5 WILDLIFE AND WILDLIFE HABITAT

The State of New Hampshire supports a rich diversity of plants and animals. Most are common throughout the state but some are restricted to certain unique habitats, are at or near the edge of their species distribution range, or may be threatened due to loss of habitat. The Town of Grantham has drawn little attention for its wildlife. The NHWAP identifies only 2,661 acres as Highest Ranked Habitat (NHFGD, 2005) and only "two or three ponds" are considered significant for recreational fishing (mainly due to accessibility) (Dakai, 2008). Despite this, Grantham is mostly forested and largely undeveloped with a healthy wildlife population. Stewardship of these resources will ensure enjoyment of this rich and varied landscape for future generations. This section discusses local wildlife resources in Grantham.

For a complete list of all wildlife species occurring in New Hampshire, see the New Hampshire Fish and Game Department website at:
http://www.wildlife.state.nh.us/Wildlife/Nongame/species_list.htm.

5.1 SPECIES OF GREATEST CONSERVATION CONCERN

The NHWAP used the following criteria to identify New Hampshire species in greatest need of conservation (See Chapter 2 of the NHWAP for more details) (NHFGD, 2005):

- Distribution and abundance of species in New Hampshire and the Northeast;
- The status and risk to the species or species' habitat in New Hampshire;
- Species vulnerability due to life-history traits;
- Statewide, regional, or global population trends.

Table 5-1 lists all species of conservation concern known to currently exist in Grantham, have had a historic presence, or are potentially existing (i.e. having favorable habitat within the town). More information on the status of the following species can be found in Appendix A of the NHWAP.

Table 5-1 Species of Greatest Conservation Concern in Grantham, NH			
Common Name	**Scientific Name**	**Occurrence in Grantham**	**Conservation Concern**
Invertebrates			
Brook Floater Mussel	*Alasmidonta varicosa*	Potential	State-listed endangered
Reptiles and Amphibians			
Wood Turtle	*Glyptemys insculpta*	Known	State-listed species of special concern
Fish			
Slimy Sculpin	*Cottus cognatus*	Known	1 of 3 NH species that serve as host to the federally and state endangered dwarf wedge mussel
Tessellated Darter	*Etheostoma olmstedi*	Known	1 of 3 NH species that serve as host to the federally and state endangered dwarf wedge mussel
Birds			
Common Loon	*Gavia immer*	Known	State-listed threatened
Common Nighthawk	*Chordeiles minor*	Known	State-listed threatened
Great Blue Heron	*Ardea herodias*	Known	Populations can provide an indication of water quality and wetland health; heron rookeries provide habitat for state endangered osprey
Whip-poor-will	*Caprimulgus vociferous*	Historic	State-listed species of special concern
Mammals			
Bobcat	*Lynx rufus*	Known	State-listed protected

Note: Species maps have not been completed for all species due to incomplete data; other maps have not been released due to species sensitivity. Additional species not reported here may potentially exist in Grantham.
Source: NHFGD, 2005, edited to include local knowledge of existing species.

5.2 RARE, THREATENED AND ENDANGERED SPECIES AND NATURAL COMMUNITIES

The Endangered Species Act (ESA), first enacted by the United States Congress in 1973, was put in place to protect species that were threatened or endangered on a national level. The State of New Hampshire followed with the Endangered Species Conservation Act (RSA 212-A) in 1979 to provide the necessary protections to maintain and enhance those species found to be threatened or endangered in the State. In 1987, the New Hampshire state legislature passed the Native Plant Protection Act (RSA 217-A) recognizing the need to protect rare plants as well. Defined by both the New Hampshire Endangered Species Conservation Act and the New Hampshire Native Plant Protection Act, "endangered" species are those in danger of being extirpated from the state while "threatened" species face the possibility of becoming endangered.

Rare wildlife in New Hampshire is under the jurisdiction of the Nongame & Endangered Wildlife Program in NHFGD. A complete list of rare species in the State can be found at: http://www.wildlife.state.nh.us/Wildlife/Nongame/endangered_list.htm.

Rare plants fall under the jurisdiction of the New Hampshire Natural Heritage Bureau (NHB), which maintains a complete list of both rare plants and animals (in conjunction with NHFGD). The statewide list of rare species and natural communities, by town, can be found on the NHB website at:
http://www.dred.state.nh.us/divisions/forestandlands/bureaus/naturalheritage/index.htm

NHB also tracks exemplary natural community and system occurrences. Natural communities are different types of forests, wetlands, grasslands, etc. Natural community *systems* occur where sets of natural communities co-occur in the landscape and are linked by a common set of driving forces, such as landforms, flooding, or soils. To qualify as exemplary, a natural community or system must be of a rare type or be a very old occurrence of a common community in good condition.

Table 5-2 lists species and natural communities with documented records for Grantham. This list is not necessarily complete. Some species vulnerable to collection may not be listed and a comprehensive plant or animal survey has not been done in Grantham. To report the occurrence of a species of concern, one can visit the NHB website listed above to download the reporting form (additional reports of species already known to exist are encouraged). For more information on rare, threatened or endangered species and natural communities, contact the NHB at 603-271-2214 or the NHFGD Nongame & Endangered Wildlife Program at 603-271-2462.

Table 5-2 Rare, Threatened and Endangered Species and Natural Communities Reported in Grantham, NH

Common Name	Scientific Name	Federal Listing	State Listing	Reported number of occurrences in Grantham	Reported number of occurrences in State of NH
Natural Communities					
Red Spruce-Heath-Cinquefoil Rocky Ridge	--	--	--	Historical	12
Plants					
Giant Rhododendron	*Rhododendron maximum*	--	T	Historical	13
Green Adder's Mouth	*Malaxis unifolia*	--	T	Historical	55
Birds					
Common Loon	*Gavia immer*	--	T	1	225
Common Nighthawk	*Chordeiles minor*	--	T	1	10
Reptiles					
Wood Turtle	*Glyptemys insculpta*	--	--	2	110

State/Federal Listings: E=Endangered T=Threatened W=Special Concern (Watch List) M=Monitored
Source: New Hampshire Natural Heritage Bureau, February 2008.

The NHB can be hired for a fee to conduct inventories for rare plant populations and exemplary natural communities. The inventory services below are listed on their website:

1. **Detailed Property Inventories**: Inventories include careful surveys for rare plants, exemplary natural communities, and rare animals (in coordination with the Nongame & Endangered Wildlife Program). In addition to site descriptions and high quality maps, management considerations to facilitate informed land use decisions are provided.

2. **Town Inventories**: Town-wide analyses and field inventories can be a tremendous planning tool. Products typically include detailed site descriptions, high quality maps, and management considerations. Descriptions of the statewide importance of significant features are provided. Inventories on private property are conducted only with landowner permission.

