Final Report:
Inventory and Assessment of Wetland and Upland Wildlife Habitat in the Upper Poultney River Watershed (including portions of Middletown Springs, East Poultney, Tinmouth, Wells and Ira, Vermont)

For

Poultney-Mettowee Natural Resource Conservation District, Poultney, VT

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EXECUTIVE SUMMARY

This inventory and assessment of wildlife habitat in the Upper Poultney River Watershed is the initial phase of a project to identify and document significant wildlife habitat and to assist landowners and local and regional planning efforts to conserve or restore wildlife habitat. This project focuses on the 23,847 acres within Middletown Springs and adjacent portions of Tinmouth, Ira, Wells and Poultney, Vermont that drain into the Poultney River. Four major habitat components were selected for evaluation during the wildlife habitat inventory: 1) wetlands and their functions and values; 2) significant natural communities; 3) potential wildlife corridors; and 4) unfragmented habitat blocks. The emphasis on the Upper Poultney River Watershed reflects an awareness of the importance of headwater regions and adjacent wetlands and uplands for the integrity of the entire river, as well as the need for more information on natural features for conservation planning within the region. An initial landscape-scale evaluation of digital data and aerial photography resulted in the identification of eighteen priority sites which were targeted for more detailed field evaluation. Major findings and outcomes of the inventory are described below.

Wetlands

The Vermont Significant Wetland Inventory (VSWI) for the study area was used along with a windshield survey and aerial photo interpretation to produce an updated and annotated map of wetlands with amended wetland boundaries where necessary, and wetland function and values and natural community types assigned. Confirmed and potential wetlands polygons range in size from <0.01 acres to 27.3 acres. Thirteen types of wetlands are represented and cover approximately 626 acres. Shrub Swamps (Alder Swamp/ Alluvial Shrub Swamp Complex) are the most common type of wetland, making up approximately one-third of all wetlands identified.

Wetland complexes were categorized as locally-significant based on: 1) the functions and values the wetlands perform, and 2) the presence of high quality natural communities. Wetland natural communities were evaluated based on Vermont Natural Heritage ranking specifications to determine if they met the criteria for state significance. Eight wetland complexes were identified as significant at the state or local level. Two examples of state-significant Red Maple-Black Ash Seepage Swamps were identified. Some sites require additional field investigations to assess the state and local significance of the wetlands present.

Thirteen confirmed or potential vernal pools were mapped within the study area. Vernal pools provide critical habitat for a number of amphibians and invertebrates including species considered “species of greatest conservation need” by the State Wildlife Action Plan. Mapped vernal pools were not fully assessed and require a confirmation of amphibian breeding.

Upland Natural Communities

A number of upland natural communities considered rare or uncommon in Vermont are characteristic of the relatively dry ridges and slopes in the Taconic as well as other warmer regions of the state. Prior to this inventory, documentation of state-significant natural communities were limited within the Upper Poultney River Watershed. Thus a goal of this inventory was to map significant upland natural communities by conducting field surveys of priority areas and compiling maps of known occurrences.

Nine different types of significant natural communities were documented on eleven sites for a total of 24 occurrences of local or state significant natural communities. Future field surveys have the potential to yield additional documentation of local or state significant natural communities.

Potential Wildlife Linkage

A statewide digital database developed by Vermont Fish and Wildlife was used to identify potentially important wildlife linkages and areas where significant barriers to wildlife movement exist. In particular, Routes 140 and Route 133 present obstacles to wildlife movement, however dispersed development along minor roads such as Garron Road also appear to restrict wildlife travel. In addition to the movement of wildlife over shorter distances, such as between habitat blocks, wildlife linkage between the Adirondacks and Green Mountains is addressed.

Citizen Wildlife Sightings

As part of this project, observations of wildlife, especially bear, bobcat, fisher, moose, coyote, and fox within the Upper Poultney River Watershed were solicited from citizens. Residents were informed of the wildlife sightings project via a letter describing the overall project. Responses were received on the project website, by return mail and at established drop-off locations. One hundred and thirteen sightings were obtained and included sightings that occurred between 1999 and 2010. Sightings were obtained of all species highlighted, as well as mink, catamount, porcupine, river otter and a number of birds and amphibians. The greatest number of sightings was received for black bear and moose, which probably reflects the enthusiasm generated by seeing these large mammal species, rather than their relative abundance. The data provide an overall picture of species encountered, but no effort was made to verify the information received.

Habitat Blocks

The Vermont Department of Fish and Wildlife in collaboration with The Vermont Land Trust has produced state-wide mapping and analysis of habitat, unfragmented by major roads and development. Within the Upper Poultney River Watershed there are eight habitat blocks greater than 500 acres which are included or partially-included within the watershed boundary. Four of these habitat blocks are over 5,000 acres and five have approximately 50% or more of the habitat defined as interior or core habitat. Maintaining large areas of unfragmented habitat is critical for wildlife and other natural processes on the landscape, and contributes significantly to the region's potential value for wildlife.

Data collected and compiled during this inventory was used to analyze and rank the eighteen priority sites that were identified and targeted for field evaluation. Each habitat block and the eighteen priority sites are described.

Community-Based Conservation Initiatives

Strategies for involving landowners and communities in wildlife habitat conservation and management are presented.

ACKNOWLEDGEMENTS

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Michael Middleman made a variety of important contributions including assembling and manipulating GIS data, developing metadata, collecting parcel information, communicating with landowners, compiling wildlife sightings, creating maps and assisting with fieldwork. PMNRCD appreciates his skill and dedication. John Van Hoesen provided invaluable support and guidance with GIS mapping as well.

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INTRODUCTION

The goal of this report is to describe the inventory and assessment of wetland and upland wildlife habitat that was conducted within the Upper Poultney River Watershed and to identify conservation and restoration priorities. The inventory provides information to help project partners -- The Poultney-Mettowee Natural Resource Conservation District (PMNRCD) and Staying Connected Initiative: Green Mountain to Adirondacks -- provide outreach and to assist landowners who wish to restore or protect critical wildlife habitat, and provides guidance to local and regional planning efforts.

The PMNRCD has been engaged in initiatives to protect water quality and conserve natural resources in the watershed since 1942. The Staying Connected Initiative aids and engages local communities in conservation efforts to protect two key habitat linkage areas connecting forests in the Green Mountains and the Adirondacks. One of Staying Connected's priority linkage areas is a forest corridor within Poultney, Middletown Springs, Tinmouth and Wallingford.

The focus on the Upper Poultney River Watershed reflects an awareness of the importance of headwater regions and adjacent wetlands and uplands for the integrity of the entire river. Moreover, previous studies (including fluvial geomorphic assessments conducted by PMNRCD and linkage mapping by The Nature Conservancy) indicate that the Upper Poultney River Watershed includes areas that are a high priority for conservation, yet there has been little comprehensive field-verified information on natural features. Finally, identifying the upper watershed as the boundary of the study area emphasizes the need for collaboration across political boundaries to implement conservation goals.

Study Area

The Upper Poultney River Watershed includes approximately 23,850 acres that drain into the Poultney River ranging in elevation from 2486' on Tinmouth Mountain near the headwaters, to approximately 520' along the Poultney River in East Poultney. Five towns are included in the study area including most of Middletown Springs and adjacent portions of Tinmouth, Ira and Wells and Poultney (Figure 1).

The study area falls within the Taconic Mountain Biophysical Region and is characterized by rugged terrain, drained by streams that flow into the Poultney River and eventually into Lake Champlain. Principal peaks and ridgelines that form the boundary of the study area include Tinmouth Mountain to the southeast, Susie Peak to the east, Train Brook Ridge to the northeast, Spruce Knob Peak to the north and Coy Mountain on the southwestern border. Other mountains and ridges found in the interior of the study area include Spoon Mountain, Morgan Mountain, Barber Mountain and Barker Mountains, as well as many unnamed hills (Figure 1).

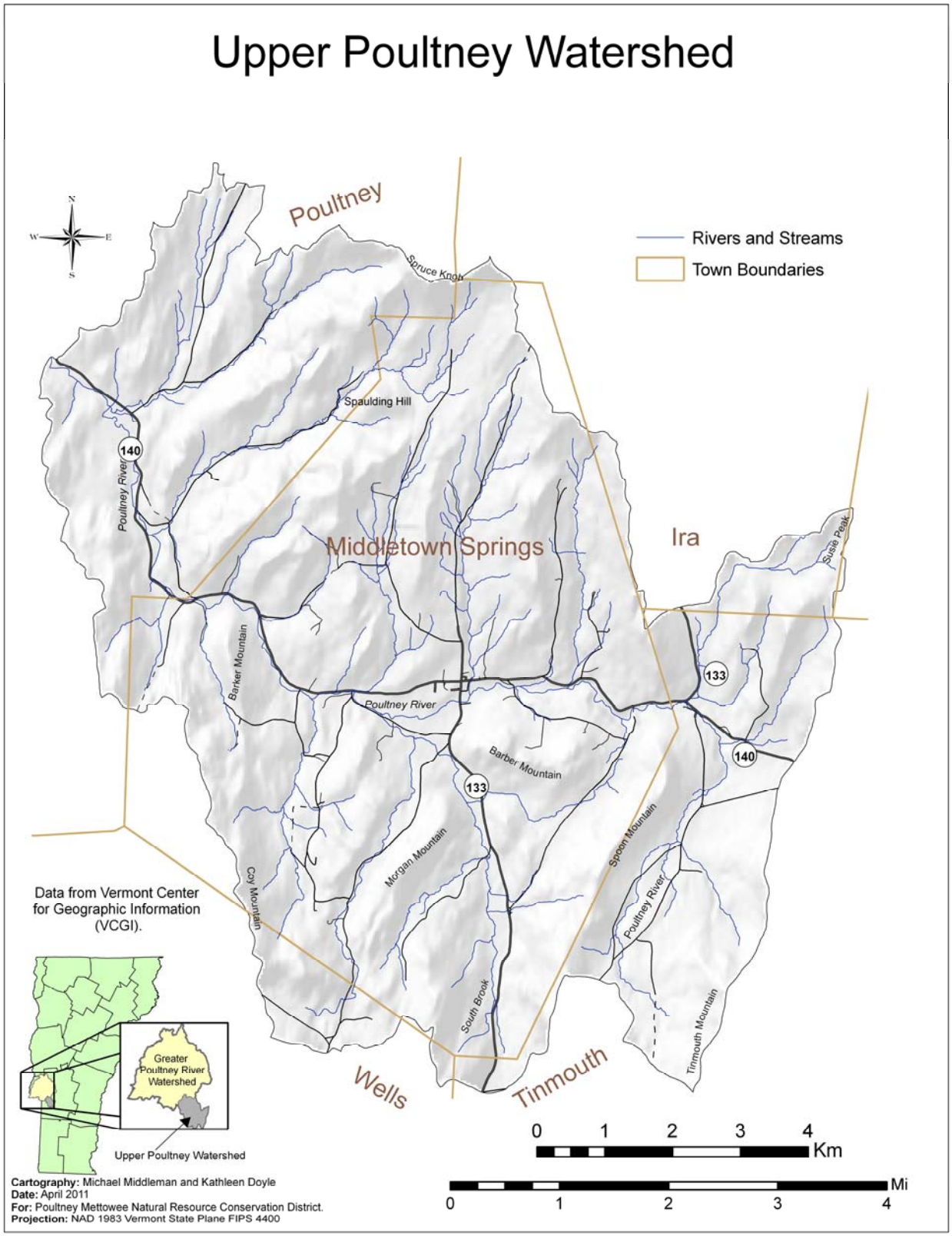

Figure 1. Upper Poultney River Watershed.

