SIGNIFICANT NATURAL COMMUNITIES OF CHARLOTTE, VERMONT

PHASE I: LANDSCAPE ASSESSMENT

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FEBRUARY 24, 2003
BACKGROUND

A natural community is an assemblage of organisms, their physical habitat, the natural processes affecting them, and the interactions between these. The conservation of natural communities is recognized by conservation biologists and practitioners as an integral part of any conservation program. The Nature Conservancy and the Vermont Biodiversity Project, for example, plan for conservation at three scales: 1) the landscape scale, 2) the natural community scale, and 3) the species scale. Conserving biological diversity at multiple scales ensures that a wide variety of species and ecological systems will be conserved. Conservation of large, intact, diverse landscapes, for example, will ensure the protection of many natural communities and wide-ranging species. Conservation of multiple examples of all natural communities will ensure that rare and uncommon natural community types and many common and uncommon species will be protected, even if they were missed by conserving large landscapes. Finally, conservation at the species level is necessary to ensure the protection of those species that are missed in landscape-scale and community-scale conservation efforts.

In addition to the importance of natural communities in conservation planning, a knowledge of the distribution of natural communities on a given piece of land can serve as a valuable management tool. Each natural community type has its own particular management needs, whether it be fire for sandplain forests, buffering from human activities for vernal pools, or the protection of groundwater sources for fens and seeps. The Vermont Agency of Natural Resources, many federal agencies, and many private landowners are mapping natural communities on their lands in order to better manage them.

In recognition of the importance of natural communities in conservation planning and in land management, the town of Charlotte has begun to identify and inventory potentially significant natural communities in Charlotte. This information will add importantly to the body of natural resource information already assembled for the town.

The best conservation plan will consider all scales simultaneously, and all conservation assessments should be done with multiple scales in mind. The assessment presented here, though conducted mainly at the natural community level, also considers landscape-scale processes and the needs of individual species. It also complements other assessments that have been completed or are ongoing at the landscape and species scales, including the Lewis Creek Watershed assessment, the Vermont Biodiversity Project, The Nature Conservancy’s ecoregional planning, the Charlotte Wildlife Habitat Assessment, the Charlotte Wetlands Assessment, and previous inventories and assessments of rare species.

The assessment of natural communities in Charlotte was conceived as a two-phase project. Phase I uses existing data to develop a map and database of potentially significant natural community complexes in Charlotte. It also prioritizes those complexes for conservation and for further inventory. Phase II is the field inventory and assessment of the natural community complexes identified in Phase I.

This is a report on Phase I.
METHODS

1. A list of potential natural communities in Charlotte was developed based on Thompson and Sorenson's book, *Wetland*, *Woodland*, *Wildland*.

2. These communities were then prioritized for attention in the inventory. Highest priority was given to communities that are rare, declining, vulnerable, or especially well represented in Charlotte. Three priority classes – high (1), medium (2), and low (3) – were assigned. *The result of this analysis is Table 1.*

3. Known occurrences of these and other communities were mapped based on information from the Nongame and Natural Heritage program and other sources.

4. Existing data layers (geology, soils, topography, aerial and satellite imagery, land cover, Charlotte Wetlands Inventory, Charlotte Wildlife Habitat Assessment, and others) were compiled and analyzed to determine other potential locations for these communities.

5. Sites for significant and potentially significant natural communities, either single communities or community complexes, were then delineated using digital orthophotos as a base. *The result of this effort is the accompanying map.*

6. The sites were then prioritized for inventory based on 1) the potential for locating new significant natural communities; 2) the size of the site; 3) the landscape context of the site (what surrounds the site and how well it is connected with other sites); 4) the landscape and expected community diversity of the site; and the quality of existing information. The sites were also prioritized for conservation action based on their known conservation value, as assessed by the Nongame and Natural Heritage Program, The Nature Conservancy’s Ecoregional planning, or the Vermont Biodiversity Project. *The result of this analysis is Table 2.*

