

NATURAL RESOURCE INVENTORY
FOR THE TOWN OF
GRANBY, CONNECTICUT



Prepared by the Town of Granby Conservation Commission

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1.0 INTRODUCTION

This document is designed to be an information resource concerning the identification and protection of the natural resources within the Town of Granby. The information gathered within this report is intended to:

- Assist in the protection of:
 - open spaces
 - significant natural features
 - surface and ground water resources
 - forest and farm lands
- Identify:
 - areas of concerns regarding wildlife corridors and critical habitat areas
 - threatened and endangered flora and fauna
 - invasive species
- Provide
 - recommendations when considering future development

Development has been carefully planned to protect and preserve the natural resources while remaining sensitive to the need for growth. The Town has worked closely with property owners, the Granby Land Trust, and other volunteer organizations to acquire and maintain open space and farmlands to support this goal.

Based on the analysis within this document, recommendations are provided to ensure the continued protection of the natural resources within the Town of Granby. The recommendations are provided at the end of each chapter, and a complete summary of recommendations is listed in Chapter 3.0.

The Town of Granby is located in North Central Connecticut on the Massachusetts border. Granby is predominantly rural, with its planned development along the route 10/202 corridor forming the center of town. Its 41.3 square miles boast a number of unique features that contribute to its natural beauty while supporting its rich agricultural history. The landscape is a diverse mix, including scenic views, dense forest trails, cascading waterfalls and open farmland, as well as homes and businesses for its 11,000 residents. Notable natural features include Barndoor Hills, Enders State Forest and Falls, Lakes Manitook and Basile, Carpenters Falls, and the two symbols included in Granby's Town seal: the Granby Oak and Salmon Brook.

Figure 1 illustrates the development that has occurred over the seventeen year period between 1985 and 2002, with the major areas of development circled. Figure 2 provides an illustration of the areas that are at the greatest risk for development (shaded red) and areas that have the greatest conservation value.

Figure 1 Development 1985-2002



1985



Legend:

-  Developed
-  Turf and Grass
-  Other Grass
-  Agricultural Field
-  Deciduous Forest
-  Coniferous Forest
-  Water
-  Non-forested Wetland
-  Forested Wetland
-  Tidal Wetland
-  Barren
-  Utility (Forest)

2002

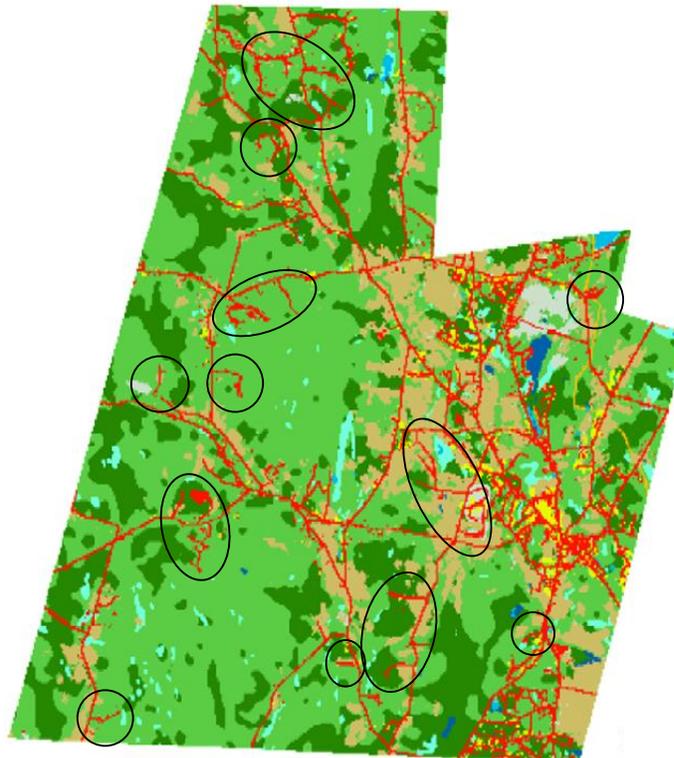
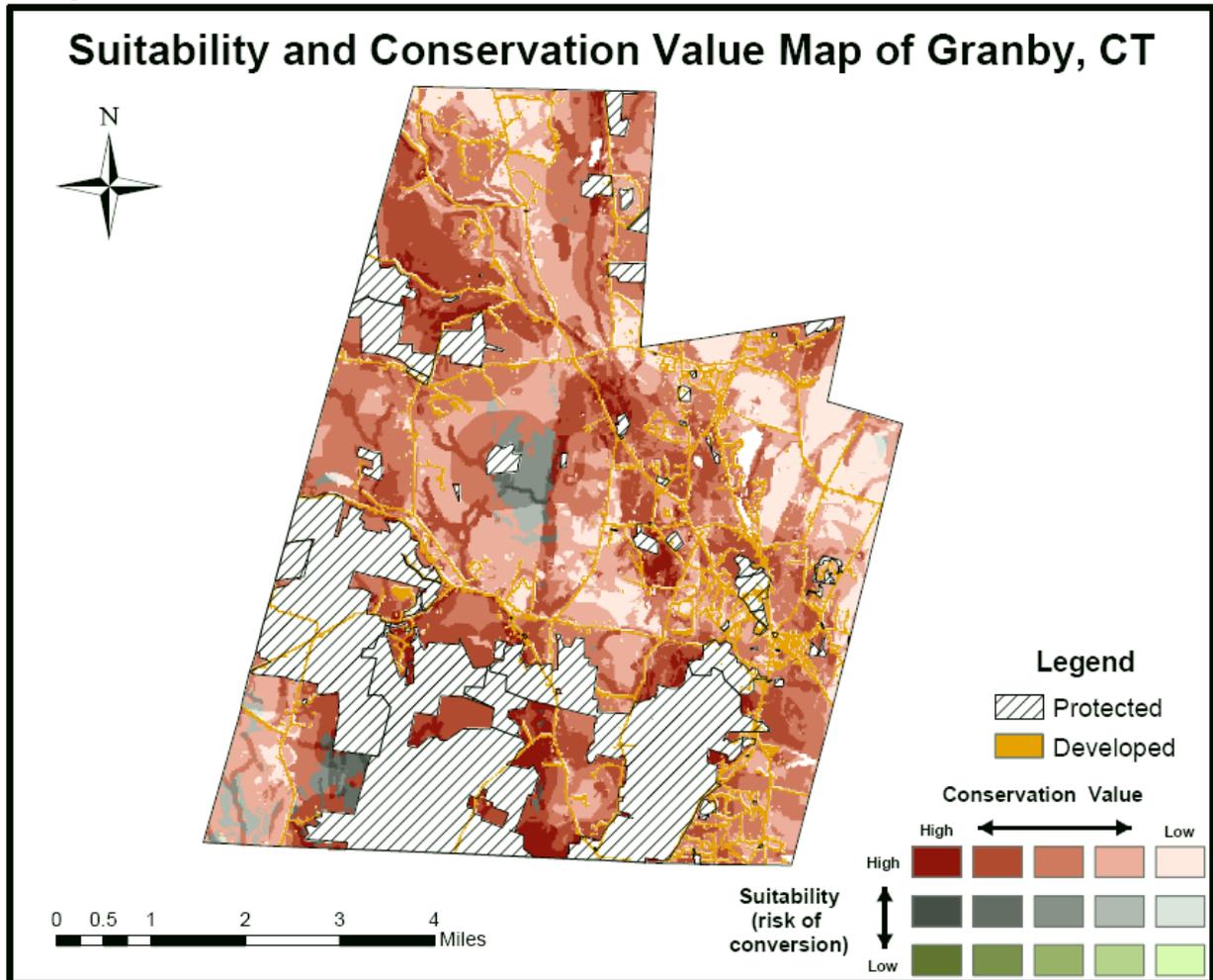


Figure 2 Conservation Value Map



Note: This Figure illustrates the areas of high conservation value based on water, forests, biological resources, agriculture, and recreational and cultural resources, against the Suitability, or land that is most attractive for development. Therefore, an area that has high conservation value and is also the most attractive for development is dark red. The pink areas indicate areas considered more appealing for development, and of less conservation value.

Source: Yale University Global Institute of Sustainable Forestry,
Highland Regional Study

Below are brief descriptions of some of the notable natural features in Granby.

Enders State Forest, Gorge, and Falls

Located off Rte. 219, Enders Gorge and Falls is a natural treasure of Granby. It is an exceptional collection of five different waterfalls within a scenic gorge that can be easily accessed by trails. This area has been enjoyed by generations of residents for hiking, swimming, or just relaxing by the stream. The combination of cascading water, deep pools, and steep ledges makes this area one of the most scenic in the region.

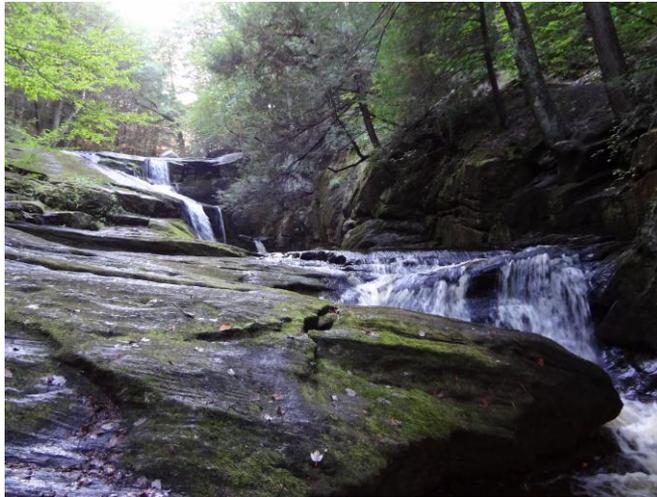


Photo by Mark Lockwood

Carpenters Falls

These falls are remotely located within 382 acres of the Carouso Collamore Carpenter Preserve, a forested area between Broad Hill and Weed Hill, and are part of the greater area of the McLean Game Refuge in West Granby.



Photo by Mark.Lockwood

The Granby Oak

One tree in Granby is particularly noteworthy. The Granby Oak, or more precisely the Dewey-Granby Oak, is located on Day Street. This white oak specimen is over 400 years old. Since 1975, the oak has been used as part of the Town seal. The oak is now under the care of the Granby Land Trust. Around 1981, an acorn from the Granby Oak was planted. The seedling was moved to the grounds of the Salmon Brook Historical Society in 1986.

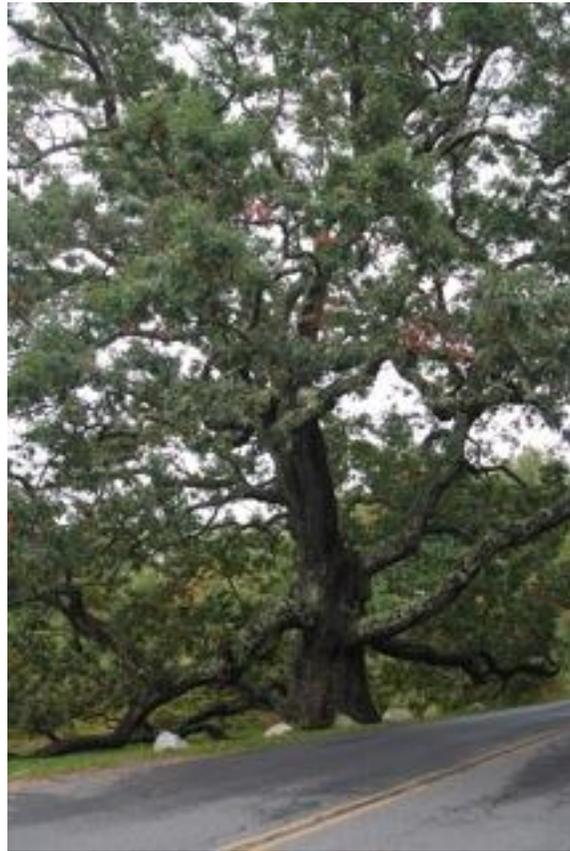


Photo by Carolyn Flint

Salmon Brook

Salmon Brook is the primary watercourse in Granby. There are three segments of Salmon Brook: the West Branch, which begins in Hartland and is approximately 12.6 miles long; and the East Branch, which begins in Granville, Massachusetts and is approximately 11.4 miles long; and the main stem, where the East and West branches join in Granby near the East Granby town line, which is approximately 2.4 miles long. The brook flows southeast through Granby and into East Granby, where it joins the Farmington River near the East Granby/Simsbury town line. Salmon Brook is notable for its excellent water quality, and a portion of Salmon Brook was designated as an official Connecticut Greenway in 2010. The Salmon Brook is included in the Granby Town Seal.



Photo by Mark Lockwood

Barndoor Hills

The Barndoor Hills are a pair of traprock ridges located along Barndoor Hills road. These hills are an outlying section of the Metacomet Ridge which extends from Long Island Sound to the Vermont border. East Barndoor Hill is located within McLean Game refuge and can be accessed by the Summit Trail. West Barndoor Hill is maintained by the Granby Land Trust.



Photo by Carolyn Flint

Lake Manitoak

Manitoak Lake is a 57 acre lake located in the northeastern part of Granby. It is fed by a stream at the northern end and flows out through a long channel at its southern end. It is primarily used for boating, fishing, and photography by residents around the lake, although there is limited access to the public. The Lake Manitoak Association monitors the health of the lake.



Photo by Mark.Lockwood

Lake Basile

Lake Basile is located in the Southeastern corner of Granby. The lake is part of the historic Farmington Canal System, and the “rails to trails” Farmington Canal Heritage Trail route runs alongside the lake. Lake Basile has been home to bald eagles, geese, snapping turtles, swans, blue heron, and other animals. The Lake Basil Association has begun treatments to remove the excessive algae and invasive plants and restore the lake to its former pristine state.



Photo by Neil Hornish

2.0 NATURAL RESOURCES INVENTORY

2.1 Wetlands and Water Resources



Photo by Neil Hornish

The water resources in Granby include surface water and groundwater. Both need protection to maintain the current level of clean drinking water, diversity of wildlife, and recreational pursuits.

Wetlands

The inland wetlands and watercourses of the State of Connecticut are an indispensable, but fragile, natural resource essential to an adequate supply of surface and underground water; to hydrological stability and control of flooding and erosion; to the recharging and purification of groundwater; and to the existence of many forms of animal, aquatic, and plant life.

Approximately 7% of the area of Granby is in wetlands. The definitions of different types of wetlands are provided in Appendix A.

The map of wetlands and watercourses entitled “Inland Wetlands and Watercourses Map, Town of Granby, Connecticut” available on the Town web site, delineates the general location and boundaries of inland wetlands and the general location of watercourses.

Surface Water

Salmon Brook dominates the surface water landscape in Granby to such an extent that it is pictured in the Town Seal. Its two main branches, the East and West Branch, cross Granby from the western highlands to the eastern lowlands. Dismal Brook, Bradley Brook, Fox Brook, Belden Brook, Mountain Brook, Creamery Brook, Manitook Lake, Kendall Brook and Hungary Brook feed the East Branch, and Wright Brook, Moosehorn Brook, Mountain Brook, Higley Brook, Beach Brook, Kendall Brook and Bissell Brook feed the West Branch. Many unnamed tributaries also lace the landscape and expand the watershed area.

Two lakes, Manitook Lake and Lake Basile; many ponds, including Three Corner Pond; and vernal pools add to the surface waters.

The Salmon Brook Watershed, which covers Granby, is part of the larger Farmington River (FR) Watershed. The FR watershed encompasses parts of Becket and Otis Massachusetts to the north, Windsor CT to the east, Plymouth, Bristol, and Farmington CT to the south, and Norfolk CT to the west.

Figure 3 provides a wetlands map of Granby. Figure 4 illustrates the Flood Zones in Granby.

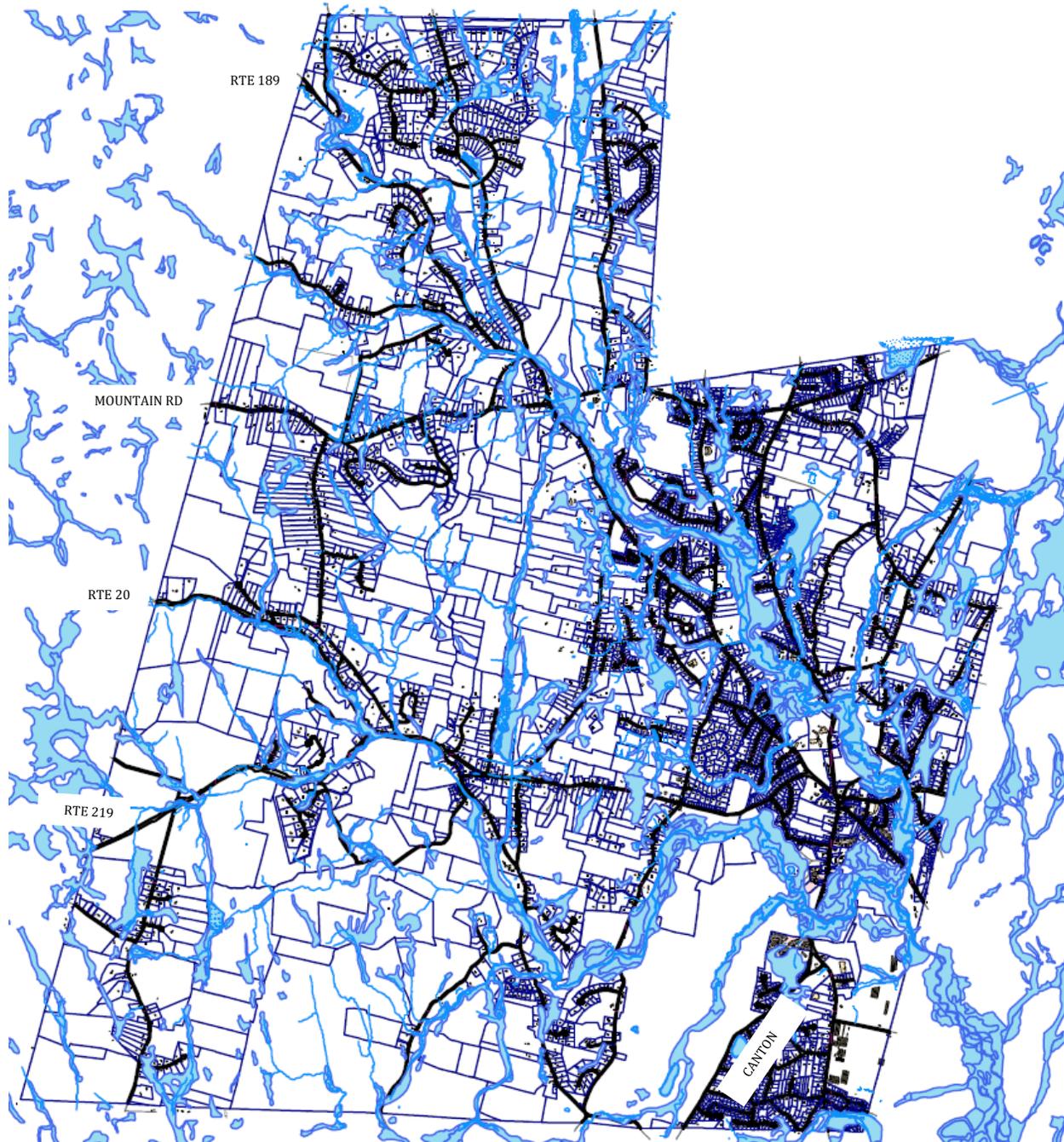
Vernal pools are found throughout Granby. Most of them are relatively small. A large one is found at the end of Stonewall Drive. Another rather large one is over the hill at the southwest corner of Simsbury Road and Barn Door Hills Road. Others are to be found on FireTown Road, Silkey Road, and Cider Mill Heights Road. These pools are the breeding habitat for wood frogs and four species of salamanders and the year-round habitat for many invertebrates who survive the dry period in eggs or asleep in the mud. In late March or early April, the frogs and salamanders complete their annual migration from the woods where they have lived for some eleven months to their home vernal pools. While some are trapped and perish in catch basins, window wells, and swimming pools, many reach their destination for another breeding season. You can tell if the frogs and salamanders have been to your vernal pool by the presence of their egg masses and later the tadpoles and salamander larvae.

Research shows that vernal pools differ from each other in populations. Not all will attract wood frogs. Very few will have all four species of salamanders. Some will not attract any amphibians but will still have their complement of smaller creatures. Because of their uniqueness all vernal pools are worth protecting.

In order to maintain the amphibian population it is also necessary to preserve the nearby wooded upland where they live most of the year. They need both habitats to survive.

