

Dummerston

Biodiversity Conservation Planning Project

Biodiversity Inventory Report



A Dummerston Conservation Commission Report

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Report written and prepared by Patti Smith
2009

Funded in part by a Vermont Watershed grant from the Vermont Department of Fish & Wildlife
a grant from the New England Grassroots Fund
and support from the Bonnyvale Environmental Education Center



This project was funded in part
by a Vt Watershed Grant.

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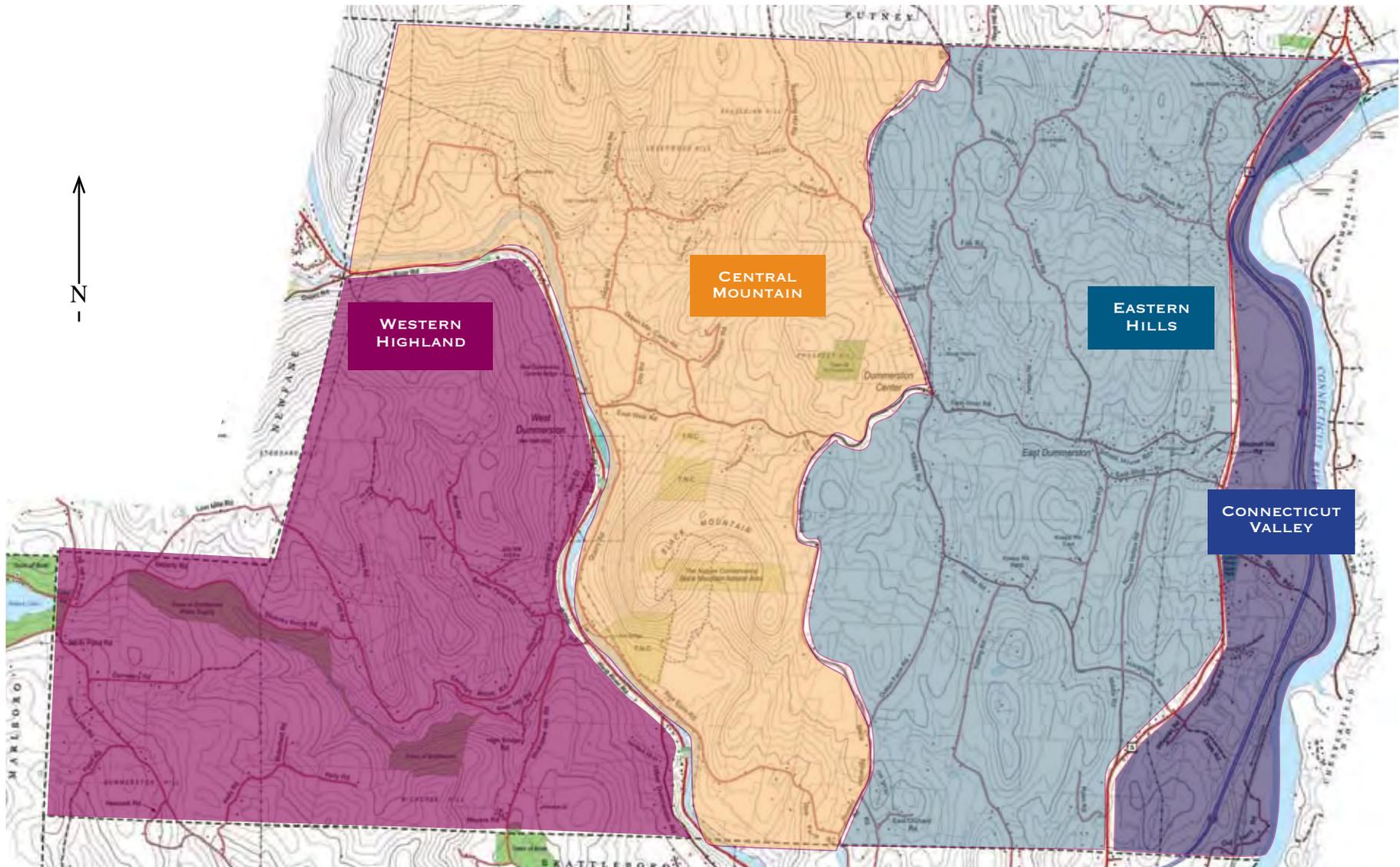
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Dummerston Biodiversity Inventory Sections



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

PROJECT DESCRIPTION

This report summarizes the findings of a biodiversity inventory project undertaken by the Dummerston Conservation Commission. The goal of this project was to catalog the resources that support the plants and animals native to the town. The commission will use this information to develop strategies to support Dummerston's biodiversity.

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 needed to consider 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. Because our goal is to provide the habitat that all native species will need to survive within our boundaries in perpetuity, we also needed 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.

Given how little is known about most of the species in the town, such a task was daunting indeed! Fortunately, the Vermont Department of Fish and Wildlife had written a manual to show the way, *Conserving Vermont's Natural Heritage: A Guide to Community-Based Planning for the Con-*

servation of Vermont's Fish, Wildlife, and Biological Diversity.

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

On the Landscape Level we considered 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*

For 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?

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.

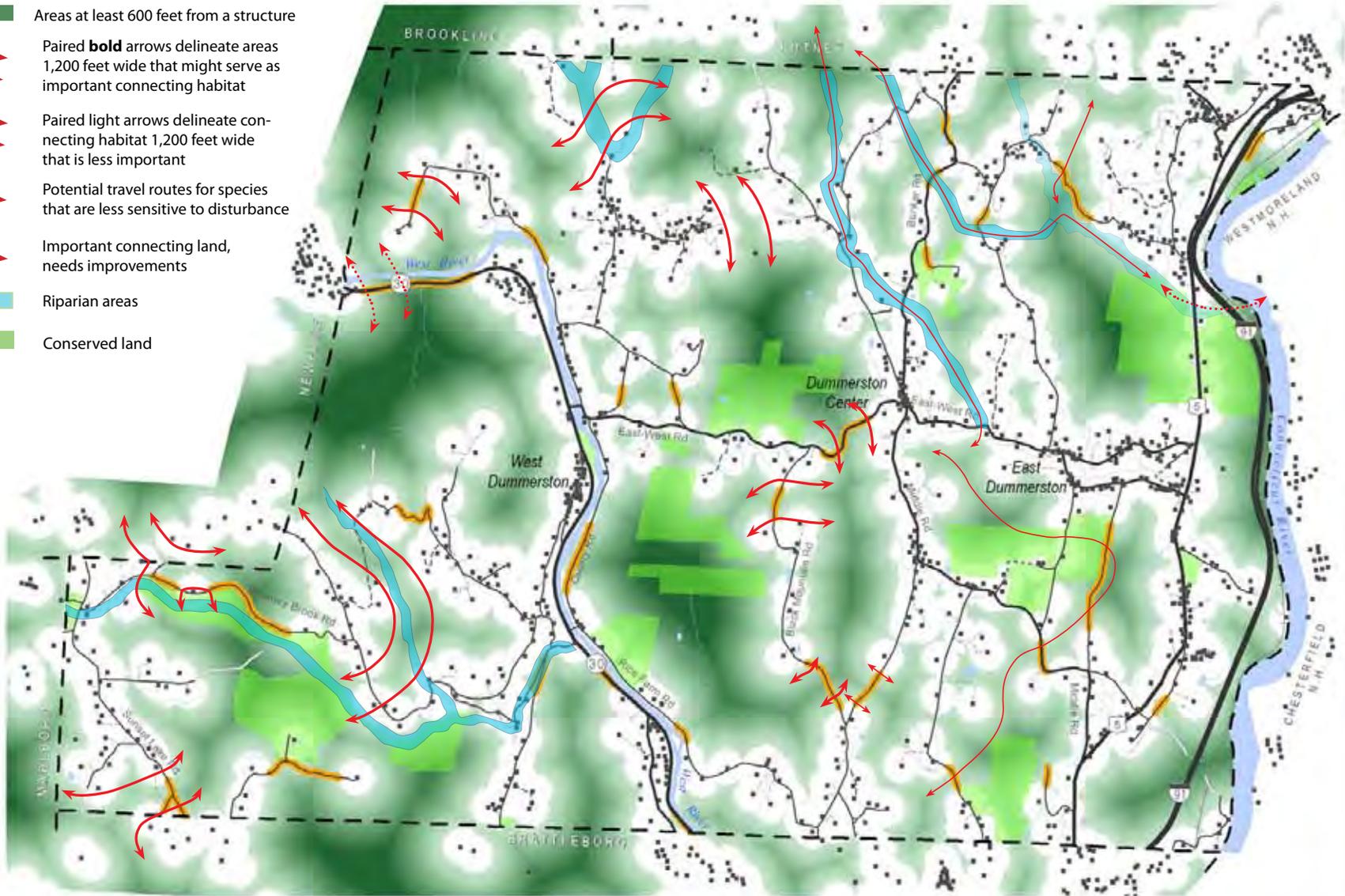
As we move west to the **Eastern Hill Section**, elevations rise and the topography becomes more rolling. This section contains larger forested areas mixed with agricultural lands and settled areas.

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.

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
-  Conserved land



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, 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, contigu-

ous 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 buffering¹), 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 Dum-

¹ Hammond, F. M. 2002. *The effects of resort and residential development on black bears in Vermont.* Vermont Agency of Natural Resources.

merston'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 impure marble, and rich forests and rich ledge exposures are found on these formations, too.

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

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 other 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.

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.

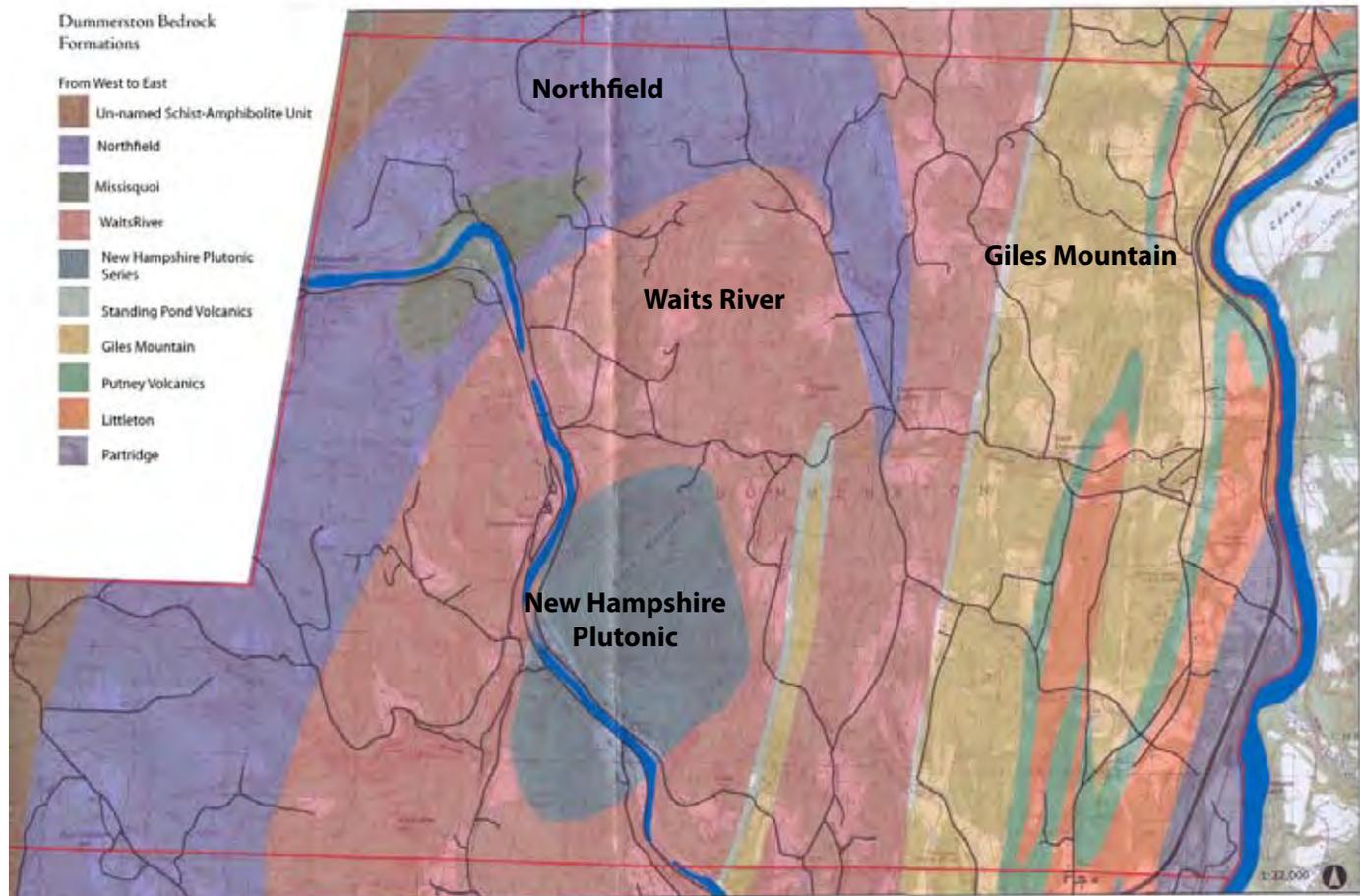
Waits River Formation



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

WETLANDS

Wetlands 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 forms 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 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 those 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
- Cattail marsh

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 have been designated Priority Aquatic Features by 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

The simple definition of “vernal pool” is a small natural basin that holds water in the spring, however 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 obligates,” species believed to depend upon ephemeral fish-free habitats for breeding success over the long-term. Vernal pools can also be defined as a wetland type meeting specific criteria, typically a wooded location, isolated from other water bodies, small, shallow, and seasonal. Vernal pools provide critical habitat for a number of species, and are an important strand of many forest food webs.

Our inventory of vernal pools included all water bodies where obligate amphibians breed. In Dummerston these species are: wood frog; spotted salamander; Jefferson salamander; blue-spotted salamander; and the Jefferson complex, a group of hybrids resulting from crosses of Jefferson and blue-spotted. Both Jefferson and blue-spotted are classified as species of “special concern” in Vermont. Jeffersons 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 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.