Geologic Features of Study Area--
A fascinating geologic history has shaped the Taconic Mountains. The metamorphosed mudstones including slate, phyllite and schist that make up the Taconic Mountains were thrust west during the Taconic orogeny many miles from where they originated. Throughout the Taconic region, the predominant slate, schist and phyllite overlay younger calcareous limestone and marble. In some areas the more calcareous rocks are exposed, and contribute to the region's biological diversity as the calcareous rock often support interesting natural communities, caves and springs (Thompson and Sorenson 2000). The majority of the project area is underlain by non-calcareous slate; schist and phyllites becoming more prevalent in some of the valleys and mountain slopes in the eastern portion of the study area (Figure 2). Two areas are underlain by more calcium-rich bedrock: one is located in the vicinity of the Lower Gulf Road and Route 140 in Tinmouth -- mapped as limestone, dolomite and marble, and the second is west of Spruce Knob Road where the bedrock includes carbonate-rich minerals, including calcareous slate. The entire study area was glaciated and soils have formed in glacial tills. In the valleys, where most of the wetlands are found, characteristic soils include organic muck deposits, and silt loams that formed in alluvial or postglacial deposits (Ferguson 1998).

Natural Communities of the Taconic Biophysical Region--
Within the Taconic region, northern hardwood forests are the pre-dominant natural community type covering extensive acreage and occurring on a variety of site conditions. Within the matrix of northern hardwood forest, less common natural communities occur. For example, oak, hickory and pine-dominated forests which have affinities to forests further south are often found on dry ridges and slopes in the Taconics and other relatively warm regions of Vermont. These less common natural communities include Dry Oak Woodland, Dry Oak Forest, and Dry Oak-Hickory-Hophornbeam Forest. On sites in the Taconics with more moisture, Mesic Maple-Ash-Hickory Oak Forests can be found (Thompson and Sorenson 2000). In other upland areas in moist conditions with calcium-rich bedrock or till, Rich Northern Hardwood Forests is often found.

Among the wetland natural communities typical of the Taconic region, intact examples of floodplain forests, such as Sugar Maple-Ostrich Fern Riverine Floodplain Forest, are among the least common since many forests on rich, productive floodplain soils were cleared long ago for agriculture. Red Maple-Black Ash Seepage Swamp is a wetland natural community type that is well expressed in the Taconic region, and although not an uncommon natural community in Vermont, it has been widely impacted by logging and development. High quality examples of Red Maple-Black Ash-Seepage Swamp are limited (Thompson and Sorenson 2000). Table 1 provides information on the relative rarity and patch size of natural communities that occur in the region.

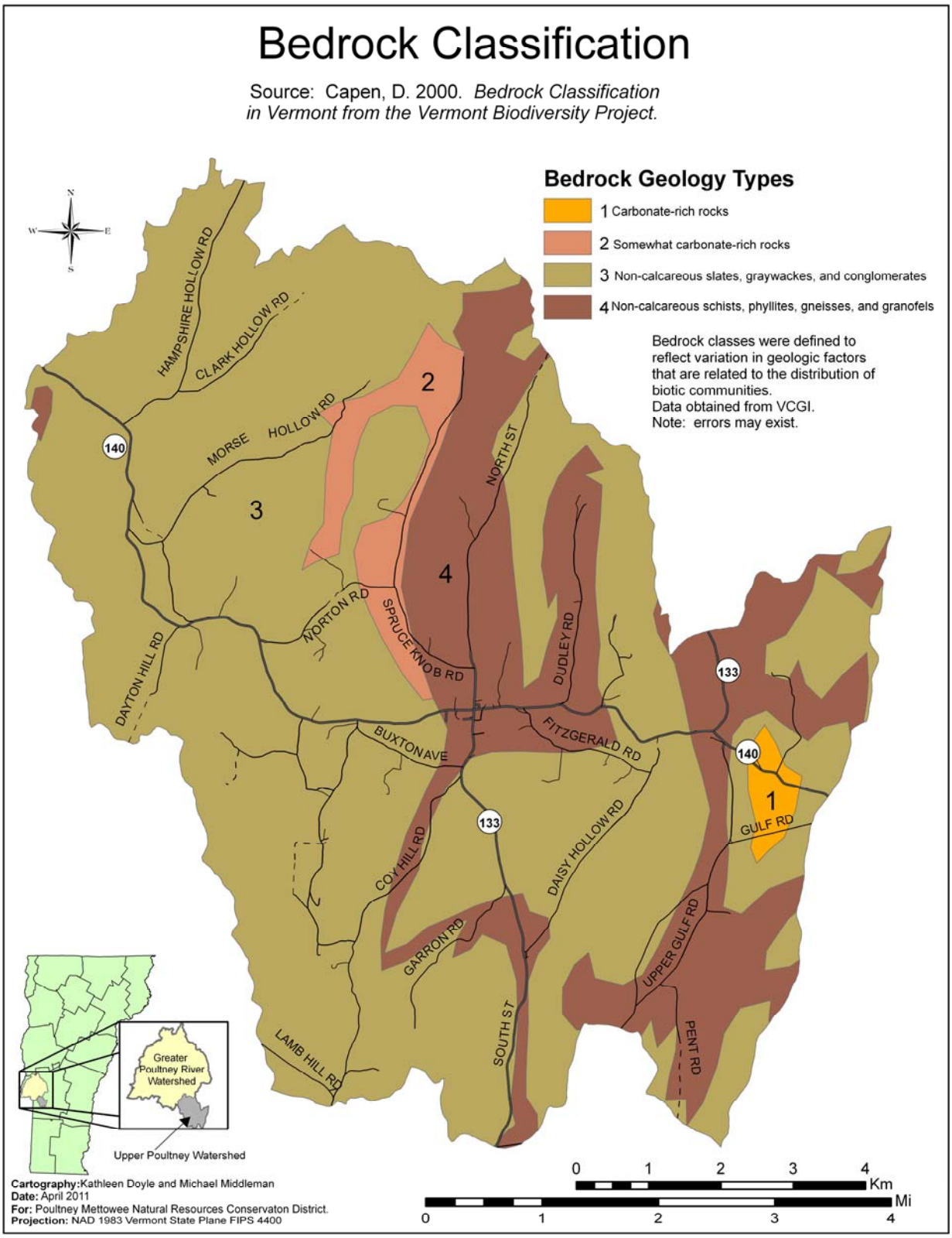

Figure 2. Bedrock Classification.

Table 1. Relative Rarity and Patch Size of Some Natural Communities found in the Region.

Natural Community Type	VT State Rank	Patch Size
Upland Natural Community Types		
Dry Oak Forest	S3	Small
Dry Oak-Hickory-Hophornbeam Forest	S3	Small – Large
Mesic Maple-Ash-Hickory-Oak Forest	S3	Large
Mesic Red Oak-Northern Hardwood Forest	S4	Large
Montane Yellow Birch Red Spruce Forest	S3	Matrix
Northern Hardwood Forest	S5	Matrix
Red Pine Forest or Woodland	S2	Small
Red Spruce-Heath Rocky Ridge Forest	S3	Small – Large
Wetland Natural Community Types		
Alder Swamp	S5	Large
Alluvial Shrub Swamp	S3	Large
Sugar Maple-Ostrich Fern Riverine Floodplain Forest	S2	Small
Red Maple-Black Ash Seepage Forest	S4	Small – Large

Data From: Vermont Natural Heritage Information Project, VT Fish and Wildlife Department, 2009. http://www.vtfishandwildlife.com/library/reports_and_documents/nongame_and_natural_heritage/natural_communities/_list_of_natural_community_types_and_other_classification_systems.pdf

Patch Size:

Matrix Patch – a natural community type that is dominant in the landscape, occupying 1,000 – 100,000 contiguous acres, occurring across a wide range of sites.

Large Patch – a natural community that occurs on a scale of 50 – 1000 acres.

Small Patch –a natural community that occurs in the landscape as small discrete areas typically less than 50 acres, and for some types consistently less than an acre in size.

VT State Rank:

S1 – very rare, generally with fewer than five high quality occurrences;

S2 – rare in the state, occurring at a small number of sites or occupying a small total area in the state;

S3 – high quality examples are uncommon in state, but not rare; the community is restricted in distribution for reasons of climate, geology, soils, or other physical factors, or many examples have been severely altered.

S4 - widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small

S5 - common and widespread in the state, with high quality examples easily found.

METHODS

Project Overview

To identify priority sites for field evaluation and to establish conservation priorities, four habitat components were considered: wetland functions and values, potentially significant upland and wetland natural communities, important wildlife linkages, and at the broadest scale unfragmented habitat blocks. An important aspect of this project is the consideration of wildlife habitat at multiple spatial scales. This is important since often land management decisions are made on a stand or parcel basis and fail to consider the larger landscape. The following describes steps carried out to complete the project.

Data Compilation--

For this project, ARC GIS version 9.0 was used to analyze, edit and manipulate digital data and create map visuals. The following digital data layers were obtained from the Vermont Center for Geographic Information (VCGI): black and white orthophotography (1:5000 scale, 2006), NAIP Color infrared orthophotography (1:40,000, 2008), USGS topographic maps (Digital Raster Graphic files, scale 1:24,000); Digital Elevation Model (DEM), Natural Resource Conservation Service County Soil Survey Data (2008), VSWI Wetlands (2010 edition), National Wetland Inventory (2003), Roads database (2009), Hydrography (2008), Bedrock Geology Classification (2000), core habitat data (Capen 2000), wildlife linkage habitat (developed by VT Department of Fish and Wildlife and Vermont Department of Transportation, 2006), and Upper Poultney River Watershed boundary and town boundaries.

Data on private conservation land for the study area was obtained from the Vermont Land Trust (updated 2011). Information on parcel boundaries was acquired from the Wells and Ira town offices (no digital data exists). Digital parcel boundary data was secured from the town of Poultney and from the Rutland Regional Planning Commission for Middletown Springs and Tinmouth. Parcel boundary data are approximate and were used for reference only. A map of likely wildlife habitat connections between the Adirondacks and Green Mountains was obtained from *Staying Connected Initiative*.

Digital and hard copy data of significant natural features were acquired from the Natural Heritage Natural Heritage Information Project (VT Department of Fish and Wildlife). Digital data include a provisional map of areas with potentially significant oak and pine natural communities, based on aerial surveys and aerial photo interpretation. Other digital data include a draft version of natural community and wetland boundaries developed in 2010 by Arrowwood Environmental for areas around Susie Peak and Spruce Knob. These data are considered provisional and subject to change and modification as the data were not all field verified by Arrowwood Environmental or during this field assessment. Hardcopy data of priority natural areas from a 1991/1992 inventory of western Rutland County, include areas designated locally significant on Morgan and Barker Mountains. In addition, a recent state-wide habitat block mapping and connectivity analysis (digital data) developed by VT Fish and Wildlife and VT Land Trust was obtained.