3. **Regional Landscape Analyses**: Areas with high potential to support rare plant populations and exemplary natural communities are identified. These analyses are valuable guides for field inventories and planning efforts.

While a town-wide inventory is probably not a financially feasible option, inventories of town-owned conservation lands would provide a useful management tool and may provide insight to the potential for certain species to exist town-wide. Such inventories would be especially useful to ensure that any rare plants, animals, or exemplary natural communities are protected from recreational activities or other damage.

5.3 FISHERIES

All lakes and ponds in Grantham are warm water and hold warm water species. The typical warm water species assemblage includes largemouth bass, smallmouth bass, chain pickerel, pumpkinseed, yellow perch, brown bullhead, common white sucker, golden shiner, and common shiner. In addition, fallfish have been historically noted in Leavitt and Eastman Ponds and yellow bullhead in Eastman Pond (Magee, 2008). Currently, the decline of water quality is the only pressing threat to lakes and ponds in Grantham. New Hampshire's climate has, thus far, prevented aggressive invasive species from taking hold and invasive aquatic plant species do not appear to threaten fish (Magee, 2008). There has been some evidence, in fact, that herbicides used to control submersed aquatic vegetation, such as variable milfoil, are more harmful to fish than the plant itself (Nugent, 2008). Global warming may enable invasive species, such as the snakehead, to establish future populations in New Hampshire if vigilance to prohibit introductions lapses.

5.3.1 EASTERN BROOK TROUT

The Eastern brook trout (*Salvelinus fontinalis*) is native to New Hampshire waters. NHFGD has supplemented native populations for over 100 years with fish raised in hatcheries (NHFGD, 2005). Eastman Brook, Skinner Brook, and North Branch Sugar River are stocked annually with hatchery-raised fish (Dakai, 2008). Although field data suggest that wild brook trout—defined as self-sustaining populations without the assistance of stocked fish—still occur in Grantham (Nugent, 2008), stocking practices has raised controversy regarding the survival of pure native strains in New Hampshire.

Domestic "Rome" strain of the Eastern brook trout, raised and stocked throughout the state by NHFGD.

The brook trout is a coldwater species, requiring temperatures no higher than 66°F (19°C) in summer. Protecting habitat for these species includes maintaining a forested buffer over streams. Overhanging trees provide shade, keeping water temperatures lower, and leaves and wood dropped into the water are the base of the food web in aquatic ecosystems. According to Matt Carpenter, the NHFGD Fish Conservation Program Leader, first order stream protection is "key"

to protecting brook trout. First order streams are typically headwaters fed by groundwater and are cooler than larger order streams.

Impervious surfaces have a significant impact on brook trout. At 5-6% within a given watershed, impervious surfaces begin to impact stream channel geometry, habitat, macro invertebrates, and fish species. At 10% impervious, visual impacts are obvious and brook trout are severely jeopardized (Magee, 2008).

The Eastern Brook Trout Joint Venture (EBTJV)—a public and private partnership and joint effort created to improve and protect brook trout habitat in the Eastern United States—has mapped the presence of wild brook trout in watersheds throughout the Northeast. Although no data is available for the two main watersheds in Grantham,—Sugar River: North Branch and Sugar River: Sawyer Brook-Stocker Brook-Eastman (Figure 2-1)— models based on statistical analysis of factors such as land use, percent and type of forest cover, and road density, categorize these watersheds as either "predicted presence" or "predicted intact." New Hampshire has been chosen as a pilot state to refine the EBTJV models over the next two to three years. NHFGD has compiled past studies and collected new data to develop the model to predict the presence of all fish species present. Data was compiled from the NHDES Biomonitoring Program and the NHFGD Fishing for the Future Program and new data was collected during the summer of 2008 at the catchment level in the Sawyer Brook-Stocker Brook-Eastman watershed (Appendix B). The Fishing for the Future project was initiated in 1983 with the recognition of a need to base fish stocking efforts on more quantifiable measures of stream characteristics (NHFGD, 2005). The NHDES Biomonitoring Program began in 1995 to assess the biological health and integrity of aquatic ecosystems throughout the state through monitoring activities such as collection and identification of the resident fish community. Data collected by NHFGD has shown the likely presence of wild brook trout populations based on the assumption that trout lengths less than 90 mm are fish bred outside a hatchery (Nugent, 2008).

If the town has particular interest regarding the presence of brook trout in any given stream, contact Ben Nugent, NHFGD Fisheries Biologist, at (603) 271-2614 or benjamin.j.nugent@wildlife.nh.gov to request a survey of fish species. This may be a helpful service when considering conservation of a tract of land or in creating a management plan for land already conserved.

5.4 WILDLIFE HABITAT

Wildlife habitat is the environment that provides the food, water, cover, and space required to meet the biological needs of an animal. Although some species have adapted well to urban environments, wildlife habitat is typically considered to be natural areas. Some species may live out an entire life cycle within one habitat type while others require a variety of habitats to meet seasonal or life cycle needs. Generally, areas with substantial habitat diversity will support more wildlife species than areas with less habitat diversity.

Table 5-3 lists the acreage of each habitat type within Grantham and how much acreage of each type is under conservation. Brief summaries of the status of each habitat in Grantham are

discussed below. See Appendix B of the NHWAP for detailed descriptions of these habitats, their management status, threat assessment, and conservation actions within the state. Figure 5-1 (Appendix A) illustrates the habitat types in town as defined by the NHWAP.

Table 5-3—Total Acreage, Acreage in Conservation, and Percentage in Conservation of Habitat Types in Grantham Predicted by the New Hampshire Wildlife Action Plan

Habitat Type	Acres	Acres in Conservation	Percentage (%) of Total Habitat in Conservation
Peatlands	51	5	9.8
Northern Hardwood-Conifer	2999	713	23.8
Marsh and Shrub Wetlands	443	82	18.5
Lowland Spruce-Fir	3945	644	16.3
High-Elevation Spruce-Fir	22	0	0
Hemlock-Hardwood-Pine	7846	822	10.5
Grassland	375	0	0
Floodplain Forest	333	12	3.6
Rocky Ridge/Talus Slope	603	0	0

Source: New Hampshire Wildlife Action Plan, 2005

Northern hardwood-conifer, lowland spruce-fir, and hemlock-hardwood-pine are the most numerous habitat types in the Town of Grantham (Table 5-3). They are also the most numerous habitat types in the State. Combined, they total 14,790 acres, or 83% of the total land cover in Grantham and are well represented with just over 50% of the total land conserved in Grantham encompassing these habitat types.

