%
34A	65	0%
34B	489.4	2%
34C	195.6	1%
36A	19.6	0%
36B	14.4	0%
36C	4.5	0%
38A	16.8	0%
38C	470.9	2%
38E	760.5	3%
39C	27.6	0%
39E	30.3	0%
4	19	0%
412B	3.2	0%
412C	6.4	0%
412D	2.8	0%
413C	333.2	1%
413E	357.4	1%
415C	136.8	0%
415E	262.5	1%
416E	23.2	0%
417B	4	0%
417C	190.2	1%
417D	260.1	1%
418C	50.3	0%
420B	2.6	0%
424B	19.1	0%
424C	26.3	0%
424D	6.3	0%
425B	15.3	0%
425C	214.9	1%
426D	16.6	0%
427B	8.1	0%
427C	112	0%
428A	2.6	0%
428B	0.3	0%
437	5.8	0%
438	30.3	0%

440C	4.6	0%
443	165.7	1%
45A	5.6	0%
45B	174.7	1%
45C	40.7	0%
46B	97.2	0%
46C	33.6	0%
47C	688.1	2%
48B	32.3	0%
48C	2.5	0%
49B	4.7	0%
49C	75.1	0%
503	0.7	0%
50B	27.7	0%
51B	25.8	0%
52C	522.6	2%
57C	0.8	0%
57D	1.5	0%
58B	1.6	0%
58C	7.3	0%
59C	15.6	0%
59D	7.9	0%
60B	242.1	1%
60C	248	1%
60D	57.8	0%
61B	232.6	1%
61C	347.8	1%
62C	2491.4	8%
62D	3813	13%
7	29.9	0%
73C	1775.6	6%
73E	2311.6	8%
75C	813.4	3%
75E	2823.9	9%
76E	129.1	0%
76F	200.4	1%
8	138.9	0%
84B	590	2%
84C	423.2	1%

84D	127.8	0%
85B	193.6	1%
85C	222.1	1%
86C	749.5	3%
86D	873.9	3%
90B	32.7	0%
90C	61.7	0%
90D	6.1	0%
91B	5.2	0%
91C	34.5	0%
91D	76.9	0%
93C	12.1	0%
94C	10.9	0%
94E	12.8	0%
95C	8.7	0%
W	345.4	1%
Total:	29911.6	

A Watershed Perspective

Introduction

This section of the report provides an overview of surface and ground water resources within the Town of Cornwall (Cornwall) and is based upon Connecticut Department of Environmental Protection (CT DEP) data and knowledge of the region. Recommendations are also offered with regard to measures the Town may wish to pursue in terms of protection, management and/or restoration of these resources.

These comments are given from the perspective of improving and maintaining water quality and supporting designated uses of the State's waters per the State of Connecticut "Water Quality Standards"[1]. This information also reflects CT DEP's growing commitment to address water resource concerns from a watershed perspective, taking into account the cumulative impact that various land use policies and activities within a given watershed may have upon water resources.

Please note that some of these comments may overlap with those of other Environmental Review Team (ERT) members who are dealing with more specialized aspects of the review (i.e. – fisheries, wetlands, etc.). In such cases, these comments are meant to support or supplement these specialized reviews, not supplant them.

Watershed Context

As a way of describing Connecticut's water resources in terms of the landscape, CT DEP has divided the state along natural drainage boundaries into eight "major basins" or watersheds. These, in turn, are divided into increasingly smaller, nested watersheds which are described as "regional", "subregional" and "local" drainage basins. At each level, these watersheds are generally named after the brook, river or waterbody into which all of the water within that topographically-defined area ultimately flows. Each drainage area has also been assigned a number which reflects how it is connected to the rest of the watershed. Every water feature, no matter how small, has its own distinct watershed.

Cornwall lies entirely within the Housatonic Major Drainage Basin (No. 6), meaning that all of the surface and ground water within the town's geographic area ultimately flows into the Housatonic River by one route or another.[2] **(see Drainage Basins Map)** Three Regional Drainage Basins comprise the Housatonic Major Drainage Basin in Cornwall: the

[1] CT DEP Bureau of Water Management – Planning and Standards Division. Effective 2002 & 1996. Water Quality Standards. CT DEP. Hartford, CT.

[2] Connecticut Geological and Natural History Survey. (Compiled by Marianne McElroy). 1981. Natural Drainage Basins in Connecticut (Map). CT DEP Natural Resources Center in cooperation with the USGS. Hartford, CT

Housatonic Mainstem Regional Drainage Basin (No. 60), the Hollenbeck Regional Drainage Basin (No. 62) and the Shepaug Regional Drainage Basin (No. 67), meaning that water either flows directly to the Housatonic River, or to the Housatonic via the Hollenbeck or Shepaug Rivers. Each of these Regional Drainage Basins is, in turn, divided into Subregional Drainage Basins.

The Housatonic Mainstem Regional Drainage Basin (No. 6) in Cornwall is comprised of three Subregional Drainage Basins:

- Housatonic River Subregional Drainage Basin (No. 6000)
- Mill Brook Subregional Drainage Basin (No. 6008)
- Furnace Brook Subregional Drainage Basin (No. 6010)

The Hollenbeck Regional Drainage Basin (No. 62) in Cornwall is comprised of just one Subregional Drainage Basin:

- Hollenbeck River Subregional Drainage Basin (No. 6200)

The Shepaug Regional Drainage Basin (No. 67) in Cornwall is comprised of two Subregional Drainage Basins:

- Shepaug River Subregional Drainage Basin (No. 6700)
- West Branch of Shepaug River Subregional Drainage Basin (No. 6702)

These Subregional Drainage Basins can be further subdivided into Local Drainage Basins. However, for the purposes of this review, water resources will be examined at the Regional and Subregional Drainage Basin level.

Water Quality Standards, Classifications and Criteria

Per federal Clean Water Act requirements as well as Connecticut's own Clean Water Act, the State has adopted "Water Quality Standards" (WQS) that establish water quality management goals and policies for the State's surface and ground waters. There are three basic elements associated with the WQS:

1) Standards[3] – The Standards describe general goals and policies for maintaining or improving water quality. They also establish the allowable discharges, principles of waste assimilation, and anti-degradation policy;
2) Classifications and Criteria – The Classifications establish water quality classes (i.e. – AA, A, B, etc.) and describe their designated uses (i.e. – potential drinking water supply, fish and wildlife habitat, recreational use, etc.). The Criteria specify

[3] Connecticut's Water Quality Standards, inclusive of classifications and criteria, can be viewed on CT DEP's website at: http://www.ct.gov/dep/lib/dep/water/water_quality_standardsl/wqs.pdf .

narrative and numerical factors (i.e. – chemical, physical, bacterial criteria) to be met for each Classification.

3) Classification Maps[4] – The Classification Maps are a companion piece to the WQS and show the classification(s) assigned to specific surface and ground water resources throughout the state. These assignments are based on both the use or potential use of such waters as well as on their known or presumed quality. In cases where actual water quality does not meet desired water quality, the Classification Maps reflect this fact by means of assigning a split designation - such as B/A. In this example, the first letter (B) represents the current water quality, and the second letter (A) represents the water quality goal for that surface water resource.

At the State level, CT DEP uses these classifications to make decisions as to how these water resources will be managed and what sorts of water-related withdrawals or discharges will be allowed or not allowed with regard to regulatory programs that CT DEP administers. The Town of Cornwall should also be aware of the implications of these Classifications with regard to local land use planning and decision making.

Specific water quality classifications for surface and ground waters in Cornwall will be discussed in the sections that follow. It should be noted that the Classification Map for the Housatonic Major Basin was last updated in 1999. Since that time, additional waters have been identified as not meeting water quality standards under a related but separate program within CT DEP that also deals with water quality. At least one waterbody in Cornwall falls in this category. This discrepancy will be discussed in a subsequent section. CT DEP is working to better integrate the information produced by each of these water quality programs. However, because reclassification of waters must go through a formal hearing process which can be a long and complicated proceeding, the Classification Maps have typically not been updated frequently.

Surface Water Resources

In this section, information about Cornwall's surface water resources from several CT DEP programs and sources is presented and discussed.

[4] For those with Geographic Information System (GIS) capabilities, Classification Maps can be downloaded directly from CT DEP's website at:
http://www.ct.gov/dep/cwp/view.asp?a=2698&q=323342&depNav_GID=1707&depNav=|
Environmental GIS Data for Connecticut can also be purchased in CD form through the CT DEP Store. For more information, see the CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322886&depNav_GID=1708&depNav=|
Paper print-outs of the Classification Maps can also be purchased directly from the CT DEP through "Maps on Demand". For more information, see the CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2688&q=322398

Surface Water Quality Classifications

The Surface Water Quality Classifications for Cornwall are most easily examined at the Regional Drainage Basin level.[5] **(See Water Quality Classifications Map)**

- Shepaug Regional Drainage Basin – This entire drainage basin within Cornwall is classified as Class AA[6]. This is because it is part of a public water supply watershed area that drains to reservoirs that serve the City of Waterbury.

  As host community to a portion of a public drinking water supply watershed, the Town of Cornwall should be acquainted with the Source Water Protection Program administered by the CT Department of Public Health (CT DPH). This program is geared toward protecting not only the withdrawal point for surface and ground water public drinking water supplies but also the area of land over and through which water flows to these reservoirs and wells. For more information on the Source Water Protection Program, see the CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387338 .

- Hollenbeck Regional Drainage Basin – This entire drainage basin within Cornwall is classified as Class A[7].

- Housatonic Mainstem Regional Drainage Basin – Most of the surface waters in this drainage basin are classified as Class A with a couple of exceptions. These exceptions are Furnace Brook which is classified as Class B/A[8]; and the Housatonic River which is classified as Class D/B[9].

  Furnace Brook is classified as B/A due to the presence of an inactive Town mixed waste landfill site near the stream. Water resources near landfill sites are typically assigned an existing Class B condition or lower because it is assumed that leachate

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[5] CT DEP Environmental and Geographic Information Center. 1997. Water Quality Classifications - Housatonic River, Hudson River, and Southwest Coastal Basins (Map). CT DEP. Hartford, CT

[6] **Class AA surface waters** have overall excellent water quality and the following designated uses: existing or potential drinking water supply; fish and wildlife habitat; recreational use (may be restricted); agricultural and industrial supply.

[7] **Class A surface waters** have overall excellent water quality and the following designated uses: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply, and other legitimate uses including navigation.

[8] **Class B surface waters** have good to excellent water quality and the following designated uses: recreational use, fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses including navigation.

[9] **Class D surface waters** have unacceptable water quality and the goal is Class B or Class A. Designated uses: same as for B. One or more of the designated uses for class B is not fully supported due to an intractable or very difficult pollution problem.

may be affecting water quality. In order for Furnace Brook to achieve the goals of Class A surface waters, outstanding issues regarding the landfill would need to be addressed. Furnace Brook is discussed further in the Water Quality Assessments section.

The Housatonic River is classified Class D/B due to the presence of polychlorinated biphenyls (PCBs) which are primarily associated with releases from the General Electric Company (GE) facility in Pittsfield, MA. A remediation project led by the U.S. Environmental Protection Agency (U.S. EPA) is currently underway. CT DEP expects the outcome of this process to eventually allow the Housatonic River to be reclassified as Class B. This complicated, inter-State issue is discussed further in the Impaired Waters section.

Leachate and Wastewater Discharge Sources

A companion piece to the Water Quality Classifications is the Leachate and Wastewater Discharge Sources inventory and maps. A major determinant of existing water quality conditions is the known or suspected presence of waste materials, discharges of wastewater, and other sources of known pollution. The Leachate and Wastewater Discharge Sources inventory is a list of these sources and the accompanying maps locate and generally categorize the type of waste source[10]. The inventory is comprised of surface and ground water discharge information including: wastewater discharges which have received a state permit; historic and now defunct waste disposal sites; accidental spills or leaks; and other discharges or releases of liquid or solid wastes which are known or suspected of affecting water quality. It does not necessarily represent all known or potential sources of pollution that may exist. The inventory is used by CT DEP to assess water quality conditions and establish goals.

In Cornwall, 10 Leachate and Wastewater Discharge Sources have been listed in the inventory and are identified on the corresponding map. [11] **(See Leachate and Wastewater**

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[10] CT DEP Bureau of Water Management. 1999. Leachate and Wastewater Discharge Sources Inventory. Hartford, CT

[11] CT DEP Environmental and Geographic Information Center. Revised 1997. Leachate and Wastewater Discharges – Housatonic River, Hudson River, and Southwest Coastal Basins (Map). CT DEP. Hartford, CT

For those with Geographic Information System (GIS) capabilities, Leachate and Wastewater Discharge Sources Maps can be downloaded directly from CT DEP's website at:
http://www.ct.gov/dep/cwp/view.asp?a=2698&q=323342&depNav_GID=1707&depNav=|
Environmental GIS Data for Connecticut can also be purchased in CD form through the CT DEP Store. For more information, see the CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322886&depNav_GID=1708&depNav=|
Paper print-outs of the Leachate and Wastewater Discharge Sources Maps can also be purchased directly from the CT DEP through "Maps on Demand". For more information, see the CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2688&q=322398

Discharge Sources Map) In some cases, the Leachate and Wastewater Discharge Sources displayed on the map have been used to determine the Water Quality Classification of a particular surface or ground water resource. For example, in the instance of Furnace Brook which was described previously, an inactive mixed waste landfill site has been identified as a Leachate and Wastewater Discharge Source and has been taken into consideration with regard to the Water Quality Classification of that stream. However, in other cases, Leachate and Wastewater Discharge Sources have been identified that have not influenced the Water Quality Classification of the adjacent surface or ground water resources. This may be because the Leachate and Wastewater Discharge Source has been remediated, or - as in many cases – the real or potential impact on the surface and/or ground water resources has not been determined. In any event, CT DEP believes that it is important to record this information, especially if it uncertain that the site has been completely remediated.

Water Quality Assessments

To determine whether the State's surface water resources are meeting the designated use goals assigned to them per the Water Quality Classifications, CT DEP periodically assesses selected water bodies throughout the state. Generally, three basic designated uses are assessed for each surface water resource: fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. Through the assessment process, each of these designated uses is classified as being either "fully supporting"; "impaired" or "unassessed". In some cases, there is "insufficient information" to make an assessment. The ideal situation, of course, is when all three designated uses are determined to be "fully supporting" for a particular water resource. However, there are many instances where one designated use is found to be "fully supporting" while the other two uses may be "impaired" or "unassessed". These results (as well as a description of Connecticut's water quality management program and assessment process) are reported biennially to the federal government in the "Integrated Water Quality Report to Congress" [12]

In Cornwall, eight surface water resources (or portions of those water resources) have been assessed recently or historically. **(See Assessed Waterbodies Map)** Included in this assessment are two lakes/ponds:

- Cream Hill Lake (No. CT6008-00-1-L1_01)
- Mohawk Pond (No. CT6700-03-1-L2_01)

In addition, six rivers/streams - or segments of these watercourses - have been assessed:

- Housatonic River (No. CT6000-00_06)

[12] For more information, see the most recent report: CT DEP Bureau of Water Management. December 2006. Integrated Water Quality Report to Congress - prepared pursuant to Federal Clean Water Act Sections 305(b) and 303(d). Hartford, CT. This document can be viewed on CT DEP's website at: http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2006_305(b)fullplusapps.pdf

- Gunn Brook (No. CT6000-14_01)
- Mill Brook (No. CT6008-00_01 & CT6008-00_02)
- Furnace Brook (No. CT6010-00_01)
- Hollenbeck River (No. CT6200-00_01)
- Bradford Brook (No. CT6200-01_01)

The beginning and end points of each stream or river segment are described in Appendix A of the "Integrated Water Quality Report to Congress".

With regard to Cream Hill Lake and Mohawk Pond, both waterbodies are reported as being fully supporting with regard to fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. However, it is important to note that some of the information used in these assessments is dated. Some of the information for Cream Hill Lake goes back to a 1978 study. Likewise, some of the information for Mohawk Pond dates from around 1995. Lakes are primarily assessed in terms of their trophic condition which is discussed further in the section of this report entitled: Lake Trophic Categories. Seasonal water quality testing for "indicator bacteria" is also required of State and local agencies that maintain public bathing beaches. Contact the local or regional health district for the Town of Cornwall for more information with regard to this matter.

With regard to the river and stream assessments –

- **Housatonic River** (18.23 mile segment) – This segment was determined to be fully supporting for habitat for fish, other aquatic life and wildlife. Insufficient information was available to assess it for recreation. It is impaired for fish consumption.
- **Gunn Brook** (3.58 mile segment) – This segment was determined to be fully supporting for fish consumption; and habitat for fish, other aquatic life and wildlife. It was not assessed for recreation.
- **Mill Brook** (two segments totaling 3.85 miles) – The first 1.63 mile segment which begins at the mouth of the brook was determined to be fully supporting for fish consumption. It was not assessed for habitat for fish, other aquatic life and wildlife; or for recreation. The second 2.22 mile segment which begins around the Route 128 crossing, was determined to be fully supporting for fish consumption. It was not assessed for recreation. It is impaired for habitat for fish, other aquatic life and wildlife.
- **Furnace Brook** (3.98 mile segment) – This segment was determined to be fully supporting for fish consumption; and habitat for fish, other aquatic life and wildlife. It was not assessed for recreation.
- **Hollenbeck River** (18.32 mile segment) – This segment was determined to be fully supporting for fish consumption. It was not assessed for habitat for fish, other aquatic life and wildlife; and insufficient information was available to assess it for recreation.
- **Bradford Brook** (1.98 mile segment) – This segment was determined to be fully supporting for fish consumption; and habitat for fish, other aquatic life and wildlife. It was not assessed for recreation.

As mentioned in the foregoing sections on Water Quality Classifications and Leachate and Wastewater Discharge Sources, Furnace Brook has been classified as B/A because of the historic landfill located near it which may be affecting this stream's ability to meet all Class A water quality criteria. This assessment shows, however, that this stream is meeting Class A and B uses associated with fish and wildlife habitat.

With regard to Mill Brook, this assessment shows that the upper section of this stream is not meeting designated uses for Class A waters with regard to fish and wildlife habitat. Unless this impairment is corrected in the near future, the water quality classification for this stream may eventually be modified to reflect the current situation. In conjunction with this, the presumed source(s) of impairment would be added to Leachate and Wastewater Discharge Sources inventory and map.

The two impaired surface water resources in Cornwall – Mill Brook as well as the Housatonic River – are discussed further in the Impaired Waters section that follows.

Impaired Waters

Through the water quality assessment process, a subset of waterbodies have been identified as not meeting Connecticut's "Water Quality Standards". These waterbodies are called "impaired waters" and are identified in a separate section of the "Integrated Water Quality Report to Congress" (Appendix C), generally referred to as the "Impaired Waters List"[13].

As described in the preceding section, two surface water resources in Cornwall have been identified as impaired through water quality assessments conducted by CT DEP – the upper section of Mill Brook, and the Housatonic River. Each of these impairments will be discussed in more detail in this section.

- **Mill Brook** (CT6008-00_02) – A 2.2 mile section of this stream, starting at the confluence of Heffers Brook (just upstream of the Route 128 crossing) and ending at the Cream Hill Lake outlet dam, has been determined to be impaired for habitat for fish, other aquatic life and wildlife. The exact cause of the impairment is unknown but suspected sources include nonpoint runoff from agricultural activities. This segment ranks high on CT DEP's Total Maximum Daily Load (TMDL)[14] priority list for developing a TMDL for this stream segment. A TMDL is a "tool" used by CT DEP to address water quality problems. TMDLs provide the framework for restoring impaired waters by establishing the maximum amount of a pollutant that a waterbody can receive without adverse impact to fish, wildlife, recreation, or other uses. Under

[13] For further information on the Impaired Waters List, see the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325614&depNav_GID=1654
[14] For further information on TMDLs, see the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325604&depNav_GID=1654

the federal Clean Water Act, States are required to develop TMDLs for waters that have been identified as being impaired by pollutants, or find another appropriate mechanism for addressing the impairment. As an initial step toward addressing the Mill Brook impairment, CT DEP is providing a grant though its Nonpoint Source Program to the Northwest Conservation District (NCD) to do a survey of the watershed to help identify possible source(s) of pollution. NCD will also provide CT DEP with recommendations for addressing the problem(s). As this process moves forward, NCD and/or CT DEP may be looking to the Town for assistance in addressing this situation so that Mill Brook can eventually be removed from the Impaired Waters List.

- **Housatonic River** (No. CT6000-00_06) – Almost the entire Housatonic River, from the Derby Dam in Shelton and Derby, up to the Massachusetts border, has been determined to be impaired for fish consumption. This includes the segment of the Housatonic River that forms the western boundary of the Town of Cornwall. As mentioned previously, the cause of this impairment is polychlorinated biphenyls (PCBs) and the source is primarily the General Electric Company (GE) facility in Pittsfield, MA and contaminated sediments that have migrated downstream into Connecticut. PCBs generally attach to sediments and other small particles which, as are they are transported through the river system, get ingested by aquatic life, incorporated into the food chain, and concentrated in predatory species toward the top of the feeding hierarchy. As a result of PCBs levels in certain fish species in the Housatonic River, the Connecticut Department of Public Health (CT DPH) has issued a fish consumption advisory.[15]

  In October 2000, a Consent Decree was issued by the U.S. District Court in Springfield, MA regarding remediation and restoration of the GE-Pittsfield/Housatonic River Site. Parties to the Consent Decree include: the U.S. Environmental Protection Agency; the U.S. Department of Justice; the Commonwealth of Massachusetts' Attorney General's Office, Executive Office of Environmental Affairs, and Department of Environmental Protection; the State of Connecticut Attorney General's Office and Department of Environmental Protection; the U.S. Department of Interior, the National Oceanic and Atmospheric Administration, the City of Pittsfield, the Pittsfield Economic Development Authority, and the General Electric Company. Because another process has been established to address PCB contamination that, if successful, will result in attainment of "Water Quality Standards" and goals for the Housatonic River in Connecticut, CT DEP has chosen to pursue this process rather than the TMDL- approach.

  The Consent Decree specifies a very detailed process for addressing clean-up of PCBs at the GE facility, a number of other properties and sites in the Pittsfield area,

[15] For more information on the Housatonic River PCB fish consumption advisory, see the CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3140&q=387460&dphNav_GID=1828&dphPNavCtr=|#47464

and in the Housatonic River. The U.S. Environmental Protection Agency (EPA) is responsible for overseeing the remediation effort which includes performing, directing and/or approving work associated with this project. The riverine portion of the clean-up is being addressed in stages and for this purpose, the Housatonic River has been divided into three distinct parts, referred to as the ½ mile, the 1 ½ mile, and Rest of River. The ½ mile and 1 ½ mile comprise the 2 mile section of the East Branch of the Housatonic, immediately adjacent to and downstream of the GE facility to the confluence of the West Branch of the Housatonic. Remediation of these two river sections was completed in 2002 and 2006, respectively. Although a very complicated undertaking, in basic terms, the river clean-up involved removing sediments that exceeded certain predetermined contamination levels and replacing them with clean sediment.

The Rest of River portion is comprised of the 135 mile mainstem of the Housatonic River, which starts at the confluence of the East and West Branches and continues downstream through the rest of Massachusetts and Connecticut to Long Island Sound. According to studies done by U.S. EPA and GE, the greatest mass of PCBs in Rest of River is concentrated within the first 10.5 miles of river and floodplain between the confluence of the East and West Branches and Woods Pond Dam in Lee, MA. As outlined in the Consent Decree, there are many steps associated with Rest of River with regard to determining the extent and degree of PCB contamination throughout the riverine system, and what, if any, additional remediation will take place. This complicated process is expected to take many years and the final outcome has not yet been determined. To date, U.S. EPA has completed ecological and human health risk assessments, and PCB transport and fate modeling studies. These, in turn, have triggered requirements for GE to provide Interim Media Protection Goals which have been completed and a Corrective Measures Study which is currently underway. All of these steps are ultimately leading to a Final Cleanup Decision for Rest of River. Additional and more detailed information about the 2000 Consent Decree and GE/Housatonic River Site can be found on the U.S. EPA website[16].

As a party to the Consent Decree, CT DEP has been participating in remediation process decisions by providing comments on key documents produced that affect the State of Connecticut's interests. The Town of Cornwall has also been involved in the remediation process through its representative on the Housatonic River Commission who participates in the Citizen Coordinating Council hosted by U.S. EPA. CT DEP is particularly concerned that the on-going source of PCBs in Massachusetts be addressed. Sometime after completion of this project, it is expected that the Housatonic River will subsequently meet "Water Quality Standards" for fish consumption in Connecticut so that the fish consumption advisory can be lifted and the waterbody removed from the "Impaired Waters List".

[16] U.S. EPA website for GE/Housatonic River Site: http://epa.gov/region01/ge/

Monitoring of fish and aquatic macroinvertebrates in the Connecticut portion of the Housatonic River has been occurring through an independent, voluntary agreement between CT DEP and GE, and is expected to continue during and following any additional remediation activities that may take place. A portion of this monitoring is conducted in the West Cornwall section of the Housatonic River.

Lake Trophic Categories

In addition to being classified according to water quality, lakes (and large ponds) in Connecticut are also categorized according to "trophic" condition. "Trophic" basically refers to the amount of nutrients in a lake which, in turn, affects algae and other aquatic plant growth. As a lake "matures", it becomes shallower as a result of accumulated sediment and decaying vegetation, which allows more opportunity for rooted aquatic plants and wetland vegetation to become established. This natural aging process is referred to as "eutrophication" and it occurs at different rates, depending on many factors influencing a particular waterbody. However, eutrophication can also be influenced by human activities which cause the rate of eutrophication to increase beyond the normal pace. This is referred to as "cultural eutrophication". Agricultural runoff, excess application of lawn fertilizers, and malfunctioning septic systems are examples of activities which may contribute excess nutrients to a lake and cause cultural eutrophication to occur.

As per Connecticut's Water Quality Standards, lakes are primarily assessed with regard to how their current condition compares to what their natural trophic condition would be, absent any significant cultural impacts. Parameters used to assess lakes pertain primarily to levels of nutrients (ie. – phosphorus and nitrogen), water clarity, and degree of plant productivity (ie. - algae and rooted aquatic vegetation). Using these parameters, lakes are identified as falling into one of the following four trophic categories: oligotrophic, mesotrophic, eutrophic and highly eutrophic.[17] Since eutrophication is a natural process, this categorization system recognizes that there is nothing wrong with a eutrophic lake that has naturally matured to that condition. It is a problem, however, if a lake is categorized as naturally mesotrophic but has become eutrophic as a result of human activities.

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[17] **Oligotrophic Lakes** may be Class AA, Class A, or Class B water. Low in plant nutrients. Low in biological productivity characterized by the absence of macrophyte beds. High potential for water contact recreation.

Mesotrophic Lakes may be Class AA, Class A, or Class B water. Moderately enriched with plant nutrients. Moderate biological productivity characterized by intermittent blooms of algae and/or small areas of macrophyte beds. Good potential for water contact recreation.

Eutrophic Lakes may be Class AA, Class A, or Class B water. Highly enriched with plant nutrients. High biological productivity characterized by frequent blooms of algae and/or extensive areas of dense macrophyte beds. Water contact opportunities may be limited.

Highly Eutrophic Lakes may be Class AA, Class A, or Class B water. Excessive enrichment with plant nutrients. High biological productivity, characterized by severe blooms of algae and/or extensive areas of dense macrophyte beds. Water contact may be extremely limited.

As described earlier, two lakes in Cornwall have been assessed: Mohawk Pond and Cream Hill Lake. Both were found to be fully supporting with regard to fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. However, as noted previously, some of the information used in these assessments is dated. Following are the trophic categorizations for each of these lakes as well as some pertinent watershed considerations:

- **Mohawk Pond** – Early Mesotrophic; 16.2 acre pond with 122 acre watershed; Mean depth = 15 ft.; Maximum depth = 26 ft.[18]

  A relatively small, mostly forested watershed surrounds this deep kettle pond which is located in both Cornwall and Goshen. This means that under undisturbed, natural conditions, a relatively small amount of nutrients are making their way into this pond, as compared to what would be contributed if the watershed were much larger. Because a large volume of water is receiving a small amount of nutrients, the concentration of nutrients in the pond is relatively dilute. As a result, the natural eutrophication rate of this pond is comparatively low. However, if there were to be a lot of human disturbance within this watershed, the impact on the waterbody would also be greater. Much of Mohawk Pond's watershed is comprised of State forest lands which serve to protect this waterbody. There is a YMCA camp on the northwestern shore of the pond and there is a State boat launch on the southwestern shore. Development activities within the private lands that drain to the lake could potentially affect lake water quality. Mohawk Pond is fed by runoff and bottom springs and drains through a marsh to the East Branch of the Shepaug River.

- **Cream Hill Lake** – Early Mesotrophic; 73 acre lake with 403.2 acre watershed; Mean depth = 15.7 ft.; Maximum depth = 43 ft.[19]

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[18] CT DEP Bureau of Water Management. Revised 1996. Caring for Our Lakes – Watershed and In-Lake Management for Connecticut Lakes. Hartford, CT (This document can be viewed on CT DEP's website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325528&depNav_GID=1654

Jacobs, Robert P., Eileen B. O'Donnell. 2002. A Fisheries Guide to Lakes and Ponds of Connecticut. CT DEP Bulletin 35. Hartford, CT

Note – Several earlier references provide slightly different measurements with regard to watershed size, pond acreage and depth of Mohawk Pond. For example, also see: CT DEP Bureau of Water Management. 1991. Trophic Classifications of Forty-Nine Connecticut Lakes. Hartford, CT. This lists watershed area = 99.8 acres; surface area = 15.2 acres; mean depth = 16.2 ft.; maximum depth = 27 ft.

[19] Frink, C.R. and W.A. Norvell. 1984. Chemical and Physical Properties of Connecticut Lakes. The Connecticut Agricultural Experiment Station. Bulletin No. 817. New Haven, CT

State Board of Fisheries and Game – Lake and Pond Survey Unit. 1959. A Fishery Survey of the Lakes and Ponds of Connecticut. Report No. 1. Hartford, CT

As with Mohawk Pond, the size of the watershed area contributing to Cream Hill Lake is relatively small compared to the lake's surface area and depth. Hence, the natural eutrophication rate of this pond is also relatively low. The watershed area contributing to this lake is mostly forested, with some agriculture and development. There is a small amount of development along the lake – mostly along the eastern shoreline. In addition, the Cream Hill Lake Association, a private club, is located on the northwestern shoreline of the lake. According to CT DEP data, all of the watershed lands are privately owned. The future use and/or protection of these lands is an important consideration with regard to maintaining the water quality of Cream Hill Lake. This waterbody is fed by bottom springs and a small brook, and the water level is slightly elevated due to the presence of a low dam. The outlet stream from the lake drains to Mill Brook.

As part of its natural resource inventory, the Town of Cornwall may wish to collect and evaluate the existing, historical data for these two bodies of water. This information can be used to determine whether it might be appropriate to have updated studies done for these lakes. In addition to consulting with the CT DEP Lakes Management Program[20], Cornwall may wish to make use of resources that can be found on the Connecticut Federation of Lakes (CLF) website at: http://www.ctlakes.org/ . As suggested by its name, CLF is a consortium of lakes groups, working together to address common issues and share information. In addition, the Town may wish to consider requesting a no-cost vegetation survey from the Connecticut Agricultural Experiment Station (CAES) which is amidst a multi-year aquatic invasive species project. For more information, consult the CAES website at: http://www.ct.gov/caes/site/default.asp and click on the link for "invasive aquatic plants". Finally, consult "Caring for Our Lakes" on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325528&depNav_GID=1654 for basic information on developing lake management plans.

Ground Water Resources

In this section, information about Cornwall's ground water resources from several CT DEP and Connecticut Department of Public Health (CT DPH) programs and sources is presented and discussed.

Ground Water Quality Classifications

As can be seen on the Water Quality Classifications map **(See Water Quality Classification Map)**, most of the ground water in the Housatonic Regional Drainage Basin and Hollenbeck

[20] Contact CT DEP Lakes Management Program by phone at: (860)424-3716

Regional Drainage Basin sections of Cornwall are classified as Class GA.[21] There are several problematic areas, however, where the water is listed as being GA or GAA[22] with the special notation that ground water in these areas "may not meet current standards". This means CT DEP knows or suspects that the ground water may be degraded in some way. In some but not necessarily all of these instances, the questionable status of the ground water may be linked to one of the Leachate and Wastewater Discharge Sources described earlier, for example, a past spill or an area of failing septic systems.

All of the ground water in the Shepaug Regional Drainage Basin is classified as Class GAA. As mentioned earlier, this area is part of the public water supply watershed for the City of Waterbury.

Aquifers

The term "aquifer" applies to any geologic formation capable of yielding usable quantities of water to wells.[23] A "usable quantity" can vary depending on whether one needs to supply an individual residence or an entire town. This definition of aquifers encompasses not only coarse stratified drift (glacial deposits of sand and gravel) but also the finer glacial materials and fractured bedrock. Most people, however, are specifically thinking of glacial deposits of coarse stratified drift when they refer to aquifers as these materials tend to yield greater quantities of ground water, particularly for public water supply systems.

Cornwall basically relies on its underlying bedrock aquifer to supply both public and private drinking water wells. However, as seen on the accompanying map, there are a number of areas of stratified drift scattered throughout the Town, along the river and stream valleys. **(See Aquifers Map)** Many of these stratified drift deposits are limited in extent and it is assumed that the amount of water they might yield would also be limited. However, there are three areas of stratified drift in Cornwall that have been identified as having the potential to serve as high and/or moderate yield aquifers for public water supply. Further hydrogeologic investigation would be needed to develop a more accurate prediction as to how much water these aquifers might potentially yield. With regard to the high and moderate yield aquifers along the Housatonic River, it is important to recognize that the aquifer areas on either side of the river are hydraulically connected (i.e. – extend into

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[21] **Class GA ground waters** have overall excellent water quality and the following designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

[22] **Class GAA ground waters** have overall excellent water quality and the following designated uses: existing or potential public supply of water suitable for drinking without treatment; baseflow for hydraulically-connected surface water bodies.