Identification of Potential Priority Sites for Field Assessment--
To determine which sites within the study area would be prioritized for detailed field evaluation, digital data and other information were evaluated to arrive at a set of preliminary priority sites. A goal of the site selection process was for the geographic and ecological variation throughout the study area to be well represented, so attention was paid to include areas within each major habitat block. Each identified priority site was assigned a preliminary qualitative rank (low, medium or high) for each of the four habitat components – wetlands function and values and natural communities, upland natural communities, important wildlife linkages and unfragmented habitat. A polygon was delineated around each priority area that encompassed potentially important wetlands and upland natural communities. When delineating boundaries, larger blocks of unfragmented habitat and core areas, and areas that specifically contribute to the maintenance of important wildlife linkage habitat were included. Roadside wildlife linkage areas were typically not prioritized, unless they contained other important habitat features such as wetlands. A set if eighteen priority sites were identified through this process.

Sites were selected for field evaluation based on their qualitative rank, the ability to secure land owner permission, as well as feasibility issues and time constraints. Permission was sought to visit as many of the priority sites as possible. Not all potentially significant areas could be field verified; priority sites not visited during the inventory process remain a priority for future field evaluation. Additional surveys are likely to provide more documentation of significant natural communities.

The following describes each habitat component and a description of how each was evaluated during the landscape evaluation and field assessment.

Wetland Survey and Assessment
Wetlands are areas where the ground is flooded or saturated long enough each year so that wetland soils develop and the dominant plants are adapted to growing in saturated conditions. For a site to be considered a wetland, three characteristics must be present: 1) hydrophytic (wetland) vegetation, 2) hydric (wetland) soils, and 3) wetland hydrology. Wetlands provide a number of critical functions and values including: flood control, water quality protection, fish and wildlife habitat, opportunities for research, education and recreation, scenic and economic value and erosion control. These functions and values provide numerous benefits to wildlife and people and contribute to the overall integrity of the environment

The State of Vermont is charged with identifying and protecting significant wetlands and their functions and values such that there is no net loss of wetlands and their functions and values are maintained. The Vermont Significant Wetland Inventory (VSWI) maps depict the approximate location and configuration of the state's regulated wetlands. All wetlands on the VSWI are designated class 1 or class 2 wetlands and are subject to VT wetland rules (Natural Resources Board 2010). In addition, wetlands that have significant function and value, even if they do not appear on the VSWI map are under the regulatory jurisdiction of the VT Wetlands Rules.

In 2010, updated VSWI maps were released which includes substantially more wetlands and a refinement of boundaries as a result of recent mapping completed by National Wetlands

Inventory (NWI). The 2010 VSWI was created by merging 2005 VSWI (based on an earlier generation of NWI mapping) and new 2008 NWI data. While the 2010 VSWI includes more wetlands than the previous version, not all wetlands are shown on the VSWI/NWI maps. Wetlands that are difficult to identify from aerial photographic interpretation include small forested wetlands, seepage wetlands on slopes and temporarily flooded wetlands. It is estimated by Agency of Natural Resources that 25% of all wetlands are not included on the NWI maps (VSWI metadata, 2010).

Wetland Functions and Values Assessment--
To provide a more detailed picture of the wetlands in the study area, the 2010 VSWI data layer was annotated through a comprehensive wetland function and value assessment and other additions or modifications as follows. Each VSWI wetland polygon received a score of low, moderate, or high for each function and value assessed, using the criteria developed by the VT Agency of Natural Resources. The functions and values evaluated include: 1) water storage for flood water and storm run-off; 2) surface and ground water protection; 3) fish habitat; 4) wildlife habitat; 5) rare, threatened and endangered species habitat; 6) education and research in natural sciences; 7) recreational value and economic benefits; 8) open space and aesthetics and 9) erosion control through binding and stabilizing the soil. An additional function 'exemplary wetland natural community' can only be judged by a field evaluation and thus was not assessed for all sites. A provisional natural community type was also assigned to each wetland (based on Thompson and Sorenson 2000). Additional information added to the wetland attribute table include overall function and value score, hydric soil type, NWI type (from NWI attribute table), confidence, as well as other information described in the GIS metadata.

The wetland function and value assessment and map modifications were accomplished by driving all roads within the study area (windshield assessment) and through a remote assessment using digital imagery and available information. Digital data layers used in the remote assessment include: black and white orthophotography (1:5000 scale, 2006), NAIP Color infrared orthophotography (1:40,000, 2008), USGS topographic maps (Digital Raster Graphic files, scale 1:24,000); Digital Elevation Model (DEM), NRCS Soil Survey (2008 edition), VSWI Wetlands (2010 edition), National Wetland Inventory (2003 edition), and streams and rivers (Hydrography 2008).

The final wetland map produced during this study includes some additional wetland polygons and revised wetland boundaries based on the windshield assessment, photo-interpretation, field surveys and other sources. Provisional wetlands mapped remotely by Arrowwood Environmental for the Susie Peak and Train Brook areas in 2010 (data obtained from the Natural Heritage Database) are included. It was beyond the scope of this study to produce a comprehensive map of all wetlands within the study area. Also, because not all of the wetlands have been field verified, the final wetland map includes confirmed as well as potential wetlands.

Identification of Priority Wetland Sites--
Individual wetlands with a high function and value score, wetland complexes with a high combined function and value score, and areas with potentially significant wetland natural communities were identified as 'priority sites' warranting field evaluation. Wetlands were identified to be state significant based solely on the existence of a high ranking natural

community, using the ranking criteria developed for Vermont (See natural community ranking procedure described below). Protocols don't exist for designating a wetland to be state significant based solely on other functions and values, so sites without significant natural communities, but with a high score for functions and values, were designated locally-significant. All areas identified as state significant received a field evaluation of at least a portion of the wetland complex. In some cases additional field evaluation of these areas are warranted. Areas were identified as potentially significant, based on a remote assessment and/or windshield survey; these areas require a more detailed field survey to evaluate their significance on a state and local level.

Vernal Pool Mapping--
Vernal pools are small ephemeral pools that provide important breeding habitats for a number of amphibians including spotted salamander, wood frog, spring peepers, red-spotted newt, Jefferson salamander and a diverse invertebrate fauna including fairy shrimp and fingernail clams. Vernal pools are often too small to be included on NWI maps and data on their location is limited. A comprehensive effort to map vernal pools using remote sensing and landowner identification was not undertaken as part of the inventory, but vernal pools identified by citizens or from other sources, and encountered in the field, were mapped as a part of this project. The vernal pools identified warrant a field evaluation during the spring to assess amphibian breeding.

Natural Community Survey and Assessment
Natural communities encompass the plant and animals that live in an area, the physical environment (e.g., topography, soils) and the natural processes that affect them (Thompson and Sorenson 2000). A natural community classification, such as that developed for Vermont by Thompson and Sorenson (2000) provides a common language for characterizing the landscape and serves to improve understanding of the biological complexity, and contributes to land use planning, management and conservation.

A comprehensive mapping of natural communities was beyond the scope of this project, instead the focus was to identify and survey examples of state or locally significant natural communities -- those that are either uncommon or are high quality examples of common natural communities. Because, a number of upland natural communities considered rare or uncommon in Vermont occur on dry ridges and slopes in the Taconic region, and because the documentation of state significant natural communities for the study area is limited, an aim of this project was both to visit areas with potentially significant natural communities such as ridgelines and slopes, and to compile any existing information on significant or potentially significant natural community occurrences. The boundaries of significant natural communities visited (or compiled from other sources) were mapped. In many cases, an entire priority area could not be surveyed, and thus areas where significant natural communities were mapped may include other occurrences as well. It is expected that with additional survey effort more examples of significant natural communities will be documented.

Information used to identify sites with potentially significant natural communities include: aerial photography, USGS topographic maps, Bedrock Geology Classification and NRCS soil survey. In addition, because the landscape context is important in identifying high ranking natural communities, core habitat data and habitat block data were instrumental. Information provided

by Natural Heritage Information Project including a provisional map of areas with potentially significant oak and pine natural communities, a draft version of natural community boundaries developed by Arrowwood Environmental for areas around Susie Peak and Spruce Knob, and data on natural community occurrences within and surrounding the study area.

Characterization and Ranking of Natural Communities--
Less common natural communities, those ranked S1, S2 that receive an A, B or C, or S3 that receive an A or B rank are considered by the Natural Heritage Information Project to be state significant. Lower ranked examples of S1, S2 or S3 natural communities were designated locally significant. In addition, high quality (A-rank) examples of more common natural communities (S4 or S5) may be considered state significant. Three factors are considered in ranking natural communities in terms of state and local significance, 1) the condition of the natural community (including structure, species composition, and age); 2) the landscape context (the extent and nature of the surrounding areas); and 3) the size of the natural community occurrence.

Wildlife Linkage Assessment
Roads and development create barriers for the movement of wildlife as they cross the landscape to access habitat, breed, disperse, reproduce and find food, water and shelter. Wildlife linkage refers to the areas or corridors used by wildlife to access other habitat areas. Wildlife linkage can be considered at different scales. First, a GIS-based landscape model of wildlife linkage potential was developed by VT Fish and Wildlife Department and VT Department of Transportation in 2006 to predict the location of potentially significant wildlife linkage habitats. The model developers note that the model is intended for planning purposes and depicts potential wildlife habitat linkages, as the data have not been field verified and may contain errors. The model incorporated the following elements: a) land use and land cover classes derived from 1994 Landsat Thematic Mapper Imagery; b) development density data (Emergency 911 house sites); and c) contiguous or 'core' habitat data (from the University of Vermont Spatial Analysis Lab in 2000). This dataset was used to assess the importance of a site in terms of facilitating wildlife movement across the landscape, and to evaluate road segments based on their potential suitability for wildlife crossing. Second, a map of the most likely corridors for wildlife movement between the Green Mountains and Adirondacks developed by the Nature Conservancy for the Staying Connected Initiative was used to assess wildlife linkage on a broader scale.

Information on potential wildlife habitat linkages was used in conjunction with information on wetland function and values, and significant natural communities and unfragmented habitat (see below) to identify priority sites. An effort to field-verify the use of different road segments by wildlife when moving between habitats was beyond the scope of this project and remains a priority for future study.

Citizen Wildlife Sightings Project
Citizen wildlife sightings were solicited, compiled and mapped to depict where different species of wildlife have been observed within the study area and to provide an opportunity for the public to become engaged in the project. A letter was sent to all residents within the Upper Poultney River Watershed describing the project and asking for them to submit wildlife sightings

especially for less common larger mammals including bear, bobcat, fisher, moose, coyote and fox. Citizens were asked to place a dot on a map showing the approximate location of the sighting, and a provide details including age and number of animals, date of sighting, confidence in the sighting and comments. Wildlife sightings were submitted by mail, on-line or at two public drop-off locations.