Marsh and shrub wetlands include wet meadows, emergent marshes and scrub-shrub wetlands. See Section 2.2.3 for discussion of the importance of wetlands. Most of the conserved wetlands identified here exist within the Grantham Town Forest/Sherwood Forest and the Enfield Wildlife Management Area. The largest and most important marsh in Grantham, totaling over 122 acres, lies along Bog Brook. A portion of the Bog Brook wetland complex is protected in the Town of Springfield, whereas none of it is conserved in Grantham. As discussed in Sections 2.2.3 and 5.4.3.1, the protection of this wetland complex would benefit both wildlife and water resources in Grantham.

Peatlands in Grantham are likely temperate peat swamps dominated by red maple, red spruce, eastern hemlock, and other hardwoods. Location data on peatlands in Grantham are predicted based on the NHWAP habitat land cover model. A wetland inventory, as recommended in Section 2.2.3, would verify the NHWAP model and document the values of individual peatlands.

Floodplain forests in Grantham occur along Bog Brook, Stocker Brook, and the Sugar River. Although these areas receive some protection through Grantham's floodplain conservation overlay district, only a very small percentage—at the northern tip of the Reney Forest—is conserved. Floodplains provide important habitat for a number of mammals, birds, amphibians,

reptiles, and plant species, some of which are unique to floodplain habitat. Floodplains also provide significant public safety by providing critical storage for floodwaters. By protecting the Bog Brook wetland complex, Grantham would have the added benefit of conserving most of the floodplain forest habitat in town at the same time.

Grassland habitat in Grantham is primarily agricultural fields and pasture which are now giving way to development. Most notably, the Juniper Hill and Gray Ledges subdivision are set on two of Grantham's four grassland areas. A third grassland area is zoned for business development. Potential species using grassland habitat in Grantham include bobolink, savannah sparrow, and possibly even meadowlarks, bluebirds, killdeer, and kestrels (Foss, 2009). Working with landowners to place easements on remaining agricultural fields and pastures would protect habitat for grassland wildlife species and maintain the availability of fertile lands for local agriculture. If desired, additional grasslands could be created through habitat management practices on conserved lands where geology and soils are appropriate.

Rocky ridge/talus slope and high-elevation spruce-fir exist within the boundaries of the Blue Mountain Game Preserve. Although these areas are not conserved, they are unlikely to be developed in the foreseeable future. Being within the bounds of Corbin Park, however, they may be threatened by the presence or overpopulation of non-native species (see Section 7.7). These habitat types are relatively rare in New Hampshire.

Other habitat features existing in Grantham include deer wintering areas. In 1987 NHFGD mapped four deeryards in Grantham, all east of I-89 (Figure 5-2, Appendix A). The largest and two smallest of the yards are fragmented by development within the Eastman community and may no longer support deer or are adversely impacted. More recent data on existing deer yards is unavailable. However, NHFGD has developed a model to map potential deer yards based on forest cover type, impact (road proximity and housing density), elevation, and other attributes. As illustrated in Figure 5-2 (Appendix A), the potential for deer wintering habitat exists town wide. The potential deer yard model has not been field checked.

Steep, rocky slopes (Figure 3-5, Appendix A) provide important denning habitat for certain species such as the bobcat and black bear. South facing steep slopes (Figure 5-2, Appendix A) have additional importance in winter for solar gain. The southern exposure of these areas provides sunning sites and reduced snow depth, which help winter-active animals to conserve energy.

Riparian corridors (Figure 5-2, Appendix A) support a significant diversity of habitat, species, and ecological processes. See Section 2.2.2, for discussion of riparian zone habitat.

Vernal pools provide a unique habitat that some species depend on for their entire life cycle. Other wetland dependant species use groups of pools as stepping stones as they travel over the landscape. Vernal pools also provide watering holes or feeding grounds for birds, snakes, turtles and some mammals. See Section 2.2.4 for more detailed discussion of vernal pools.

5.4.1 HIGHEST RANKED WILDLIFE HABITAT (NHWAP)

The NHWAP analyzed the condition of wildlife habitats by ranking the biological, landscape and human impact factors affecting each habitat type. Biological factors include rare plant and animal species and overall biodiversity. Landscape factors include size and proximity of habitat to other patches of that habitat. Human impact factors include road density, presence of dams, recreation impact, and potential pollution sources.

The highest ranked habitat in New Hampshire represents the top 10-15% of wildlife habitat in the state. These are the habitats where the biological and landscape ranks are highest, and the human impacts are lowest. Highest ranked habitat in the ecoregion are areas of highest ranking condition as compared to all areas of the same habitat within an ecoregion. An ecoregion is defined by common climatic, geological, land use, and vegetation characteristics. New Hampshire consists of twelve ecoregions. The Sunapee Uplands, for example, is characterized by a humid climate; low mountains, sandy loam till-outwash, and sand-gravel bedrock; forestry, agriculture, and recreation; and sugar maple-birch-beech forest and other forest types. Grantham is included in the Sunapee Uplands (Figure 5-3). The NHWAP also mapped supporting landscapes. Supporting landscapes are areas that are important to the integrity of the highest ranking habitats because of their interactions with those habitats. Loss of the supporting landscape could detrimentally impact the quality of the high ranking habitats.