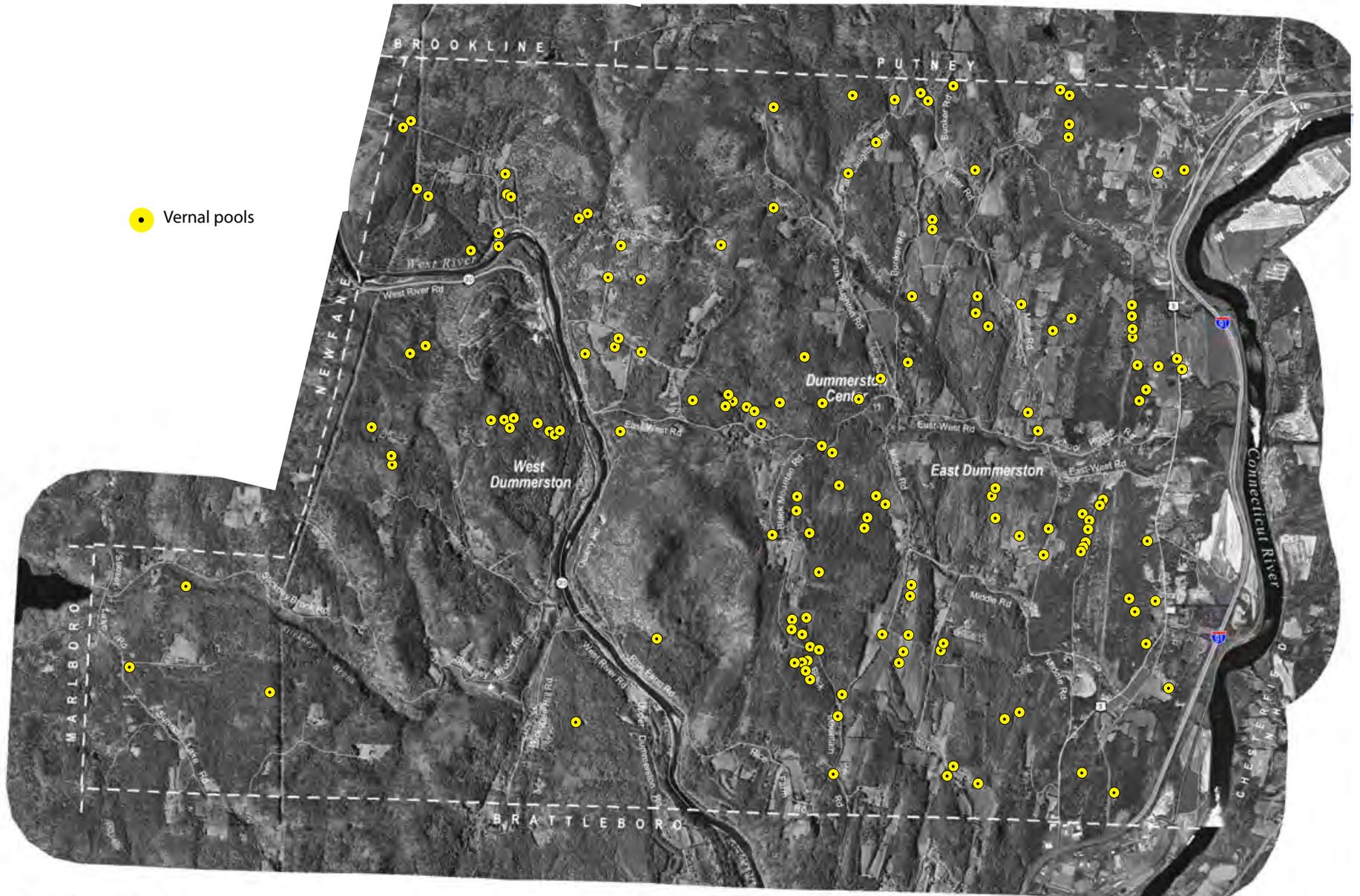
As part of this project, the conservation commission, with the assistance of an Antioch graduate student, Alexis Mullen, and BEEC naturalists, mapped and documented over 150 vernal pools in Dummerston. While this mapping included ponds that might not fit all definitions of “vernal pool,” we gathered descriptive data for each occurrence that will allow us to further classify these pools and assess their conservation value. Some vernal pools are surely undocumented, but this is an excellent baseline for ongoing vernal pool monitoring.

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 breeding female wood frogs in her study area during 2007-2008.



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. Their 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 specialized communities, rather than in the matrix 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 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 additional populations 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>
Tuberclad Orchid	<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.

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.

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. While

we recommend that deer yards be conserved, we also recommend that the deer population be reduced to levels that the habitat can support.

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. Bears can feed more efficiently in areas where they feel safe. A study of bear-clawed beech stands showed that bears need significant buffers to feed in a beech stand. Depending upon the surrounding topography, a distance of half a mile

1 Wolfson, D. L. 1992. *Development of a quantitative procedure to assign a value rating to beech stands as black bear habitat*. M. S. thesis, Antioch New England, Keene. NH.

seems to be the minimum required between beech stands and human activity. The author 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 popu-

lations. 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. Now that forests have matured, all of these species are less common than they were forty years ago.

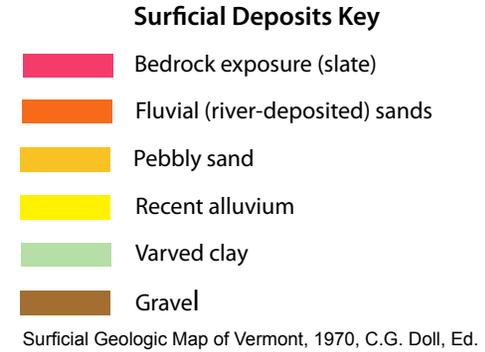
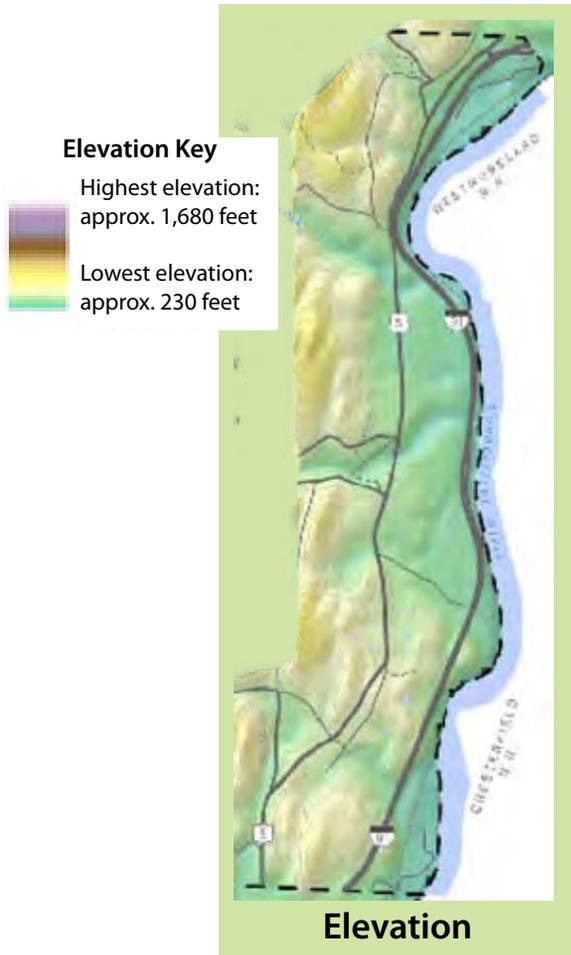
According to a 1997 U.S. Forest Service survey, the Southern Piedmont biophysical region in which Dummerston is located, just 5.6% of forest land is in the seedling/sapling size class.

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, so powerline habitat is considered a mixed blessing.

Federal funds are available through the Wildlife Habitat Improvement Program (WHIP) and provide cost-sharing for landowners interested in creating and maintaining young forests.

CONNECTICUT VALLEY SECTION



The gravel pits off Carpenter Road record the dynamic depositional environments associated with glacial Lake Hitchcock.

Landscape Level Elements

ENDURING FEATURES

This section, bounded on the east by the Connecticut River, is the lowest and least hilly part of town. The elevation of the river is about 230 feet above sea level. As a result of its proximity to the river, and its post-glacial history, this is the section with the best agricultural soils and many alluvial deposits.

The banks of the Connecticut are steep in Dummerston. There are only a few areas next to the river where floodplain exists—at the far south and the far north.

Glacial Lake Hitchcock once flooded this valley to an elevation of 370 feet, and thus water covered most of this area after the glacier receded. This history is recorded in the lakeshore sands,

clays from the former lake bottom, and the gravels deposited in deltas where streams emptied into the lake. Where Canoe Brook flows into the Connecticut it cuts through varved clay deposits. The “varves” are layers that show the annual deposits of silt on the former lake bottom.



 Areas at least 600 feet from a structure

 Important connecting habitat

Canoe Brook corridor



CONTIGUOUS HABITAT AND CONNECTING LANDS

While large portions of this section are mapped as “undeveloped,” much of that land is under cultivation, and forest occurs in small blocks and strips. Furthermore, this zone is sandwiched between Route 5 and I-91, making this a dangerous area for animals to move into or out of, and unsuitable as habitat for any species that require remote forest. The mix of agricultural lands, edge habitat, forest, and riparian areas make this zone suitable for species that tolerate (or thrive on) human disturbance, such as red foxes, raccoons, skunks, and any possums that have enough sense to stay off the roads. Deer also thrive in this area, and many deer tracks were recorded on a walk along the railroad tracks.

The frontage along the Connecticut River provides a north-south corridor for aquatic and semi-aquatic species like mink, otter, and beavers. The one important connection to lands to the west is along Canoe Brook where it empties into the Connecticut. Four small areas are conserved: the Putney (in Dummerston) and Dummerston boat landings are State property; Sweet Tree Farm, conserved by the Vermont Land Trust; and Dutton Pines State Park.

COMPLEMENTARY LANDSCAPE

The southeastern corner of Dummerston has been designated a “Complementary Landscape” by the Vermont Biodiversity Project. This area has a combination of enduring features that are not found on land that has been conserved elsewhere in Vermont. The Vermont Nongame and Natural Heritage Program recommends making these areas priorities for conservation.

Community Level Elements

NATURAL COMMUNITIES

While this section is the most impacted by development, its soils, topography, and proximity to the Connecticut River allow small patch communities to occur here that are not found elsewhere in town. Among these are two examples of Silver Maple-Ostrich Fern-Riverine Forest. These forests are considered significant by the Vermont Heritage program and have a designation of S3 (uncommon, vulnerable in Vermont). These small patch forests host species adapted to survive in a tumultuous zone with fluctuating water levels and scouring ice. The northernmost of these, adjacent to the Putney Landing has the only known Dummerston occurrence of hackberry (*Celtis occidentalis*), a tree in the elm family. The southernmost is being infiltrated by invasive plants.

Majestic floodplain forests were once common along the Connecticut River. Because they occupied the best agricultural soils, they are now reduced to tiny remnants. Dummerston might consider setting aside additional rivershore areas for the re-establishment of riparian forests.

WETLANDS

The most significant wetland complex in this section is found along the streams in Kathan meadows, the large area of floodplain agricultural land along Kathan Meadows Road, the road that goes to the Dummerston Landing. At the landing is an area of deciduous riparian forest.

Invasive plants have a secure root hold in these wetlands. Yellow flag iris, glossy buckthorn, and honeysuckle are prolific. This area still provides great habitat for shrubland birds, wetland birds, and other wildlife.

RIPARIAN AND AQUATIC HABITATS

The Connecticut River is classified as a Priority Aquatic Feature by the Vermont Biodiversity Project. The riparian areas have been degraded by proximity to the interstate and railroad tracks, and to some extent by agriculture, and invasive exotic plants.

VERNAL POOLS

Only three vernal pools have been documented in this section. This is in part because little survey work has been done here, and in part because there is not a great deal of forest land in this section.

Species Level Elements

RARE SPECIES

Two species in this section have been listed as threatened. Racemed milkwort, *Polygala polygama* and the fern, blunt-lobed woodsia, *Woodsia obtusa*, have been recorded along the river. Well-drained floodplain areas, such as the land off of Ferry Road at the south end of this section, and Kathan Meadows to the north, are ideal habitat for the state-listed Fowler's toad, *Bufo fowleri*, S1. While these toads have not yet been located in this area, they are found in a very similar area in Vernon, and have been recorded historically in White River Junction.

DEER WINTERING AREAS

White-tailed deer have a well-developed trail network beneath the hemlocks in the Complementary Landscape. This area is also included in the Agency of Natural Resources deer wintering area survey.

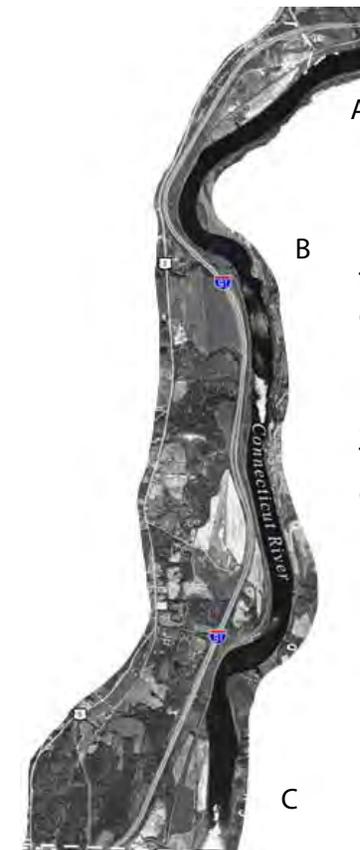
GRASSLAND AND BIRD HABITAT

Although this area has extensive open land, we are not aware of grasslands in this area that are

managed in a way that would be compatible with nesting success of grassland birds.

EARLY SUCCESSIONAL AND SHRUB HABITAT

Shrub habitat is found in a few places in the areas of wetland and riparian forest. Many of the shrubs that grow in this low section of town are invasive exotics, and their value as habitat is thought to be less than that of native shrubs. Though considered degraded, this habitat still provides important cover and nesting sites.

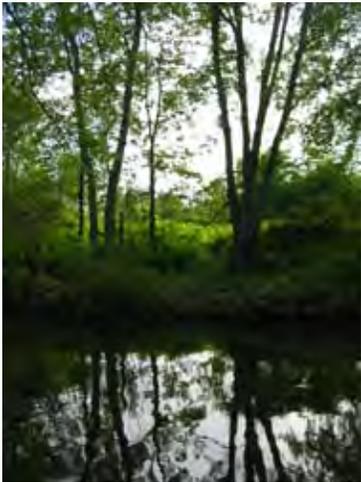


Three areas have Community and Species Level Elements that merit special attention. These are examined on the next two pages.

Area A



4 Rare Plant Site



Silver Maple-sensitive Fern Riverine Floodplain Forest

1

Putney Landing

Silver maple-ostrich fern riverine floodplain forest (S3)
 Only record of hackberry in Dummerston
 Few invasives, excellent small example of this community type

2

Kathan Meadows

Prime agricultural soils, under cultivation. Possible Fowler's toad habitat.

3

Dummerston Landing Communities

Silver maple-sensitive fern floodplain forest.
 Wetland complex includes

Invasive plants include yellow flag iris, glossy buckthorn, and honeysuckle.

- Shrubland bird habitat
- Wetland bird habitat
- Mammals that use this habitat include mink, fox, bobcat, raccoon, deer, muskrat, and beavers.
- Bats, swallows, kingfishers, osprey, and eagles can be seen over the river.
- Potential Fowler's toad habitat

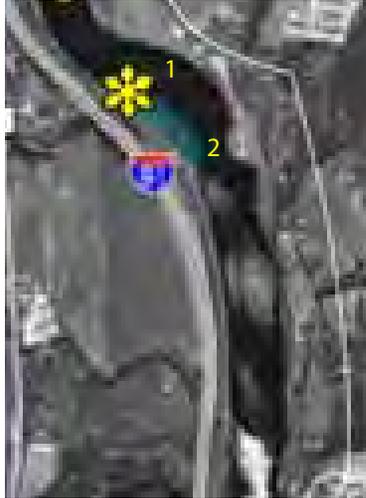


Dummerston Landing



Yellow Flag Iris in Wetland Complex

Area B



1

Rare Plant Site

2

Riverbend Forest

Silver maple-ostrich fern riverine floodplain forest (S3)

A weedy example—buckthorn and shrub honeysuckles abundant.

Shrub habitat

Area C



Complementary Landscape



Vernal Pools



Deer wintering area



Old Ferry Road

One of the two level sites directly adjacent to the river. A section might be suitable for restoration of floodplain forest.