[23] For general information on ground water and aquifers, please see CT DEP's website at: http://www.ct.gov/dep/cwp/view.asp?a=2685&q=322260&depNav_GID=1625&depNav=|

neighboring townships). In addition, any evaluation of these aquifers as potential water supplies would need to also take into account other important factors such as the amount of "base flow" that these aquifer areas provide to the river, and overlying land uses that may affect the quality of the ground water beneath.

Ground Water Protection Programs

There are two different programs at the State level that were created to specifically help protect public drinking water supplies and/or ground water drinking supplies, in particular. One is the Aquifer Protection Program which is administered by CT DEP and augments existing CT DEP water quality programs; the other is the Source Water Protection Program which is administered by the CT Department of Public Health (CT DPH).

The CT DEP Aquifer Protection Program is specifically focused on protecting public water supply wells in sand and gravel aquifers that serve more than 1000 people. None of the public water supply wells in Cornwall serve more than 1000 people, and all of these wells are located in bedrock. Therefore, none of Cornwall's public water supply wells fall under the umbrella of this program. However, it might be helpful for the Town of Cornwall to review the Aquifer Protection Program for components that might be useful in protecting the public water supply wells throughout town. More information on the Aquifer Protection Program can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2685&q=322252&depNav_GID=1654 .

The CT DPH Source Water Protection Program is geared towards protecting both surface and ground water public drinking supplies.[24] This program was mentioned previously in the "Surface Water Quality Classification" section since a portion of Cornwall lies in the Shepaug Regional Drainage Basin, a public water supply watershed which contributes to downstream surface water reservoirs. Cornwall residents do not receive any of their drinking water from surface water supplies. While most residents rely on private wells, a portion of the population depends on community wells. In addition, there are a number of non-community wells which serve schools and businesses. Altogether, there are approximately a dozen community and non-community public water supply wells throughout Cornwall.

One component of the Source Water Protection Program is the federal Source Water Assessment Program (SWAP) which was established to assess all public drinking water supply sources in terms of their susceptibility to potential sources of contamination. In accordance with this program, CT DPH, in cooperation with CT DEP, conducted a statewide assessment of all public drinking water supply sources. Reports and maps were produced for all public water supply systems, along with recommendations for protection. Copies of all of these reports were provided to the chief elected official (or designee) for each municipality.

[24] Information on the CT DPH Source Water Protection Program can be found on the CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387338

However, because the location of these public water supplies is considered sensitive due to national security threats, maps of these well sites can no longer be made publicly available. This is a double-edged sword, of course, because these circumstances also make it difficult to educate citizenry and raise public awareness about local land use policy and practices that are needed to protect the source areas which supply these wells with water. For further information on SWAP, see CT DPH's website at: http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387342 . For guidance on how to protect community and non-community wells and how to incorporate this type of sensitive information into a municipal natural resource inventory, contact the CT DPH Drinking Water Section at: (860)509-7333.

General Recommendations for Water Resource Protection

In addition to the foregoing information and recommendations with regard to Cornwall's surface and ground water resources, the Town should be familiar with the following documents which are specifically geared towards protecting water resources impacted by non-point source pollution and stormwater run-off from land use development activities:

- "2002 Connecticut Erosion & Sedimentation Guidelines" [25]
- "Connecticut Stormwater Quality Manual" [26]

The Town of Cornwall should consider incorporating these documents into its local land use plans and regulations if it has not done so already. Additional information on state-of-the-art stormwater management practices, low impact development (LID) techniques and watershed protection can be obtained through:

- The University of Connecticut - Cooperative Extension System – Nonpoint Education for Municipal Officials program (NEMO). See their website at: http://nemo.uconn.edu/

- The Center for Watershed Protection. See their website at: http://www.cwp.org/index.html

In addition, information on creating greenways along Connecticut's rivers and streams for protection of water quality and other purposes can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2707&q=323858&depNav_GID=1704&depNav=|

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[25] The Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection. 2001. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (DEP Bulletin 34). Hartford, CT.

[26] Connecticut Department of Environmental Protection. 2004. 2004 Connecticut Stormwater Quality Manual. Hartford, CT. This document can be viewed on CT DEP's website at: http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325704&depNav_GID=1654)

Related Initiatives and Programs

Additional information on Cornwall's water resources and recommendations for management and protection may be gained from the following regional programs and initiatives that include all or portions of Cornwall:

- Housatonic River Management Plan[27] (Housatonic River Commission)

  For more information, contact the Northwestern Connecticut Council of Governments by telephone at: (860)868-7341

- Housatonic Riverbelt Greenway

  In 2001, the Housatonic Main Stem was officially designated by the Governor of Connecticut as the "Housatonic Riverbelt Greenway". It is hoped that this planning designation will encourage towns and other groups to work together and create a contiguous greenway along the river corridor. The Housatonic Valley Association (HVA) has been working with communities and other organizations up and down the river corridor to make this vision a reality.

  For more information, see the HVA website at:
  http://www.hvatoday.org/show.cfm?page=land/riverbelt.htm&folder=land

- Litchfield Hills Greenprint Project (Housatonic Valley Association/Trust for Public Land)
  For more information, see the HVA website at:
  http://www.hvatoday.org/show.cfm?page=land/greenprint.htm&folder=land
  and the TPL website at:
  http://www.tpl.org/tier3_cd.cfm?content_item_id=19095&folder_id=261

- Northwest Highlands Program (The Nature Conservancy – CT Chapter)

  For more information, see the TNC-CT website at:
  http://www.nature.org/wherewework/northamerica/states/connecticut/preserves/art21228.html (Note – TNC-CT has also conducted a special study focusing specifically on the Hollenbeck watershed which included identifying important natural resources, threats to natural resources, etc.)

[27] Housatonic River Commission. September 2006. Housatonic River Management Plan. (Prepared for Housatonic River Commission by Dodson Associates, Ltd.) Warren, CT

- Upper Housatonic Valley National Heritage Area

  For more information, see UHVNHA website at:
  http://www.upperhousatonicheritage.org/

- Highlands Study (U.S. Forest Service)

  For more information, see the USFS website at:
  http://www.na.fs.fed.us/highlands/ (Note – Phase 2 of the Connecticut study is currently underway. As part of this, the U.S. Geological Survey is conducting a water resources study which includes the Cornwall area.)

Housatonic River Hydroelectric Project (FERC No. 2576)

The Housatonic has been extensively harnessed for hydroelectric power generation. In Connecticut, FirstLight Hydro Generating Company operates five hydroelectric facilities on the Housatonic River: Falls Village, Bulls Bridge, Rocky River (associated with Candlewood Lake), Shepaug (dam forms Lake Lillinonah) and Stevenson (dam forms Lake Zoar). A new license covering all of these facilities was issued by the Federal Energy Regulatory Commission (FERC) in June 2004. The entire operation is referred to as the Housatonic River Hydroelectric Project (FERC No. 2576).

The license includes a Water Quality Certificate (WQC) issued by CT DEP. Among other things, the WQC requires that the Falls Village hydropower facility operate in "run-of-river" mode rather than in the former "pond-and-release" mode. This basically means that all the water coming down the river must continue to pass down the river, through the hydropower plant and/or the natural bypass channel below the dam. In other words, the water can no longer be impounded, held for a period of time and then released at the Falls Village dam as was previously done. CT DEP required this change of operation to improve water quality and aquatic habitat in the stretch of river below the dam. The Falls Village hydropower operation is the only Housatonic River Project facility above Cornwall and this change to a more natural flow regime affects the segment of river that forms the Town's western border. A copy of the FERC License and other documents related to the Housatonic River Hydroelectric Project can be found on the FERC website at: http://www.ferc.gov/ .[28]

[28] When searching the FERC eLibrary for documents related to the FirstLight Hydro Generating Company – Housatonic River Hydroelectric Project (FERC No. 2576), be sure to enter "P-" in front of the license docket number. (For example, enter: P-2576)

References

Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection. 2001. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (DEP Bulletin 34). Hartford, CT.

CT DEP. 2004. Connecticut Stormwater Quality Manual. Hartford, CT. (This document can be found on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325704&depNav_GID=1654)

CT DEP. 2006. List of Connecticut Waterbodies Not Meeting Water Quality Standards. (aka: Impaired Waters List). Appendix C in 2006 Integrated Water Quality Report to Congress - prepared pursuant to Federal Clean Water Act Sections 305(b) and 303(d). Hartford, CT. (This document available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325614&depNav_GID=1654

CT DEP Bureau of Water Management. Revised 1996. Caring for Our Lakes – Watershed and In-Lake Management. Hartford, CT (This document available on CT DEP's website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325528&depNav_GID=1654)

CT DEP Bureau of Water Management. December 2006. Integrated Water Quality Report to Congress - prepared pursuant to Federal Clean Water Act Sections 305(b) and 303(d). Hartford, CT. (This document available on CT DEP's website at: http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2006_305(b)fullplusapps.pdf)

CT DEP Bureau of Water Management. 1999. Leachate and Wastewater Discharge Sources Inventory. Hartford, CT

CT DEP Bureau of Water Management – Planning and Standards Division. Effective 2002 & 1996. Water Quality Standards. CT DEP. Hartford, CT (This document available on CT DEP's website at: http://www.ct.gov/dep/lib/dep/water/water_quality_standardsl/wqs.pdf)

CT DEP Environmental and Geographic Information Center. Revised 1997. Leachate and Wastewater Discharges – Housatonic River, Hudson River, and Southwest Coastal Basins (Map). CT DEP. Hartford, CT

CT DEP Environmental and Geographic Information Center. Adopted 1997. Water Quality Classifications - Housatonic River, Hudson River, and Southwest Coastal Basins. (Map). CT DEP. Hartford, CT

Connecticut Geological and Natural History Survey. (Compiled by Marianne McElroy). 1981. Natural Drainage Basins in Connecticut (Map). CT DEP Natural Resources Center in cooperation with the USGS. Hartford, CT

Frink, C.R. and W.A. Norvell. 1984. Chemical and Physical Properties of Connecticut Lakes. The Connecticut Agricultural Experiment Station. Bulletin No. 817. New Haven, CT

Housatonic River Commission. September 2006. Housatonic River Management Plan. (Prepared for Housatonic River Commission by Dodson Associates, Ltd.) Warren, CT

Jacobs, Robert P., Eileen B. O'Donnell. 2002. A Fisheries Guide to Lakes and Ponds of Connecticut. CT DEP Bulletin 35. Hartford, CT

State Board of Fisheries and Game – Lake and Pond Survey Unit. 1959. A Fishery Survey of the Lakes and Ponds of Connecticut. Report No. 1. Hartford, CT

Website References

Center for Watershed Protection website: http://www.cwp.org/index.html

Connecticut Agricultural Experiment Station – Invasive Aquatic Plant Survey – Information available on CAES website at: http://www.ct.gov/caes/site/default.asp

CT DEP - Ground Water and Aquifers - Information available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2685&q=322260&depNav_GID=1625&depNav=|

CT DEP - Total Maximum Daily Load (TMDL) - Information available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325604&depNav_GID=1654)

CT DPH – 2006 Connecticut Fish Consumption Advisory - Information available on CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3140&q=387460&dphNav_GID=1828&dphPNavCtr=|#47464

CT DPH Source Water Assessment Program - Information available on CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387342

CT DPH Source Water Protection Program - Information available on CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387338

Connecticut Federation of Lakes (CLF) website: http://www.ctlakes.org/

Connecticut Greenways - Information available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2707&q=323858&depNav_GID=1704&depNav=|

Housatonic River Hydroelectric Project (FERC No. 2576) – For documents related to this project, see the Federal Energy Regulatory Commission website at: http://www.ferc.gov/

Housatonic Riverbelt Greenway – Information available on HVA website at: http://www.hvatoday.org/show.cfm?page=land/riverbelt.htm&folder=land

Litchfield Hills Greenprint Project - For more information, see the HVA website at: http://www.hvatoday.org/show.cfm?page=land/greenprint.htm&folder=land and the TPL website at: http://www.tpl.org/tier3_cd.cfm?content_item_id=19095&folder_id=261

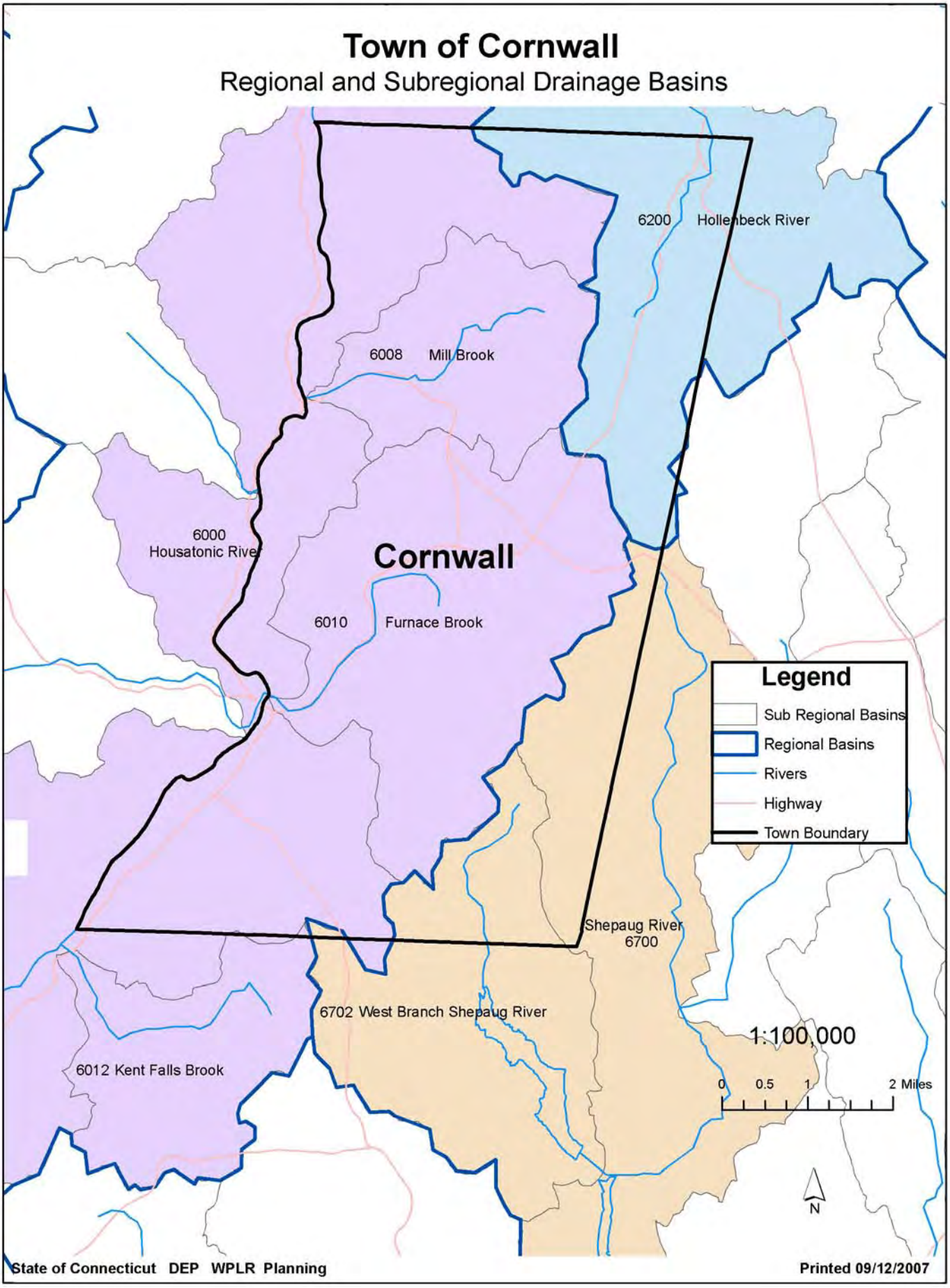
Northwest Highlands Program (and Hollenbeck Watershed) - For more information, see the TNC-CT website at: http://www.nature.org/wherewework/northamerica/states/connecticut/preserves/art21228.html

U.S. EPA - GE/Housatonic River Site website: http://epa.gov/region01/ge/

U.S. Forest Service - Highlands Study - For more information, see the USFS website at: http://www.na.fs.fed.us/highlands/

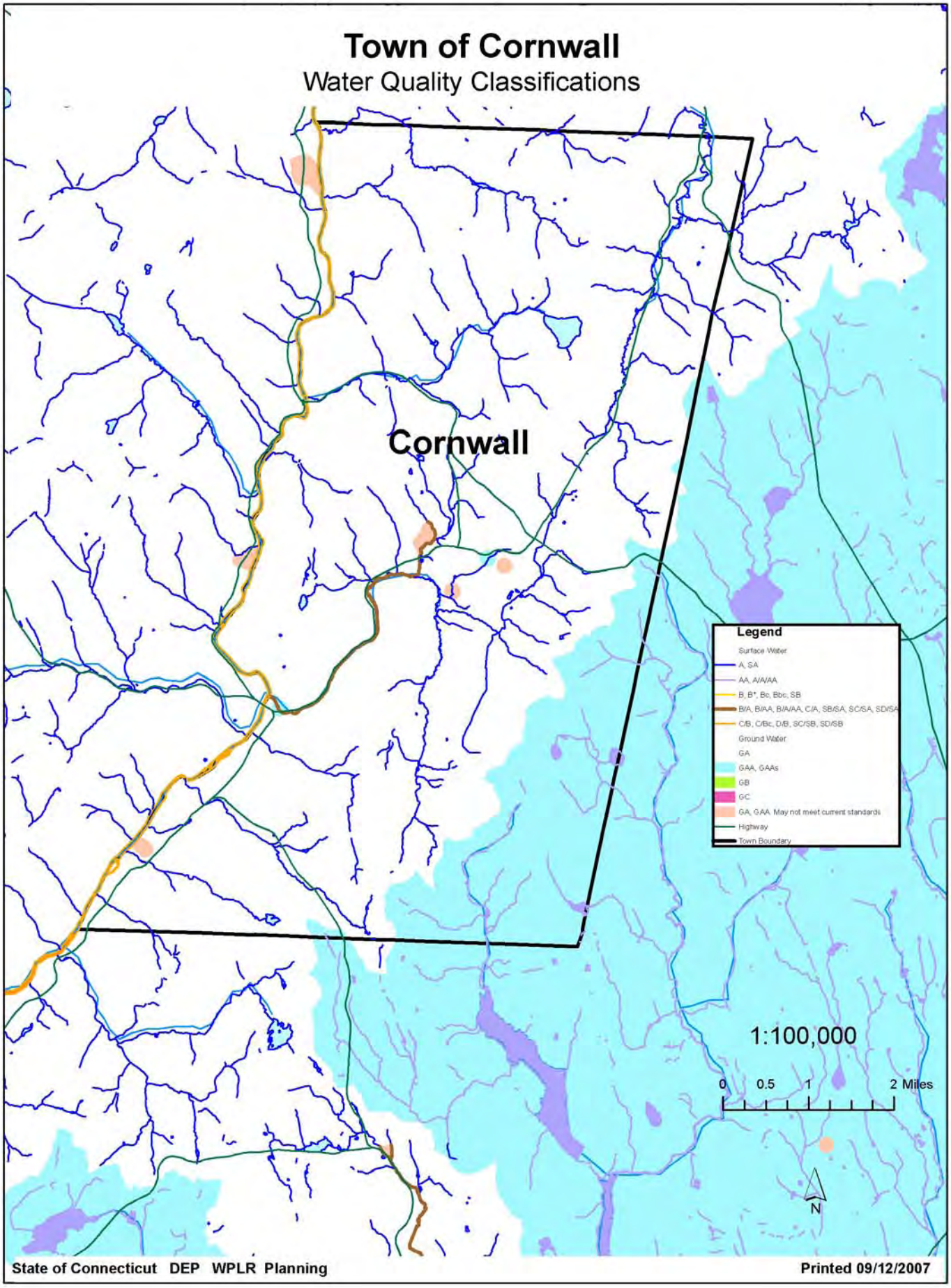
University of Connecticut - Cooperative Extension System – Nonpoint Education for Municipal Officials website: http://nemo.uconn.edu/

Upper Housatonic Valley National Heritage Area - For more information, see UHVNHA website at: http://www.upperhousatonicheritage.org/


Town of Cornwall
Regional and Subregional Drainage Basins
6200 Hollenbeck River
6008 Mill Brook
6000 Housatonic River
Cornwall
6010 Furnace Brook
Legend
Sub Regional Basins
Regional Basins
Rivers
Highway
Town Boundary
Shepaug River 6700
6702 West Branch Shepaug River
6012 Kent Falls Brook
1:100,000
0 0.5 1 2 Miles
N
State of Connecticut DEP WPLR Planning
Printed 09/12/2007

Town of Cornwall

Water Quality Classifications

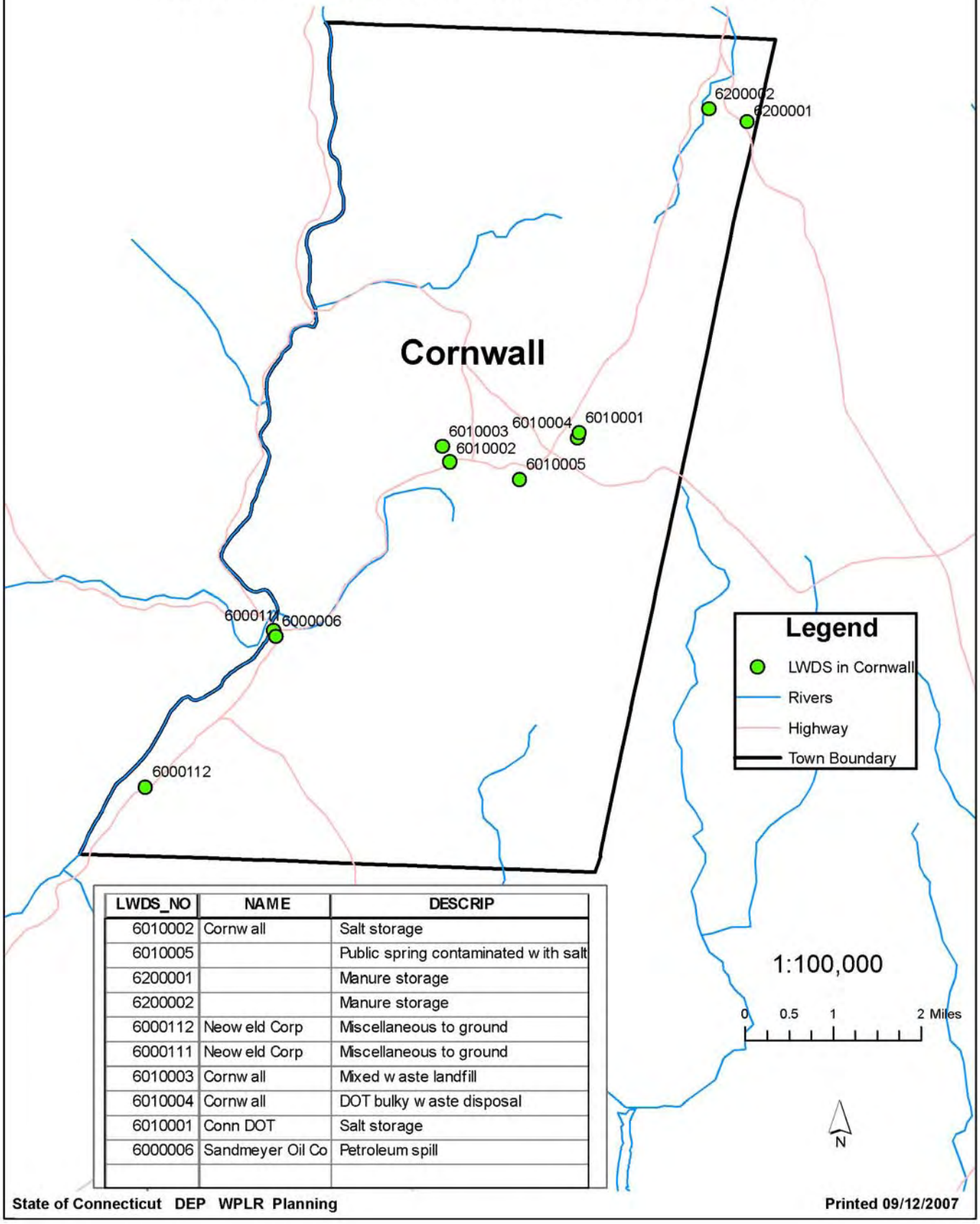


State of Connecticut DEP WPLR Planning

Printed 09/12/2007

Town of Cornwall

Leachate and Wastewater Discharge Sources (LWDS)



LWDS_NO	NAME	DESCRIP
6010002	Cornw all	Salt storage
6010005		Public spring contaminated w ith salt
6200001		Manure storage
6200002		Manure storage
6000112	Neow eld Corp	Miscellaneous to ground
6000111	Neow eld Corp	Miscellaneous to ground
6010003	Cornw all	Mixed w aste landfill
6010004	Cornw all	DOT bulky w aste disposal
6010001	Conn DOT	Salt storage
6000006	Sandmeyer Oil Co	Petroleum spill

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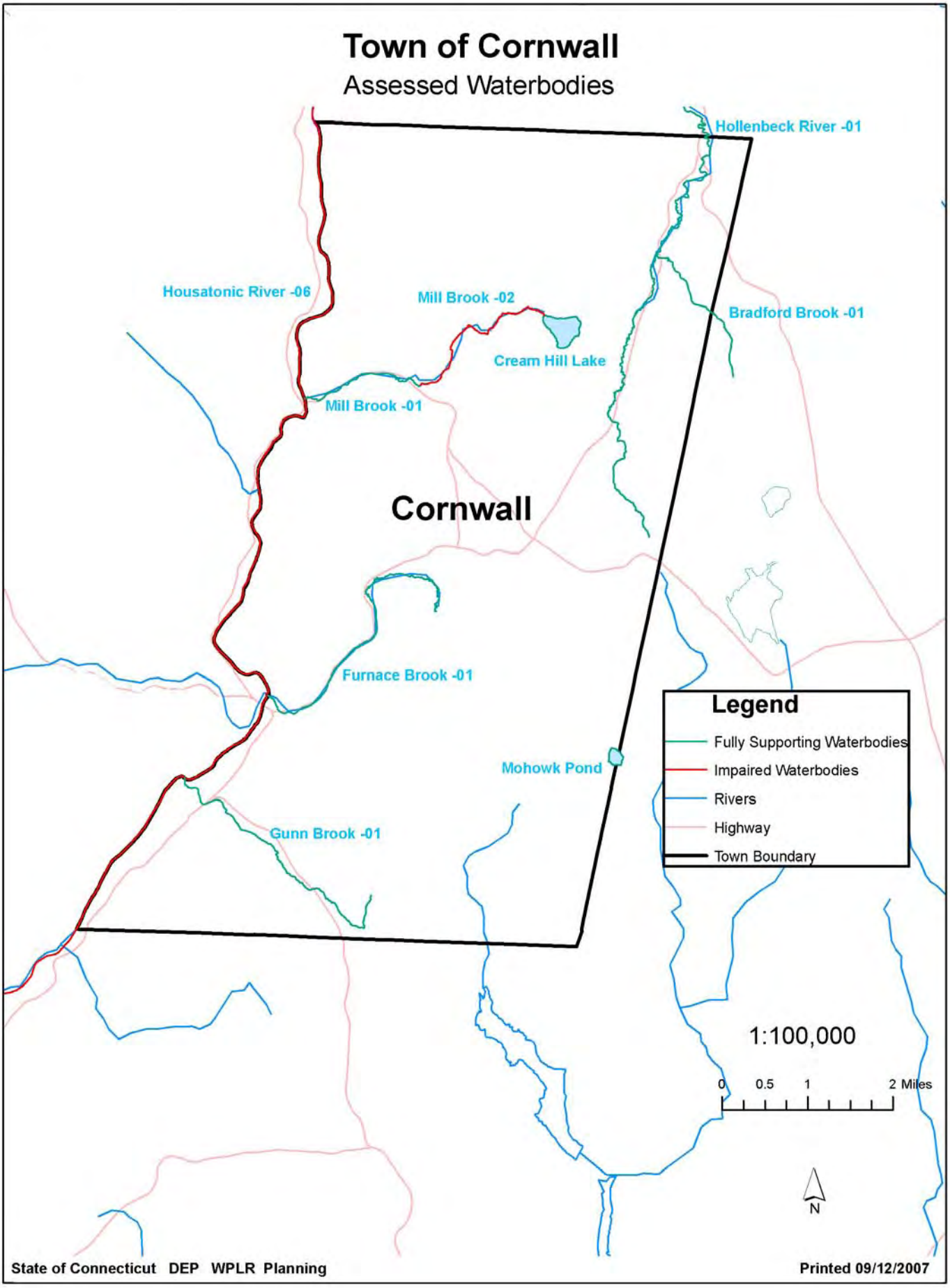
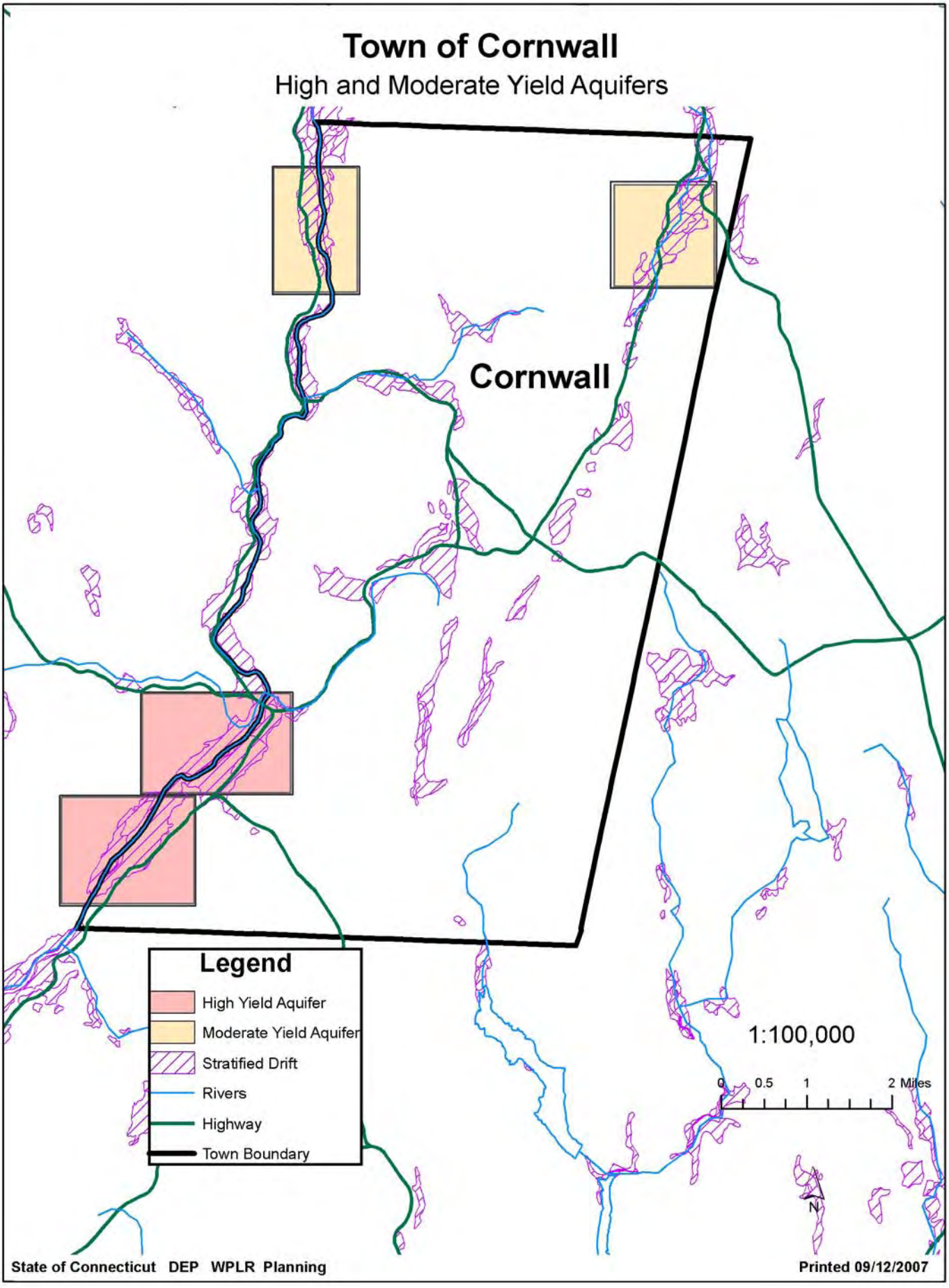
Printed 09/12/2007


Town of Cornwall
Assessed Waterbodies
Hollenbeck River -01
Housatonic River -06
Mill Brook -02
Bradford Brook -01
Cream Hill Lake
Mill Brook -01
Cornwall
Furnace Brook -01
Mohowk Pond
Gunn Brook -01
Legend
Fully Supporting Waterbodies
Impaired Waterbodies
Rivers
Highway
Town Boundary
1:100,000
0 0.5 1 2 Miles
N
State of Connecticut DEP WPLR Planning
Printed 09/12/2007


Town of Cornwall
High and Moderate Yield Aquifers
Cornwall
Legend
High Yield Aquifer
Moderate Yield Aquifer
Stratified Drift
Rivers
Highway
Town Boundary
1:100,000
0 0.5 1 2 Miles
N
State of Connecticut DEP WPLR Planning
Printed 09/12/2007

Wetland Resources

Land Use History

It is of interest to note that historically Cornwall has apparently never heavily depended upon its rivers for much other than occasional power. Town histories do not mention fishing or transportation as key assets of the watercourses. Rather, the natural resource value was in the woodlands where land-based charcoal making, which resulted in a deforestation of the land every 20 to 30 years, and iron making became important industries.

Photographs provide a means for land use comparison through the years. The sepia tone photograph below was taken sometime between the years 1890 and 1930. Though difficult to discern, the farthest hills are barren of trees. Only the few conifers that appear as dark patches stand out. By comparison, the color image from the spring of 2007 shows approximately the same area from a slightly different angle. The hills in this second photograph are completely wooded.

The historic growth and harvesting of the woodlands allowed for a fairly normal water cycle across the decades. The scarcity and/or lack of dammed rivers, extensive mill ponds, and channeled waterways helped preserve the wetland systems that Cornwall enjoys today.

