

PROJECT DESCRIPTION

This report summarizes the findings of a biodiversity inventory project undertaken by the Dummerston Conservation Commission. The goal of this project is to catalog the resources that support the plants and animals native to the town. The commission will use this information to develop strategies to ensure that future generations of residents will enjoy the landscape and wildlife that we do today.

The lands of Dummerston are among the most species-rich in all of Vermont. We are in a climate mixing zone. Many species exist here at the northern or southern limits of their ranges. We have the southern oaks and hickories, cottontail rabbits and opossums, and the northern sugar maple, beech, and yellow birch, as well as moose and snowshoe hare. From the shores of the Connecticut River to the hills at the western border, there are many different natural communities and species, some of which are found in few other places in Vermont.

We define biodiversity broadly. Since our goal is to provide the habitat that all native species will need to survive within our boundaries in perpetuity, we need to think about conserving representatives of each species in a way that will allow them to continue to evolve, shift ranges, and function within ecological communities. We need to think about biodiversity on different scales: the diversity of ecological communities; the numbers of species; the sizes of populations; and the genetic diversity within each species, since all may prove integral to the well-being of our flora and fauna.

We have used the Vermont Department of Fish and Wildlife's manual, *Conserving Vermont's Natural Heritage: A Guide to Community-Based Planning for the Conservation of Vermont's Fish, Wildlife, and Biological Diversity*, to conduct this inventory.

We gathered information on the elements the manual recommended. These elements are divided into three **Conservation Levels: Landscape, Community, and Species.**

On the Landscape Level we consider the elements that contribute to biodiversity on a large scale:

- *Contiguous land*
- *Connecting lands*
- *Enduring features*

On the Community Level we evaluated:

- *Natural Communities*
- *Wetlands*
- *Riparian and Aquatic Habitats*
- *Vernal Pools*

On the Species Level we gathered information on:

- *Rare, threatened and endangered species*
- *Deer wintering areas*
- *Mast stands*
- *Grassland bird habitat*
- *Early successional forest and shrub habitat*

From maps and photos we had a reasonably good sense of the topography, forest cover, and the presence of large brooks and rivers. We knew something of the bedrock and soils from surveys. We knew where residents had seen wildlife from conversations and mapping projects at Town Meeting for several years. What we didn't know is whether or not there were small wetlands or vernal pools, exceptional stands of beech or oak, sites with ledges that might provide wildlife den sites or a substrate for unusual plants. Were there unusually rich soils that support calciphilic plants? Were there unusually wet or well-drained soils that

supported specialized species? Do the trees in different parts of the town seem unusually robust or unusually stressed? Are there any sites that might be of cultural interest?

Conservation commission members, a graduate student, and naturalists from the Bonnyvale Environmental Education Center spent many hours filling in these gaps in our information. They focused on the parts of town about which the least was known, and on the parts of town which were most likely to be essential to the conservation of biodiversity.

To organize the analysis of the information, we have divided the town into sections (see Map 1). Each of these has a certain geographical integrity.