EASTERN HILL SECTION

Landscape Level Elements

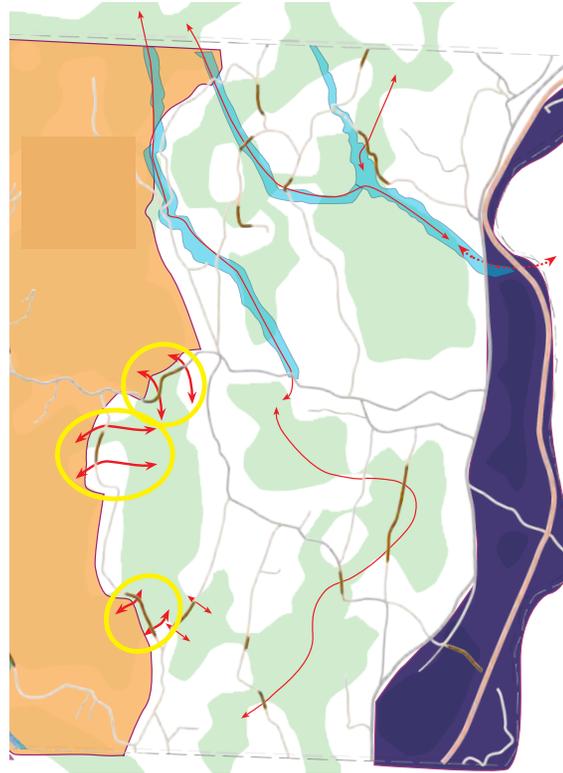
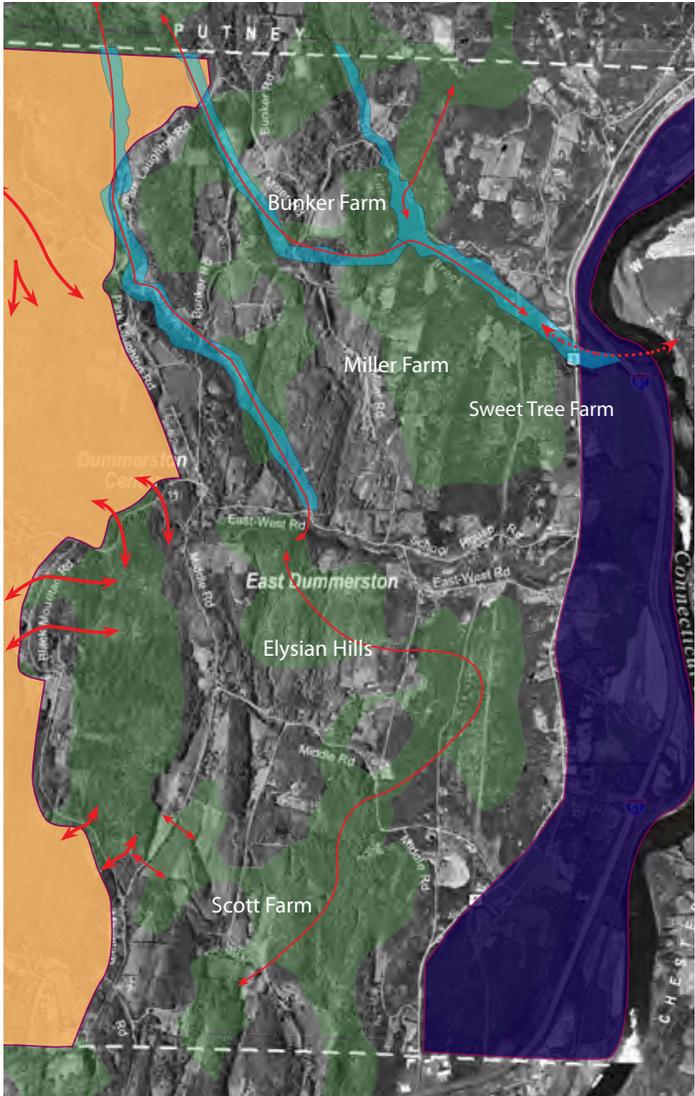
CONTIGUOUS LANDS

As we move beyond the traffic of Route 5, we find larger areas of undeveloped land. A look at the ortho photo of this area reveals that these “undeveloped” areas contain a great deal of land in agricultural production. The farms include much of the Sweet Tree Farm, the Miller Orchard and Farm, Elysian Hills Tree Farm, the Scott Farm, and the Bunker Farm. This is, therefore, a region with a high human impact, often just the sort of impact that provides great habitat for species that thrive in open areas, along edges, and in proximity to humans. The orchards and farmland provide a lure for even shy, area sensitive species like black bear at certain times of year, though perhaps to the farmers’ dismay.

The largest of these areas is about 639 acres in size, 220 of which, Sweet Tree Farm, are conserved by the Vermont Land Trust. Some of the smaller areas, when the collective conservation elements are added, have high value for biodiversity.

EASTERN HILL SECTION

Contiguous Habitat & Connecting Lands



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

RIPARIAN CORRIDORS

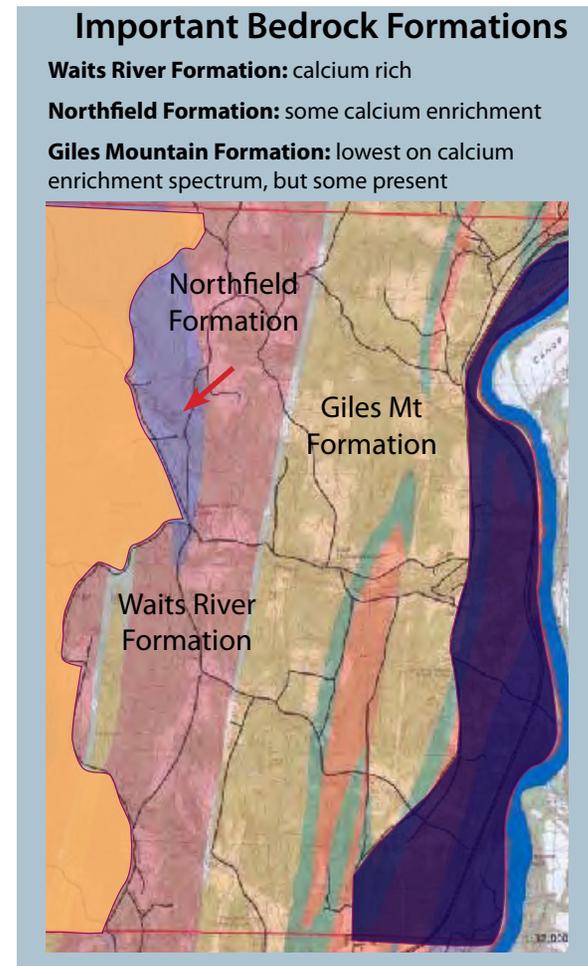
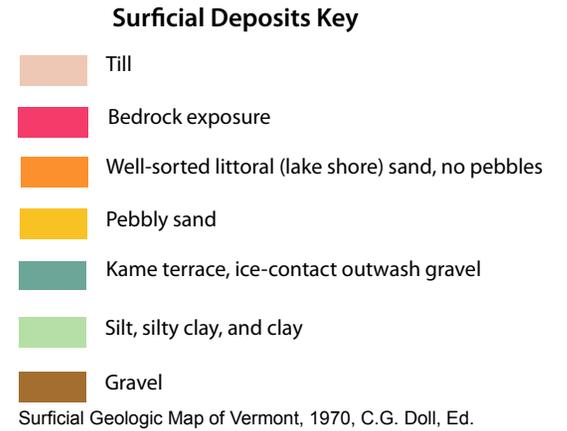
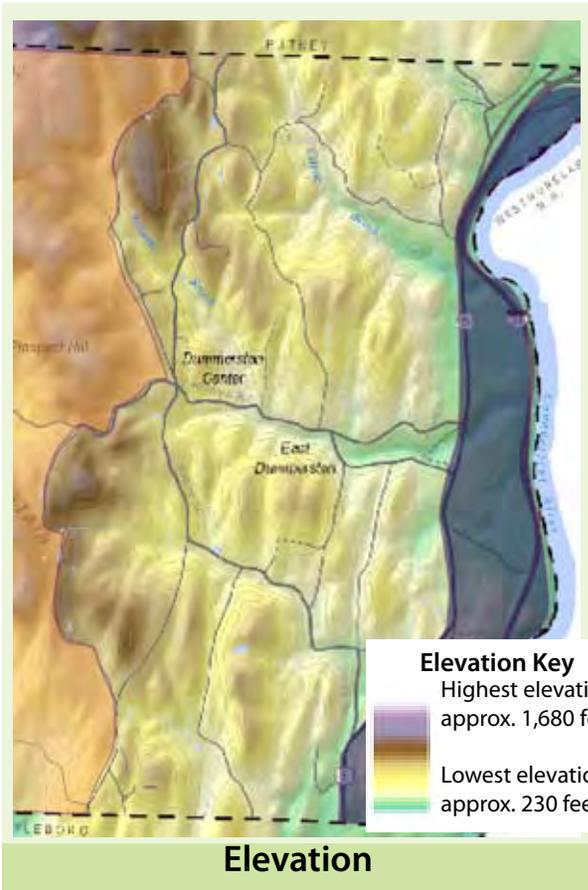
The riparian areas along Salmon Brook and Canoe Brook provide important wildlife travel corridors. The northern stretch of Salmon Brook flows through a fairly wide, forested valley. There are few houses within sight of the brook, and little to no disturbance of the riparian vegetation. Animals moving upstream along this brook reach undeveloped areas on Putney Mountain.

Canoe Brook flows through a sheltered valley for much of its length. Where the brook forks, we consider the southern branch to be a more important corridor, since it flows through forest and shrubland and leads to part of Putney that has less development, and provides wildlife with good access to conserved lands owned by the Putney Mountain Association.

ROAD CROSSINGS

Among the areas of importance, and potentially at risk, are the crossing areas between Black Mountain and the area to the east. These are forested areas that contains parcels that do not have houses on them currently. If these parcels are built on, the major route from the forested lands to the west and north could be impacted. They are circled in yellow on the map to the left.

The other undeveloped road segment that connects these lands is the hilly, windy section of East West Road. This is also the site of a spring amphibian migration.



ENDURING FEATURES

This is an area of rolling hills with steep slopes found primarily along the brooks. The soils are mainly glacial till. In the north central part of this section, adjacent to Miller Road and Canoe Brook are well-sorted sands, likely remnants of a small glacial lake. The gravels of a kame terrace also extend into this section from the west along the Salmon Brook. The well-drained soils affiliated with these deposits may provide a substrate for unusual plants.

This part of town has bands of Waits River Formation, the most calcium rich, and Giles Mountain, with less calcium enrichment. A finger of Northfield extends into the northwest part of this section. Putney Mountain Volcanics and the Littleton Formation are harder rocks with fewer available nutrients. Where bedrock is close to the surface, as it is along Nourse Hollow Road and Route 5, it forms an impervious substrate where a number of vernal pools are found.

NATURAL COMMUNITIES

The natural communities map was not created using GPS technology, and therefore gives only a general idea of the community boundaries. The map is based on some site visits, information gathered from the community, and orthophotographs. In this part of Dummerston, with low, rolling hills, and pockets of impure marble in the bedrock, the matrix forest is red-oak northern hardwood forest. Sugar maple often replaces red oak in the forest mix where soils are calcium-rich.

Hemlock and hemlock northern hardwood communities are most likely to occur on north and west facing hillsides, and on very steep terrain. The northern hardwoods are often on the less steep terrain.

Several rich northern hardwood communities have been mapped. Rich northern hardwood communities are often high in species diversity. These are the communities that support carpets of spring

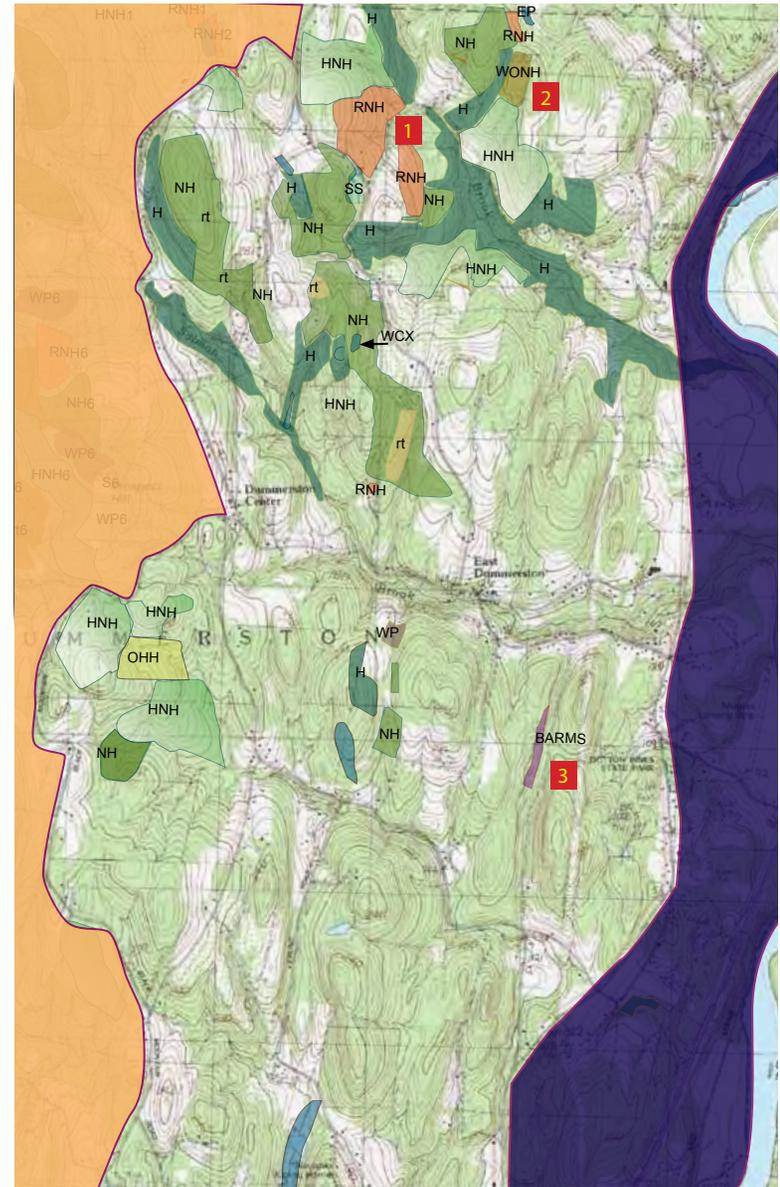
Natural Communities Key

Upland	
H	Hemlock Forest
NH	Northern Hardwood Forest
RNH	Rich Northern Hardwood Forest
HNNH	Hemlock-Northern Hardwood Forest
WONH	White Oak-Northern Hardwood Forest
OHH	Oak-Hickory-Hop Hornbeam Forest
Wetland	
RMS	Red Maple Swamp
SS	Scrub Shrub Wetland
WCPX	Wetland Complex
Also Noted:	
rt	Rich Site Tree Species

ephemerals, the woodland wildflowers that bloom before the trees leaf out. The tree species that excel in rich soils in Dummerston include sugar maple, bitternut hickory, and white ash. Rich site plants include wild leeks, sharp-lobed hepatica, dutchman's britches, squirrel corn, blue cohosh, and wild ginger. Two exceptional examples of this community type occur in this part of town. One is on a fairly steep, moist slope. Here bitternut hickory, white ash, and sugar maple grow tall and straight, but are vulnerable to toppling because of the substrate. As a result there are a number of large openings in the canopy. The understory is carpeted in wild leeks and blue cohosh in the spring, while rich site ferns and sedges keep the forest floor



Scapes from wild leeks on rich hillside site



- 1 Exceptional rich northern hardwood sites
- 2 White oak northern hardwood forest
- 3 Red maple swamp

green throughout the summer. These include silvery spleenwort, Goldie's fern, maidenhair fern, and plaintain-leaved sedge.

The second site has drier soils and greater diversity in understory plants. These include:

- Wild leek
- Blue cohosh
- Plantain-leaved sedge
- Maidenhair fern
- Rattlesnake fern
- Dutchman's Britches
- Squirrel corn
- Sharp-lobed hepatica
- Dwarf ginseng
- Spring beauties
- White wood nettle

There are other sites where there are indicators of rich soils, but where a full suite of rich site plants is missing. These are places where rich northern hardwood communities may re-establish if the sites are undisturbed or are managed carefully.

Also noteworthy in this section of town is a variation of the mesic red oak-northern hardwood forest. Here white oak, rather than red oak is the large canopy oak. A number of handsome white oaks grow on this hillside, and are clearly former pasture shade trees. White oak is often found in warmer drier sites, and particularly sites that are fire prone.

WETLANDS

A 4.5 acre swamp has been inventoried by the Nongame and Natural Heritage Program, and is described as "small but significant," since it is in a good natural condition. The shrub layer includes spicebush, silky dogwood, and winterberry holly. Royal fern and cinnamon fern are prolific in the understory.

A few other small wetlands occur, but have not been visited and inventoried. They include

a wetland complex that can be seen from Middle Road. This wetland has some open water, a cattail marsh, and a shrub swamp. The largest wetland in this section, mapped as an emergent persistent marsh by the National Wetlands Inventory, is found off Kipling Road and extends to the Brattleboro boundary.

RIPARIAN AND AQUATIC FEATURES

Two brooks flow across this area, draining from Putney into the Connecticut River, the Salmon Brook and Canoe Brook. Crosby Brook originates in Dummerston, and then drains into the Connecticut through the north end of Brattleboro.