Drainage Systems

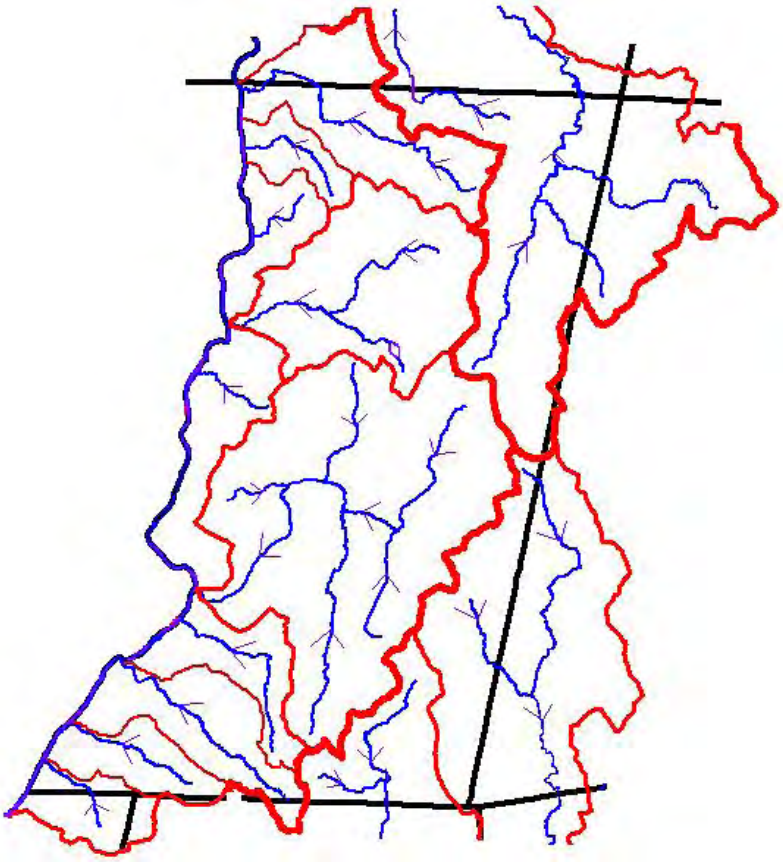
Knowing the boundaries of the watersheds is imperative to the understanding and long term maintenance of wetland health. For only in the knowing of the boundaries of the wetland systems can the planning to preserve them come about.

Housatonic River - The most noticeable of Cornwall's water resources is the Housatonic River which forms the 11.7 mile western boundary of the town. It is undammed in its north to south run but features rapids in three prominent places: West Cornwall, downstream of West Cornwall and due west of Green Mountain, and further south in the bend west of the Calhoun Cemetery. And while the water quality of the Housatonic itself is impaired, this is not the case with the tributaries that rise in, or pass through, Cornwall on their way to the main stem.

The Housatonic has abutting or riparian land use that is dominated by rail beds which parallel the river very nearly its entire length through town. Topographically, the riparian lands alternate between steep-to-the-waters-edge and flat floodplain. Four steep areas are: 1) Rugg Hill; 2) just above Cornwall Bridge; 3) west of Calhoun Corners, and 4) in the southwest corner of town. In a few places agricultural fields fill the floodplain as at: 1) west of Tarradiddle Hill, and 2) where Millard Brook enters the Housatonic. But mostly woodlands and rail beds abut the river.

Housatonic River Tributaries

The following graphic depicts Cornwall's eight primary drainages that feed the Housatonic. The heavy red line that runs from the top center of town to the east boundary and down to the bottom center marks the east/west drainage divide. All of the area west of the line drains to the Housatonic.



This graphic depicts the primary drainages in the town along with their direction of their flow.

As can be seen, the predominance of water that is shed by the Cornwall hills drains west into the Housatonic River.

The town measures 46.43 square miles of undulating topography. In the graphic above, west of the red line, ~33.4 square miles (72 per cent) of town sheds water into the Housatonic River. East of the line, the remaining ~12.9 square miles (28 per cent) of town, drains into the Hollenback River to the north and the Shepaug River branches to the south.

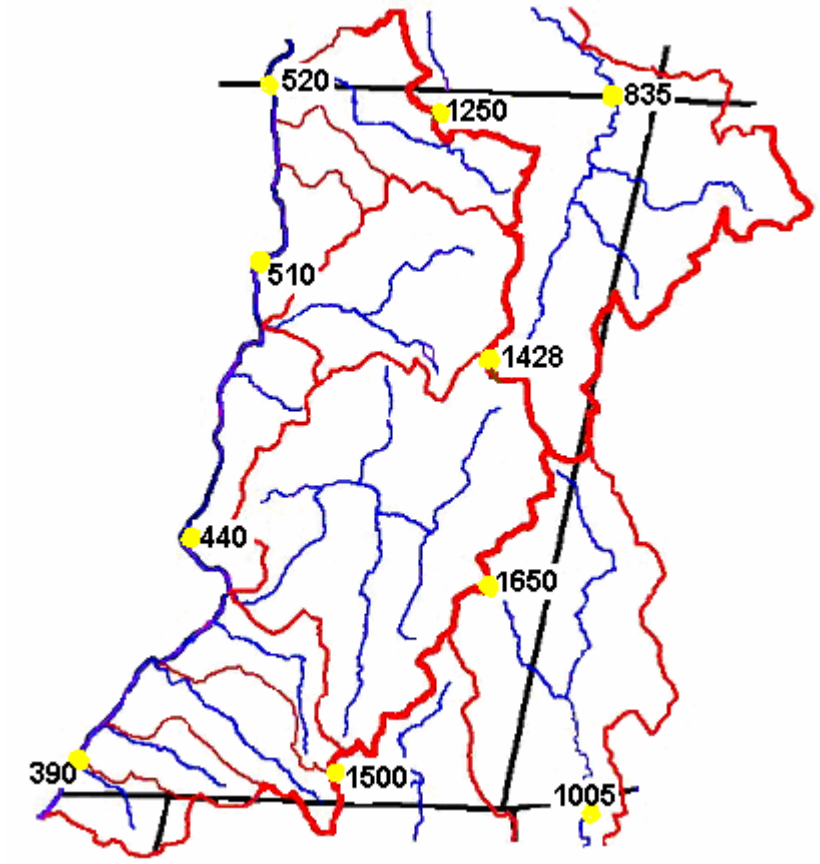
Cornwall's various drainages are the result of its rolling topography which gives rise to a wide variety of wetlands and watercourses. Thus, the drainage lines define the boundaries and extent of the individual wetland *systems*.

The largest single drainage system completely within town limits is the Birdseye/Tanner/ Furnace Brook watershed which dominates the central/south portion of town. It measures ~8,525 acres in size (29% of the town's land surface). The second largest is the Mill Brook drainage in the north central part of town. It abuts the Furnace Brook drainage to

the north. Mill Brook drains ~3,651 acres (12% of the town's land surface). Other smaller drainages such as the Reed, Preston and Adams brook drainages in the northwest and Bonney, Gunn, Millard and Deep Brook drainages to the southwest make up the drainage on the west side of the divide.

East of the divide Cornwall's hills give rise to watercourses that flow through many other towns. The Hollenback which rises in northwest Cornwall passes through Canaan before empting into the Housatonic. Southeastern Cornwall gives rise to the east and west branches of the Shepaug which pass collectively through Goshen, Litchfield and Warren.

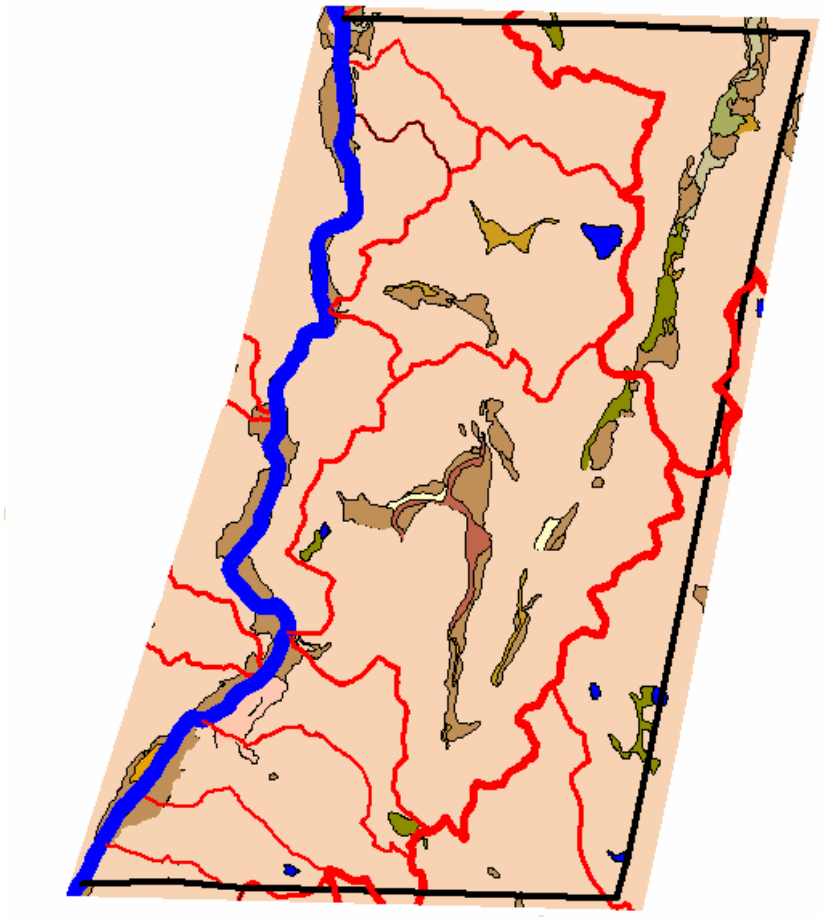
The diagram above shows the twelve major drainages that bound Cornwall's wetland systems. Of the twelve, six are completely within the town boundaries: Preston, Adams, Mill, Ivy, Furnace, and Bonney brooks. All of these drain to the west into the Housatonic.



This graphic displays ten elevation points which have been sited with yellow dots.

Taken individually, the sites show the variety of elevation within the town. Taken in combination, they show the nature of the drainage ridge that runs through town as the crest from which everything else is down slope.

While the information in the geologic section of this review discusses the literal underpinnings of Cornwall's landscape, a more recent event (in geologic time) has had great effect on the land surface, and thus the wetlands, of today. The melting of the most recent glaciation 16,000 years ago left us today's landscape. For within the glacier there was a great jumble of all types of accumulated earth material. These unsorted materials included sands, rocks, silts, cobbles, even boulders and were all amassed chaotically within the ice. When the ice finally melted, that mixture (known as glacial till or simply till) settled onto the landscape and provided the surface materials we have today. Those surface materials, in combination with topography, help define the nature of the wetlands in the town.



In this image of the glacial materials that cover the town, till is the sand color, and is by far Cornwall's most dominant surficial material. Other earth tone colors represent water-sorted materials such as sand and gravels, along with alluvium, that follow existing water courses or, in some cases, followed the historic glacial meltwater courses of long ago.

In general, most till is not very permeable. That is, water set on top of till takes a longer time seeping into the soil than, for example, if the water was on top of sand.

Thus, taking the factors discussed so far: that there are many individual watersheds in town and that they sit atop not-very-permeable till which dominates the landscape, we can better understand the wetlands.

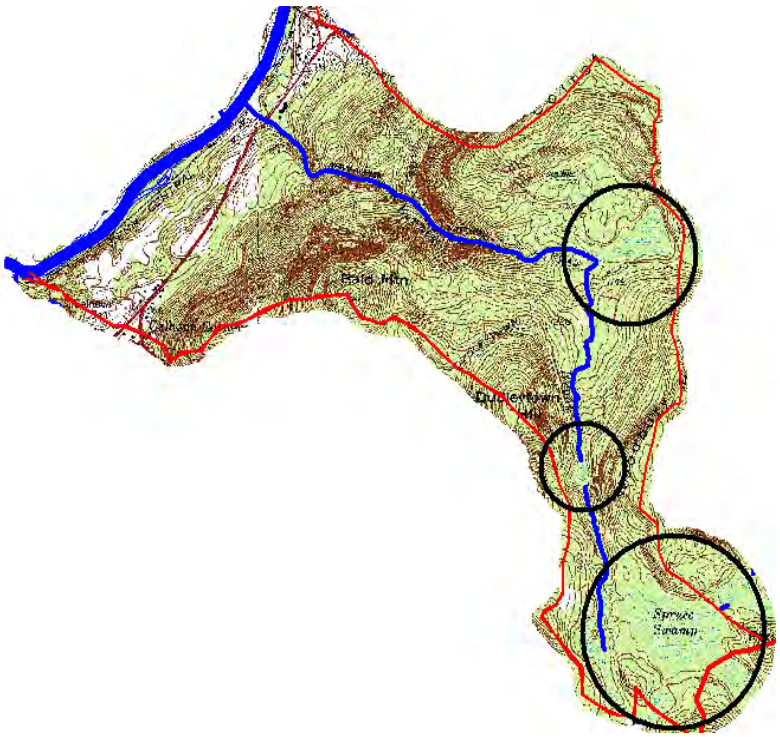
Wetlands and Watercourses

In the driving tour of the town it was very apparent that the wetlands the Team was exposed to showed a very high level of ecological integrity. In this vein it is clear that as

of this writing, regarding wetlands, there is far more right in the town of Cornwall than there is wrong.

Because it gives rise to so many watersheds, Cornwall, as a result, has many headwaters wetlands. It is typical of Cornwall's watersheds that the principal watercourse has, as its headwaters, a wetland. Inspection of the topographic map shows that, for example, both Bonney Brook and Reed Brook have headwaters wetlands. Adams Brook, south of Reed Brook, does not because of its very steep nature. Its main tributary, however, does. It is important to note that from a planning perspective, headwaters wetlands are a most sensitive and important part of the overall wetlands system.

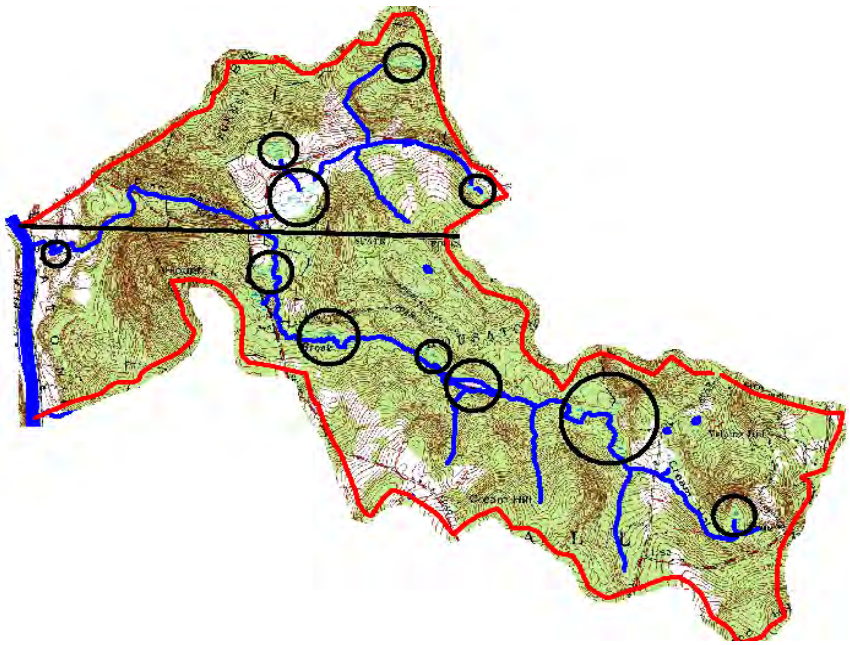
Following any of these watercourses downstream, where the topography allows (IE: not too steep), it is typical that the watercourse connects a series of wetlands.



Pictured on the left is a simplified depiction of the Bonney Brook watershed (red outline). Circled in black, like pearls on a string, are three wetlands connected by the watercourse. Easily visualized is the fact that degradation in the upstream wetlands will quickly pass down-stream and affect the others.

Because of the rural nature of land use/development in town, the many headwaters wetlands are very much intact and in a good state of health. The ecological integrity mentioned above provides for a high value for wildlife habitat. The diversity of both the finfish and the wildlife that makes use of these wetlands speaks to the condition of both the habitat, the water quality, and the wetland extent.

In a fashion similar to Bonney Brook, the Reed Brook watershed along the northern border of town is even more extensive and, as a result, shows a more diverse network of wetlands that feed the main stream and its principal tributary.



The Bonney Brook wetlands are circled in black.

Moving downstream in Cornwall's wetland and watercourse systems, the flood storage function of wetlands is intact because the wetland edge and watercourse riparian zones have experienced such little impact from development. This flood storage/protection function is one of the key values, and valuable assets, lost in suburban and urban wetland systems.

Cornwall's wetlands and watercourses have reached a dynamic steady state. Sitting on till based soils they are physically extensive and their many functions provide much value to the town. As developmental pressures occur and homeowner and town park lawns are constructed right up to the shorelines, erosion, impervious surfaces, road sand sedimentation, and new or replacement (larger/smaller) culverts will all eventually impact the wetland's health. Often not one development has impact enough to foster major changes in the wetlands system. However, *incremental wetland impacts*, up and down the watershed, will be like straws accumulating on the camel's back.

Other Wetlands - Vernal Pools

While it is beyond the scope of the ERT to inventory and assess all wetlands, a not-to-be overlooked part of the town wetland resources is their vernal pools. An effort must be made to document these pools and their contributing areas so future planning may provide for their longevity.

In densely populated and highly developed areas this is almost impossible. That is because the largest integral part of the vernal pool ecosystem is the upland area which neighbors the pool – and all too often is taken up by house yards and roadways.

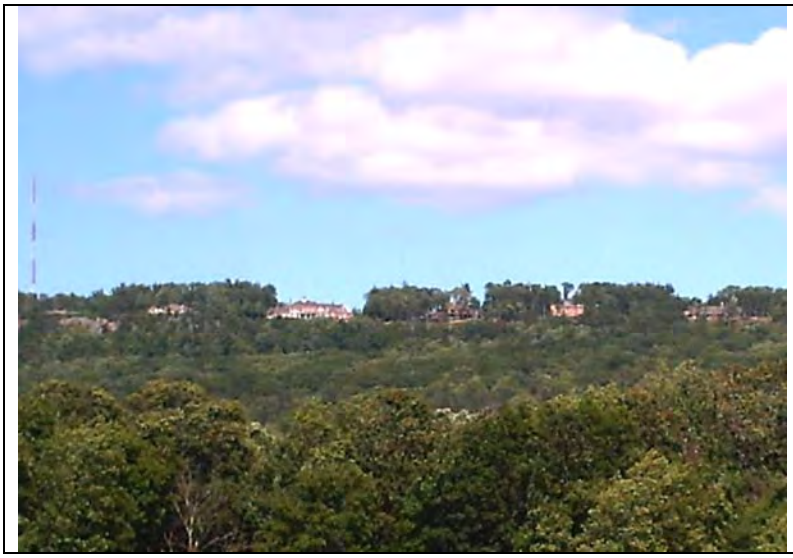
This upland area typically extends away from the vernal pool uphill or upslope to drier soil types. The slopes often vary from gentle to steep. It is in these slopey areas that amphibians spend over 90% of their adult lives. They travel up hill to the well drained soils to burrow. In places, some usable slopes can approach 45 or more degrees. The drainage areas for these pools are typically located on till-based soils and measure 2-3 to 5-6 acres. With such small watersheds, local impacts can be dramatic and damaging to the vernal pool ecology, especially since vernal pools are fed primarily by surface water runoff (precipitation and snowmelt).

There is extensive information in print about vernal pools. Much of it points to the fact that the reduction of more than a certain percentage of critical adjacent upland habitat will have telling impacts on the pool's breeding ecology. A greater understanding of the amphibian's land-based needs may be obtained by mapping each pool's contributing watershed.

Dr. Michael Klemen's recent book, co-authored with Dr. Aram J.K. Calhoun, entitled: "*Best Development Practices – Conserving Pool Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States*" is currently one of the go-to resources for setback recommendations and vernal pool mapping procedures.

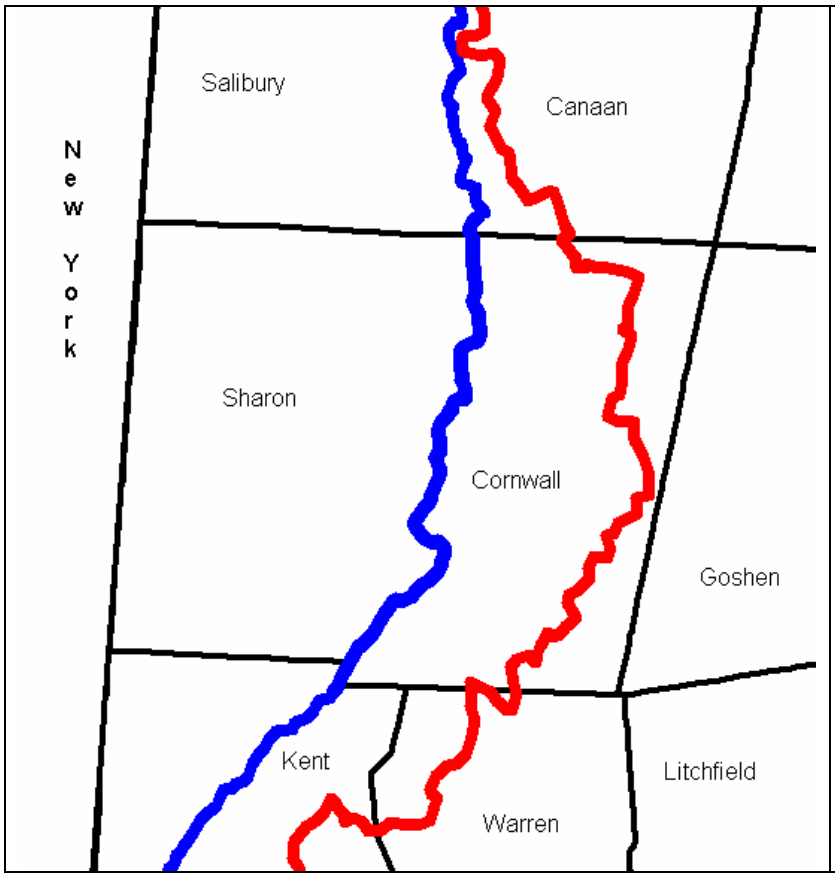
Ridge Top Protection

As described above, Cornwall has an extensive number of headwaters wetlands within its boundaries. Because of their sensitive nature a plan for protecting ridge tops, and subsequently the headwaters wetlands, should be pursued. It is noteworthy that the ridge that plays such an important role by giving rise to the many watersheds within the town does not end at the town boundary. Rather it continues north into Canaan and south into Warren and Kent.



The Farmington River valley's ridge tops have no protection and have become the home sites for many families. Towers also help break up the once scenic hill crest.

Protecting the ridge top/drainage divide would be similar to the intent of the 1998 Metacomet Ridge Conservation Compact that preserves the Metacomet Ridge though 17 towns in central Connecticut. A copy of the Compact may be viewed on the Town of Guilford Web site. Within their Natural Resources Inventory, see Appendix H2a.
http://www.ci.guilford.ct.us/



This graphic shows the Housatonic River in blue and the dividing ridge top in red. This same ridge which passes through Cornwall continues north into Canaan and south into Warren and Kent - two towns that may have similar environmental concerns.

Aquatic Resources

Waterbodies and Watercourses

The following is a listing of named waterbodies and watercourses within the Town of Cornwall. The list was developed from review of the U.S. Geological Survey topographic maps for the Cornwall Quadrangle (photorevised 1984), Ellsworth Quadrangle (photorevised 1969), and South Canaan Quadrangle (photorevised 1969).

Waterbodies	**Watercourses**		
Cream Hill Lake	Adams Brook	Furnace Brook	Millard Brook
Hart Pond	Baldwin Brook	Gunn Brook	Ocain Brook
Hawkins Pond	Birdseye Brook	Heffers Brook	Preston Brook
Mohawk Pond	Bloody Brook	Hollenbeck River	Reed Brook
Stony Batter Pond	Bonney Brook	Housatonic River	Shepuag River
	Clark Brook	Ivy Brook	Spruce Brook
	Deep Brook	Mill Brook	Tanner Brook
			Valley Brook

A search of the Inland Fisheries Division (the "Division") lake, pond, and stream databases found fish survey records for the following:

Waterbodies

Cream Hill Lake is natural in origin with the water level raised slightly by a low earthen and masonry dam. The lake has a surface area of 72 acres. Habitat and fish surveys were conducted on Cream Hill Lake by the Connecticut State Board of Fisheries and Game-Lake and Pond Survey Unit during the late 1950's. Those surveys reported the lake to have a maximum depth of 43 feet and an average depth of 15.7 feet. The lake bottom was composed of coarse boulders with dense beds of aquatic vegetation in shoal areas. At that time, as it is now, shoreline development was slight. Attached is a bathymetric map of Cream Hill Lake produced by the Connecticut State Board of Fisheries and Game-Lake and Pond Survey Unit.

Cream Hill Lake has been stocked with brook trout, brown trout, rainbow trout, largemouth bass, smallmouth bass, black crappie, chain pickerel, yellow perch, sunfish and bullhead. When surveyed by the Connecticut State Board of Fisheries and Game-Lake and Pond Survey Unit, Cream Hill Lake was found to contain a fish population composed of largemouth bass, smallmouth bass, red breast sunfish, and yellow perch. Trout were collected in the size class stocked but there were no apparent holdover-sized fish.

Statewide angling regulations for lakes and ponds apply for all species (current regulations follow).

Mohawk Pond is natural kettle pond located entirely within the Mohawk State Forest. The lake has a surface area of 16.2 acres. Habitat and fish surveys were conducted at Mohawk Pond by the Division on a number of occasions in the 1990's. Those surveys reported the pond to have a maximum depth of 26 feet and an average depth of 15 feet.

Largemouth Bass

The lake bottom was composed of coarse rubble, boulders and mud. Dense beds of emergent and submergent aquatic vegetation grow along the western and southern shores. Except for a YMCA summer camp on the northern shore, the shoreline is mostly wooded. The western shore is a wetland. Attached is a bathymetric map of Mohawk Pond produced by the Division.

The Division stocks Mohawk Pond during the spring and fall with 3,400 catchable size brook, brown and rainbow trout. Holdover trout are rare due to limited summer habitat and high fishing pressure. Largemouth bass, bluegill, white sucker, and creek chubsucker are also present.

Statewide angling regulations for lakes and ponds apply for all species.

Watercourses

Birdseye Brook was surveyed once by the Division on July 27, 1992. The survey site was within the Mohawk Ski Area. The stream was reported to be of moderate grade and surface flow predominated by shallow pool. The streambed was composed primarily of gravel; instream and riparian overhead cover was limited.

The fish population of Birdseye Brook was found to be composed of blacknose dace, creek chub, common shiner, white sucker, pumpkinseed sunfish, golden shiner, and brown bullhead. This fish species assemblage is commonly associated with slow moving cool water and warmwater stream systems. The Division stocks Birdseye Brook once annually with 250 catchable size brook and rainbow trout. Over summer trout survival is rare due to elevated water temperatures and high fishing pressure.

Statewide angling regulations for rivers and streams apply for all species (current regulations attached)

Rainbow Trout

Bonney Brook was surveyed once by the Division on June 26, 1992. The survey site was immediately upstream of the Route 7 bridge. The stream was reported to be of steep grade and surface flow predominated by shallow riffle and cascade. The streambed was composed primarily of large boulder that provided an abundance of instream cover for fish. Riparian vegetation created a nearly complete canopy over the stream.

The fish population of Bonney Brook was found to be composed solely of brook trout. The Division does not stock Bonney Brook. This fish species assemblage is commonly associated with coldwater streams of high quality water and riparian habitat.

Statewide angling regulations for rivers and streams apply for brook trout.

Furnace Brook has been surveyed yearly since the initial survey of July 9, 1992. There are several survey sites along Route 4 within the Wyanteock State Forest at the base of Coltsfoot

Mountain. The stream transitions from a moderate to steep grade as it flows toward the Housatonic River. Surface flow predominated by shallow pool, shallow riffle and several cascades. The streambed was composed primarily of large boulder that provided an abundance of instream cover for fish. Riparian vegetation created a nearly complete canopy over the stream.

The fish population of Furnace Brook is composed of brook trout, brown trout, blacknose dace, longnose dace, creek chub, and white sucker. This fish species assemblage is commonly associated with coldwater streams of good quality water and riparian habitat.

Brook Trout

The length of Furnace Brook from the Route 4 bridge upstream a distance of approximately 1 ½ miles has been designated the Heather Reaves Wild Trout Management Area. The Division manages the stream reach as a Class 2 Wild Trout Management Area (WTMA). It is one of two Class 2 WMTA's in Connecticut. Class 2 WMTA's have some wild trout and are supplemented with stocked fry and/or fingerling size trout. The Division stocks approximately 10,000 brown trout fry annually in the Heather Reaves WTMA.

Angling regulations set a daily creel limit of 2 trout that must have a minimum length of 12 inches.

The confluence of Furnace Brook with the Housatonic River is an important thermal refuge. The thermal refuges are critical for trout during the summer months when river water increases above optimum temperatures for their survival. Thermal refuges were found to be critical to trout survival in the Housatonic River Trout Management Area. Through the relicensing of the Falls Village hydroelectric facility in 2005, the mode of operation was changed from the historic "pond and release" to "run-of-river" specifically to protect the thermal refuges against warm water intrusions.

Brown Trout

Gunn Brook was surveyed once by the Division on June 17, 1992. The survey site was immediately downstream of the Swifts Bridge Road bridge. The stream was reported to be of steep grade and surface flow predominated by shallow riffle. The streambed was composed primarily of cobble. There was somewhat limited instream cover however, riparian vegetation created a nearly complete canopy over the stream.

The fish population of Gunn Brook was found to be composed of brook trout, brown trout and longnose dace. The Division does not stock Gunn Brook. This fish species assemblage is commonly associated with coldwater streams of high quality water and riparian habitat.

Statewide angling regulations for rivers and streams apply.

Heffers Brook was surveyed once by the Division on June 16, 1992. The survey site was immediately upstream of the Route 128 bridge. The stream was reported to be of moderate grade and surface flow predominated by shallow pool. The streambed was composed primarily of gravel. There was somewhat limited instream cover however, riparian vegetation created a nearly complete canopy over the stream.

The fish population of Heffers Brook was found to be composed of brook trout and blacknose dace. The Division does not stock Heffers Brook. This fish species assemblage is commonly associated with coldwater streams of high quality water and riparian habitat.

Statewide angling regulations for rivers and streams apply.

The ***Hollenbeck River*** was surveyed twice by the Division. The first survey was on July 2, 1992. The survey site was parallel to Route 63 approximately 100 yards upstream of the Brown

Brook confluence on property of the Hollenbeck Club. The stream was reported to be of low grade and surface flow predominated by deep riffle. The streambed was composed primarily of cobble. There was an abundance of instream cover however, the riparian vegetation created a somewhat sparse canopy over the stream.

In addition to the Division survey, the site was also surveyed in the mid to late 1980's by a fisheries consulting firm retained by the Hollenbeck Club and again in 2005-2006 by researchers of the University of Connecticut College of Agriculture and Natural Resources. In each survey, the Hollenbeck River fish population at this site was found to be composed of native brook trout, stocked and wild brown trout, stocked rainbow trout, blacknose dace, longnose dace, creek chub, common shiner, tessellated darter and white sucker. This fish species assemblage is commonly associated with low-gradient coldwater streams of high quality water and riparian habitat.

Burbot, a State-listed *Endangered Species* were also collected. To date, the only populations of burbot are found in the Hollenbeck River and Blackberry River.

Angling in this section of the Hollenbeck River is restricted to members and guests of the Hollenbeck Club. The club has established their own angling regulations.

Burbot

The second Division survey site on the Hollenbeck River was at the ConnDOT "picnic area" along Route 43 immediately north of the Hautboy Hill Road intersection. The survey was on August 12, 1992. The stream was reported to be of moderate to steep grade and surface flow predominated by deep pool. The streambed was composed primarily of small boulder. There was an abundance of instream cover and a nearly complete canopy of riparian vegetation over the stream.

The fish population of this reach of the Hollenbeck River was found to be composed of native brook trout, blacknose dace, longnose dace, creek chub, common shiner, slimy sculpin, and

white sucker. This presence of native brook trout and slimy sculpin indicate a high quality coldwater stream.

Slimy Sculpin

The Division does not stock trout into this section of the Hollenbeck River. Wherever angling is allowed, statewide angling regulations for rivers and streams apply.

The ***Housatonic River*** is the most prominent aquatic resource in Cornwall. Approximately 12 miles of the river are found within Cornwall with the midpoint of the channel forming the boundary with the town of Sharon. The river channel is approximately 200 – 250 feet in width and flows in a southerly direction. There are long riffle sections with many moderate to deep pools some of which are greater than 5 feet in depth. The riverbed is composed primarily of small boulder and cobble. The river width and its north – south direction exposes the river to the sun with little shading except in early morning or late afternoon. The water in the river is generally clear and can become extremely turbid after rain events.
The fish population in this section of the Housatonic River is not as diverse as would be expected for a river of this size. This may be in part due to daily fluctuation in flow that had historically occurred from power generation at the Falls Village hydroelectric facility. The fish population is limited to the following species: brown trout, rainbow trout, smallmouth bass, pumpkinseed sunfish, rock bass, fallfish, longnose dace, and white sucker. Longnose dace and smallmouth bass dominate the fish community.

Smallmouth Bass

Longnose Dace

The 14-mile stretch of the Housatonic River from the Route 7 bridge, Canaan and Salisbury, south to the Route4/7 bridge in Cornwall has been designated the Housatonic River Trout Management Area (TMA). This is the longest of the fourteen TMA's in Connecticut and has a

long and complex history spanning almost 25 years. The Housatonic River TMA was created in 1981 to prevent the loss of a popular fishery threatened by PCB contamination. Catch-and-release trout fishing in the TMA is allowed year round; the TMA segment from the Route 4/7 bridge northerly a distance of approximately 3-miles restricts the angling method to fly fishing only. Statewide angling regulations for rivers and streams apply to smallmouth bass fishing.