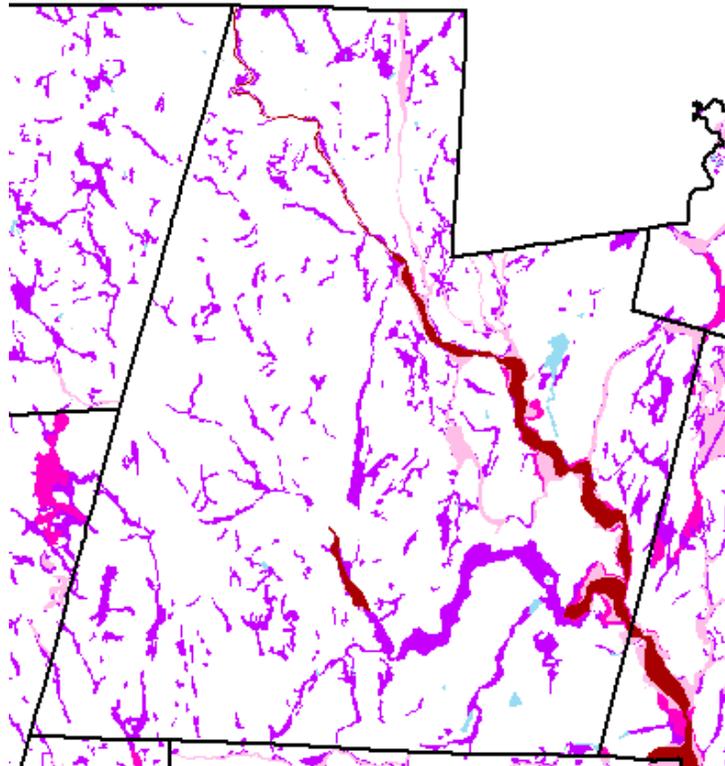
Hank J. Gruner of the Science Center of Connecticut has written many publications about vernal pools and has done extensive investigation of the vernal pools of Granby.

Figure 3 Wetlands Map, Granby and Surrounding Area



Source: Nonpoint Education for Municipal Officials (NEMO)
<http://clear.uconn.edu/projects/cri/interactive.htm>

Figure 4 Flood Zones
(Source: NEMO Community Resource Inventory)



FEMA Flood Zones

-  100 Year Flood Zone
-  500 Year Flood Zone
-  Floodway in Zone AE
-  Other Flood Areas

Source: Nonpoint Education for Municipal Officials (NEMO)
<http://clear.uconn.edu/projects/crri/interactive.htm>

Water Quality

Historically, Salmon Brook has been known for its clean, clear water. In 1898 Dr. Alfred Weed, who was Granby's first Town Health Officer, wrote, "Our sparkling brooks course their way through miles and miles of uninterrupted forests...and from its mossy banks no pollution arises, neither doth contamination or evil proceed from its white pebbly bottom...." Despite the interruption of forests by lumbering and housing developments and the introduction of man-made pollutants, Salmon Brook retains its good water quality. Mike Beauschene of the Connecticut Department of Environmental Protection (DEP) stated in 2009:

"Based on my work around CT, the Salmon Brook Watershed is an *exceptional (ital. added)* resource as it relates to water quality for aquatic organisms. It is the only large watershed where a coldwater fish, the slimy sculpin, is found widespread throughout. These fish require very cold and clear streams to complete their life cycle. In addition, many of the tributaries have self-maintaining populations of Brook Trout, the only native trout in New England.

The aquatic insect life is equally impressive with many of the very pollution sensitive organisms, like stoneflies, abundant in most locations.

Any effort to maintain the watershed in its current condition should be supported. It would be a great loss to everyone should conditions change in this watershed."

Figure 5 shows that the ground water quality for Granby is overall good quality, suitable for drinking. Figure 6 illustrates to surface water quality.

Wild and Scenic Designation

On Nov. 27, 2006 President George Bush signed into law S. Bill 435 which authorizes a Feasibility Study of the Lower Farmington River and Salmon Brook. The Study Committee, composed of members from the ten towns bordering the watercourses, has researched the Outstanding Resource Values (ORV) of these areas.

ORV's have been found in the areas of Geology, Biological Diversity, Recreation, Cultural Landscape, and Water Quality. To mention a few specifics: The endangered dwarf wedge mussel is found in the Lower Farmington, the excellent water quality of Salmon Brook supports a large native brook trout population, and Tariffville Gorge provides top-level water for expert kayakers. The Study Committee has written a management plan. The ten towns involved have endorsed this plan, and a bill designating the Lower Farmington River and Salmon Brook as Wild and Scenic has been introduced in the United States Congress.

The Management Plan outlines current local protective regulations and threats and gaps to that protection. If the lower Farmington and Salmon Brook are designated “Wild and Scenic” a coordinating committee of townspeople will be established that will oversee actions along the watercourses. This committee can *advise* towns about any changes to regulations, but the towns retain their local control over any changes. Moreover, federal funds and National Park Service staff help will be given to help protect the ORV’s.

Figure 5 Ground Water Quality Map

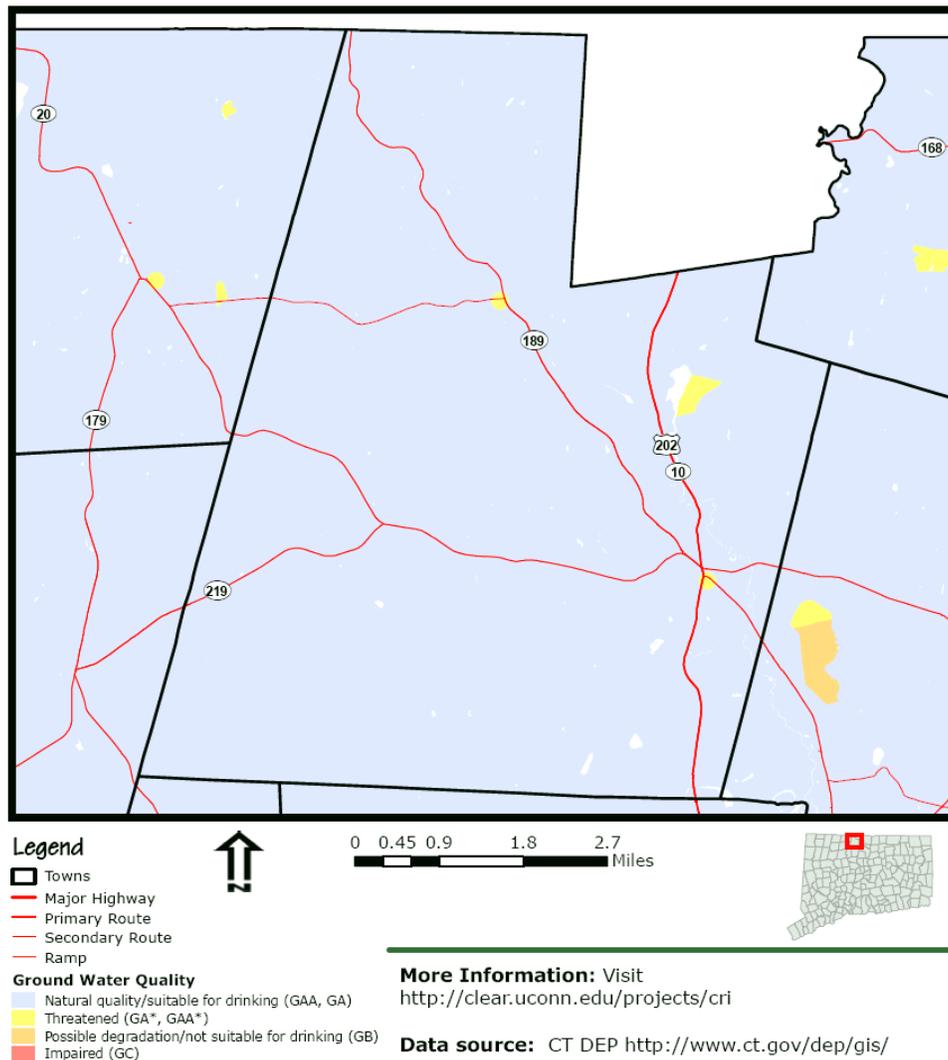
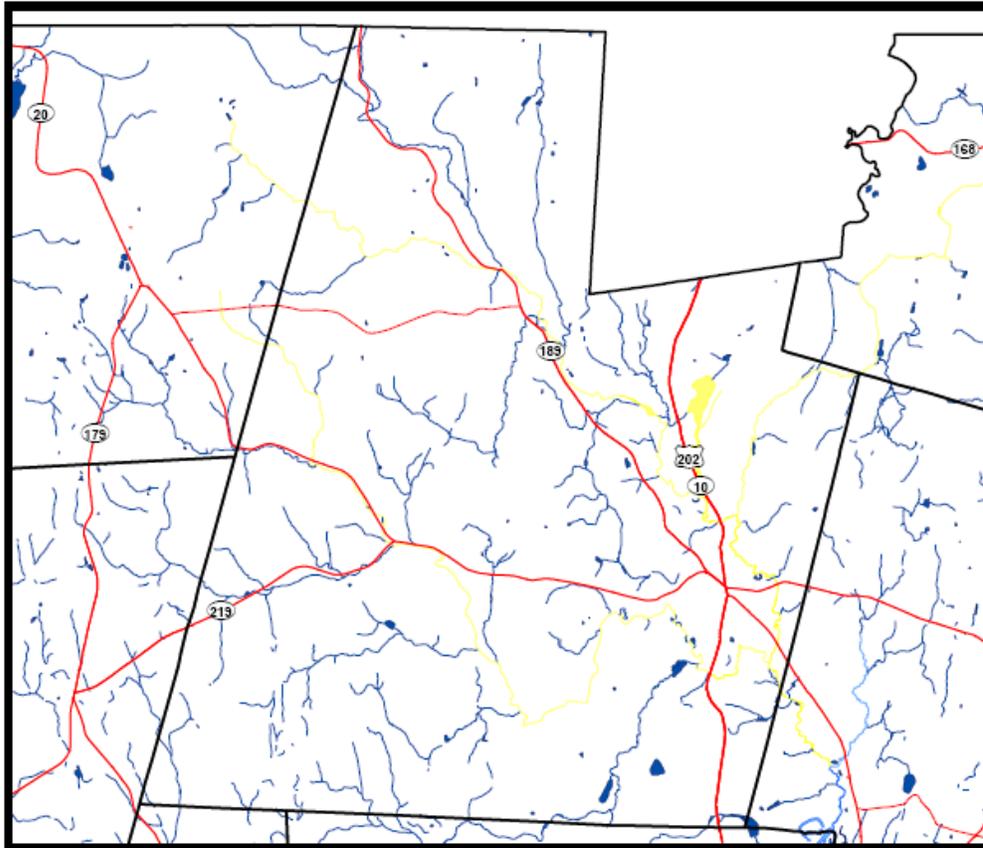


Figure 6 Surface Water Quality Map – CRI



0 0.45 0.9 1.8 2.7 Miles



-  Towns
-  Major Highway
-  Primary Route
-  Secondary Route
-  Ramp

More Information: Visit <http://clear.uconn.edu/projects/cri>

Data source: CT DEP <http://www.ct.gov/dep/gis/>

Surface Water Quality

-  Good to excellent natural quality
-  Fishable, swimmable
-  Natural quality may be threatened
-  Impaired
-  Coastal impaired
-  Coastal good to excellent natural quality
-  Coastal fishable, swimmable

Threats to Wetlands and Water Sources

Many inland wetlands and watercourses throughout the state have been destroyed or are in danger of destruction because of deposition, filling, or removal of material, the diversion or obstruction of water flow, the erection of structures and other uses, all of which may despoil, pollute, and eliminate wetlands and watercourses. Such activity has had, and will continue to have, a significant adverse impact on the environment and ecology of the state of Connecticut and has and will continue to imperil the quality of the environment, thus adversely affecting the ecological, scenic, historic and recreational values and benefits. The preservation and protection of the wetlands and watercourses is in the public interest and is essential to the health, welfare and safety of the citizens of the state.

The Granby's Inland and Wetlands Commission is tasked with protecting the wetlands and watercourses within the town. There are a number of concerns that may diminish the surface water quality in Granby. As development continues, the amount of impervious surfaces (e.g. asphalt) increases. This may diminish water quality from increased runoff from these surfaces that are not naturally filtered through the soil.

Agriculture may pose another source of water pollution from runoff of pesticides and manure. Granby has a significant amount of farmland, and care should be taken to avoid agricultural sources of water pollution.

Improper development or clearing of land may produce runoff of silt and nutrients that may contaminate water sources.

Currently, the tributaries of Salmon Brook are good to excellent natural quality, but the main branches are considered "threatened" since they cannot be used for drinking water.

2.1.1 Recommendations for the Conservation of Wetlands and Water Sources in Granby.

1. Continued participation in the Lower Farmington River and Salmon Brook Wild and Scenic Study Committee. Implement the Management Plan developed by the Study Committee.
2. Analyze the use of non-impervious materials with new construction and renovations. *Granby zoning regulations paragraphs 4.2.4.2.1 (Peak Runoff Attenuation) and 4.2.4.3.1 (Stormwater Quality) mention the use of impervious surfaces without specific requirements, and zoning regulation paragraph 8.27.3.6 (Standards and Requirements for an Active Adult Residential Development) currently specifies that impervious surface coverage shall not exceed 40% of the overall site.*
3. Implement agricultural best practices to avoid chemical and manure runoff into water courses. *Granby Inland Wetlands Regulations paragraph 4.1(a) permits grazing in inland wetlands and watercourses as of right.*

2.2 Farmland



Photo by Neil Hornish

According to a Highlands Regional Study by the Yale University Global Institute of Sustainable Forestry, as of 2004, approximately 2,011 acres of land, 7.65% of the total area, are used for active agriculture within the Town of Granby. This is the eighth largest percentage of land used for agriculture within the 28 towns that constitute the Connecticut Highlands Region.

There are dozens of farms in Granby. Areas designated as farmland include a variety of applications, from fruit and vegetable production, equestrian centers, community farm plots, annual and perennial plants, meat, dairy, and egg production, and other products, such as maple syrup and wine production. Tables 1 and 2 provide a list of farms and items produced in Granby. Figure 7 illustrates the areas of active farmland in Granby.

A burgeoning interest in locally grown food has made more communities regard at their farmland as valuable assets. The social climate is favorable to farmland protection, and thus protection of good agricultural soils, vital to the production of fresh local produce. Increasing concern about the health and environmental costs of industrial farming has made the viability of Connecticut's farms a matter of significant community interest. Protecting existing small farms and making suitable land available for farming is critical to protecting valuable agricultural soils.

The American Farmland Trust and the Connecticut Conference of Municipalities, with funding from the Hartford Foundation for Public Giving and the Connecticut Department of Agriculture, have put together an excellent guide on how to keep farming viable in Connecticut. It is available online at www.ctplanningforagriculture.com.

Threats to Farmland

The primary threat to farmland is development. The aforementioned Yale study concluded that, based on development from 1985 through 2002, it is predicted that between 2002 and 2022, Granby may develop an additional 553 acres of land, resulting in a total of almost three thousand acres of developed land, approximately 11% of total Town area. This is the fifth highest predicted rate of development within the Connecticut Highlands Region.

Another threat to farming is the migration of farmers to other, more profitable, careers. Granby is fortunate that while some of the farms in Granby are multi-generational, many farms are relatively new, being created within the last ten years.

2.2.1 Recommendations for the Conservation of Farmland.

Table 3 provides information on various farmland protection programs in Connecticut that are offered by the Connecticut Department of Agriculture, Connecticut Department of Environmental Protection, and USDA/Natural Resources Conservation Services, as means of conserving farmland.

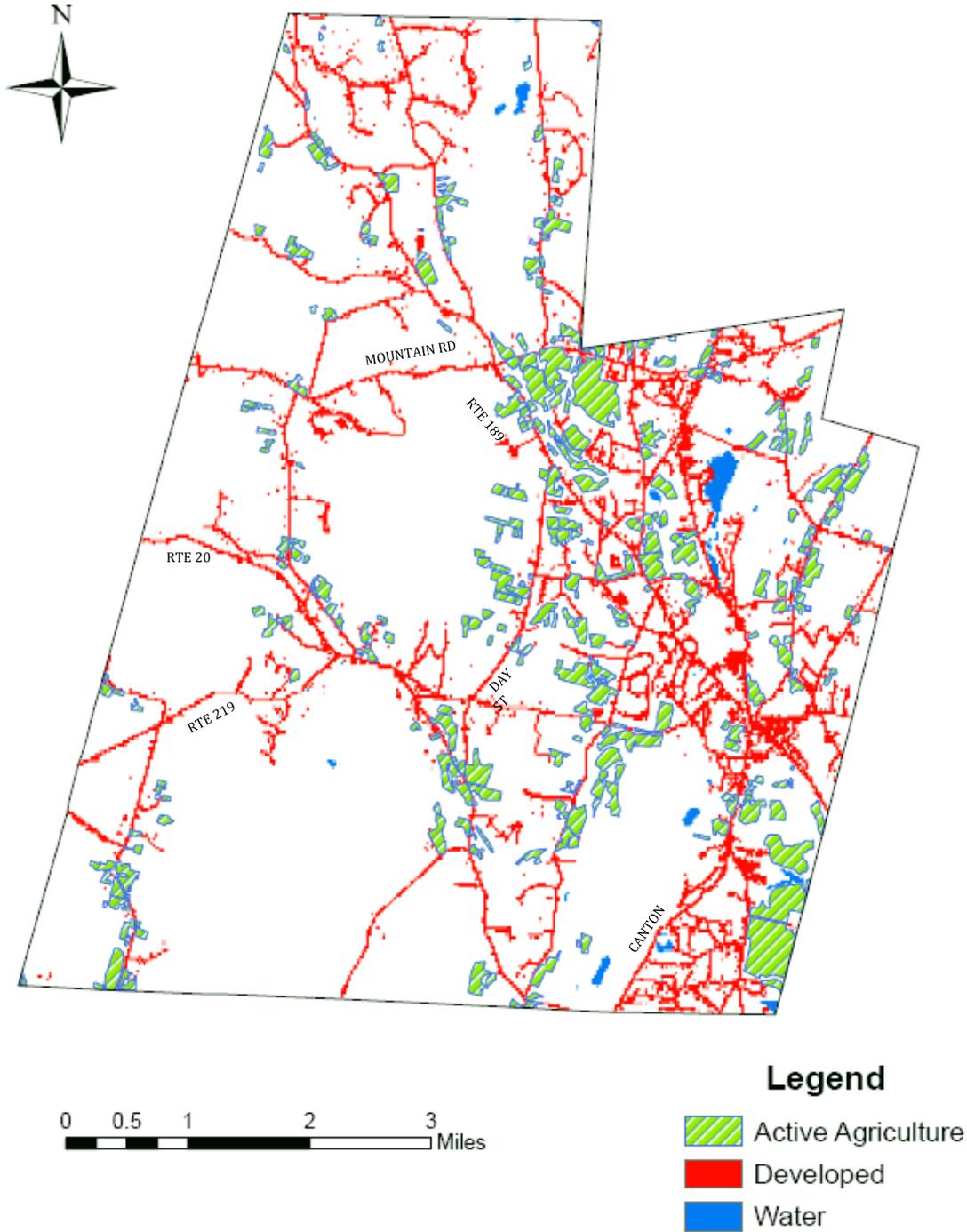
TABLE 1 GRANBY FARMS

Name	Street	Town	Zip	Contact	Phone	Web Site
Alba Flower Apiaries	53 Barndoor Hills Road	Granby	06035	Gilman Mujac	(860) 844-0404	granbyag.org
Allenhurst Farm	4 Mountain Road	North Granby	06060	Lois & Allen Longley	(860)653-6438	granbyag.org
Angel Horses	12 Knollwood Lane	West Granby	06090	Pam Traun	(860) 764-9004	angelhorses.org
Another Way Farm	49 Hartford Avenue	Granby	06035	Laura Laflamme		granbyag.org
Arlows Sugar Shack	101 Bushy Hill Road	Granby	06035	Arlow Case	(860) 653-3270	sweetwindfarm.net
Baggott Corn Farms	87 Notch Road	Granby	06035	Thomas Baggott		
Barolli Farm	176 Lost Acres Road	North Granby	06060	Sali Barolli	(860) 653-1284	granbyag.org
Basile Farm	11 Mechanicsville Road	Granby	06035	Stephen Basile	(860) 653-9599	
Belmeade Farms	46 Simsbury Road	West Granby	06090	Jean Luc Belmeade	(860) 413-3569	belmeadesigns.com
Budder Bar	238 Silver Street	North Granby	06060	Debi Swanson	(860) 653-5235	budderbar.com
Clark Farm at Bushy Hill Orchard	33 Bushy Hill Road	Granby	06035	Becky Clark	(860) 653-4022	bushyhill.com
Double Nickel Ranch	45 Kelly Lane	Granby	06035	Roger Dinsmore	(860) 844-8775	granbyag.org
Emery Farm	71 Loomis Street	North Granby	06060	Dave Emery	(860) 653-3746	granbyag.org
Farm View Acres	163 North Granby Road	Granby	06035	Connie Legeyt	(860) 653-4991	granbyag.org
Fiddlehead Farm	74R Silkey Road	North Granby	06060	Luisa Mayock	(860) 653-5279	fiddleheadantiques.com
Hale Mountain Farm	Haleview Drive	Granby	06035		(860) 653-0137	granbyag.org
Hemlock Knoll LLC	18 Loomis Street	North Granby	06060	Aimee Gilbert	(860) 653-6447	hemlockknoll.com
Hidden Acres	101 East Street	North Granby	06060		(860) 653-4209	
Holcomb Farm CSA	111 Simsbury Road	West Granby	06090		(860) 653-5554	holcombfarmcsa.org
Horse Central Stable	31 Wells Road	Granby	06035	Richard Stevens	(860) 653-5504	horsecentralstable.com
House of Hayes	151 East Street	North Granby	06060	Stan & Dorothy Hayes	(860) 653-4157	hayesmaze.com
Janeski Farm	100 Wells Road	Granby	06035	Stephen Janeski	(860) 653-7290	