Habitat Block Assessment

Maintaining large areas of unfragmented habitat contributes to the region's potential value for wildlife and the maintenance of other natural processes. Large blocks of unfragmented habitat can support a variety of natural communities and contribute to the overall biodiversity of an area by virtue of the variety of environmental conditions that exist. Fragmentation caused by development and roads and the resultant loss of interior habitat are linked to the decline of a number of 'species of greatest conservation need' in Vermont and elsewhere (Kart et al. 2005). Ecological processes impacted by fragmentation include the ability of native species to disperse in a changing climate and the movement of wide-ranging species such as moose and bear. Moreover, non-native species are more likely to invade fragmented habitats. (Goldblum and Beatty 1999). While individual species have different habitat requirements, and thus do not respond to habitat fragmentation in the same way; areas of unfragmented habitat can be viewed as a general indication of landscape quality and ecological integrity.

To identify large blocks of unfragmented habitat within the study area and adjacent areas, recent statewide habitat block mapping and analysis completed by the Vermont Land Trust and Vermont Fish and Wildlife Department was used (See Osborne et al.). Habitat blocks were delineated to include contiguous habitat e.g., forest, shrublands and wetlands greater than 20 acres, while developed land including bare land, pasture and cropland were excluded. Landcover data (2006) from National Oceanic and Atmospheric Administration (NOAA) Coastal Change Analysis Program (C-CAP) was utilized to create the dataset. Class four roads were not designated as boundary of a habitat block, as they are typically narrow and have minimal traffic, although they are recognized as creating some degree of fragmentation and the potential for future development within habitat blocks. As part of a connectivity analysis, the portion of each habitat block represented by interior habitat was characterized. Interior habitat were defined as interior portions of habitat blocks generally 200 m from the habitat block edge and at least 250 acres in size (Osborne et al.).

A second "core habitat" dataset developed in 2000 as part of the Vermont Biodiversity project (Capen 2000) was used in conjunction with the habitat block data to help identify priority areas. Core habitats were defined as including land at least 100 m distant from human disturbance and encompass forests (including areas with timber harvesting), wetlands, natural open areas and open water. Human disturbance areas were defined as: developed, industrial or residential areas, agricultural openings and roads including class 4 roads. Landcover data utilized for this analysis included 1992/1993 Landsat Thematic Mapper imagery. This data layer was used as one of a number of different resources when delineating priority area boundaries, to help ascertain what areas were least impacted by roads and development.

The habitat block and core habitat data layers were used together to identify priority sites for field evaluation. Larger areas of unfragmented habitat, distributed throughout the study area

were prioritized for field evaluation. The habitat block data layer is based on more recent land cover data, provides a more conservative characterization of interior habitat (200m versus 100m from the edge of development) and because less-travelled class 4 roads do not serve as boundaries of habitat blocks, larger blocks of contiguous forests can be visualized. While the habitat data is well documented (Osborne et al.) and provides a valuable depiction of unfragmented habitat, because it has not been formally released by Vermont Department of Fish and Wildlife, it is considered a provisional data layer.

Assessment of Priority Areas

The eighteen priority areas identified were re-assessed in light of data collected during this project. In some cases boundaries of priority areas were redrawn to better reflect confirmed or potential habitat features. Each priority area is described based on wildlife habitat attributes as well as additional needs for assessment.

The inventory of wildlife habitat in the Upper Poultney River Watershed contributes a clearer understanding of significant wildlife habitat and conservation priorities; however, the products generated from this project are best viewed as works in progress. Not all mapped features were visited and there may be additional areas within and outside 'priority areas' that contain significant natural features and wildlife habitat. It is important to acknowledge that the digital data evaluated has received varying degrees of field verification and may contain errors or not be up-to-date. Future field investigations by naturalists and townspeople will provide additional information and over time, the landscape will change requiring the need to update resource information and adjust conservation priorities.

RESULTS AND DISCUSSION

Wetland Mapping and Assessment

Wetlands in the Upper Poultney River Watershed are concentrated primarily along the drainages of the Poultney River and its tributaries. The final wetland map includes 341 confirmed and potential wetland polygons ranging in size from <0.01 to 27.3 acres for a total acreage of 626 acres (Figure 3). In comparison, the first iteration of the 2010 Vermont State Wetland Inventory (VSWI) for the Upper Poultney Watershed includes 374 wetland polygons for a total of 593.4 acres. The net reduction in the number of wetland polygons is due to our combining adjacent wetland polygons judged to be the same type of wetland (including many small sliver polygons that were generated when the 2010 VSWI was created). The final wetland map created in this project includes more acres of wetlands, due to adjusting wetland boundaries, as well as the addition of wetland polygons, including provisional wetlands mapped by Arrowwood Environmental (data provided by Natural Heritage Database) and those mapped during this project.

The wetlands data layer generated by this project includes potential as well as confirmed wetlands, as not all wetlands have been field-verified. In addition, there are likely additional wetlands, especially seeps, vernal pools and seepage forests that were not identified during this inventory and NWI mapping as they are difficult to map remotely. Future surveys by ecologists and townspeople will help to confirm mapped wetlands, and could also identify some mapped areas that should not be considered wetlands based on the character of the soil, hydrology and/or vegetation.

Wetland Types--

Thirteen different 'types' of wetlands were mapped and classified within the Upper Poultney River Watershed (Table 2). Some of the types correspond with a specific natural community described by Thompson and Sorenson (2000) such as Hemlock-Balsam Fir-Black Ash Seepage Swamp, Red Maple-Black Ash Seepage Swamp, Sedge Meadow, Shallow Emergent Marsh and Cattail Marsh. Other types may encompass more than one natural community.

Shrub swamps dominated by speckled alder (*Alnus incana)* are the most abundant kind of wetland within the study area and are classified as "Alder/Alluvial Shrub Swamp" as the two natural communities often are found in close proximity and it was difficult to map them separately. Alluvial Shrub Swamps are less common in the state (Table 1) and are restricted to silt loams and other alluvial deposits on the floodplain of smaller rivers. Alder Swamps are typically associated with soils with higher amount of organic matter that remain saturated for longer periods. Both natural community types are broadly defined. Thompson and Sorenson (2000) note that additional study is needed to better understand the how past land use and other factors influence their composition and successional trajectories.

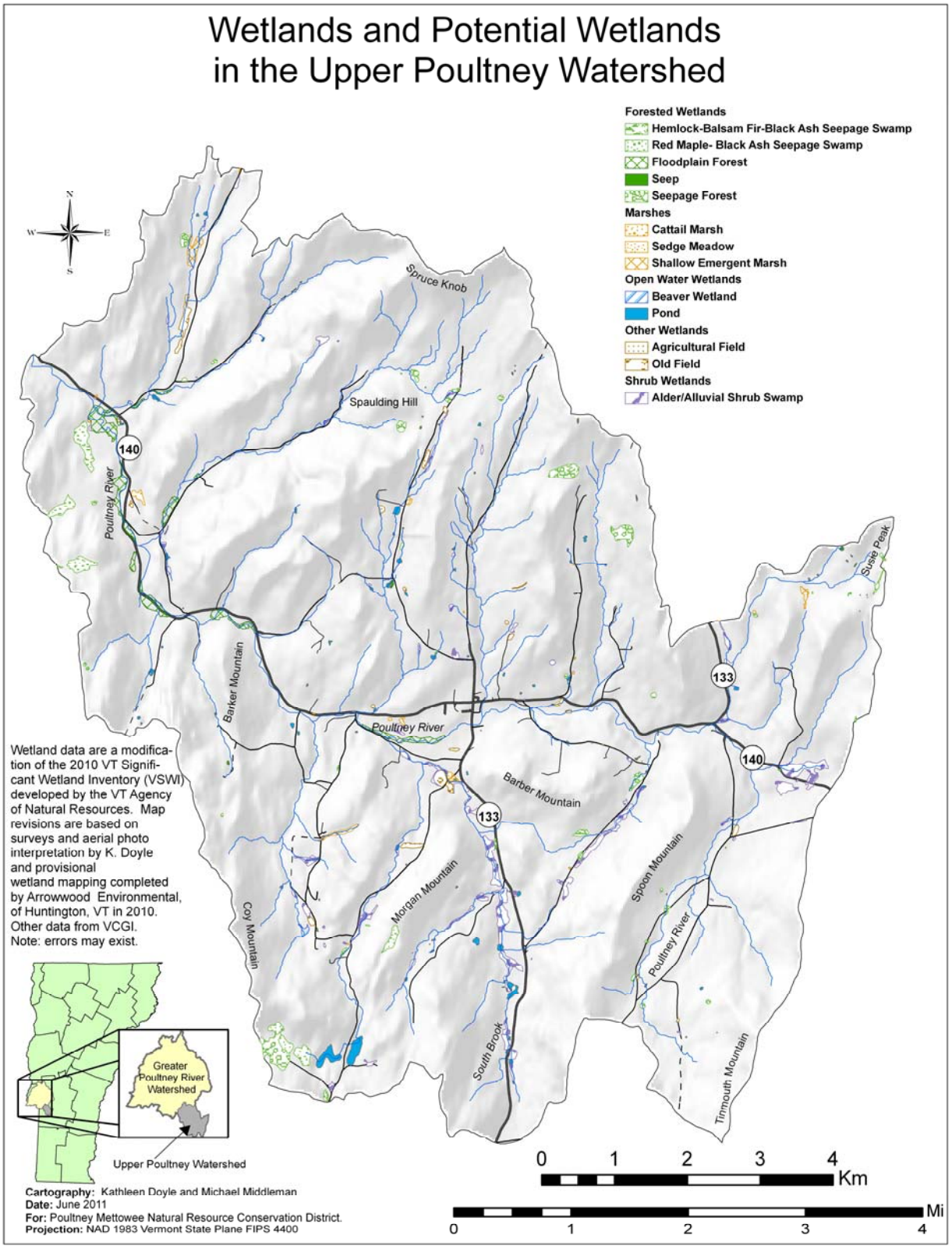

Figure 3. Wetlands and Potential Wetlands in the Upper Poultney River Watershed.

Table 2. Types of Wetlands Found in the Upper Poultney River Watershed.

Wetland Type	# of Occurrences	Total Acres	Average Size of Wetland
Agricultural Field	5	10.4	2.07
Beaver Wetland	1	2.6	2.6
Cattail Marsh	12	14.7	1.2
Floodplain Forests	14	102	7.3
Hemlock-Balsam Fir-Black Ash Seepage Swamp	2	0.7	.35
Old field	19	31.5	1.7
Pond	87	52.3	.60
Red Maple-Black Ash Seepage Swamp	7	75	11
Sedge Meadow	2	2.5	1.3
Seep	45	6.5	0.1
Seepage Forest	47	98.6	2.1
Shallow Emergent Marsh	11	17.4	1.6
Alder Swamp/ Shrub Swamp	90	212	2.3
Total	341	626	1.8

Data collected by Doyle (2010) for PMNRCD based on review and updates to 2010 Vermont State Wetland Inventory (VSWI).