There is a health advisory for the consumption of smallmouth bass due to PCB contamination. The Connecticut Department of Health recommends that smallmouth bass not be consumed by those in a *High Risk Group* that includes pregnant women, women planning to become pregnant within one year, nursing mothers and children under the age of six. Individuals not in the *High Risk Group* are advised to consume no more than one meal of smallmouth bass per two months.

Trout fishing in the Housatonic River TMA is good to excellent with approximately 4,000 adult and 6,000 yearling aged brown trout stocked annually. Depending on the severity of summer flows and water temperatures, there can be significant numbers of trout holding over from one year to the next. Some of the trout can reach lengths of up to 20-inches.

Thermal refuges, such as those at the Furnace Brook and Mill Brook confluences, were found to be critical to trout survival in the Housatonic River TMA. Through the Federal Energy Regulatory Commission relicensing of the Falls Village hydroelectric facility in 2005, the mode of operation was changed from the historic "pond and release" to "run-of-river" specifically to protect the thermal refuges against warm water intrusions. The Division's future fish surveys will focus on evaluating the effects of recently required run-of-river flows on fish populations in the Housatonic River TMA. Areas within 100 feet of the thermal refuges are closed to all fishing from June 15 to August 31 as posted.

Mill Brook was surveyed once by the Division on July 13, 1992. The survey site was immediately upstream of the Cream Hill Road bridge. The stream was reported to be of moderate grade and surface flow predominated by shallow pool. The streambed was composed primarily of cobble. There was somewhat limited instream cover however, riparian vegetation created a nearly complete canopy over the stream.

The fish population of Mill Brook was found to be composed of native brook trout, wild brown trout, blacknose dace, creek chub, common shiner, and white sucker. This fish species assemblage is commonly associated with coldwater streams of high quality water and riparian habitat.

Public fishing is allowed in the section of Mill Brook from the Housatonic River upstream along Route 128 for approximately 1-mile. The Division stocks this section Mill Brook annually with approximately 300 adult aged brook and rainbow trout. Statewide angling regulations for rivers and streams apply.

Ocain Brook was surveyed on one occasion by the Division on June 25, 1992. The survey site was not in Cornwall but nearby in Goshen. The survey site was located

Blacknose Dace

upstream of the Route 63 bridge. At this site, Ocain Brook flowed through an area maintained as pasture. The stream channel was reported to be of moderate grade and surface flow predominated by shallow riffle. The streambed was composed primarily of coarse sand and gravel. Riparian vegetation consisted of tall grasses and a sparse growth of low shrubs. Instream cover was somewhat limited and was provided primarily by undercut banks.

The fish population of Ocain Brook was found to be composed of native brook trout and blacknose dace. Despite the lack of riparian vegetation and limited instream cover, the stream's water is of a quality to support a coldwater fish community.

The Division does not stock trout into Ocain Brook. Statewide angling regulations for rivers and streams apply.

Reed Brook was surveyed on once by the Division on June 24, 1992. The survey site was immediately upstream of the Wickwire Road ford crossing. The stream channel was reported to be of moderate grade and surface flow predominated by shallow riffle. The streambed was composed primarily of coarse sand and gravel. Both instream cover and riparian vegetation was limited.

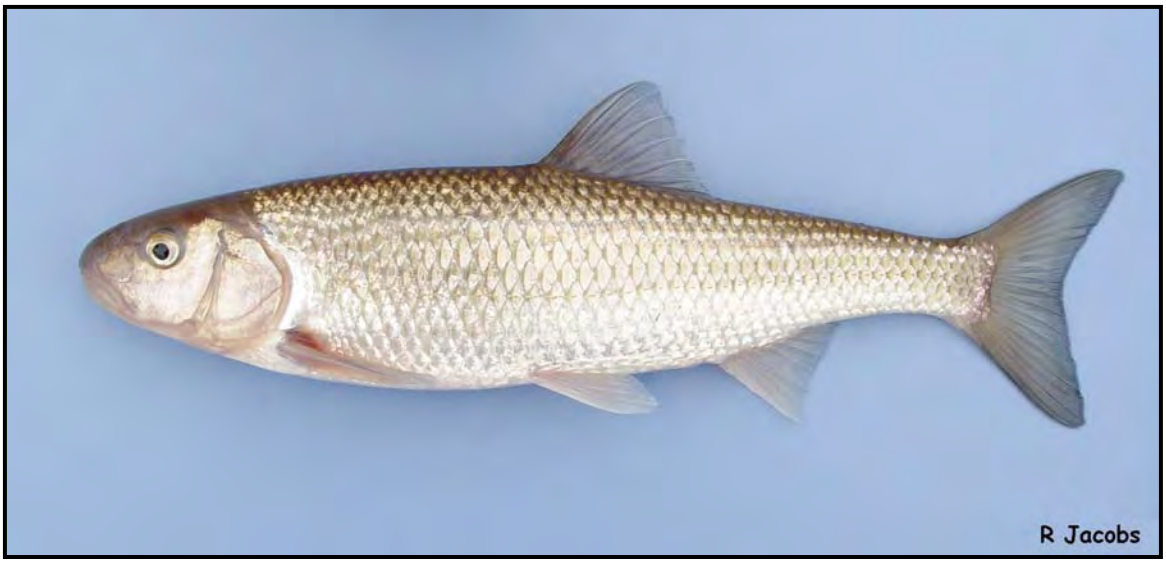
The fish population of Reed Brook was found to be composed of native brook trout and blacknose dace. Despite the lack of riparian vegetation and limited instream cover, the stream's water is of a quality to support a coldwater fish community.

The Division does not stock trout into Reed Brook. Statewide angling regulations for rivers and streams apply.

Creek Chub

Valley Brook was surveyed on once by the Division on July 29, 1992. The survey site was approximately 1-mile upstream of the Birdseye Brook confluence. The stream channel was reported to be of moderate grade and surface flow predominated by deep pool. The streambed was composed primarily of gravel. Both instream cover and riparian vegetation was somewhat limited.

Common Shiner



Fallfish

The fish population of Valley Brook was found to be composed of native brook trout, wild brown trout, blacknose dace, creek chub, common shiner and white sucker. Despite the lack of riparian vegetation and limited instream cover, the stream's water is of a quality to support a coldwater fish community.

The Division does not stock trout into Valley Brook. Statewide angling regulations for rivers and streams apply.

White Sucker

Potential Threats to Aquatic Habitats / Resources and Measures to Mitigate Threats

As reported in *Connecticut Town Profiles (November 2001)* prepared by the Connecticut Department of Economic Development and Community Development, approximately 85% of Cornwall's 46 square mile area is open land. A review of aerial photographs and topographic maps indicate the largest amount of open land is forested with lesser (yet significant) acreage being agricultural land. As depicted on the *Cornwall Build-Out Map* recently prepared by The Nature Conservancy, there is currently sparse residential development (800 residential dwelling units) however; full build-out projections indicate the potential for 4,000+ dwelling units if every possible lot were utilized at the minimum allowed zoning standards of 1, 3, or 5 acres. The land use practices within the past century have afforded a protection to the aquatic habitats within Cornwall that sustain species diverse fish communities.

Should future build-out projects projections be accurate, the aquatic habitats and resources will be faced with the threats associated with either **riparian area degradation** or **habitat segmentation**.

A species diverse **riparian area** is critical to the ecosystem health of both waterbodies and watercourses. The roots of trees, shrubs, and grasses bind streambank and shoreline soils and provide a resistance to the erosive forces of flowing water and wave action in lakes and ponds. Stems and leaves of streambank and shoreline vegetation provide shade that prevents high water temperatures. Leaves, stems, and other plant parts that fall into the waterbodies provide food for aquatic insects. Large woody debris that fall into waterbodies or watercourses enhance physical habitat. Abundant riparian vegetation softens rainfall and enables the riparian area to serve as a reservoir storing surplus runoff for a gradual release to surface waters during low flow periods of summer and early fall. The riparian area is a natural filter that removes nutrients, sediments, and other non-point source pollutants from overland runoff.

Recognizing the critical functions of riparian areas, the Inland Fisheries Division developed riparian area guidelines that are designed to bring uniformity and consistency to environmental review. In 1991, the Division issued a *Policy Statement* and *Position Statement* pertaining to the protection of riparian areas; both documents are attached. The Division recommends the following standard setting procedure to calculate protected riparian area widths for watercourses:

Perennial Watercourses: A protected riparian area of ***100 feet*** in width should be maintained along each side.

Intermittent Watercourses: A protected riparian area of ***50 feet*** in width should be maintained along each side.

The boundaries of the protected riparian area should be measured from either, (1) the edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of riparian inland wetland, the edge of the watercourse bank based on bankfull flow conditions. Bankfull flow is the amount of water that just fills the watercourse channel and where additional water would result in a rapid widening of the stream or overflow into the floodplain. In Connecticut, bankfull flows equate to the 1.5 to 2 year frequency storm flow.

Physical indicators of bank-full flow can be either (1) a change from a vertical bank to a horizontal floodplain, (2) bank undercuts, (3) change in bank material particle size, or (4) change in riparian vegetation.

A well vegetated riparian area along a typical coldwater stream in Connecticut.

The Division has yet to develop formal guidelines to establish protected riparian area around waterbodies (lakes and ponds) but has recommends buffer widths of ***25 to 50 feet*** in regulatory reviews.

It is recommended that Cornwall's land use commission(s) adopt no less stringent guidelines to protect riparian areas around waterbodies or along watercourses from future development. The riparian areas should be protected from development by conservation easement or similar covenant. The boundary of the protected riparian area should be delineated with signage or other marking that is clearly visible. This should be an effective means to avoid encroachment

by the property owner(s) and to aid Town of Cornwall staff in identifying and addressing violations of the protected riparian area.

It is also recommended that Cornwall's land use commission(s) enter into cooperative agreements with private landowners to protect riparian areas on their property. Cooperative efforts should be undertaken to, (1) identify riparian areas altered by prior land use and (2) develop a strategy to restore altered riparian areas to conditions similar to those found in adjacent, undisturbed riparian areas. Vegetation selected for reestablishment within the riparian areas shall be native and non-invasive.

As long and linear ecosystems, watercourses are extremely important for the movement of fish and other obligate aquatic species, and are particularly vulnerable to **habitat segmentation**. In addition to natural barriers (e.g. waterfalls), a number of human activities can disrupt the continuity of watercourse ecosystems. While the most familiar human-caused barriers are dams, there is a more recent concern about the role watercourse crossing structures (primarily culverts) in disrupting riverine ecosystem continuity. With the potential for full build-out of 4,000+ dwelling units in Cornwall, the land use commission(s) must take steps to ensure that new road and/or driveway crossings be designed to protect habitat quality and ecosystem processes that maintain aquatic habitats and resources over time.

An example of the impact of culverts: habitat loss and a fish migration barrier.

It is recommended that Cornwall's land use commission(s) carefully analyze new road and/or driveway crossings of watercourses to minimize the number of crossings. Where crossings are

necessary, they should be located away from sensitive areas (e.g. fish spawning or juvenile rearing habitat).

After minimizing the number of crossings and locating them away from sensitive areas, attention should be focused on the design of the crossing structure itself. The Division recommends the installation of ***span bridges*** or ***arch culverts*** for the crossing of ***perennial watercourses***. Bridges and arch culverts best preserve physical aquatic habitat and do not create barriers to fish migration. In certain select situations, the Division has accepted the installation of culverts for stream crossings. However, a certain amount of modification to a culvert is required to assure the efficacy of maintaining aquatic habitat and resource integrity. Attached are the Division's *Stream Crossing Guidelines* that detail design standards for culvert installation.
Culverts installed on ***intermittent watercourses*** are evaluated based on the potential for seasonal utilization of the watercourse by fish.

Example of an arch culvert. Road crossing of an unnamed stream at the Litchfield Hollow residential subdivision, Litchfield.

It is recommended that Cornwall's land use commission(s) compile an inventory of all watercourse crossings on either town or private property and evaluate the crossing structures affect on the aquatic ecosystem (i.e. fish migration barrier). The task can be overwhelming however, the USDA Natural Resources Conservation Service has developed a community based, volunteer oriented stream survey program that can collect such data. Further information can be obtained from the Natural Resources Conservation Service, Torrington office at 860.626.8258. Upon completion of the crossing structure inventory and assessment, a strategy would then be developed to correct for any impairment the structures impart on aquatic habitat or resources.

Fishway installed by the Connecticut Department of Transportation at the Route 4 crossing of Furnace Brook, Cornwall Bridge. The fishway was installed to provide passage for brook trout and brown trout.

Baffles installed in a stone and masonry box culvert to retain streambed material and to provide fish passage.

A number of dams were created on steep gradient streams in northwest Connecticut during the 1700's and 1800's to meet many historical societal and individual needs. A number of those dams exist to today varying both in condition and in their use as originally intended. Unless they have either completely or partially breached, they remain as a barriers to fish migration and as an alteration to the natural watercourse ecosystem.

As mentioned previously with crossing structures, it is recommended that Cornwall's land use commission(s) compile an inventory of all dams on either town or private property and evaluate the dams' affect on the aquatic ecosystem (i.e. fish migration barrier).

Low head dam on Mill Brook along Cream Hill Road and immediately downstream of the Cogswell Road crossing, North Cornwall.

Remnant dam on Heffers Brook along Route 128, North Cornwall.

Again, the USDA Natural Resources Conservation Service community based, volunteer oriented stream survey program would be ideally suited to collect such data. Upon completion of the dam inventory and assessment, a strategy would then be developed to restore watercourse habitat and/or provide fish passage. Such strategies include complete or partial removal, constructing a bypass channel around the dam, or installing a fishway. The strategy selected is based on the dam owner's preference, condition of the structure, cost, and/or historic significance of the structure.

Bypass channel around the Cannondale Dam on the Norwalk River, Wilton.

Fishway (right) on the Opartny Dam, Sandy Brook, Colebrook.

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Natural Resources – Inland Fisheries Division

STREAM CROSSING GUIDELINES

The Inland Fisheries Division (the "Division") routinely recommends the installation of span bridges or arch culverts for the crossing of ***perennial watercourses***. These structures best preserve physical aquatic habitat and do not create barriers to fish migration. In certain select situations, the Division has accepted the installation of culverts for stream crossings. However, a certain amount of modification to a culvert is required to assure the efficacy of maintaining aquatic habitat and resource integrity. The modifications recommended are:

- The invert of a box culvert should be set no less than 1 foot below the existing streambed elevation. The invert of a round culvert less than 10 feet in diameter should be set 1 to 2 feet below the existing streambed elevation. For round pipe greater than 10 feet in diameter, the culvert invert should be set one-fifth of the pipe diameter below the streambed elevation.

- For multiple culvert situations, one or more of the culverts should be installed as per the guidelines for single culverts. Deflectors may need to be installed in the stream to concentrate low streamflows into and through the recessed culvert.

- The culvert gradient should be no steeper than the streambed gradient up- or downstream of the culvert.

- The culvert alignment should be similar to that of the stream and the culvert kept at a short a length as possible. Vertical headwalls rather than fill slopes should be installed at the culvert inlet and outlet to reduce the total culvert length.

- The culvert should have a width that spans an area 1.2 times the bankfull width of the stream. In Connecticut streams, bankfull width equates to the channel width wetted at the 1.5 to 2 year frequency flow. This standard also applies to arch (bottomless) culverts.

- The culvert should have an Openness Ratio of $\geq$ 0.25. The Openness Ratio (OR) is calculated by dividing a culvert's cross sectional area (height X width) by its length. All measurements are metric.

  Embedded culverts OR = $\frac{\text{[(cross-sectional culvert area pre-embedded) – embedded area]}}{\text{culvert length}}$

  Arch (bottomless) culverts OR = $\frac{\text{height x width}}{\text{length}}$

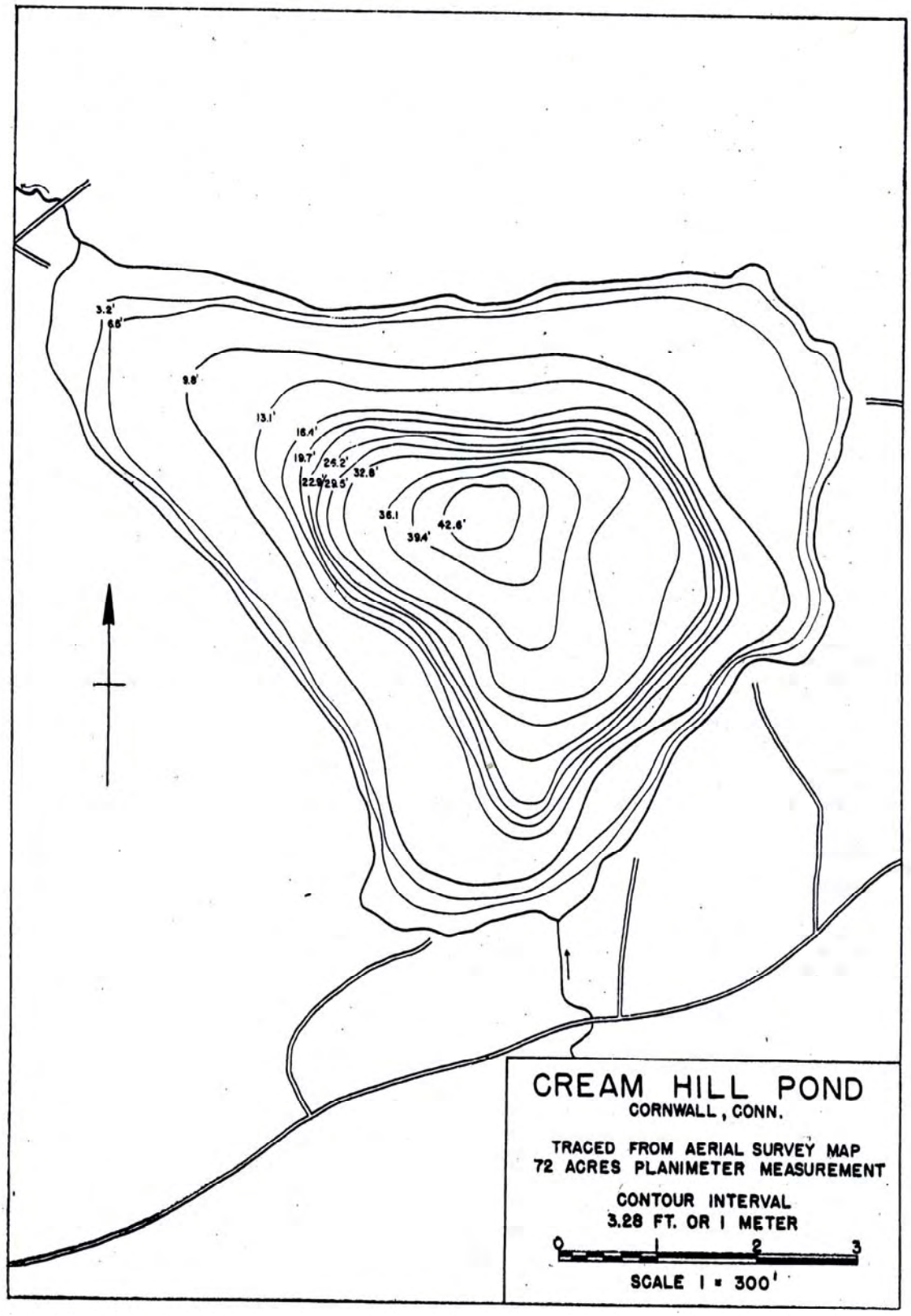
- Corrugated metal culverts rather than concrete culverts are preferred. The corrugations create a roughness that aids in the retention of streambed material.
- Streambed material excavated for the culvert placement should be stockpiled and be replaced within the culvert following its installation. The streambed material should be replaced in a manner replicating the original stream cross section with a well defined low flow channel contiguous with that existing in the stream.

Culverts installed on ***intermittent watercourses*** are evaluated based upon the potential for seasonal utilization of the watercourses by fish.

In addition to offering recommendations for structure design, the Division has developed the following measures to enhance and/or protect aquatic habitats and resources during instream and near-stream construction activities

- The placement of scour protection measures should be minimized to the fullest extent possible. Native stone should be utilized rather than quarried rip-rap.
- Unconfined instream activities should be allowed only during the time period of June 1 through September 30.
- Retaining walls should be utilized in lieu of fill slopes along roadway approaches to stream crossing structures to minimize riparian habitat loss.
- Riparian vegetation disturbed during construction should be re-established in a timely manner upon the project completion. The species of vegetation selected for reestablishment should be native to the immediate watershed and be non-invasive.
- All appropriate erosion and sediment controls should be established prior to and be maintained through all phases of construction

Revised: March 2007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CREAM HILL POND
CORNWALL, CONN.
TRACED FROM AERIAL SURVEY MAP
72 ACRES PLANIMETER MEASUREMENT
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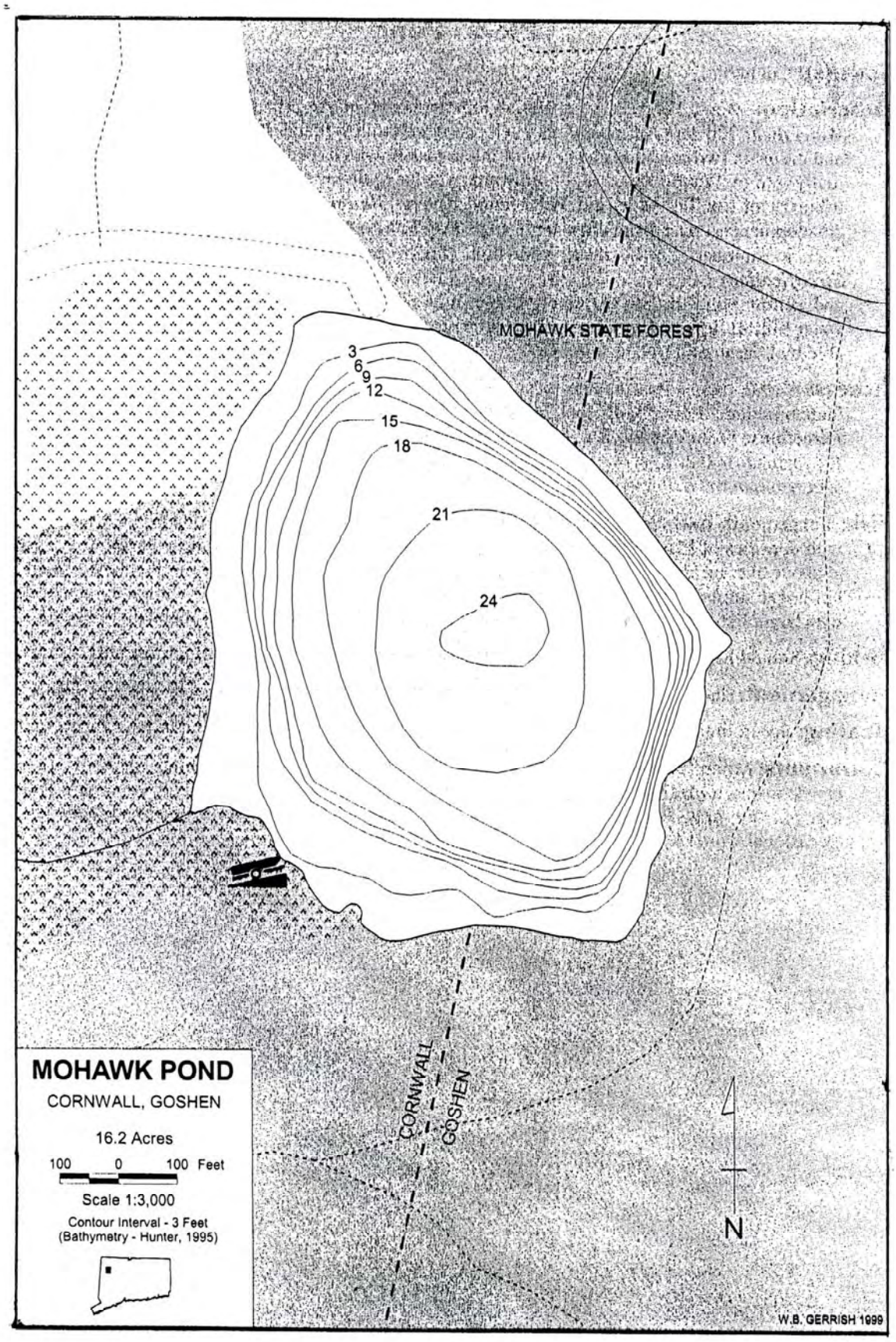
SCALE 1 = 300'


MOHAWK STATE FOREST
3
6
9
12
15
18
21
24
CORNWALL
GOSHEN
MOHAWK POND
CORNWALL, GOSHEN
16.2 Acres
100 0 100 Feet
Scale 1:3,000
Contour Interval - 3 Feet
(Bathymetry - Hunter, 1995)
N
W.B. GERRISH 1999

DEPARTMENT OF ENVIRONMENTAL PROTECTION
INLAND FISHERIES DIVISION

POLICY STATEMENT
RIPARIAN CORRIDOR PROTECTION

I. INTRODUCTION, GOALS, AND OBJECTIVE

Alteration and exploitation of riparian corridors in Connecticut is a common event that significantly degrades stream water quality and quantity. Inasmuch as riparian ecosystems play a critical role in maintaining aquatic resource productivity and diversity, the Inland Fisheries Division (Division) recognizes that rigorous efforts are required to preserve, protect, and restore these valuable resources. Consequently, a riparian corridor protection policy has been developed to achieve the following goals and objective:

Goals

Maintain Biologically Diverse Stream and Riparian Ecosystems, and

Maintain and Improve Stream Water Quality and Water Quantity.

Objective

Establish Uniform Riparian Corridor Buffer Zone Guidelines.

II. DEFINITIONS

For the purpose of implementing a statewide riparian corridor protection policy, the following definitions are established:

Riparian Corridor: A land area contiguous with and parallel to an intermittent or perennial stream.

Buffer Zone: An undisturbed, naturally vegetated area adjacent to or contained within a riparian corridor that serves to attenuate the effects of development.

Perennial Stream: A stream that maintains a constant perceptible flow of water within its channel throughout the year.

Intermittent Stream: A stream that flows only in direct response to precipitation or which is seasonally dry.

III. RIPARIAN FUNCTION

Naturally vegetated riparian ecosystems perform a variety of unique functions essential to a healthy instream aquatic environment. The delineation and importance of riparian functions are herein described. Vegetated riparian ecosystems:

* Naturally filter sediments, nutrients, fertilizers, and other nonpoint source pollutants from overland runoff.

* Maintain stream water temperatures suitable for spawning, egg and fry incubation, and rearing of resident finfish.

* Stabilize stream banks and stream channels thereby reducing instream erosion and aquatic habitat degradation.

* Supply large woody debris to streams providing critical instream habitat features for aquatic organisms.

* Provide a substantial food source for aquatic insects which represent a significant proportion of food for resident finfish.

* Serve as a reservoir, storing surplus runoff for gradual release into streams during summer and early fall base flow periods.

IV. RIPARIAN CORRIDOR BUFFER ZONE GUIDELINES

Recognizing the critical roles of riparian corridors, the Division provides buffer zone guidelines that are designed to bring uniformity and consistency to environmental review. The guidelines are simple, effective, and easy to administer. The following standard setting procedure should be used to calculate buffer zone widths.

Perennial Stream: A buffer zone 100 feet in width should be maintained along each side.

Intermittent Stream: A buffer zone 50 feet in width should be maintained along each side.

Buffer zone boundaries should be measured from either, (1) edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of a riparian wetland, the edge of the stream bank based on bank-full flow conditions.

The riparian corridor buffer zone should be retained in a naturally vegetated and undisturbed condition. All activities that pose a significant pollution threat to the stream ecosystem should be prohibited.

Where the Division policy is not in consonance with local regulations and policies regarding riparian corridor buffer zone widths and allowable development uses within these areas, local authorities should be encouraged to adopt the more restrictive regulations and policies.

12/13/91
Date

James C. Moulton
Acting Director

POSITION STATEMENT
UTILIZATION OF 100 FOOT BUFFER ZONES TO PROTECT RIPARIAN AREAS IN CONNECTICUT

BY
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I. INTRODUCTION

One tenet of the Inland Fisheries Division Policy on Riparian Corridor Protection is the utilization of a 100 foot buffer zone as a minimum setback along perennial streams. The adoption of such a policy is sure to be controversial. Laymen, developers and natural resource professionals alike will ask questions such as: Why was a standard setting method adopted? What's magical about 100 feet? Will 100 feet be sufficiently protective, or will it be overly protective? In response, this paper outlines the ramifications of adopting a riparian corridor policy including the use of a 100 foot buffer zone.

II. STANDARD SETTING VERSUS SITE SPECIFIC BUFFER ZONES

There are two approaches for determining buffer zone width; standard setting and site specific. Standard setting methods define an area extending from the streambank edge or highwater mark to some landward fixed point boundary. Site specific methods utilize formulas that incorporate and consider special site specific land characteristics, hence, the calculation of a variable width buffer zone. In both case, buffers are employed to define an area in which development is prohibited or limited.

A major advantage of standard setting methods is that they are easy to delineate and administer, thereby improving the consistency and quality of environmental assessments. Furthermore, valuable staff time would not be required to determine site specific buffer zones along each and every watercourse of concern.

The exact width of a buffer zone required for riparian corridor protection is widely disputed (Bottom et al. 1985 and Brinson et al. 1981). Buffer width recommendations found in the literature vary from as little as 25 feet to as great as 300 feet (Palfrey et al. 1982). The 100 foot buffer is widely accepted in Connecticut having been adopted by numerous inland wetland and conservation commissions as an appropriate minimum setback regulation for streambelts. In addition, Division staff have been recommending the utilization of the 100 foot buffer zone to protect streambelts since the early 1980's. Scientific research has not been generated to dispute the adequacy of utilizing 100 foot buffer zones to protect Connecticut's riparian corridors. In fact, to ensure that riparian functions are not significantly altered, recent scientific information points towards maintaining buffer zones that would be at a minimum, 100 feet in width (see section III).

Site specific methods define buffer widths according to the character and sensitivity of adjacent streamside lands. These buffer widths, also referred to as "floating buffers," consider physical site characteristics such as slope, soil type, and vegetative cover. The advantage of site specific methods is that buffer widths are designed using site characteristics and not an arbitrary predetermined width. Unfortunately, there is no "one" universally accepted formula or model and none have been developed for use in Connecticut. Most formulas are based on the degree to which sediment can be removed or filtered by natural vegetation, thus, the primary useage is sediment control. Other weaknesses of site specific techniques are (1) all areas must be evaluated on a case-by case basis and, (2) the subjectivity of different techniques (i.e. if the evaluation technique is inadequate, the buffer width will also be inadequate).

Additionally, these formulas only concentrate on one specific riparian function at a time and do not take into account multiple riparian functions, especially those of inland fisheries values as discussed in Section III. Consequently, site specific formulas approach riparian function on a single dimension rather than taking a more realistic, holistic approach.

In the absence of a scientific model to determine buffer widths suitable to protect Connecticut's riparian corridors, the utilization of a standard setting method is environmentally and politically prudent.

III. RIPARIAN FUNCTION

To assess the efficacy of a 100 foot buffer zone, the literature was searched to identify studies which have applied a quantitative approach to buffer width determination. Literature was searched for studies which both support and dispute the 100 foot zone. The following is a summary "by riparian function" of quantitative studies which assess buffer widths.

Sediment Control

Width, slope and vegetation have been cited as important factors in determining effectiveness of buffer zones as sediment filters (Karr and Schlosser 1977). Wong and McCuen (1981), who developed and applied a mathematical model to a 47 acre watershed, found that a 150 foot zone along a 3% slope reduced sediment transport to streams by 90%. Mannering and Johnson (1974) passed sediment laden water through a 49.2 foot strip of bluegrass and found that 54% of sediment was removed from the water. Trimble and Sartz (1957) developed recommendations as to width of buffer areas between logging roads and streams to reduce sediment load. They determined a minimum strip of 50 feet was required on level land with the width increasing 4 feet for each 1% slope increase. Buffer widths as determined by Trimble and Sartz (1957) have been characterized as evaluated guesses rather than empirically defined widths (Karr and Schlosser 1977). Rodgers et al. (1976) state that slopes greater than 10% are too steep to allow any significant detention of runoff and sediment regardless of buffer width. After a critical review of the literature, Karr and Schlosser (1977) determined that the size and type of vegetative buffer strip needed to remove a given fraction of the overland sediment load cannot be universally quantified. Existing literature does suggest that 100 foot riparian buffers will assist with sediment entrapment, although efficacy will vary according to site conditions.

Temperature Control

Brown and Brazier (1973) evaluated the efficacy of buffer widths required to ameliorate stream water temperature change. They concluded that angular canopy density (ACD), a measure of the ability of vegetation to provide shading, is the only buffer area parameter correlated with temperature control. Results show that maximum angular canopy density or maximum shading ability is reached within a width of 80 feet. Study sites were 9 small mountain streams in Oregon that contained a conifer riparian vegetative complex. Whether or not maximum angular canopy density is reached within 80 feet in a typical Connecticut deciduous forest riparian zone is doubtful. Tree height in Connecticut riparian zones is smaller than in Oregon (Scarpino, personal communication), therefore buffers greater than 80 feet in width would be required for temperature maintenance in Connecticut.

Nutrient Removal

Nutrient enrichment is caused by phosphorous and nitrogen transport from, among other things, fertilized lands and underground septic systems. Most research on nutrient enrichment has focused on overland surface flow. Karr and Schlosser (1977) report that 88% of all nitrogen and 96% of all phosphorous reaching watercourses in "agricultural watersheds" were found to be attached to sediment particles; thus, successful nutrient removal can be accomplished through successful sediment removal. There are conflicting reports on the ability of buffer widths to remove nutrients with most research being tested on grass plots. Butler et al. (1974) as cited by Karr and Schlosser (1977) found that a 150 foot buffer width of reed canary grass with a 6% slope caused reductions in phosphate and nitrate concentrations of between 0-20%. Wilson and Lehman (1966) as cited by Karr and Schlosser (1977) in a

study of effluent applied to 300 m grass plots found that nitrogen and phosphorous concentrations were reduced 4 and 6%, respectively. Studies on subsurface runoff as cited in Clark (1977) found high concentrations of nitrates at 100 feet from septic systems with unacceptable levels at 150 feet. Clark (1977) recommended that a 300 foot setback be used whenever possible, with a 150 setback considered adequate to avoid nitrate pollution. Environmental Perspective Newsletter (1991) states that experts who commonly work with the 100 foot buffer zone set by the Massachusetts Wetlands Protection Act are increasingly finding that it is insufficient since many pollutants routinely travel distances far greater than 100 feet with nitrate–nitrogen derived from septic systems moving distances of greater than 1000 feet. Research indicates that the adoption of 100 foot buffer widths for Connecticut riparian zones will assist with the nutrient assimilation; albeit, complete removal of all nutrients may not be achieved.