TABLE 1 GRANBY FARMS (CONTINUED)

Name	Street	Town	Zip	Contact	Phone	Web Site
Lael Farm	166 Barndoor Hills Road	Granby	06035	Ron & Barbara Greenwood	(860) 653-2327	granbyag.org
Lost Acres Orchard	130 Lost Acres Road	North Granby	06060	Ginny & Tom Wutka	(860) 653-6600	lostacres.com
Lost Acres Vineyard	84 Lost Acres Road	North Granby	06060	Kevin Riggot	(860) 653-3043	lostacresvineyard.com
Lytic Hill Farm	134 Hungary Road	Granby	06035	Don & Nancy Butler	(860) 214-8031	lyrichillfarm.com
Maple View Farm	198R Salmon Brook Street	Granby	06035	Kate & Jason Bogli	(860) 655-2036	mapleviewhorsefarm.com
Maplewood Farm	170 N. Granby Road	Granby	06035	Dr. Forrest Davis	(860) 653-0300	
Millborne Farm	264 N. Granby Road	Granby	06035	Peter Miller	(860) 653-5621	millbornefarm.com
Millbrook Farm	100 Wells Road	Granby	06035	Stephen Jeneski	(860) 653-7290	
Mountain Spring Farm	359 North Granby Road	North Granby	06060	Stephen & Nancy Hayes	(860) 653-5726	mountainspringgoats.com
O'Brien's Nursery	40 Wells Road	Granby	06035	John O'Brien	(860) 653.0163	obrienhosta.com
Old Beech Farm - Fitzpatrick Family Farm	53 Case Street	West Granby	06090	Daniel Fitzpatrick	(860) 693-3275	granbyag.org
Old Homestead Farm	114 Hungary Road	Granby	06035	Fred Griffin	(860) 653-2989	
Robert Farm	235 N. Granby Road	Granby	06035	Robert Brockett	(860) 653-6740	
Schoolhouse Farm	100 East Street	Granby	06035	Mary-Jo Toczydlowski		
Shinder Family Farm	167 Case Street	West Granby	06090	David & Daphne Shinder	(860) 693-1427	granbyag.org
Stony Brook Farm	94 Granville Road	North Granby	06060	Norm Laverdiere	(860) 653-9758	granbyag.org
Strain Family Horse Farm	30 Sakrison Road	Granby	06035	Bill Strain	(860) 653-3275	strainfamilyhorsefarm.com
Sunflower Equestrian	35 Kelly Lane	Granby	06035	John Hurst	(860) 413-4157	granbyag.org
SweetPea Cheese	151 East Street	North Granby	06060	Stanley & Dorothy Hayes	(860) 653-4157	sweetpeacheese.com
The Garlic Farm	76 Simsbury Road	West Granby	06090	Gary Cirullo	(860) 653-0291	garlicfarmct.com
Wilhelm Farm	329 North Granby Road	North Granby	06060	Ann Wilhelm & Bill Bentley	(860) 844-0008	granbyag.org
Windham Gardens	87 Notch Road	Granby	06036	Erin Windham & Doug Baggett	(860) 798-7989	windhamgardensonline.com
Young's Farm	5 Barndoor Hills Road	Granby	06035		(860) 653-3167	granbyag.org

Figure 7 Agricultural Land
Active Agriculture in Granby, CT



Source: Nonpoint Education for Municipal Officials (NEMO)
<http://clear.uconn.edu/projects/cr/interactive.htm>

TABLE 3 Farmland Protection Programs

Connecticut Farmland Preservation Program Conn.A6 Department of Agriculture	
Who May Apply?	Landowners
Eligibility Requirements	<p>Property must:</p> <ul style="list-style-type: none"> - Be an active farm operation - Include a minimum of 30 acres of cropland or be adjacent to a larger parcel - Meet minimum program criteria that include: amount of prime and important soils, amount of cropland, proximity to other active farms, viability of agriculture business, proximity to agricultural support services, and surrounding land use - Meet FRPP requirements if federal funding will be used as part of sale
Selection Criteria	<p>Priority given to:</p> <ul style="list-style-type: none"> - Land with high percentage of prime and important agricultural soils and cropland - Land in proximity to other active farmland, protected lands and farm services
Cost-share Requirements	State may accept a gift or pay up to 100% of value of development rights
Easement Requirements	Only agricultural and compatible uses permitted. Property may never be subdivided or converted to non-agricultural use. No public access required. State easement language required. Subject of federal requirements if FRPP funding is used.
Application Period	Applications accepted continuously. Acquisitions must be approved by State Properties Review Board and the Attorney General. If the application is approved by the state, landowners should anticipate a period of 15 months or longer to complete negotiations, survey, and title work before the final closing.

Source: Connecticut Farmland Trust: "Conservation Options for Connecticut Farmland"

TABLE 3 FARMLAND PROTECTION PROGRAMS (CONTINUED)

Joint State-Town Farmland Preservation Program Conn. A15Department of Agriculture	
Who May Apply?	Municipalities, Landowners
Eligibility Requirements	<p>Municipalities must:</p> <ul style="list-style-type: none"> - Have a policy in support of farmland preservation - Have a farmland preservation plan developed and approved by local policymakers - Have a fund established for the purpose of purchasing development rights - Have a willing applicant who has voluntarily offered to sell development rights - Meet FRPP requirements if federal funding will be used as part of sale <p>Property must:</p> <ul style="list-style-type: none"> - Be an active farm with 30 acres of prime or important farmland soils - Have a minimum gross annual agricultural production of \$10,000.
Selection Criteria	<p>Priority given to:</p> <ul style="list-style-type: none"> - Land with high percentage of prime and important agricultural soils and cropland - Projects that comply with local and/or regional open space plans or plans of conservation and development
Cost-share Requirements	State may accept a gift or pay from 10 to 75% of value of development rights depending on quantity of active agricultural land within 3-mile radius of the subject farm.
Easement Requirements	Only agricultural and compatible uses permitted. Property may never be subdivided or converted to non-agricultural use. No public access required. State easement language required. Subject to federal requirements if FRPP funding is used.
Application Period	Applications accepted continuously. Acquisitions must be approved by State Properties Review Board and the Attorney General. If the application is approved by the state, landowners should anticipate a period of 15 months or longer to complete negotiations, survey, and title work before the final closing.

Source: Connecticut Farmland Trust: "Conservation Options for Connecticut Farmland"

TABLE 3 Farmland Protection Programs (continued)

Open Space & Watershed Land Acquisition Grant Program Conn.A36 Department of Energy and Environmental Protection	
Who May Apply?	Municipalities, Water Companies, Nonprofit conservation organizations
Eligibility Requirements	Program can be used to purchase development rights on farmland or farmland if fee. No minimum acreage or prime agricultural soils required.
Selection Criteria	Priority given to: - Land vulnerable to development - Projects that comply with local and/or regional open space plans or plans of conservation and development - Land with diverse categories or natural resources - Projects with pending written offer with landowners
Cost-share Requirements	State pays up to 65% (up to 75% for projects in "distressed municipalities or targeted investment communities") of either fair market value of development rights or purchase price, whichever is less.
Easement Requirements	Public access required. Limited agriculture-related structures permitted on protected land. State easement language required.
Application Period	Applications accepted and evaluated during designation grant rounds; typically, the Conn Department of Energy and Environmental Protection holds one grant round per year.

Source: Connecticut Farmland Trust: "Conservation Options for Connecticut Farmland"

TABLE 3 Farmland Protection Programs (continued)

Farm & Ranch Lands Protection Program USDA/Natural Resources Conservation Service	
Who May Apply?	Municipalities, States, Nonprofit conservation organizations
Eligibility Requirements	Property must: <ul style="list-style-type: none"> - Be part of active farm operation - Have prime or important agricultural soils or have historic or archeological resources - Meet minimum program criteria for amounts (or percentages) of prime and important farmland soils and agricultural land use - Be privately owned (non-governmental) - Have pending written offer with landowner
Selection Criteria	Priority given to: <ul style="list-style-type: none"> - Land vulnerable to development; land with high percentage of prime and important agricultural soils - Projects with high percentage of non-federal matching funds - Projects must have non-federal matching funds in hand
Cost-share Requirements	FRPP pay up to 50% of fair market value of development rights. Applicant provides cash match of either 25% of development rights value or 50% of purchase price. Landowner donations of up to 25% of development rights value may be considered part of applicant's match.
Easement Requirements	NRCS farm conservation plan is required. NRCS easement language required. No public access required.
Application Period	Applications accepted during an annual sign up period. Applicants awarded FRPP funding must sign a cooperative agreement with NRCS stipulating certain easement provisions and agreeing to purchase easement(s) within two years.

Source: Connecticut Farmland Trust: "Conservation Options for Connecticut Farmland"

2.3 Geology



Photo by Neil Hornish

(The information provided herein was obtained through the Lower Farmington River and Salmon Brook Wild and Scenic Management Plan, June 2011 <http://www.lowerfarmingtonriver.org>)

The geology of an area is important for a variety of reasons. Certain features, such as traprock ridgelines, support unique ecological systems and provide aesthetic beauty. The types of soil determine the presence of ground water reservoirs, the potential for agriculture, the adequacy of septic systems, and the impact to flood plains. Travel routes and population centers are historically influenced by bedrock patterns. This section discusses the different types of rock and soil in the Granby area. A more complete discussion can be found in the Farmington River Valley Wild and Scenic Area report, from which much of the information presented herein was gleaned.

The rock and soil of Granby is the result of a long history of geologic activity. A NW to SE traverse of the Wild & Scenic Study Area reveals bedrock units that range in age from the billion year old metamorphic gneisses and schists of western Hartland to the 200 million year old dolerites, basalts (traprock) and arkoses (brownstone) of Granby, Simsbury, Avon, East Granby, Bloomfield and Windsor. The metamorphosed remains of the Shelburne Falls Arc, an ancient, Japan-like, volcanic island arc, extend northward from Burlington, Vermont to the Massachusetts line in Granby. The glacial deposits that mantle the bedrock yield evidence of the two glaciations that are known to have occurred.

The present configuration of the bedrock that underlies Granby developed west to east in two stages: the colliding of the North American and African continents approximately 500 million years ago, and the subsequent separation of the Pangea supercontinent approximately 200 million years ago, which formed the Atlantic Ocean. As the two continents collided in the first stage, the crushing, heating, and mountain building associated with this convergence assembled

and metamorphosed the bedrock units that now underlie the area west of the Hartford Basin (The Hartford Basin is basically the Connecticut River Valley from Holyoke, Mass to New Haven, Conn).

Faults that defined the Hartford Basin deepened and layers of sediment began to accumulate. Eventually the faults penetrated deep enough to intersect magma and periods of volcanic activity punctuated sedimentation. Some of the magma cooled underground forming the Barndoor Hills and Onion Mountain which are composed of dolerite (a.k.a. diabase or traprock). Variations in the color of the sedimentary rock layers indicate they were deposited during rainy periods (black to grey layers) that alternated with drier periods (tan to red layers).

The Hartford basin provides an excellent example of the role that rock type plays in landscape development. The resistant traprock stands in sharp contrast to the low-lying layered sedimentary bedrock. The traprock forms prominent outcrops and the shape of the bedrock surface controls the configuration and character of the ridges it forms. Owing to the way traprock weathers, steep talus-strewn slopes often flank ridge tops that have little soil or glacial cover. These opposing settings provide ecological niches related to the warmer and drier conditions at the top and cooler and wetter conditions on ridge flanks. Traprock chemistry can also provide atypical nutrients to support vegetation.

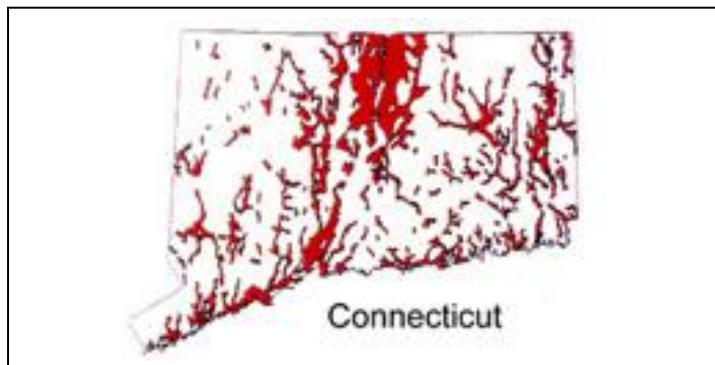
The sequence of events that emplaced the bedrock of the study area resulted in a distinct north-south alignment of major faults and bedrock units. During the nearly 200 million years since the development of the Hartford Basin, bedrock units of varying resistance to weathering and erosion were exposed to freeze, thaw, and stream action.

By the time the first of the two known glaciations began, about 150,000 years ago, a well developed south flowing drainage system had developed. This bedrock-controlled drainage system was rounded and smoothed by the glaciers, but the overall north-south alignment of the bedrock-controlled hills and valleys was not significantly altered. The enduring influence of the region's distinctive bedrock fabric can be seen in the transportation system and cultural features that have developed amongst the ridgelines and picturesque valleys that still typify the landscape. The vast majority of glacial deposits in the study area were deposited by the second glaciations, known as the Wisconsinan, between about 26,000 and 15,000 years ago. These deposits exist in two forms - till and meltwater deposits.

Till is deposited directly from the ice and is typically a mixture of all of the debris that the ice contained, large boulders to very fine sediment and everything in between. Till, which is commonly exposed in upland areas, is often "bony" and impermeable so it is not a great aquifer and not suitable for septic systems. It is the reason that many New England farmers "went west". Water is a better sorting agent than ice so meltwater deposits tend to fill valleys with layered clays, sands and gravels that were deposited in glacial lakes and ponds or meltwater streams. These deposits are often fairly flat, good sources of aggregate, good aquifers, and more suitable for development than till. Deposits of finer materials – silt and clay – commonly underlie the area's many wetlands.

Because of the Valley's geologic and glacial history and its location at the junction of Connecticut's Western Highlands and Central Lowlands, the Lower Farmington River and Salmon Brook Study area has the highest soil diversity in Connecticut and one of the most complex soil systems in the United States. Of the over 200 different soil types in Connecticut, fifty percent are represented in the Farmington River Valley. In turn, the biodiversity and habitat complexity of the Study area is strongly influenced by this soil complexity. Connecticut's State Soil is known as the Windsor Soil series, and is found throughout the state, as illustrated in Figure 8. Windsor soils are well suited to the highly diversified agriculture of Connecticut such as the production of fruit and vegetable crops, silage corn, and ornamental shrubs and trees. Figures 9 and 10 present soil types in Granby from wetland and farming perspectives.

Figure 8 Agricultural Soil



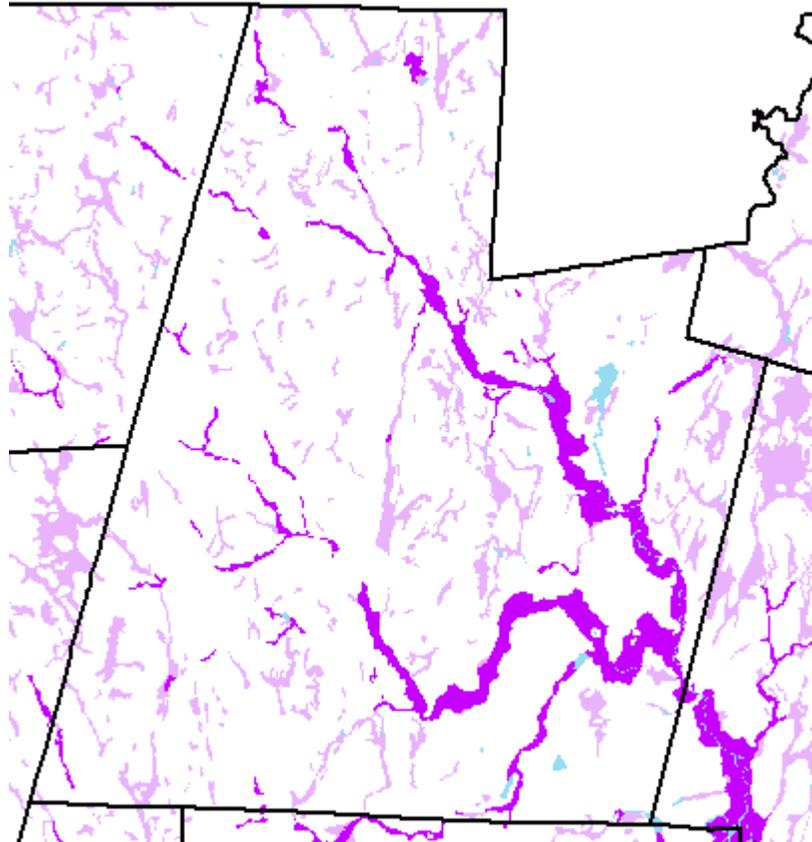
Windsor Soil Series

-- Connecticut State Soil

Source: Margery Winters

Based on presentations before the Study Committee by Kip Kolesinskas, CT State Soil Scientist; Ethan Nedeau, Biodiversity; and the NRCS website

Figure 9 Granby Wetland Soils
(Source: NEMO Community Resource Inventory)

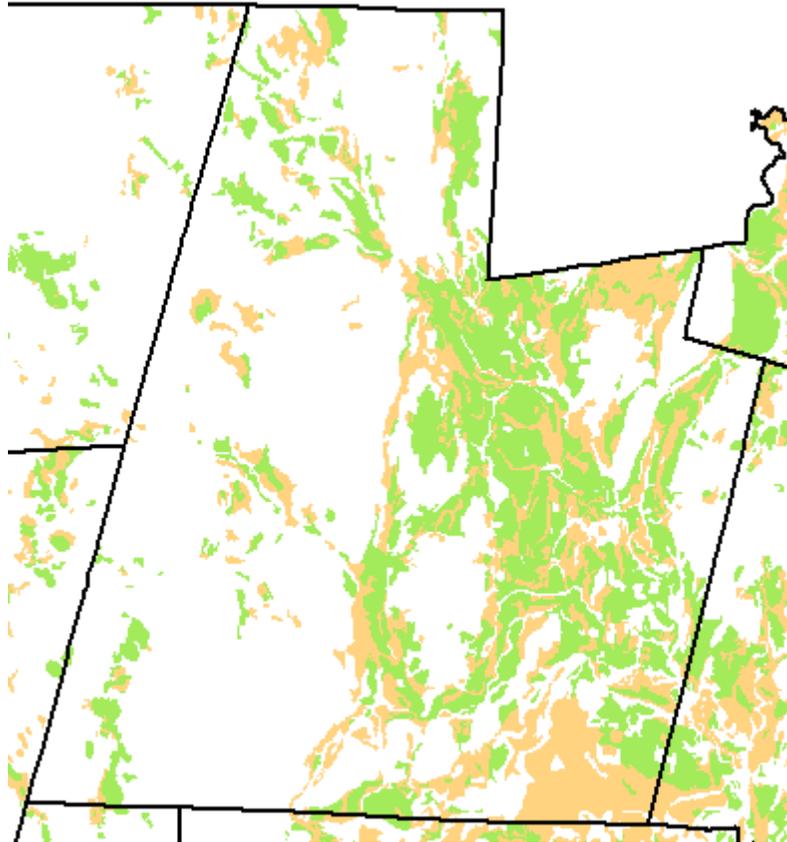


Wetland Soils

-  Alluvial and floodplain soils
-  Poorly/very poorly drained soils
-  Water

Source: Nonpoint Education for Municipal Officials (NEMO)
<http://clear.uconn.edu/projects/cr/interactive.htm>

Figure 10 Granby Farmland Soils
(Source: NEMO Community Resource Inventory)



Farmland Soils

 Important Farmland Soils

 Prime Farmland Soils

Source: Nonpoint Education for Municipal Officials (NEMO)
<http://clear.uconn.edu/projects/crri/interactive.htm>

Threats to Geological Resources

Development pressure is a threat to geological resources. Development activities can cause changes to hydrology (water distribution and quality), and lead to erosion and sedimentation, resulting in loss or substantial alteration of important bedrock and glacial features. One area of importance is traprock ridgelines. Ridgeline sites are particularly sensitive environmentally because they may, for example, support rare plant and animal populations or be part of a wildlife corridor. Where farmland is available for development, loss of productive agricultural soils to development is a significant threat because those soils tend to be located in areas that are also suitable for business, industrial and/or residential development.

In addition to development, uncontrolled earth material extraction, such as gravel mining operations or quarrying, may threaten the bedrock and surficial geological features within the watershed as well as the water quality, biodiversity, cultural history and recreational opportunities of the area.