Canoe brook flows through a steep-sided hemlock clad valley for much of its length. The well-oxygenated water and deep shade result in temperatures that should support a healthy population of trout.



Red maple seepage swamp

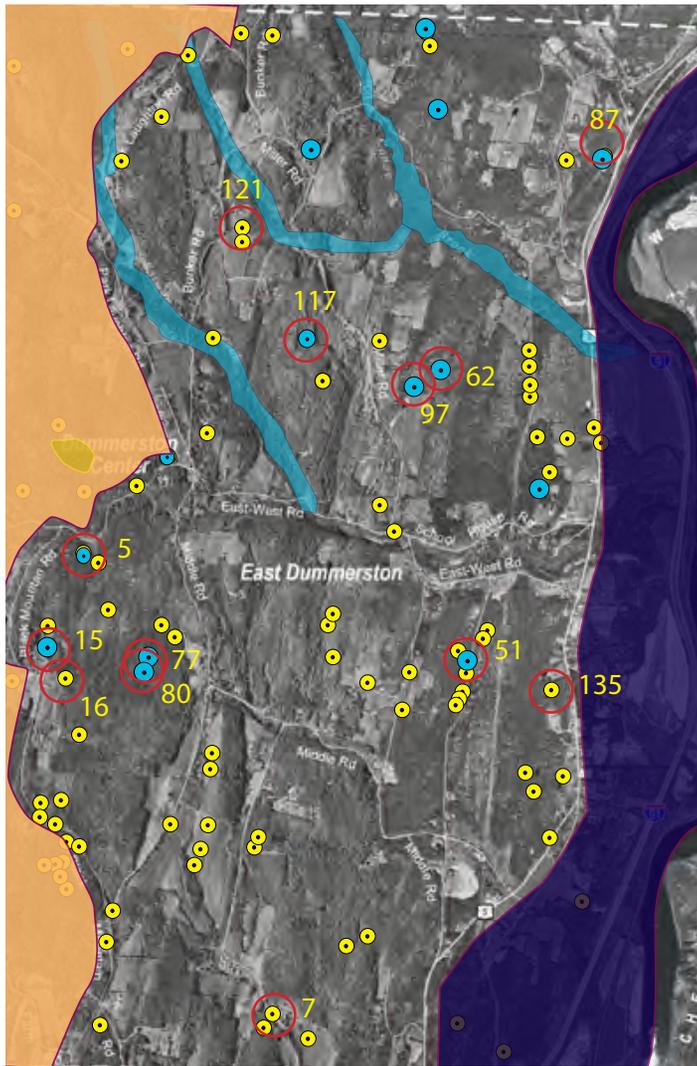
Salmon Brook flows through a wider valley, and has a gentler gradient. It flows through Slab Hollow and below East-West and Schoolhouse Roads.



Vernal pool near border with Putney

VERNAL POOLS

Far more vernal pools have been documented in this section of town than any other. Of a total of 164 documented pools, 89 are found in this section. Many of these pools host Jefferson salamanders, S2. In some cases only wood frog eggs were counted, so it is likely that Jeffersons breed in many more pools.



Vernal Pools & Riparian Features

- Vernal pools
- Vernal pools with Jefferson salamanders
- Ecologically significant vernal pools
- Significant riparian areas

Pools have been ranked as “ecologically significant” when they have large numbers of two or more populations of amphibians, and are classic woodland pools.

Ecologically Significant Vernal Pools

VP#	Wood Frog Masses	Spotted Masses	Jefferson Masses
5	163	0	32
7	146	TNTC*	0
15	380	0	45
16	185	0	TNTC*
51	170	15	TNTC*
62	65	0	125
77	0	0	0
80	12	0	45
87	200	0	TNTC*
97	90	0	175
117	327	4	93
121	105	TNTC*	0
135	2	TNTC*	0

*TNTC: Too numerous to count (possibly because visibility was poor, but large numbers were seen)



Dwight Miller and Nongame Natural Heritage Program botanist Bob Popp visit a rare plant.

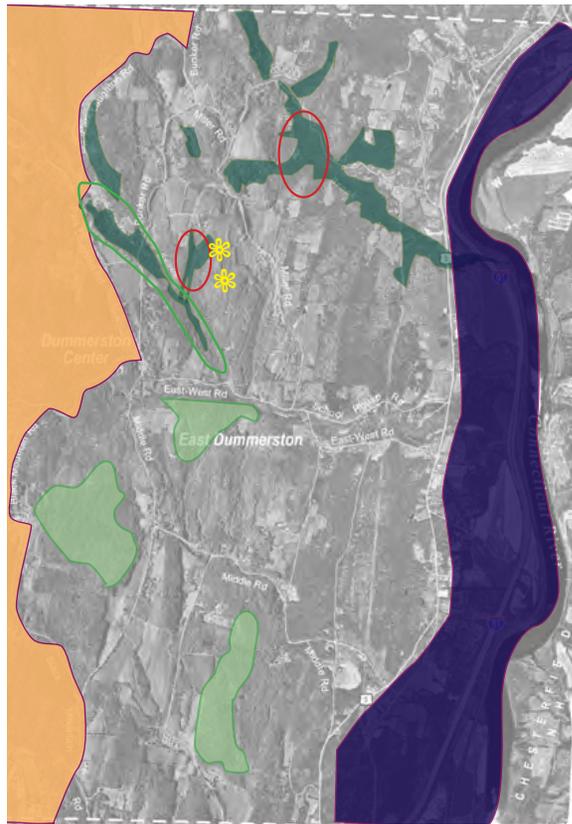
Species Level Elements

RARE, THREATENED, AND ENDANGERED SPECIES

Two rare plant species have been documented in this section.

GRASSLAND AND BIRD HABITAT

Most of the large fields preferred for nesting by such birds as bobolinks and are mowed for hay. There are a number of orchards in this section, however, and if mowing in orchards is delayed until after the middle of July, these areas could serve as important grassland habitat. Orchards could also provide habitat for eastern racers and other unusual grassland specialists. The large hayfields in this section might also be targeted as sites where grassland bird nests could be marked before mowing.



Rare Plants & Deer Wintering Areas

-  Rare Plant Site
-  Hemlock Forest mapped by conservation commission, possible deer wintering habitat
-  Deer Wintering Areas mapped by VT ANR, not surveyed as part of this project*
-  Hemlock Forest also included on Windham Regional Commission *Deer Wintering Areas* map*
-  Hemlock Forest, identified by Dummerston residents as deer wintering areas

* Delineated by the Vermont Agency of Natural Resources, Department of Fish and Wildlife. Digital data released in 1997.

EARLY SUCCESSIONAL AND SHRUB HABITAT

No early successional forests were documented in this section, although there certainly are some. The shrublands here are affiliated with some of the wetlands, and are quite small. Shrubs are also found along riparian areas and fence lines.

DEER WINTERING AREAS

White-tailed deer thrive in this part of town, with the mix of open land, orchards, and hardwood and softwood forests. Their population is so high that foresters report difficulty regenerating certain trees. While the population needs to be lower for the overall biodiversity of this section, it is important to maintain wintering habitat. We have mapped some of the hemlock stands and residents and conservation commission members have noted those that show the signs of winter use by deer.

The Vermont Agency of Natural Resources, Department of Fish and Wildlife, has mapped deer wintering areas statewide. They conducted much of this project remotely. Many of these areas need to be checked to see if they serve as deer wintering habitat.

CENTRAL HILL SECTION

Landscape Level Elements CONTIGUOUS LANDS

As we move west, the land becomes steeper, the areas of contiguous forestland are larger, and there are few acres under cultivation.

There are three large unfragmented forest areas in this section. The southernmost contains Black Mountain. With 1,111 acres of contiguous undeveloped land, this area is the third largest in Dummerston. The Nature Conservancy has conserved 345 acres on Black Mountain.

To the north of Black Mountain is Prospect Hill. This centrally located block contains 703 acres of unfragmented forest. Of these, 260 acres are conserved (69 with a "Forever Wild" designation). This includes the town-owned summit of Prospect Hill.

In the northwest corner, with 1,159 acres, is the largest contiguous area in Dummerston. This is an area of very irregular shape, so it has more edge and less remote forest habitat than an area of a similar size but more regular shape would have.

This block is in an important location for maintaining connections to forestland in Newfane, Brookline, and Putney. To the north, the Putney Mountain/Pinnacle ridge extends for more than 30 miles, and much of the ridge has been conserved. Narrow undeveloped sections of land connect this block to large blocks to the south and east in Dummerston.

CENTRAL HILL SECTION

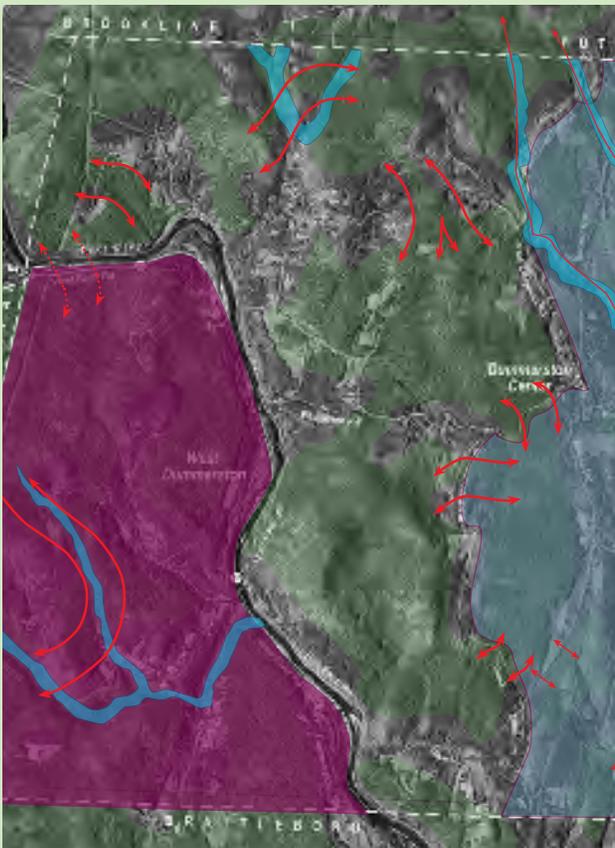
CONNECTING LANDS

Route 30 poses a major impediment to the movement of wildlife to and from the large tracts of land to the south. Amphibians and reptiles, bears, and small mammals are among the species likely to be deterred (or unsuccessful). The bridge over the Rock River offers safe passage to wildlife willing to move in the river or along the rocky area next to the bridge abutments. Improving this area as a wildlife corridor should be considered as decisions are made about swimmer access.

One of the most important and perhaps most imperiled connections in Dummerston is located between the Prospect Mountain area and the

northwest. Here the strip of connecting lands is already narrower than would be ideal for some species. Fortunately, the road here is a Class 4 (unmaintained) so vehicular traffic is slow and infrequent.

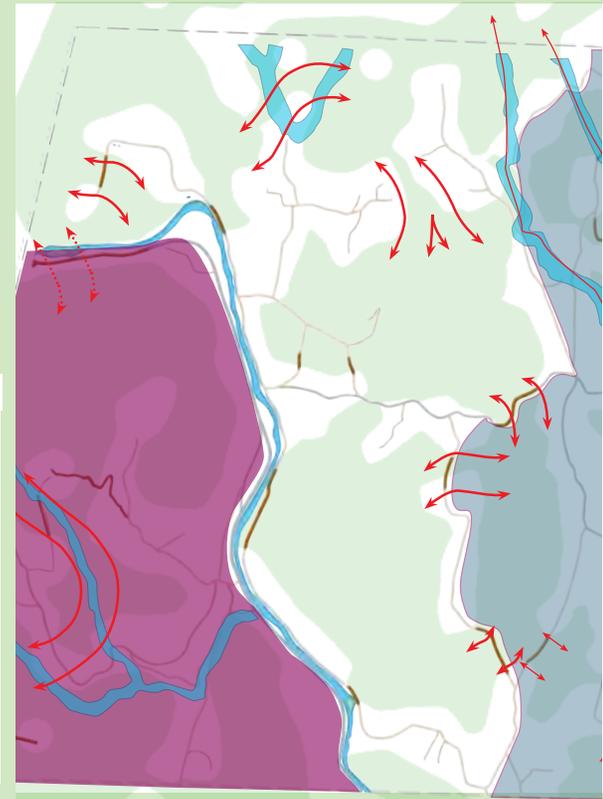
The northern stretches of Fall Brook, Salmon Brook, and Canoe Brook are largely undeveloped, and provide important travel corridors for mink, otter and other mammals, as well as aquatic species like trout.

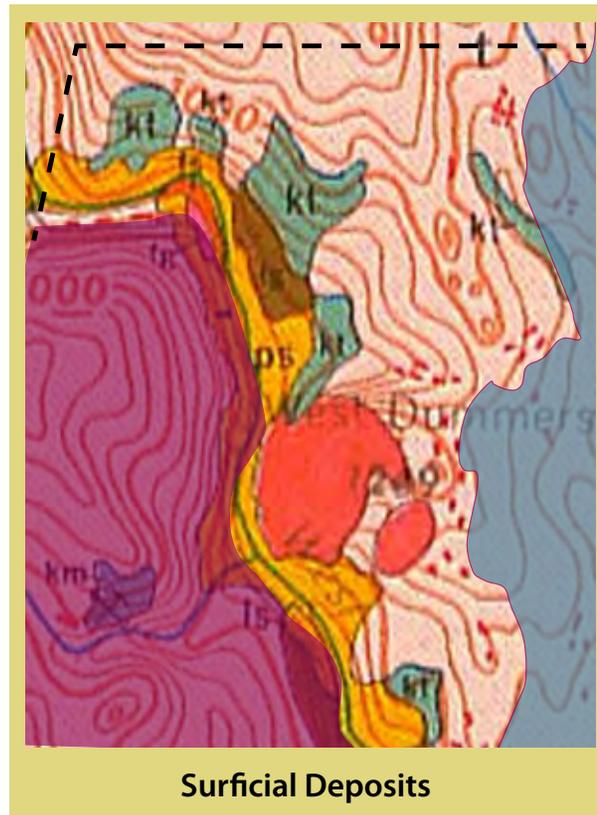
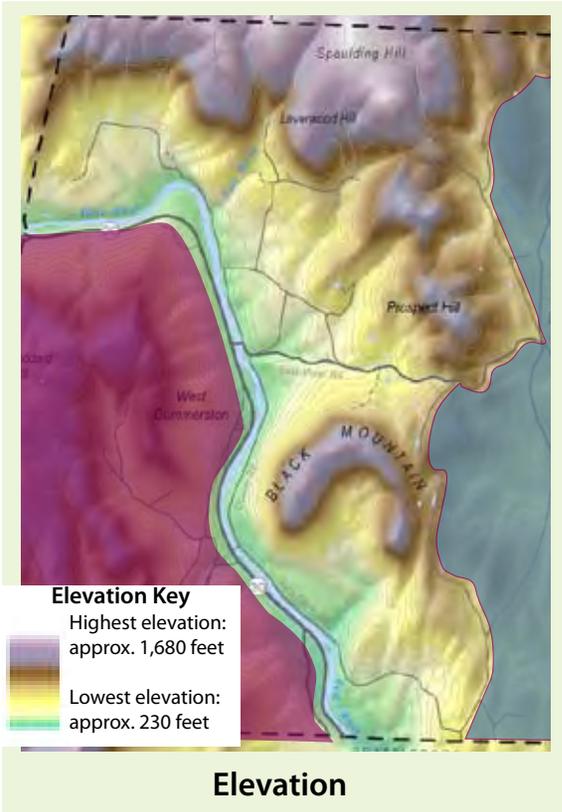