SUMMARY OF RESULTS

I. LANDSCAPE ANALYSIS

The analysis of geology, soils, landforms, and aquatic features that make up Charlotte and the surrounding areas reveals a diversity of habitats and a rich tapestry of natural communities. The history of land use reflects these differences and adds to the pattern of diverse landscapes in the town. The bedrock of the western part of town is dominated by calcareous shale, seen easily along the shore in some places, with some inclusions of dolomite. The eastern side of town is dominated by dolomite, while in the central strip Monkton quartzite appears along the Champlain Thrust Fault on Pease Mountain, Mutton Hill, and Mount Philo, among other places.

Where bedrock is close to the surface, as on these hills, the forests tend to be composed of a mix of northern hardwoods (maple, ash, and birch) along with oaks, hickories, and hophornbeam in
the drier locations. Interspersed in the forests are outcrops, cliffs, streams, vernal pools, seeps, and other natural communities that increase diversity.

The larger forested areas provide critical habitat for a number of wildlife species, and provide important linkage areas. The Critical Wildlife Habitat of Charlotte report and map show clearly that the three prominent hills of the central part of town – Mutton Hill, Pease Mountain, and Mount Philo, along with the forested hills in the southeast part of town, provide much of the important wildlife habitat of the town. Analysis of land cover maps of southern Chittenden and northern Addison Counties shows that the southeastern corner of Charlotte presents the greatest opportunity for providing major habitat linkages between the large forested areas of the Green Mountains and the forested areas adjacent to Lake Champlain. Lewis Creek and its riparian zone provide much of this opportunity. This function has been will undoubtedly be addressed in the Lewis Creek Watershed Assessment.

Over the bedrock in many places lies a mantle of surficial materials – deposits left by glaciers and postglacial water bodies, including Lake Vermont and the Champlain Sea. Analysis of soils data reveals that glacial lake clays dominate much of the landscape of Charlotte. Prior to European settlement, these clay soils supported a diverse forest of oaks, maples, ashes, pines, hemlock, and hickories. This forest – we call it Valley Clayplain Forest – is now reduced to small fragments. One of Vermont’s most mature examples of this natural community is found in Charlotte at Williams Woods. Several small but highly significant areas of Valley Clayplain Forest are known from Charlotte, and there are opportunities to restore this forest in places where it has been absent for a century or more.

The lowlands also support a diversity of wetland types, from Red Maple-Black Ash Swamp to Deep Rush Marsh. The Charlotte Wetlands Inventory identifies wetlands throughout the town, many of them on clay soils. These wetlands are worthy of detailed on-the-ground investigation.

On the shoreline, bluffs and beaches support a diversity of natural communities and species, including the rare Limestone Bluff Cedar-Pine Forest.

The following section describes the results of the detailed investigation of specific places where significant natural communities may be found.

II. Potential Natural Community Complexes

Of the eighty upland and wetland natural communities described in Vermont (Thompson and Sorenson 2000), fifty-seven could potentially be found in Charlotte. Table 1 lists these fifty-seven community types with their natural patch sizes (small, large, or matrix – see Thompson and Sorenson for explanation), state ranks, synonyms, inventory priority, comments, and notes on how one might locate them.

For some of these community types, potential locations can easily be found through the use of remote sensing. For example, any forested area on clay soils is a potential Valley Clayplain Forest. Any softwood swamp as identified in the Charlotte Wetlands Inventory is a potential Hemlock Swamp. On the other hand, natural communities that are small or linear by their
nature, such as Vernal Pool or Rivershore Grassland, are difficult to locate remotely, and must be found in other ways.

Table 2, then, lists a number of sites - 43 in all - that either do have or may have significant natural communities, based on existing inventory data and remote sensing. Each site is a community complex, or group of natural communities occurring together.