2.3.1 Recommendations for the Conservation of Geological Aspects of Granby

Geological resources do not enjoy the level of regulatory protection accorded to endangered species or wetlands, but some protections are in place. Granby requires soil and erosion control measures that pertain to the development process, and should use as a guide the latest edition of the “Soil and Erosion Control Guidelines” from the Connecticut Department of Environmental Protection. Protecting development sites from erosion is important to maintain good water quality because eroded sediments increase turbidity of watercourses and carry bacteria, unwanted nutrients and other contaminants such as pesticides into the water.

Undertaking a detailed inventory of important geological sites and prioritizing their conservation value would be an important step in protecting significant geological resources that are not already protected. The results of the inventory may be integrated into the Town’s Plan of Conservation and Development.

Protecting geological features that are important as agricultural, cultural, hydrologic, or recreational resources, or that are the basis for natural ecological functions, should be a primary concern when considering land usage. Therefore, the following recommendations are presented:

1. **Incorporate Traprock Ridgeline Guidelines**

Traprock ridges may harbor plant and animal species not found in other geological features, support productive vernal pools, provide a corridor for wildlife movement and shelter recreational trails. As a result, they merit protection not only for their scenic beauty but also for their important environmental roles.

The Planning and Zoning Commission is currently considering guidelines recommended by the Conservation Commission to protect the special habitats, wildlife corridors and hydrology as well as the scenic beauty of the area provided by the traprock ridges.

2. Review regulations regarding Steep Slope development

The suitability of a steep slope for development depends on the stability of the site, its drainage patterns and the effects of development on them, the potential for erosion with sedimentation into watercourses, possible flooding issues and safety.

Granby Zoning Regulation paragraphs 1.4 (Definitions) and 5.2.12 (Contiguous Developable Area) do not consider slopes in excess of 20% that extends 50 linear feet or more as developable area.

3. Review Soil type when considering land development

Good agricultural soils are an essential resource readily lost through development.

Granby zoning regulation paragraph 4.2.5(H) (Landscape Treatments) mention soil as a factor that may limit developable areas, and paragraphs 9.3.7 (Topsoil Preservation) and 9.4.5 (Restoration Plan) address restoring topsoil in the development plan. Paragraph 8.20.1 (Special Regulations – Purpose) notes that the purpose of Flexible Residential Developments is to ensure that residential development in Granby, to the extent reasonably possible, preserves the natural features of the land including agricultural soils. Paragraph 8.20.8.2 specifically mentions the protection of Class I and II farmland soils.

4. Open Space conservation

Because geological resources are not as highly regulated as some other natural resources, conservation of open space has been and should continue to be an important tool in their protection.

There are numerous examples of open space safeguarding special geological features. Land that belongs to the State of Connecticut, to the Town and to various conservation organizations provides a patchwork of protection. The Town of Granby's ownership of Holcomb Farm in West Granby has conserved an especially steep-sided esker and also alluvial soils along Salmon Brook and Kendall Brook that are used for growing produce for a Community Supported Agriculture project. McLean Game Refuge, with 4000+ acres in Granby, Simsbury and Canton safeguards a section of traprock ridge, and a variety of glacial features. Important geological features such as farmland soils have been protected in Granby through conservation easements or purchases of development rights. This allows the farmer to keep farming and provides funds for improvements to the farm, but prevents sale of the land for development.

5. Consideration of buffer zones to accommodate changing stream and river patterns. The natural meandering, erosion, and deposition that is characteristic of waterways has become better known over time and is the subject of ongoing study by fluvial geomorphologists. Increases in precipitation and flood flows in Connecticut rivers over the past century have been documented; these inevitably affect the dynamics and the size of stream channels. Waterway corridor planning should include measures for adapting to the changes that can reasonably be expected for increased flow volumes, channel size, channel changes, and other predictions emerging from the study of climate change in southern New England.

2.4 Forested Land



Photo by Neil Hornish

This section addresses forest composition and conservation within Granby and the surrounding area. The goal is to conserve productive forests in a way that protects native wildlife populations, preserves Granby's rural character, and supports forest-based recreational opportunities.

Forests are the natural vegetative cover in Connecticut. They provide many critical benefits that we often take for granted. They remove carbon dioxide and pollutants from the air and produce the oxygen we breathe. The root structure of trees, forests and windrows plays a major role in preventing erosion and reducing run-off into watersheds. Forested areas cleanse and moderate the flow of our water supply. They provide the habitat for virtually all of Granby's native wildlife species. They also provide countless recreational and educational benefits for our Townspeople.

Forest products commonly produced in the area include fuel wood, maple products, Christmas trees, and fruit. At present, there are eight registered "Tree Farmers" in the Town of Granby, including 3 orchards (Lost Acres, Bushy Hill, Barolli Farm), 3 maple syrup producers (Arlow's Sugar Shack, Emery Farm, Young Farms), 1 Christmas Tree farm (Maple View), and 1 firewood supplier (Shinder Family Farm).

In Granby and Hartland, the upper east and west branches of Salmon Brook traverse two eco-regions known as Highland and Highland Transition. Compared to the lower Farmington reaches of the region, they generally have higher elevations, steeper slopes, and more dramatic stream gradients. About 13.4% of the whole Farmington/Salmon Brook region consists of "core forest," and much of this is in the Salmon Brook headwater region. Here, large tracts of contiguous forests of northern hardwood and conifers support robust communities of forest interior birds including the Cerulean Warbler. Black bear, fisher, bobcat, otter and an occasional moose are also characteristic of this part of the corridor. The larger the contiguous forested area,

the greater the overall habitat value. Recent studies by the US Forest service suggest that in contiguous forest areas approaching 500 acres species diversity is measurably improved.

Figure 11 shows that the most extensive and contiguous core forest cover is in the western half of the Town of Granby. This area includes People's State Forest and Enders State Forest to the west, the McLean Game Refuge in the south, and Granby Land Trust property and conservation easements. Collectively they anchor the areas of greatest significance in Granby. While privately owned land is also present in this area, the existing forest cover has yet to be affected. These areas are subject to possible future fragmentation.

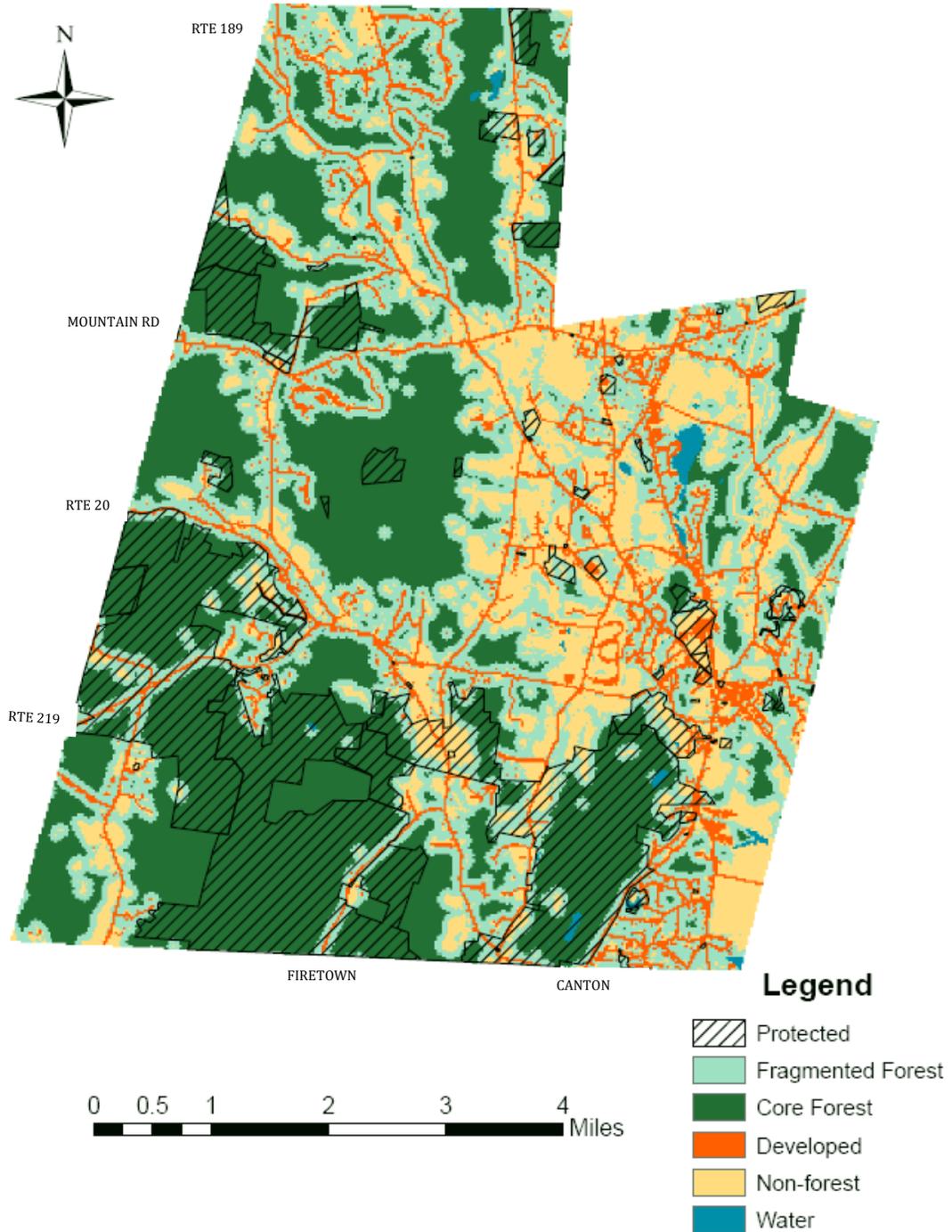
There are two significant attributes that characterize this important area of the Town as they pertain to wildlife populations. First, in "History and Status of Moose in Connecticut, 2002" The Department of Environmental Protection has noted the presence of moose in a broad region of northeastern Connecticut, including Granby. These areas also support habitat for fur-bearing species such as black bear and beaver.

For more information, the *Conservation and Development Policies Plan for Connecticut, 1998-2003* includes policies specifically directed toward protecting and enhancing forestlands and wildlife resources (Office of Policy and Management, 1998). Specifically, Policy C in the Natural and Cultural Resources section of the Plan states that it is the policy of the State to:

"Encourage management of natural resources that preserves the diversity of habitats and species and achieves sustainable yields of renewable resources. In particular, retain healthy, vigorous forestlands and achieve sustainable yields of forest resource-based benefits through scientific management of these resources. (pp. 105)"

Figure 11 Forests

Protected Area and Core Forest in Granby, CT



Source: Nonpoint Education for Municipal Officials (NEMO)
<http://clear.uconn.edu/projects/cr/interactive.htm>

Threats to Forest Land

The primary threat to the forests' continued ability to provide these benefits is fragmentation due to development. Fragmentation, such as residential development or roads, inhibits active forest conservation and management practices that yield such positive results as enhanced timber production, watershed protection, wildlife habitat, scenic vistas, and protection of air quality. Some degree of forest fragmentation is inevitable as our Town continues to develop. Land use and conservation plans must therefore consider measures that allow economic growth and development to occur while mitigating these negative effects.

One large, contiguous tract of forest which is diverse biologically provides far greater habitat, recreation and other resource benefits than many small tracts adding up to the same acreage. By connecting large tracts to one another with vegetated "corridors", wildlife populations can intermingle and avoid the devastating effects of genetic inbreeding and human/wildlife conflicts. The lack of genetic diversity in wildlife populations relegated to isolated forest "islands" causes many species to gradually decline due to sterility and other results arising from inbreeding. These corridors also provide the pathways for a number of migratory species, including land, air and water-based migration. Both contiguity and corridor concepts are central to a successful and coordinated plan to conserve forested lands and wildlife diversity in the Town of Granby.

Minimizing forest fragmentation also benefits species that have smaller ranges (compared to large mammals) but that rely on a broader diversity of habitat. Even for these species, habitat value diminishes rapidly as forests fragment. Some wildlife species such as wild turkey require home ranges of 1,000 acres or more; others like the pileated woodpecker and many of our less common songbirds require 300 acres or more per pair to breed successfully. In addition, blue jays, cowbirds and other predatory species that frequent the edges of forests gradually predate interior forest bird species out of existence as fragmentation increases the "edge effect".

Fragmentation also hinders the ability of the forest to provide other benefit. When a 100-acre forest is developed as two-acre home sites, for example, its ability to absorb septage and residential pollutants is limited. Septage loading is simultaneously increased. As a result, the forested area no longer has the same capacity to cleanse water percolating through the soils as it had before the development occurred. The forest's contribution to air quality is also greatly diminished through the reduction in the number of trees present in forested tracts.

Granby supports efforts to minimize fragmentation. For example, 46% of the Town's 26,000 acres are protected under various land conservation programs, and development efforts are curtailed by continued efforts to acquire large tracts of property that become available. However, continued vigilance is necessary. Individuals and families privately own much of Granby's forestland as relatively small, individual parcels of land. If not properly managed, development of these parcels can result in fragmentation.

2.4.1 Recommendations for the Conservation of Forest Land.

1. Establish and preserve wildlife habitat by reducing forest fragmentation and encroachment, promoting conservation-sensitive planning for new development, and connecting existing forested habitat by designating habitat corridors.
2. Foster economically viable forest management practices and habitat protection through education, voluntary action and better land use decision-making by commercial interests, private citizens, and government.
3. Forge working relationships between the Town commissions, Town-based land trusts, and nationally based conservation organizations to assess and protect critical wildlife habitat in forested lands.

Granby Zoning Regulations Paragraph 8.20 addresses the use of Flexible Residential Developments (FRD). FRDs ensure that residential development is accomplished in such a way as to preserve the natural features of the land.

2.4.1.1 More Information:

- www.oplin.org/tree/ - online field guide to identify trees
- www.fs.fed.us/database/feis/plants - choosing the right tree, index of species information
- www.newenglandforestry.org/home/indes.asp - information on planting a tree (Chapter 6)
- www.canr.uconn.edu/ces/forest/ - general local forestry information, with many useful forestry links
- www.treelink.org/books/simpleact/ - New England Forestry Foundation (NEFF) - a private, nonprofit organization dedicated to conservation and management of New England's working forests.
- Southern New England Forest Consortium - forest facts, projects, resources and a wood directory.

2.5 Wildlife and Endangered and Threatened Species

Wildlife Corridors

Wildlife has always used certain pathways to travel from one location to another for a variety of reasons. A few of the many reasons wildlife use these corridors include: to find new food sources and water, to find new territory to start a new family group, to find a mate, to find another family group to join, seasonal migrations, or to escape predators. Some corridors are a few miles long, while others are hundreds of miles long. The short corridors are used for more day to day purposes such as avoiding a dangerous area, to get from a food source to a water source, or from nests and dens to food sources. Some corridors are multi-generational. An animal may start along the corridor, mate, have a family and die there. It could be the 6th generation of their offspring that finally reaches the other end of the corridor. Many corridors are species specific. A bear requires a much larger corridor than a raccoon or a fox, which in turn requires a larger corridor than a squirrel. The wider a corridor, the more diverse and more useful it is.

Connectivity through the use of wildlife corridors is a key to the survival and maintenance of a healthy and diverse wildlife population. Moreover, wildlife corridors can work well when planned in combination with riparian buffers developed in conjunction with preserving water quality and wetlands resources. Wildlife corridors support the movement of all forms of wildlife that use these corridors to get from one core habitat or seasonal range to another. Habitat ranges can be relatively limited, like those required by small, waterborne species of amphibians, or relatively large, like those required by fur-bearing predators or large migratory herbivores.

These corridors are critically important in northeastern Connecticut, as there are several larger herbivore and carnivore species that are attempting to re-populate portions of southern New England – areas from which they have been excluded by past human activity for over 100 years. Moose and black bear are key examples of recently observed naturally re-introduced species. Both of these species use high elevation ranges in the summer and lowlands in the winter. Breeding moose have been observed in this region within the past three years, where there was no evidence of any moose activity just ten years ago. Black bear have been observed in Granby and are known to inhabit the higher elevations in central and eastern Connecticut and central Massachusetts.

Connecticut is one of the states where fragmentation is extreme in many areas, making what little habitat there is less than desirable for many species. Wildlife corridor preservation and design has become a necessity if wildlife is to survive. Connecticut has three natural transitional wildlife corridors, known as movement or dispersal corridors. These corridors are used for movement from one location to another. One follows the Connecticut River up to Canada. The second follows the western ridges up through the state and goes through Granby at Barn Door Hills and crosses East Street and follows the ridge up through Granville, Mass to the Berkshires. The third goes up the eastern part of the state. The western ridges corridor which goes through

Granby is the most fragmented. There are other corridors which have been designated for wildlife. The success of a corridor depends on size, natural resources needed to sustain wildlife, and isolation from human contact. The Center for Biological Diversity notes in “Principles of Wildlife Corridor Design” that in ideal corridors there should be no domestic animals allowed in this area, no fencing, barriers or human activity, and should have conservation easements along the boundaries to protect the wildlife in the corridor. Buffers around these corridors need to be strictly controlled and maintained. Life in the corridor should be as natural as if it were in the middle of a forest or grassland.

Granby does have a number of habitat wildlife corridors, most notably the McLean Game Refuge. In these corridors, the animals remain within the area. There are some smaller corridors scattered around Town that are maintained by the Town as well as the Granby Land Trust. While they are not large enough to prevent wildlife population collapse of endangered, threatened, and special concern species, they do provide linkages to other core habitat where species populations may be maintained.

Endangered Species

Wildlife on our planet is in peril. The United Nations Convention on Biological Diversity estimates that globally we are losing three animal and plant species an hour. Connecticut’s Endangered Species Act, which was designed to protect, conserve and restore plant and animal populations in the state which were faced with extinction, was passed in 1989. The status of all endangered and threatened species in the state is reviewed every five years. Species are listed according to their level of risk. Connecticut has 584 plants and animals listed on the endangered, threatened and special concern species lists. The plants and animals on this DEEP list which may be found in Hartford county is provided in Appendix B. The primary reason a species becomes extinct is due to loss of habitat. The other leading factors are competition from other non-native species, pollution, illegal wild trade, and people-related factors.

A complete physical inventory of Granby is of great importance since there are areas where there may be endangered and threatened species. Granby still has some areas of critical habitat necessary for their survival. While the Farmington River Watershed Association has performed a partial physical inventory “bio-blitz” in selected areas of the Town, an in-depth “bio-blitz” of the entire Town has not been performed.

2.5.1 Recommendations for the Conservation of Endangered, Threatened, and Special Concern Species.

1. Maintain buffers along wildlife corridor perimeter.
A mowed 30-foot to 60-foot buffer along a flat or slightly sloped grade between the native vegetation in the corridor and each adjacent lot will provide a fire abatement zone.
2. Avoid fences within the corridors
3. Avoid free-roaming domestic animals (dogs and cats) within the corridors.
4. Avoid feeding wild animals other than birds within the corridors.
5. Empower residents living adjacent to wildlife corridors to act as stewards of the corridor.
Each landowner adjacent to the corridors should be aware of any regulations pertaining to the corridor. Information regarding the benefits of a buffer zone, no trespassing signs, and lighting should be made available to the land owners and other residents.
6. Requirements pertaining to the protection of wildlife corridors should be citable and enforced.
7. Identify the corridors with signs so people know when they are in a corridor, including information of the animals that utilize the corridor and the importance of its preservation.

Note: These recommendations come from the Connecticut Department of Energy and Environmental Protection (DEEP).

2.6 Open Space



Photo by Neil Hornish

This section addresses open space conservation within Granby, including forest, pasture, farmland, and wetlands. Methods of preserving open spaces, the risks to currently preserved land, identification of primary and secondary conservation sites, and suggestions for future conservation is addressed.

The Protected Areas Database of the United States (PAD-US) defines Protected Areas as lands dedicated to the preservation of biological diversity and to other natural, recreation, and cultural uses, and managed for these purposes through legal or other effective means.

The Connecticut Department of Environmental Protection (DEP, now the DEEP) created *The Green Plan: Guiding Land Acquisition and Protection in Connecticut 2007 – 2012*. As stated in this plan:

“...open space as a whole provides a wealth of valuable services to Connecticut’s citizens, including options for outdoor play, activity, and environmental education. Forested areas are adept at removing carbon from the atmosphere, which helps to minimize global climate change, and floodplains, coastal waterfront and adjacent uplands provide opportunities to respond to the anticipated effects of climate change. Other valuable open space services are the provision and preservation of scenic beauty, contributions to local sustainable economy from wood, food, and fiber production, and maintenance of the diversity of Connecticut’s landscape. Open space can provide a variety of specific ecological functions such as preserving biodiversity, habitat for rare species, stream flow and water supply protection, and flood control. Open space protection will play an expanding role in Connecticut’s economic future as businesses increasingly consider quality of life in making decisions on where to locate and expand.”

Section 23-8 of the Connecticut General Statutes sets a goal of preserving 21 percent of the land area of Connecticut for open space for public recreation and natural resource conservation and preservation, by the year 2023, as noted in Connecticut General Statute section 23-8(b). Twenty-one percent is equivalent to 673,210 acres. Ten percent (320,576 acres) is to be acquired and held by the State of Connecticut, and eleven percent (352,634 acres) is to be acquired and held by towns, water companies, or nonprofit land conservation organizations.