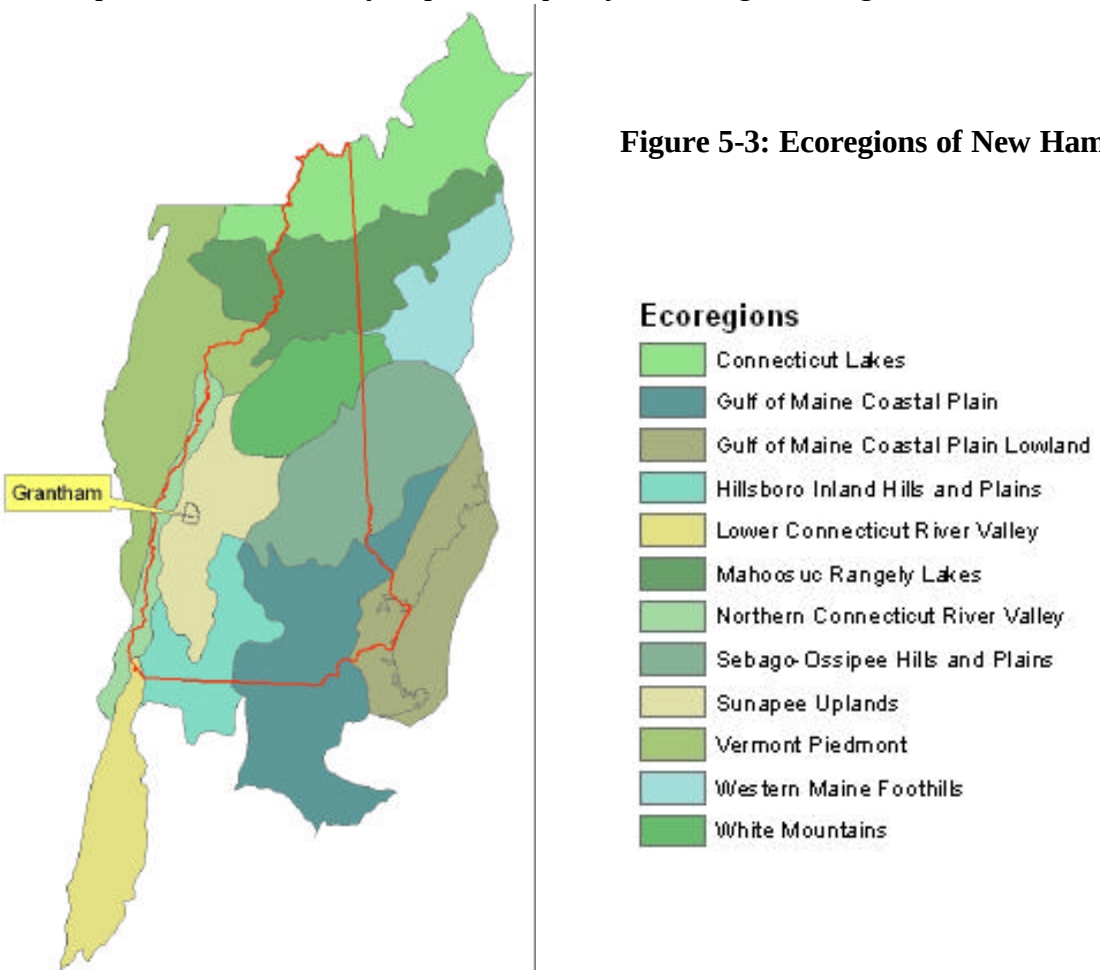

Figure 5-3: Ecoregions of New Hampshire

Of the roughly 2,300 acres currently conserved in Grantham, the NHWAP identified 635 as high value or supporting landscapes (Table 5-4). If the town were to focus on conservation areas based on the NHWAP data alone, the Bog Brook wetland complex would be among the top priorities (Figure 5-4, Appendix A). Other focus areas would include the riparian strips along the Sugar River and Littlefield Brook.

Table 5-4—Total Acreage, Acreage in Conservation, and Percentage in Conservation of High-Ranked Habitat in Grantham

Rank	Acres	Acres in Conservation	Percentage (%) of Total Habitat in Conservation
Highest Ranked Habitat in NH	395.5	12	<1
Highest Ranked Habitat in Ecoregion	2,266	179.5	1
Supporting Landscapes	5,552	443	2.5

Source: NHFGD, 2005

5.4.2 NATURAL SERVICES NETWORK

In partnership with numerous state and non-governmental organizations, the Audubon Society of New Hampshire and the Jordan Institute created the New Hampshire Natural Services Network (NSN) as a tool to help communities identify lands that provide important ecological services and are difficult and/or expensive to replicate. The NSN is made up of four components: water supply lands, productive soils, flood storage lands, and high ranking wildlife habitat. Water supply lands include favorable gravel well areas and aquifers. Flood storage lands include floodplains and wetlands. Productive soils (Section 3.1) include prime agricultural soils and soils of statewide importance. Important wildlife habitat includes the highest condition wildlife habitat in New Hampshire and the highest ranked habitat in the ecoregion as identified in the NHWAP.

Natural service network lands cover nearly one quarter of the Town of Grantham (Figure 5-5, Appendix A and Table 5-5). Important wildlife habitat covers the most acreage of the four categories. The majority of important wildlife habitat exists within the bounds of Corbin Park.

TABLE 5-5—Natural Services Network in Grantham

Natural Services Network (NSN) Type	Acres	Percentage (%) of Total Town Acreage
Water Supply Lands	103	0.5
Flood Storage Lands	1669.5	9
Productive Soils	594.5	3
Important Wildlife Habitat	2662	15
Total NSN	4327	24

Note: Lands may include more than one category and services may overlap. Thus, total acreage and total percentage of NSN in Grantham is not the sum of each component.

5.4.3 CO-OCCURRENCE ANALYSIS

In order to identify priority conservation areas, or Conservation Focus Areas (CFA), in Grantham, a weighted co-occurrence model that attributes relative importance values to individual natural resources was applied. Three co-occurrence maps were created for the Town of Grantham—Water Resources, Field and Forest, and Wildlife Habitat—each focusing on a select group of natural resources that would provide the town with a detailed understanding of each resource group. See Section 1.3.1 for detailed methodology on the co-occurrence analysis method. **The numbered order of CFAs do not in any way reflect order of importance of water resources, field and forest resources, or wildlife habitat.**

5.4.3.1 WATER RESOURCES CO-OCCURRENCE

Eastman Pond is encompassed by CFA 1 (Figure 5-6, Appendix A and Figure 5-7) in the co-occurrence analysis of water resources. Water quality issues in this lake are a serious concern (see the Eastman Pond Watershed Study published by the Upper Valley Lake Sunapee Regional Planning Commission) but Eastman Pond's emergence in the co-occurrence analysis attests to its importance. Due to the extent of development around the lake, conservation efforts should focus on the Eastman Pond watershed.

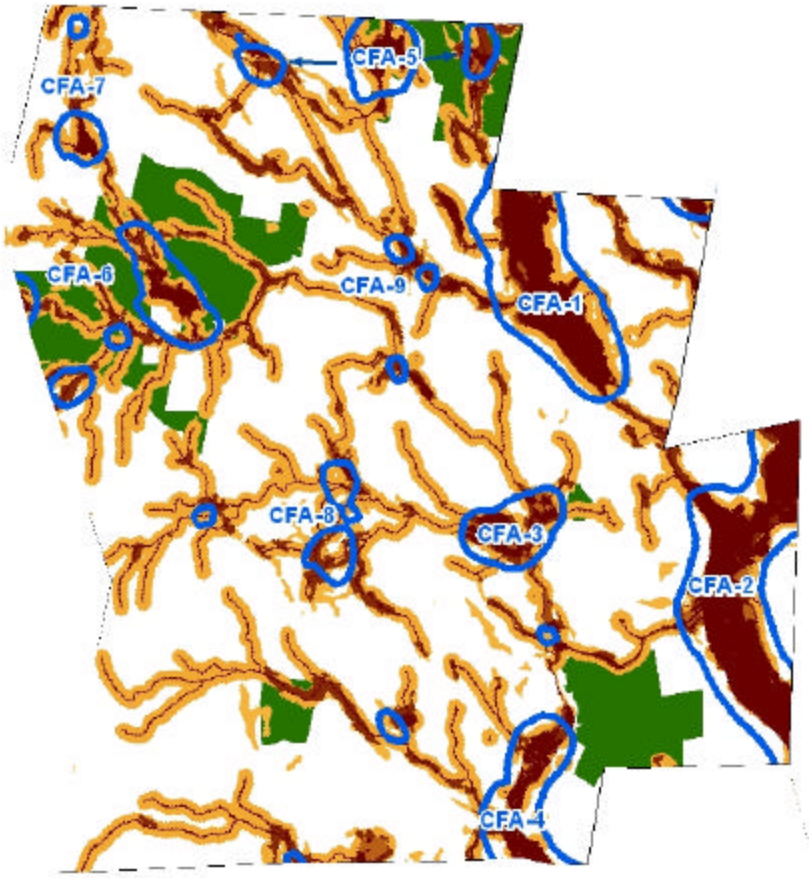

Figure 5-7: Conservation focus areas for the water resources co-occurrence analysis.