"Floodplain Forests" may include a number of different floodplain forest natural communities such as Sugar Maple-Ostrich Fern Riverine Floodplain Forest. Beaver Wetlands include a mosaic of more than one type of natural community such as Alder Swamp, Shallow Emergent Marsh and open water. Areas mapped as Seepage Forest do not fit well into any of the natural community types defined by Thompson and Sorenson (2000). Some occurrences may share similarities to Red Maple-Black Ash Seepage Swamp, but are either early successional or appear drier than the typical example. Other wetland types, such as ponds, agricultural fields and old fields, are not natural communities per se, but are included due to their wetland regulatory status and the wetland functions and values they provide.

State and locally-significant wetlands--

Priority sites with locally- or state- significant wetlands are identified in Tables 3 and 4 (For location of Priority Sites, see Figure 34). Most of the sites include an assemblage of interacting wetland natural communities. It is useful to think of the wetlands as complexes due to the many ways that adjacent wetlands are connected -- through hydrologic regime, water chemistry, wildlife habitat and so on.

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Table 3. State and Locally-Significant Wetlands in the Upper Poultney River Watershed.

Site Name	Town	Total Acres	Natural Communities (acres)	Significance	
				Local	State
Daisy Hollow Wetlands	Middletown Springs	34.5	Alder Swamp/ Alluvial Shrub Swamp Cattail Marsh Seep Seepage forest	Yes	No
East Poultney Floodplain Wetlands	Poultney and Middletown Springs	106.3	Red Maple-Black Ash Seepage Swamp (32 acres – one polygon not field-verified)	Yes	Yes/ Potential
			Floodplain Forest (73.1 acres)	Yes	Potential
			Alder Swamp Cattail Marsh	Yes	No
Morgan Mtn. Swamp	Middletown Springs	7.9	Red Maple Black Ash Seepage Swamp	Yes	No
South Brook Wetlands	Middletown Springs	81.4	Alder Swamp/ Alluvial Shrub Swamp Beaver Wetland Sedge Meadow Seepage forest Shallow Emergent Marsh	Yes	No
Wells Pinnacle Wetlands	Wells	71.0	Red Maple-Black Ash Seepage Swamp (28.2 acres – one polygon not field-verified)	Yes	Yes/ Potential
			Seepage Forest Open Water		No

State significant wetlands were determined based on Vermont Natural Heritage Program Ranking Specifications. Potentially Significant Wetlands require more field evaluation to assess condition and confirm natural community type.

Table 4. Potentially Significant Wetlands in the Upper Poultney River Watershed.

Site Name	Town	Total Acres	Natural Communities	Significance	
				Local	State
East Poultney Hills Wetland	Poultney	13.3	Red Maple-Black Ash Seepage Swamp	Potential	Potential
NW Tinmouth Wetlands	Tinmouth	34.3	Alder Swamp Alluvial Shrub Swamp Seepage Forest	Potential	Potential
Poultney River Floodplain Forest	Middletown Springs	15.6	Sugar Maple-Ostrich Fern Riverine Floodplain Forest	Yes	Potential

Potentially Significant Wetlands require more field evaluation to assess condition and confirm natural community type..

Red Maple-Black Ash Seepage Swamps are some of the largest wetlands in the Upper Poultney River Watershed. Three sites are identified as having state-significant or locally-significant Red Maple-Black Ash Seepage Swamp based on landscape context, condition and size (Table 3). Several other occurrences require additional field evaluation to more fully assess their characteristics. While this type of natural community is relatively common in the Taconic region and elsewhere in Vermont (Table 1), relatively undisturbed examples, surrounded by intact forest are not common (Sorenson et al. 2004, Thompson and Sorenson 2000).

Floodplain forests, particularly along the main stem of the Poultney River (East Poultney Floodplain Wetlands and Poultney River Floodplain Forest) are considered locally significant due to the important functions and values they provide including flood control, water quality protection and wildlife habitat. These forests may include some high quality examples of natural communities that are rare in Vermont (for example Sugar Maple-Ostrich Fern Riverine Floodplain Forest; Table 1) but because the sites were not surveyed, or assessed only from the road, additional field assessment is needed.

Alder Swamp and Alluvial Shrub Swamp are a dominant type of wetland within the Daisy Hollow Wetlands and South Brook Wetlands. The alder-dominated swamps provide important functions and values, but were not designated as state-significant as Alder Swamps are a common natural community type throughout the state and Alluvial Shrub Swamps were not mapped separately.

Described below are the eight sites the Upper Poultney River Watershed where significant or potentially significant wetlands have been identified. In addition, the numerous smaller wetlands collectively provide important functions and values on the landscape.

Significant Wetlands

The Wells Pinnacle Wetlands –

The Wells Pinnacle Wetlands are a 71-acre locally-significant wetland complex including state-significant Red Maple-Black Ash Seepage Swamps (~ 28 acres), "seepage forest" (~27.3 acres) and two large dammed ponds (~21.5 acres) in a basin at the foot of "The Pinnacle" in Wells. Coy Brook originates in this wetland complex and flows north to join South Brook and eventually the Poultney River. The area identified as 'seepage forest' were not extensively surveyed, but appear drier than the Red Maple-Black Ash Seepage Swamps and lacks the distinctive hummock-hollow topography of the more saturated areas. The easternmost Red Maple-Black Ash Seepage Swamp was not surveyed and needs field-verification.

The forested wetland complex is underlain by organic wetland soils mapped as Linwood and Peacham muck. Linwood muck is characterized by a very deep surface organic layer and the Black Ash Seepage Swamps appear to be best developed on these deeper organic soils at this site. Peacham muck has a shallow organic layer over a dense gravelly basal till. Much of the area designated as 'seepage forest' occurs on the Peacham muck. According to current landowners, the two large ponds which are downstream of the Red Maple-Black Ash Seepage Swamp complex were created circa 1968– 1975 when Coy Brook was dammed, east and west of Mountain Road. It is possible that the Red Maple-Black Ash Seepage Swamps were more extensive before the hydrology was altered by the dams. Although, the ponds do not provide all of the functions afforded by Red Maple-Black Ash Seepage Swamps, including habitat for songbirds and other forest-dependent wildlife, the open water benefits other wildlife species and contributes to the habitat diversity of the area.

The Red Maple-Black Ash Seepage Swamp visited has a fairly open canopy dominated by red maple (*Acer rubrum*) with lower densities of black ash (*Fraxinus nigra*), white pine (*Pinus strobus*), yellow birch (*Betula alleghaniensis*) and white ash (*Fraxinus americana*) and scattered serviceberry (*Amelanchier* sp.) in the subcanopy. Past cutting is evident with the largest red maple observed measuring about 20 inches in diameter. The ground surface has a distinctive hummock-hollow microtopography with recent dead and down trees observed. There is a mosaic of herbaceous and tall shrub-dominated areas. The most common tall shrubs are speckled alder (*Alnus incana*), meadowsweet (*Spiraea alba var. latifolia*) and some of elderberry (*Sambucus canadensis*) and winterberry holly (*Ilex verticillata*). Dewberry (*Rubus* sp.) is a characteristic low shrub. On drier hummocks, foamflower, (*Tiarella cordifolia*), partridgeberry (*Partenocissus quinquefolia*) and Canada mayflower (*Mainantemum canadensis*) are common herbaceous plants. Tussock sedge (*Carex stricta*) is dense in some low-lying areas, while other areas are dominated by ferns including cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*) and crested wood fern (*Dryopteris cristata*; Figure 4).

Figure 4. Red Maple-Black Ash Seepage Swamp in the Wells Pinnacle Wetlands.

An important feature of this extensive forested wetland complex is that it is surrounded by unfragmented forest habitat (See description of Coy Mountain and Lamb Hill Road Habitat blocks) which buffer the wetlands and provides connectivity to the surrounding upland forests. The wetland complex provides significant flood water storage, water quality protection and important wildlife habitat. In particular, hardwood swamps provide important breeding habitat for a variety of birds including great-crested flycatcher, northern waterthrush, veery and red-shouldered hawk, as well as a number of amphibians. Beaver and mink are also commonly found in these forested wetlands and bear sign was noted near the edge of the swamp.

Management Recommendations: To protect the important functions and values provided by the wetland complex, it is recommended a 100' buffer be established around the wetland, so disruption to soils and vegetation is limited. Heavy logging can convert hardwood swamps to a shrub-dominated wetland. Because of the fragile nature of organic soils, logging with heavy machinery can cause compaction, rutting and change the hydrology. Therefore, it is recommended that timber harvest not occur within a buffer of 50' surrounding the wetland complex. If harvesting occurs, it should be done selectively and only when soils are completely frozen to avoid disruption to soils, hydrology and vegetation (Thompson and Sorenson 2000).

Morgan Mountain Swamp-

Situated at 1400' elevation on a high bench southwest of the summit of Morgan Mountain is a 7.9-acre wetland complex dominated by Red Maple-Black Ash Seepage Swamp. The swamp has formed in very deep, very poorly drained, Pinnebog muck soil. A small drainage flows from the south end to the north. The swamp varies in tree density and there are inclusions of emergent marsh as well as shrub-dominated swamp. The swamp-complex is surrounded by northern hardwood forest and is part of the 8,385-acre Coy Mountain Forest Habitat Block (Figure 31).

Red Maple (*Acer rubrum*) is the dominant tree in the swamp along with lesser amounts of paper birch (*Betula papyrifera*), white pine (*Pinus strobus*) and yellow birch (*Betula alleghaniensis*). The canopy varies is fairly open in most areas, with trees typically less than 12" in diameter indicating past timber harvest (Figure 5). Dominant shrubs include speckled alder (*Alnus incana*), meadow-sweet (*Spiraea alba var. latifolia)*, winterberry holly (*Ilex verticillata*). Dewberry (*Rubus* sp.) is a characteristic low shrub on drier hummocks with foamflower (*Tiarella cordifolia*) and goldthread (*Coptis trifolia*). Tussock sedge (*Carex stricta*) and other sedges are dominant in low-lying areas with localized patches of cattail (Typha latifolia). The understory of other areas, particularly the north end, are dominated by ferns including cinnamon fern (*Osmunda cinnamomea*), and royal fern (*Osmunda regalis*).

Figure 5. Morgan Mountain Red Maple-Black Ash Seepage Swamp. The ground layer has a distinctive hummock-hollow topography.

Morgan Mountain Swamp is well buffered by the surrounding forest and contributes to its local significance. This example is unusual in that many swamps of this type are often adjacent to developed areas. The surrounding forests improve the capacity of this swamp to provide breeding habitat for birds and amphibians and habitat for a variety of animals that utilize forested wetlands. In addition to the water quality and floodwater retention that the wetland provides, the wetland has recreational and aesthetic value and hiking and cross-country ski trails exist nearby.