The sites are prioritized for inventory as described above. There are twelve high-priority (1) sites, places that either have not been inventoried previously or need more extensive inventory, and potentially have state-significant natural communities. There are fourteen medium-priority (2) sites, places that need inventory and have potential for at least locally significant community complexes. There are seventeen low-priority (3) sites, places that have already been well-inventoried and are known to be significant, or, on the other hand, have not been inventoried and are not believed to be highly significant.

The sites are also prioritized for conservation. This prioritization should be understood to be very preliminary and based on limited data. The town should conduct its own prioritization based on a detailed threats assessment, knowledge of the individual sites, and further field inventory. Before any conservation action is taken at a site, a site conservation plan should be prepared.

Highest conservation priority (Priority 1) is given to sites that are known to have communities that are rare and/or vulnerable, that are identified in other conservation plans (The Nature Conservancy or the Vermont Biodiversity Project), or that can contribute significantly to landscape-level conservation as well as natural community-level conservation. Second priority (Priority 2) is given to sites that are likely of statewide and ecoregional significance, but which need further assessment. Lowest priority (Priority 3) is given to sites for which there is inadequate field data. These sites should be visited in Phase II. A few sites were not classified for conservation priority - these are indicated with a "U" in Table 2 and on the accompanying map. I defer to the Lewis Creek Watershed Assessment for analysis of these areas.

All the sites are described in Appendix A.

III. ACCOMPANYING PRODUCTS

- Map and GIS shape file: Town of Charlotte, Vermont: Known and Potential Significant Natural Community Complexes
- Table 1: Potential Natural Communities of Charlotte, listing all communities which might potentially occur in the town
- Table 2: Known and Potential Natural Community Complexes of Conservation Significance in Charlotte, describing the mapped sites and prioritizing them for inventory and for conservation
CONCLUSION

Charlotte has a rich and varied landscape with a diversity of natural communities, from lakeshore wetlands to wet lowland forests on clay soils to dry forests of oaks and hickories on the dramatic hilltops. It can be argued that Charlotte contains nearly the full diversity of natural community types that can be found in the Champlain Valley, and is thus a microcosm of the biophysical region.

Many of Charlotte’s natural communities are recognized as having statewide or ecoregional significance. Conserving these would further the conservation goals of The Nature Conservancy as well as the conservation goals of the Vermont Biodiversity Project.

More importantly, conservation of Charlotte’s special natural communities – whether that means making them natural areas or managing them for sustainable timber harvest and recreation – would be a source of pride for the town of Charlotte and its residents.

Much has already been done to conserve Charlotte’s natural communities. More can be done, beginning with the sites shown in green (Conservation Priority 1) on the accompanying map. For each of these sites, a detailed site conservation plan should be completed to identify threats, determine exact boundaries and connections to other conserved lands, and develop strategies for conservation.

In addition, the sites shown in yellow, blue, or red may have high conservation significance but more information is needed. Phase II of this project would supply that information and complete the picture.
APPENDIX A: SITE REPORTS

The reports that follow are meant to provide a brief look at the significance of each area. Sites beginning with “H” were identified by the Vermont Nongame and Natural Heritage Program. Most of these are known to be of statewide significance. Sites beginning with “ET” were identified by the author during this assessment project, and have not been field checked. Their significance is not known.

When reading these descriptions, please refer to Table 2 and to the map. For the sites beginning with “H,” please also refer to the Chittenden County Natural Areas Inventory of the Vermont Nongame and Natural Heritage Program.

Conservation recommendations are given below only for areas that have been field inventoried.