CFA 2 contains the most important water resources in the Town of Grantham. This area involves every natural resource included in the water resources analysis. Providing connectivity to both McDaniel's Marsh in Springfield as well as the Enfield Wildlife Management Area, it is excellent wildlife habitat (see wildlife habitat analysis below). Probably due to its high wetland density, it remains mostly undeveloped and contains Grantham's best groundwater resources with the only known high-yield aquifer flowing

beneath it. Finally, it is Grantham's most extensive floodplain, thereby providing a measure of public safety.

Concern has been raised that the old Grantham Municipal Landfill is located in CFA 2. According to online NHDES records, this landfill was capped in 2002 at a total closing cost of $378,952. The landfill is unlined and capped with a low permeability cap. The effect of low permeability caps on groundwater and surface water is monitored through the Groundwater Permit system. If at any time the cap is found to be inadequate in controlling the landfill's releases to the environment, or if the landfill is out compliance with state regulations, NHDES will require final closure of the landfill with an impermeable cap and/or will implement other steps to ensure remediation of the site. It is extremely important to monitor the groundwater beneath and downstream of this site to ensure contaminated leachate is not seeping into the aquifer.

CFA 3 is somewhat developed and, because of its location off of I-89 exit 13, it is likely to see higher development pressure than other areas of town. Soils are primarily hydric in this location and any development would likely be threatened by flooding. Flood damage would impact a section of the fourth-order Skinner Brook shortly before it enters the North Branch Sugar River.

CFA 4 contains most of the two miles of North Branch Sugar River flowing through Grantham. This area contains all the natural resources included in the water resources analysis with the exception of high yield aquifers. This area is the beginning of the North Branch Sugar River sub-watershed. It is one of the more developed locations in town which may be a cause for concern.

CFA 5 includes Grass and Butternut Ponds and a wetland complex associated with the outflow of Cole Pond in Enfield. Much of this area is already under the protected status of the Enfield Wildlife Management Area. Expanding protection around Butternut Pond would help establish a connectivity corridor to the Sherwood/Grantham Town Forest tracts if an acceptable passage could be found across I-89. Grass Pond and its associated wetland have limited value due to the proximity to I-89.

CFA 6 lies primarily within the Grantham Town Forest/Sherwood Forest acreage. These areas, along with CFA 7, which is unprotected, are consistent with the highest scoring natural resource, lakes and ponds (Table 5-6). This area remains undeveloped. Conserved, it would help provide connectivity with the Enfield Wildlife Management Area to the north. This general area also ranks high in the wildlife habitat co-occurrence analysis (see below). Interstate 89 continues to pose a hazard to connectivity efforts.

CFA 8 appears to have some noteworthy wetland resources and lies in within the transition of sprawl development (see Section 7.1) and an unfragmented tract of greater than 1,000 acres. The area surrounding this CFA is deemed significant in the field and forest co-occurrence analysis.

Development is restricted by the floodplains and hydric soils that dominate CFA 9. It is not a prime area for conservation efforts due to its location between I-89 and Eastman.

Table 5-6: Water Resources Co-occurrence Delphi Voting Scores

Natural Resource	Score
Lakes/Ponds	21.67
High Yield Aquifers	20.83
Streams ≥ 4th order	18.33
Streams ≤ 3rd order	14.17
Low Yeild Aquifers or Yield Unknown	8.33
Riparian & Shoreland Buffer Zones (300')	6.67
NWI Wetlands & Hydric Soils	5.83
Floodplains	4.17

5.4.3.2 FIELD AND FOREST CO-OCCURRENCE

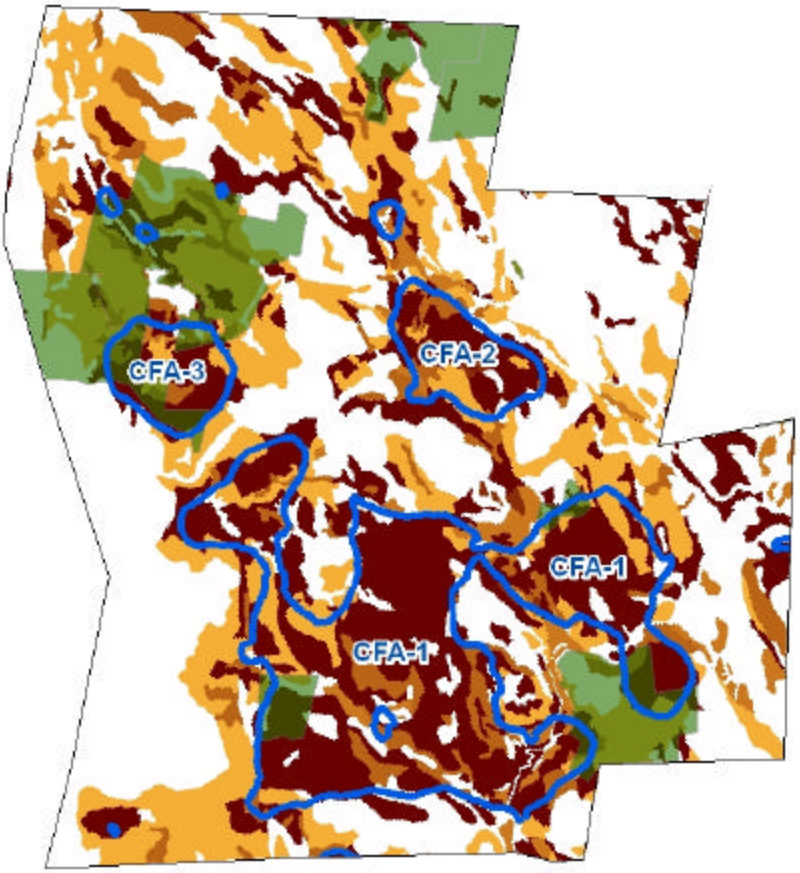

Figure 5-9: Conservation focus areas for the field and forest co-occurrence analysis.