Contiguous Lands & Connecting Lands

Contiguous & Connecting Lands Key

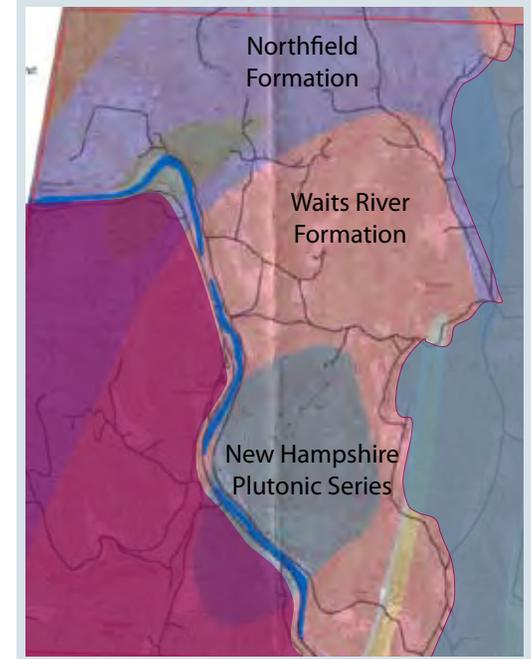
-  Areas at least 600 feet from a structure
-  Paired arrows delineate areas 1,200 feet wide that are likely to serve as important connecting habitat
-  Single lines show potential travel routes for species that are less sensitive to disturbance
-  Important connecting land, needs improvements
-  Important riparian corridors





Important Bedrock Formations

- Waits River Formation:** calcium rich
- Northfield Formation:** some calcium enrichment
- New Hampshire Plutonic Series:** granite, acidic



ENDURING FEATURES

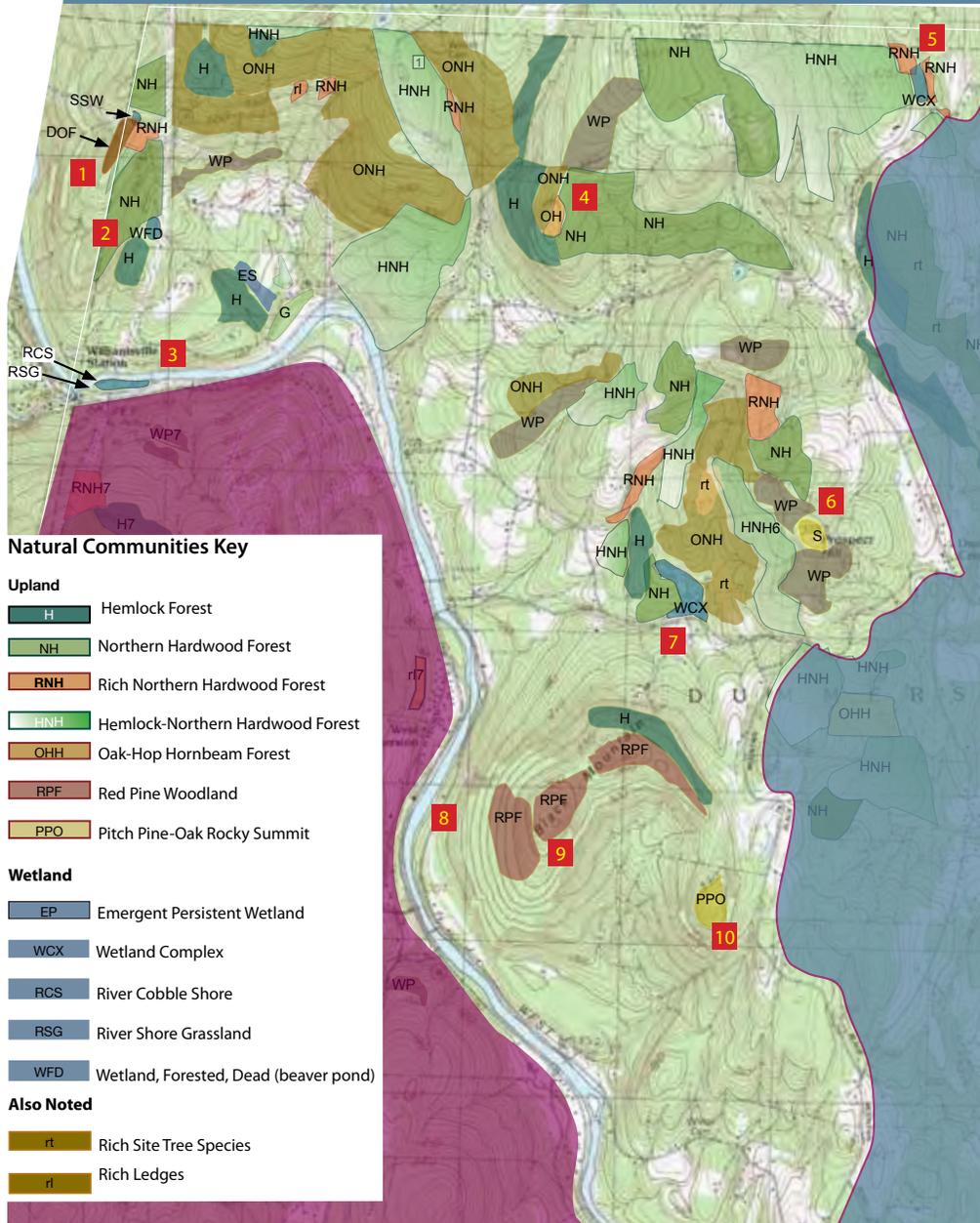
In this section we find some of the enduring features that make Dummerston's landscape so special: the West River, Black Mountain, Prospect Hill, and the southern end of Putney Mountain. Agricultural land gives way to forest land.

The West River Valley is rich in sedimentary deposits, including recent alluvial deposits from the river, and glacial and fluvial deposits from the time when this area was beneath Lake Hitchcock. Stepped terraces mark the historical depositional environments. Highest on the hillside are the

kame terraces, gravel and cobble deposited by meltwater flowing along the side of the receding glacier. Lower terraces of pebbly sand show former shorelines. These sands and gravels tend to be well drained and a number of Dummerston's rare plants are found on these deposits.

In this section we find the granite of Black Mountain (New Hampshire Plutonic Series) adjacent to the soft, calcium enriched Waits River Formation. Each hosts a different flora and contributes to the richness of natural communities in Dummerston.

Central Hills Natural Communities



Natural communities layer by Patti Smith

Community Level Elements

NATURAL COMMUNITIES

This section of town has the greatest diversity of natural communities, and some of the most important wildlife habitat. The West River and Black Mountain are the enduring features that are largely responsible for increasing the variety of small and large patch communities in this section. Several of these have been listed as significant by the Nongame and Natural Heritage Program.

As with the rest of town, steep slopes or sunny hillsides where soils are drier host a matrix forest of oak-northern hardwood forest. Rich ledges and rich northern hardwood forest appear in a number of places. Prospect Hill, on Waits River Formation bedrock, has many pockets of richness, and the bitter-nut hickory, white ash, and basswood trees that thrive in sweet soils grow well on many parts of the mountain.

The well-drained sedimentary deposits above the river support forests with white pine as a dominant in the canopy.

Ten areas where clusters of communities are found are looked at more closely in the photo section that accompanies the communities map.

WETLANDS

The steepness of much of the land in this section is not conducive to the formation of large wetlands, and this section of town has even fewer than the rest of town. A few wetlands were visited as part of this project, and are described in the following section.

1 Putney Mountain Foot

This area along the northwest border has a number of interesting small patch communities. A dry oak forest along the ridge extends into Brookline. A small wetland complex here is part classic woodland depression vernal pool, but is spring fed and drainage might hold water year-round. Buttonbush, *Cephalanthus occidentalis*, occurs in this wetland, the only place in Dummerston we encountered it.



Joe-Pye weed and other wetland plants growing near the pond

2 Beaver Pond and Ledges

This small pond is in the powerline right of way. Beaver have augmented the pond in the past, though none were in residence at the time of our visit. The landscape to the southwest of the pond has a varied topography, with steep ledge outcroppings. Porcupines have resided here for many generations. A classic woodland depression vernal pool with many wood frog and spotted salamander egg masses is located between the pond and the ledges. Jefferson salamander egg masses were suspected but not confirmed. The widening of the powerline will alter this area significantly.



Mossy porcupine ledges



River cobble shore and rivershore grassland communities

3 River Cobble Shore and Rivershore Grassland

The seasonal West River islands below the mouth of the Rock River host two natural communities identified as significant by the NNHP, a Rivershore Grassland that has been ranked S3 (uncommon, believed to be threatened), and a River Cobble Shore, S2 (rare in Vermont).

These islands are seven to eight acres in size, and formed where the Rock River and West River converge, slowing the flow and creating a depositional environment. The shores are subject to flooding and ice scouring, and the plants that populate these communities are adapted to survive in such challenging conditions. The cobble community is adjacent to the river, and the grassland is higher on the bar where conditions are more moderate. Three rare plants are found in these communities.



John Warren examines Canada burnet on a conservation commission visit to the site

4 Leverwood Hill

The summit of this hill has a small patch of dry oak-hop hornbeam forest. A number of large old pasture oaks and slender hop hornbeams create an open, park-like forest with a lawn of Pennsylvania sedge. The hemlocks on the steep south and west slopes shelter deer.



5 Wetland Complex, Rich Woods

This wetland complex can be seen from Park Laugh-ton Road, and contains a mix of cattail marsh, alder swamp, and old beaver pond. This complex lies at the base of a hillside with several seeps that create calcium enrichment. Maidenhair fern and plantain-leaved sedge grow beneath sugar maple, bitternut hickory, and ash.

Bear-clawed beech



A layer of beech leaves tries to conceal the evidence of rich soils—the frosted remains of maidenhair fern, plantain-leaved sedge, and sharp-lobed hepatica

6 Prospect Hill East

Prospect Hill is on Waits River Formation bedrock, and the bedrock’s influence can be seen in the bitternut hickories, ash, sugar maple, and basswood that grow on the mountain. Because most of the mountain was heavily grazed, the rich soil flora is not as diverse as can be found in other parts of the town. There is one moist hillside on the eastern side that was maintained as sugar bush, and there maidenhair fern, hepatica, wild ginger, and rich-site sedges (*Carex plantaginea* and *Carex platyphylla*) can be found. Three beech trees that have been climbed by bears are found in this site. A few vernal pools are found in the proximity of the prospect summit, including a classic woodland depression pool that can be seen from the trail.



7

Prospect Hill South

Rich site trees are found in many parts of these woods, but the understory flora shows little evidence of nutrient enrichment. This could be the result of historical agricultural activities at this site. Rich site indicators are still found on bedrock in this area, and include fragile fern and ebony spleenwort. Beavers have contributed to the development of a wetland complex that can be seen to the north from East West Road. A series of former ponds are in various stages of old pond succession, including shrub swamp, cattail marsh, and sedge meadow. Many of the shrubs in this wetland complex are invasive honeysuckles and buckthorn. No beavers were active in this area during the inventory.



Old barn foundation is part of the evidence of this areas past

Fragile fern



White pine begins to creep back into drying meadow

Areas that still hold water now function as vernal pools



8

Riverside Outcrop

Riverside outcrop communities are located in zones where the rock is frequently scoured by water and ice. Pockets of nutrient-rich silt accumulate in the rock. Some very specialized plants can grow in these conditions.

The NNHP has mapped this as a significant natural community. The outcrop is located at the contact between Black Mountain granite and the Waits River Formation. It is considered a good example of this community type, and is ranked S3.



Granite and mountain laurel beneath the red pine woodland on the west side of Black Mountain

9 Red Pine Woodland

Many red pine stands in Vermont have been planted, and such forests are not natural communities. Red pine woodlands do occur naturally on the drought- and fire-prone ridges of Black Mountain. The Nongame and Natural Heritage Program considers these areas to be significant. They are rare statewide, and are ranked S2. The woodlands found on Black Mountain are large and there is little human disturbance. This forest community is found along the ridge, and in an expanse of about 100 acres on the steep western slope. Pitch pine, red oak, and white oak are also common canopy trees. Blueberry, huckleberry, and mountain laurel are abundant understory shrubs.



Red pine woodland



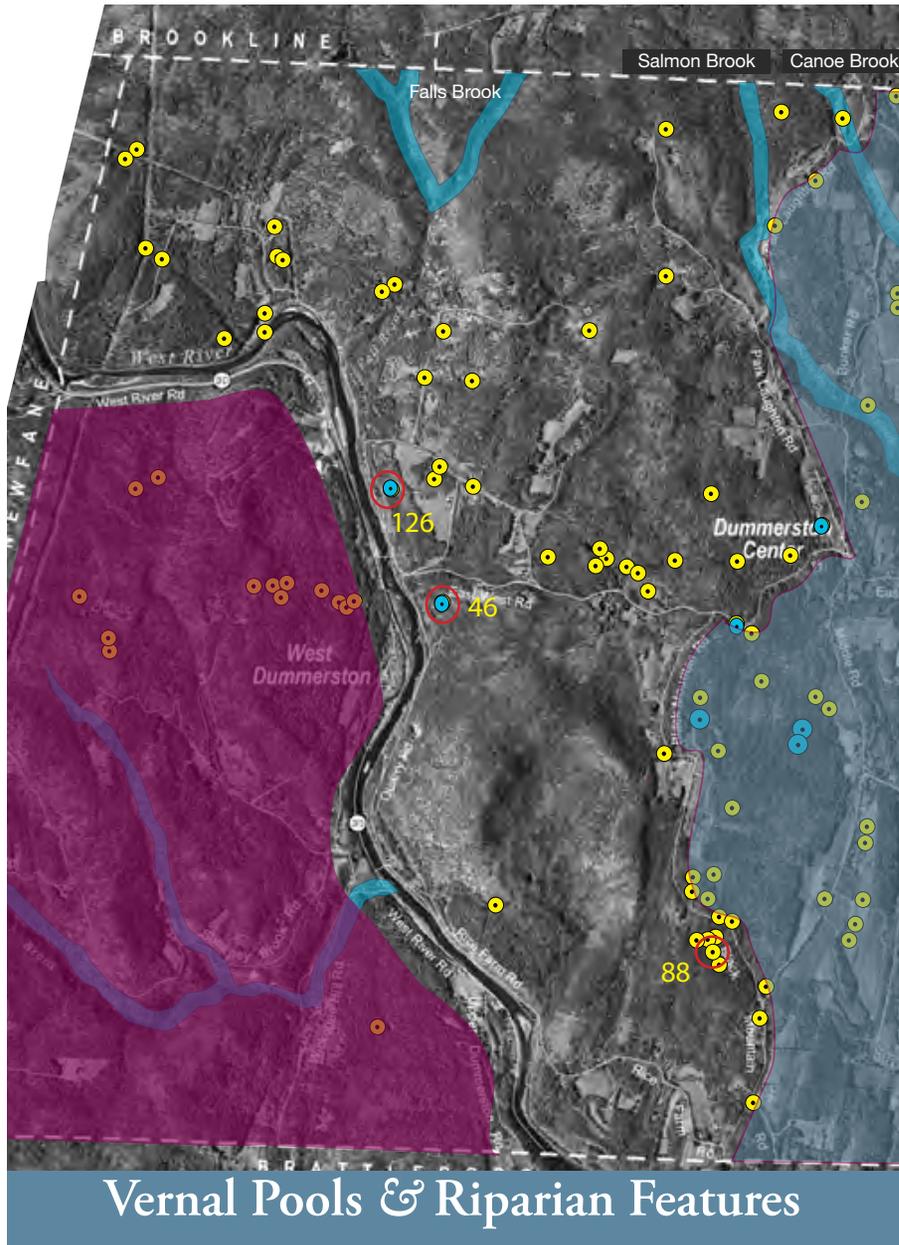
Mountain laurel

Roger Haydock describes Black Mountain geology amidst pitch pine on the summit



10 Pitch Pine-Oak-Heath Rocky Summit

This site, the popular destination for hikers on Black Mountain, is ranked S1 in Vermont, and is considered to be an excellent example of this community type. Pitch pine is a fire adapted tree. Its cones open when subjected to heat, and the seeds germinate in the nutrient poor pockets of mineral soil found on this granite dome. Pitch pine is the most abundant tree on this summit, and shares this open woodland with scrub oak, red pine, and white pine. Mountain Laurel, blueberry, and huckleberry are abundant shrubs. Both scrub oak and mountain laurel are rare in Vermont.