H01, Thorp Brook Mouth – This site is one of the most important natural areas in Charlotte because of the diversity and quality of its natural communities. The Nongame and Natural Heritage Program recognized the significance of its Floodplain Forest, Valley Clayplain Forest, and Deep Rush Marsh. At lake’s edge, cattail and river bulrush form a dense marsh. Moving toward the upland, shrubs become common, and a floodplain forest lines the shore. Silver maples here reach diameters of up to 25 inches. Landward of the floodplain forest lies an impressive and diverse Valley Clayplain Forest. The Nature Conservancy, through its ecoregional planning, has identified the area as a priority for conservation, both because of its specific natural communities and because it is part of a larger block of land – a so-called “matrix block” – that offers potential for large-scale restoration of natural communities in the St. Lawrence-Champlain Valley Ecoregion. In addition, Thorp Brook is recognized by the Vermont Biodiversity Project as one of the state’s best examples of a small stream in the Champlain Valley. Conservation recommendations: This wetland complex should be conserved along with adjacent areas (H02 and perhaps ET23, if field work verifies its significance), and connected to the natural area at Williams Woods (H03). The exact boundaries of the area to be conserved, and the management of those areas, should be determined through site conservation planning. Conservation of this area would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

H02 and H37, Thorp Brook Hills – This site has excellent examples of Temperate Calcareaous Cliff and Temperate Calcareaous Outcrop natural communities along with several rare plants. The site also has a Limestone Bluff Cedar-Pine Forest that is likely of statewide significance. The hills add physical and biological diversity to the landscape near the mouth of Thorp Brook. The Nature Conservancy, through its ecoregional planning, has identified the area as a priority for conservation, both because of its specific natural communities and because it is part of a larger block of land – a so-called “matrix block” – that offers potential for large-scale restoration of natural communities in the St. Lawrence-Champlain Valley Ecoregion. Its conservation would also contribute to the goals of the Vermont Biodiversity Project. Conservation recommendations: This area should be conserved along with adjacent areas (H01 and perhaps ET23, if field work verifies its significance). The exact boundaries of the area to be conserved, and the management of those areas, should be determined through site conservation planning.
**H03, Williams Woods** - This site has been known and protected for many years as one of the most mature examples of Valley Clayplain Forest in Vermont. It is identified by The Nature Conservancy as a priority in its ecoregional plan. In addition, Thorp Brook is recognized by the Vermont Biodiversity Project as one of the state’s best examples of a small stream in the Champlain Valley. **Conservation recommendations:** Williams Woods is owned and managed by The Nature Conservancy. Should opportunities arise, it would be beneficial to enlarge the protected area by protecting adjacent lands.