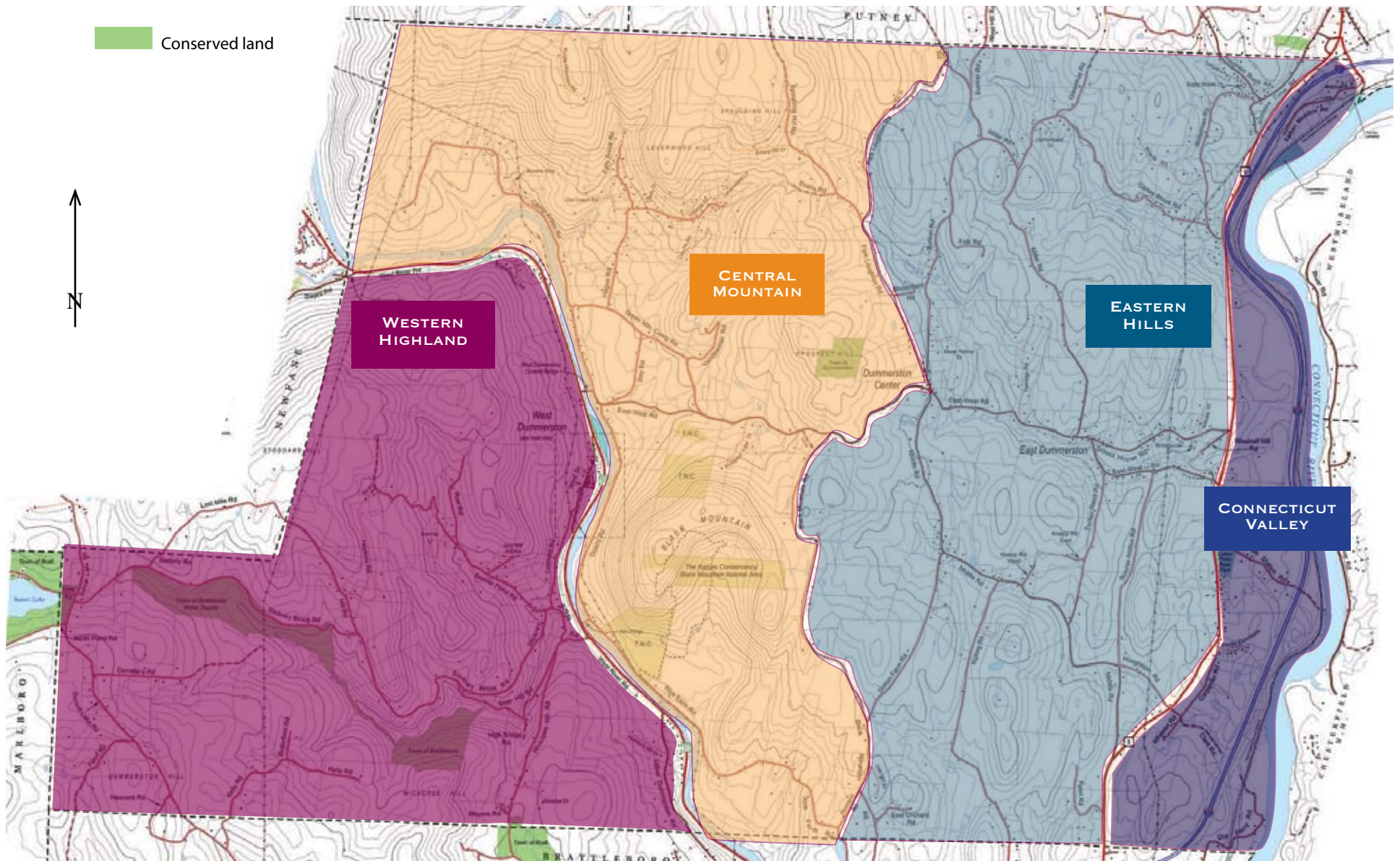
The **Connecticut Valley Section** has relatively low hills and a low elevation. It has been heavily influenced by the Connecticut River and a long history of human occupancy and use.

As we move west to the **Eastern Hill Section**, elevations rise and the topography becomes more rolling. This section contains larger forested areas mixed with agricultural lands and settled areas.

The **Central Mountain Section** includes Black Mountain, Prospect Hill, and the southern end of the Putney Mountain ridge. The landscape here continues the east-west trend of increasing steepness, elevation, and larger tracts of forest land.







In the **Western Highland Section**, we find the highest elevations in town, and excellent connections to contiguous forest areas in Newfane and Marlboro.

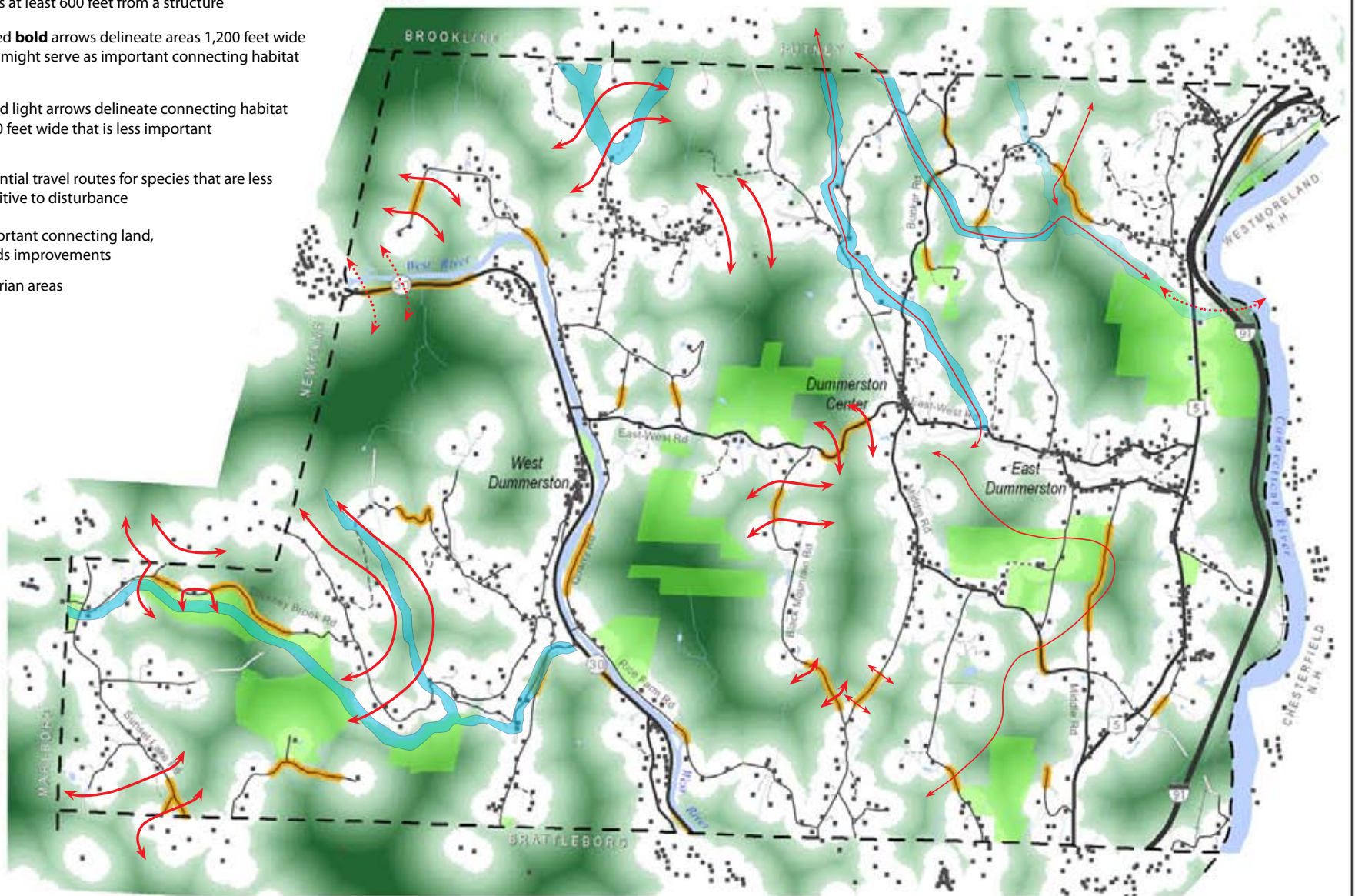
Dummerston Biodiversity Inventory Sections