Vernal Pools & Riparian Features

- Key**
- Vernal pools
 - Vernal pools with Jefferson salamanders
 - Ecologically significant vernal pools
 - Significant riparian areas

RIPARIAN AND AQUATIC FEATURES

The West River is classified as a “Priority Aquatic Feature” by the Vermont Biodiversity Project. With its rocky bottom, fluctuating water levels, and springtime ice scouring, it creates habitat for a number of specialized plants. It is one of the rivers where Atlantic salmon fry are released each spring as part of the project to restore the population.

Three small streams drain into the West River from Putney Mountain. Falls Brook, Salmon Brook, and Canoe Brook are larger brooks. Falls Brook is a high gradient stream that flows through a steep-sided valley. Salmon Brook, in this northern stretch of town, flows on a low gradient through a forested valley. These stream segments are largely undeveloped. Salmon Brook, in particular, offers an inviting corridor to the north for larger mammals. This short stretch of Canoe Brook flows through the wetland complex on Park Laughton Road. While it also flows through a stretch of agricultural land, the streamside vegetation is shrubby and dense and provides good cover for wildlife and shade for the brook.

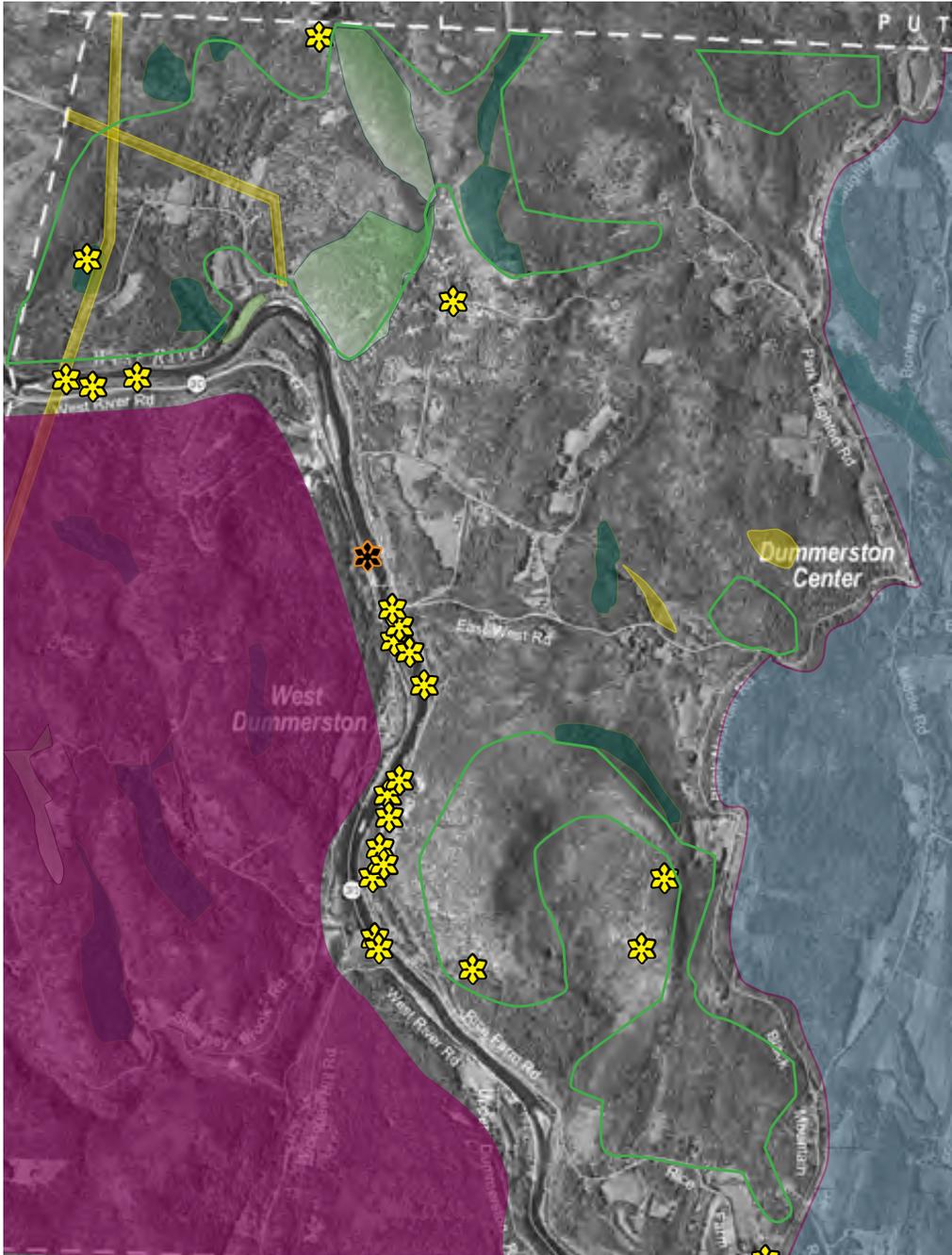
VERNAL POOLS

Forty-nine vernal pools have been mapped and measured in this section of Dummerston. Egg mass counts exist only for wood frogs in many of these pools, however, so some of the ecologically significant pools have yet to be identified. A number of the pools here are part of the ongoing vernal pool monitoring project, so we will soon have counts of other species’ egg masses. Black Mountain needs further survey work.

Ecologically Significant Pools

VP#	Wood Frog Masses	Spotted Masses	Jefferson Masses
46	250	35	8
126	139	90	2
88	67	0	TNTC*

*TNTC: Too numerous to count (possibly because visibility was poor, but large numbers were seen)



Species Level Elements

Species Level Key

-  Rare invertebrate site
-  Rare Plant site
-  Hemlock Forest, possible deer wintering habitat
-  Mapped by VT ANR as deer wintering areas
-  Early successional and shrub habitat
-  Grassland and bird habitat

RARE, THREATENED AND ENDANGERED SPECIES

Most of the rare plants in Dummerston are found in the specialized communities on Black Mountain and along the West River.

DEER WINTERING HABITAT

The Vermont Agency of Natural Resources shows most of this region as "Deer Wintering Areas." A large deer yard that the Vermont Department of Fish & Wildlife monitors is located here. Of the areas surveyed, the deer yard mentioned above, and the south and west sides of Leverwood Hill show clear sign of winter use by deer.



Deer wintering area

Species Level Elements



Shrub habitat under powerline



Grassland and shrubland on summit of Prospect Hill



Streeter's Meadow

EARLY SUCCESSIONAL AND SHRUB HABITAT

The summit of Prospect Hill provides excellent shrub habitat for breeding birds. Unfortunately many of the shrubs are invasive honeysuckles. Efforts to manage invasives should consider bird nesting in the timing of shrub removal. The lowbush blueberries and huckleberries that grow in this opening are a source of fruit for wildlife, and also provide good cover for a number of small mammals and snakes. This is the type of habitat preferred by eastern racers, though none have been found on this hill.

The largest area of early successional and shrub habitat is found in the powerline right of way. While we are concerned about the herbicides used to maintain this area and about the impact of habitat fragmentation on forest interior birds, there is no denying that this corridor offers valuable habitat to many species. The soil moisture varies from saturated to well drained

and hosts a diverse mix of plants from both ends of the spectrum. Raspberries and blackberries are abundant.

Bear and bobcat tracks have been seen here, and bears have marked many of the powerline poles. A smooth green snake and a Dekay's brown snake were seen during the inventory.

GRASSLAND AND BIRD HABITAT

While this area doesn't have vast open fields, it has a few modest openings (5-10 acres) that might accommodate grassland birds.

Streeter's Meadow is located above the West River on a former flood plain. The grassland is about 5 - 7 acres in size and appears to remain open as a result of the dense root mat produced by reed canary grass. Signs of deer were abundant. This area might also provide breeding habitat for grassland birds.



Bear claw marks on powerline pole



Bobcat tracks under the powerline

WESTERN HIGHLANDS SECTION

Landscape Level Elements

CONTIGUOUS LANDS

The land to the west of the West River contains the highest elevations in Dummerston and the largest area of unfragmented land. This area is roughly 1,850 acres in size and contains Stoddard Hill. Maple Valley ski area once operated on it's eastern slope. This unfragmented area bends around to include a ridge to the south. This ridge has a road that bisects it. Today this road offers little trouble to wildlife that might cross, but appears likely to become more developed. If this happens, this contiguous area will become two smaller areas.

The Stickney Brook contiguous area contains about 1,300 acres in mostly large parcels. The Town of Brattleboro has conserved 238 acres as water supply protection. Another 195 acres are conserved by the Vermont Land Trust.

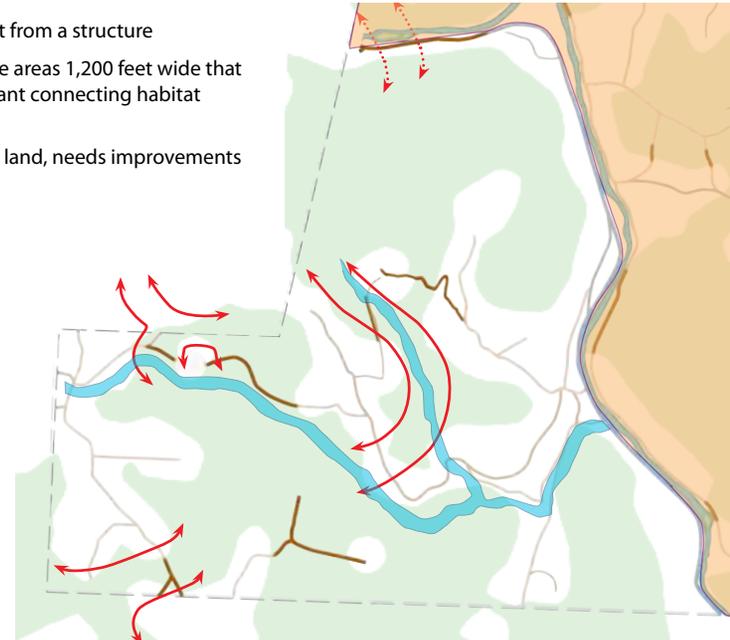
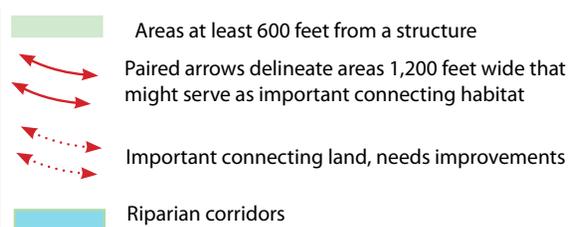
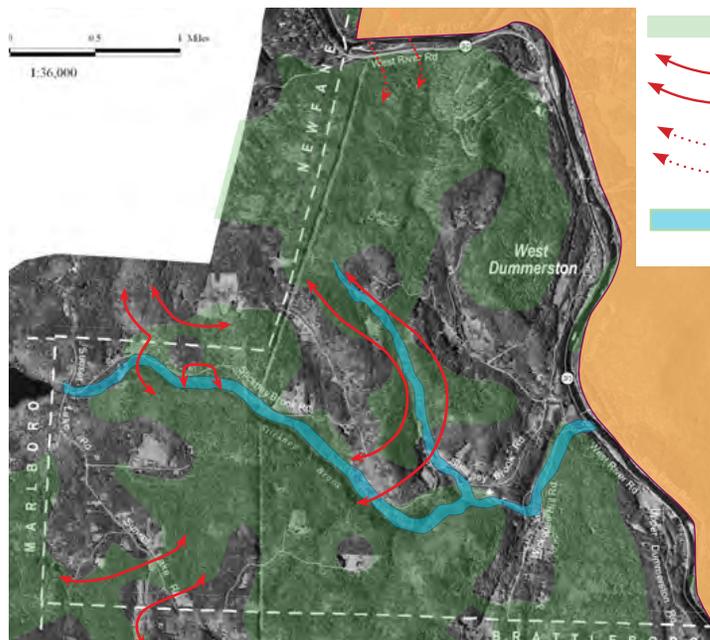
CONNECTING LANDS

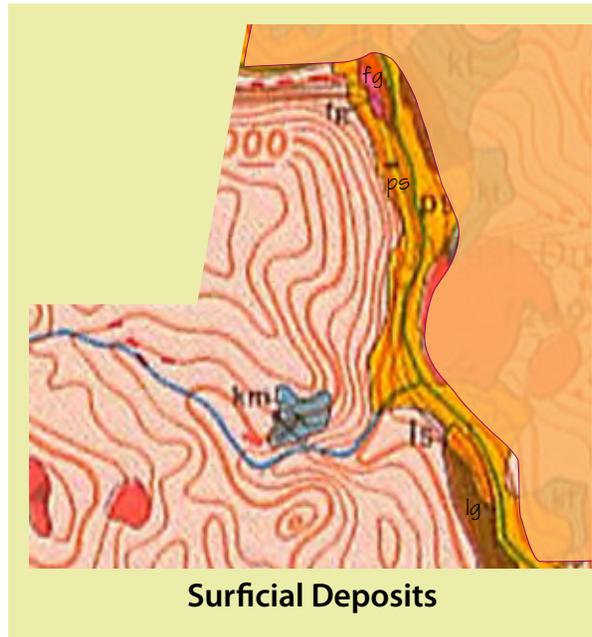
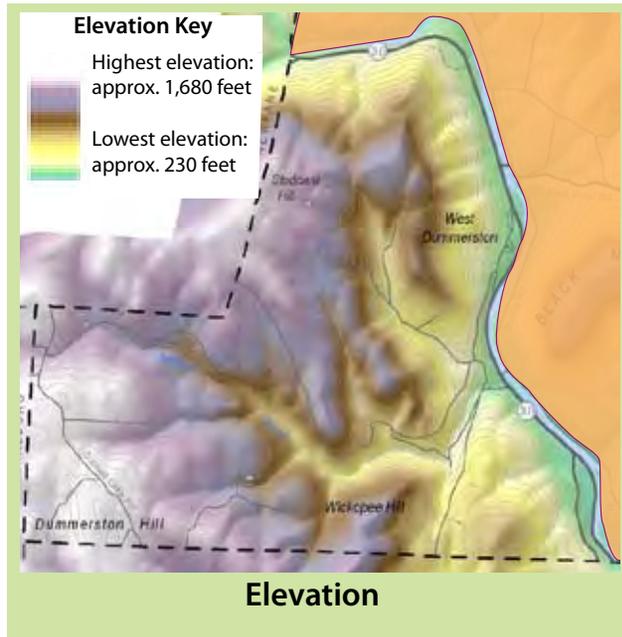
This western side of town provides connections to important natural areas, including the Sunset Lake Reservoir and large unfrag-

mented areas in Marlboro and Newfane. Bears and other wide-ranging species can move from Dummerston through Newfane to the Green Mountain National Forest.

Sunset Lake Road has just one undeveloped segment. While this is a narrow dirt road, it receives a fair amount of traffic. If the undeveloped fragment can remain open this may be important to the connectivity between Dummerston and parts west.

Another important connection is between Stoddard Hill and Putney Mountain. Unfortunately Route 30 poses a major impediment to the movement of wildlife to and from the large tracts of land to the south. Amphibians and reptiles, bears, and small mammals are among the species likely to be deterred from crossing, or unsuccessful if they try. The bridge over the Rock River offers an underpass to wildlife willing to move in the river or along the rocky area next to the bridge abutments. Improving this area as a wildlife corridor should be considered as decisions are made about swimmer access.





- Surficial Deposits Key**
- Till
 - Bedrock exposure
 - Well-sorted littoral (lake shore) sand, no pebbles
 - ps Pebbly sand, lake shore deposit
 - km Kame moraine, kame complex with morainic topography
 - fg Post-glacial fluvial gravel
 - lg Gravel, horizontally bedded lakeshore deposit

Surficial Geologic Map of Vermont, 1970, C.G. Doll, Ed.



ENDURING FEATURES

Dummerston Hill, in the southwest corner, is the high point in town at 508 meters (1,666 feet). Stickney Brook has carved a deep, steep-sided valley here.