All three CFAs in the field and forest co-occurrence analysis are consistent with the top scoring soils classes in important forest soils and prime agricultural soils (Table 5-7). CFA 1 and 2 (Figure 5-8, Appendix A and Figure 5-9) encompass most of the prime agricultural soils in town. The three largest contiguous sections of productive forest soils of class 1A are covered by all three CFAs. About half of CFA 3 is already protected and managed as part of the Grantham Town Forest. Agricultural and forest practices in CFA 2 are limited by development. The tract of land west and south of Dunbar Hill road, however, lies within an unfragmented tract of greater than 1,000 acres. This area is worthy of further conservation efforts.

Table 5-7: Field and Forest Co-occurrence Delphi Voting Scores

Natural Resource	Score
Prime Agricultural Soils	25.00
Productive Forest Soil Class IA	23.75
Farmland of Local Importance	21.67
Productive Forest Soil Class IB	15.42
Farmland of Statewide Importance	14.17

5.4.3.3 WILDLIFE HABITAT CO-OCCURRENCE

CFA 1, the largest wildlife habitat CFA in Grantham (Figure 5-10, Appendix A and Figure 5-11), covers the majority of Corbin Park and extends north along the Plainfield town border and into Enfield. This CFA is consistent with two of the highest scoring natural resource layers (Table 5-8): northern hardwood/conifer forest and the NHWAP highest ranked habitat in the ecological region. To the east, CFA 2 is consistent with the two highest scoring values of northern hardwood/conifer forest and unfragmented lands of 100-500 acres in size. The majority of the Grantham Town Forest and Sherwood Forest are encompassed by these two focus areas; efforts to conserve the land to the north would not only protect much of the remaining acreage in CFAs 1 and 2, but would likely safeguard an important wildlife travel corridor between the Grantham Town and Sherwood Forests and the Enfield Wildlife Management Area (although I-89 would remain a major barrier). In close proximity to CFA 1 and CFA 2, CFA 3 consists of the second highest scoring resource, northern hardwood/conifer forest.

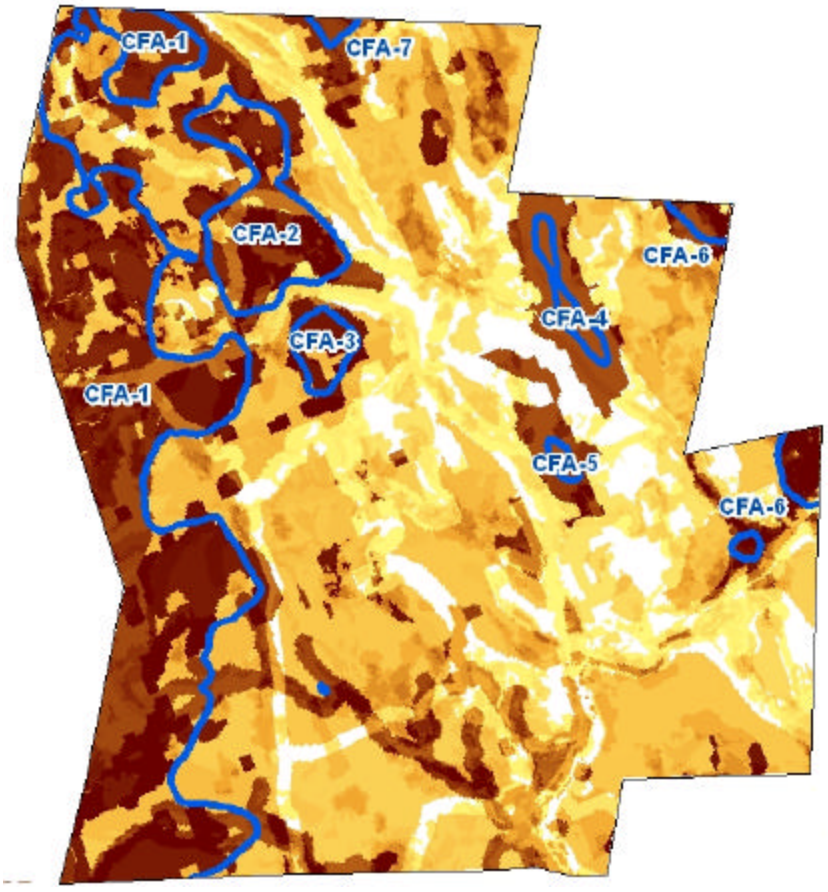

Figure 5-11: Conservation focus areas for the wildlife habitat co-occurrence analysis.

Eastman Pond is highlighted as CFA 4. It stands out because, in the unfragmented lands analysis, the lake is shown as an unfragmented parcel between 100-500 acres. Although the lake itself may have value to certain

aquatic or semi-aquatic species, it is unlikely to contain prime wildlife habitat due to the extent of development in Eastman.

CFA 5 is also highlighted because of where it falls in the unfragmented lands category. The habitat landcover of CFA 5 is hemlock-hardwood-pine which, because it is one of the most abundant landcovers in New Hampshire, was not included in the Delphi voting process as an important resource to consider. CFA 5 is surrounded by development and is not an appropriate location to focus conservation efforts.

Table 5-8 Wildlife Habitat Co-occurrence Delphi Voting Scores

Natural Resource	Score
Unfragmented Lands 100 - 500 acres	17.50
Northern Hardwood/Conifer Forest	15.00
Highest Ranked Habitat in Ecological Region	10.00
Highest Ranked Habitat in NH	8.33
Unfragmented Lands 500 - 2,500 acres	7.17
Unfragmented Lands >10,000 acres	6.67
Existing Deer Wintering Areas	5.83
Unfragmented Lands 2,500 - 10,000 acres	5.67
Unfragmented Lands <100 acres	4.83
Lowland Spruce/Fir Forest	3.33
Floodplain Complexes >500 acres	2.50
Marsh Complexes >250 acres	2.50
Potential Deer Wintering Areas	2.33
Grasslands & Meadows	1.67
Other NWI Wetlands & Hydric Soils	1.67
Southfacing Slopes	1.67
Rocky Ridge/Talus Slope	1.50
Peatland Complexes >250 acres	1.00
Riparian & Shoreland Buffer Zones (300')	0.83
High Elevation Spruce/Fir Forest	0.00
Steep Slopes >25%	0.00

CFA 6 is part of the Bog Brook wetland complex which has been identified a number of times within this document as important wildlife habitat. CFA 2 from the water resources co-occurrence analysis is coincident with the wildlife resources CFA 6. This area provides continuity to McDaniels Marsh and the Enfield Wildlife Management Area to the north. It is a prime location to focus conservation efforts both locally and regionally.