Base map by Jeff Nugent, Windham Regional Commission. Section overlay, Patti Smith

Contiguous Habitat and Connecting Lands

-  Areas at least 600 feet from a structure
-  Paired **bold** arrows delineate areas 1,200 feet wide that might serve as important connecting habitat
-  Paired light arrows delineate connecting habitat 1,200 feet wide that is less important
-  Potential travel routes for species that are less sensitive to disturbance
-  Important connecting land, needs improvements
-  Riparian areas



Base map by Jeff Nugent, Windham Regional Commission. Arrow overlay, Patti Smith

LANDSCAPE LEVEL ELEMENTS:

CONTIGUOUS HABITAT AND CONNECTING LANDS:

The conservation of large tracts of contiguous undeveloped land is likely to have the greatest benefit to biodiversity, since these areas are often in the most natural condition, and they are likely to contain a diversity of landscape features, natural communities, and species.

Some species require remote forest, some have large territories, and others can tolerate human activities, but may have some special needs that will be jeopardized by a landscape that is fragmented.

In this report we have mapped contiguous habitat as any land that is more than 600 feet from a structure. In many cases such land is a mix of forest, field, wetland and farmland. To a fox that moves freely between farm and forest, this might be considered "contiguous habitat." To a bobcat that prefers dense cover and forest, this landscape is not contiguous. Fortunately, in Dummerston, there are undeveloped tracts that contain remote forest, as well as tracts that contain a variety of habitat types.

Each unfragmented area has unique and valuable features, and an ideal system of conserved lands would keep them all intact. However, biodiversity is not the only consideration in land use choices, so each of these areas will be assessed for its value to biodiversity when we take a closer look at each Section. The unfragmented areas in the western half of the town are the largest, and connect to large unfragmented lands in adjoining towns. From these areas it is possible for species such as bear, bobcat, and moose to travel between Dummerston and the Green Mountain National Forest with few road crossings and through large, undeveloped tracts of land.

For the sake of diversity, however, contiguous habitat that includes low elevations, fields, meadows, and edges, is important as well.

For species that prefer to move through areas that are at least 600 feet from a structure (some mature black bears require such buffering [Hammond, 2002]), we have delineated priority connecting lands that are 1,200 feet wide.

Riparian areas, land adjacent to rivers and streams provide a natural travel route for many species. Riparian areas are discussed in greater detail under the Community Level Elements.

Undeveloped road segments are also important for connecting habitat. Some of these are located in places that are likely to be important areas for wildlife to cross and for maintaining habitat connectivity. These areas have all been surveyed to assess their suitability for wildlife crossing, and will be discussed in greater detail in the reports on each Section.

ENDURING FEATURES:

Enduring features form the physical structure that supports natural communities. They include bedrock, soils, elevation, hydrology, and landforms. The combination of these features often determines what can grow or live on a given site.

Dummerston elevations range from about 230 feet above sea level along the Connecticut River to a high point of 1,650 feet at the summit of Dummerston Hill in the southwest part of town.

Slopes of a variety of steepness occur, with greater steepness found to the west, and the land becoming lower and flatter as you move toward the Connecticut River.

Bedrock geology plays a dramatic role in Dummerston's landscape. Black Mountain, a dome of granite exposed when the layers of metamorphic rock above it eroded away, is a hard acidic bedrock. What little soil accumulates on its steep slopes tends to be well-drained and low in nutrients. Plant communities here are different from those in the

rest of town. Some are rare in the rest of the state.