Open Space Categories

Three categories of land qualities are identified by “The Green Plan” of the DEEP when considering potential land preservation sites: ecological value, use needs, and location concerns.

Ecological Value

Properties containing sensitive ecological communities should be considered of high importance. These ecological communities help maintain biological integrity and diversity. Some of these communities provide inclusive habitat for certain species, while other species require a combination of ecological types. Ecological communities within Granby may include:

- Specific Ecological Communities:
 1. Traprock ridges and associated communities
 2. Calcareous (limestone-based) uplands
 3. Calcareous (limestone-based) fens and associated wetlands
 4. Grassy glades
 5. Landscapes sensitive to disturbance (e.g. steep slopes, erodible soils, shallow depth to bedrock, with sparse groundcover.)
- Water Resources
 1. Free-flowing (undammed) streams and rivers and associated riparian communities
 2. Vernal pools
 3. Surface springs, cold headwater springs, and seeps
 4. Wild trout or cold water streams
- Select farmland, particularly non-active farmland that can be managed for early successional habitat or farmland abutting existing protected forestland.
- Grasslands, scrublands.

Use Needs

In addition to protecting certain ecological types, properties that can provide certain uses for public benefit should also be considered, including:

- Wildlife habitat
 1. Habitat that supports species of greatest conservation need as identified in the *Connecticut Wildlife Conservation Strategies*
 2. Habitat that supports, enhances, or protects biodiversity
- Floodplain protection
 1. To protect or improve water quality
 2. To preserve natural flood storage or function (to the 500 year flood level)
- Streamflow protection
- Protection of large areas of unfragmented forest
- Recreation

Location Concerns

The relative location of a property is also important. Site-specific conditions can enhance the value of properties, including land proximate to existing protected lands capable of expansion of recreational activities, buffering for sensitive areas, and use as wildlife corridors or seed dispersal.

Identification of Primary and Secondary Conservation Areas

For consistency purpose, the definition and identification of Primary and Secondary conservation areas are derived from “The Farmington Valley Biodiversity Project: A Model for Intermunicipal Biodiversity Planning in Connecticut” (FVBP).

Primary conservation sites are those that meet the minimum size criteria of 125 acres of forests, 25 acres of grassland, or 5 acres of shrub or scrub, or a combination of these and were documented as supporting populations of state-listed plants and animals.

Secondary conservation sites are those that meet the minimum size criteria as described in the primary conservation areas and, based on GIS analysis, features a high diversity of habitat types such as wetland, talus slopes, etc. that suggest the potential for supporting a rich biodiversity. Secondary sites have no existing records of state-listed species, however.

Tertiary sites are those that meet the minimum size criteria, however GIS analysis does not identify a significant diversity of habitat types, and there were no records of state-listed species documented at these locations.

In Granby, the Farmington Valley Biodiversity Project identified eight primary and two secondary core areas for biodiversity:

Primary Conservation Areas:

- The Knolls
- Barndoor Hills East
- Barndoor Hills West
- Manitook Mountain North
- Manitook Mountain South
- Manitook Lake
- West Mountain
- Crag Mountain

Secondary Areas

- Salmon Brook
- West Branch Salmon Brook

Primary Conservation Areas

Barn Door Hills and The Knolls Primary Conservation Areas

Six of the primary habitat areas are associated with the intrusive traprock ridge ecoregion that extends along the western edge of the Farmington River Valley. “The Knolls”, “Barndoor Hills West”, and “Barndoor Hills East” are three clustered traprock knolls located in the southern section of the Town. Large sections of these areas are owned and managed by the McLean Game Refuge. All three of these sites are extensively forested and a high percentage of the breeding bird community associated with these sites is composed of forest-interior dependent species. A number of raptor species including the northern goshawk (*Accipiter gentilis*) reside within these sites. All three sites also feature a diversity of significant natural communities associated with traprock ridges including talus slopes, rocky outcrops, and summits and cliffs. These, in turn, host an array of rare plants. These sites along with other intrusive traprock ridge sites extending to the south in Simsbury and Canton support the only known Connecticut occurrences of the long-leaved bluet. A diversity of wetland habitats also is common to these sites including many glacial kettle ponds. A number of high streams such as Bissell Brook support fish, amphibian and benthic macroinvertebrate communities requiring high water quality conditions. Barndoor Hills East also has a number of fens and bogs within it, providing habitat for additional rare plant species. The Knolls support a noteworthy diversity of vernal pool-breeding amphibians including Jefferson salamanders. Although the FVBP did not survey for mammals, biologists record a number of black bear sightings within these sites.

All four aspects of land conservation described herein are utilized in this primary conservation area. The McLean Game Refuge protects the largest section of this area. Holcomb Farm and Salmon Brook Park are also located in this area. Portions of Enders State Forest and property owned by the Granby Land Trust provide a continuous corridor of preserved land that extends from route 10/202 in the East into Barkhamsted in the West and into Simsbury in the South.

Manitook Mountain and Manitook Lake Primary Conservation Areas

“Manitook Mountain North”, “Manitook Mountain South”, and “Manitook Lake” are three primary areas located along the intrusive traprock ridge ecoregion extending along the western edge of the Farmington River Valley, and located in the northeast section of Granby. Biodiversity data for these three sites is limited due to the inability of the FVBP to obtain access to much of the key habitats within these sites for survey work.

The Manitook Mountain North and South sites include a number of natural communities associated with traprock ridge systems including talus slopes, cliffs and ledge, acidic forest, and open summits that support a variety of rare plants. The only extant occurrence in New England of the narrow-leaved horse gentian was documented among these sites during the survey. The Manitook Lake site includes a series of bogs that support populations of rare plants as well as spotted turtles (*Clemmys guttata*), and a diversity of amphibians and insects.

The Manitook Conservation areas rely extensively on private property. The Granby Land Trust does own some parcels of land in these areas, but the vast majority is held under private ownership.

West Mountain Primary Conservation Area

The West Mountain site is situated within the western highlands ecoregion and is located in the southwestern section of Granby. It is contiguous with large forest tracts extending south into Simsbury. Numerous small, high-quality streams and seeps support populations of brook trout and northern spring salamanders. The large intact forest habitat support robust breeding populations of forest-interior dependent birds. This is one of the few locations in the study area that has breeding cerulean warblers, among the most area-sensitive species of the forest-dependent breeding birds. The West Mountain site also serves as an ecological bridge between the western highlands and the intrusive traprock ridge ecoregion.

The West Mountain Primary Conservation Area is preserved through large tracts of land owned by the Granby Land Trust, including the Godard Preserve and Mary Edwards Mountain. Tunxis State Forest preserves a section of this conservation area, with the remaining land held through private land.

Crag Mountain Primary Conservation Area

The final primary habitat area, “Crag Mountain”, is an extensive and primarily privately owned forested ridge system located within the western highlands ecoregion and located in north Granby. The site features a number of extensively wetland complexes, high-quality streams, and large, unfragmented forest habitat with a breeding bird community dominated by forest-interior dependent species. Only limited survey effort was undertaken at this site due to time constraints.

The Crag Mountain Conservation area is extensively private property. The Granby Land Trust and the Town of Granby do own some parcels of land in these areas; but the vast majority is held in private ownership.

Secondary Conservation Areas

Salmon Brook

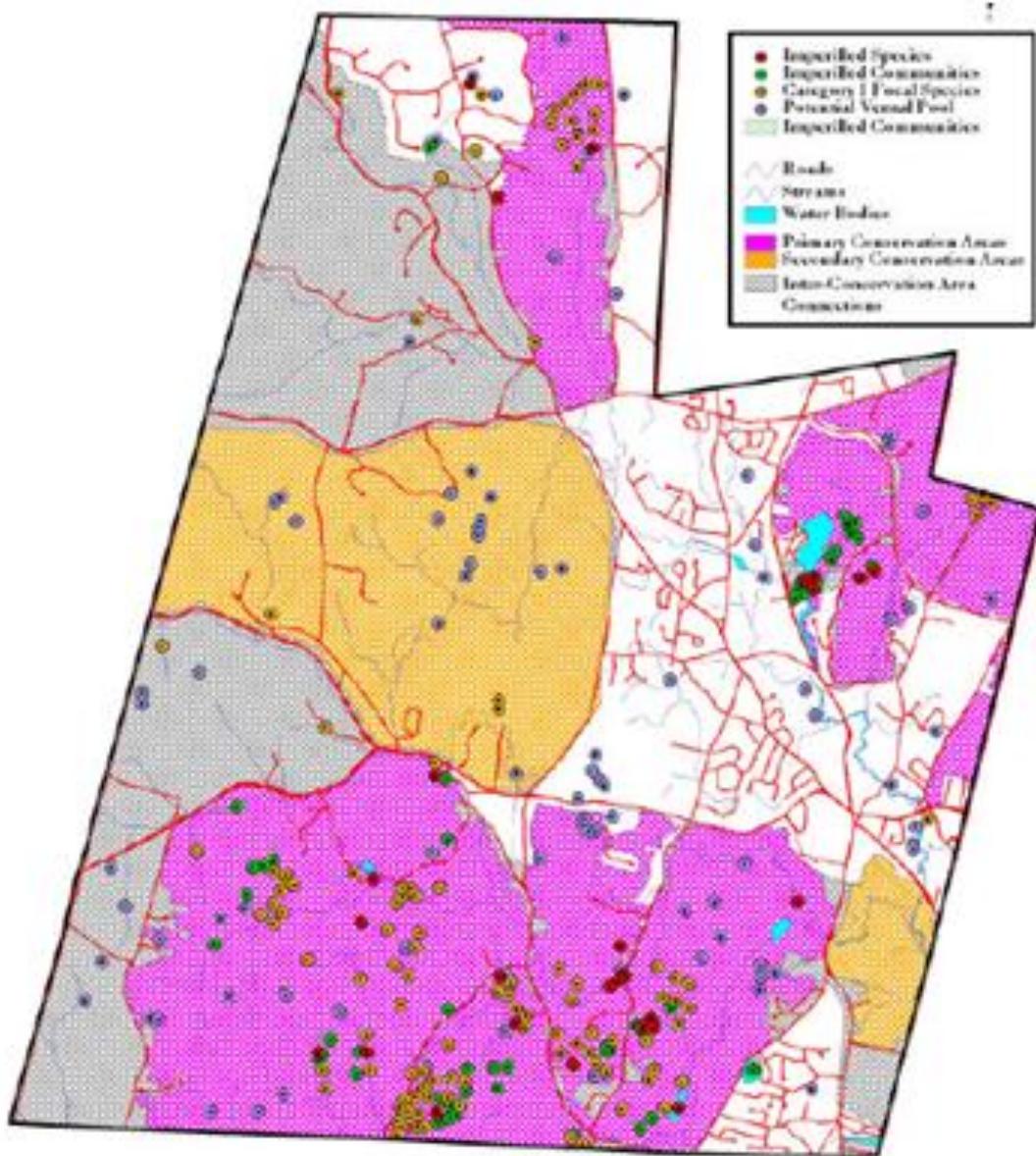
“Salmon Brook”, located in the southeast section of Granby, was identified as an ecological connector between the northwest highlands and western traprock ridge ecoregions and the Farmington River. This site is contiguous with land tracts in neighboring East Granby and has small open space holdings but is primarily privately owned.

West Branch Salmon Brook

A large, unfragmented forested land tract “West Branch Salmon Brook”, located north of West Mountain, was identified as a secondary conservation area because it serves as an ecological connector within the western highlands ecoregion. Little survey work was conducted in this site during the FVBP and further investigation of biodiversity in this area is warranted.

Figure 12 provides an illustration of the primary and secondary conservation areas in Granby.

Figure 12 Primary and Secondary Conservation Areas in Granby



Preserving Open Spaces

Four aspects of land preservations within Granby are discussed herein: The McLean Game Refuge, State-owned property, the Granby Land Trust, and Town-owned property. It should be noted that Open Space does not necessarily imply public space. Land that has is currently afforded some level of protection through easements is private land.

The acreage listed in this section was determined from the Town of Granby Assessor's Online Data Base, and the Town's Office of Community Development.

The McLean Game Refuge

"I want the Game Refuge to be a place where trees can grow unmolested by choppers and trout and birds and other animal life can exist unmolested by hunters and fisherman, a place where some of the things God made may be seen by those who love them as I loved them and who may find in them the peace of mind and body that I have found."

-Last Will and Testament, George P. McLean

Senator and former Governor George McLean left the refuge, which includes tracts of land in Granby and Simsbury, to be free from development. In Granby, the game refuge covers over 3,350 acres of land, as shown in Figure 13, shaded in light blue.

State-Owned Property

The State of Connecticut owns tracts of land in western and northern portions of Granby. This land is part of Enders State Forest, Tunxis State Forest, and property adjacent to the state forests. State-Owned property is shown in Figure 13, shaded purple. Properties shaded dark green are agricultural easements to the State Department of Agriculture.

The Granby Land Trust

The Granby Land Trust is a 501(3)(c) nonprofit organization founded in 1972 to preserve Granby's Natural Heritage through the conservation of its scenic vistas, open space corridors, wildlife habitat, ecologically sensitive areas, and agricultural land.

The Land Trust has preserved over 1,000 acres, shown in Figure 13 shaded light green. Properties shaded orange is land preserved by easement to the Granby Land Trust

Town-Owned Property

The Town of Granby owns approximately 590 acres within the Primary and Secondary conservation areas. Only those properties located in conservation areas are considered in this report.

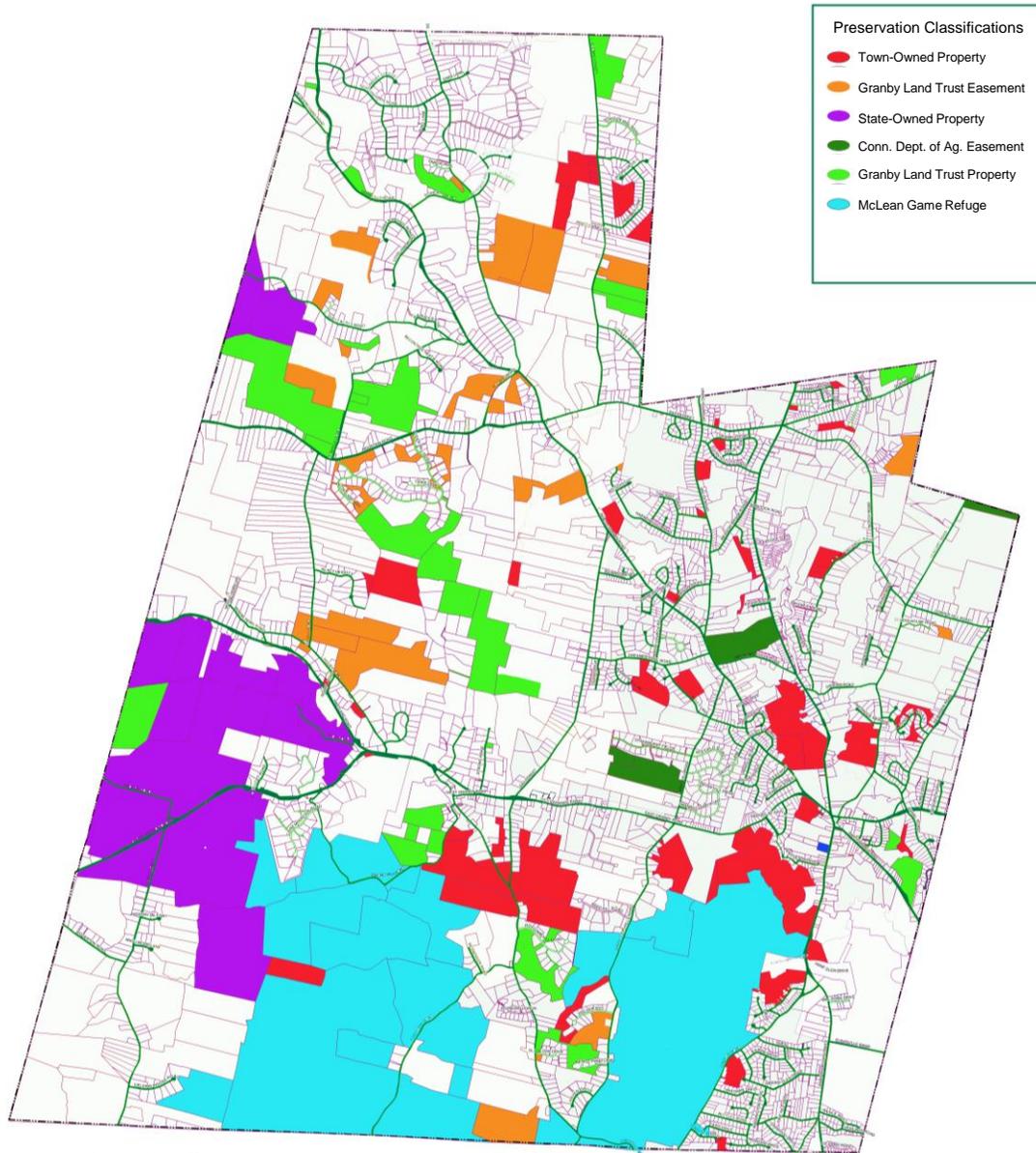
The primary Town-owned property in terms of conservation is Holcomb Farm and Salmon Brook Park. The Holcomb property consists of the Holcomb Farm Learning Center, and Community Supported Agriculture (CSA) farmland.

As stated in the Holcomb website, the Holcomb property contains more than “300 pristine acres, including rolling hills, stone walls, fresh meadows, dense woodlands, fertile pastures, and sparkling brooks. The land contains more than 10 miles of public trails. The property also includes a section of Salmon Brook and vernal pools.”

Salmon Brook Park is a 116 acre public park and recreation area. The main entrance is located on Salmon Brook Street (Route 10/202), just south of the Town center. A second entrance is on West Granby Road (Route 20). The park is host to a variety of sporting events, which include volleyball, tennis and basketball courts as well as soccer and baseball fields. The park also has a dog park, a horse exercise area, a man-made swimming area, a pavilion, and a playground.

The Town of Granby owns other property that provides a link between parcels owned by The McLean Game Refuge and The Granby Land Trust, as well as other parcels throughout the Town. The land owned by the Town of Granby is illustrated in Figure 13, shaded red.

Figure 13 Open Space Land



Risk to Conserved Land

This section addresses the potential risk to land currently preserved through the five methods described herein.

McLean Game Refuge

The risk of land owned by the McLean Game Refuge being developed is very small. Since the land was donated by Senator McLean, the game refuge has increase its land holdings by over 1,000 acres (not necessarily in Granby). The only risk that may occur is selected logging. The Game Refuge trustees performed logging of small areas in 2001. This act did create a controversy in Town, questioning if the act violated the will of Senator McLean. It remains to be seen if the Game Refuge trustees intend to perform further logging operations in the future.

State-Owned Property

The risk of development of state forest land is minimal. It is possible that the state may allow logging in State-owned property, but that is unlikely.

Granby Land Trust Property

Being a nonprofit entity, the risk of development of land owned by the Granby Land Trust is minimal. It may be possible that the trust may sell property they currently own, but that would only be to obtain land more desirable from a conservation perspective.

Town-Owned Property

The risk of development of Town-owned open space land is minimal. While it is possible that the Town could allow logging or development, or sell parcels for revenue, the Town has shown through its Plan of Conservation and Development that Open Space preservation is a significant benefit to the Town and its citizens.

Conclusion

Using the land preservation methods described herein, Granby currently has approximately 7,080 of protected property. This accounts for over 25% of Granby's area. The percentages of land preserved by the five methods described herein are shown below.

TABLE 4

LAND PRESERVATION BREAKDOWN

McLean Game Refuge	3,350 acres	47%
State of Connecticut	1,725 acres	24%
Granby Land Trust	1,030 acres	15%
Town of Granby	975 acres	14%

Future consideration of land conservation should focus on obtaining property between currently protected areas in order to create corridors of preserved areas.

Privately-Owned Land Under Public Act 490

Public Act 490 (PA490) was passed in Connecticut in 1963 (Connecticut General Statutes Sections 12-107a through 107-f), and promotes the conservation of land by allowing farm, forest, or open space land to be assessed at its use value rather than its fair market or highest and best use value for purposes of local property taxation. Without the lower use value assessment, most landowners would have to sell the land because they would not be able to afford the property taxes on farm, forest, or open space land. PA490 allows farmers to continue to farm, and other landowners to continue to own forest and open space land without being forced to sell it to pay the local property taxes.