CFA 7 is the southernmost tip of a CFA that lies primarily within the Town of Enfield and is mostly protected by the Enfield Wildlife Management Area. This general location in Grantham is valued more for its water resources (see CFA 5 in the water resources analysis) than its wildlife habitat but is still important due to its proximity to the WMA.

5.4.3.4 CONSERVATION FOCUS AREA CO-INCIDENT ANALYSIS

In an effort to determine the most important CFAs for the town to concentrate their conservation efforts, the three co-occurrence analyses were overlapped in a final co-incident model. Each CFA in the co-incident analysis is assumed to be of equal value. Where they overlap would indicate the overall highest value CFA in Grantham. Because the datasets are inherently different resource types, the focus areas differ greatly and there is very little overlap for the CFAs of each resource group (Figure 5-12). Thus, the focal mean analyses and their resulting CFAs must be used in a comparative, but stand-alone way, depending on the conservation focus. Should the GCC choose to prioritize CFAs, they will first need to prioritize conservation goals. If water quality is the focus, for example, efforts should concentrate on those CFAs identified in the water resources co-occurrence model.

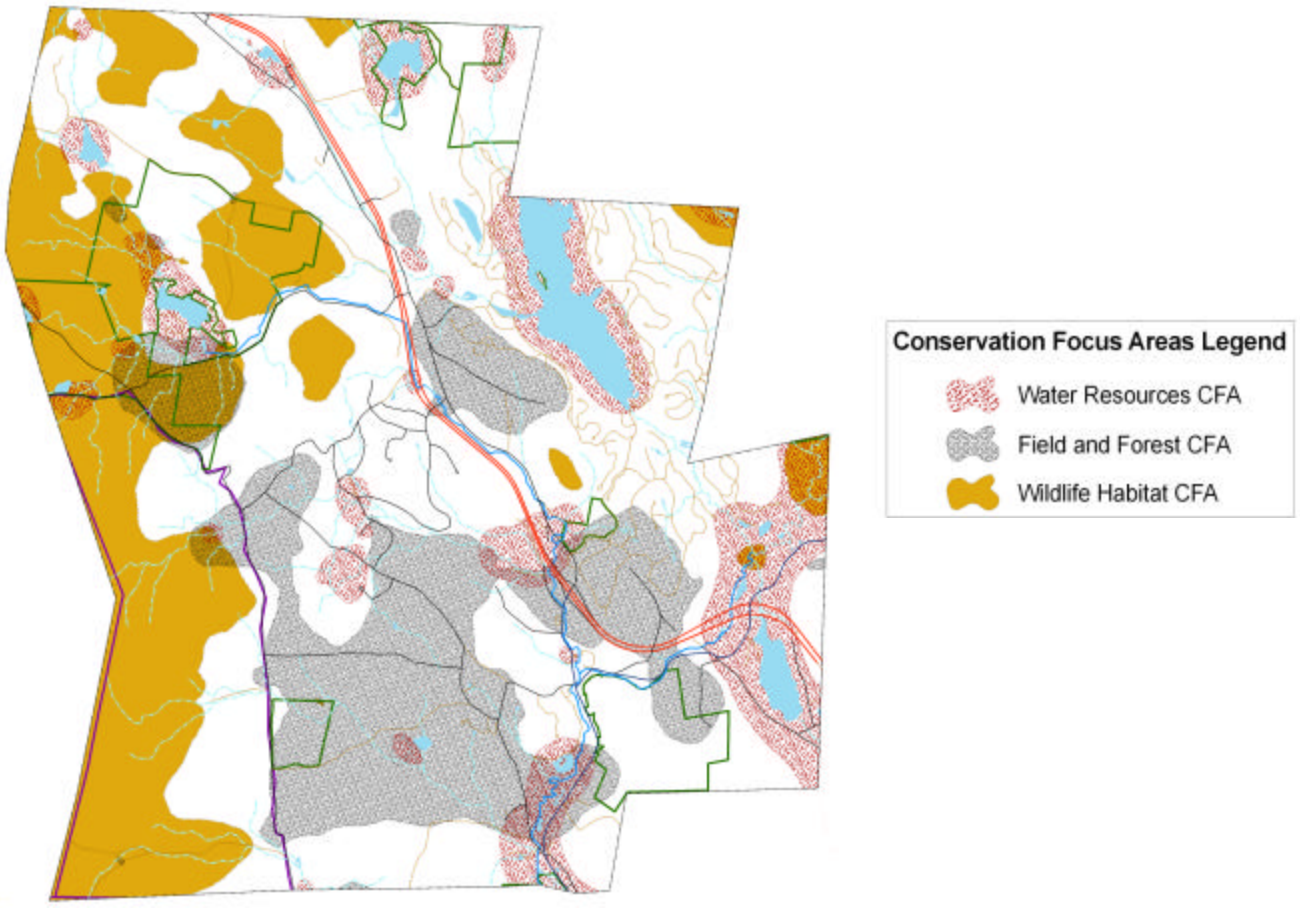

Figure 5-12: Because each resource group is inherently different, there is little overlap in the conservation focus areas for each co-occurrence analysis.

In summary, the prime CFA for wildlife habitat is north of Corbin Park and the Grantham Town Forest/Sherwood Forest. This are provides connectivity between existing conserved lands. For water resources, the Bog Brook wetland complex is an exceptional area, providing wildlife habitat, potential drinking water resources, and public safety through floodwater storage. And for field and forest resources, the unfragmented block in the south-central portion of town, largely undeveloped and mostly forested, is of highest value for its forest resources. These three areas should be the focus of the Grantham Conservation Commission's conservation efforts.

5.4.4 CONNECTIVITY

There are two general categories of connectivity: landscape and aquatic (Forman et al. 2003). Aquatic connectivity may be broken down into upstream-downstream connections; connections between wetlands or floodplains with streams; and connections between forests and streams. Grantham's upstream-downstream connections, as is the case virtually nationwide, have fallen victim to the impacts of road and stream intersections. This is discussed in greater detail in Section 7.3. Much of Grantham's shoreline remains naturally vegetated with the highest density of development occurring along Skinner Brook, Sugar River, and Sawyer Brook. To maintain a mostly vegetated shoreline and protect wildlife habitat and water quality, consideration of enhancing shoreline protection rules is recommended (See Section 2.2). A town-wide wetland inventory, as recommended in Section 2.2.3, will aid the town in determining which wetlands are most valuable. Wetland function criteria to be considered include floodwater storage, sediment and toxicant retention, shoreline stabilization, wildlife habitat, and which upland connections are still intact.