The Waits River Formation bedrock provides the town's other extreme. This rock contains impure marble that contributes calcium to soils. Where this calcium-rich component of the formation occurs a rich northern hardwood forest can develop. This is a natural community that produces displays of spring wildflowers, and grows some of the world's finest sugar maples. The Giles Mountain Formation and the Northfield Formation both contain smaller amounts of the impure marble, and rich forests and rich ledge exposures are found on these formations, too.

East of Route 5, Littleton and Partridge formations derive from muddy materials in a less rich ocean bed environment. The Littleton Formation includes slate, some of which was quarried in Dummerston in the 1800s.

Dummerston's soils reflect the glacial past. While much of the land is covered with glacial till, the influence of glacial Lake Hitchcock is recorded in these surficial deposits. This lake filled the Connecticut and West River valleys to the elevation of about 370 feet, which would have put the village of West Dummerston underwater, and much of the land east of Route 5. The areas adjacent to or below this shore exhibit the variety of deposits you would expect to see along lake beds and shores, including deltas, layered clays, and sand and gravel deposits. Some of these deposits are quite deep, and many are well drained.

The Enduring Features element of the report discusses the bedrock, soils, and shape of the land. Hydrology comes up in other sections of this report as we discuss how water on the landscape effects natural communities.

These bedrock types exert an influence on the natural communities of Dummerston

New Hampshire Plutonic Series is the granite that forms Black Mountain. Here plants that can tolerate dry, shallow, acidic soils can be found. Note that the West River cuts through this granite, indicating that the river is older than the mountain.

Waits River Formation contains abundant interbeds of brown punky impure marble that contributes calcium to soils. Rich northern hardwood forests are most likely to occur on this bedrock. Exposed ledges can host flowering plants and ferns that need calcium.

Giles Mountain and Northfield Formations also contain small amounts of impure marble and rich forest/plant sites may be found on these formations, though less often than on the Waits River.