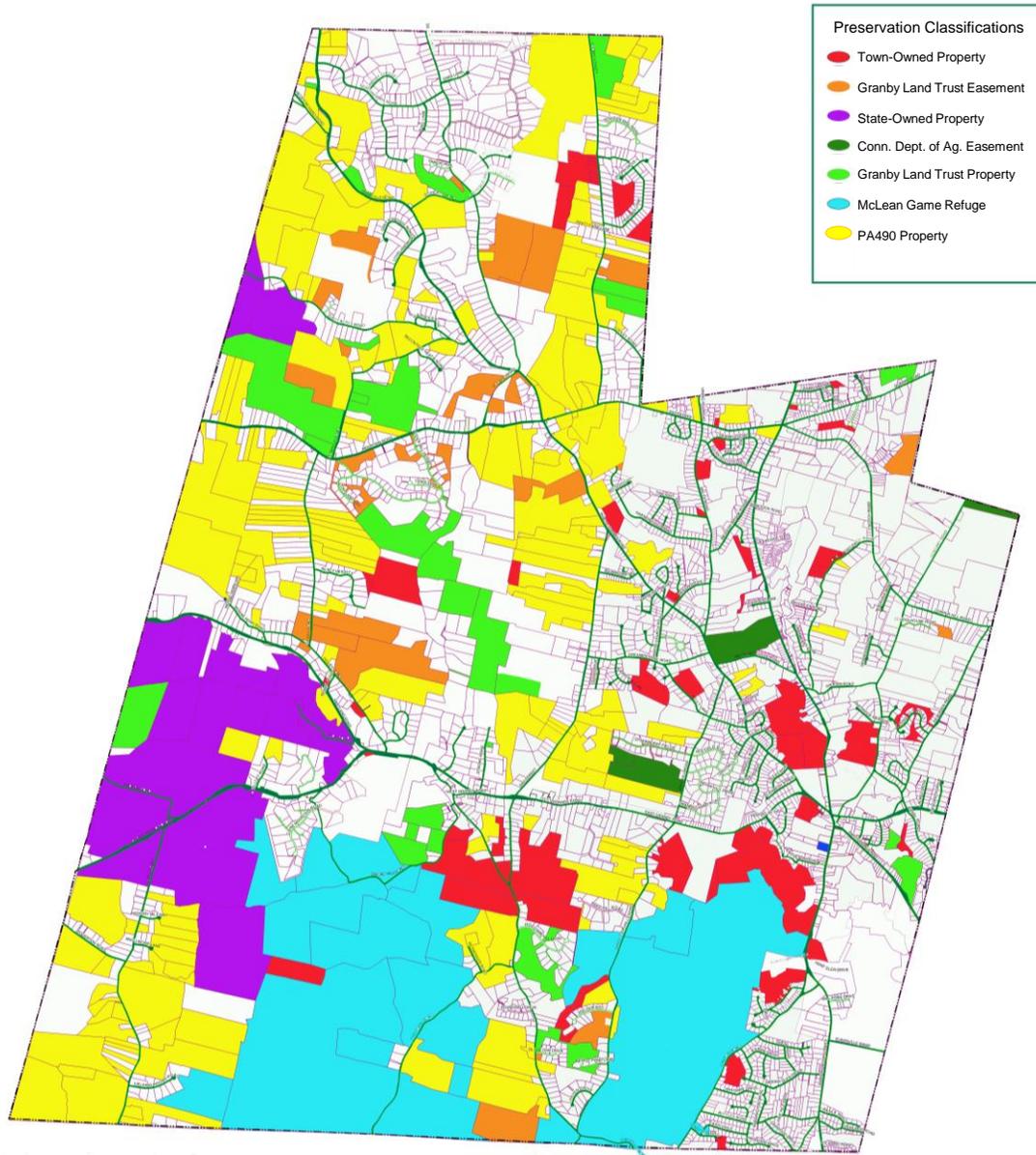
The PA490 property identified in this section of the Resource Inventory Report does not differentiate between farmland, forest, or open space classifications. The property may include buildings.

Public Act 490 has been very successful in preserving farm, forest, and open space. Of all the methods of conservation discussed in this report, PA490 constitutes the greatest amount of land, with over 6,300 acres classified under PA490. This does not include property classified under PA490 which is also addressed in other areas of this report, such as land protected by easements. Figure 14 illustrates the land classified under PA490 shaded in Yellow.

Risk of Loss of Conservation of Land under PA490

Public Act 490 was designed to encourage land conservation through tax credits. The land under PA490 may be developed by the owner, assuming all zoning requirements are met. The risk of land under PA490 being developed is mitigated by the term that land taken out of the farm, forest, or open space classification shall be subjected to a conveyance tax penalty, which may include back taxes up to ten years when the land was placed under PA490. If the land is sold, the farm, forest, or open space classification is lost, and the new owner would have to reapply. There does not appear to be any monitoring process in place by the Town or state to verify land once classified under PA490 remains in its current state of preservation.

Figure 14 PA490 Land



2.6.1 Recommendations for the Conservation of Open Space.

1. Connecticut Farmland Preservation Program
Connecticut General Statute 22-26aa established a program for the preservation of agricultural land. The Farmland Preservation Program
2. Continue Granby Plan of Conservation and Development Open Space Goals
The Granby Plan of Conservation and Development provides goals for Open Space preservation that the Town should continue to pursue, including linking existing preserved land by using undevelopable areas such as wetlands and floodplains, increasing the width of buffers and setbacks to provide corridors, and minimizing fragmentation of open spaces.
3. Land Purchase and Easements
Continue to increase public awareness of the benefits of preserving Open Space, and obtain land through donation, purchase and easements. Particular attention should be paid to parcels in the Western and Northwestern sections of Town to link existing preserved parcels.
4. Conservation Commission Review of Land Acquisitions
Support the establishment of policies that encourage organizations which acquire land to consult with the Conservation Commission prior to acquisition.

2.7 Residential Space

The natural resources of Granby are not contained within the forests, wetlands, and farmlands of the Town. Natural resources are found in the residential neighborhoods as well. Land owners can maintain these natural resources by identifying and removing invasive species and utilizing native plants in landscaping,

Invasive plants are non-native or exotic plants that were introduced, typically by human activity, and became quickly established in the environment. Many non-native plants are well known agricultural or horticultural species. Most of these do not escape cultivation or have minimal impacts on natural communities if they do spread.

Invasive species rapidly disperse and establish, displacing native plants and altering ecological processes. Due to their rapid growth, efficient means of seed dispersal, and tolerance of a wide range of environmental conditions, invasive plants outcompete native species for sunlight, nutrients, and space. A partial list of invasive plant species are presented in Appendix C.

There are many attractive native plant species that can be utilized in residential landscaping. Using native plant species helps to maintain native insect species, which in turn supports the local bird population. Native plants are often healthier, more robust, and may require less maintenance than common landscaping plants since they have adapted to thrive in our environment. A partial list of native plant species suitable for landscaping is presented in Appendix D.

3.0 PLAN OF CONSERVATION

3.1 Summary of Recommendations

Recommendations for the Conservation of Wetlands and Water Sources.

1. Continued participation in the Lower Farmington River and Salmon Brook Wild and Scenic Study Committee. Implement the Management Plan developed by the Study Committee.
2. Analyze the use of non-impervious materials with new construction and renovations. *Granby zoning regulations paragraphs 4.2.4.2.1 (Peak Runoff Attenuation) and 4.2.4.3.1 (Stormwater Quality) mention the use of impervious surfaces without specific requirements, and zoning regulation paragraph 8.27.3.6 (Standards and Requirements for an Active Adult Residential Development) currently specifies that impervious surface coverage shall not exceed 40% of the overall site.*
3. Implement agricultural best practices to avoid chemical and manure runoff into water courses. *Granby Inland Wetlands Regulations paragraph 4.1(a) permits grazing in inland wetlands and watercourses as of right.*

Recommendations for the Conservation of Farm Land

Table 3 provides information on various farmland protection programs in Connecticut that are offered by the Connecticut Department of Agriculture, Connecticut Department of Environmental Protection, and USDA/Natural Resources Conservation Services, as means of conserving farmland.

Recommendations for the Conservation of Geological Aspects

Geological resources do not enjoy the level of regulatory protection accorded to endangered species or wetlands, but some protections are in place. Granby requires soil and erosion control measures that pertain to the development process, and should use as a guide the latest edition of the “Soil and Erosion Control Guidelines” from the Connecticut Department of Environmental Protection. Protecting development sites from erosion is important to maintain good water quality because eroded sediments increase turbidity of watercourses and carry bacteria, unwanted nutrients and other contaminants such as pesticides into the water.

Undertaking a detailed inventory of important geological sites and prioritizing their conservation value would be an important step in protecting significant geological resources that are not already protected. The results of the inventory may be integrated into the Town’s Plan of Conservation and Development.

Protecting geological features that are important as agricultural, cultural, hydrologic, or recreational resources, or that are the basis for natural ecological functions, should be a primary concern when considering land usage. Therefore, the following recommendations are presented:

1. Incorporate Traprock Ridgeline Guidelines

Traprock ridges may harbor plant and animal species not found in other geological features, support productive vernal pools, provide a corridor for wildlife movement and shelter recreational trails. As a result, they merit protection not only for their scenic beauty but also for their important environmental roles.

The Planning and Zoning Commission is currently considering guidelines recommended by the Conservation Commission to protect the special habitats, wildlife corridors and hydrology as well as the scenic beauty of the area provided by the traprock ridges.

2. Review regulations regarding Steep Slope development

The suitability of a steep slope for development depends on the stability of the site, its drainage patterns and the effects of development on them, the potential for erosion with sedimentation into watercourses, possible flooding issues and safety.

Granby Zoning Regulation paragraphs 1.4 (Definitions) and 5.2.12 (Contiguous Developable Area) do not consider slopes in excess of 20% that extends 50 linear feet or more as developable area.

3. Review Soil type when considering land development

Good agricultural soils are an essential resource readily lost through development.

Granby zoning regulation paragraph 4.2.5(H) (Landscape Treatments) mention soil as a factor that may limit developable areas, and paragraphs 9.3.7 (Topsoil Preservation) and 9.4.5 (Restoration Plan) address restoring topsoil in the development plan. Paragraph 8.20.1 (Special Regulations – Purpose) notes that the purpose of Flexible Residential Developments is to ensure that residential development in Granby, to the extent reasonably possible, preserves the natural features of the land including agricultural soils. Paragraph 8.20.8.2 specifically mentions the protection of Class I and II farmland soils.

4. Open Space conservation

Because geological resources are not as highly regulated as some other natural resources, conservation of open space has been and should continue to be an important tool in their protection.

There are numerous examples of open space safeguarding special geological features. Land that belongs to the State of Connecticut, to the Town and to various conservation organizations provides a patchwork of protection. The Town of Granby's ownership of Holcomb Farm in West Granby has conserved an especially steep-sided esker and also alluvial soils along Salmon Brook and Kendall Brook that are used for growing produce for a Community Supported Agriculture project. McLean Game Refuge, with 4000+ acres in Granby, Simsbury and Canton safeguards a section of traprock ridge, and a variety of glacial features. Important geological features such as farmland soils have been protected in Granby through conservation easements or purchases of development rights. This allows the farmer to keep farming and provides funds for improvements to the farm, but prevents sale of the land for development.

5. Consideration of buffer zones to accommodate changing stream and river patterns.

The natural meandering, erosion, and deposition that is characteristic of waterways has become better known over time and is the subject of ongoing study by fluvial geomorphologists. Increases in precipitation and flood flows in Connecticut rivers over the past century have been documented; these inevitably affect the dynamics and the size of stream channels. Waterway corridor planning should include measures for adapting to the changes that can reasonably be expected for increased flow volumes, channel size, channel changes, and other predictions emerging from the study of climate change in southern New England.

Recommendations for the Conservation of Forest Land.

1. Establish and preserve wildlife habitat by reducing forest fragmentation and encroachment, promoting conservation-sensitive planning for new development, and connecting existing forested habitat by designating habitat corridors.
2. Foster economically viable forest management practices and habitat protection through education, voluntary action and better land use decision-making by commercial interests, private citizens, and government.
3. Forge working relationships between the Town commissions, Town-based land trusts, and nationally based conservation organizations to assess and protect critical wildlife habitat in forested lands.

Granby Zoning Regulations Paragraph 8.20 addresses the use of Flexible Residential Developments (FRD). FRDs ensure that residential development is accomplished in such a way as to preserve the natural features of the land.

Recommendations for the Conservation of Endangered, Threatened, and Special Concern Species.

1. Maintain buffers along wildlife corridor perimeter.
A mowed 30-foot to 60-foot buffer along a flat or slightly sloped grade between the native vegetation in the corridor and each adjacent lot will provide a fire abatement zone.
2. Avoid fences within the corridors
3. Avoid free-roaming domestic animals (dogs and cats) within the corridors.
4. Avoid feeding wild animals other than birds within the corridors.
5. Empower residents living adjacent to wildlife corridors to act as stewards of the corridor.
Each landowner adjacent to the corridors should be aware of any regulations pertaining to the corridor. Information regarding the benefits of a buffer zone, no trespassing signs, and lighting should be made available to the land owners and other residents.
6. Requirements pertaining to the protection of wildlife corridors should be citable and enforced.
7. Identify the corridors with signs so people know when they are in a corridor, including information of the animals that utilize the corridor and the importance of its preservation.

Note: These recommendations come from the Connecticut Department of Energy and Environmental Protection (DEEP).

Recommendations for the Conservation of Open Space

1. Connecticut Farmland Preservation Program
Connecticut General Statute 22-26aa established a program for the preservation of agricultural land. The Farmland Preservation Program
2. Continue Granby Plan of Conservation and Development Open Space Goals
The Granby Plan of Conservation and Development provides goals for Open Space preservation that the Town should continue to pursue, including linking existing preserved land by using undevelopable areas such as wetlands and floodplains, increasing the width of buffers and setbacks to provide corridors, and minimizing fragmentation of open spaces.
3. Land Purchase and Easements
Continue to increase public awareness of the benefits of preserving Open Space, and obtain land through donation, purchase and easements. Particular attention should be paid to parcels in the Western and Northwestern sections of Town to link existing preserved parcels.

Appendix A
Wetland Definitions

Terminology

Watercourses

Rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through, or border upon the Town or any portion thereof not regulated pursuant to sections 22a-28 through 22a-35, inclusive, of the Connecticut General Statutes. Intermittent watercourses are delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (a) evidence of scour or deposits of recent alluvium or detritus, (b) the presence of standing or flowing water for a duration longer than a particular storm incident, and (c) the presence of hydrophytic vegetation.

Wetlands

Land, including submerged land not regulated pursuant to sections 22a-28 through 22a-35, inclusive, of the Connecticut General Statutes, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial and floodplain by the National Cooperative Soils Survey of the Natural Resources Conservation Service of the U.S. Department of Agriculture (USDA). This survey is periodically amended, and such areas may include filled, graded, or excavated sites which possess an aquic (saturated) soil moisture regime as defined by the USDA Cooperative Soil Survey.

Watershed Area

Another name for the drainage area of a stream or river.

Vernal Pool

An isolated depression that has water for at least two months in the spring and dries up in the late summer.

Treatment of Water Bodies

Some bodies of water, particularly Manitoak Lake, are threatened by microorganisms, plants, and animals that can disrupt natural ecosystems. Manitoak Lake has had the invasive plant water milfoil for a number of years. When invasive plants are discovered, there are a number of methods of removing the invasive species. These methods include:

1. Mechanical harvesting, hydro-raking, dredging, hand-pulling, suction harvesting
2. Physical winter drawdown, bottom barriers, etc.
3. Introduction of herbivorous insects and fish
4. Chemical herbicides

The consideration of any of these techniques is dependent upon the individual water body, the extent of infestation, and the species in question. For example, mechanical pulling of plants can remove the entire plant, including roots, but may also stimulate new growth if plant fragments are left behind. The introduction of herbivorous insects and fish could be beneficial, as long as they have a preference for the plant which is targeted for removal. Species-specific chemical herbicides are available for large-scale infestations. The proper permits must be acquired for the Connecticut Department of Environmental Protection, and must be administered by certified applicators.

Appendix B
Endangered Species, Threatened Species, and Species of Concern

Endangered Species

“Endangered Species” means any native species documented by biological research and inventory to be in danger of extirpation throughout all or a significant portion of its range within the state and to have no more than five occurrences in the state, and any species determined to be an “endangered species” pursuant to the federal Endangered Species Act.

Birds

Common Name	Scientific Name
Sharp-shinned hawk	<i>Accipiter striatus</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Long-eared owl	<i>Asio otus</i>
Upland sandpiper	<i>Bartramia longicauda</i>
American bittern	<i>Botaurus lentiginosus</i>
Northern harrier	<i>Circus cyaneus</i>
Sedge wren	<i>Cistothorus platensis</i>
Horned lark	<i>Eremophila alpestris</i>
Common moorhen	<i>Gallinula chloropus</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Vesper sparrow	<i>Pooecetes gramineus</i>
Barn owl	<i>Tyto alba</i>

Reptiles

Common Name	Scientific Name
Timber rattlesnake	<i>Crotalus horridus</i>

Amphibians

Common Name	Scientific Name
Blue-spotted salamander	<i>Ambystoma laterale</i>

Fish

Common Name	Scientific Name
Shortnose sturgeon	<i>Acipenser brevirostrum</i>
American brook lamprey	<i>Lampetra appendix</i>
Burbot	<i>Lota lota</i>

Invertebrates

Common Name	Scientific Name
Dwarf wedge mussel	<i>Alasmidonta heterodon</i>
Brook floater	<i>Alasmidonta varicosa</i>
Dune ghost tiger beetle	<i>Cicindela lepida</i>
Puritan tiger beetle	<i>Cicindela puritana</i>
Columbine duskywing	<i>Erynnis lucilius</i>
Phyllira tiger moth	<i>Grammia phyllira</i>
Buck moth	<i>Hemileuca maia maia</i>
Yellow lamp mussel	<i>Lampsilis cariosa</i>

Plants

Common Name	Scientific Name
Sandplain gerardia	<i>Agalinis acuta</i>
Yellow giant hyssop	<i>Agastache nepetoides</i>
Purple giant hyssop	<i>Agastache scrophulariifolia</i>
Broadwing sedge	<i>Carex alata</i>
Barratt's sedge	<i>Carex barrattii</i>
Brown bog sedge	<i>Carex buxbaumii</i>
Variable sedge	<i>Carex polymorpha</i>
Cyperus-like sedge	<i>Carex willdenowii</i>
Devil's-bit	<i>Chamaelirium luteum</i>
Long-bracted green orchid	<i>Coeloglossum viride</i>
Panic grass	<i>Dichanthelium scabriusculum</i>
Narrow-leaved glade fern	<i>Diplazium pycnocarpon</i>
Bur-head	<i>Echinodorus tenellus</i>
Meadow horsetail	<i>Equisetum pratense</i>
Rough aster	<i>Eurybia radula</i>
Stiff gentian	<i>Gentianella quinquefolia</i>
Golden seal	<i>Hydrastis canadensis</i>
Small whorled pogonia	<i>Isotria medeoloides</i>
Yellow flax	<i>Linum sulcatum</i>
Lily-leaved twayblade	<i>Liparis liliifolia</i>
Green adder's-mouth	<i>Malaxis unifolia</i>
Tall millet-grass	<i>Milium effusum</i>
One-flower wintergreen	<i>Moneses uniflora</i>
Gravel-weed	<i>Onosmodium virginianum</i>
Red pine	<i>Pinus resinosa</i>
Slender mountain ricegrass	<i>Piptatherum pungens</i>
White-fringed orchid	<i>Platanthera blephariglottis</i>
Nuttall's milkwort	<i>Polygala nuttallii</i>
Basil mountain-mint	<i>Pycnanthemum clinopodioides</i>
Water-plantain spearwort	<i>Ranunculus ambigens</i>
Long-beaked bald rush	<i>Rhynchospora scirpoides</i>

Swamp red currant	<i>Ribes triste</i>
Waputo	<i>Sagittaria cuneata</i>
Bog willow	<i>Salix pedicellaris</i>
Pod grass	<i>Scheuchzeria palustris</i> ssp. <i>americana</i>
Nutrush	<i>Scleria triglomerata</i>
Hyssop skullcap	<i>Scutellaria integrifolia</i>
Hyssop-leaf hedge-nettle	<i>Stachys hyssopifolia</i>
False pennyroyal	<i>Trichostema brachiatum</i>
Narrow-leaved horse gentian	<i>Triosteum angustifolium</i>
Nodding pogonia	<i>Triphora trianthophora</i>
Large-flowered bellwort	<i>Uvularia grandiflora</i>
Barren strawberry	<i>Waldsteinia fragarioides</i>

Threatened Species

"**Threatened Species**" means any native species documented by biological research and inventory to be likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range within the state and to have no more than nine occurrences in the state, and any species determined to be a "threatened species" pursuant to the federal Endangered Species Act, except for such species determined to be endangered by the Commissioner in accordance with section 4 of this act.