Management Recommendations: To protect the important functions and values provided by the wetland complex, it is important that the more than 100' forest buffer be retained, so that disruption to soils and vegetation is limited. Heavy logging can alter Red Maple-Black Ash Seepage Swamps to a shrub-dominated wetland. Because of the fragile nature of organic soils, logging with heavy machinery can cause compaction, rutting and change the hydrology. Therefore, it is recommended that timber harvest not occur within a buffer of 50' surrounding the wetland complex. If harvesting occurs, it should be done selectively and only when soils are completely frozen to avoid disruption to soils, hydrology and vegetation (Thompson and Sorenson 2000).

East Poultney Floodplain Wetlands-

This extensive 106.3-acre wetland complex is situated at 560–700' elevation along the Poultney River channel and in the surrounding lowlands in East Poultney and adjacent Middletown Springs. The wetland complex includes floodplain forest (73 acres), Red Maple-Black Ash Seepage Swamp (32 acres), alder swamp, cattail marsh, old field and ponds. The floodplain forest is associated primarily with Limerick silt loam, a very poorly drained alluvial soil, while the Red Maple-Black Ash Seepage Swamp occurs mostly on Adrian muck, and Canandaigua silt loam.

Figure 6. Floodplain forests (Map ID #275) along the Poultney River are locally significant due to the important functions and values they provide including floodwater retention, surface and ground water protection, fish and wildlife habitat, recreational and aesthetic value and erosion control.

Figure 7. Exemplary floodplain forest natural communities may exist within the *East Poultney Floodplain Wetlands*; however, since the forests (including this example -- Map ID# 285) were surveyed primarily from the road, a more detailed assessment is required to assess potential state significance

Sugar maple (*A. saccharum*), white ash (*F. americana*), American elm (*Ulmus americana*) white pine (*P. strobus*) and sycamore (*Platanus occidentalis*) are tree species dominant t in the floodplain forests in the *East Poultney Floodplain site*. The integrity of both the Poultney River and the adjacent floodplain forests are impacted by proximity to Route 140. Because the road is close to the river, the floodplain forests play an especially important role retaining floodwaters and buffering the river from pollutants. Some of the floodplain forests occur as a narrow strip between the river and adjacent agricultural fields, however the highest priority floodplain forests are adjacent to upland forests to the west and south and merit further ecological assessment.

Figure 8. *East Poultney Floodplain* Red Maple-Black Ash Seepage Swamp (Map ID #333) includes open, sedge-dominated areas.

One of the two Red Maple-Black Ash Seepage Swamps (~21 acres) was visited during this assessment and is designated state significant. It is situated about 300 meters from the Poultney River near the edge of the Coy Mountain Forest Habitat Block (Figure 31 & 35). The second swamp (~ 11 acres, Map ID# 334) was not visited and remains a high priority for field assessment. It is located further south and west ~ 0.8 km south of the Poultney River.

The Red Maple-Black Ash Seepage Swamp (Figure 8) is dominated by (*Acer rubrum*), black ash (*Fraxinus nigra*), yellow birch (*Betula alleghaniensis*) and white pine (*Pinus strobus*). In some drier areas, hemlock (*Tsuga canadensis*) is dominant. The canopy trees are typically less than 10" in diameter indicating past timber harvest. The most abundant shrub is speckled alder (*Alnus incana*). Sedges, including tussock sedge (*Carex stricta*) are dominant in the understory with areas of cinnamon fern (*Osmunda cinnamomea*), cattail (*Typha latifolia*), goldenrod (*Solidago spp*), spotted touch-me-not (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*) and marsh fern (*Thelypteris palustris*). Characteristic hummock-hollow topography exists within this swamp .

Management Recommendations: Floodplain forests are especially vulnerable to invasion by exotic species, which can aggressively colonize and outcompete native species. Because many non-native species such as Japanese knotweed (*Fallopia japonica*), garlic mustard (*Alliaria petiolata*), and Norway Maple (*Acer platanoides*) are so highly invasive in floodplain forests, it is important to attempt to control them during early stages of establishment (Sorenson et al. 1998). Garlic mustard has become increasingly abundant along the Poultney River corridor in the last 7 years (personal observation) and its control becomes increasingly difficult once it has spread. Because of the proximity of the floodplain forests to Route 140, it would be highly beneficial for local road crews to be trained to identify potential non-native invaders and implement efforts to ensure that clean fill is used when conducting road work. Where possible, the establishment of a 100' forested buffer around the wetland complex is recommended to protect the functions and values the wetlands provide. Limiting timber cutting to outside a buffer of 50' surrounding the wetland complex is also advised. If harvesting occurs, it should be done

selectively and only when soils are completely frozen to avoid disruption to soils, hydrology and vegetation. Timber harvest that creates canopy gaps should be avoided especially in areas where invasive species are present as this can increase their spread.

South Brook Wetlands-

A complex of locally-significant wetlands is found along South Brook from near the southern part of Middletown Springs to where South Brook joins the Poultney River near Buxton Road. The wetland complex is dominated by ~78 acres of shrub swamps including Alluvial Shrub Swamp and Alder Swamp natural communities. Other wetlands in the complex include man-made ponds, sedge meadow, old fields, shallow emergent marsh and seepage forest. A variety of wetlands soils occur including: Scarboro muck and Adrian muck organic soils; Limerick silt loam and Rippowam fine sandy loam, which formed in alluvial deposits: and Rayham silt loam, a soil formed in glacial lake deposits.

Figure 9. Alluvial shrub swamp (MapID# 142) provides a buffer between South Brook. and adjacent fields protecting water quality.

This site was determined to be locally significant based on the functions and values this extensive wetland complex provides. According to Ed Marcy, a long-time resident of Middletown Springs, South Brook has been straightened and adjacent areas drained to support agricultural production. Although the hydrology and vegetation of this wetland complex has been altered, the existing shrub swamps and other wetlands provide important water quality protection, floodwater retention and vital wildlife habitat. Beaver and mink have been observed in the area. Native woody species that are dominant in the shrub swamps include speckled alder (*Alnus incana*), willow (Salix spp.) and dogwood (*Cornus spp*).

Management Recommendations: Restoration of native species in degraded wetlands is a management priority for this area. Efforts to restore wetlands that provide wildlife linkage across Route 133 would be most beneficial.

Figure 10. Above, alluvial shrub swamps (Map ID# 146) provide important riparian wildlife corridors, breeding habitat for birds such as alder and willow flycatcher, yellow warbler, common yellowthroat, northern waterthrush and gray catbird.

Figure 11. The shrub swamp (on the right; Map ID# 137) facilitates habitat linkage between upland forests east and west of Route 133.

Daisy Hollow Wetlands-

In the valley west of Spoon Mountain, an extensive, 35 acre complex of wetlands occur along two drainages one that flows north to the main channel of the Poultney River and a second that drains to South Brook. The wetlands are associated with organic soils, mapped as Linwood and Scarboro mucks. Much of the wetland complex (~29.7 acres) is mapped as shrub swamps, but cattail marsh, seeps, 'seepage forest' and old fields are intermixed. The entire wetland complex is designated locally-significant due to the important functions and values the wetland complex provides.

Figure 12. The alder swamp intermixed with cattail marsh and surrounded by unfragmented forest provides habitat for a diversity of songbirds and other wildlife.

Dominant species in the Alder Swamp/Alluvial Shrub Swamps include speckled alder (*Alnus incana*), willow (*Salix spp*.), meadow-sweet (*Spiraea alba var. latifolia*) and in some areas red maple (*Acer rubrum*). Joe pye-weed (*Eupatorium maculatum*), cattail (*Typha latifolia*), sensitive fern (*Onoclea sensibilis*) and sedges (*Carex spp*.) are common herbaceous species (Figure 12).

The presence of red maple in some of the shrub swamps suggests the possible transition to forest for some areas. Thompson and Sorenson (2000) note that the successional patterns of alder swamps is not well understood, yet is likely related to hydrology and past land use history, with shrub swamps in more frequently flooded areas being more stable.

The Daisy Hollow Wetlands provide a number of important functions and values including water quality protection, floodwater retention and important habitat for a variety of wildlife. The close proximity of the wetlands to unfragmented forest habitat blocks --Barber Mountain and Spoon/Tinmouth Mountain --- helps maintain ecosystem processes and enhance wildlife habitat (See Figures 31 &35). The wetland complex functions as an important wildlife linkage (Figure 22) for species such as bear and moose moving between the two forest habitat blocks. Amphibians that may be found in these wetlands include spotted salamander, wood frog and gray tree frog (Thompson and Sorenson 2000). Bird species that breed in shrub-dominated wetlands include alder and willow flycatcher, yellow warbler, gray catbird, common yellowthroat and American woodcock. Two species of greatest conservation need (SGCN) Canada warbler (a high priority species) and chestnut-sided warbler (a medium priority species; Vermont Fish and Wildlife, 2005) were documented from a wetland near the north end of the complex (Map ID# 86).

<u>Management Recommendations</u>**:** Species such as Canada warbler, along with chestnut sided warbler may benefit from active management to maintain some early successional habitat in a matrix of unfragmented forest. It is an important conservation priority to retain forest connectivity surrounding the Daisy Hollow wetlands.

Potentially Significant Wetlands

East Poultney Hills Wetland-

A potentially significant 13.3 acre wetland is mapped at an elevation of 880' on very deep, very poorly-drained Pinnebog muck soils in the hills in East Poultney, west of Route 140. A field visit is required to determine the character and natural community type of this forested wetland which has been mapped provisionally as Red Maple-Black Ash Seepage Swamp. This mid-elevation wetland is found in the northern part of the Coy Mountain forest habitat block and is included within the East Poultney Hills priority site (Figures 31 and 35) and likely contributes important habitat diversity to the large (~8400 acre) block of unfragmented forest.

Poultney River Floodplain Forest-

Located south of Route 140 near the center of Middletown Springs is a 15.6 acre-floodplain forest on Limerick silt loam soils. A thorough field assessment is required to assess natural community attributes of this floodplain forest. Although the condition of the natural community may be compromised by the surrounding land-use which includes agricultural fields, a cemetery and nearby roads and homes, the forest provides a small island of forested habitat near the center of town and also has the potential to contribute to educational and recreational opportunities due to its proximity to the Elementary School and town center. The forest is considered locally significant because it provides important functions and values, including floodwater retention and water quality protection. The spread of invasive plant species into this floodplain forest is a major threat to the native species composition. A number of non-native plant species including Japanese knotweed (*Fallopia japonica*), garlic mustard (*Alliaria petiolata*), Norway Maple (*Acer platanoides*) and goutweed (*Aegopodium podograria*) have been observed in the surrounding areas and thus efforts to control the spread of these species is recommended.

NW Tinmouth Wetlands-

Figure 13. Old field and shrub swamp in NW Tinmouth Wetland complex. This wetland complex serves as an important wildlife linkage and important habitat for breeding amphibians.

This sizeable 34.3 acre wetland complex in Tinmouth is appears locally-significant for the functions and values it provides, but a more thorough assessment is needed. The wetland complex is located in a basin about 1280' elevation. Wetland soils include Canandaigua silt loam, Linwood muck and Birdsall muck. A tributary of the Poultney River originates here. The wetlands provide important floodwater retention and water quality protection. A portion of the wetland is visible from Route 140, and thus important open space and aesthetic value are provided as well (Figure 13) . The wetland complex affords habitat for breeding birds and amphibians and also provides an important wildlife linkage between the Spoon and Tinmouth Mountain habitat block to the south and the Susie Peak habitat block to the north (Figures 22 and 31).