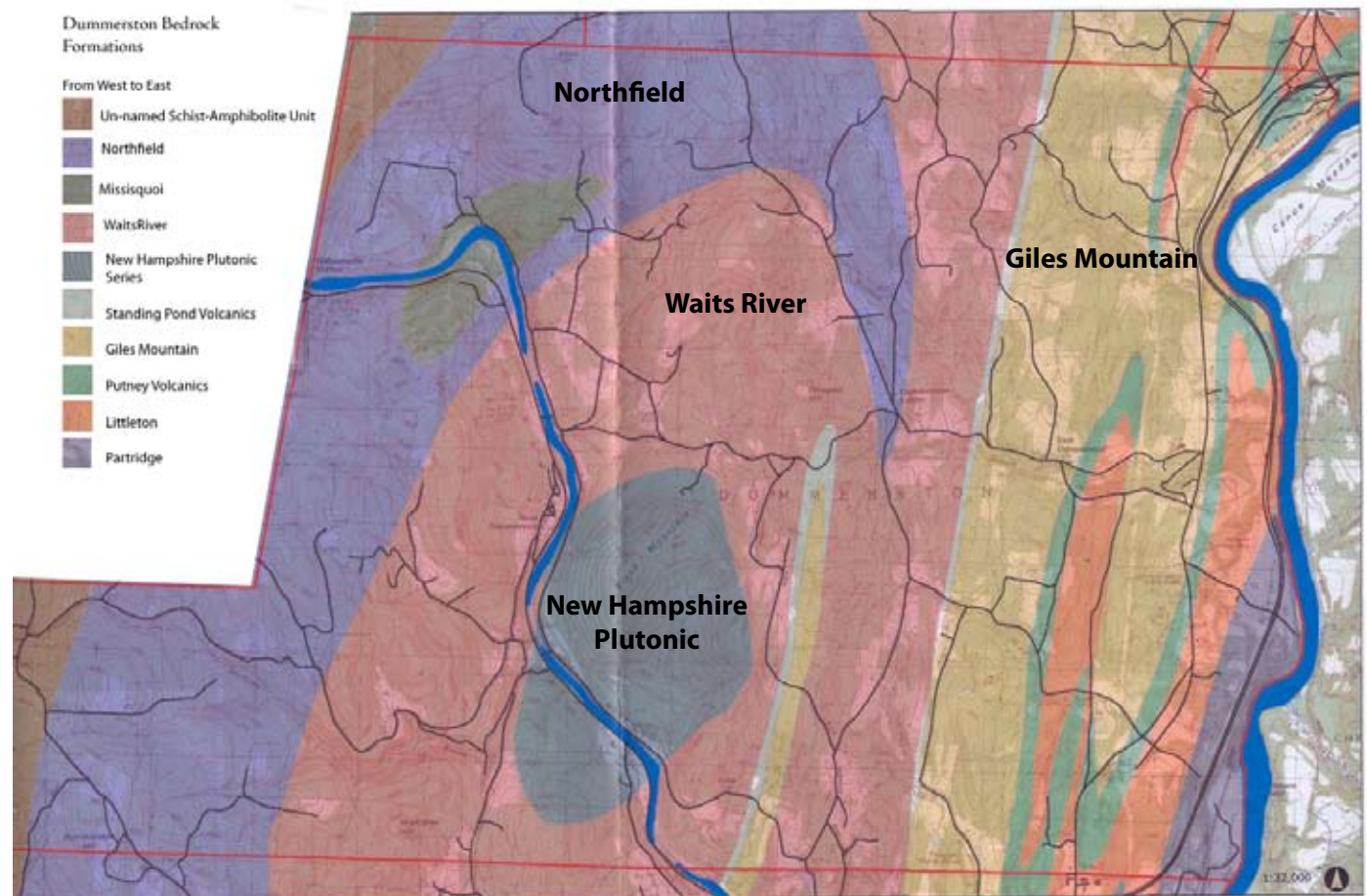
Waits River Formation



New Hampshire Plutonic



Dummerston Bedrock Formations



COMMUNITY LEVEL ELEMENTS:

NATURAL COMMUNITIES

Across the landscape, species composition changes in predictable ways as the physical conditions change. One set of plants and animals will be found on dry, fire-prone slopes, while a different set will be found along wooded streams. These groups of species and their environments can be classified as natural communities. (In Vermont, natural communities have been described and defined in the book, *Wetland, Woodland, and Wildland* by Eric Sorenson and Liz Thompson.)

“Matrix communities” encompass the species that excel in the environmental conditions that are typical of a region—in Dummerston’s case the matrix community is the northern hardwood forest. On a slope with a southeastern exposure and well-drained soils, you will find sugar maples displaced by oaks, and the mesic red oak-northern hardwood forest becomes the matrix.



Northern Hardwood Forest Community

“Large patch” communities usually comprise fifty to one-hundred acres and are associated with an excess or deficit of environmental variables like moisture or sunlight. Most hemlock forest communities are in this category.

“Small patch” communities consist of species adapted to take advantage of a very specific set of

conditions, like a vernal pool or seep, or the pitch pine summit of Black Mountain. Unusual species are often found in these communities.

By conserving examples of all natural communities native to Dummerston, in sizes that are ecologically viable, we are likely to save the habitat needed by most species.

Natural communities have been mapped for parts of Dummerston. Some of the information mapped was contributed by assessment in the field. In other cases, where good ortho photos exist and the physical landscape is well known, the maps are based on the photos. In the discussion of each section, interesting and unusual communities will be described.

Natural Community information was also gathered from the Vermont Nongame and Natural Heritage Program (NNHP). They described eight significant natural communities they have identified in surveys. This survey work occurred along the West and Connecticut Rivers and on Black Mountain. These significant communities are:

- River Cobble Shore
- Rivershore Grassland
- Riverside Outcrop
- Red Pine Forest or Woodland
- Pitch Pine-Oak-Heath Rocky Summit
- Mesic Maple-Ash-Hickory-Oak Forest
- Silver Maple-Ostrich Fern Riverine Forest
- Red Maple-Black Ash Seepage Swamp

These communities will be described in the Section discussions.

WETLANDS

Wetlands make up all of the landscape that is neither aquatic nor upland. They are inundated or saturated by water during at least a portion

of the growing season. They contain hydric soils (usually rich in organic matter that form in reduced oxygen conditions). They are dominated by plants that are adapted to live in saturated soils.

Four factors determine wetland type: hydrology, nutrient availability, water and ice movement, and climate.

Wetlands occupy only five to ten percent of the land area of Vermont, but provide essential habitat for a disproportionately high number of plant and animal species. Wetland dependent species include:

- Muskrats
- Beavers
- Wood ducks
- Great blue herons
- Snapping turtles
- Bullfrogs

Of 153 threatened and endangered plants in Vermont, 54 are found exclusively in wetlands.

According to the US Fish and Wildlife Service’s National Wetlands Inventory maps, there are approximately 56 wetlands in Dummerston that are 3 acres or larger in size. Most of the wetlands are



located near rivers, streams, or brooks, although several small isolated wetlands also exist. Compared with other parts of the state, Dummerston has few wetlands, so it is especially important that we take good care of the ones we have.

The following wetland community types are found in Dummerston:

- Shallow emergent marsh
- Silver maple-ostrich fern riverine floodplain forest
- Red maple-black ash swamp
- Hemlock swamp
- Hemlock-hardwood swamp
- Alluvial shrub swamp
- Alder swamp
- Unconsolidated bottom, shore

RIPARIAN AND AQUATIC HABITATS

Water Quality in our rivers and streams is dependent to a large extent on the landscape directly influenced by the watercourse—the riparian area. The vegetation in a riparian area mitigates erosion and provides shade. Riparian areas also contribute leaves, fallen branches, and tree trunks to streams, providing important components of aquatic habitat.

Because of the dynamic nature of rivers and streams, riparian areas host a high diversity of plants, animals, and natural communities. These areas also serve as important travel corridors for wildlife.