**H05, Charlotte Southeast Hill** - The Vermont Nongame and Natural Heritage Program has identified this area as significant, describing it as follows: “Dry Oak-Hickory-Hophornbeam Forest, perched atop a steep-sided 800 ft. ridge, is the centerpiece of this site. Outcropping ledges, nearly vertical cliffs, and steeply sloping bedrock slabs attest to the shallow skin of soil. Trees here don’t grow very tall, but create a beautiful forest of red oak, shagbark hickory, and white ash.” With its excellent examples of Dry Oak-Hickory-Hophornbeam Forest, Mesic Maple-Ash-Hickory-Oak Forest, and Vernal Pools, the hill is a conservation priority in The Nature Conservancy’s ecoregional plan. Its conservation would contribute to the goals of the Vermont Biodiversity Project. This hill lies within the part of Charlotte that offers the greatest potential for landscape-scale conservation of wildlife habitat – southeast Charlotte is relatively heavily forested and connects to other large areas of forested land to the east and south. The assessment of landscapes in the Lewis Creek Watershed should be consulted to learn more about this area. **Conservation recommendations:** Conservation of this area is a priority, and the details regarding how much land should be conserved and how it should be managed will require a site conservation plan. A core of undeveloped forested land would almost certainly be a recommendation of a site conservation plan. Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H06, Prindle Corners Forest** - This is a small, but very fine, example of Valley Clayplain Forest, a rare and vulnerable natural community type. The Nongame and Natural Heritage Program, recognizing the statewide significance of this site, describes it thus: “Multi-stemmed silver maple with draping branches, the straight stems and twisting branches of the swamp white oak, and the stout twigs of green ash and butternut give a juxtaposition of shapes to the tree layer.” The Nature Conservancy has identified this site as a priority in its ecoregional plan. Its conservation would contribute to the goals of the Vermont Biodiversity Project. **Conservation recommendations:** Since this site is very small (about 10 acres), conserving it in isolation is not enough to protect it against the invasion of non-native species and to ensure its full functioning as a community. It should be assessed, through field inventory and site conservation planning, together with ET17, the surrounding upland hills and other wetlands. At a minimum, this analysis would likely result in recommending that the clayplain forest itself be protected as a natural area. Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H07, East Charlotte Swamp** - One of the largest, most diverse, and least disturbed wetlands in Charlotte, this swamp is recognized to have statewide and ecoregional significance. Its conservation would contribute to the goals of the Vermont Biodiversity Project. The Charlotte wetlands inventory shows both open and forested wetland here - Cattail Marsh dominates in the north and around the margins, while Red Maple-Black Ash Swamp forms the heart of the wetland. Here, red maple is dominant, with the largest trees up to 25 inches in diameter. Black
ash and yellow birch, the two most common associates, are smaller. Fallen trees and limbs, and very hummocky topography, make travel difficult and add structural diversity to the forest. This wetland is identified as important wildlife habitat, and is associated with an important north-south linkage route. **Conservation recommendations:** The Nongame and Natural Heritage Program recommends maintaining a vegetated buffer around the wetland and also keeping logging to a minimum. A site conservation plan should be done to elucidate the details of conservation and management. Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H08, Pease Mountain** – This is the largest forested area in the western, more agricultural half of Charlotte, and is a prominent geographic feature of the northern Champlain Valley. Together with Mutton Hill, it provides important habitat for wildlife and provides a large and diverse habitat for a number of natural communities and species. It has a fine example of Dry Oak-Hickory-Hophornbeam Forest with its characteristic lawns of Pennsylvania sedge, and large examples of Temperate Acidic Outcrop Communities on outcrops of Monkton quartzite. Several rare plants grow on the outcrops and in the forest. **Conservation recommendations:** A large central area of Pease Mountain is owned and managed as a natural area by the University of Vermont. Protection of the natural communities and wildlife values would be enhanced by adding to the area of conserved land. A site conservation plan should be completed to determine the details of conservation and management.

**H09, Lost Forest** – This patch of Valley Clayplain Forest in the northwestern corner of Charlotte, between Greenbush and Orchard Roads, is of statewide significance. The Nongame and Natural Heritage Program describes it thus: “Several different forest types occupy the site. On the slightly higher land, the tree canopy is more diverse; characteristic species are shagbark hickory, sugar maple, green ash, yellow birch, and butternut...[in lower places] bur oak becomes more common.” Two rare plants, Gray’s sedge and broad beech fern, grow here. **Conservation Recommendations:** Conservation of this forest would support the goals of the Vermont Biodiversity Project and The Nature Conservancy. Management should be planned to minimize the spread of European buckthorn.

**H13, Thompson’s Point Forest** – According to the Nongame and Natural Heritage Program, “The rocky hill that extends south from the large peninsula into Town Farm Bay supports one of the finest stands of Hemlock-Northern Hardwoods Forest in Charlotte. Hemlock, sugar maple, white ash, and American beech are the dominant trees; the moderate climate of the Champlain Valley is expressed vegetatively by the high abundance of black birch, red oak, and shagbark hickory. Many of the hemlock are evidently old trees, as are a few large, remnant hardwood trees.” The site is of statewide and ecoregional significance. **Conservation Recommendations:** This site, owned by the Town of Charlotte, is a treasure – undisturbed parcels of forest on the shores of Lake Champlain are becoming more and more rare. All efforts should be made to avoid fragmenting the forest and to prevent the spread of exotic invasive species. Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H17, Vermont Wildflower Farm** – This is a Valley Clayplain Forest of statewide and ecoregional significance. The forest is young and recently cut, and is dominated by a mix of red oak, bur oak, green ash, white ash, shagbark hickory, red maple, and sugar maple. **Conservation**
**Recommendations:** In spite of its young age, this is a good example of a rare and vulnerable community type, and it should be conserved. Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H18, Hill Bay Bottoms** – Located in the northwest corner of Charlotte, between Hill Point and Orchard Roads, this site contains a statewide and ecoregionally-significant example of Valley Clayplain Forest. It has been used as a farm woodlot, but it retains the character of Valley Clayplain Forest. The topography is varied, and the canopy is dominated by green ash, shagbark hickory, bur oak, silver maple, and yellow birch. **Conservation Recommendations:** Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H20 and ET09, McCabe’s Brook** – A small portion of this area was identified as a Valley Clayplain Forest of statewide and ecoregional significance. Examination of aerial photographs and soils maps suggest that lands to the north and west may also have significant communities. Some of this land appears to be Valley Clayplain Forest; while some is former agricultural land on clay or other soils. **Conservation Recommendations:** Further inventory is needed to determine how to best manage and conserve this area.