"Landscape connectivity is the degree to which the landscape facilitates animal movement and other ecological flows" (Forman et al. 2003). Connectivity allows animals to move between habitats for foraging, establishing new populations or territories, and for seasonal migration. Animals move freely about the forest but may also move along a linear path—oftentimes following a prominent landscape feature such as a ridgeline or riparian zone—with the sole objective being to get from one habitat to another. These trails are commonly called wildlife travel corridors and their effectiveness depends upon the length and width of the corridor as well as the habitat (food and cover) in the corridor itself. It's important to recognize that a long, thin swath of forest passing through a landscape of houses and roads will probably not be effective in moving at least some wildlife species.

NHFGD, in cooperation with the Audubon Society of New Hampshire, is currently developing a statewide wildlife connectivity model for New Hampshire. The preliminary results of the least cost analysis are presented here. A least cost analysis, applied through GIS, creates an index of resistance to wildlife mobility where the least amount of resistance has the lowest cost. In other words, the model estimates the most likely route an individual animal may travel to get from one location to another, thus identifying areas of permeability between habitats. Landscape factors included in the model include land use/land cover, distance to roads by road class, distance to a riparian area, and slope (not included in the data presented here but currently being worked into the model at NHFGD, is traffic volume). Fifteen focal species were chosen, each with varying

degrees of sensitivity to the landscape factors, to serve as umbrella species to model wildlife travel corridors.

As an example, Figure 5-13 represents the corridor analysis for bobcat. The least cost analysis identifies the potential routes a bobcat may travel between the Enfield WMA, the Grantham Town Forest/Sherwood Forest, and the Reney Memorial Forest. Note where the corridors narrow as they cross I-89 and through more developed areas (noted in red as "high cost" to the species). The corridor analysis does not take the Corbin Park fence into consideration; it was decided the fence should be part of the analytical evaluation of potential corridors rather than trying to accommodate it into the GIS analysis of cost surfaces (Callahan, 2009).

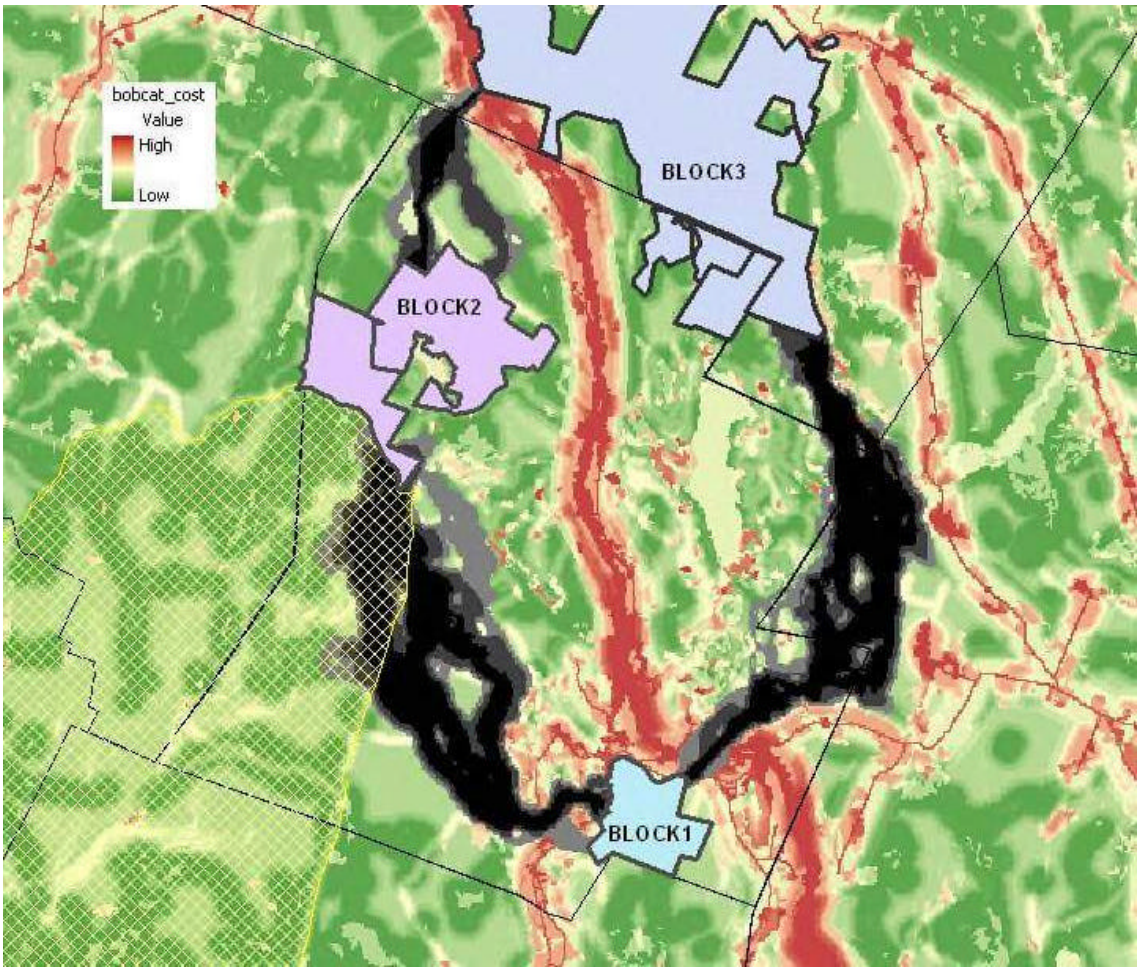

Figure 5-13: Potential travel corridors between Grantham's conserved parcels for bobcat.

Other selected focal species were Blanding's turtle, mink, spotted turtle, otter, wood turtle, long-tailed weasel, black racer, fisher, eastern hognose snake, American marten, snowshoe hare, New England cottontail, Canada lynx, porcupine, and black bear. These species were chosen to serve as umbrella species because they were habitat generalists, habitat specialists, area sensitive, or barrier sensitive. Analyses for all these species is expected to be released early in 2009.

5.5 SUMMARY OF RECOMMENDATIONS

- Consider hiring the Natural Heritage Bureau to conduct detailed property inventories of town-owned conservation lands.
- Work with landowners to protect remaining grassland habitat; create additional openings through habitat management practices.
- Consider additional or extended protection of all riparian buffers, maintaining tree cover and limiting impervious surfaces, to protect wild brook trout and riparian corridor habitat.
- Conduct a town-wide wetland inventory that would include peatlands and vernal pools.
- Enact steep slopes protection ordinances to preserve denning and sunning sites and ridgeline protections to preserve potential wildlife travel corridors.
- Proposed development must be sensitive to potential winter deer yards.
- Conservation focus areas should include the lands north of the Grantham Town Forest/Sherwood Forest, the Bog Brook Wetland Complex, and the mostly forested, undeveloped portion of town south and west of Dunbar Hill Road.