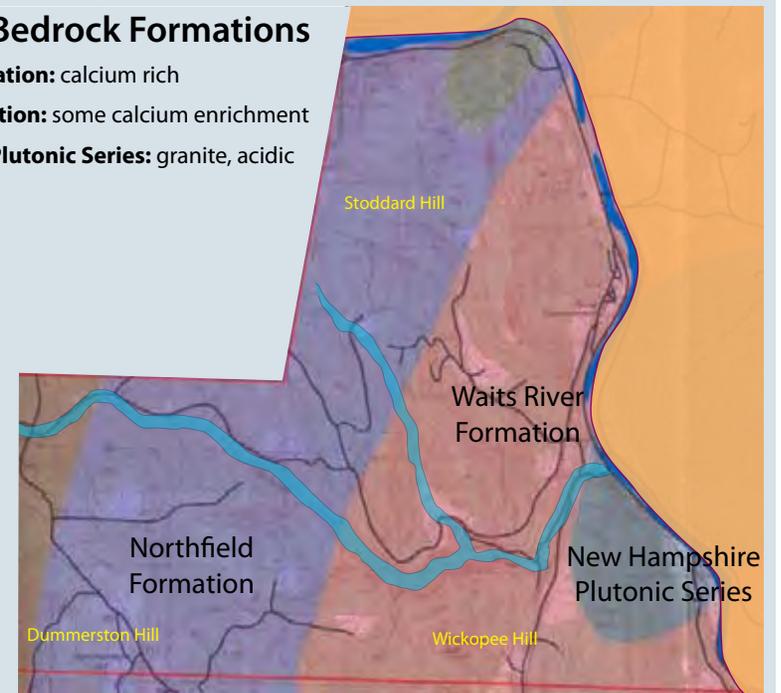
The bedrock in this section includes a swathe of the calcium-rich Waits River Formation. This contributes to rich forest sites and rich ledges on the West face of Stoddard Hill.

There is also a lobe of the New Hampshire Plutonic Series granite on this western side of the river. Much of this is buried beneath deep lakeshore gravels, but some outcroppings, and evidence of small-scale quarrying can be found.

The shores of the glacial Lake Hitchcock are evident along the West River. The village of West Dummerston sits on the pebbly sands deposited on the lakeshore. Farther south, a band of gravels forms a plateau above the river, and this well-drained substrate grows tall pines.

Important Bedrock Formations

- Waits River Formation:** calcium rich
- Northfield Formation:** some calcium enrichment
- New Hampshire Plutonic Series:** granite, acidic



Community Level Elements

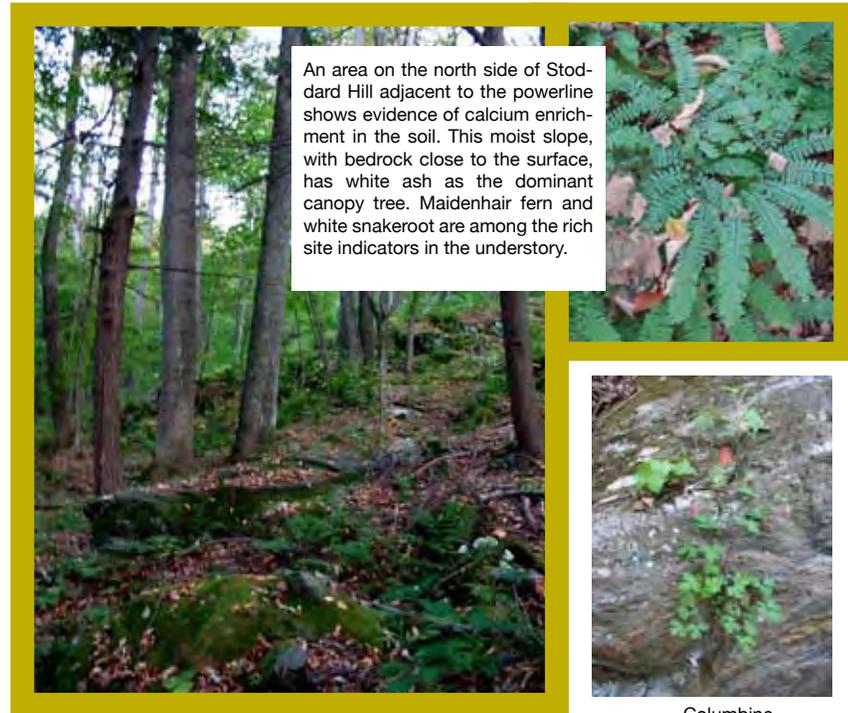
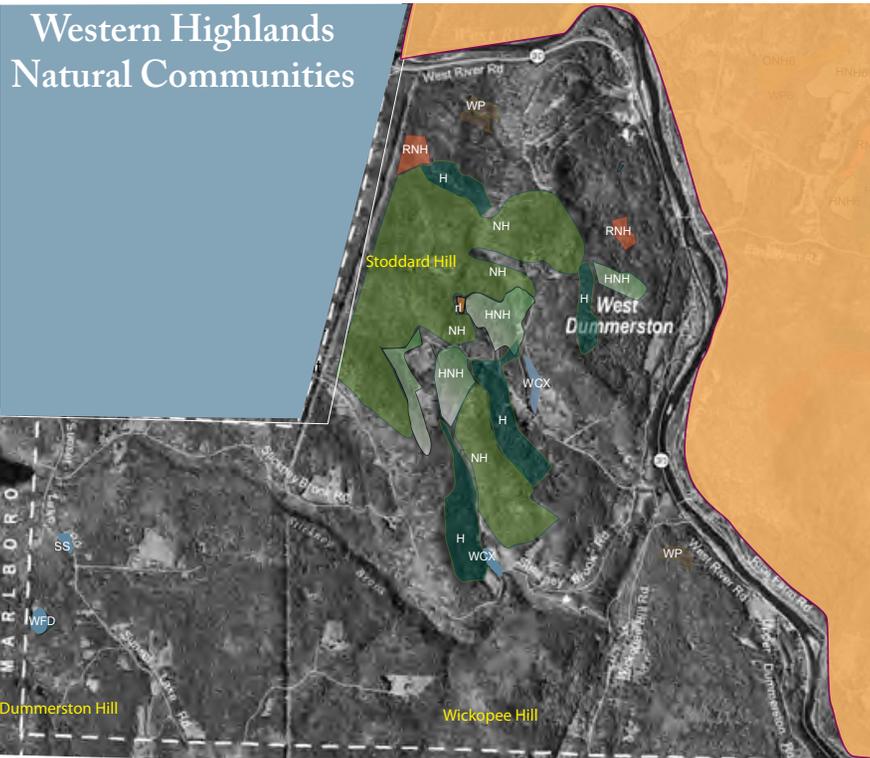
NATURAL COMMUNITIES

No natural communities were mapped here that were not found in other parts of town. The natural community inventory should be extended to the southern portion of this section. It is possible that unusual community types might be found with a more comprehensive survey.

Patches of rich hardwood forest and rich ledges add variety to northern hardwoods. Oaks are less common in this part of town, in part because of the elevation, in part because of a lack of dry slopes.

WETLANDS

Beavers have contributed to the development of wetland complexes on the two streams, Beaver Brook and one of the tributaries flowing into Stickney Brook. No beavers were in residence during the inventory. A number of small wetlands are also found along the high, poorly drained plateau along Sunset Lake Road.



Columbine

Natural Communities Key

Upland

- H Hemlock Forest
- NH Northern Hardwood Forest
- RNH Rich Northern Hardwood Forest
- HNH Hemlock-Northern Hardwood Forest

Wetland

- WCX Wetland Complex
- SS Shrub Swamp
- WFD Wetland, Forested, Dead (beaver pond)

Outcrops of Waits River Formation are found on the steep slopes on the west side of Stoddard hill. These ledges serve as refuges for a flora that disappeared from much of the forest when the land was grazed.



Wild ginger and Dutchman's britches



Miterwort



Small shrub swamp adjacent to Sunset Lake Road



Abandoned beaver pond on border with Marlboro



Gravel terrace above the West River with regenerating white pine seedlings

RIPARIAN AND AQUATIC FEATURES

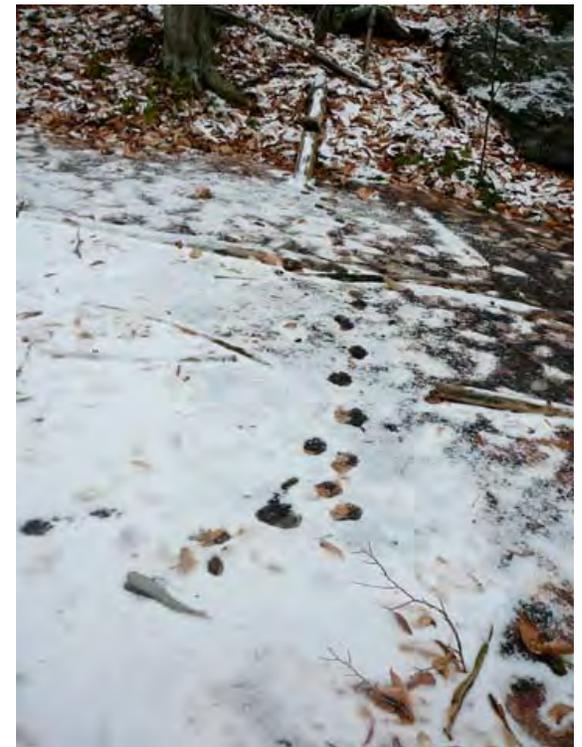
The riparian area along Stickney Brook is owned by the town of Brattleboro, and has been conserved to protect the town's water supply. Brattleboro draws a regulated quantity of water from the brook to feed the Pleasant Valley Reservoir.

VERNAL POOLS

This is the least surveyed section of town, and it is likely a number of pools will be mapped here in the future. Because of the forested nature of this section, nearly all of the pools that have been mapped here are natural woodland pools. Of these several were mapped outside of the amphibian breeding season, and were identified by presence of fingernail clams in the leaf litter. It is likely that some of these pools host breeding populations of Jefferson salamanders.

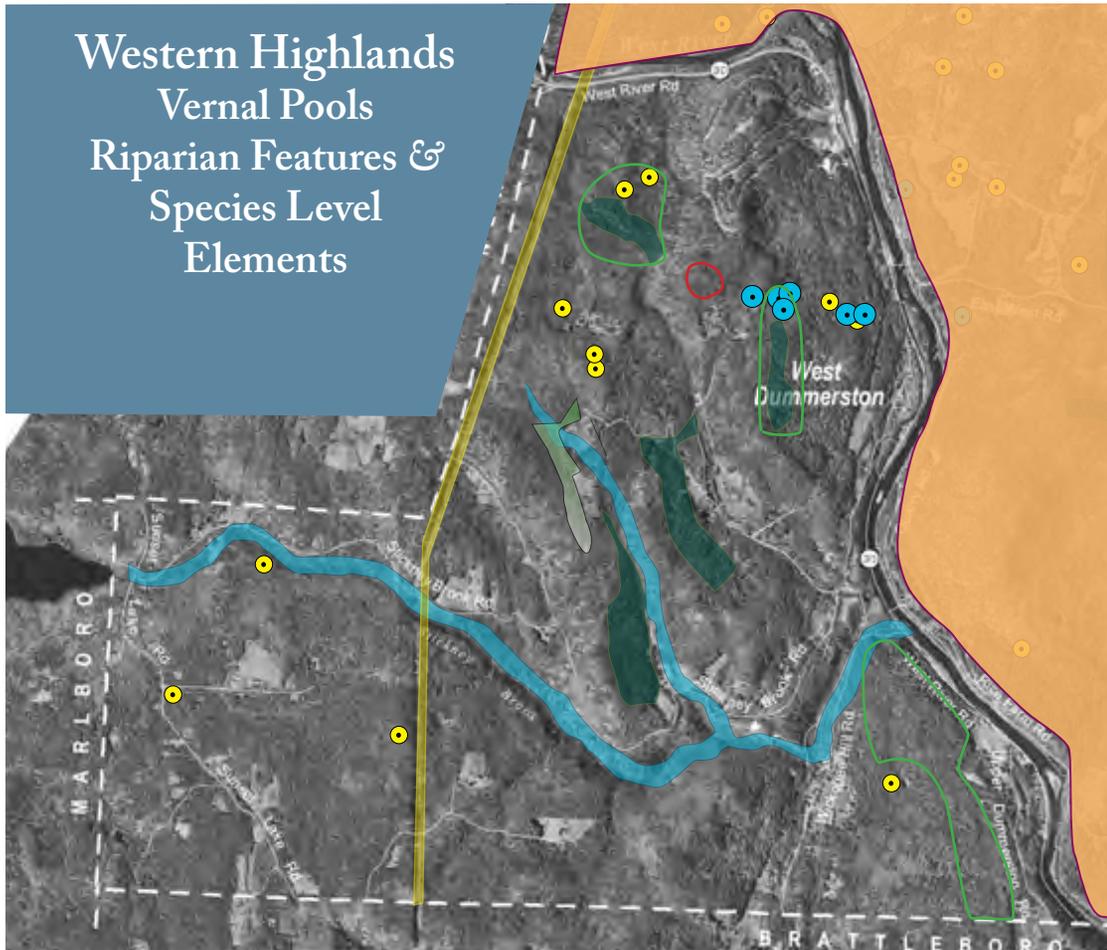


Snowshoe hare tracks were found near the Marlboro border



Vernal pool with fisher tracks on Stoddard Mountain

Western Highlands Vernal Pools Riparian Features & Species Level Elements



- Vernal pools
- Vernal pools with Jefferson salamanders
- Mast stand
- Significant riparian areas
- Hemlock Forest, possible deer wintering habitat
- Mapped by VT ANR as deer wintering areas
- Early successional and shrub habitat

Species Level Elements

DEER WINTERING HABITAT

Deer wintering habitat in this section has not been field checked.



MAST STANDS

This is the part of town, with its proximity to important bear habitat in adjacent towns, where beech and oak stands are most likely to provide autumn feeding sites for black bears. This was, in fact, the only part of town where recent evidence of bears climbing beech trees was found. Several trees had fresh and historical claw marks and a "nest" of broken branches was seen in the top of one. This would be an important area to conserve as a mast stand that might be important for bears in the future.



Stoddard Hill power line facing north



Bear claw marks

EARLY SUCCESSIONAL AND SHRUB HABITAT

As with other sections of town, there is little forest in an early successional stage, and the shrub areas are found in the small wetlands and under the powerline right of way. The powerline does provide many acres of this habitat, and we found evidence that this area is used by wildlife. John Anderson has reported a fox den near a power pole. He also saw indigo buntings and rufous-sided towhees on a survey hike and has observed ruffed grouse and woodcock in the vicinity. There are a number of bear-clawed power poles. During raspberry season there were fresh bear tracks and trampled bushes.

In this section, the powerline has a mix of substrates. Wetlands and wet soils are found where there are springs. The summit is dry with bedrock exposures.

GRASSLAND AND BIRD HABITAT

No grasslands suitable for bird nesting were identified; however, more inventory work is needed. The area under the powerline provides excellent cover for grassland-affiliates, such as the eastern racer and other snakes, and small mammals.



Trampled raspberries

Appendices

BEDROCK GEOLOGY MAP.....	39
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Bedrock Formations

From Geologic Map of the Brattleboro Quadrangle, Vermont Geological Survey, J.C. Hepburn, N. J. Trask, J. L. Rosenfeld, J. B. Thompson, Jr.

Un-named Schist-Amphibolite Unit

Rusty-weathering, fine-grained black carbonaceous phyllite and schist with thin black quartz interbeds; medium-grained porphyritic black amphibolite; minor gray mica-schist with garnets; distinctive thin coticule layers.

Northfield

Gray, commonly crinkled, mica schist with conspicuous almandine porphyroblasts; thin impure quartzite interbeds, minor impure marble.

Waits River

Dark gray to gray mica schist and calcareous mica schist with abundant interbeds of punky brown-weathering impure marble; thin interbeds of impure quartzite toward eastern contact.