**H21 and ET02, Mud Hollow Brook** – This complex of Valley Clayplain Forest, agricultural land, forests, and streams, is one of Charlotte’s natural treasures. Taken together, these patches of forest comprise the largest area of Valley Clayplain Forest in Charlotte and present an opportunity for conservation and restoration of that natural community on a large scale. The portion of the site labeled “ET02” was identified in this project as a potential extension of the Nongame and Natural Heritage Program site. **Conservation Recommendations:** Landowners should be encouraged to conserve the remaining forest in this area and to consider restoration of forest to abandoned fields. Conservation of this forest would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H22 and ET21, North Charlotte Bluff** – This is a state-significant Temperate Calcaceous Cliff identified by the Nongame and Natural Heritage Program (H22), and an extension of that area along the shoreline that should be inventoried if it has not already been. H22 is described as a “very steep shale slope...[with] little vegetation – only some grasses, composites, and...northern white cedar.” **Conservation Recommendations:** Very little undeveloped lakeshore remains on this part of Lake Champlain. Conservation of this area would contribute to the goals of the Vermont Biodiversity Project and The Nature Conservancy.

**H37 – See H02**

**H38, Thompson’s Point North Shore** – This site was identified by the Nongame and Natural Heritage Program as a potential site for Limestone Bluff Cedar-Pine Forest during its inventory of that community in 2002. A field assessment was not conducted.

**H39, Garden Island** – This site was visited by the Nongame and Natural Heritage Program during its 2002 inventory of Limestone Bluff Cedar-Pine Forests. It was determined to be of likely statewide significance, but further comparative analysis is needed.
**H40, Cedar Island** – This site was identified by the Nongame and Natural Heritage Program as a potential site for Limestone Bluff Cedar-Pine Forest during its inventory of that community in 2002. A field assessment was not conducted.

**H41, Converse Bay Bluff** – This site was identified by the Nongame and Natural Heritage Program as a potential site for Limestone Bluff Cedar-Pine Forest during its inventory of that community in 2002. A field assessment was not conducted.

**H42, McNeil Cove Bluff** – This site was identified by the Nongame and Natural Heritage Program as a potential site for Limestone Bluff Cedar-Pine Forest during its inventory of that community in 2002. A field assessment was not conducted.

**ET01** – The shores of Lewis Creek may have significant examples of River Mud Shore, River Sand or Gravel Shore, and Rivershore Grassland communities.

**ET02** – See H21

**ET03** – This area has the potential to support Valley Clayplain Forest, and has an intriguing wetland described in the Charlotte Wetlands Inventory as containing tamarack.

**ET04** – This small forested wetland is described as a softwood swamp – it may be a Hemlock Swamp.

**ET05** – This is a complex of hardwood hills with a softwood swamp, and is within the watershed of Lewis Creek.

**ET06** – This is a complex of hardwood hills with a softwood swamp, and is within the watershed of Lewis Creek.

**ET07** – This is a complex of hardwood and softwood swamps on clay soils, potentially supporting Hemlock Swamp and Valley Clayplain Forest.