Birds

Common Name	Scientific Name
Blue-winged teal	Anas discors
Short-eared owl	Asio flammeus
Peregrine falcon	Falco peregrinus
American kestrel	Falco sparverius
Bald eagle	Haliaeetus leucocephalus
Least bittern	Ixobrychus exilis
Purple martin	Progne subis

Reptiles

Common Name	Scientific Name
Five-lined skink	Eumeces fasciatus

Amphibians

Common Name	Scientific Name
Northern spring salamander	Gyrinophilus porphyriticus

Invertebrates

Common Name	Scientific Name
New Jersey tea inchworm	Apodrepanulatrix liberaria
Frosted elfin	Callophrys irus
Tiger spiketail	Cordulegaster erronea
Violet dart moth	Euxoa violaris
Harpoon clubtail	Gomphus descriptus
Midland clubtail	Gomphus fraternus
Rapids clubtail	Gomphus quadricolor
Crimson-ringed whiteface	Leucorrhinia glacialis
Barrens itame	Speranza exornata
Atlantis fritillary butterfly	Speyeria atlantis
Riverine clubtail	Stylurus amnicola
Noctuid moth	Zale curema
Noctuid moth	Zale submediana
Noctuid moth	Zanclognatha martha

Plants

Common Name	Scientific Name
Orange foxtail	<i>Alopecurus aequalis</i>
Bog rosemary	<i>Andromeda polifolia</i> var. <i>glaucophylla</i>
Wallrue spleenwort	<i>Asplenium ruta-muraria</i>
Water-marigold	<i>Bidens beckii</i>
Clustered sedge	<i>Carex cumulata</i>
Davis' sedge	<i>Carex davisii</i>
Sedge	<i>Carex limosa</i>
Yellow corydalis	<i>Corydalis flavula</i>
Hare's tail	<i>Eriophorum vaginatum</i> var. <i>spissum</i>
Dwarf huckleberry	<i>Gaylussacia dumosa</i> var. <i>bigeloviana</i>
Low frostweed	<i>Helianthemum propinquum</i>
Longleaf bluet	<i>Houstonia longifolia</i>
Dwarf bulrush	<i>Lipocarpha micrantha</i>
Three-leaved false Solomon's-seal	<i>Maianthemum trifolium</i>
Ragwort	<i>Packera paupercula</i>
Swamp lousewort	<i>Pedicularis lanceolata</i>
Yellow-fringed orchid	<i>Platanthera ciliaris</i>
Swamp cottonwood	<i>Populus heterophylla</i>
Labrador tea	<i>Rhododendron groenlandicum</i>
Toothcup	<i>Rotala ramosior</i>
Sandbar willow	<i>Salix exigua</i>
Torrey bulrush	<i>Schoenoplectus torreyi</i>
Starry champion	<i>Silene stellata</i>
White mandarin	<i>Streptopus amplexifolius</i>
Northern white cedar	<i>Thuja occidentalis</i>
Northern yellow-eyed grass	<i>Xyris montana</i>

Special Concern Species

"Species of Special Concern" means any native plant species or any native nonharvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state.

Mammals

Common Name	Scientific Name
Red bat	<i>Lasiurus borealis</i>
Hoary bat	<i>Lasiurus cinereus</i>

Birds

Common Name	Scientific Name
Northern saw-whet owl	<i>Aegolius acadicus</i>
Henslow's sparrow	<i>Ammodramus henslowii</i>
Broad-winged hawk	<i>Buteo platypterus</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Alder flycatcher	<i>Empidonax alnorum</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Eastern meadowlark	<i>Sturnella magna</i>
Brown thrasher	<i>Toxostoma rufum</i>

Reptiles

Common Name	Scientific Name
Wood turtle	<i>Glyptemys insculpta</i>
Eastern hognose snake	<i>Heterodon platirhinos</i>
Smooth green snake	<i>Liochlorophis vernalis</i>
Eastern box turtle	<i>Terrapene carolina carolina</i>
Eastern ribbon snake	<i>Thamnophis sauritus</i>

Amphibians

Common Name	Scientific Name
Jefferson salamander "complex"	<i>Ambystoma jeffersonianum</i>
Northern leopard frog	<i>Rana pipiens</i>

Fish

Common Name	Scientific Name
Blueback herring	<i>Alosa aestivalis</i>
Bridle shiner	<i>Notropis bifrenatus</i>

Invertebrates**Common Name****Scientific Name**

Ground beetle	<i>Agonum darlingtoni</i>
Ground beetle	<i>Agonum mutatum</i>
Ground beetle	<i>Amara chalcea</i>
Apamea moth	<i>Apamea burgessi</i>
Ground beetle	<i>Bembidion carinula</i>
Bombardier beetle	<i>Brachinus cyanipennis</i>
Pine barrens tiger beetle	<i>Cicindela formosa generosa</i>
Dark bellied tiger beetle	<i>Cicindela tranquebarica</i>
Horace's duskywing	<i>Erynnis horatius</i>
Scrub euchlaena	<i>Euchlaena madusaria</i>
Noctuid moth	<i>Eucoptocnemis fimbriaris</i>
Brown-bordered geometer	<i>Eumacaria latiferrugata</i>
Noctuid moth	<i>Euxoa pleuritica</i>
Pitcher plant moth	<i>Exyra fax</i>
Ground beetle	<i>Geopinus</i>
Cobra clubtail	<i>Gomphus vastus</i>
Skillet clubtail	<i>Gomphus ventricosus</i>
Aquatic snail	<i>Gyraulus circumstriatus</i>
Ground beetle	<i>Harpalus eraticus</i>
Horse fly	<i>Hybomitra typhus</i>
Noctuid moth	<i>Lepipolys perscripta</i>
Tidewater mucket	<i>Leptodea ochracea</i>
Eastern pond mussel	<i>Ligumia nasuta</i>
Bog copper	<i>Lycaena epixanthe</i>
Eastern pearl shell	<i>Margaritifera margaritifera</i>
Eyed brown	<i>Satyrodes eurydice</i>
Ground beetle	<i>Scaphinotus viduus</i>
Noctuid moth	<i>Schinia spinosae</i>
Ground beetle	<i>Tetragonoderus fasciatus</i>
Noctuid moth	<i>Zale obliqua</i>

Plants

Common Name	Scientific Name
Virginia copperleaf	<i>Acalypha virginica</i>
Hairy angelica	<i>Angelica venenosa</i>
Puttyroot	<i>Aplectrum hyemale</i>
SCArethusa	<i>Arethusa bulbosa</i>
Needlegrass	<i>Aristida longespica</i>
Arrowfeather	<i>Aristida purpurascens</i>
Purple milkweed	<i>Asclepias purpurascens</i>
Downy wood-mint	<i>Blephilia ciliata</i>
Hairy woodmint	<i>Blephilia hirsuta</i>
Low bindweed	<i>Calystegia spithamea</i>
Summer sedge	<i>Carex aestivalis</i>
Bronze sedge	<i>Carex foenea</i>
Hitchcock's sedge	<i>Carex hitchcockiana</i>
Eastern few-fruit sedge	<i>Carex oligocarpa</i>
Few-seeded sedge	<i>Carex oligosperma</i>
Sedge	<i>Carex squarrosa</i>
Tuckerman's sedge	<i>Carex tuckermanii</i>
Sedge	<i>Carex typhina</i>
Eastern redbud	<i>Cercis canadensis</i>
Early coral root	<i>Corallorhiza trifida</i>
Blue waxweed	<i>Cuphea viscosissima</i>
Yellow lady's-slipper	<i>Cypripedium parviflorum</i>
Tufted hairgrass	<i>Deschampsia caespitosa</i>
Dillenius' tick-trefoil	<i>Desmodium glabellum</i>
Squirrel corn	<i>Dicentra canadensis</i>
Panic grass	<i>Dichanthelium ovale</i> var. <i>addisonii</i>
Panic grass	<i>Dichanthelium xanthophysum</i>
Goldie's fern	<i>Dryopteris goldiana</i>
Wiegand's wild rye	<i>Elymus wiegandii</i>
Marsh horsetail	<i>Equisetum palustre</i>
Hervey's aster	<i>Eurybia x herveyi</i>
Creeping snowberry	<i>Gaultheria hispidula</i>
Bicknell's northern crane's-bill	<i>Geranium bicknellii</i>
Dwarf rattlesnake plantain	<i>Goodyera repens</i> var. <i>ophioides</i>
Featherfoil	<i>Hottonia inflata</i>
Virginia waterleaf	<i>Hydrophyllum virginianum</i>
Great St. John's-wort	<i>Hypericum ascyron</i>
Blazing-star	<i>Liatrix scariosa</i> var. <i>novae-angliae</i>
Sandplain flax	<i>Linum intercursum</i>
Climbing fern	<i>Lygodium palmatum</i>
Eastern prickly pear	<i>Opuntia humifusa</i>
Golden club	<i>Orontium aquaticum</i>

One-sided pyrola	<i>Orthilia secunda</i>
Violet wood-sorrel	<i>Oxalis violacea</i>
American ginseng	<i>Panax quinquefolius</i>
Hairy forked chickweed	<i>Paronychia fastigiata</i>
Tall white bog orchid	<i>Platanthera dilatata</i>
Hooker's orchid	<i>Platanthera hookeri</i>
Large round-leaf orchid	<i>Platanthera orbiculata</i>
Threadfoot	<i>Podostemum ceratophyllum</i>
Tall cinquefoil	<i>Potentilla arguta</i>
Alleghany plum	<i>Prunus alleghaniensis</i>
Bristly buttercup	<i>Ranunculus pensylvanicus</i>
Skunk currant	<i>Ribes glandulosum</i>
Slender willow	<i>Salix petiolaris</i>
Long's bulrush	<i>Scirpus longii</i>
Wild senna	<i>Senna hebecarpa</i>
Elliott's goldenrod	<i>Solidago latissimifolia</i>
Smooth hedge-nettle	<i>Stachys tenuifolia</i>
Northern stitchwort	<i>Stellaria borealis</i>
Appalachian gametophyte	<i>Trichomanes intricatum</i>
Narrow false oats	<i>Trisetum spicatum</i>
Mountain cranberry	<i>Vaccinium vitis-idaea</i> ssp. <i>minus</i>
Beaked corn-salad	<i>Valerianella radiata</i>
Narrow-leaved vervain	<i>Verbena simplex</i>
Canada violet	<i>Viola canadensis</i>
Great-spurred violet	<i>Viola selkirkii</i>
New England grape	<i>Vitis x novae-angliae</i>

Appendix C
Identifying Invasive Species

Ecologically Invasive Plants

Invasive plants are non-native or exotic plants typically introduced by human activity which quickly become established. Many non-native plants are well known agricultural or horticultural species. Most of these do not escape cultivation or have minimal impacts on natural communities if they do spread. Invasive species rapidly disperse and establish, displacing native plants and altering ecological processes like fire occurrence and nutrient cycling. Due to their rapid growth, efficient means of seed dispersal, and tolerance of a wide range of environmental conditions, invasive plants outcompete with native species for sunlight, nutrients, and space.

Natural predators and disease, which controlled their populations in their native habitat, are lacking. Native species that are threatened or endangered are particularly susceptible to displacement. As the diversity and populations of native plant species decrease, wildlife habitat is reduced. Occasionally, invasive species will reproduce with natives and produce hybrids. This changes the gene pool in an area and can reduce biodiversity. If biodiversity decreases, the ecosystem becomes more vulnerable to disease and pests. Of the 4000 estimated non-native plants in the United States, over 300 are considered highly invasive. Half of these were introduced for horticultural purposes. Others arrived in seed mixes, packaging materials, and by other means. In Connecticut, the Department of Environmental Protection has identified 87 invasive plant species that occur in natural areas, parks, and other areas throughout the state. Human activity often disrupts natural cycles by creating disturbances that provide ideal conditions for invasive plant species. With this in mind, land managers should develop goals to control problem species and restore ecological processes.

Management goals can be achieved in two ways: prevention and eradication and control.

Prevention

Preventing invasive species from establishing in an area is critical to any invasive species control plan. Early detection and control is more effective than trying to eradicate or control large populations. Prevention will save time, effort, and money. Two ways to reduce establishment are **1)** avoid introducing known invasives and **2)** reduce land disturbance and soil exposure. Many invasives are still sold for gardening and landscaping, wildlife habitat enhancement, and erosion control. Aquatic invasives are introduced by boat propellers and ballast/bilge water, released from aquariums, or attached to ornamental plants shipped from growers. Be careful to inspect nursery-supplied aquatic plants and remove all plant material from boats and boating equipment before traveling between waterbodies. As an alternative for landscaping and erosion control, promote the use of native species or non-invasive ornamentals. In balanced ecosystems, natural disturbances like fire and flooding keep the populations of introduced species in check.

Human disturbance enables potentially invasive species to spread. Whenever possible, avoid disturbance to the soil and canopy. Disturbances associated with trail and road construction create ideal conditions for establishment of invasive species. In fact, in natural areas these species often first appear at trail heads and along parking lots. Where disturbance is unavoidable, plant native species to establish a “natural” community and eliminate introduction sites for invasives.

Eradication and Control Methods

Permanent eradication of invasive species is time consuming and often expensive. The time and resources available and the risks involved may dictate whether eradication is feasible. Where introductions are recent and populations are not well established, eradication may be possible. However, controlling population size is often more practical and will allow native vegetation to co-exist and thrive.

Efforts to control invasive species require patience, as several years may be needed to achieve desired results. Control methods are divided into three categories: mechanical, chemical, and biological. Determining which method is most suitable will depend on the species involved, the size of the population, surrounding environmental conditions, the management objectives for the area, and the resources available. In many cases, combining control methods may be more effective.

Mechanical Control Methods

Mechanical control methods include hand-pulling, use of hand-tools to cut, dig up, or girdle, mowing, and prescribed burning. Hand-pulling can control small annual or biennial species or seedlings of woody species. Remove as much of the root system as possible since many species can regenerate from root fragments. For large populations of herbaceous (softstemmed) species, hand tools like weed whips or hoes can be effective.

Shrubs and tree saplings can be removed with a weed wrench, designed to pull up the entire plant. Large trees can be girdled by removing bark from a 2-inch wide band around the trunk about four feet from the ground. Girdling effectively kills the plant by cutting off the flow of nutrients (sugars) from the crown to the roots. While many species can resprout from the roots or lower trunk, repeated cutting of sprouts will eventually kill the plant. Combining cutting or girdling with herbicide treatment will greatly increase control of woody species. In plant communities adapted to or dependent on fire, prescribed burning is preferred since this method mimics a natural process. Many invasive species are not adapted to fire and, thus, are effectively controlled by burns.

However, fire is not an appropriate control method in all communities. Land managers should first consider their conservation goals and experience. Prescribed burns are not appropriate if used for invasive species control only. They are best suited to areas where the goal is to maintain a fire-dependent community. Conducting a prescribed burn requires extensive training and experience. The time of year the burn is conducted and the intensity of the fire will greatly influence how native species respond.

Chemical Control Methods

Herbicide use is effective, but is best reserved for severe infestations or where non-chemical methods are inadequate. Different herbicides have different application methods and target species. Research these carefully and apply according to label instructions. In Connecticut, herbicide applicators may need to be licensed, especially if working in wetlands or on waterbodies. A license can be obtained by passing a written examination on the safe and effective handling and application of herbicides in specific categories.

Licensing does not qualify an individual to apply all herbicides. Herbicides are categorized as either Restricted Use or General Use. Any person who purchases, mixes, applies, or disposes of a restricted use herbicide must be licensed. Applicators of general use herbicides must be licensed if working in wet areas or applying to land other than their own. For wetland applications, an operator's permit is required in addition to licensing. For more information on herbicide licensing and operator permits, contact: Pesticide Program Connecticut Department of Environmental Protection 79 Elm St. Hartford, CT 06106 (860) 424-3369 Herbicides can be applied in two ways, as a foliage spray or brushed/sprayed onto cut stems or basal bark. Workers should wear protective clothing and gear, including coveralls, rubber boots and gloves, eye protection, and a respirator or gas mask. After use, clothing should be washed and gear thoroughly cleaned. In Connecticut, the Department of Environmental Protection recommends the use of glyphosate-based herbicides.

Glyphosate is a phosphoglycine found to be relatively nontoxic to animals and humans. It is absorbed by most soils and broken down by microorganisms. Half-life in the soil ranges from 1-174 days. Glyphosate is a non-selective herbicide that kills all vegetation. It is translocated throughout the plant from the place of contact, and is most effective applied late in the growing season when plants are translocating to the roots. Foliar sprays are used to apply herbicide to the leaves. They are effective on large populations, but put non-target plants at risk. Apply just enough spray to cover the leaves, but not so much that it drips off. Do not spray under windy conditions as this may kill surrounding native plants. If the herbicide label recommends, dyes can be added to make the herbicide more visible to the applicator. Walking backwards through a treatment area will reduce applicator expose. Cut stump or cut stem treatments are used on woody species or large, stout-stemmed herbaceous plants. Shrubs or trees are cut down and the herbicide applied directly to the living tissue or sapwood around the edge of the stump just inside the bark.

Plants are best cut at the end of the growing season so that the herbicide is absorbed and transported to the roots. Injection treatment, also known as frilling or the “hack-and-squirt” method, is the application of herbicide to cut areas in a woody stem. Cuts are made with an axe and the herbicide painted, dripped, or carefully sprayed into the fresh cut. Basal bark treatment is appropriate for small woody plants with smooth, thin bark. Apply herbicide to a 6-12 inch wide band of bark around the base of the trunk, 6-12 inches from the ground.

Biological Control Methods

Biological control uses a plant’s natural enemies, usually insect herbivores or microbial pathogens, to control a population. Highly host-specific organisms must be used to minimize impacts to non-target species. Pre- and post-treatment monitoring of non-target species is critical to a biocontrol program.

Winged Euonymus or Invasive Plant Information Sheet

Burning Bush

Euonymus alatus

Staff-tree Family (Celastraceae)

Description: Winged Euonymus is a deciduous shrub that averages 6 to 9 feet in height but is capable of reaching 15 feet. It has opposite, simple, elliptical toothed leaves which turn bright scarlet in autumn. Among its distinctive features are the prominently corky-winged green and brown twigs. The fruit is a cluster of pods, usually four, which are quite showy. These purple fruits split open when ripe revealing the bright red inner parts.

Origin: Native to eastern Asia, winged Euonymus was brought to the United States during the mid-nineteenth century and has been widely planted as an ornamental. A dwarf variety, *compactus*, is a popular hedge-forming plant. Winged Euonymus is used primarily as foundation plantings, hedges, and highway plantings. It is widely disseminated by wildlife species, which spread the seeds in their droppings.

Habitat: Winged Euonymus grows in a variety of soil conditions and spreads readily from cultivation into old fields, open woods, and mature second growth forests.

Why is it a problem? In open woodlands, winged Euonymus replaces native shrubs. In areas where it forms dense monotypic stands, it reduces habitat diversity. The root system forms a dense mat just below the soil

surface. The combination of the dense shade provided and the tight root system makes survival of other plants beneath Euonymus impossible.

Management: Hand pulling sprouts and saplings can be effective. Larger shrubs may require heavy equipment for eradication of the plant. Use of herbicides on cut stumps and young plants may also be effective.

Alternatives:

For persistent berries:

Aronia arbutifolia (Red Chokeberry)
- also bright fall color

Ilex verticillata (Winterberry)

Viburnum trilobum (Highbush Cranberry)

For fall foliage/winter interest:

Cornus amomum (Silky Dogwood) –
also a fall food source



Illustration by E. Farnsworth

Cornus sericea (Red Twig Dogwood) – also a fall food source

Vaccinium corymbosum (Highbush Blueberry) – also a summer food source

Written by:

Peter Picone
CT Department of Environmental Protection, Wildlife Division
May 2000

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Janet Marinelli and Beth Hanson, Editors, 1996. Invasive Plants: Weeds of the Global Garden. Handbook Number 149. (New York: Brooklyn Botanic Garden, Inc.) 111 pp.

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Autumn Olive

Elaeagnus umbellata

Oleaster Family (Elaeagnaceae)

Invasive Plant Information Sheet

Description: Autumn olive is a small, spiny deciduous shrub-like tree capable of reaching 20 feet in height. It has alternate oval leaves with silvery undersides. The leaves are simple and lack marginal teeth, but the margins are often crisped or wavy. The small, yellowish-white flowers reach the peak of bloom around mid-May and are highly fragrant. The fleshy fruits are brown at first and mature to a reddish hue with minute metallic dots. Russian olive (*Elaeagnus angustifolia*) is similar in appearance but its leaves are silvery on both sides and its fruits are yellow.

Origin: Autumn olive is native to eastern Asia and was introduced to the United States during the 1830s for a variety of uses including soil conservation and wildlife habitat enhancement. In Connecticut, it has been widely planted along highways, perhaps because of its wind and drought tolerance and its ability to form dense thickets.

Habitat: Autumn olive spreads rapidly from cultivation into old fields, thickets and forest edges. It is extremely hardy and tolerant of drought, wind, and air pollutants.

Why is it a problem? A rapid grower and prolific seed producer, autumn olive out-competes and displaces native shrubs. It forms monotypic stands and reduces floral and habitat diversity. As a nitrogen fixer, it can alter nutrient cycle dynamics and change soil suitability for other shrub species.

Management: Autumn olive is best controlled by cutting in late September and October, followed immediately by application of an herbicide to the cut stems. Spring cutting may actually promote additional growth. Prescribed burning is a good control method in areas where it is feasible.