Natural communities observed in NW Tinmouth Wetlands during the windshield survey include shrub swamp and old field, The scattered trees including larch and pine and red maple suggest that the shrub swamp may succeed to a forested wetland. Preliminary assessment indicates that natural communities have been degraded by past land use and the wetlands are bordered by agricultural fields. The invasive non-native species, purple loosestrife was observed in the old field portion of the wetland complex. There is however, the potential for some interesting natural communities within the wetland complex. The western portion of the wetland complex is distinctive for the Upper Poultney River Watershed in being underlain by carbonate-rich rocks. In nearby Tinmouth Channel Marsh, Red Maple-Northern White Cedar Swamps are found in areas with calcium-rich groundwater. A field assessment would provide more information on the character of existing natural communities within the NW Tinmouth Wetlands and their condition and restoration needs.

Vernal Pools

Thirteen vernal pools were mapped during the study (Figure 17). The majority were identified during field work, two were documented in the Natural Heritage Database, VT Department of Fish and Wildlife and the remainder were identified by landowners. A thorough assessment of vernal pools was not conducted as part of this project and remains a priority for future survey.

Evidence of successful breeding by wood frogs and spotted salamander was confirmed at one pool; the remaining pools require field verification during the breeding season to confirm the existence of amphibian egg masses or terrestrial young. The criteria used to determine if a vernal pool meets the State criteria for designation as a state-significant natural community include pool size, amphibian breeding ranking, landscape context and condition.

Figure 14. Spotted salamander (*Ambystoma maculatum*) migrate to vernal pools on rainy nights in early spring to breed and lay eggs. They spend most of their life in the upland forest surrounding the vernal pool.

Figure 15. The number of amphibian egg masses observed in the vernal pool provides an indication of breeding success. Shown here are spotted salamanders egg masses.

Management Recommendations:
Forestry Habitat Management Guidelines for northeastern forests have been developed to conserve the sensitive wildlife species associated with vernal pools in areas where timber harvest occurs (Calhoun and deMaynadier, 2004). The guidelines recommend establishing management zones around a pool, with decreasing harvest intensity with increasing proximity to the vernal pool. Immediately surrounding the pool, it is recommended that no disturbance or timber harvesting occur. In this zone, maintaining good water quality and undisturbed vegetation is a priority. In the zone up to 100feet from the pool, called the vernal pool protection zone, it is recommended that only limited harvesting occur to maintain canopy cover at >75%. In the zone between 100 and 400 feet, called the amphibian life zone, the management guidelines call for only light to moderate partial cuts, where the canopy cover is maintained at >50%. It is further recommended that any timber harvest occur only when soils are frozen or dry to maintain uncompacted forest floor conditions. These guidelines seek to maintain both the integrity of the breeding pool as well as the upland forests where vernal pool species spend the majority of the year.

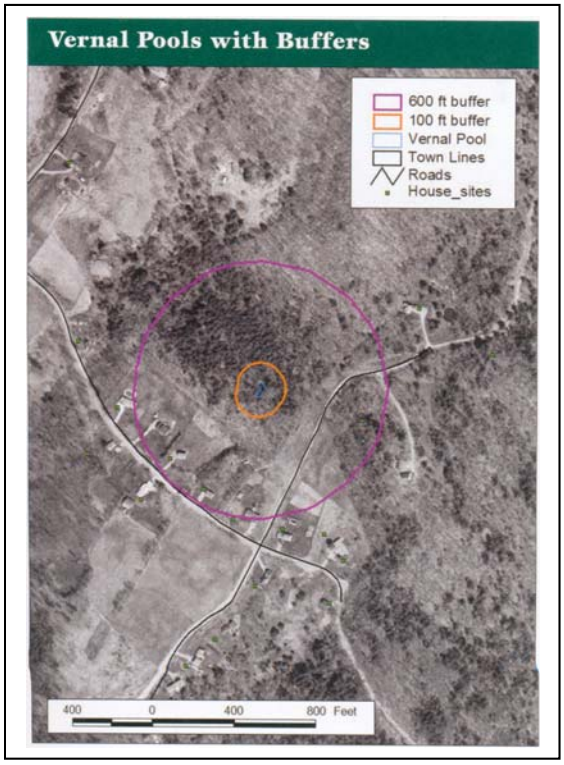

Figure 16. This aerial photograph shows an example of management zones surrounding a vernal pool. (From Vermont Department of Fish and Wildlife).

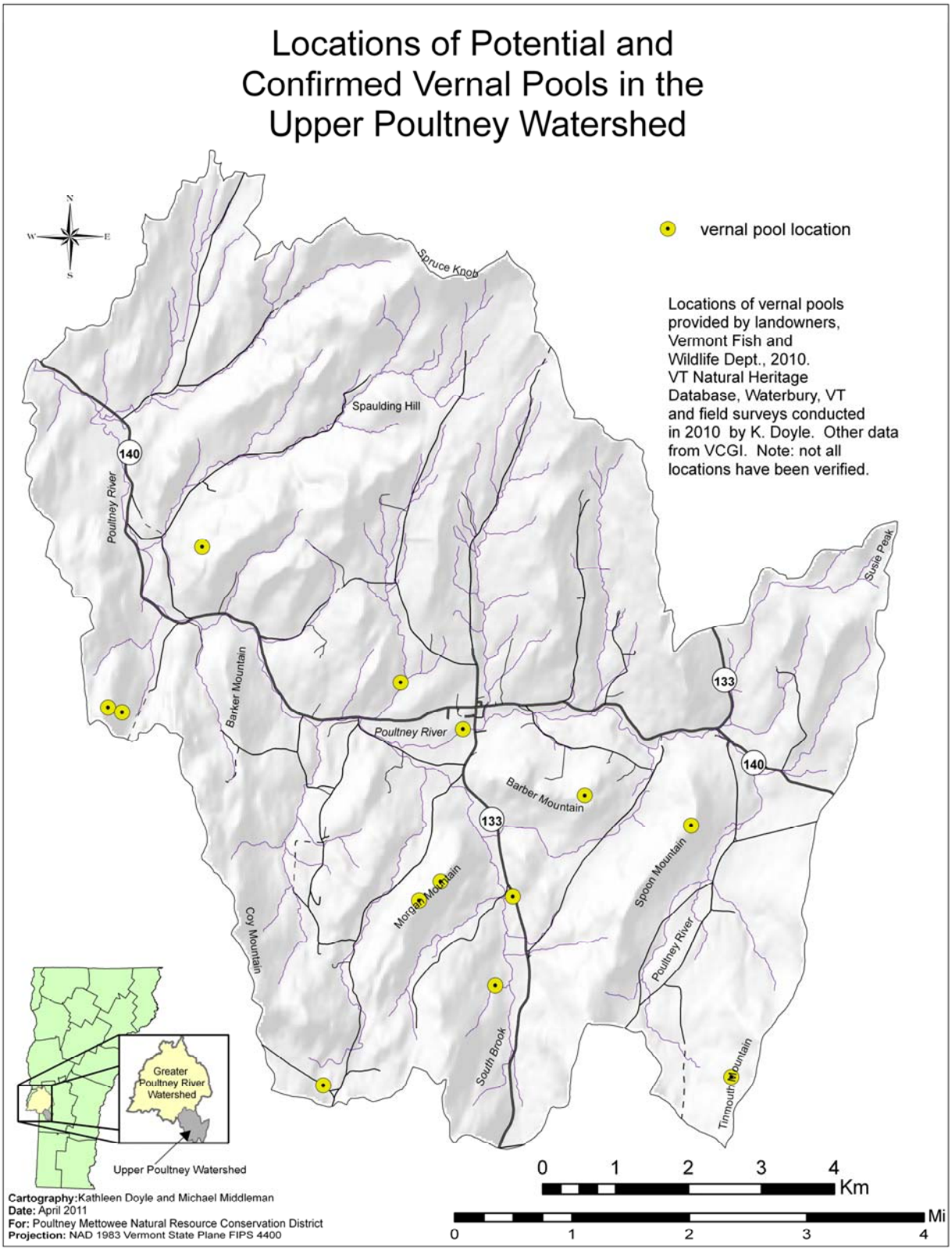

Figure 17. Location of confirmed and potential vernal pools in the Upper Poultney River Watershed.

Significant Upland Natural Communities
Examples of local and state significant natural communities identified during this project are listed in Table 5. Prior to this inventory and recent natural community mapping completed by Arrowwood Environmental in the Spruce Knob and Susie Peak areas, there had been limited survey of natural communities in the Upper Poultney River Watershed and there was no documentation of state significant natural communities in the VT Natural Heritage Database (Vermont Fish and Wildlife Department).

Forested natural communities dominate the landscape of the Upper Poultney River Watershed, with agricultural fields and human development concentrated along many of the major roadways. Northern hardwood forests are the dominant or matrix forest type throughout the study area. Within the Upper Poultney River Watershed, nine different types of local or state significant upland natural communities were documented on eleven sites for a total of 24 occurrences of significant upland natural communities (Table 5, Figure 19). Priority sites were not fully assessed during the inventory; some significant natural community occurrences may be larger than mapped and future field surveys are expected to yield additional occurrences of local or state significant upland natural communities.

The following summaries describe the 'typical' characteristics of each natural community based on examples from across the state as defined by Thompson and Sorenson (2000). Many natural communities have a great deal of variation due to climate, geology and other factors including land use history. Not surprisingly, examples from the Upper Poultney River Watershed may vary somewhat from these descriptions. Often animals are not strictly affiliated with one type of upland forest natural community, but may move between natural communities in search of food, water, shelter and habitat for breeding and reproduction.

Dry Oak Forests--
Dry Oak Forests typically occur on rocky ridgetops at lower elevations with shallow, infertile soil. In Vermont, they are most common in the Champlain Valley, Taconic Mountains, and in the lowlands near the Connecticut River. They occur in very dry places due to low average rainfall and low moisture-holding capacity of soils. More research is needed to understand the role fire may play as a natural disturbance in this community. Overall diversity in these forests is quite low. Red oak (*Quercus rubra*) is generally mixed with white oak (*Quercus alba*) in the canopy, and often associated with white pine (*Pinus strobus)*. The tree canopy is generally continuous, but the trees are often poorly formed. In southern regions of the state, chestnut oak (*Quercus prinus*) may also be a common canopy associate. Shrubs in the heath family dominate the understory, especially huckleberry (*Gaylussacia baccata*) with lower amounts of low sweet blueberry (*Vaccinium angustifolium*). Common herbaceous species include poverty grass (*Danthonia spicata*), hairgrass (*Deschampsia flexuosa)*, woodland sedge (*Carex pensylvanica*) and cow-wheat (*Melampyrum lineare*). Turkey and gray squirrel are common animals associated with this natural community (Thompson and Sorenson 2000).

Figure 18. Chestnut oak on dry rocky slope in East Poultney Hills priority area.