**ET08** – This is a softwood swamp, potentially Hemlock Swamp, with upland hardwood forest.

**ET09** – See H20

**ET10** – This is a wetland complex on clay soils, potentially supporting Hemlock Swamp and Valley Clayplain Forest.

**ET11** – This is a forested wetland, possible Red Maple-Black Ash Swamp.

**ET12** – This is a forested wetland with some softwood, potentially Hemlock Swamp

**ET13** – This is a forested wetland with some softwood, potentially Hemlock Swamp

**ET14** – This area (Mutton Hill) should be inventoried for potential Dry Oak-Hickory-Hophornbeam Forest.
ET15 – This is a forested wetland, possible Red Maple-Black Ash Swamp.

ET16 – This area (Mount Philo) should be inventoried for potential Dry Oak-Hickory-Hophornbeam Forest and related communities. It is known to have several rare plants.

ET17 – This area has potential Dry Oak-Hickory-Hophornbeam Forest and related communities, plus a large open wetland that merits inventory.

ET18 – This area should be inventoried for potential Dry Oak-Hickory-Hophornbeam Forest and related communities.

ET19 – This area has potential Dry Oak-Hickory-Hophornbeam Forest and related communities, along with beaver-influenced wetlands.

ET20 – This section of the LaPlatte River and Mud Hollow Brook may support significant examples of River Mud Shore, River Sand or Gravel Shore, and Rivershore Grassland communities.

ET21 – See H22.

ET22 – This is a forested area along a brook with clay soils, a potential site for Valley Clayplain Forest.

ET23 – This area should be inventoried for potential Dry Oak-Hickory-Hophornbeam Forest and related communities.

ET24 – This is a potential site for Valley Clayplain Forest.

ET25 – This is a forested area along a brook with clay soils, a potential site for Valley Clayplain Forest.
APPENDIX B: INFORMATION SOURCES

Vermont Nongame and Natural Heritage Program – provided data and reports on known and potential significant natural communities in Charlotte for this assessment, and can provide more detailed information upon request.

Town of Charlotte, Wetlands Inventory – was an excellent basis for seeking out uncommon wetland communities for this assessment. Provides a basis for further field inventory.

Town of Charlotte, Wildlife Habitat Assessment – verified that nearly all natural communities identified in this assessment are also regarded as significant wildlife habitat.

Vermont Center for Geographic Information – provided basic data on roads, surface waters, soils, geology, and topography, as well as Digital Orthophoto Quads, for this assessment.

Vermont Biodiversity Project – provided data on priority aquatic sites, core forest, biological hotspots, landforms, and other features for this assessment.

Vermont Wetlands Office – provided color infrared aerial photos used in this assessment.

Marc Lapin, Consulting Ecologist – provided information and insights on Lewis Creek Watershed Assessment, and is a good source of information on Valley Clayplain Forest.

Sue Morse, Keeping Track© – provided perspective on wildlife values of Lewis Creek Watershed, and is a good source, in general, for wildlife information.

Town of Charlotte: Linda Hamilton, Marty Illick, Robert Turner and others provided background information on previous and ongoing natural resource assessments in Charlotte.
APPENDIX C: GLOSSARY

The Nature Conservancy – An international, private, non-profit conservation organization with a mission of conserving the diversity of life on earth. The Nature Conservancy's conservation planning (see Ecoregional Plan, below) includes the town of Charlotte.

Ecoregional Plan – In 2002, The Nature Conservancy completed a conservation plan for the St. Lawrence-Champlain Valley Ecoregion, an area that encompasses the St. Lawrence Valley in Quebec and upstate New York as well as the Champlain Valley of Vermont and New York. This plan sets forth broad goals for conservation of the ecoregion's landscapes, natural communities, and native species and targets specific sites for conservation.