Large Woody Debris

The input of large woody debris (LWD) to streams from riparian zones, defined as fallen trees greater than 3 m in length and 10 cm in diameter has been recently heralded as extremely critical to stream habitat diversity as well as stream channel maintenance. Research on large woody debris input has mainly been accomplished in the Pacific Northwest in relation to timber harvests. Murphy and Koski (1989) in a study of seven Alaskan watersheds determined that almost all (99%) identified sources of LWD were within 100 feet of the streambank. Bottom et al. 1983 as cited by Budd et al. (1987) confirm that in Oregon most woody structure in streams is derived from within 100 feet of the bank. Based on research done within old–growth forests, the Alaska region of the National Marine Fisheries Service, recognizing the importance of LWD to salmonid habitat, issued a policy statement in 1988 advocating the protection of riparian habitat through the retention of buffer strips not less than 100 feet in width (Murphy and Koski 1989). All research findings support the use of a 100 foot buffer zone in Connecticut for large woody debris input.

Food Supply

Erman et al. (1977) conducted an evaluation of logging impacts and subsequent sediment input to 62 streams in California. Benthic invertebrate populations (the primary food source of stream fishes) in streams with no riparian buffer strips were compared to populations in streams with buffer widths of up to 100 feet. Results showed that buffer strips less than 100 feet in width were ineffective as protective measures for invertebrate populations since sediment input reduced overall diversity of benthic invertebrates. Buffer strips greater than 100 feet in width afforded protection equivalent to conditions observed in unlogged streams. The ultimate significance of these findings is that fish growth and survival may be directly impacted along streams with inadequate sized riparian buffer zones. All research supports the feasibility of implementing a 100 foot buffer zone in Connecticut to maintain aquatic food supplies.

Streamflow Maintenance

The importance of riparian ecosystems in terms of streamflow maintenance has been widely recognized (Bottom et al. 1985). In Connecticut, riparian zones comprised of wetlands are of major importance in the hydrologic regime. Riparian wetlands store surplus flood waters thus dampening stream discharge fluctuations. Peak flood flows are then gradually released reducing the severity of downstream flooding. Some riparian wetlands also act as important groundwater discharge or recharge areas. Groundwater discharge to streams during drier seasonal conditions is termed low flow augmentation. The survival of fish communities, especially coldwater salmonid populations is highly dependent upon low flow augmentation (Bottom et al. 1985). Research, although documenting the importance of riparian zones as areas critical to streamflow maintenance, has not investigated specific riparian buffer widths required to provide the most effective storage and release of stream flows.

IV. OTHER POLICY CONSIDERATIONS

Measurement Determination

The proposed policy states that buffer zone boundaries should be measured from either the edge of the riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or in the absence of a riparian wetland, the edge of the streambank based on bank–full flow conditions. This boundary demarcation is absolutely necessary to ensure that all riparian wetlands are protected. For example, if all measurements were to start from the perennial stream edge and extend landward for a distance of 100 feet, many riparian zones that contain expansive wetlands greater than 100 feet in width would be left unprotected.

Also, since boundary demarcation includes wetland delineation, the ultimate width of the buffer will vary according to site specific features. Consequently, buffer width determination as stated by Division policy is a "hybridization" of both standard setting and site specific methods. This hybridization of methods is advantageous since it acknowledges the sensitivity of streamside wetlands.

Home Rule

Where the Division policy is not in consonance with local regulations and policies regarding riparian corridor buffer zone widths, local authorities would be encouraged to adopt the more restrictive regulations and policies. This feature incorporates flexibility to acknowledge the importance of local "home rule" regulations or policies already in accepted practice. Conversely, towns and cities without accepted policies and regulations could choose to enact the Division policy.

Allowable Uses in Buffer Zones

The Division policy states that "the riparian corridor buffer zone should be retained in a naturally vegetated and undisturbed condition and that all activities that pose a significant pollution threat to the stream ecosystem should be prohibited." In essence, the buffer zone becomes an area where no development should be allowed. For this policy to be effective, there should be no exceptions, a blanket restriction of all uses would be recommended. Further clarification and more precise definitions of allowable uses will, however, be required in the future if the policy evolves into a departmental regulation.

Recently, the Connecticut Supreme Court has ruled that local agencies can prohibit specific development within buffer zones. The *Lizotte v. Conservation Commission of the Town of Somers, 216 Conn.320 (1990)* decision ruled that the construction or maintenance of any septic system, tank, leach field, dry well, chemical waste disposal system, manure storage area or other pollution source within 150 feet of the nearest edge of a watercourse or inland wetland's seasonal high water level can be prohibited (Wetlands Watch 1990). If this decision is a precursor of the future, Connecticut courts will continue to the support the use of buffers, especially those which restrict or prohibit detrimental activities.

V. CONCLUSIONS

The following actions are required to preserve, protect, and restore Connecticut's riparian corridors:

1. The Inland Fisheries Division needs to adopt and implement the proposed policy so that staff can use it as a guideline to assist cities, towns, developers and private landowners with making sound land use decisions. This policy will act to solidify a collective position concerning riparian corridor protection.

2. While the proposed policy in its "current form," represents a recommendation from the CTDEP Inland Fisheries Division, the ultimate goal of the Division should be to progressively implement this policy as either a CTDEP regulation or State of Connecticut statute.

LITERATURE CITED

Bottom, D.L., P.J. Howell, and J.D. Rodger. 1983. Final research report : fish research project Oregon, salmonid habitat protection. Oregon Dept. of Fish and Wildlife, Portland, OR. 155pp.

Bottom, D.L., P.J. Howell, and J.D. Rodger. 1985. The effects of stream alterations on salmon and trout habitat in Oregon. Oregon Dept. of Fish and Wildlife, Portland, OR. 70pp.

Brinson, M.M., B.L. Swift, R.C. Plantico, and J.S. Barclay. 1981. Riparian ecosystems: their ecology and status. U.S. Fish Wildl. Serv. FWS/0BS-81/17. Kearneysville, W.V. 154pp.

Brown, G.W. and J.R. Brazier. 1973. Buffer strips for stream temperature control. Research Paper 15, Forest Research Lab, School of Forestry, Oregon State University, Corvallis, OR. 9pp.

Budd, W.W., P.L. Cohen, P.R. Saunders, and F.R. Steiner. 1987. Stream corridor management in the pacific northwest: determination of stream corridor widths. Environmental Management. 11(5) 587-597.

Butler, R.M., E.A. Meyers, M.H. Walter, and J.V. Husted. 1974. Nutrient reduction in wastewater by grass filtration. Paper No. 74-4024. Presented at the 1974 winter meeting, Amer. Soc. Agr. Eng. Stillwater, OK. 12pp.

Clark, J. 1977. Coastal Ecosystem Management. The Conversation Foundation. John Wiley & Sons, New York, NY.

EPN (Environmental Perspective Newsletter). 1991. Protecting watersheds takes more than 100 feet. Environmental Perspective Newsletter. 2(2) 1-3.

Erman, D.C., J.D. Newbold and K.B. Ruby. 1977. Evaluation of streamside buffer strips for protecting aquatic organisms. California Water Resources Institute. Contribution NO. 165, Univ. of Calif., Davis, CA. 48pp.

Karr, J. R. and I.J. Schlosser. 1977. Impact of nearstream vegetation and stream morphology on water quality and stream biota. U.S. Environmental Protection Agency, Report EPA-600/3-77-097, Athens, GA. 84pp.

Mannering, J.V. and C.B. Johnson. 1974. Report on simulated rainfall phase. Appendix No. 9. First Annual Report, Black Creek Study Project, Allen County, Indiana, Indiana Soil and Water Conservation District. Fort Wayne, IN.

Murphy, M.L. and K.V. Koski. 1989. Input and depletion of woody debris in Alaska streams and implications for streamside management. North American Journal of Fisheries Management. 9:427-436.

Palfrey, R., and E. Bradley. 1982. The buffer area study. Maryland Dept. of Natural Resources. Tidewater Administration. Annapolis, MD. 31pp.

Rodgers, J., S. Syz, and F. Golden. 1976. Maryland uplands natural areas study. A report by Rodgers and Golden, Inc., Philadelphia, PA, for the Maryland Department of Natural Resources.

Scarpino, R. Personal Communication. Connecticut Department of Environmental Protection, Forestry Division, 165 Capitol Avenue, Hartford, CT.

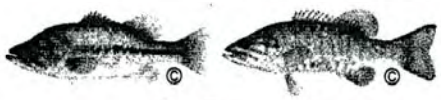
Trimble, G.R. Jr., and R.S. Sartz. 1957. How far from a stream should a logging road be located? Journal of Forestry 55:339-341.

WWN (Wetlands Watch Newsletter). 1991. Regulatory authority of inland wetland agencies expanded. Wetlands Watch Newsletter. Robinson & Cole. 1(2) 1–12.

Wilson, L.G. and G.S. Lehman. 1966. Grass filtration of sewage effluent for quality improvement prior to artificial recharge. Presented at the 1966 winter meeting Amer. Soc. Agr. Eng. Chicago, IL.

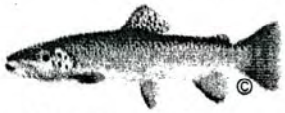
Wong, S.L. and R.H. McCuen. 1981. Design of vegetative buffer strips for runoff and sediment control. Research Paper, Dept. of Civil Engineering, University of Maryland, College Park, MD.

INLAND DISTRICT STATEWIDE SPECIES REGULATIONS

Kind of Fish (notes)	Legal Methods	Area	Open Season[A]	Minimum Length	Daily Creel Limit
 **Alewife/Blueback Herring** (Daily creel limit is for both species in aggregate)	***TAKING OF ANADROMOUS ALEWIFE & BLUEBACK HERRING FROM ALL CONNECTICUT WATERS IS PROHIBITED*** ***Emergency closure is in effect. See page 7 for more information.*** ***EXCEPTION: Landlocked alewife only may be taken from specific lakes. See page 7 for list of lakes. Methods, seasons & creel limits for these lakes are as follows:***				
	Angling	Lakes & Ponds	Open Year-round[A]	none	25
	Scoop Net	Lakes & Ponds	April 1-June 15	none	25
 **American Eel**	**Angling, Icefishing, Bobbing, Bow and Arrow, Spearing**	All Areas	Open Year-round[A]	6"	50
	Note: Spearing and bow and arrow use prohibited in all waters stocked with trout. Spearing prohibited in all lakes & ponds. The taking of elver eel, glass eel and silver eel is prohibited.				
 **American Shad**	**Angling**	Lakes & Ponds, Rivers & Streams	3rd Saturday in April-June 30	none	6
		Lower River / Tidal Waters'	April 1-June 30	none	6
 **Atlantic Salmon**	***TAKING OF ATLANTIC SALMON IS PROHIBITED Exception: Atlantic Salmon Broodstock Fisheries (see page 7)***				
 **Largemouth Bass & Smallmouth Bass** (Daily creel limit is for both species in aggregate)	**Angling & Icefishing**	Lakes & Ponds	Open Year-round[A]	12"	6
		Rivers & Streams	Open Year-round[A]	none	6
		Connecticut River	Open Year-round	12"	6
 **Carp, Suckers & Lampreys**	**Angling, Icefishing, Bobbing, Bow and Arrow, Spearing**	All Areas	Open Year-round[A]	none	none
	Note: Spearing and bow and arrow use prohibited in all waters stocked with trout. Spearing prohibited in all lakes & ponds.				
 **Chain Pickerel**	**Angling & Icefishing**	Lakes & Ponds	Open Year-round[A]	15"	6
		Rivers & Streams	Open Year-round[A]	none	none
 **Hickory Shad**	**Angling, Icefishing, Scoop Net**	All Areas	Open Year-round[A]	none	6
	Note: Daily creel limit is in aggregate with American shad				

[A] Except in areas closed to all fishing during a period of the year.

INLAND DISTRICT STATEWIDE REGULATIONS

Kind of Fish (notes)	Legal Methods	Area	Open Season[A]	Minimum Length	Daily Creel Limit
 **Kokanee**	Angling & Icefishing	All Areas	3rd Saturday in April-last day in February.	none	8
 **Northern Pike**	Angling & Icefishing	All Areas	Open Year-round[A]	26"	2
 **Panfish*** *except White Perch-see below	Angling Icefishing Bobbing	All Areas	Open Year-round[A]	none	none
 **Smelt**	Angling & Icefishing	Lakes & Ponds	Open Year-round[A]	none	50
		TAKING OF SMELT IN RIVERS & STREAMS IS PROHIBITED			
 **Striped Bass**	Angling	All Areas	Open Year-round[A]	28"	2
 **Sturgeon**		***TAKING OF STURGEON IS PROHIBITED***			
 **Trout (Brook, Brown, Lake, Rainbow)**	Angling & Icefishing	Lakes & Ponds Rivers & Streams	3rd Saturday in April-last day in February.	none	5
		Lower Rivers/ Tidal Waters	Open Year-round[A]	15"	2
 **White Perch**	Angling Icefishing Bobbing	Connecticut River (including Coves & Tributaries) Tidally influenced Rivers & Streams	Open Year-round[A]	7"	30
		Lakes & Ponds all other Rivers & Streams	Open Year-round[A]	none	none
 **Walleye**	Angling & Icefishing	All Areas	Open Year-round[A]	18"	2

[A] **Except in areas closed to all fishing during a period of the year.**

If I Catch It, Can I Eat It?

A Guide to Safe Eating of Fish Caught in Connecticut

Contains Updated Information About Store-Bought Fish

STATE OF CONNECTICUT
DEPT. OF PUBLIC HEALTH
410 Capitol Ave.
Hartford, CT 06134-0308
860-509-7740
www.ct.gov/dph

Pamphlet Based Upon 2007 Fish Advisory

Background:

Fish from Connecticut's waters are a healthy, low-cost source of protein. Unfortunately, some fish tend to take up chemicals such as mercury and polychlorinated biphenyls (PCBs). These chemicals can build up in your body and damage your nervous system. The developing fetus and young children are most sensitive. Women who eat fish containing these chemicals before or during pregnancy or nursing may have children who are slow to develop and learn. PCBs can also cause cancer.

This pamphlet provides advice that will help your family avoid these chemicals and eat fish safely.

What Does The Fish Consumption Advisory Say?

The advisory tells you how often you can safely eat fish from Connecticut's waters and from the store or restaurant. In many cases, separate advice is given for the High Risk and Low Risk Groups. The next section will tell you which group you belong to. Advice is given for three different types of fish consumption:

1. Statewide Freshwater Fish Advisory: Most freshwater fish in Connecticut contain enough mercury to cause some limit to consumption. The statewide freshwater advice is that:

- High Risk Group: no more than 1 meal per month
- Low Risk Group: no more than 1 meal per week

2. Advisories for Specific Waterbodies: Certain waterbodies contain fish with higher levels of contaminants than seen elsewhere in the state. These waterbodies include the Housatonic River, parts of the Quinnipiac River, certain lakes, and certain species from Long Island Sound. The chart and map in the center of this pamphlet provides details on safe fish consumption from these waterbodies.

3. Advice for Fish Purchased from the Market: Most fish from the market are healthy to eat and contain essential nutrients such as omega-3 fatty acids. However, there are some fish that contain elevated levels of mercury or PCBs and so should be consumed less or not at all. This pamphlet points out which fish are healthy to eat and which ones to eat less of.

Am I In The High Risk Group?

- You are in the **High Risk Group** if you are a *pregnant woman*, a *woman of childbearing age*, a *nursing mother*, or a *child under the age of 6.*
- If you do not fit into the High Risk Group, you are in the **Low Risk Group**.

MORE SPECIFIC FACT SHEETS CAN BE OBTAINED BY CALLING THE CT DPH (860-509-7740), OR BY GOING TO OUR WEB SITE :

www.ct.gov/dph

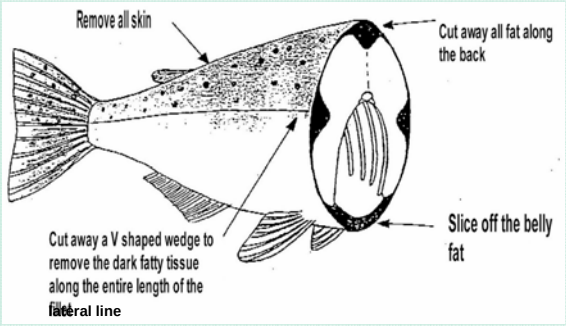
Are Trout Safe To Eat?

Most trout from Connecticut's rivers are safe to eat because they usually have little contamination. However, there are limits on trout from certain waterbodies due to PCBs and on large trout from lakes due to mercury (see chart).

What Else Can I Do To Eat Fish Safely?

PCBs are mostly in the fatty portions of fish. It is very important to remove skin and other fatty parts. Cook fish on a rack (broil) so that fat can drip away from the flesh.

Fatty portions to remove before cooking



Remove and do not eat the organs, head, skin and the dark fatty tissue along the back bone, lateral lines and belly.

Mercury is in the edible (fillet) portion of fish. Therefore, you cannot lower your exposure to mercury by cooking or cleaning the fish. Large fish tend to have the highest levels of PCBs and mercury. If you have a choice, eat smaller fish of any given species. In addition, certain smaller species generally have lower levels of contamination (perch, small trout, sunfish).

How Do These Contaminants Get Into Fish?

Mercury and PCBs can build up in fish to levels that are thousands of times higher than in the water. These contaminants enter the water from:

- Chemical spills that occurred in the past. Even though these spills have been stopped, it will take years for the mercury or PCB levels in the fish to drop to safe levels.
- Mercury in the air. Mercury travels long distances from where it is released. Much of it comes from air pollution outside of Connecticut.

The Connecticut Department of Environmental Protection (CTDEP) is working to improve water quality in Connecticut and is limiting the amount of mercury which can be released into the air.

What About Fish from the Store?

Many fish from the supermarket or restaurant are low in contaminants. Some of these fish are also high in omega-3 fatty acids, a nutrient oil from fish that enhances brain development and helps prevent heart disease. However, some fish from the market can contain elevated levels of certain contaminants, especially mercury.

In general, people in the High Risk Group should not eat any more than 2 fish meals a week from the market or restaurants. These meals should come from a variety of species, and includes canned tuna. The following are specific tips for those in the High Risk Group to choose healthy fish from the store:

- Swordfish and Shark: these contain high levels of mercury and **should not be eaten.**
- Canned tuna: Choose "light" tuna because it has less mercury than "white" tuna.
- Lobster and other shellfish are generally low in chemical contaminants. The tomalley portion of lobster (the green gland) can be high in contaminants and should not be eaten. This applies to lobster from Long Island Sound and elsewhere.

People in the Low Risk Group can safely eat higher amounts of market seafood. For example, swordfish or shark - once per month; tuna steak or halibut - twice per week.

The Chart below provides general guidance on which fish to choose more often:

Eat More of These	Eat Less or None of These
Haddock	Swordfish **
Sardines	Shark **
Salmon (wild) †	King Mackerel**
Atlantic Mackerel	Striped Bass**
Flounder	Bluefish**
Cod	Tilefish**
Light tuna (canned)	White Tuna (canned)
Pollock	Halibut
Shellfish (oysters, shrimp, clams, scallops, lobster)	Tuna Steak

****High Risk Group should not eat any of these species.**

† Salmon: Canned salmon is low in contaminants and so is a good choice. Fresh or frozen salmon fillets are typically from farm-raised fish. These can contain more contaminants than wild salmon and therefore should be eaten only once per week.

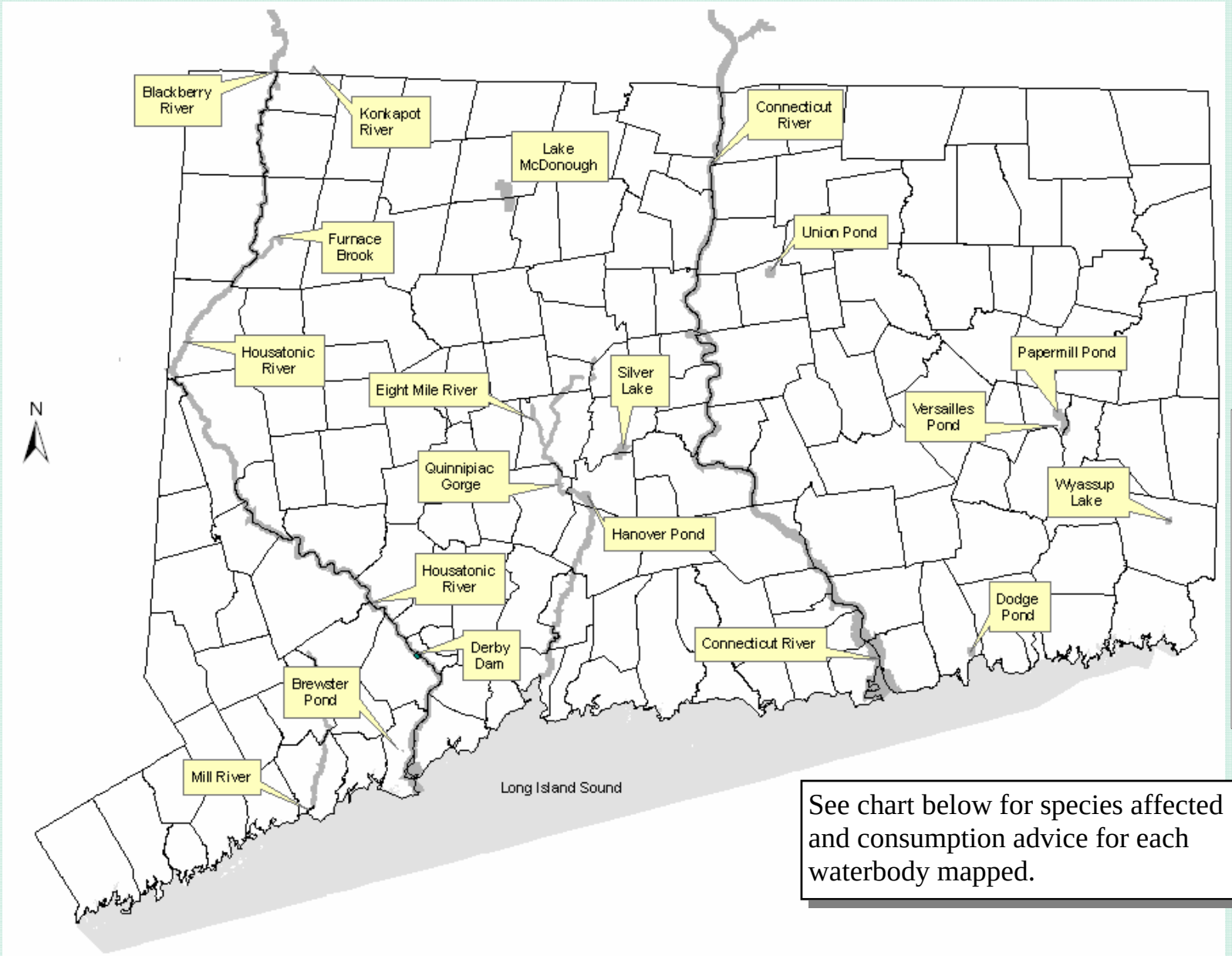
Please call the Connecticut Health Department (860-509-7740) if you would like to know about any fish species not listed in the above chart.

It is important to keep in mind that the High Risk Group should eat no more than 2 fish meals per week, regardless of whether they come from local waters or from the market. This means that if you are in the High Risk Group and have already eaten one locally caught fish meal that week, you should eat only 1 additional fish meal, either from the store or local waters.

Please unfold for more information

Connecticut Safe Fish Consumption Guide

Waterbodies of Specific Concern in Connecticut's 2007 Fish Consumption Advisory
(All other freshwater bodies fall under the general statewide advisory)



See chart below for species affected and consumption advice for each waterbody mapped.

(This fact sheet is funded in part by funds from the Comprehensive Environmental Response, Compensation, and Liability Act trust fund through a cooperative agreement with the Agency for Toxic Substances & Disease Registry, & the Environmental Public Health Tracking Program, Public Health Service, U.S. Department of Health and Human Services.)

REMEMBER

- Follow this advisory to make sure the fish you eat are safe for your family.
- While this advisory focuses on locally caught fish, you should also be selective about store bought fish. See advice on page 3.
- Most trout are not part of the advisory and are safe to eat.
- *Long Island Sound:* Most fish are safe to eat except for listed restrictions on Striped Bass and Bluefish.
- The *High Risk* group consists of pregnant women, women planning pregnancy within a year, nursing women and children under age 6.
- The *High Risk Group* should eat no more than one fish meal per month of most freshwater fish. More restrictions apply to fish from certain waterbodies.
- The *Low Risk Group* should limit eating most freshwater fish to once a week.
- Your exposure to PCBs in fish can be further reduced by trimming away fat and cooking fish on a rack so that fat drips away.

WHERE CAN I GET MORE INFORMATION?

Health Questions?
Call CTDPH at 860-509-7740.

Questions about fishing in Connecticut?
Call CTDEP at 860-424-3474.

2007 Advisory for Eating Fish From Connecticut Waterbodies

Advisory Type	Waterbody	Fish Species	High Risk Group[a] Advice	Low Risk Group Advice	Contaminant
Statewide Freshwater Fish	All fresh waterbodies (See more restrictive advice for specific waterbodies listed below.)	Trout	No Limits on Consumption [b]	No Limits on Consumption	- -
		All other fish	One meal per month	One meal per week	Mercury
More Restrictive Advice For Specific Freshwater Fish	Dodge Pond Lake McDonough Silver Lake Wyassup Lake	Largemouth Bass, Smallmouth Bass, Pickerel	Do not eat	One meal per month	Mercury
	Housatonic River above Derby Dam (except as listed below for lakes on Housatonic River)	Trout, Catfish, Eels, Carp, Northern Pike	Do not eat	Do not eat	PCBs
		Bass, White Perch	Do not eat	One meal per 2 months	PCBs
		Bullheads	One meal per month	One meal per month	PCBs
		Panfish [c] (yellow perch, sunfish, etc)	One meal per month	One meal per week	PCBs
	Lakes on Housatonic River: (Lillinonah, Zoar, Housatonic)	Bass, White Perch	One meal per month	One meal per month	PCBs
		Other Species	See advice for river	See advice for river	PCBs
	Furnace Brook (Cornwall)	Trout	One meal per month	One meal per month	PCBs
	Blackberry River Downstream of "Blast Furnace" (North Canaan)	Smallmouth Bass	One meal per month	One meal per month	PCBs
	Quinnipiac River above Quinnipiac Gorge	All Species	Do not eat	Do not eat	PCBs
	Q Gorge/Hanover Pond (Meriden)	All Species	One meal per month	One meal per month	PCBs
	Eight Mile River (Southington)	All Species	Do not eat	Do not eat	PCBs
	Connecticut River	Carp	Do not eat	One meal per 2 months	PCBs
		Catfish	Do not eat	One meal per month	PCBs
	Versailles, Papermill Ponds & connecting section of Little River (Sprague)	All Species	Do not eat	One meal per month	Mercury, PCBs
	Konkapot River (North Canaan)	White Suckers	Do not eat	One meal per month	Mercury
	Brewster Pond (Stratford)	Catfish & Bullheads	Do not eat	Do not eat	Chlordane
	Union Pond (Manchester)	Carp, Catfish, Bass	Do not eat	Do not eat	Chlordane
Specific Saltwater Fish	Long Island Sound and connected rivers	Striped Bass	Do not eat	One meal per 2 months	PCBs
		Bluefish over 25"	Do not eat	One meal per 2 months	PCBs
		Bluefish 13- 25 " [d]	One meal per month	One meal per month	PCBs
Shellfish	Mill River, Fairfield [excluding Southport Harbor]	Blue Crab	Do not eat	Do not eat	Lead

[a] **High Risk Group** includes pregnant women, women planning to become pregnant within 1 year, nursing women & children under 6. Low risk group includes all others.
[b] It is prudent for the High Risk Group to eat no more than one large trout (over 15") from lakes and ponds per month. See more restrictive trout advice above for sections of the Housatonic and Quinnipiac Rivers, and other waterbodies.
[c] For panfish (yellow perch, sunfish, Pumpkinseed, etc) refer to Statewide Freshwater Fish section above regarding mercury.
[d] Snappers, which are bluefish under 13", are not on the advisory because they are not contaminated.

ARE THE FISH I CATCH SAFE TO EAT? (860) 509-7740

The summary of advisories issued in the past by the Connecticut Department of Public Health and Department of Environmental Protection is updated annually and included as a reminder to anglers. These advisories apply to recreationally-caught fish from Connecticut waters. Individuals in the high risk group should be particularly careful in their fish consumption.

Proper cleaning and cooking methods include: removing the skin, "lateral line" area, belly flaps and dark meat, and broiling or grilling. These methods can reduce PCB levels by 50%.

Advisory	Waterbody	Fish Species	High Risk Group [A]	Low Risk Group [B]	Contaminant
Statewide Freshwater Fish	**All Fresh Waterbodies** (See more restrictive advice for specific waterbodies listed below.)	Trout	No Limits on Consumption [C]	No Limits on Consumption	--
		All other fish	One meal per month	One meal per week	Mercury
Specific Freshwater Fish	**Dodge Pond, Wyassup Lake, Lake McDonough, Silver Lake** (Berlin)	Largemouth Bass, Smallmouth Bass, Pickerel	Do not eat	One meal per month	Mercury
	Housatonic River above Derby Dam (except as listed below for lakes on Housatonic River)	Trout, Catfish, Eels, Carp, Northen Pike	Do not eat	Do not eat	PCBs
		Bass, White Perch	Do not eat	One meal per 2 months	PCBs
		Bullheads	One meal per month	One meal per month	PCBs
		Panfish (Sunfish, Yellow Perch, etc)	One meal per month	One meal per week	PCBs
	Lakes on **Housatonic River**: (Lillinonah, Zoar, Housatonic)	Bass, White Perch	One meal per month	One meal per month	PCBs
		Other Species	See advice for river	See advice for river	PCBs
	Quinnipiac River above Quinnipiac Gorge	All species	Do not eat	Do not eat	PCBs
	Q Gorge/Hanover Pond (Meriden)	All species	One meal per month	One meal per month	PCBs
	Eight Mile River (Southington)	All species	Do not eat	Do not eat	PCBs
	Connecticut River	Carp	Do not eat	One meal per 2 months	PCBs
		Catfish	Do not eat	One meal per month	PCBs
	Versailles, Papermill Ponds & connecting section of **Little River** (Sprague)	All species	Do not eat	One meal per month	Mercury, PCBs
	Furnace Brook (Cornwall)	Trout	One meal per month	One meal per month	PCBs
	Blackberry River Downstream of "Blast Furnace" (North Canaan)	Smallmouth Bass	One meal per month	One meal per month	PCBs
	Konkapot River (North Canaan)	White Sucker	Do not eat	One meal per month	Mercury
	Brewster Pond (Straford)	Catfish & Bullheads	Do not eat	Do not eat	Chlordane
	Union Pond (Manchester)	Carp, Catfish, Bass	Do not eat	Do not eat	Chlordane
Specific Saltwater Fish	**Long Island Sound and connected rivers**	Striped Bass	Do not eat	One meal per 2 months	PCBs
		Bluefish over 25"	Do not eat	One meal per 2 months	PCBs
		Bluefish 13-25" [D]	One meal per month	One meal per month	PCBs

(A) **High Risk Group** includes pregnant women, women planning to become pregnant within one year, nursing mothers and children under six.
(B) **Low Risk Group** included everyone not in the High Risk Group.
(C) It is prudent for the High Risk Group to eat no more than one large trout (over 15") from lakes and ponds per month.
(D) Bluefish under 13" are not on the advisory because they have not been found to contain PCBs at levels sufficient to merit an advisory.

FOR MORE INFORMATION:
Including the fish consumption fact sheet, a special fact sheet for pregnant women, foreign language summaries, and for updates visit the Department of Public Health (CTDPH) website at: **www.ct.gov/dph** or call CTDPH.

Have health questions, call **CTDPH** at **860-509-7740**. Have fishing questions, call **CTDEP** at **860-424-3474**.

CONSUMPTION ADVISORY

Forest Resources

Major Forest Types

The following types can classify the forest resources of Cornwall:

Oak – Hickory

This type is composed of 60% or more hardwoods with oaks or oaks and hickory making up 50% or more of the area's stocking of trees. This type is found on well drained to extremely well drained soils. The predominant species in this type are northern red oak, black oak, white oak, shagbark hickory, pignut hickory, and mockernut hickory. Associate species are chestnut oak, scarlet oak, red maple, white pine, white ash, hemlock, paper birch, black birch, tulip poplar, aspen, American beech, and black cherry. Northern hardwoods or hemlock usually succeed this type.

Mixed Hardwoods

This type is composed of 60% or more hardwoods with oaks or oaks and hickories making up less than 50% of the area's stocking of trees. This type occurs on well-drained soils. Tree species found in this type are northern red oak, black oak, white oak, chestnut oak, scarlet oak, hickories, red maple, white ash, black birch, paper birch, yellow birch, white pine, hemlock, tulip poplar, aspen, American beech, and black cherry. Northern hardwoods or hemlock usually succeed this type.

Northern Hardwoods

This type is composed of 60% or more of shade tolerant hardwoods. This type occurs on fertile moist well-drained soils. The predominant species in this type are sugar maple, yellow birch, and American beech. Associated species are black cherry, red maple, white ash, basswood, white pine, hemlock, red oak, black birch, aspen, yellow poplar, and eastern hop hornbeam. This type tends to be climax.