Alternatives:

For persistent berries:

Aronia arbutifolia (Red Chokeberry)
- also bright fall color

Aronia melanocarpa (Black Chokeberry) – also bright fall color

Ilex verticillata (Winterberry)

Viburnum trilobum (Highbush Cranberry)

For fall wildlife food source:

Cornus amomum (Silky Dogwood)

Cornus racemosa (Gray Dogwood)

Cornus sericea (Red twig Dogwood)



Illustration by E. Farnsworth

Viburnum lentago (Nannyberry)

Viburnum recognitum (Northern Arrowwood)

Written by:

Peter Picone
CT Department of Environmental
Protection, Wildlife Division
May 2000

References:

Janet Marinelli and Beth Hanson, Editors, 1996. *Invasive Plants: Weeds of the Global Garden*. Handbook Number 149. (New York: Brooklyn Botanic Garden, Inc.) 111 pp.

Gleason, H. A. and A. Cronquist, 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, 2nd ed., (Bronx, NY: The New York Botanical Garden) 910 pp.

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Mile-A-Minute or Devil's Tearthumb

Polygonum perfoliatum

Smartweed Family (Polygonaceae)

Invasive Plant Information Sheet

Description: This annual weed has elongated, branched stems that can reach lengths over 20 feet. Mile-A-Minute can climb into trees. Branches and stems are covered with small spines and can have a reddish color. The leaves are simple, alternate, triangular and 1"-3" wide. The mid-vein of the leaf also has spines. There is a very distinct saucer-shaped bract that encircles the stems at each node. New plants can be seen in late April or early May. The metallic-blue colored fruits ripen from September to November.

Origin: Mile-A-Minute is native to Japan, Korea, China, Taiwan and India. The first recorded specimen of Mile-A-Minute came from boat ballast in Portland, Oregon in 1890, but the weed was first reported growing wild in the late 1930's in Pennsylvania. Mile-A-Minute can now be found in Connecticut, Delaware, Maryland, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Virginia, Washington, D.C. and West Virginia.

Habitat: This weed grows along roadsides, wood edges, and in fields, nurseries and other open areas. Mile-A-Minute prefers moist, well-drained soils in sunny locations. However, it may grow in wooded areas with partial shade. In temperate parts of the country, the first hard frost will kill the plant. Each year's new growth comes from the germination of overwintering seeds.

Why it is a problem: Extremely rapid growth (up to 6 inches per day) allows Mile-A-Minute weed to form dense mats that smother nursery tree seedlings and/or native plants. Also, since birds and rodents eat the fruits, new outbreaks can occur great distances from the original source. There is the potential in the southeastern US for this weed to become a perennial plant pest because there is no killing frost.

Management: Mowing, cutting or hand removal can be used to manage this weed. To avoid the spines, remember to wear gloves for hand removal of this plant. Action should be taken before large, dense areas form and before seed set. All plant debris should be removed from the site to ensure that no viable seeds are left behind. In agricultural settings, there are registered herbicides that will kill Mile-A-Minute.



Illustration by E. Farnsworth

Alternatives: This plant is not used as an ornamental. However, the initial spread of the weed in Pennsylvania can be traced to the movement of infested Rhododendrons from the original nursery.

Written by:
Tim Abbey
CT Agricultural Experiment Station
May 2000

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Norway Maple

Acer platanoides

Maple Family (Aceraceae)

Invasive Plant Information Sheet

Description: Norway maple, a deciduous tree, reaches a height of 40-50 feet, occasionally exceeding 90 feet. The leaves are dark green, simple, opposite, 4"-7" wide with 5 lobes. The mature tree has a rounded crown of dense foliage and the bark is grayish-black and furrowed. Norway maple is distinguished from other maples by the milky fluid that oozes from freshly broken leaf petioles (stems). The tree leafs out and produces seeds earlier than other maples. Its normal fall foliage is pale yellow; however, there is a popular cultivar known as "Crimson King" which has deep reddish purple fall foliage.

Origin: Norway maples are native to Europe, from Norway southward. Populations in the United States have either escaped from cultivation or originated from individual trees used as ornamental specimens.

Habitat: Norway maple is well adapted to various soil extremes, such as sand, clay or acid. It grows in hot and dry conditions, and it can tolerate ozone and sulfur dioxide air pollution. Norway maples are widely planted in the United States and can be found from the northern border with Canada south to the Carolinas (Hardiness Zones 3-7).

Why is it a problem? Individual trees produce large numbers of seeds that are wind dispersed and invade forests and forest edges. The dense canopy formed by Norway maple inhibits the regeneration of sugar maple and

other tree seedlings, reducing forest diversity. Also, since Norway maple has shallow roots, it competes with other plants in the landscape, including grasses, and can cause damage to pavement in urban settings.

Management: Norway maple can be controlled by hand removal of seedlings. Larger trees in the natural landscape can be girdled.

Alternatives:

Acer rubrum (Red Maple) has red fall color and is a good wildlife food source.

Acer saccharinum (Silver Maple) is a good wildlife food source, but may be too large for use as a street tree.

Acer saccharum (Sugar Maple) is a good wildlife food source, but is susceptible to road salt damage.

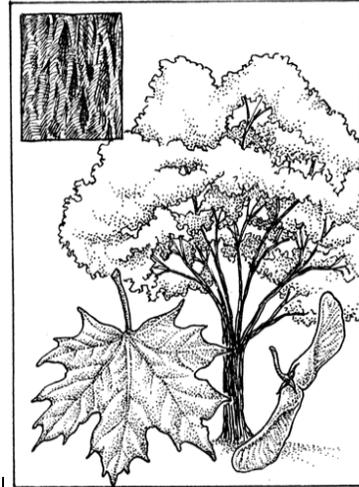


Illustration by E. Farnsworth

Quercus spp. (Oaks) are an excellent wildlife food source.

Tilia americana (Basswood) is a good shade tree.

Written by:
Tim Abbey
CT Agricultural Experiment Station
May 2000

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Yellow Flag or European Yellow Iris

Iris pseudacorus

Lily Family (Liliaceae)

Description: Yellow flag is a perennial that grows to a height of 1-3 feet, with grassy or sword-like leaves and showy, lemon-yellow flowers from May to July. The flower has three recurving sepals with broad blades that abruptly contract at the base and three erect, somewhat spoon-shaped petals. Yellow flag's thick pink-fleshed rhizomatous roots form dense mats. Fruits are ovoid and contain several large seeds per capsule. It is the only yellow iris likely to be found growing wild.

Origin: Yellow flag is native to Europe and has long been used in ornamental plantings. The initial escape from cultivation may be by rhizomes washing from low-lying gardens by floods. Subsequent spread is from breaking up of rhizomes or from the abundantly produced seed. Yellow flag is now widely established from Newfoundland to California.

Habitat: Yellow flag prefers moist mineral soils and full sun, but does well in garden conditions. It commonly spreads along river banks, pond edges and in marsh wetlands, but has also invaded the rocky coastal shores of north-eastern Massachusetts.

Why is it a problem? Yellow flag spreads rapidly on shorelines and in wetlands and can out-compete native wetland plants, including two native iris species. It reproduces by rhizome and seed. Floating seeds are carried downstream and create new colonies.

Yellow flag appears to speed up marsh degradation. The rhizome mat prevents germination and seedling growth of other plant species. The mat also creates improved habitat for the iris by compacting soil, elevating the topography and squeezing out water to create drier habitat. Yellow flag reduces wildlife food supplies by out-competing arrow arum (*Peltandra virginica*), an important duck food.

Management: Pulling and hand-digging new plants are good management techniques and preferable to herbicide use in wetland areas. Plants in artificial settings (backyard gardens and water gardens) should be dead-headed after blooming to prevent seedpod development.

Alternatives:

In garden conditions:

Iris innominata, (Golden Iris) from the Pacific Northwest has yellow- gold color.



Illustration by E. Farnsworth

Iris cristata (6 inches) and *Iris verna* (6 to 8 inches) are good for ground covers and rock gardens.

For water gardens and waterside plantings:

Iris versicolor, the native Blue Flag Iris, has showy blue-purple flowers with long-lasting vertical foliage.

Caltha palustris (Marsh Marigold) has yellow blossoms for spring color.

Written by:

Heather Crawford
CT Sea Grant Extension Program
May 2000

Reference:

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Appendix D

Native Landscaping Plants

(For more information, see the Connecticut Botanical Society,
www.ct-botanical-society.org)

All of the plants listed here are suitable for Granby, which is located in Zone 6,

PerennialsWild red columbine (*Aquilegia canadensis*)

average to moist soil

zones 3-9

It's hard to think of a more graceful plant than the wild columbine, with its spurred red-and-yellow flowers nodding on slender stems. These, like many red flowers, attract hummingbirds. The delicately scalloped leaves form a neat mound of foliage. Wild red columbine, like most columbines, tends to seed itself in the garden (though not such much as to be a nuisance). In the wild, this plant prefers growing in the alkaline soil of limestone rocks, but in the garden it will grow in anything except very strongly acidic soil. 1-2' tall.

Bearberry, kinnickinick (*Arctostaphylos uva-ursi*)

dry to average soil

zones 2-6

Bearberry is a useful ground cover that is handsome year-round. The leaves are glossy and evergreen. Small pink or white flowers in late spring are followed by bright red berries, popular with ground-dwelling birds. In winter, the stems become red and the leaves take on a dark red tint. Bearberry grows well in exposed, rocky or sandy sites; it also tolerates acid soil and the salt spray of seaside locations. 4" tall.

Wild ginger (*Asarum canadense*)

dry to moist soil

zones 3-8

An easy, tolerant plant that makes a good ground cover. Its bold, heart-shaped leaves create a pleasing texture in the garden. The roots smell very much like ginger, though this plant is not related to culinary ginger. Wild ginger has interesting triangular flowers in spring, but finding them requires getting down on hands and knees -- they bloom just above the ground. (Click on the photo to the left to see an image of wild ginger in bloom.) 6" tall.

Butterfly weed (*Asclepias tuberosa*)

dry to average soil

zones 3-9

True to its name, butterfly weed is a marvelous for attracting butterflies. The "weed" label, however, is entirely undeserved; it's not weedy in its looks or habits. The handsome, dark green foliage is topped with bright orange flowers in July and August. Butterfly weed has a long tap root that makes the plant highly drought-resistant, but also makes mature plants tricky to transplant. Container-grown plants, however, transplant easily. Butterfly weed is considered a "Great Plant for American Gardens" by the American Horticultural Society. 2-3' tall.

White wood aster (*Eurybia divaricata*, syn. *Aster divaricatus*)

dry to average soil

zones 4-8

A good ground cover for tough situations. White wood aster thrives in dry shade, so it can be planted beneath shallow-rooted trees such as maples and elms. The flowers are not especially showy, but they are long-lasting, and an individual plant may be in bloom for two months. Foliage grows 6" high; flower stalks 18-24".

New England aster (*Symphyotrichum novae-angliae*, syn. *Aster novae-angliae*)

average to wet soil

zones 3-9

There are hundreds of species of asters, but one of the best for gardens is our New England aster. (The American Horticultural Society lists it as a "Great Plant for American Gardens".) New England aster lights up the fall garden with its cheerful flowers, resembling purple daisies. This is a tall plant, good for the back of the garden. Frankly, its lower leaves can look tatty by fall, so keep it behind other plants. 3-5' tall.

Marsh marigold (*Caltha palustris*)

moist to wet soil

zones 2-7

or water up to four inches deep

In the wild, marsh marigold grows in shallow water or marshy soil, but it doesn't need a marsh -- it will grow in moist garden soil. In mid-spring, its glossy, bright yellow flowers really grab one's attention. The plant goes dormant by mid-summer, so it makes a good companion for late-emerging plants, such as ferns. 1' tall.

Wild geranium (*Geranium maculatum*)

moist soil, preferably acidic

zones 3-9

This charming woodland plant has soft lavender flowers in spring. Even when wild geranium is not in bloom, the distinctive, deeply cut leaves provide a decorative effect. If it is planted in a moist woodland spot, wild geranium may spread slowly by seed. 1-2' tall.

Cardinal flower (*Lobelia cardinalis*)

moist soil in part shade, or wet soil in full sun

zones 3-9

In the wild, cardinal flower grows mostly in sunny swamps, but it will grow in moist garden soil if given part shade. Cardinal flower blooms in mid- to late summer; the brilliant red flowers are a favorite of hummingbirds. It is considered a "Great Plant for American Gardens" by the American Horticultural Society. 3' tall.

Solomon's plume (*Maianthemum racemosum*, syn. *Smilacina racemosa*)

dry to moist soil

zones 4-8

This is a graceful plant for the woodland garden. In spring, clusters of starry white flowers are borne at the ends of arching stalks. Solomon's plume is easy to grow, and it spreads fast -- give it lots of room or be prepared to weed out excess. Its cousin [starry Solomon's plume](#) (*Maianthemum stellatum*) is another worthwhile garden plant, more restrained in its habits. Both plants have interesting berries; red-spotted in Solomon's plume, and striped like a beach ball in starry Solomon's plume. 1-2.5 feet tall.

Partridgeberry (*Mitchella repens*)average to moist soil;
prefers acidic soil

zones 3-9

Partridgeberry is a member of that essential garden category, the shade-loving evergreen ground covers. It is one of the best choices for dark shade. Partridgeberry spreads across the ground by vining stems, growing only two inches high. Its leaves are small and dark green, often with light-colored veins. Partridgeberry has white flowers in early summer; in fall and winter it is ornamented by bright red fruits. 2 inches tall.

Wild blue phlox (*Phlox divaricata*)

average to moist soil

zones 3-8

Lightly fragrant clusters of lilac-colored flowers grace this woodland plant in spring. The flowers reward close inspection -- each petal is shallowly notched at the tip, and appears to have been pinched where it joins the center of the flower. Wild blue phlox is considered a "Great Plant for American Gardens" by the American Horticultural Society. 1 foot tall.

Bloodroot (*Sanguinaria canadensis*)

average to moist soil

zones 3-8

Bloodroot is one of the earliest wildflowers of spring. In March, the delicate white flowers appear, each with a broad leaf wrapped protectively around its stalk. Bloodroot goes dormant around mid-summer. Ferns make good companions, as they tend to emerge late in spring. By the time bloodroot goes dormant, ferns can fill in the gap. 6 inches tall.

Foamflower (*Tiarella cordifolia*)

average to moist soil

zones 3-8

Foamflower's charms have just recently begun to be appreciated by gardeners and plants breeders. Foamflower has spikes of fluffy white flowers that rise above a carpet of soft green leaves. It blooms strongly in late spring, and, if it has consistently moist soil, it will continue to produce the occasional flower spike until frost. Foamflower spreads by stolons, so it can be used as a ground cover. The leaves will stay green through mild winters. 8-12 inches tall.

Barren strawberry (*Waldsteinia fragarioides*)

dry to moist soil

zones 4-9

Barren strawberry looks similar to strawberry plants, but with showy yellow flowers (and no edible fruit). Like strawberries, barren strawberry will spread quickly by runners, making it a good ground cover. The leaves are evergreen, at least during Connecticut's milder winters. Yellow flowers in spring and summer. 4-8 inches tall.

Vines



Trumpet honeysuckle (*Lonicera sempervirens*)



average soil

zones 4-9

This is a showy vine with scarlet flowers in summer and autumn. Trumpet honeysuckle is a favorite with hummingbirds. The leaves are dark green on top, and pale blue-green beneath. The vine climbs by twining stems, so it needs a trellis, fence, or large shrub to climb on. Climbs 10-20'.



Climbing bittersweet (*Celastrus scandens*)



dry to moist soil

zones 3-8

This vine is rapidly becoming rare in New England, due to competition from an invasive alien, Asiatic bittersweet. Climbing bittersweet is grown for its showy fruit -- clusters of bright orange-red seeds with pumpkin-orange seed covers. The fruits dry well, and they are good for decoration. Both male and female vines are needed to get fruit, but unfortunately bittersweet is generally sold without labeling the sex. Planting four or more vines is generally enough to get both sexes. Be sure to buy this from a nursery that knows their plants well; we have seen nurseries that selling Asiatic bittersweet labelled as climbing bittersweet. (Asiatic bittersweet is too aggressive to be a good garden vine -- it can climb to the top of an 80 foot tree.) Climbing bittersweet grows 20-30' high.



Virgin's Bower (*Clematis virginiana*)



average to moist soil

zones 3-9

Virgin's bower is grown for its late-summer flowers. After the flowers are gone, it has attractive, feathery seed heads. This vine spreads rapidly, so it's best to give it lots of space. Climbs 5-20'.



Virginia creeper (*Parthenocissus quinquefolia*)



dry to average soil

zones 3-9

A vigorous and adaptable vine with showy fall foliage. Virginia creeper will climb up walls or trees, clinging to the surface with adhesive disks. If it doesn't have anything to climb, it serves as a fast-spreading ground cover. In fall, the leaves turn brilliant red. Tolerates salt, strong wind, and urban conditions. Not recommended for climbing up shingled or painted surfaces. Climbs 50'.

Ferns

Marginal woodfern (*Dryopteris marginalis*). Marginal woodfern has dark green, leathery fronds. The fronds stay green all winter, adding interest to the winter landscape. 2' tall.

(☀️🌑 / average to moist soil / zones 3-8)

Ostrich fern (*Matteuccia struthiopteris*). This is a large fern that forms lovely vase-shaped clumps. In good conditions it tends to spread aggressively by the roots, so exercise caution in planting it near delicate plants. Grows 2'-5' tall -- more sun and moisture means taller.

(☀️🌑 / average to wet soil / zones 3-8)

Cinnamon fern (*Osmunda cinnamomea*). Simply a magnificent fern. Given constantly wet soil and full sun, cinnamon fern will grow in dense, 5' clumps. Less tall, but still handsome, in drier or shadier conditions. The cinnamon-colored fertile fronds make a nice accent. 3-5' tall.

(☀️🌑 / moist soil in part shade, or wet soil in full sun / zones 4-8)

Christmas fern (*Polystichum acrostichoides*). The evergreen fronds of this fern have been used for Christmas decorations, hence the name. This fern is very useful in plantings beneath trees, as it tolerates root competition. Christmas fern is also more tolerant of dry soil than are most ferns. 1.5' tall.

(☀️🌑 / average to damp soil / zones 3-8)

Ornamental Grasses

Big bluestem (*Andropogon gerardii*). This is the dominant grass of tall-grass prairie. The blue-green leaves turn shades of red and purple in fall. 4-6' tall.

(☀️ / dry to average soil; needs good drainage; good in sandy soil / zones 2-8)

Switchgrass (*Panicum virgatum*). Another denizen of tall-grass prairie, switchgrass forms tall, stately clumps. In early fall, it has airy purplish flower-heads. The seeds provide food for birds. The grass is yellow in fall, and tan in the winter. 3-5' tall.

(☀️ / dry to average soil / zones 4-9)

Little bluestem (*Schizachyrium scoparium*, syn. *Andropogon scoparius*) is a highly ornamental grass that deserves to be used more. Little bluestem is a dominant grass of mixed-grass prairie; in the east, it tends to grow in abandoned fields and rocky ridges. Little bluestem thrives in poor or rocky soil, where it grows into a neat column. In rich soil, however, it grows tall and floppy. In fall, the grass turns reddish-gold, with fluffy white seed clusters. Its gold color and columnar form persist all winter. It's still looking good after winter wind has damaged most other grasses. 3' tall.

(☀️ / dry to average soil / zones 4-9)

Little bluestem (*Schizachyrium scoparium*, syn. *Andropogon scoparius*)

Sun: Full sun

Soil: Dry to average soil

Height: 3 feet tall

Description: Little bluestem is a highly ornamental grass that deserves to be used more. Little bluestem is a dominant grass of mixed-grass prairie; in the east, it tends to grow in abandoned fields and rocky ridges. Little bluestem thrives in poor or rocky soil, where it grows into a neat column. In rich soil, however, it grows tall and floppy. In fall, the grass turns reddish-gold, with fluffy white seed clusters. Its gold color and columnar form persist all winter. It's still looking good after winter wind has damaged most other grasses.

Switchgrass (*Panicum virgatum*).

Sun: Full sun

Soil: Dry to average soil

Height: 3-5 feet tall

Description: Another denizen of tall-grass prairie, switchgrass forms tall, stately clumps. In early fall, it has airy purplish flower-heads. The seeds provide food for birds. The grass is yellow in fall, and tan in the winter.

Big bluestem (*Andropogon gerardii*).

Sun: Full sun

Soil: Dry to average soil, needs good drainage, good in sandy soil

Height: 4-6 feet tall

Description: This is the dominant grass of tall-grass prairie. The blue-green leaves turn shades of red and purple in fall.

Notes on garden conditions

Light:

-  Full sun -- more than five hours of direct sun per day.
-  Part shade -- two to five hours of direct sun, or all-day dappled sun, as from sunlight shining through open trees.
-  Full shade -- less than two hours of direct sun per day.

Soil moisture: "Average" soil moisture describes typical conditions for Connecticut. "Dry," here, means soil that dries fairly quickly after a rain, or soil dried out by shallow tree roots -- not desert conditions.

Hardiness zones: These describe the plant's tolerance of winter cold. Plants listed here are hardy throughout Connecticut, which is in zones 5 and 6.