Vermont Biodiversity Project – A statewide conservation planning project initiated by a consortium of organizations and agencies. The Vermont Biodiversity Project sets out specific conservation goals for each biophysical region of Vermont, and also identifies specific resources as priorities for conservation. In Charlotte, these include Lewis Creek and Thorp Brook.

Natural area – a relatively small area of land (less than 500 acres) managed primarily for biodiversity. Hunting, fishing, and hiking are often allowed in natural areas. Williams Woods and Pease Mountain are two natural areas within the town of Charlotte.

Core Reserve (referred to in Appendix D) – a relatively large area of land (often thousands of acres) managed primarily for biodiversity. Hunting, fishing, and hiking are often allowed in natural areas. Williams Woods and Pease Mountain are two natural areas within the town of Charlotte.

Biodiversity or Biological Diversity – the variety of life in all its forms, and the interactions between living things and their environment.
APPENDIX D: VERMONT BIODIVERSITY PROJECT CONSERVATION GOALS FOR NATURAL COMMUNITIES

I. UPLAND AND WETLAND NATURAL COMMUNITIES

General Conservation Goal: To ensure that multiple viable examples of all 80 upland and wetland natural community types are protected in ecological reserves, at the appropriate scale, in all the biophysical regions in which the community naturally occurs.

Specific Conservation Goals by Natural Community Rank (consult Thompson and Sorenson 2000 or the Vermont Nongame and Natural Heritage Program for information on these ranks):

Extremely rare communities (S1): Protect all occurrences in core reserves or natural areas. Note: There are no S1 natural communities known from Charlotte.

Very rare communities (S2): Protect at least three viable examples in each biophysical region in which the community naturally occurs, and at least 25 percent of the total number of occurrences statewide, in core reserves or natural areas. Encourage careful stewardship of remaining examples. Note: Two S2 natural communities occur in Charlotte: Limestone Bluff Cedar-Pine Forest and Valley Clayplain Forest.

Uncommon communities (S3): Protect at least three viable examples in each biophysical region in which the community naturally occurs, and at least 10 percent of the total number of occurrences statewide, in core reserves or natural areas. Encourage careful stewardship of remaining examples. Note: Six S3 natural communities are known from Charlotte. These are Lakeside Floodplain Forest, Vernal Pool, Dry Oak-Hickory-Hophornbeam Forest, Mesic Maple-Ash-Hickory-Oak Forest, Temperate Calcareous Cliff, and Temperate Calcareous Outcrop.

Widespread and common communities (S4 and S5): Protect at least three viable examples in each biophysical region in which the community naturally occurs, and at least 10 percent of the total number of occurrences statewide, in core reserves or natural areas. Encourage careful stewardship of remaining examples. Note: Some examples in Charlotte include Northern Hardwood Forest and Red Maple-Black Ash Swamp

Exception: For the large dominant communities – what we call matrix communities – the goal is to protect one viable example per biophysical region in which it naturally occurs, in an ecological reserve. This one example will need to be large enough (tens of thousands of acres in some cases) to accommodate natural disturbance processes and the needs of wide-ranging mammals and forest-interior species. In some cases (as for Valley Clayplain Forest), major restoration efforts will be necessary in order to meet this goal.
II. Aquatic Natural Communities

*General Conservation Goal:* To protect all priority aquatic features from degradation and changes in species composition through water quality protection and other means, and to encourage careful stewardship of all remaining aquatic features. Priority Aquatic Features are specific lakes, ponds, rivers, and streams that represent the best examples of all aquatic community types in Vermont, as classified by the project’s Aquatic Classification Work Group (1998). *Note: Thorp Brook and Lewis Creek are Priority Aquatic Features.*

All aquatic systems, whether or not they are shown here as Priority Aquatic Features, should be protected from water quality degradation and the introduction of nuisance aquatic species. The Vermont Department of Environmental Conservation, Water Quality Division, can provide guidance on protection of aquatic systems.