The West and Connecticut rivers and their riparian areas are designated Priority Aquatic Features by scientists working on the Vermont Biodiversity Project. There are a number of rare plants found within their riparian areas. Several significant natural communities occur next to the rivers as well.



VERNAL POOLS

While the simple definition of “vernal pool” is a small natural basin that holds water in the spring, there are a variety of wetland types that have been included as vernal pools in different inventory systems. Wetlands are commonly classified as vernal pools based upon the presence of one or more “vernal pool obligate” species, species believed to depend upon fish-free habitats for breeding success over the long-term. Vernal pools can also be defined as a wetland type meeting specific criteria: wooded location, isolated from other water bodies, small, shallow, and seasonal.

Our inventory of vernal pools included all waterbodies where obligate amphibians breed. In Dummerston these species are: wood frog; spotted salamander; Jefferson’s salamander; blue-spotted salamander; and the Jefferson’s complex, a group of hybrids resulting from crosses of Jefferson’s and blue-spotted. Both Jefferson’s and blue-spotted are classified as species of “special concern” in Vermont. Jefferson’s have a state ranking of S2 (rare; at high risk of extinction or extirpation), blue spotted are S3 (uncommon; at moderate risk of extinction or extirpation). According to road crossing data gathered by the Bonnyvale Environmental Education Center, Jefferson’s salamanders are more

abundant in Dummerston than any other town in southeastern Vermont, and, as a species approaching the northern extent of its range, may be more abundant here than anywhere else in the state.

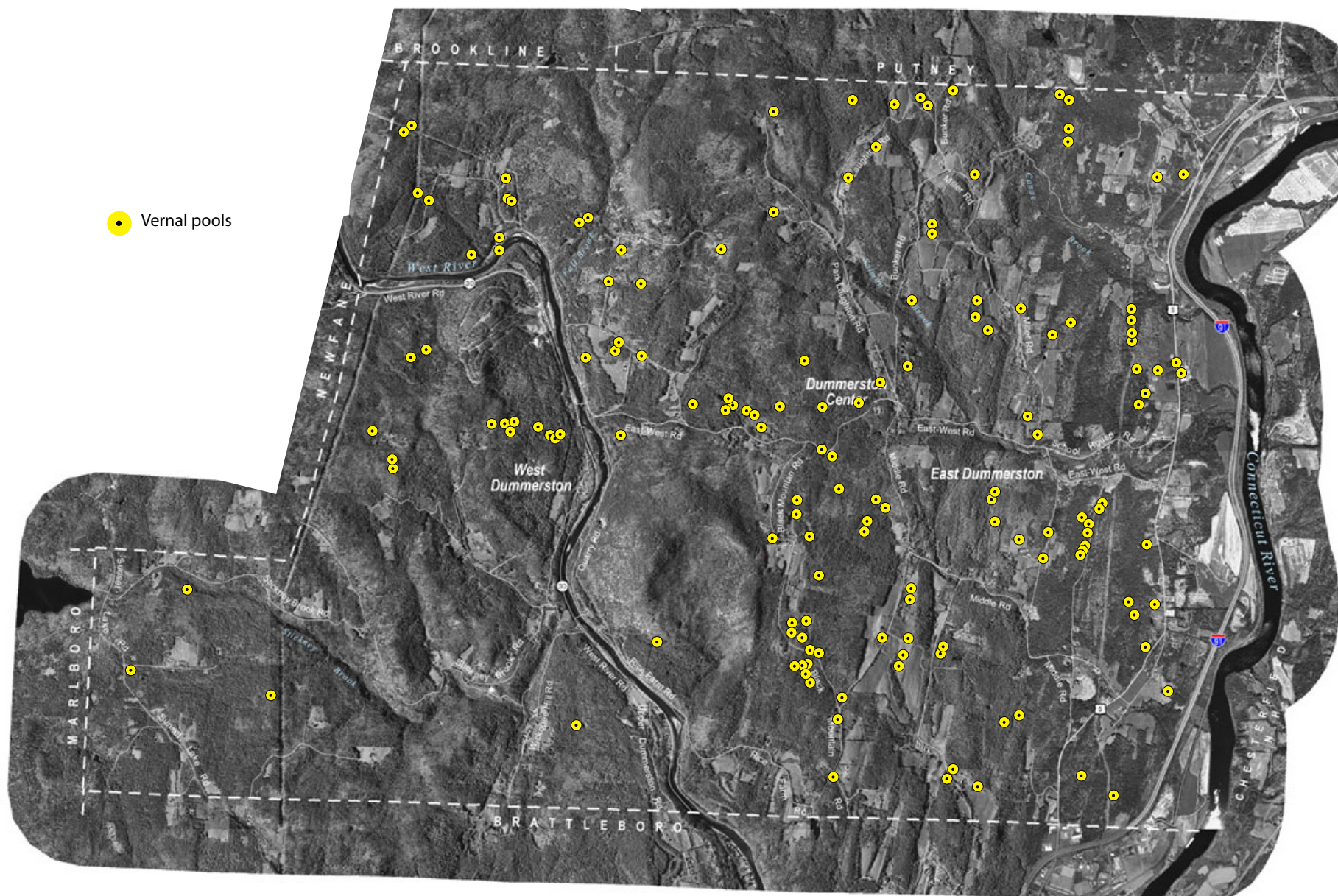
As part of this project, the conservation commission, with the assistance of an Antioch graduate student, Alexis Mullen, and the Bonnyvale Environmental Education Center, mapped and documented over 150 vernal pools in Dummerston. While this mapping included ponds that might not fit all definitions of “vernal pool,” we gathered descriptive data for each occurrence that will allow us to further classify these pools and assess their conservation value.