White Pine

This type is composed of 60% or more white pine or white pine/hemlock with white pine as the predominant stocking. This type is found on a variety of sites. Stands with a higher percentage of white pine develop best on soils that are well drained sands or sandy loams. White pine/hemlock stands favor cool sites such as moist ravines and northern slopes. Associates to purer white pine stands are aspen, red maple, paper birch, black birch, yellow birch, black cherry, white ash, red oak, black oak, sugar maple, basswood, hemlock, pitch pine, scarlet oak, chestnut oak, white oak, and hickories. Associates to white pine/hemlock stands are beech, sugar maple, yellow birch, basswood, red maple, black cherry, white ash, tulip poplar, red oak, white oak, black oak, and chestnut oak. This type growing on dry sandy soils may persist a long time and even approach climax.

On heavier soils, northern hardwoods, hemlock, or white oak usually succeeds white pine.

Hemlock

This type is composed of 60% or more of hemlock or hemlock/white pine with the hemlock predominating. This type develops best on sites that are cool and moist such as ravines and north slopes. Trees associated with this type are beech, sugar maple, yellow birch, basswood, red maple, black cherry, white ash, white pine, paper birch, black birch, yellow poplar, red oak, and white oak. This type tends to be climax.

Plantation

This type is recognized as any area greater than two acres in size on which hardwood or softwood trees where planted. The planted trees are expected to dominate the area for the life of the trees.

Oak Ridge

This type is composed of 60% or more of mixed hardwoods. This type occurs on shallow very well drained to extremely well drained rocky outcrops and ridge tops. The tree growth is usually stunted due to the soil conditions. Species present are chestnut oak, black oak, scarlet oak, white oak, red oak, black birch, gray birch, red maple, hickory, white pine, and hemlock. This type is self-sustaining.

Hardwood Swamp

This type is composed of at least 60% hardwoods. The type is found on inland wetland soils that are flooded or have water at or near the surface for a portion of the year. Species found in this type are red maple, elm, white ash, black ash, yellow birch, black gum, white pine, and hemlock. This type is self-sustaining. Hemlock may eventually succeed it.

Field

This type is open or agricultural land that has not yet become covered with tree growth or has been cleared of tree growth and is maintained in an open condition.

Shrub-Old Field

This type is abandoned agricultural fields reverting to forest and is characterized by old-field grasses, shrubs, and small trees, or barrens on dry sites persisting in shrubs such as blueberry or huckleberry

Open Wetland

This type is a wetland area that has not yet become covered by tree growth or that the tree growth has been killed off by flooding from the activity of beavers. This type is dependent on the beaver activity to maintain water levels.

The tree size class that predominates in the forest types is sawtimber. This is defined as trees with a diameter of 12 inches or larger measured at a point on the trunk that is 4.5 feet from ground level or diameter at breast height (dbh).

State Forest Management

Forestry operations will be used to maintain a mix of plant species and ages, improve plant productivity, provide forest products, provide a variety of forest habitats, protect and improve aesthetics and long term recreational opportunities and to educate the public about forests. All operations will be conducted following best management practices to minimize erosion and protect the water resource.

Forest stands will be managed as even-aged or all-aged (uneven-aged). Natural regeneration will be the primary means of regenerating stands. Planting will be used on a limited basis to supplement natural regeneration, and to introduce species as future seed source. Use of non-native species will be avoided, but with the loss of native species to insects and diseases, it may be necessary to plant non-native species to provide specific habitats.

The priority for deciding to harvest in a forest will be:

1. Salvage or pre-salvage of damaged or threatened stands.
2. Regeneration of understocked stands, which will support a commercial operation
3. Regeneration of fully stocked stands to maintain forest age class distribution.
4. Thinning overstocked stands, which will support a commercial operation.
5. Regeneration or timber stand improvement in stands, which will not support a commercial operation.

The removal of poor quality trees may result in the removal of more trees of one species that another and may result in some forest type changes such as hemlock to mixed hardwood, but type conversion is not the harvest objective.

All-aged management will be applied in northern hardwood, mixed hardwood, and hemlock types. A 20-year cutting cycle will be used. Group selection method will be the primary regeneration system. Harvest openings will be generally less than one acre.

Even-aged management will be applied in oak-hickory and white pine types. Management will be for trees of one age class, but stands where a deferred cut is to be conducted may include trees of two age classes for a portion of the rotation. One hundred

years will be the rotation age of the stands. On average one percent of the even-aged stands will be regenerated annually.

Questions concerning the management of State Forest lands in Cornwall should be directed to Jerry Milne, CT DEP Division of Forestry, PO Box 161, Pleasant Valley, CT 06063, Office: (860) 379-7085, Fax: (860) 379-7103, E-Mail: gerard.milne@po.state.ct.us.

Forest Management on Private Land

The primary consideration in practicing forest management on private lands in Cornwall is the landowners seeking out professional forestry advice from certified foresters. The Connecticut Division of Forestry Cooperative Forest Management Program offers free technical assistance and advice to private forest landowners. Forest landowners in Cornwall should contact Larry Rousseau, Service Forester,
Western Headquarters, 230 Plymouth Road, Harwinton, CT 06791, Phone: (860) 485-0226, Fax: (860) 485-1638, E-Mail: Lawrence.rousseau@po.state.ct.us .

Significant Forest Areas

The two significant forest areas on state-owned land in Cornwall are the Black Spruce Bog Natural Area Preserve and the Gold's Pines Natural Area Preserve.

The Black Spruce Bog Natural Area Preserve consists of 19 acres of state-owned land lying within Mohawk State Forest. The Preserve encompasses an acidic bog located within the Northwest Uplands Ecoregion. The site has long been recognized as a unique natural area and represents one of the few such plant communities of its type in Connecticut. This plant community is considered an outstanding example of a late stage peat bog. Individual specimens of black spruce and larch have achieved a stature rarely found in the state. The bog is a poplar site for educational activities and scientific purposes and features a trail and boardwalk.

The Gold's Pines Natural Area Preserve consists of 12 acres of state-owned land lying within the Housatonic State Forest. The Preserve is located south off CT Route 128 and is across the road from the Cornwall Consolidated School. Located within the Northwest Uplands Ecoregion, Gold's Pines is a mixture of tree species of varying size and age with one portion containing a unique assemblage of very large and very old white pine. This stand of large mature individuals is approximately 180 years old and considered the

oldest stand of white pine in Connecticut. The area has a well-documented history of forest management activities and contains a “Blue Ribbon” long-term forest research plot established by the State in 1932. These plots are among the oldest such research plots in the nation and are an extremely valuable scientific resource.

(Invasive plant information may be found in Appendix A.)

The Natural Diversity Data Base

The Natural diversity Data Base (NDDB) does not provide lists of endangered species for each town. The NDDB maps are now available on line at: www.ct.gov/dep/endangeredspecies. These maps are updated twice each year. As projects are planned that require construction the town should consult the maps and re-contact our program if the project is located in a NDDB area. Please provide specific details, along with a map so that we may facilitate a detailed review of potential impacts with state-listed species. In this way we can be sure that we are providing the Town of Cornwall with the most current information available as projects emerge.

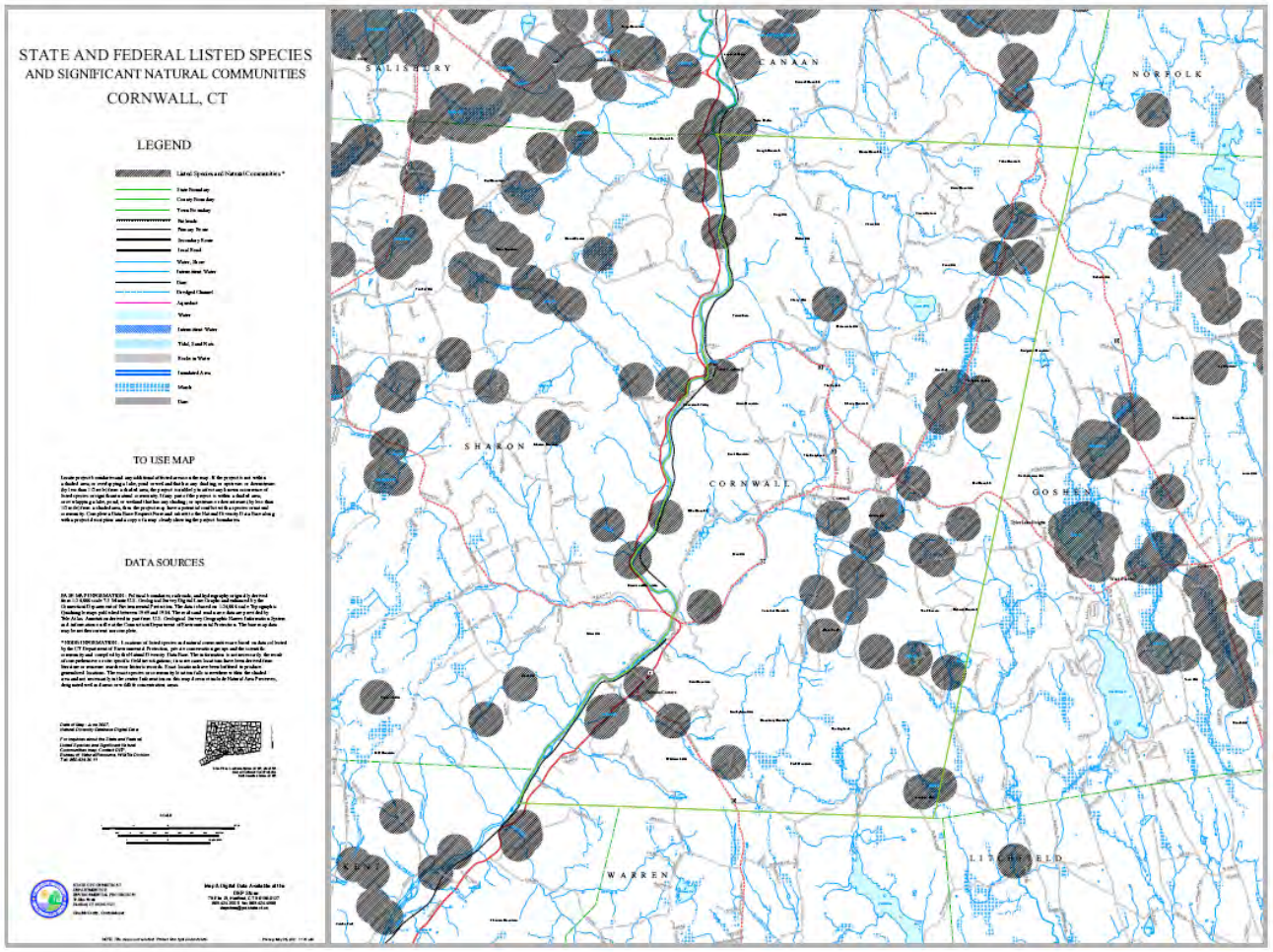
Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department's Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

The Natural Diversity Data Base maps represent approximate locations of endangered, threatened and special concern species and significant natural communities in Connecticut. The locations of species and natural communities depicted on the maps are based on data collected over the years by DEP staff, scientists, conservation groups, and landowners. In some cases an occurrence represents a location derived from literature, museum records and specimens. These data are compiled and maintained by the Natural Diversity Data Base program.

The maps are intended to be a pre-screening tool for those required through state or local permits to consult the NDDB for impacts to state-listed species. These data are also used by groups wishing to identify areas of potential conservation concern. The maps are updated every six months and new information is continually being added to the database. It is important to always use the most current version for your planning needs.

Maps were originally distributed to all town planners as part of the Mapping for Municipalities project which was aimed at providing towns with a tool for including endangered species reviews in their local land use planning efforts. The availability of these maps online and in digital formats has allowed us to reach a wider audience and we continue to encourage local officials and citizens to use this important information.

The general locations of species and communities are symbolized as grey hatched areas on the maps. Exact locations have been masked to protect sensitive species from collection and disturbance and to protect landowner's rights whenever species occur on private property.


STATE AND FEDERAL LISTED SPECIES
AND SIGNIFICANT NATURAL COMMUNITIES
CORNWALL, CT
LEGEND
TO USE MAP
DATA SOURCES
SALISBURY
CANAAN
NORFOLK
SHARON
CORNWALL
GOSHEN
WARREN
LITCHFIELD

Wildlife Resources

Introduction

The following discussion provides a brief overview of the major wildlife habitats found in Cornwall as classified and described in the Wildlife Division's Connecticut's Comprehensive Wildlife Conservation Strategy (2005), state lands and their management missions and general management recommendations to conserve wildlife habitat. The information is meant to provide a cursory overview of the habitat resources of the Town and does not represent a comprehensive assessment. It is highly recommended that if the Town desires a more in-depth comprehensive assessment that addresses wildlife management on private lands, a more in depth description of various habitat types and their associated use by wildlife and their status and location in town, that they hire the services of a well-qualified consulting biologist who could spend the time necessary to perform such an evaluation.

Wildlife Habitat

Wildlife habitat is said to be the complex of vegetative and physical characteristics that provide for all the requirements of wildlife, that is food, shelter, resting, nesting and escape cover, water and space. Generally, the greater the habitat diversity and degree of interspersion of various habitat types, the greater the variety of wildlife there will be using an area. Conversely, while there may be fewer wildlife species, large unbroken expanses of one habitat type provide important habitat for many species of wildlife including species that avoid edges. For instance, some species of migratory birds can only successfully nest in forest interiors well away from edges, where predation from a host of species and nest parasitism by the brown-headed cowbird tends to be higher. Some specialized species need large expanses of grasslands or brushy shrublands. Still others require thicket or edge type habitats which are found where the borders of fields are no longer mowed and the vegetation gradually transitions into mature forest or where stonewalls have been allowed to over grow into a tangle of shrubs, vines and small trees.

There are many factors to consider when determining habitat use and quality of an area for different species, including habitat types, size of habitat types and their quality, overall size of the study area, location, degree of isolation, diversity, and juxtaposition with other neighboring habitat types, etc. Generally, areas with a diversity of habitats can support a higher diversity of species, but patches of a single type of habitat can be very important habitat if they are of high quality, or very large, or contain a natural imperiled community or a unique habitat component, or perhaps are the only significant habitat remaining in a highly developed area. In general larger areas of habitat are much more valuable to wildlife because they can provide for the requirements of more species and a greater number of individuals of a particular species. They can also support species with large home ranges, while simultaneously accommodating those with smaller home.

Major Wildlife Habitat Types in Cornwall

The town of Cornwall lies in Litchfield County in Connecticut which remains fairly rural and is only lightly to moderately developed when compared too much of the rest of the state, which is highly developed, especially in the central and coastal regions. Connecticut is the 29th most populated state in the country and the third smallest. The town of Cornwall is still largely unspoiled and not impacted by development and is characterized by large tracts of forestland interspersed with active and reverting farmland along with various types of wetlands including red maple swamps, shrub wetlands, herbaceous wetlands, forested wetlands, beaver flowages, wet meadows, vernal pools, brooks, streams, rivers, lakes and ponds. Because Cornwall provides extensive blocks of high quality forests interspersed with a diversity of other high quality habitats in a lightly developed setting, it provides excellent wildlife habitat. The habitat exists primarily in large blocks, making it highly desirable to wildlife, especially those with large territory needs.

The Housatonic River is a major waterway and forms the western boundary with the town of Sharon. The river provides an important travel corridor for wildlife, but is especially important to migrating birds during the spring, when they feed on the flush of insects produced in the aquatic and riparian habitat associated with the river. The river also provides important habitat for various invertebrates, fish, reptiles, amphibians and mammals on a year round and seasonal basis. This large river and its associated habitat along with the other diverse quality habitats in town combine to make Cornwall critically important in providing excellent wildlife habitat in the Northwest corner of Connecticut. Conserving as much wildlife habitat in the town as possible will help ensure that the town continues to provide for large expanses of habitat for a wide variety of Connecticut's wildlife from bears to butterflies. The value of the habitat in town is augmented by its location within the northwest corner of Litchfield County, where it is surrounded by other undeveloped diverse wildlife habitat of good to excellent quality in the region.

General Descriptions of Wildlife Habitat

Under Connecticut's Comprehensive Wildlife Conservation Strategy (2005) habitats are classified into 12 major types. Of these, at least 9 occur in Cornwall. They include the following; Upland Forest, Upland Woodland and Shrub, Upland Herbaceous, Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Freshwater Aquatic and Intensively Managed. The following is an overview and description of each type according to Connecticut's Comprehensive Wildlife Conservation Strategy (CWCS), Chapter 4. "Threats" to the various habitat types were also directly taken from Chapter 4 of the CWCS. (The plan is available on the DEP web site at (http://dep.state.ct.us/burnatr/wildlife/geninfo/fedaid/cwcs/home.htm). Many specific references about habitat types and locations of important sub-habitats or imperiled communities come directly from Chapter 4.

Upland Forest:

Deciduous trees and evergreen or coniferous trees characterize this habitat, or mixed evergreen-deciduous trees with overlapping crowns forming between 60-100% canopy cover. This key habitat classification includes four sub-habitats identified as important to wildlife; two of these sub-habitats are found in Cornwall: Coniferous Forest, and Old Growth Forest.

Upland Forest habitat is the predominant (60%) vegetation in Connecticut and is currently dominated by mature trees in the 80-100 year old class. Hardwood forests make up about 80% of Connecticut's forests with oak/hickory accounting for 51% and northern hardwoods for 29%. Cornwall contains both, but mixed hardwoods dominate. Connecticut's forests are approximately 69% saw timber, 25% poletimber and only 6% seedling sapling. Connecticut's forests lack age stand and structural diversity that are beneficial to wildlife diversity. With the exception of some state forestlands that are more actively managed for forest and wildlife, most of Cornwall's forests are dominated by mature stands of trees lacking age class diversity, mirroring the condition of the rest of the state's forests.

Very good examples of upland forest (hardwood, evergreen and mixed hardwood/evergreen) can be found in Cornwall on state forestlands, some private lands, and in neighboring towns. Forested areas provide extremely valuable wildlife habitat for hundreds of species, especially large tracts of forests in generally good condition like those in town. Forests provide cover, food, nesting places, denning sites and roosting areas. Trees provide a variety of food in the form of nuts, berries, catkins, buds and browse. Trees, both living and dead (often called snag trees) serve as a home to a variety of insects, which in turn are eaten by many species of birds like woodpeckers, warblers and nuthatches. Trees with holes, dens or cavities provide nest sites and cover for species such as raccoon, mice, wood duck, fisher, barred owl, flying squirrel and chickadee to name just a few.

In addition to serving as habitat for a wide variety of well known birds and mammals, upland forest also serves as habitat for less visible and often overlooked reptile and amphibian species. For example, the common redback salamander spends its entire life cycle in upland terrestrial habitats in deciduous or coniferous forests or in openings under cover very close to forests patches. It breeds and deposits eggs beneath logs, under stones, inside rotten logs, and spends its adulthood under leaf litter.

Many other species of salamanders require temporary or vernal pools for breeding and then return to the surrounding forest to spend the balance of their time. That's why the connections between wetlands and vernal pools with upland forests are so important. Forests are also home to a wide variety of invertebrates including moths, butterflies, beetles, borers, flies and a host of others.

There are several examples of Old Growth Forest in Cornwall, although they are small and considered in ecologically poor condition by ecologists. They are however, the best

examples the state has of very old, large stands of trees that have had limited human disturbance. They include Gold's Pines Natural Area Preserve within Housatonic State Forest and the Ballyhack Preserve owned by The Nature Conservancy.

Coniferous or evergreen forests supply important sources of food from cones for small mammals and birds and provide cover for many species of wildlife to nest in, escape to and find shelter from bad weather. Conifer cover can be especially important during the winter, since temperatures tend to be slightly higher due to reduced wind speeds and finding food can sometimes be easier since snow depths are often less.

Cornwall provides some exceptional forest habitat due to the size of the forest blocks (greater than 500 acres), the fact that so much of it is protected and the town is still relatively undeveloped. The forested areas are made even more valuable because they are in close proximity to so much other undeveloped and protected forestland.

Threats to this habitat type statewide include:

- ***Degradation of habitat from over-browsing by deer.***
- ***Degradation of habitats by non-native invasive species***
- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Loss of very large forest blocks (e.g. 2000+ acres) with unbroken canopy structure***

<u>Upland Woodland and Shrub:</u>

Upland Woodland and Shrub habitats are characterized by open forests where tree crowns usually do not touch (between 25% -60% canopy cover). These woodlands are dominated by evergreen and/or deciduous trees with a variety of shrubs, herbs and non-vascular plants in the understory and ground cover. This key habitat classification includes three sub-habitats determined to be important to wildlife, one of which is likely found in the town, Red Cedar Glades. The overall status and distribution of Upland Woodlands and Shrub habitats in Connecticut is not well known at this time. Good examples of Red Cedar Glades can be found in the neighboring towns of Salisbury, Sharon, Kent and Canaan, but many of these have been impacted by limestone quarry activities.

These more open Upland Woodlands and Shrub habitats that are characterized by shrubs, scattered trees and lush growth of growth of ground and mid story vegetation are generally favored by species that favor early successional or young forest and shrub habitat. These wildlife species generally favor high structural diversity and can often use thickets and edges in conjunction with these more open woodland/shrublands.

Examples of species that would use this type of habitat include New England cottontail, red bat, meadow jumping mouse, woodland vole, brown thrasher, chestnut-sided warbler, blue- spotted salamander, and wood frog along with various invertebrates such as the

phantom crane fly and eastern comma. The extent and location of these habitats in town are not well documented.

Threats to this habitat type statewide include:

- ***Degradation of habitat from over-browsing by deer.***
- ***Degradation of habitats by non-native species***
- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Lack of fire needed to maintain certain habitats.***
- ***Loss of early successional habitats through natural selection.***

Upland Herbaceous:

Upland herbaceous habitats are characterized by herbaceous plants such as grasses, herbs and ferns that form 25% or more of the ground cover. Areas with scattered trees, shrubs and dwarf-shrubs are included as long as they provide less than 25% cover. This key habitat classification includes four sub-habitats important to wildlife, only one of which probably occurs in Cornwall: Grassy glades and balds found on top of hills such as Mine Mountain. All upland herbaceous habitats are scarce and declining in Connecticut. The best examples in the immediate area occur on Canaan Mountain, and Pond Mountain Natural Area (Pond Mountain Trust) in Kent.

While there are unique plants and invertebrates found in these habitats, the birds, reptiles, amphibians, and mammals found there would generally be those species using the forested areas surrounding these ridge tops.

Threats to this habitat type statewide include:

- ***Degradation of habitats by non-native invasive species***
- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Impacts from human disturbance***
- ***Lack of fire to maintain certain habitats***
- ***Loss of early successional habitat through natural selection***

Forested Inland Wetland:

Forested inland wetland habitats are characterized by wetland soils and dominated by evergreen or deciduous trees with crowns forming 60-100% cover. Connecticut has about 100,000 acres of Forested Inland Wetlands, with red maple forests being the most common. This broad key habitat classification includes four sub-habitats determined to be important to wildlife, only one of which is noted to occur in Cornwall.

The only occurrence of a viable Black Spruce Swamp community in Connecticut is found at Mohawk Mountain Black Spruce Bog Natural Preserve in Mohawk State Forest, in Cornwall. This area is dominated by dense tree and shrub growth including black spruce, mountain holly, sheep laurel, and high bush blueberry.

Forested inland wetlands generally provide extremely important habitat because they bring water and high plant and structural diversity together in one place for wildlife to take advantage of. Standing trees, living, dying and dead, provide nest sites, food, and cover. Abundant insects, invertebrates, fish and small mammals provide prey for a wide variety of predators, such as hawks, owls, weasel, mink, fox, coyote, bobcat, and wading birds. Permanently flooded areas provide breeding sites and abundant food. Many species utilize these wetland sites including the big and little brown bat, black bear, hairy-tailed mole, black duck, woodcock, green heron, black-billed cuckoo, least flycatcher, Northern saw-whet owl, northern waterthrush, blue-spotted salamander, and the spotted turtle.

Threats to this habitat type statewide include:

- ***Degradation of habitats by non-native invasive species and wildlife***
- ***Loss, degradation or fragmentation of habitats from development or changes in land use***
- ***Loss of wetland habitat from historic filling, dredging, and ditching.***
- ***Loss of habitat value due to hydrologic impacts from development, new roads, impervious surfaces and culverts.***

Shrub Inland Wetland:

Shrub inland wetlands are dominated by wetland soils and woody vegetation greater than 1.5 feet and less than 20 feet in height, arranged individually or clumped. The shrub layer generally forms more than 25%of the canopy cover, with whatever trees are present forming less then 25% of the canopy. This habitat includes shrub thickets, bogs, seeps and fens. Shrub thickets are variable in composition and include red maple sapling swamps, willow and alder thickets and high bush blueberry/swamp azalea swamps. Bogs and fens are natural peatlands that occur in topographic basins influenced by ground water. Spring fens are characterized by saturated wetland soils that receive groundwater discharge throughout the year. Of these, bogs and fens are most imperiled and these very special habitats are considered important to wildlife. There are several imperiled plants associated exclusively with these habitats. Mohawk Mountain Black Spruce Swamp is a good example of a bog. While bogs, fens, and seeps are found throughout Connecticut, they are not abundant. Other than the Black Spruce Bog at Mohawk, not much is know about the status and/or location of fens and seeps in Cornwall.

While not abundant, shrub swamps are located throughout Cornwall on private and state owned lands, in wetland areas that were formerly cleared for agriculture and sporadically pastured, areas too wet to support tree growth and areas recovering from beaver activity. Shrub wetlands are important because of the diverse plant growth, high structural diversity and abundant, cover, food and nesting sites they supply. The presence of water on a year round or seasonal basis also makes these areas highly desirable for wildlife. Often shrub wetlands can be associated with herbaceous wetlands, forested wetlands or sparsely vegetated wetlands dominated by shallow open water. Species using these habitats include the northern water shrew, New England cottontail, alder flycatcher,

woodcock, Northern waterthrush, willow flycatcher, blue-spotted salamander, eastern box turtle, Eastern ribbon snake, wood turtle, and bog copper, along with many others.

Threats to this habitat type statewide include:

- ***Degradation of habitats by non-native invasive species and wildlife***
- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Loss of wetland habitat from historic filling, dredging and ditching.***
- ***Loss of habitat value due to hydrologic impacts from development, new roads, impervious surfaces, and culverts.***
- ***Nutrient input from surrounding development and beaver impoundments***

Herbaceous Inland Wetland:

Herbaceous Inland Wetland habitat is dominated by an herbaceous layer of grasses, forbs and ferns and includes less than 25% of scattered tree, shrub and dwarf-shrub cover. This key habitat classification includes two sub-habitats determined to be important to wildlife: Calcareous Spring Fens and Freshwater Marshes. The condition of Herbaceous Inland Wetland habitats is poor and declining in Connecticut and the extent and condition of these habitats in Cornwall is not specifically known.

Threats to his habitat type statewide include:

- ***Degradation of habitats by non-native invasive species and wildlife***
- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Loss of wetland habitat from historic filling, dredging, and ditching***
- ***Degradation of habitats by non-native invasive species and wildlife***
- ***Loss of habitat value due to hydrologic impacts from development, new roads, impervious surfaces and culverts.***
- ***Loss of early successional habitats through natural selection***

Sparsely Vegetated Inland Wetland:

The Sparsely Vegetated Inland Wetland habitat is characterized by open water or open mineral substrates with scattered if any, plants. This key habitat includes two aquatic communities determined to be important to wildlife: Surface Springs and Vernal Pools. While many vernal pools and springs no doubt exist on both state and private lands in Cornwall, the extent and condition of these habitats in Cornwall is largely unknown.

Threats to this habitat type statewide include:

- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Loss of habitat value due to hydrologic impacts from development, new roads, impervious surfaces and culverts.***
- ***Degradation of habitats by non-native invasive species and wildlife***

- ***Impacts from development to upland migration corridors associated with vernal pools.***
- ***Impacts from development in upland buffers.***
- ***Degradation of habitats by non-native invasive species.***

<u>Freshwater Aquatic:</u>

Freshwater Aquatic habitats in Connecticut encompass a variety of bodies of water including large rivers, streams, lakes and ponds. These include both vegetated shorelines and non-vegetated habitats. The vegetative may be either emergent or submerged. There are 15,000 miles of rivers and streams and 6,000 lakes and ponds in Connecticut. This key habitat classification includes six sub-habitats determined to be important to wildlife, five of which occur in Cornwall: Large Rivers and Streams and their associated riparian zones, Unrestricted free-flowing streams, Cold water streams, Head-of-Tide, and Lakes and their Shorelines.

Cornwall, like the rest of Connecticut, contains a wide variety of freshwater aquatic habitats. The Housatonic River is an outstanding example of a large river system and provides habitat for a variety of wildlife species including the crayfish, green frog, snapping turtle, muskrat, otter, mink, beaver, common merganser, Canada geese, black duck, mallard, and great blue heron, to name just a few.

Threats to this habitat type include:

- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Degradation of habitats by non-native invasive species and wildlife.***
- ***Degradation, alteration and loss of habitat due to stream channel modifications, channelization, filling, dredging, development, and vegetation control and shoreline modification.***
- ***Fragmentation of populations and loss of access to upstream and spawning habitat due to impediments to fish movements, such as dams, barriers, culverts and tide gates.***
- ***Impacts of water diversions that reduce stream flows, resulting in fish mortality, loss of habitat and interference with migration.***
- ***Impacts of point and non-point source pollution.***
- ***Loss of habitat value due to hydrologic impacts from development, new roads, impervious surfaces and culverts.***
- ***Impacts to and loss of riparian habitat for wildlife corridors and insufficient buffer requirements to protect streams.***
- ***Instream flow alterations and increasing temperatures caused by consumptive withdrawals of surface or ground water and wetland loss.***
- ***Impacts to fish habitats due to ineffective or insufficient land use regulations among towns.***
- ***Loss of coldwater habitat due to decreased groundwater input or increased warming (e.g. filling of wetlands, impoundments, removal of riparian vegetation).***

- ***Impacts to coldwater habitats from beaver dams that result in ponding and warming, fragmentation of habitat and increased sedimentation and nutrient loading.***

Intensively Managed:

Intensively managed habitats have various vegetative cover and hydrology. Their common characteristic is the need for substantial human maintenance through activities such as clearing, grazing, burning or mowing. Without this maintenance, they would succeed or naturally grow into young and than mature forest. This successional process however, often favors invasive species. This key habitat includes three sub-habitats determined to be important to wildlife and available in Cornwall: Early Successional Shrublands and Forests, Cool Season Grasslands, and Wet Meadows. Many different types of these managed habitats are found in town and provide extremely important habitat to a wide variety of wildlife, many of which were mentioned in the descriptions about early successional habitats previously (i.e. Open Woodlands and Shrublands, Upland Herbaceous).

Early successional shrublands and forest generally include shrubs less than 0.5m tall with individuals or clumps overlapping but not touching. This forms less than 25% canopy coverage. Tree cover also is less than 25%. Early Successional Forest stands contain trees less than 4.9 inches dbh (diameter at breast height) and are generally dominated by regenerating stands of late seral (stage) species (i.e. oaks, maples, etc). Early Successional Shrublands and Forests may be either seasonally flooded or non-flooded. (Shrub dominated wetlands were described previously and would provide habitat for a different assemblage of species than upland early successional communities, although there may be some overlaps with certain species).

This Intensively Managed habitat is comprised of shrubs, such as alder and dogwood species, as well as seedling to young sapling forest stands. Early Successional Shrublands and Forests generally occur when mature forest canopy is disrupted, allowing sunlight to reach the ground, which promotes the growth of herbaceous and woody vegetation. The tornado that touched down in Cornwall in the late 1980's and forestry clear cutting or regeneration cutting are examples of the type of disturbance required to create this habitat. These habitats are distributed statewide and throughout Cornwall and include abandoned fields, power-line-rights-of-ways, abandoned beaver flowages, and areas where timber harvesting activities or other management activities are creating and maintaining this habitat.

Cool Season Grasslands include hayfields and other managed grasslands consisting primarily of naturalized European species, such as timothy, orchard grass, red clover, and red fescue as well as a mix of other herbaceous plants and flowers. Cool Season Grasslands require active management to remain open and grassy. Most are maintained through active agriculture, pasturing of animals or periodic brush mowing.

Wet Meadows include a variety of temporarily flooded grasslands. Wet meadows are typically created in grass dominated areas where water seasonally pools or floods, or where the water table is close to the surface. Periodic mowing, haying or sometimes pasturing has historically maintained this habitat. Many of these areas have limited agricultural value, but provide excellent wildlife habitat.

These open, early successional type habitats provide extremely important habitat for a vast number of species here in Connecticut, many of which are listed as threatened, endangered or of special concern here in Connecticut (2004). Many of the species are declining because the habitats they depend upon have decreased due to development of historically open areas, intensified agriculture, natural succession and a disruption of natural disturbances across the landscape. Species such as the bobolink, Savannah sparrow, grasshopper sparrow, American kestrel, and meadowlark are considered grassland specialists that require large areas of grasslands in which to breed and forage. While bobolinks may nest in open fields as small as 5 acres, the grasshopper sparrow requires fields of 30 acres or more. These birds also require long nesting periods, at least until July 15th, to ensure completion of the nesting cycle. Since most active agricultural hay fields are mowed two and three times per year beginning in May, these birds don't have a chance to successfully nest even if there are large enough areas to be attractive. Typically these birds are only successfully nesting in areas that are not being intensively farmed and are large enough to be attractive and those that are specifically being managed for them.

Early Successional Shrublands and Forests (seedling/sapling areas, old fields) and Wet Meadows are important for a variety of wildlife including woodcock, ruffed grouse, wood turtle, smooth green snake, eastern racer, field sparrow, eastern towhee, whip-poor will, yellow-billed cuckoo, indigo bunting, gray catbird, spicebush swallowtail and regal fritillary. All these habitats require disturbance and/or active management to create or maintain them. Because Cornwall is only lightly developed and still has land in town being actively farmed and old agricultural land still in the process of reverting to forestland, it currently provides some high quality early successional habitats. The actively managed state forestlands and wildlife management areas also helps to increase the supply of this important habitat type. It is critical to encourage the creation and maintenance of this type of habitat for the long-term conservation of all native species of wildlife.