Missisquoi

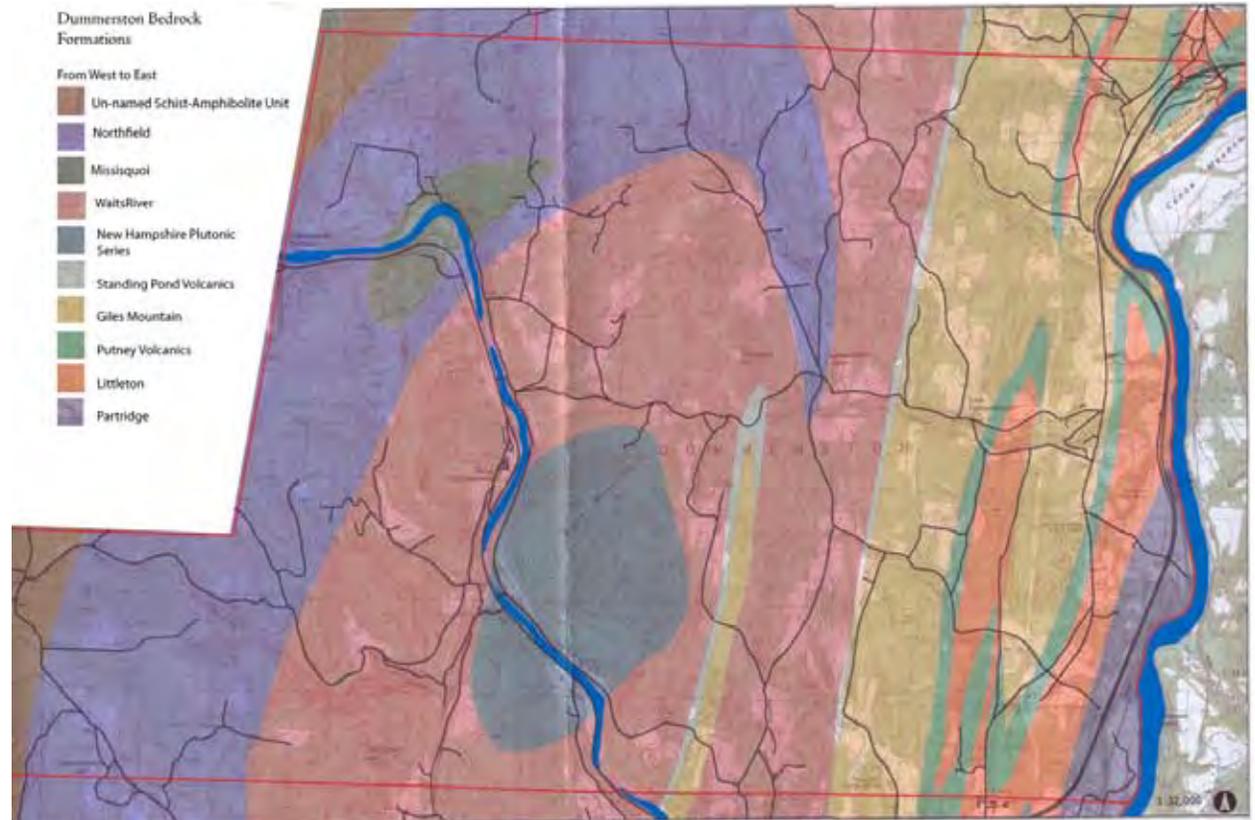
Barnard Volcanic Member, dark gray to black amphibolite with feldspar megacrysts; gray to light gray quartzofeldspathic gneiss, schist; granulite, and layered gneiss with interlayers of amphibolite; minor black, rusty-weathering mica schist.

New Hampshire Plutonic Series

Medium- to coarse-grained, light gray to gray granite, granodiorite, and quartz diorite; some bodies weakly to moderately foliated.

Standing Pond Volcanics

Black medium-grained amphibolite and epidote amphibolite; very coarse-grained garnet-hornblende faciculitic schist; minor impure quartzite, coticule, and schist; dark gray to gray-green,



Map by Claire Dacey and John Warren, 2005

massive plagioclase-biotite-quartz and plagioclase-biotite-hornblende-quartz-carbonate granulite and gneiss.

Giles Mountain

Interbedded light gray to tan micaceous and feldspathic quartzite and rare, punky brown-weathering impure marble.

Putney Volcanics

Buff to light-brownish weathering feldspathic granulite and feldspathic phyllite; light greenish gray chlorite phyllite; greenstone; interbedded gray slate or phyllite.

Littleton

Gray to dark gray slate, phyllite and mica schist

with interbedded quartzite; biotite, garnet, and staurolite porphyroblasts common at the appropriate metamorphic grades.

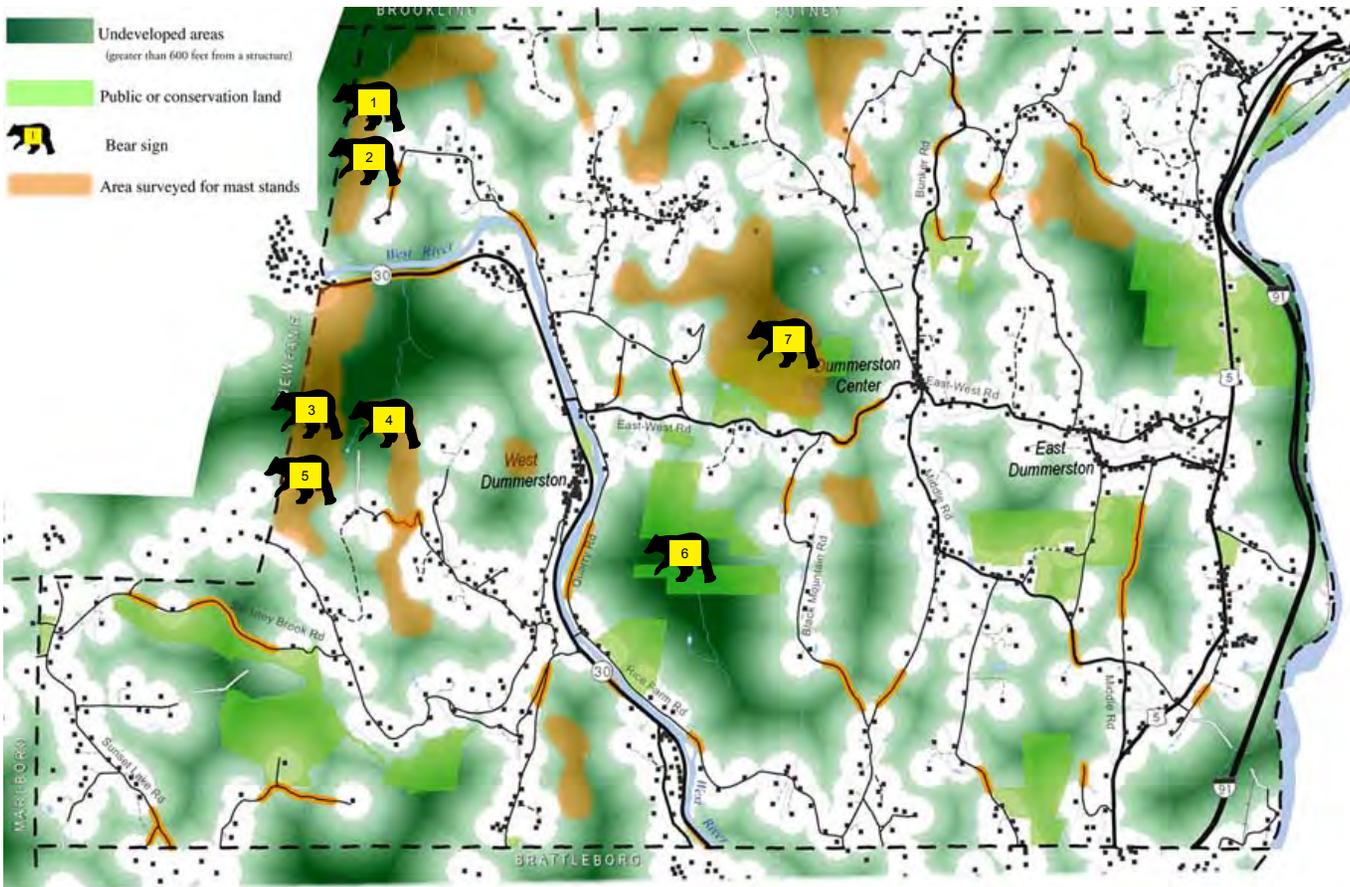
Partridge

Rusty-brown weathering sulfidic mica schist; gray quartz-mica schist; biotite, garnet and staurolite porphyroblasts present at appropriate metamorphic grades; lesser amounts of amphibolite and quartz-feldspar-biotite gneiss and granulite.

Dummerston Mast Stand and Bear Sign Survey



Northwest Powerline
Several powerline poles had been clawed and bitten by bears.



In a survey of beech stands in remote sections of contiguous forest, no mast stands were found. All beeches were checked in likely stands, and individual beeches were checked when encountered. In three cases scarred trees were found. Since a minimum of 10 trees within a stand must show claw marks to be considered a significant bear mast stand, none of these stands qualify. This was most surprising along the very beechy slopes in the northwest corner of town, which is well connected to undeveloped lands in Brookline, Newfane, and Putney and often well away from human disturbance.

In the course of this survey, other bear sign was discovered and recorded below. All sights recorded have been GIS mapped.

Dummerston Mast Stand and Bear Sign Survey



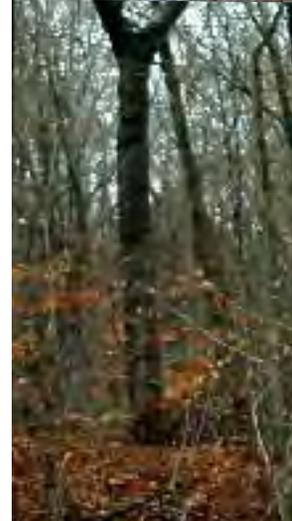
Stoddard Hill Powerline

Power poles had been scarred by bears near the summit of Stoddard Hill. During the late summer there was also evidence of bears feeding on raspberries in the powerline right-of-way. One beech had been climbed by bears at the edge of the powerline, but that was more than five years ago.



Stoddard Hill Beeches

Two trees had been climbed in this large stand of mature beech. Both had been actively used in the fall of 2006, with an impressive "nest" in one beech.

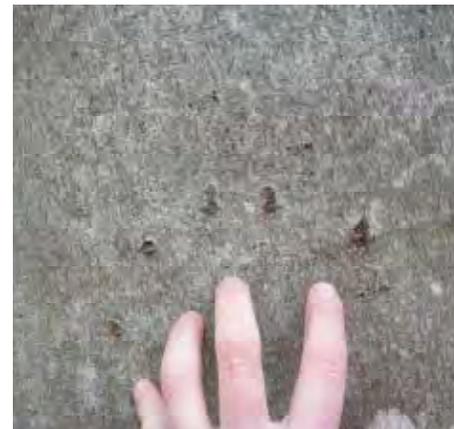


Dummerston Mast Stand and Bear Sign Survey



Prospect Mountain

Only three beeches had been climbed in this large stand, and none had fresh scarring.



Stoddard Hill Foraging

While no beeches were scarred on this section of the mountain, a bear had been feeding on jack-in-the-pulpits in the summer of 2007.



Black Mountain

This area still needs to be surveyed. One scarred beech is known to occur in the "bowl."



Roads and Habitat Connectivity in Dummerston: Preliminary Analysis

Roads and houses divide the landscape of Dummerston into fragmented blocks of habitat. The ability of an animal to cross roads to move from one of these blocks to another depends upon a number of factors. In 2007, the Dummerston Conservation Commission worked with a volunteer, Andrea Durant, to survey the undeveloped sections of road more than 500 feet in length. This is believed to be a minimum distance that some species, such as black bear, need. We hoped to learn which of these segments are likely to be the most essential to maintain habitat connectivity, and whether crossing sites could be made safer.

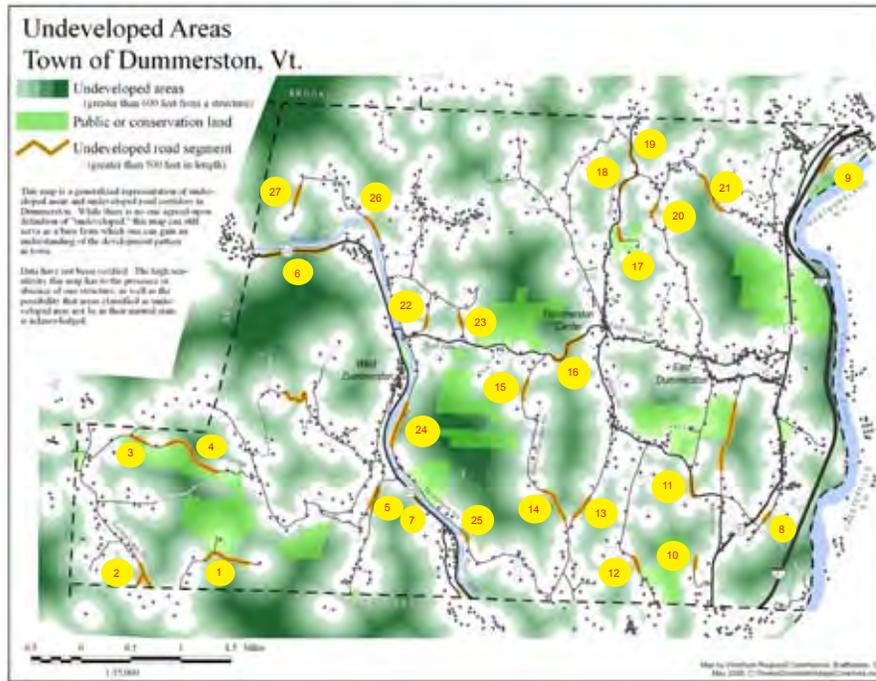
Each segment was rated (from 0 - 10) on its importance based on the size and value of the habitats on either side, whether other access existed, and whether the site was important in linking a number of contiguous blocks. The most important crossing zones were given a 10.

Each segment was then evaluated as a crossing site. The "Suitability Score" is based upon the amount of traffic (score 0-10 as traffic decreases), absence of guardrails (score 1-4), quality of vegetation cover (score 1-4), the topography of the site (score 0-8), and visibility to traffic (score 1-4). The highest possible score for crossing suitability is 30.

The results show that some of the sites that could provide the most valuable habitat linkages, such as site 6, probably are not used as crossing sites by many animals, or only at their great peril.

The Dummerston Conservation Commission will examine the conditions at each of the important crossing sites and consider ways to improve and protect them.

Undeveloped Road Segments



Suitability for Wildlife Crossing

#	Road	Linkage Ranking	Traffic	Guardrails	Vegetation	Topography	Visibility	Suitability Score
1	Sunset Lake	6	5	4	3	6	4	22
2	Hesscock	6	10	4	4	6	4	28
3	Stickney Brook	4	6	4	4	6	4	24
4	Stickney Brook	4	6	4	4	4	2	20
5	Wickopee Hill	4	8	4	4	2	4	22
6	Route 30	10	0	1	4	0	2	7
7	Route 30	6	0	2	3	6	3	14
8	Carpenter	4	8	4	4	4	4	24
9	Kathan Meadow	0	10	4	1	1	2	18
10	Ryan	0	10	4	3	4	4	25
11	Middle	6	3	4	4	3	2	16
12	Kipling	5	6	4	3	6	4	23
13	Dutton Farm	6	8	4	3	3	4	22
14	Black Mountain	8	5	4	4	8	4	25
15	Black Mountain	8	5	4	4	4	4	21
16	East West	10	2	4	4	8	1	18
17	Falk	2	10	4	2	4	2	22
18	Bunker	8	5	4	2	6	3	20
19	Bunker	8	5	4	4	4	3	15
20	Miller Road	8	5	4	4	8	3	24
21	Canoe Brook	8	8	4	4	8	4	28
22	Day	4	7	4	4	4	3	26
23	Green Mountain Camp	5	7	4	2	8	4	25
24	Quarry Road	0	6	4	4	4	4	22
25	Rice Farm Road	0	6	4	4	4	3	21
26	Camp Arden	2	7	2	4	2	3	18
27	Camp Arden	6	8	4	4	6	4	26