Alexis also counted all wood frog egg masses in the 130 vernal pools mapped east of the West River. Since each female wood frog lays one egg mass, she found that Dummerston had a population of 9,094 female wood frogs in her study area in 2007 and 2008. Some vernal pools are surely undocumented, but this is an excellent baseline for ongoing vernal pool monitoring.



Dummerston Vernal Pools

Mapped 2007 & 2008



Orthophoto map by Jeff Nugent, Windham Regional Commission. Based on Vermont digital orthophoto imagery, spring 2000. Vernal pool overlay by Patti Smith and Jerry Jenkins

SPECIES LEVEL ELEMENTS

RARE, THREATENED, AND ENDANGERED SPECIES

Dummerston is the home of a number of species on the State's rare, threatened and endangered species list. The map on the next page shows the location of documented occurrences. The distribution is in part a result of the areas where surveys have been focused, but also reflect the fact that rare species are most likely to show up in the specialized small patch communities, rather than in common hardwood forests. The concentrations of rare species are within a few select riparian habitats, a stretch of powerline right of way on sandy soil, and within the unusual natural communities found on Black Mountain. More information about these specific sites appears in the discussion of each section.

These are plants and invertebrates that are at risk, and specific attention to their needs is required to meet a goal of maintaining all of the town's native species.

These occurrences have been documented by the Vermont Department of Fish and Wildlife's Non-game and Natural Heritage Program. A few populations of these were found by conservation commission members as part of this inventory.

Plants:

Clustered Sedge	<i>Carex cumulata</i>
Barbed-bristle Bulrush	<i>Scirpus ancistrochaetus</i>
Grass Rush	<i>Juncus marginatus</i>
Greene's Rush	<i>Juncus greenei</i>
Blunt-leaved Woodsia	<i>Woodsia obtusa</i>
Canada Burnet	<i>Sanguisorba canadensis</i>
Harsh Sunflower	<i>Helianthus strumosus</i>
Canada Frostweed	<i>Helianthemum canadense</i>
Plains Frostweed	<i>Helianthemum bicknellii</i>
Field Milkwort	<i>Polygala sanguinea</i>
Racemed Milkwort	<i>Polygala polygama</i>
Whorled Milkwort	<i>Polygala verticillata</i>

Spotted Wintergreen	<i>Chimaphila maculata</i>
Orange-grass St. John's-wort	<i>Hypericum gentianoides</i>
Shining Ladies'-tresses	<i>Spiranthes lucida</i>
Tubercled Orchis	<i>Platanthera flava</i>
Three-bird Orchid	<i>Triphora trianthophora</i>
Mountain Laurel	<i>Kalmia latifolia</i>
Low Sand Cherry	<i>Prunus pumila</i> var. <i>depressa</i>
Scrub Oak	<i>Quercus ilicifolia</i>

Invertebrates:

Brook Floater	<i>Alasmidonta varicosa</i>
Dwarf Wedge Mussel	<i>Alasmidonta heterodon</i>

DEER WINTERING AREAS

In winters when deep snow makes it costly for whit-tailed deer to move about, they will "yard up" in groups in sheltered areas to conserve energy. In our region, these areas are hemlock forests, with a preference for those with sunny exposures and in proximity to good winter browse.

According to foresters and forestland managers in Dummerston, the white-tailed deer population is currently so large that it is having a negative impact on the regeneration of trees. The recommendation that this important deer habitat be appreciated and conserved comes with the concern that the deer population be reduced to levels that the habitat can support.

In each Section you will find maps that show deer wintering areas recorded by the Department of Fish & Wildlife as Deer Wintering Areas. One of these areas has been a Fish & Wildlife study site. The rest were mapped using orthophotography, and most of these were not field-checked.

Conservation commission members have visited some of these sites, as well as others they knew of, to field check their use as deer wintering areas. These are also shown on maps in each Section.

MAST STANDS

Mast refers to seeds produced by trees and shrubs. Cherries, berries, and other fruits are considered "soft mast" while nuts are "hard mast." In Dummerston the tree species that produce important hard mast crops are American beech and red oak. Bitternut hickory is a less common nut tree in our forests. Many animals depend on hard mast to fatten for the winter. These include turkeys, deer, squirrels, mice, and bears. Soft mast is also an important source of food, but the nuts contain the concentrated calories of oils.