Threats to these habitats include:

- ***Loss, degradation or fragmentation of habitats from development or changes in land use.***
- ***Degradation of habitats by non-native invasive species***
- ***Impacts from human disturbance.***
- ***Lack of fire to maintain certain habitats.***
- ***Loss of early successional habitats through natural selection.***
- ***Degradation of habitat from over-browsing by deer.***

General Forest Management for Wildlife

In the Northeast, our forests are predominately the same age, around 60 to 80 years old, (containing mostly saw timber size tress), because of our history of clearing for agriculture and charcoal in the late 19th early 20th century. In the northeast, we lack old growth forest (trees at least 100 years old) and young forest (seedling/sapling and brushy/shrubby growth). In the northeast, 77 % of the bird species and 88% of the mammal species use various combinations of tree size classes, that is seedling/sapling, pole and saw timber size (Scanlon 1992). In general, most species of wildlife, be it bird, mammal, reptile or amphibian, need a variety of tree size classes or age classes to ensure their survival.

Some species of wildlife require large unbroken expanses of forest habitat because they are prone to predation and/or nest parasitism or have large territory requirements. For example Neotropical migrant birds like the ovenbird and wood thrush, are considered "area sensitive," meaning they need large blocks of mature forest (500 to 1000 acres) in order to produce successful nests/fledglings, which in turn provide for a viable population of these species. However, many of these area sensitive birds show stable trends in Connecticut and declines for specific species are often caused by loss of habitat on their wintering grounds in central and South America.

Conversely, many species that require early successional habitats that include seedling sapling stands, shrublands, old fields, wet meadows and grasslands have shown marked declines. Researchers have drawn a clear link between species declines and the declines of the habitat they are dependent on. Much of the early successional habitat has simply been replaced by development along our coastline and major river systems and conservationists agree if we are going to conserve these native species, we will need to do it where and when we still have the opportunity to do so. The most feasible opportunities exist on non-prime agricultural lands and by conducting professional, sustainable forestry operations within the large amount of forestland we have. We also need to try and direct development away from the best open early successional sites, where it is often placed due to ease of building.

A highly feasible and environmentally sound way to create early successional habitat and forest diversity is through forestry operations. The two basic forestry silvicultural methods used in Connecticut are "uneven-age management" and "even-aged management". Even aged management is generally applied where the goal of forestry is to regenerate shade intolerant trees or trees that will not grow in shade and uneven-aged management can be conducted with trees that are shade tolerant. Each system produces various benefits and impacts for wildlife species. Under the uneven-aged management system, certain trees are selected, creating small, temporary gaps in the forest, which can be beneficial for some wildlife generalists like turkey and deer, but it does not generally produce the early successional seedling sapling forest in enough quantity to provide for the needs of the early successional or shrubland/thicket specialists. Under the even-aged management system, all the trees in an area are cut and a new forest is grown from existing sprouts/seedlings and new sprouts that occur after cutting. This produces the

lush growth of seedling/sapling habitat that is so important for many species of declining wildlife such as, golden-winged warblers, blue-winged warblers, ruffed grouse, hognose snake, and woodcock.

General Management Recommendations for Managing Early Successional Habitats

Early successional habitats include hayfields, grasslands, old fields, shrublands, and seedling sapling forests. These habitats are rapidly declining due to natural plant succession, fragmentation, loss of farmland, development and the absence of fire and other natural disturbances within the Connecticut landscape. They are also being degraded due to invasion by non-native plant species. Yet these habitats are extremely important to a wide variety of wildlife, many of which are considered rare or declining in Connecticut. These species include the state listed Savannah sparrow, meadowlark, bobolink, American kestrel, golden winged warbler, American woodcock, ruffed grouse, hognose snake, eastern box turtle, bronze copper and regal fritillary.

Management of early successional habitats can generally be thought of as management to create early successional habitats and management to maintain the habitat type in certain seral or growth stage by conducting management activities. Forestry operations carried out under the auspices of a professional forester are an effective and efficient method to create early succession seedling sapling habitat in appropriate areas where mature forest not stands. Using specialized equipment such as a Brontosaurus cutting head mounted on an excavator is commonly used on state land habitat management projects to cut and mulch larger encroaching trees and/non-native species from old fields and shrublands to both create and maintain these habitats. This equipment can also be used to clear all the woody vegetation if the desired goal is to create grassland for grassland specialists.

Mowing with a brush hog or flail mower pulled behind a tractor is generally used to maintain fields in an open condition by cutting down small woody vegetation before it has a chance to take over. This can be done periodically every 3 to 5 years depending on how fast woody vegetation encroaches on the site and what species of wildlife you are trying to favor. Some species prefer more open early successional conditions such as bluebirds, while other species like the chestnut-sided warbler prefer shrubby or seedling sapling growth for cover (but would not be found in mature forest). Mowing should be done before March 15th and after October 1st to avoid nesting wildlife.

Burning can be a preferred option for grasslands management over brush mowing because it removes the thatch layer, which is detrimental to most birds. Unfortunately burning is not a very feasible management option for private landowner since volunteer fire departments don't always have the resources to carry out a prescribed burn.

Management of early successional habitats is extremely important as these habitats are in shortest supply and are not being created on the landscape like they were historically due to man's influence across the landscape and on ecological processes.

General Recommendations for Habitat Management for Wildlife

- Large blocks of a habitat type are generally more valuable to wildlife than smaller areas, so when possible, encourage larger private land holdings and protected areas.
- Connect protected lands via protected corridors of habitat (through easements, outright purchases, short-term agreements, etc.) whenever possible.
- Riparian buffers should be a minimum of 100 feet, if residential development must occur near them. But, the larger or wider they are, the more valuable they are.
- Manage for diversity of forest classes by considering the needs of area sensitive species and species that need seedling sapling or other early successional habitats, in balance with the amount of habitat available.
- Where possible, manage private land in conjunction with surrounding landowners.
- Retain a professional forester when carrying out silvicultural operations on private land.
- Use best management practices for forestry operations.
- Use forestry practices to benefit both forest health and wildlife.
- Leave snag trees (a standing dead or dying tree) at a distribution of 3 to 4 per acre.
- Leave den trees (a large diameter tree-15 inches or greater dbh-with a cavity in it) at a distribution minimum of 1 per acre.
- Concentrate on managing larger grassland blocks (greater than 5 acres, preferably over 30 acres).
- When managing larger grassland or old-field complexes, mow sections in alternate years so that a variety of cover heights and densities is available
- If managing hay fields or grassland for wildlife, mow after the nesting season – July 15th, ideally August 15th if possible, but before April 15th of the following year.

State Lands in Cornwall/State Lands Management

State Forests –

Cornwall hosts several major tracts of the Housatonic State Forest including the Music Mountain Block, Cream Hill Block and the Mine Mountain Block, along with others. It also has a small block of Wyantenock State Forest and a major portion of Mohawk State Forest. The Division of Forestry is responsible for state forest lands management and seeks to develop vigorous, resilient, forest environments capable of sustaining the wide range of demands that the public places on these lands. These demands include a variety of recreational experiences, natural diversity (including threatened and endangered species), and the preservation of unique sites (both geologic and archeological), the

provision of raw materials such as forest products, and the maintenance of wildlife and fisheries habitats. The Division's professional foresters work to insure that these forests remain healthy and vigorous while serving the needs of the citizens of Connecticut (DEP Forestry Division). (For further information see the DEP website www.ct.gov)

Natural Area Preserves-

As stated before, there are several Natural Area Preserves within Cornwall. These lands are given special designation due to their unique natural communities or features.

Wildlife Management Areas –

a. Two small portions of the Housatonic River Wildlife Management Area (WMA) are contained in the town of Cornwall along the Housatonic River. The WMA is 558 acres and the major parcel is located in Kent, just south of the Cornwall town line. This management area contains riparian habitat, agricultural fields, old fields, forested wetlands, shrublands, and upland forestland.

WMA's are managed primarily for the conservation and enhancement of wildlife habitat and to provide opportunities for fish and wildlife-based recreation. The Wildlife Division is responsible for managing 88 WMA's statewide, totaling over 25,000 acres. The goal of the DEP Wildlife Division is to maintain stable, healthy and diverse wildlife populations on all suitable habitats across the state in numbers compatible with habitat carrying capacity and existing land use practices. Acquiring and managing wildlife management areas are one mechanism for accomplishing this goal.

Management techniques employed at the Housatonic WMA are typical of those used in many other management areas. These include silvicultural operations such as even aged and uneven aged forest management, early successional creation and management through the use of a specialized equipment (brontosaurus mowing head mounted on an excavator), brush hogging with a tractor, treating non-native invasives, planting warm and cool season grasses on fields no longer being actively used for farming and installation of various types of wildlife nest boxes. The Wildlife Division also leases some areas of agricultural land on some of its WMA's to area farmers who get to use the land in exchange for goods (like mulch hay) and services such as brush mowing designated wildlife areas. Several fields at the WMA are leased to local farmers.

State Leased Area –

There is one tract of private land enrolled in the state's leased land program. Under this program willing private landowners may lease their land to the state for a small per acre fee and in return the state can offer more areas for public recreational hunting. The Wickwire Property is located on Lower River Road and is a mix of overgrown fields, pine plantations and some forestland. The area remains a popular small game-hunting destination.

Summary

Cornwall currently provides excellent wildlife habitat because it provides large blocks of quality habitat composed of forests, wetlands and farmland relatively unfragmented by heavy development or major highways. Its value is augmented because it is adjacent to thousands of acres of the similar, complementary habitat. In addition, a major portion of land within the town is protected in perpetuity because they are owned by the State of Connecticut and/or a handful of private conservation organizations including the Cornwall Conservation Trust. Cornwall is fortunate in that it still has time to conserve the critical resources it has stewardship responsibility for. Development is by far the biggest threat facing the habitat resources in Cornwall, as it is the biggest threat continuing to face the remaining undeveloped critically important habitat in the state. By carefully planning how and where the town is going to be developed, Cornwall has the opportunity to maintain its character and the excellent wildlife habitat it currently provides for a vast array of Connecticut's wildlife species, including many rare state listed species.

Resources

Connecticut's Endangered Threatened and Special Concern Species 2004. State of Connecticut Department of Environmental Protection.

McCarthy, G. D.K. Leff, E.C. Parker. 2005 Connecticut's Comprehensive Wildlife Conservation Strategy. Chapter 4. pp 4-1-89.

Scanlon, J.J. 1992. Managing Forests to Enhance Wildlife Diversity. Transactions of the Northeast Section. The Wildlife Society. Vo. 49. pp.1-9.

Archaeological and Historical Resources

The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) recommends that the Town of Cornwall update and revise its Historical Sites Map (Resource Map Series) to include both National Register properties (listed below) and all historic architectural resources identified by Cornwall's 2000 townwide survey (co-sponsored by the State of Connecticut's Commission on Culture and Tourism (CCT). Most importantly, the Town of Cornwall should supplement and complement its existing information on historic structures by applying for grant assistance from CCT (SHPO) to conduct a townwide assessment of prehistoric, historic and industrial archaeological resources. *(Grant information may be found in the Appendix.)*

The Office of State Archaeology maintains an electronic version of archaeological sites in the Town of Cornwall, including 23 prehistoric, historic and industrial sites. They treat mapped versions of these sites similar to the Department of Environmental Protection's Natural Diversity Data Base. With guidelines provided due to the threats of vandalism, OSA would be willing to work with the Town of Cornwall in providing data for site protection within their new Plan of Development.

The OSA and SHPO are available to provide technical assistance to the Town of Cornwall to accomplish the above recommendations.

National Register of Historic Places, Cornwall, CT

Bridge No. 500, Route 7 and Route 4 over Housatonic River

Cornwall Bridge Railroad Station, Poppleswamp Brook Road and Kent Road

Red Mountain shelter (Connecticut State Park and Forest Depression-Era Federal Work Relief Programs Structures Thematic), Route 4 and Appalachian Trail

Rumsey Hall, 12 Bolton Road

Sedgwick, Major General John, House, 52 Hautboy Hill Road

West Cornwall Bridge, Route 128 over Housatonic

Recreation Planner Comments

Cornwall is a fortunate community endowed with a varied and very attractive landscape. Its Taconic topography with rugged, steep hills and narrow, deep valleys is in sharp contrast with the gently rolling Litchfield Hills plateau seen in Goshen on its eastern flank. Even its share of the limestone valley accompanying the Taconic region is narrow and often overlain with wetland soils.

Thanks to its hilly terrain and relatively remote location, Cornwall's population is quite small. Although settlement occurs throughout the town, three centers of population exist, including Cornwall Village, Cornwall Bridge, and West Cornwall, the last two of which act as its economic and commercial foci and should retain this role. Cornwall contains several regionally-significant tourism industry facilities including the Mohawk Mountain Ski Area, operated under State lease and the Cornwall Inn.

Important historic assets include the villages of Cornwall Village and West Cornwall which may inherit district designation. In addition the hamlet of North Cornwall is an outstanding visual example of rural New England landscape and, because it could be damaged by one or more non-conforming additional structures, needs special attention and protection. Also, the general Sedgewick Monument in Cornwall Hollow deserves mention.

Cornwall has possessed a number of natural areas meriting notice. Two include the famous Cathedral Pines and the so called Ballahack, both old growth coniferous stands which were severely damaged by the same tornado, fortunately the state-owned Gold Pines remain intact as a striking example of magnificent white pines. In addition, the black spruce bog on Mohawk Mountain is noteworthy.

Hiking trails have been another significant feature of Cornwall. A prime example is the Mohawk Trail, following the former route of the Appalachian Trail and almost entirely located within Cornwall. A second trail is the Mattatuck Trail, extending north from the Warren border to link with the Mohawk Trail near the ski area. Maintenance of the continuity of these trails involves the CT Forest and Park Association's proposed east-west trail connecting the Metacomet Trail (part of the proposed New England National Scenic Trail) and the Appalachian National Scenic Trail, a connection most likely via the Mohawk Trail. The last possibility deserves attention in Cornwall's future planning.

What does the future hold for Cornwall? Can its character survive likely change? For better or worse, the lack of sewer and water facilities rule out dense, large scale development. Reportedly only Cornwall Village has a community water and septic tank problems in West Cornwall put a limit on potential growth. However, there is a trend for large properties to be replaced with moderate-sized tracts occupied primarily by weekenders and vacationers. This

will involve considerable, scattered development. It also raises the question whether Cornwall can remain a living community, with local residents who live, work and go to school in town.

Because Cornwall still retains a number of large properties whose disappearance would substantially impact its future, monitoring their status is recommended. Prime examples include the Hollenbeck Fish and Game Club, Trinity Conference Center, Dark Entry Association and the Yelping Hill Association.

The future of agriculture in Cornwall also deserves attention because of its impact on the landscape and its linkage to the town's history. Traditionally farming in Cornwall has meant dairying and economic pressures have sharply curtailed dairying as a viable activity. Some farmland has received permanent protection through philanthropy and purchase of development rights for example, as seen with the Gold Farm. However the future use of Cornwall's farmland remains a question in the absence of active dairy farms. The most likely options will be gentleman farms, leasing, maintenance haying, and hopefully some financially successful specialty farm operations. A good example of such niche farming is seen with the Hurlburt Farm's specialization in old fashioned creamline milk.

Planning Comments

Land Use

According to information supplied by the University of Connecticut's Center for Land Use Education and Research, over 80% of Cornwall's land area is either deciduous or coniferous forest. In 2002, less than 6% of the town was classified as developed which land used for residences, business and institutions. Development claimed approximately 75 acres of land (0.3% of the Town) between 1985 and 2002. Permits for new housing units average roughly eight units per year.

TABLE 1									CHANGE	
	1985		1990		1995		2002		1985 to 2002	
	acres	% of Town	acres	% of Town	acres	% of Town	acres	% of Town	acres	% Change
Developed	1,567	5.3%	1,616	5.4%	1,618	5.4%	1,642	5.5%	75	4.8%
Turf & Grass	121	0.4%	128	0.4%	131	0.4%	130	0.4%	9	7.4%
Other Grasses & Agriculture	2,404	8.1%	2,518	8.5%	2,584	8.7%	2,612	8.8%	208	8.7%
Deciduous Forest	17,025	57.3%	16,989	57.2%	16,980	57.2%	16,937	57.0%	-88	-0.5%
Coniferous Forest	7,169	24.1%	7,066	23.8%	7,025	23.7%	7,009	23.6%	-160	-2.2%
Water	451	1.5%	472	1.6%	433	1.5%	401	1.4%	-50	-11.1%
Non-Forested Wetland	34	0.1%	89	0.3%	107	0.4%	122	0.4%	88	258.8%
Forested Wetland	902	3.0%	796	2.7%	787	2.6%	788	2.7%	-114	-12.6%
Barren	15	0.1%	15	0.1%	22	0.1%	46	0.2%	31	206.7%
Utility Right-of-Way	14	0.0%	14	0.0%	14	0.0%	14	0.0%	0	0.0%
Source: University of Connecticut's Center for Land Use Education and Research										

The Nature Conservancy in cooperation with the Cornwall Planning and Zoning Commission conducted a build out analysis to determine the maximum number of new housing units that could be built. The analysis was based on the Town's current zoning regulations. Parcels that are permanently protected as open space were not included in the calculations. The Towns currently has approximately 787 housing units. The build out analysis determined that a maximum of 3,866 new housing units could be constructed under the current zoning regulations.

Protected land

More than thirty percent - 9,023 acres - of Cornwall's land is protected from development through either direct ownership or easements. Of these 9,203 protected acres, the State of Connecticut owns 7,140 acres and holds easements on another 245 acres. The Litchfield Greenprint Project, a joint project of the Housatonic Valley Association and the Trust for Public Land, has recently identified a number of parcels that they consider a high priority for preservation.

TABLE 2: Protected Properties		
		Acres
Federal	easements	124
	owned	14
State	easements	246
	owned	7,141
Land Trusts	easements	873
	owned	626
Total Protected	easements	1,243
	owned	7,780
	total	9,023
Total Area of Town		29,701
% of Town's Total Area Protected		30.4%
Source: Housatonic Valley Association		

Zoning

Cornwall's zoning regulations provide for three residential zoning districts, one general business zone, three overlay zones and one special district zone. The vast majority of the Town is zoned residential with minimum lot sizes of either three or five acres. Small areas in or near West Cornwall, Cornwall Bridge and Cornwall Plains are zoned residential with minimum lot sizes of one acre. The two general business districts are limited to small long established business areas in West Cornwall and Cornwall Bridge.

In 2003, the Cornwall Planning and Zoning Commission adopted a zoning regulation requiring each lot to have a "buildable area" which is defined as "a rectangular area of a lot

that contains no wetland soils, waterbodies, watercourses, utility or access easements, rights of way or any naturally occurring slope exceeding 25% as measured using 2 foot contour intervals." The regulations require all structures and septic systems be located within a buildable area except accessory structures with a footprint under 250 square feet and wells which may be located outside of the buildable area. Because of Cornwall's topography and wetlands, the buildable area requirement will have a significant impact on the number of lots that can be developed.

The Cornwall Zoning Regulations contain a section that allows for a "planned conservation zone" in the 3 and 5 acre residential zones. The planned conservation zones purpose is to allow for "the creative development of land." The requirements for creating such a zone are, however, daunting. The implementation of this zone requires an amendment to the town zoning regulations and map as well as a site plan and a report on how the proposed zone will meet the purposes of the planned conservation zone. Subdivision approval would also be required. Because of the uncertainties surrounding the approval process, the "planned conservation zone" is unlikely to used.

It is common practice for municipal zoning regulations to establish standards for cluster -or open space - subdivisions. Cluster subdivision regulations establish minimum standards for lot size, yard setbacks and open space. Cluster subdivisions can result in the preservation of significant amounts of open space and farmland and the creation of lots that are more in keeping with the area's character. Some municipalities have gone so far as to require cluster subdivisions be used. Cornwall's zoning regulations contain no provisions for cluster subdivisions.

In 1989, the State created an affordable housing land use appeals procedure aimed at increasing the amount of affordable housing in the State. The affordable housing appeals procedure essentially allows developers to bypass a municipality's zoning regulations provided at least 30% of the housing units meet the State's definition of affordable and less that 10% of the municipality's housing is classified by the State as affordable. According to the State, 2.06% of Cornwall's housing meets the State's definition of affordable.

An example might help clarify how this process works. Assume that a private for-profit developer proposed a fifty unit project in Cornwall on one acre lots in an area zoned for five acre lots. The developer submits an application to rezone the project site for one acre minimum lot sizes as well as applications for subdivision approval and inland wetlands approval. The developer claims the project qualifies as a "set-aside development". Of the fifty units, fifteen units must be sold to persons or families making less than 80% of the median income. In Cornwall, a family of four with an annual income of less than $59,600 would be eligible to purchase one of the units. In addition, 8 of the 15 units must be sold to persons or families making less 60% of the median income. In Cornwall, a family of four with an annual income less than $49,200 would qualify.

The deeds for the fifteen units would contain restrictions limiting both the sales price of the units and the income of the purchaser. The restrictions are meant to insure that the units

remain affordable for forty years. The remaining thirty-five units in the project would be market rate units that could be sold and resold without any restrictions.

Even though the project did not meet the minimum lot sizes of the zoning regulations, the Planning and Zoning Commission could deny the applications only if the Commission could prove that the project did not meet one of three tests.

First, the municipality could try to prove that its denial is necessary to protect "the public interests in health, safety or other matters which the commission may legally consider"; that those public interests "clearly outweigh the need for affordable housing" and that reasonable changes to the application cannot be made protect the public interests. Alternatively, the municipality could try to prove that the affordable housing would be in an industrially zoned district which does not permit residential uses. The third test requires the municipality to prove that the project is not actually "assisted housing" as defined in the State Statutes.

The affordable housing land use appeals procedure has been successfully used by developers to gain approvals for their projects. Unfortunately, the State does not keep track of how many affordable housing units have been constructed through the appeals procedure. Private estimates put the number at about 3,200 affordable units. In the NWCCOG Region, only one project has been approved under the affordable housing appeals procedure.

Major Roadways

Cornwall has 24.49 miles of State highway. The longest stretch of State highway is the little traveled Route 43 which connects Route 63 with Route 4. All of the State highways have relatively modest traffic volume. Route 7 has the highest traffic volume at 4,100 vehicles per day. None of the State Highways even approach their capacity. Route 4 has the highest volume to capacity ratio at .28. There are no plans to expand or widen any of the State highways in Cornwall.

Little data exists on the average traffic volumes for local roads but, based on the traffic counts for State highways; it is likely that their volumes are less than 500 vehicles per day.

TABLE 3: State Highways			
	Length in Cornwall (miles)	Avg. Daily Traffic 2005	Volume to Capacity Ratio 2005
Route 4	6.25	3,100	.28
Route 7	3.56	4,100	.18
Route 43	5.06	400	.02
Route 45	2.34	1,400	.13
Route 63	1.29	2,800	.15
Route 125	1.24	600	.03
Route 128	3.98	1,700	.15
Route 480 (Great Hollow Rd)	.77	400	.04
Source: Ct. Department of Transportation			

Scenic Roads

While one might reasonably argue that most of Cornwall's roads are scenic, the Town has only one officially designated scenic road – Route 7 from the Cornwall – Kent town line to its intersection with Route 4.

There are two types of official scenic road designations – State and local. In accordance with the Ct. General Statutes, the Ct. Department of Transportation has established a procedure by which any agency, municipality, group or individual may request the at State highway be designated as scenic. The three general criteria for designation are:

- the State highway must be bordered by significant natural or cultural features such as historic buildings, vistas, or agricultural land;
- the highway must be at least a mile in length; and
- the highway must not have incompatible development along it which detracts from its scenic character.

If a State highway is designated as scenic, then any proposed improvement along that highway must be reviewed by an advisory committee which evaluates the impact of the proposed improvements on the highway's scenic character. The Ct. DOT regulations also establish special improvement and maintenance standards that are to be observed – where possible - on scenic highways. The standards, for example, discourage widening of the roadway, the removal of stone walls and the cutting of mature trees. While State scenic designation does not offer absolute protection for a State highway, it does ensure that a highway's scenic character will be taken into account in any proposed project.

Most, if not all, of the State highways in Cornwall would qualify for scenic designation.

A town may also designate, by ordinance, local roads as scenic. A town can also – again, by ordinance – delegate the authority to designate a local road as scenic to the planning and zoning commission. By State Statute, a local road can only if it is "free of intensive commercial development and intensive vehicular traffic" and it meets at least one of the following criteria: : "(1) It is unpaved; (2) it is bordered by mature trees or stone walls; (3) the traveled portion is no more than twenty feet in width; (4) it offers scenic views; (5) it blends naturally into the surrounding terrain, or (6) it parallels or crosses over brooks, streams, lakes or ponds". In addition, the "owners of the majority of lot frontage abutting the highway or portion of the highway" must "agree to the designation by filing a written statement of approval with the town clerk".

Towns have the authority to establish their own regulations for alterations and improvements on locally designated scenic roads. A good argument could be made for protecting many of Cornwall's local roads using a local scenic road ordinance.

Appendices

A. Invasive Plants

B. NRCS

Identification of Important Farmland
Connecticut Inland Wetland Soils

C. Connecticut Commission on Culture &Tourism

Historic Preservation Activities Grant Program

A. Invasive Plants

Non-native, invasive plants are a problem in Connecticut. They can disrupt entire ecosystems by changing the make-up of native plant communities. They are aggressive competitors – competing with native plants for sunlight, nutrients, water, and growing space. They have growth characteristics that allow them to spread readily – and once spread to new sites, they quickly establish and dominate. Invasive plants frequently crowd out native ones, causing problems for wildlife that need them for food and shelter. They may also totally overrun small populations of rare plants.

Two changes that have occurred in Connecticut's landscape over the last 25 years make the continued spread of invasive plants likely. First, an increasing number of invasive species have found their way to the state. Second, invasive plants have become established on an increasing number of sites. Now, when soil or vegetation is disturbed, it is likely there will be a nearby source of an invasive plant. The invasives even may spread from disturbed sites to undisturbed sites. Forests, grasslands, and wetlands are examples of natural habitats likely to be invaded.

Not every non-native plant in Connecticut is invasive. In fact, most are not. The problems are caused by non-native plants that find both 1) good growing conditions, and 2) few factors acting to control their growth. Japanese Barberry, Japanese Knotweed, Garlic Mustard, and Purple Loosestrife are a few examples of invasive plants that are widespread in the state.

In Connecticut, NRCS recommends avoiding the use of any plant currently listed as invasive or potentially invasive by the Connecticut Department of Environmental Protection.

CONNECTICUT INVASIVE PLANT LIST
JANUARY 2004

This is a list of species that have been determined by floristic analysis to be invasive or potentially invasive in the state of Connecticut, in accordance with PA 03-136. The Invasive Plants Council will generate a second list recommending restrictions on some of these plants. In developing the second list and particular restrictions, the Council will recognize the need to balance the detrimental effects of invasive plants with the agricultural and horticultural value of some of these plants, while still protecting the state's minimally managed habitats.

CONNECTICUT INVASIVE PLANT LIST

(Produced by the Connecticut Invasive Plants Council)

Connecticut Public Act No. 03-136

The Connecticut Invasive Plants Council encourages the use of non-invasive alternatives, particularly when planting near parks, natural areas, or other minimally managed habitats.

AQUATIC & WETLAND PLANTS

Species	Common name	Invasive	Potentially Invasive
Butomus umbellatus L.	Flowering rush		X
Cabomba caroliniana A. Gray	Fanwort	X	
Callitriche stagnalis Scop.	Pond water-starwort		X
Egeria densa Planchon	Brazilian water-weed		X
†Eichhornia crassipes (Mart.) Solms	Common water-hyacinth		X
Hydrilla verticillata (L.f.) Royle	Hydrilla	X	
Iris pseudacorus L.	Yellow Iris	X	
Lythrum salicaria L.	Purple loosestrife	X	
Marsilea quadrifolia L.	European waterclover		X
Myosotis scorpioides L.	Forget-me-not	X	
Myriophyllum aquaticum (Vell.) Verdc.	Parrotfeather		X
Myriophyllum heterophyllum Michx.	Variable-leaf watermilfoil	X	
Myriophyllum spicatum L.	Eurasian	X	

	watermilfoil		
Najas minor All.	Brittle water-nymph		X
Nelumbo lutea (Willd.) Pers.	American water lotus		X
†Nymphoides peltata (Gmel.) Kuntze	Yellow floating heart		X
†Pistia stratiotes L.	Water lettuce		X
Potamogeton crispus L.	Crispy-leaved pondweed	X	
Rorippa microphylla (Boenn. ex Reichenb.) Hyl. ex A. & D. Löve	Onerow yellowcress		X
Rorippa nasturtium-aquaticum (L.) Hayek	Watercress		X
†Salvinia molesta Mitchell complex	Giant salvinia		X
Trapa natans L.	Water chestnut	X	

TREES

Species	Common name	Invasive	Potentially Invasive
Acer ginnala L.	Amur maple		X
*Acer platanoides L.	Norway maple	X	
Acer pseudoplatanus L.	Sycamore maple		X
Ailanthus altissima (Mill.) Swingle	Tree of heaven	X	
Paulownia tomentosa (Thunb.) Steudel	Princess tree		X
Populus alba L.	White poplar		X
*Robinia pseudo-acacia L.	Black locust	X	

SHRUBS			
Species	Common name	Invasive	Potentially Invasive
Amorpha fruticosa L.	False indigo		X
*Berberis thunbergii DC.	Japanese barberry	X	
Berberis vulgaris L.	Common barberry	X	
Elaeagnus angustifolia L.	Russian olive		X
Elaeagnus umbellata Thunb.	Autumn olive	X	
*Euonymus alatus (Thunb.) Sieb.	Winged euonymus	X	
Frangula alnus Mill.	Glossy buckthorn	X	
Ligustrum obtusifolium Sieb. & Zucc.	Border privet		X
Ligustrum ovalifolium Hassk.	California privet		X
Ligustrum vulgare L.	European privet		X
Lonicera ×bella Zabel	Bell's honeysuckle	X	
Lonicera maackii (Rupr.) Maxim.	Amur honeysuckle	X	
Lonicera morrowii A. Gray	Morrow's honeysuckle	X	
Lonicera tatarica L.	Tatarian honeysuckle		X
†Lonicera xylosteum L.	Dwarf honeysuckle		X
Rhamnus cathartica L.	Common buckthorn	X	
Rosa multiflora Thunb.	Multiflora rose	X	
*Rosa rugosa Thunb.	Rugosa rose		X
Rubus phoenicolasius Maxim.	Wineberry		X

WOODY VINES

Species	Common name	Invasive	Potentially Invasive
*Ampelopsis brevipedunculata (Maxim.) Trautv.	Porcelainberry		X
Celastrus orbiculatus Thunb.	Oriental bittersweet	X	
*Lonicera japonica Thunb.	Japanese honeysuckle	X	
Pueraria montana (Lour.) Merr.	Kudzu		X

HERBACEOUS PLANTS

Species	Common name	Invasive	Potentially Invasive
Aegopodium podagraria L.	Goutweed	X	
Alliaria petiolata (Bieb.) Cavara & Grande	Garlic mustard	X	
Cardamine impatiens L.	Narrowleaf bittercress	X	
Centaurea biebersteinii DC.	Spotted knapweed	X	
Cirsium arvense (L.) Scop.	Canada thistle		X
Cynanchum louiseae Kartesz & Gandhi	Black swallow-wort	X	
Cynanchum rossicum (Kleo.) Borhidi	Pale swallow-wort	X	
Datura stramonium L.	Jimsonweed		X
Elsholtzia ciliata (Thunb.) Hylander	Crested late-summer mint		X
Euphorbia cyparissias L.	Cypress spurge		X
Euphorbia esula L.	Leafy spurge	X	
Froelichia gracilis (Hook.) Moq.	Slender snake cotton		X
Glechoma hederacea L.	Ground ivy		X
Heracleum mantegazzianum Sommier & Lavier	Giant hogweed		X
Hesperis matronalis L.	Dame's rocket	X	

Humulus japonicus Sieb. & Zucc.	Japanese hops		X
†Impatiens glandulifera Royle	Ornamental jewelweed		X
Kochia scoparia (L.) Schrader	Common kochia		X
Lepidium latifolium L.	Perennial pepperweed	X	
Lychnis flos-cuculi L.	Ragged robin		X
*Lysimachia nummularia L.	Moneywort		X
*Lysimachia vulgaris L.	Garden loosestrife		X
Onopordum acanthium L.	Scotch thistle		X
Ornithogalum umbellatum L.	Star-of-Bethlehem		X
Polygonum caespitosum Blume	Bristled knotweed		X
Polygonum cuspidatum Sieb. & Zucc.	Japanese knotweed	X	
Polygonum perfoliatum L.	Mile-a-minute vine	X	
Polygonum sachalinense F. Schmidt ex Maxim.	Giant knotweed		X
Ranunculus ficaria L.	Fig buttercup	X	
Rumex acetosella L.	Sheep sorrel		X
†Senecio jacobaea L.	Tansy ragwort		X
Silphium perfoliatum L.	Cup plant		X
Solanum dulcamara L.	Bittersweet nightshade		X
Tussilago farfara L.	Coltsfoot	X	
Valeriana officinalis L.	Garden heliotrope		X

GRASSES AND GRASS-LIKE PLANTS

Species	Common name	Invasive	Potentially Invasive
Arthraxon hispidus (Thunb.) Makino	Hairy jointgrass		X
Bromus tectorum L.	Drooping brome-grass		X

†Carex kobomugi Owhi	Japanese sedge		X
Glyceria maxima (Hartman) Holmburg	Reed mannagrass		X
Microstegium vimineum (Trin.) A. Camus	Japanese stilt grass	X	
*Miscanthus sinensis Anderss.	Eulalia		X
Phalaris arundinacea L.	Reed canary grass	X	
Phragmites australis (Cav.) Trin.	Common reed	X	
Poa compressa L.	Canada bluegrass		X

∗ An asterisk (*) denotes that the species, although shown by scientific evaluation to be invasive, has cultivars that have not been evaluated for invasive characteristics. Further research may determine whether or not individual cultivars are potentially invasive. Cultivars are commercially available selections of a plant species that have been bred or selected for predictable, desirable attributes of horticultural value such as form (dwarf or weeping forms), foliage (variegated or colorful leaves), or flowering attributes (enhanced flower color or size).

† A dagger (†) indicates species that are not currently known to be naturalized in Connecticut but would likely become invasive here if they are found to persist in the state without cultivation.