With oak and beech very abundant in Dummerston forests, our mast stand survey focused on important bear habitat. While the value of acorns to bears in Vermont is unclear, the importance of beech nuts cannot be overstated. Studies show that the relationship between the beech mast crop and the numbers and survival rates of cubs is a direct correlation. A conservation plan that will ensure the survival of bears must include access to mast stands.

Unfortunately, not just any group of beech trees will do. In the fall, with leaves down, bears find little dense cover in beech stands. The need to ingest as many nuts as possible means that time can not be diverted to worry about danger. A study of bear-clawed beech stands (Wolfson, 1992) showed that bears need significant buffers to feed in a beech stand. Depending upon the surrounding topography, a distance of half a mile seems to be the minimum required between beech stands and human activity. He found several beech stands that had been used heavily by bears in the past, but not since structures had been built nearby.

In a survey of beech stands in remote sections of Dummerston's contiguous forest, no significant bear stands were found. All beeches were checked in likely stands, and individual beeches were checked

when encountered. In three locations scarred trees were found. These three places were remote and very beechy, but in each case fewer than three trees had been climbed, and showed no sign of frequent and repeated use. This suggests that bears leave Dummerston for preferred feeding sites during the fall. Does this mean a Dummerston conservation plan should ignore its many large beech stands? Certainly not! Even if bears seldom take advantage of the nut crop, many of the less sensitive species benefit from the fall calories these trees produce. Furthermore, if bear populations increase, or if habitat fragmentation continues, these once marginal areas might become important feeding areas for bears, too.

What is clear is that if black bears are to continue to live in Dummerston, we must maintain high quality connections with the larger forested areas to our north and west.

In the course of looking for mast stands in Dummerston, we did find evidence of bears feeding in other seasons. Jack-in-the-pulpit and raspberries were among the favored summer foods.

GRASSLAND AND BIRD HABITAT

In the mid nineteenth century, the Dummerston landscape was one of wide vistas and grass, as small farms dominated the land use. This was the case statewide, and during that period wildlife that prosper in grasslands expanded their populations statewide. Now that the forests have grown back, these populations have also dwindled. This is to be expected, and is to a certain extent natural. There are ecological, ethical, and sentimental reasons to make sure these species don't disappear altogether. Because the remaining grasslands are often managed in ways that are incompatible with wildlife use of the habitat, populations continue to shrink.

Birds and snakes are especially vulnerable on lands that are mowed for hay. Birds that breed in grasslands are seldom successful if they choose to

nest in mowings, which make up a majority of the grasslands in town. The first hay cut usually takes place before nestlings can fledge.

The black racer, a snake that was found in Dummerston grasslands forty years ago, has not been documented in the past few decades. A decline in their population has been correlated to the used of hay balers.

Grassland species are likely to benefit from maintaining existing grasslands and managing some of them in ways that are compatible with wildlife. ***One way to protect grassland birds in fields that must be mowed before July 15 is for volunteers to locate nests and mark them before fields are mowed.*** This project would require partnership between farmers and the conservation commission or other volunteers.

At present there are a few grasslands that we have identified that are likely to offer good habitat without such intervention. One of these is along the West River, and is described in more detail in the Central Hills Section.

Changes to the Use Value Appraisal program that will soon be adopted will support a goal of increasing grassland habitat. Open areas may be included in forest plans if they are not mowed for hay, and are kept open by mowing or brush-hogging no more than once a year, and only after July 31.

EARLY SUCCESSIONAL FOREST AND SHRUB HABITAT

As farming declined in Vermont, grasslands grew up into shrubs, brambles, and young trees—exceptional habitat for a different group of animals. As was the case with grasslands, with the transition from field to forest, these species proliferated. Among those that benefit from open brushy lands and young forests are ruffed grouse, American woodcock, golden-winged warbler, cottontail rabbit (including the now rare New England cottontail), and white-tailed deer. With the exception of white-

tailed deer, all of these species are now uncommon (or much less common) in Dummerston.

According to a 1997 U.S. Forest Service survey, the Southern Piedmont biophysical region in which Dummerston is located, just 5.6% of forest land is in the seedling/sapling size class.

A few significant parts of Dummerston are now managed to maintain open shrub and early successional forests. The summit of Prospect Hill, owned by the town, provides about five acres of open shrub land that is managed by the Prospect Hill Trustees to maintain a view.

The most significant expanse of this habitat type is beneath powerlines. Wildlife sign is abundant in these areas. The conservation commission has concerns about the impact of the herbicides used to maintain these areas. Also, by cutting through sections of contiguous forest in the western side of town, these powerlines serve as a corridor for species such as raccoons and brown-headed cowbirds. These species have a detrimental impact on the breeding birds that depend on forest interiors.

Federal funds are available through the Wildlife Habitat Improvement Program (WHIP) and provide cost-sharing for landowners interested in creating and maintaining this type of wildlife habitat.

Little bluestem grassland at the summit of Prospect Hill