January 2004

The following information on Giant Hog Weed is from http://www.hort.uconn.edu/cipwg/

Giant Hogweed (*Heracleum mantegazzianum*), an invasive, non-native plant that was confirmed in 2001 as a new state record in West Cornwall, Litchfield County, Connecticut continues to persist in 2005. The site of this Federal Noxious Weed was found by Elizabeth Corrigan, a botanist and Co-Chair of the Connecticut Invasive Plant Working Group, during a survey funded by the U.S. Department of Agriculture and the University of Connecticut. Educational outreach is underway to alert the public about Giant Hogweed, its serious health hazards, and provide control options.

Giant hogweed leaf

Giant hogweed is a biennial or perennial herbaceous plant that reaches up to 15 feet in height. Leaves grow up to 5 feet wide. The hollow stems of the plant are 2 to 4 inches in diameter. Large numbers of small white flowers are borne on the umbel-shaped inflorescence that extends 2.5 feet across the top. The many seeds produced by each plant can remain viable in the soil for up to seven years.

Umbel inflorescence

The sap of giant hogweed, a poisonous plant, causes large painful blisters on human skin and acts as an anti-sunscreen. Eye contact may result in blindness. Giant hogweed has negative impacts to the environment as well, displacing native flora on riverbanks and in disturbed sites such as waste areas and along railroads.

If you have seen giant hogweed in Connecticut, please contact Donna Ellis at the University of Connecticut (860-486-6448; donna.ellis@uconn.edu) or Elizabeth Corrigan (elizabethcorrigan@yahoo.com).

Giant hogweed in Connecticut

Giant hogweed plants can grow up to 15 feet in height

Seeds of Giant Hogweed (left) and Cow Parsnip (right).
Note the heart-shaped lobes of the Cow Parsnip seed on the right.

HAVE YOU SEEN THIS INVASIVE PLANT IN CONNECTICUT?

CONTACT THE CONNECTICUT INVASIVE PLANT WORKING GROUP

Invasive Plant Management: Principles for Project Planning and Site Management

I. Incorporate Awareness of the Problem of Invasive Plants into the Primary Levels of Decision Making

   A. Make sure planning engineers and others think about how to prevent the establishment and spread of invasive plants when they first plan projects (location, layout, design, and decisions about alternatives).

   B. Make sure field people are trained to recognize invasive plants.

   C. Set a good example by maintaining invasive-free public building grounds.

   D. Don't plant invasive plants.

   E. Become aware of heavily infested sites in the local area and avoid unnecessary movement of equipment through them.

   F. When people use public or private lands for special events, have them agree to invasive plant prevention measures, as needed.

II. Avoid Spreading Invasive Plants.

   A. Don't set up staging areas in places with heavy invasive plant infestations.

   B. Think about the sequence of movement of equipment to avoid bringing seeds from heavily infested sites to non-infested ones.

   C. Be aware of the seasons when different invasives are producing seeds.

   D. Keep equipment and trailers free of seeds and plant parts that will sprout.

   E. Don't move contaminated fill, gravel, etc. to non-infested project sites.

   F. Stockpile separately contaminated and uncontaminated materials.

III. Manage Project Site Conditions to Discourage Invasive Plants.

   A. When appropriate, control existing invasive plants on the site before beginning project.

   B. Minimize soil disturbance.

   C. Minimize disturbance of native plants.

   D. Retain as much shade as possible to make site less hospitable to invaders.

   E. Re-vegetate quickly with non-invasive plants.

IV. Understand and Use Timely Invasive Plant Control Measures.

   A. Know the options for species-specific invasive plant control.

   B. Make sure field people have the necessary training and equipment

The Invasive Plant Atlas of New England (IPANE) lists 5 invasives plants in the Town of Cornwall (http://www.uconngia.uconn.edu/ipane/ipane.db.output.pl). These are:

- Heraleum mategazzium – Giant hogweed
- Lychnis floscuculis – Ragged robin
- Herperis matronalis – Dames rocket
- Rhamnus cathartica – Common buckthorn
- Phalaris arundinacea – Reed canarygrass

B. NRCS

Identification of Important Farmland
Connecticut Inland Wetland Soils

Identification of Important Farmland

I. Prime Farmland

A. General

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to modern farming methods.

In general, prime farmlands have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time. Typically they do not flood during the growing season or they are protected from flooding.

Examples of soils that qualify as prime farmland are Canton and Charlton soils, 3 to 8 percent slopes; Agawam fine sandy loam, 0 to 3 percent slopes; and Woodbridge fine sandy loam, 0 to 3 percent slopes.

B. Specific Criteria

Prime farmlands meet the following criteria. Terms used in this section are defined in USDA publications: Soil Taxonomy, Agriculture Handbook 436; Soil Survey Manual, Agriculture Handbook 18; Predicting Rainfall and Erosion Losses: A Guide to Conservation, Agriculture Handbook 537; and Saline and Alkali Soils, Agriculture Handbook 60.

1. The soils have:

    a) Aquic, udic, ustic, or xeric moisture regimes and sufficient available water capacity within a depth of 40 inches (1 meter), or in the root zone if the root zone is less than 40 inches deep to produce the commonly grown crops in 7 or more years out of 10; or,

    b) Xeric or ustic moisture regimes in which the available water capacity is limited, but the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; or,

c) Aridic or torric moisture regimes and the area has a developed irrigation water supply that is dependable and of adequate quality; and,

2. The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32°F (0°C). In addition, the mean summer temperature at this depth in soils with a 0 horizon is higher than 47°F (8°C); in soils that have no 0 horizon, the mean summer temperature is higher than 59°F (15°C); and,

3. The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep; and,

4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; and,

5. The soils can be managed so that, in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep, during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm and the exchangeable sodium percentage (ESP) is less than 15; and,

6. The soils are not flooded frequently during the growing season (less often than once in 2 years); and,

7. The product of K (erodibility factor) x percent slope is less than 2.0, and the product of I (soil erodibility) x C (climatic factor) does not exceed 60; and,

8. The soils have a permeability rate of at least 0.06 inch (0.15 cm) per hour in the upper 20 inches (50 cm) and the mean annual soil temperature at a depth of 20 inches (50 cm) is less than 59°F (15°C); the permeability rate is not a limiting factor if the mean annual soil temperature is 59°F (15°C) or higher; and,

9. Less than 10 percent of the surface layer (upper 6 inches) in these soils consists of rock fragments coarser than 3 inches (7.6 cm).

C. Additional Farmland of Statewide Importance

This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate state

agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state laws.

Prime and other Important Farmlands

State of Connecticut

Map symbol	Map unit name	Farmland classification
20A	Ellington silt loam, 0 to 5 percent slopes	All areas are prime farmland
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	All areas are prime farmland
22A	Hero gravelly loam, 0 to 3 percent slopes	All areas are prime farmland
22B	Hero gravelly loam, 3 to 8 percent slopes	All areas are prime farmland
23A	Sudbury sandy loam, 0 to 5 percent slopes	All areas are prime farmland
26A	Berlin silt loam, 0 to 3 percent slopes	All areas are prime farmland
27A	Belgrade silt loam, 0 to 5 percent slopes	All areas are prime farmland
28A	Elmridge fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
28B	Elmridge fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
29A	Agawam fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
29B	Agawam fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
30A	Branford silt loam, 0 to 3 percent slopes	All areas are prime farmland
30B	Branford silt loam, 3 to 8 percent slopes	All areas are prime farmland
31A	Copake fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
31B	Copake fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
32A	Haven and Enfield soils, 0 to 3 percent slopes	All areas are prime farmland
32B	Haven and Enfield soils, 3 to 8 percent slopes	All areas are prime farmland
33A	Hartford sandy loam, 0 to 3 percent slopes	All areas are prime farmland
33B	Hartford sandy loam, 3 to 8 percent slopes	All areas are prime farmland
34A	Merrimac sandy loam, 0 to 3 percent slopes	All areas are prime farmland
34B	Merrimac sandy loam, 3 to 8 percent slopes	All areas are prime farmland
40A	Ludlow silt loam, 0 to 3 percent slopes	All areas are prime farmland
40B	Ludlow silt loam, 3 to 8 percent slopes	All areas are prime farmland
43A	Rainbow silt loam, 0 to 3 percent slopes	All areas are prime farmland
43B	Rainbow silt loam, 3 to 8 percent slopes	All areas are prime farmland
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
48B	Georgia and Amenia silt loams, 2 to 8 percent slopes	All areas are prime farmland
50A	Sutton fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
50B	Sutton fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
53B	Wapping very fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
55A	Watchaug fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
55B	Watchaug fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
57B	Gloucester gravelly sandy loam, 3 to 8 percent slopes	All areas are prime farmland
60B	Canton and Charlton soils, 3 to 8 percent slopes	All areas are prime farmland
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
66B	Narragansett silt loam, 2 to 8 percent slopes	All areas are prime farmland
69B	Yalesville fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
80B	Bernardston silt loam, 3 to 8 percent slopes	All areas are prime farmland
82B	Broadbrook silt loam, 3 to 8 percent slopes	All areas are prime farmland
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	All areas are prime farmland
87B	Wethersfield loam, 3 to 8 percent slopes	All areas are prime farmland
90B	Stockbridge loam, 3 to 8 percent slopes	All areas are prime farmland
92B	Nellis fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
101	Occum fine sandy loam	All areas are prime farmland
102	Pootatuck fine sandy loam	All areas are prime farmland
105	Hadley silt loam	All areas are prime farmland
106	Winooski silt loam	All areas are prime farmland

Prime and other Important Farmlands

State of Connecticut

Map symbol	Map unit name	Farmland classification
412B	Bice fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland
420A	Schroon fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland
421A	Ninigret fine sandy loam, cold, 0 to 3 percent slopes	All areas are prime farmland
423A	Sudbury sandy loam, cold, 0 to 3 percent slopes	All areas are prime farmland
429A	Agawam fine sandy loam, cold, 0 to 3 percent slopes	All areas are prime farmland
429B	Agawam fine sandy loam, cold, 3 to 8 percent slopes	All areas are prime farmland
434A	Merrimac sandy loam, cold, 0 to 3 percent slopes	All areas are prime farmland
434B	Merrimac sandy loam, cold, 3 to 8 percent slopes	All areas are prime farmland
448B	Hogansburg loam, 3 to 8 percent slopes	All areas are prime farmland
450B	Pyrities loam, 3 to 8 percent slopes	All areas are prime farmland
501	Ondawa fine sandy loam	All areas are prime farmland
2	Ridgebury fine sandy loam	Farmland of statewide importance
4	Leicester fine sandy loam	Farmland of statewide importance
5	Wilbraham silt loam	Farmland of statewide importance
7	Mudgepond silt loam	Farmland of statewide importance
9	Scitico, Shaker, and Maybid soils	Farmland of statewide importance
10	Raynham silt loam	Farmland of statewide importance
12	Raypol silt loam	Farmland of statewide importance
13	Walpole sandy loam	Farmland of statewide importance
14	Fredon silt loam	Farmland of statewide importance
24A	Deerfield loamy fine sand, 0 to 3 percent slopes	Farmland of statewide importance
25A	Brancroft silt loam, 0 to 3 percent slopes	Farmland of statewide importance
25B	Brancroft silt loam, 3 to 8 percent slopes	Farmland of statewide importance
25C	Brancroft silt loam, 8 to 15 percent slopes	Farmland of statewide importance
26B	Berlin silt loam, 3 to 8 percent slopes	Farmland of statewide importance
29C	Agawam fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
30C	Branford silt loam, 8 to 15 percent slopes	Farmland of statewide importance
31C	Copake gravelly loam, 8 to 15 percent slopes	Farmland of statewide importance
32C	Haven and Enfield soils, 8 to 15 percent slopes	Farmland of statewide importance
34C	Merrimac sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
35A	Penwood loamy sand, 0 to 3 percent slopes	Farmland of statewide importance
35B	Penwood loamy sand, 3 to 8 percent slopes	Farmland of statewide importance
36A	Windsor loamy sand, 0 to 3 percent slopes	Farmland of statewide importance
36B	Windsor loamy sand, 3 to 8 percent slopes	Farmland of statewide importance
36C	Windsor loamy sand, 8 to 15 percent slopes	Farmland of statewide importance
37A	Manchester gravelly sandy loam, 0 to 3 percent slopes	Farmland of statewide importance
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
38A	Hinckley gravelly sandy loam, 0 to 3 percent slopes	Farmland of statewide importance
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
39A	Groton gravelly sandy loam, 0 to 3 percent slopes	Farmland of statewide importance
39C	Groton gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
48C	Georgia and Amenia silt loams, 8 to 15 percent slopes	Farmland of statewide importance
57C	Gloucester gravelly sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
60C	Canton and Charlton soils, 8 to 15 percent slopes	Farmland of statewide importance
63C	Cheshire fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
66C	Narragansett silt loam, 8 to 15 percent slopes	Farmland of statewide importance
69C	Yalesville fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
80C	Bernardston silt loam, 8 to 15 percent slopes	Farmland of statewide importance

Prime and other Important Farmlands

State of Connecticut

Map symbol	Map unit name	Farmland classification
82C	Broadbrook silt loam, 8 to 15 percent slopes	Farmland of statewide importance
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	Farmland of statewide importance
87C	Wethersfield loam, 8 to 15 percent slopes	Farmland of statewide importance
90C	Stockbridge loam, 8 to 15 percent slopes	Farmland of statewide importance
92C	Nellis fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
100	Suncook loamy fine sand	Farmland of statewide importance
103	Rippowam fine sandy loam	Farmland of statewide importance
104	Bash silt loam	Farmland of statewide importance
107	Limerick and Lim soils	Farmland of statewide importance
412C	Bice fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance
414	Fredon silt loam, cold	Farmland of statewide importance
420B	Schroon fine sandy loam, 3 to 8 percent slopes	Farmland of statewide importance
429C	Agawam fine sandy loam, cold, 8 to 15 percent slopes	Farmland of statewide importance
433	Moosilauke sandy loam	Farmland of statewide importance
434C	Merrimac sandy loam, cold, 8 to 15 percent slopes	Farmland of statewide importance
440A	Boscawen gravelly sandy loam, 0 to 3 percent slopes	Farmland of statewide importance
440C	Boscawen gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance
450C	Pyrities loam, 8 to 15 percent slopes	Farmland of statewide importance
457	Mudgepond silt loam, cold	Farmland of statewide importance
503	Rumney fine sandy loam	Farmland of statewide importance

United States Department of Agriculture NRCS Natural Resources Conservation Service

Connecticut

Connecticut Inland Wetland Soils

The state of Connecticut defines inland wetlands based on soils. The Connecticut Inland Wetlands and Watercourses Act defines wetland soils to include "any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soil Survey, as may be amended from time to time, of the Natural Resources Conservation Service of the United States Department of Agriculture."

Map units may be dominated by Connecticut inland wetland soils, but have inclusions of non-wetland soils. Non-wetland map units may contain inclusions of Connecticut inland wetland soils. On site investigation is necessary to determine the presence or absence of wetland soils in a particular area.

The following map units meet the definition of Connecticut inland wetland soils:

Map Unit No.	Map Unit Name
2	Ridgebury fine sandy loam
3	Ridgebury, Leicester, and Whitman soils, extremely stony
4	Leicester fine sandy loam
5	Wilbraham silt loam
6	Wilbraham and Menlo soils, extremely stony
7	Mudgepond silt loam
8	Mudgepond and Alden soils, extremely stony
9	Scitico, Shaker, and Maybid soils
10	Raynham silt loam
12	Raypol silt loam
13	Walpole sandy loam
14	Fredon silt loam
15	Scarboro muck
16	Halsey silt loam
17	Timakwa and Natchaug soils
18	Catden and Freetown soils
96	Ipswich mucky peat
97	Pawcatuck mucky peat
98	Westbrook mucky peat

99	Westbrook mucky peat, low salt
100	Suncook loamy fine sand
101	Occum fine sandy loam
102	Pootatuck fine sandy loam
103	Rippowam fine sandy loam
104	Bash silt loam
105	Hadley silt loam
106	Winooski silt loam
107	Limerick and Lim soils
108	Saco silt loam
109	Fluvaquents-Udifluvents complex, frequently flooded
409B	Brayton mucky silt loam, 0 to 8 percent slopes, very stony
414	Fredon silt loam, cold
419	Loonmeadow mucky fine sandy loam, extremely stony
433	Moosilauke sandy loam
435	Scarboro muck, cold
436	Halsey silt loam, cold
437	Wonsqueak peat
438	Bucksport muck
442	Brayton loam
443	Brayton-Loonmeadow complex, extremely stony
457	Mudgepond silt loam, cold
458	Mudgepond and Alden soils, extremely stony, cold
501	Ondawa fine sandy loam
503	Rumney fine sandy loam
508	Medomak silt loam

C. Connecticut Commission on Culture & Tourism
Historic Preservation Activities Grant Program

Connecticut Commission on Culture & Tourism

Historic Preservation Activities Grant Program

2007-2008

Historic Preservation and Museum Division
59 South Prospect Street
Hartford, CT 06106

(860) 566-3005

www.cultureandtourism.org

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Connecticut Commission on Culture & Tourism

HISTORIC PRESERVATION ACTIVITIES GRANTS

Fiscal Year 2007-8

PROGRAM HIGHLIGHTS

The Historic Preservation and Museum Division of the Connecticut Commission on Culture & Tourism (CCT) is pleased to support historic preservation programs that recognize the importance of the state's heritage and its role in enhancing the quality of life for all citizens. The Historic Preservation Activities Grant program may be used by Connecticut non-profit organizations and municipalities. Grants may be used to support activities sponsored by non-profit organizations and municipalities for a wide range of historic preservation planning activities.

Grants

With state funds provided by the Community Investment Act, the Commission on Culture & Tourism awards Historic Preservation Activity grants of up to $20,000 on a competitive basis. With the exception of Historic and Architectural Resource Survey projects, grant awards must be matched (50/50%) by non-state funds. Applicants that want the matching share provision reduced must describe why in the narrative section of the application.

Grants will be awarded on a year-round basis for activities that can be completed in a 12 month period. A proposed program or project budget may exceed the total matching grant; however, additional sources of non-state funding must be identified in the application

budget. HPAG grants will be available on an annual basis; however, non-profit organizations or municipalities may have only one active HPAG grant at a time.

The following are examples of initiatives, projects or programs that would qualify for funding. This is intended as guidance to assist in the development of an appropriate application.

- Historic and Architectural Resource Surveys – Detailed inventories of buildings located in the municipality including archival research, fieldwork, and photography;
- Computer indexing of surveyed historic properties;
- Archaeological Surveys at the reconnaissance or intensive level;
- Nominations to the State or National Registers of Historic Places;
- Pre-development studies such as feasibility studies, structural and engineering studies, or reuse studies for historic buildings;
- Architectural plans and specifications for historic municipally-owned properties;
- Outdoor Sculpture Condition Assessment Reports and Conservation Reports;
- Historic Structure reports;
- Historic Preservation Plans or Historic Preservation components of the municipal plan of conservation and development;
- Archaeological preserve reports;
- Public education publications and events;
- Website development on local historic preservation activities;
- Local historic district studies or reports;
- Heritage tourism materials.

Eligible applicants are limited to Connecticut municipalities or non-profit organizations that have had tax-exempt status under Section 501(c) (3) for least two years. Federal and state agencies are not eligible to apply.

Ineligible activities include: general operating expenses, acquisition of real estate, fundraising efforts; scholarships; lobbying activities; hospitality expenses; capital expenses; software acquisition; construction, restoration or rehabilitation, equipment purchase, travel, political contributions, interest payments, equipment or regranting. Costs incurred prior to the date of a grant award are ineligible.

If you have any questions regarding your eligibility for the HPAG program, contact Mary M. Donohue, Survey and Grants Director, Historic Preservation and Museum Division, CCT, at telephone (860) 566-3005 Ex. 323 for more information.

Applications may be submitted after July 1, 2007and will be considered for funding as long as state funds are available.

Faxed or Electronic Applications will not be accepted.

Copies may be requested from Mary M. Donohue at mary.donohue@ct.gov

APPLICATION REVIEW PROCESS

HPAG

The Commission is using a simplified application process for the Historic Preservation Activities Grant program. Applications will be reviewed and scored by the staff of the Historic Preservation and Museum Division and will be presented to the Historic Preservation Council for detailed review. Final award will be made by the full board of the CCT. The following criteria are the basis for the review of HPAG applications:

1. **QUALITY OF PROGRAM:**
   - Ability of program to have a clear and positive impact on local historic preservation efforts

2. **PROGRAM IMPACT:**
   Evidence that the proposed program will do one or more of the following:
   - Encourage new awareness of historic preservation at the local level
   - Expand the scope of current public education outreach
   - Strengthen the municipality's administrative or regulatory capacity related to historic preservation
   - Produce written or website materials for homeowners and/or town officials
   - Inventory and survey historic, architectural, and archaeological resources
   - Protect properties through nomination to the National Register of Historic Places

- Designate municipalities for participation in the federal Certified Local Government program or the Preserve America program in order to enhance their ability to apply for outside funding
- Produce high-quality pre-development documents such as historic structures reports, feasibility studies, or architectural plans

3. ABILITY TO CARRY OUT THE PROGRAM:

- Thoroughness and appropriateness of program budget
- Feasibility of the program's success, based on thorough planning reflected in narrative

APPLICATION MATERIALS

Application

Your application must include an application cover sheet, narrative, budget and attachments. **Please note that applications missing any of the listed materials will be considered incomplete and will not be reviewed**. Program must be compatible with the Commission on Culture & Tourism' Strategic Plan and the Historic Preservation and Museum Division's State Historic Preservation Plan.

1. Application Cover Sheet

Complete one application cover sheet for your program. The form must be signed and dated, with an original signature.

2. Application Narrative

Answer questions 1-3 in narrative form in no more than ten (10) single-spaced typed pages (one side only). Margins should be no less than ¾ inch on all four sides, with font size no smaller than 11 point. Your project budget is not included in the two-page total.

A. Describe your organizations or municipalities current historic preservation activities.

B. Describe the project for which you seek funding. Specify how requested funds will be used. Provide an estimated project timeline. All projects must be completed within a 12-month period.

C. Describe the benefits of your proposed project.

3. Budget

Outline the budget for the proposed program. State Funds of any kind may not be used as matching share. Federal, municipal or private funds may be used as matching share. Matching share may be composed of both cash and in-kind services.

4. Attachments

Historic Preservation Activities Grants are awarded on a reimbursement basis. Funded applicants are required to submit a Final Report and a Request for Reimbursement within 60 days of the completion of the project or no later than. Failure to submit a final report will void eligibility for future funding from CCT. **Samples of any finished work with the Commission's acknowledgement statement and logo must be submitted. If possible, submit photographs.**

ASSEMBLY

Submit **two (2) photocopies, and one (1) original**.

Applications should be assembled in the following order:

- ❑ 1. Application Cover sheet – *signed at the bottom*
- ❑ 2. Application Narrative – *no more than 10 pages*

Required Attachments

- ❑ 3. Project Budget Form – *one page*
- ❑ 4. Authorizing Letter – *on letterhead, original signature*
- ❑ 5. State of Connecticut Employer Report of Compliance Staffing form
- ❑ 6. State of Connecticut Notification to Bidders form
- ❑ 7. Affirmative Action and Americans with Disabilities Compliance Form
- ❑ 8. Gift Affidavit Form

Faxed or electronic applications will not be accepted.

Send applications to:
Mary M. Donohue, Survey and Grants Director
Historic Preservation and Museum Division
Connecticut Commission on Culture and Tourism
59 South Prospect Street
Hartford, CT 06106

CONNECTICUT COMMISSION ON CULTURE & TOURISM HISTORIC PRESERVATION ACTIVITIES GRANTS: APPLICATION COVER SHEET

APPLICANT INFORMATION

Federal Employer ID Number
_____

Municipality
Name_____

Street Address
_____

Mailing Address (if different)_____

City/State/Zip
_____
_____
_____

Daytime Telephone Fax Number
Web Address

_____ _____
_____ _____

Application Contact Person Phone or Extension Email
Address

PROJECT INFORMATION

LEGISLATIVE INFORMATION

Is this a new initiative? ❑ Yes ❑ No
Is this the expansion of a current project/program? . Yes No

U.S. Representative District Number
_____ _____
State Senator District Number
_____ _____
State Representative District Number
_____ _____

Use one sentence to describe your project/program in the space allotted here:
Up to $20,000
Start Date:

End Date:
Signature of Authorized Official Title
Date

_____ _____
_____

ATTACHMENT 3

REQUIRED ATTACHMENTS

Expense (Description)	HPAG Funds State	In-Kind	Federal or Private Funding	Municipal Cash Match	Expense Total
Personnel Salary:_____	$ _____	$ _____	$ _____	$ _____	$ _____
Consultant Fees:_____	$ _____	$ _____	$ _____	$ _____	$ _____
_____	$ _____	$ _____	$ _____	$ _____	$ _____
Supplies:_____	$ _____	$ _____	$ _____	$ _____	$ _____
_____	$ _____	$ _____	$ _____	$ _____	$ _____
Postage:_____	$ _____	$ _____	$ _____	$ _____	$ _____
Telephone:_____	$ _____	$ _____	$ _____	$ _____	$ _____
Printing:_____	$ _____	$ _____	$ _____	$ _____	$ _____
Promotion:_____	$ _____	$ _____	$ _____	$ _____	$ _____
Legal notices:_____	$ _____	$ _____	$ _____	$ _____	$ _____
Other (Specify):_____	$ _____	$ _____	$ _____	$ _____	$ _____
_____	$ _____	$ _____	$ _____	$ _____	$ _____
_____	$ _____	$ _____	$ _____	$ _____	$ _____
_____	$ _____	$ _____	$ _____	$ _____	$ _____
Overall Total(s)	$ _____	$ _____	$ _____	$ _____	$ _____

REQUIRED ATTACHMENTS (continued)

ATTACHMENT 4
Signatory Authorizing Resolution

I, _____, the duly qualified and acting Clerk of the

_____ of _____, Connecticut, do hereby certify that
(Town/city/organization)

the following resolution was adopted at a _____ meeting of the
(regular/special)

_____, held on _____, and is on file
(town/city governing body) (date)

and of record, and that said resolution has not been altered, amended or revoked and is in full force and effect.

RESOLVED:

That the _____ is authorized and
(First Selectman, Mayor, City Manager, Town Manager, Executive Director)

directed to file an application on forms prescribed by the Connecticut Commission on Culture and Tourism for financial assistance in accordance with the provisions of Public Act 03-06 of the Connecticut General Assembly, in an amount not to exceed $_____, and upon approval said request to enter into and execute a funding agreement with the state for such financial assistance to this municipality for _____.
(grant project)

_____ _____
(Signature of clerk) (date)

ATTACHMENT 5

REQUIRED ATTACHMENTS

To

(continued)

STATE OF CONNECTICUT
LABOR DEPARTMENT

EMPLOYER OF COMPLIANCE STAFF

Department _____

❑ Pending Investigation

❑ Approved

❑ Disapproved

_____

❑ Investigation Requested

Compliance Officer

Date _____

This form should reflect the number of permanent employees on your payroll on date of submission.

Name of Contracting Firm

Type of Report

_____

_____

❑ Prime Contractor ❑ Subcontractor

EMPLOYEE INFORMATION

Does your firm have a collective bargaining agreement or other contract or understanding with a labor organization or employment agency for the recruitment of labor? ❑ Yes ❑ No

If yes, list the name and address of the agency or organization.

_____

_____

Name

Address (No. and Street, City, State

If no, indicate the usual methods of recruitment.

❑ Connecticut State Employment Service
❑ Private Employment Agency
❑ Newspaper Advertisement
❑ Walk-In
❑ Other (specify)

_____

The signer certifies that its practices and policies, including but not limited to matters concerning personnel, training, apprenticeship, membership, grievance and representation, and upgrading, do not discriminate on grounds of race, color, religious creed, age, sex, or national origin, or ancestry of any individual, and that the signer agrees it will affirmatively cooperate in the implementation of the policy and provisions of Executive order Number Three, and consent and agreement is made that recruitment, employment and the terms and conditions of employment under the contract shall be in accordance with the purpose and provisions of Executive Order Number Three.

Is firm in minority ownership? (51% of assets in control of minorities) ❑ Yes
❑ No

I certify that the above is correct to the best of my knowledge.

_____

_____ _____

Employer Business Name

Date

By _____

_____

Signature Title

ATTACHMENT 6

REQUIRED ATTACHMENTS (continued)

NOTIFICATION TO BIDDERS FORM

The contract to be awarded is subject to contract compliance requirements mandated by Section 4-114a of the Connecticut General Statutes; and, when the awarding agency is the state, Section 46a-71(d) of the Connecticut General Statutes. There are Contract Compliance Regulations codified at Section 4-114a-1 et seq. of the Regulations of Connecticut State Agencies which establish a procedure for the awarding of all contracts covered by Sections 4-114a and 46a-71(d) of the Connecticut General Statutes.

According to Section 4-114a-3(9) of the Contract Compliance Regulations, every agency awarding a contract subject to the contract compliance requirements has an obligation to "aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials." "Minority business enterprise" is defined in Section 4-114a of the Connecticut General Statutes as a business wherein fifty-one percent or more of the capital stock, or assets belong to a person or persons: "(1) Who are active in the daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Section 32-9n." "Minority" groups are defined in Section 32-9n of the Connecticut General Statutes as "(1) Black Americans …. (2) Hispanic Americans …. (3) Women …. (4) Asian Pacific Americans and Pacific Islanders; or (5) American Indians …." The above definitions apply to the contract compliance requirements by virtue of Section 4-114a-1 (10) of the Contract Compliance Regulations.

The awarding agency will consider the following factors when reviewing the bidder's qualifications under the contract compliance requirements:

(a) the bidder's success in implementing an affirmative action plan;
(b) the bidder's success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17 of the Connecticut General Statutes, inclusive;
(c) the bidder's promise to develop and implement a successful affirmative action plan;
(d) the bidder's submission of EEO-1 data indicating that the composition of its work force is at or near parity when compared to the racial and sexual composition of the work force in the relevant labor market area; and
(e) the bidder's promise to set aside a portion of the contract for legitimate minority business enterprises. See Section 4-114a-3(10) of the Contract Compliance Regulations.

*INSTRUCTION: Bidder must sign acknowledgement below, detach along dotted line and return acknowledgement to Awarding Agency along with bid proposal.

The undersigned acknowledges receiving and reading a copy of the "Notification to Bidders" form.

_____

_____

Signature Title

On behalf of

_____

_

ATTACHMENT 7

REQUIRED ATTACHMENTS (continued)

AFFIRMATIVE ACTION & AMERICANS WITH DISABILITIES COMPLIANCE FORM

The Commission has adopted a policy stating that no application for state funds through the Connecticut Commission on Culture & Tourism by any organization shall be complete nor will funds be voted without the submission of affirmative action and ADA information approved by the applicant/organization's governing body.

Your organization should not discriminate on the basis of disability in admission to, access to, or operation of its programs, services, or activities and should not discriminate on the basis of disability in its hiring or employment practices as provided by Title II of the Americans with Disabilities Act of 1990.

AFFIRMATIVE ACTION STATEMENT

I. Name of Organization:
_____

Address:
_____
_____

II. Please list the date (or dates) when your organization's Board of Directors approved an Affirmative Action Plan or Statement of Policy and an American's for Disabilities Act (ADA) Compliance or plan. Statements of Compliance may be requested as needed by the Commission on Culture & Tourism, the State Attorney General's Office or the State Commission on Human Rights and Opportunities Office.
Dates: Affirmative Action _____ ADA: _____

III. Annual statistical report of employees and board as of last year of fiscal activity.
Indicate year: _____

TOTAL MALE							
EMPLOYEES	White	Black	Hispanic	American Indian	Asian or Pacific Islander	General*	Disabled
-time Employees							
-time Employees							
tracted Employees							
TAL EMPLOYEES							
rd of Directors							

TOTAL FEMALE							
EMPLOYEES	White	Black	Hispanic	American Indian	Asian or Pacific Islander	General*	Disabled
Full-time Employees							
Part-time Employees							
Contracted Employees							
TOTAL EMPLOYEES							
Board of Directors							

* if none of the above apply

ATTACHMENT 8

REQUIRED ATTACHMENTS (continued)

Grant Application Gift Affidavit

I, _____, hereby swear that during the two-year period preceding the submission of this grant application that neither myself nor any principals or key personnel of the submitting grantee nor any agent of the submitting grantee gave a gift, as defined in Conn. Gen. Stat. Section 1-79(e), including a life event gift as defined in Conn. Gen. Stat. Section 1-79(e)(12), to (1) any public official(s) or state employee(s) who has participated in the preparation of or has requested funding for this grant application or (2) to any state employee(s) who has supervisory or appointing authority over the state agency administering this grant, except the gifts listed below:

Name of Benefactor Name of Recipient Gift Description Value Date of Gift

Further, neither I nor any principals or key personnel of the submitting grantee know of any action to circumvent this gift affidavit.

Sworn as true to the best of my knowledge and belief, subject to the penalties of false statement.

_____
_____
Signature Date

_____
Title

_____
Name of Grantee

Sworn and subscribed before me on this _____ day of _____, 200__.

_____
Commissioner of the Superior Court
Notary Public

About the Team

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists and landscape architects, recreational specialists, engineers and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - an 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns within the King's Mark RC&D Area - *free of charge.*

Purpose of the Environmental Review Team

The Environmental Review Team is available to assist towns in the review of sites proposed for major land use activities or natural resource inventories for critical areas. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments and recreation/open space projects.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision making. This is done through identifying the natural resource base of the site and highlighting opportunities and limitations for the proposed land use.

Requesting an Environmental Review

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of an administrative agency such as planning and zoning, conservation or inland wetlands. Environmental Review Request Forms are available at your local Conservation District and through the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner / developer allowing the Team to enter the property for the purposes of a review and a statement identifying the specific areas of concern the Team members should investigate. When this request is reviewed by the local Conservation District and approved by the King's Mark RC&D Executive Council, the Team will undertake the review. At present, the ERT can undertake approximately two reviews per month depending on scheduling and Team member availability.

For additional information regarding the Environmental Review Team, please contact the King's Mark ERT Coordinator, Connecticut Environmental Review Team, P.O. Box 70, Haddam, CT 06438. The telephone number is 860-345-3977.