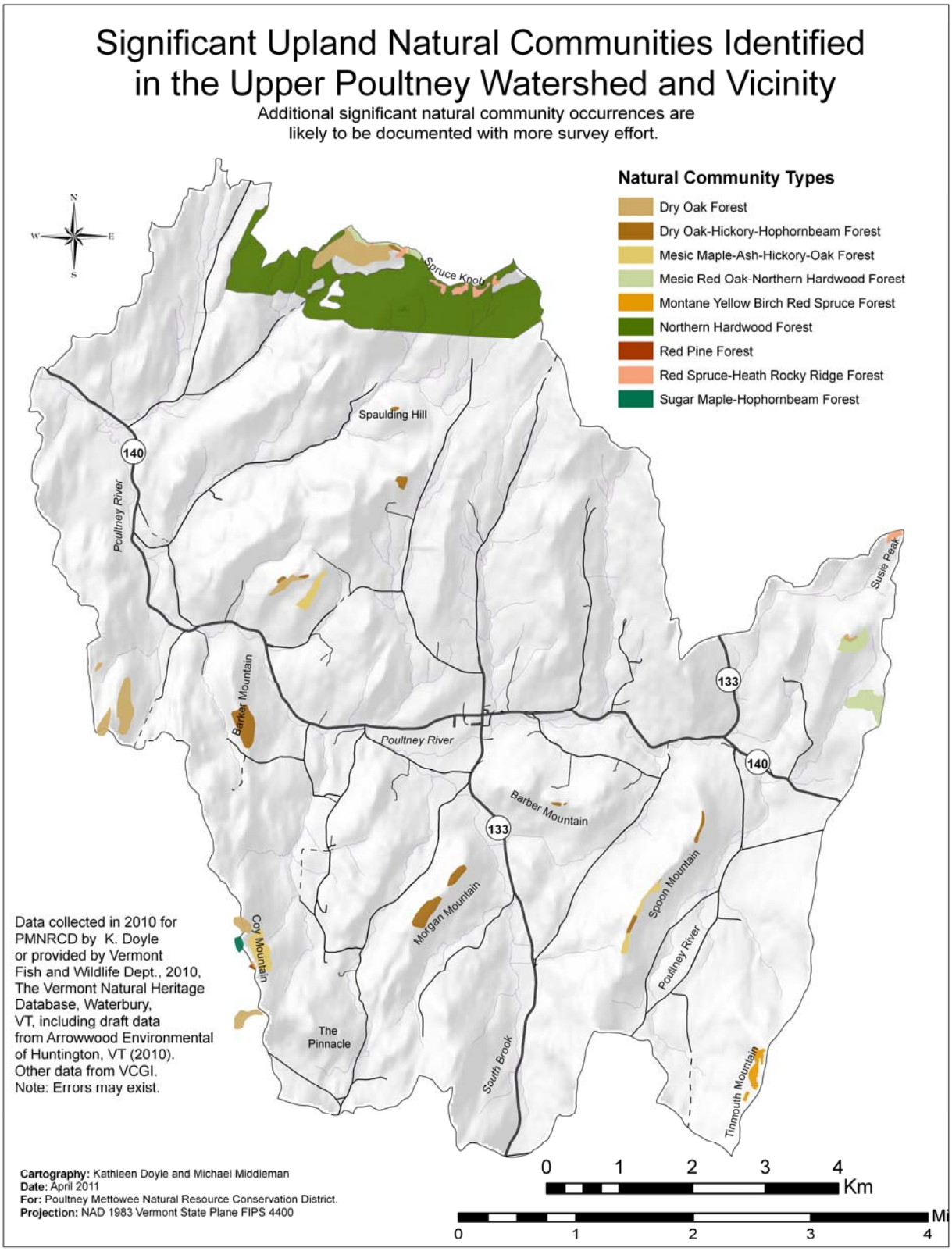

Figure 19. Map of Significant Upland Natural Communities Identified in the Upper Poultney River Watershed and Vicinity.

Table 5. Significant Upland Natural Communities Identified in the Upper Poultney Watershed and Adjacent Areas.

Forest Habitat Block	Priority Site Name	Source Of Data	Natural Communities	# of Patches Mapped	Total Acres in Study Area	Significance	
						Local	State
#2 Spruce Knob	Norton Ridge	PMNRCD	Dry Oak Forest	1	9.5	Yes	Yes
			Dry Oak-Hickory-Hophornbeam Forest	2	2.9	Yes	Yes
			Mesic Maple-Ash-Hickory-Oak Forest	1	14.9	Yes	Yes
	Spaulding Hills		Dry Oak-Hickory-Hophornbeam Forest	2	6.7	Yes	Yes
	Spruce Knob Highlands	AE	Dry Oak Forest	3	70.7 (71.1*)	Yes	Yes
			Dry Oak-Hickory-Hophornbeam Forest	2	2.0	Yes	Yes
			Northern Hardwood Forest	1	757.2 (5665.5*)	Yes	Yes
			Mesic Red Oak-Northern Hardwood Forest	1	13.7 (37.8*)	Yes	Yes
			Red Spruce- Heath Rocky Ridge Forest	6	20.1 (21.3*)	Yes	Yes
#3 Susie Peak	Susie Peak		Dry Oak Forest	1	2.8	Yes	Yes
			Mesic Red Oak-Northern Hardwood Forest	2	50.8 (511.2*)	Yes	Yes
			Red Spruce-Heath Rocky Ridge	2	5.2 (11.7*)	Yes	Yes
#4 Coy Mtn.	Barker Mtn.	NHD	Dry Oak-Hickory-Hophornbeam Forest	1	30.0	Yes	NR**
	Coy Mtn.	PMNRCD (NHD)	Dry Oak Forest	3	5.4 (22.5*)	Yes	Yes
			Mesic Maple-Ash-Hickory-Oak Forest	1	28.0	Yes	Yes
			Red Pine Forest/Woodland	1	.01 (5.2*)	Yes	Yes
			Sugar Maple-Hophornbeam Forest	1	4.9	Yes	Yes
	East Poultney Hills	PMNRCD	Dry Oak Forest	3	40.6	Yes	Yes
	Morgan Mtn.	NHD	Dry Oak-Hickory-Hophornbeam Forest	2	28.7	Yes	NR**
# 6 Barber Mt	Barber Mtn.	PMNRCD	Dry Oak-Hickory-Hophornbeam Forest	2	1.6	Yes	No
#7 Spoon and Tinmouth Mtns	Spoon Mtn.		Dry Oak Forest	1	.5	Yes	No
			Dry Oak-Hickory-Hophornbeam Forest	2	8.0	Yes	Yes
			Mesic Maple-Ash-Hickory-Oak Forest	2	12.7	Yes	Yes
	Tinmouth Mtn.		Montane Yellow Birch-Red Spruce Forest	2	16.3	Yes	Yes

* Includes acres within habitat block, but outside the boundary of the Upper Poultney River Watershed.
** Potentially state significant, but no state rank assigned and not visited during this project.
Source of data: PMNRCD -- data collected in 2010 by K. M. Doyle for Poultney-Mettowee Natural Resource Conservation District; NHD - Data provided by Vermont Natural Heritage Database, VT Fish and Wildlife Department; AE – data collected by Arrowwood Environmental, provided by Vermont Natural Heritage Database, VT Fish and Wildlife Department. Habitat block data provided by VT Fish and Wildlife and VT Land Trust.

Within the Upper Poultney River Watershed, Dry Oak Forests have been documented from the Spruce Knob Highlands, East Poultney Hills, Norton Ridge, Susie Peak, Coy Mountain, and Spoon Mountain priority sites (Table 5, Figures 19 and 35). The size of the forests range from very small, occupying small rocky knolls of less than 0.5 acre, to very large (>25 acres) occurring on dry exposed slopes as well as adjacent ridgetops. Within several of the Dry Oak Forests visited during this project red oak was the only oak species encountered, one exception is the Dry Oak Forests in the East Poultney Hills area, where red oak, chestnut oak and white oak are co-dominants.

Dry Oak-Hickory-Hophornbeam Forest—
Dry-Oak-Hickory-Hophornbeam Forests are often characterized by an open, park-like structure, where the ground layer is dominated by a carpet of woodland sedge (*Carex pensylvanica*).

Figure 20. Dry Oak-Hickory-Hophornbeam Forest on Barber Mtn.

This forest type is found on hilltops and ridges and other locations where droughty conditions prevail and the trees are often stunted. It is believed that past grazing and fire, in addition to the dry conditions, may contribute to the open nature of these forests. The forest canopy can be quite variable, but red oak (*Q. rubra*), shagbark hickory (*Carya ovata*) are common dominants. Other associated canopy trees include white pine (*Pinus strobus*), white ash (*Fraxinus americana*), white oak (*Q. alba*), basswood (*Tilia americana*), and sugar maple (*Acer saccharum*). Hophornbeam (*Ostrya virginiana*) is a characteristic dominant in the subcanopy layer. Although shrubs are sparse, maple-leaf Viburnum (*Viburnum acerifolium*) is typical. Scattered herbs include: marginal wood fern (*Dryopteris marginalis*), bottlebrush grass (*Elymus hysterix*), blue-stemmed goldenrod (*Solidago caesia*) and broad-leaved sedge (*Carex, platyphylla*). Common animals of these forests include white-tailed deer, turkey, white-breasted nuthatch and scarlet tananger. A variant of this natural community, Sugar Maple-Hophornbeam Forest, occurs on more fertile, calcareous soils where oak is uncommon and sugar maple (*Acer saccharum*) is abundant (Thompson and Sorenson 2000).

Within the Upper Poultney River Watershed, Dry Oak-Hickory-Hophornbeam Forest has been documented from Norton Ridge, Spaulding Hills, Spruce Knob Highlands, Barker Mountain, Coy Mountain and Barber Mountain. Sugar-Maple-Hophornbeam Forest was found in the Coy Mountain area also (Table 5, Figures 19 and 35).

Mesic Maple-Ash-Hickory-Oak Forest--
This forest type is similar in many ways to Northern Hardwood Forest (described below) but has affinities to the hardwood forests that dominate the Appalachians further south. Like the two communities described above, this natural community is found in parts of the state with warmer than average temperatures and lower than average rainfall. As the name suggests, these forests are occur on more mesic situations than either Dry Oak or Dry Oak-Hickory-Hophornbeam Forests, but in situations that are drier than the typical Northern hardwood forest. The tree layer is variable in composition with Sugar Maple, (*A. saccharum*) white ash (*F. americana*), red maple (*A. rubrum*), basswood (*Tilia americana*), hophornbeam (*O. virginiana*) and hemlock

Figure 21. Mesic-Maple-Ash-Hickory-Oak Forest on Coy Mountain.

(*Tsuga canadensis*) sharing dominance with more southern species such as red oak (*Q. rubra*), white oak (*Q. alba*) and shagbark hickory (*C. ovata*). The shrub layer often includes maple-leaved Viburnum (*Viburnum acerifolium*), striped maple (*A. pensylvanicum*) and witch hazel (*Hamemelis virginiana*) and serviceberry (*Amelanchier spp*). Herbs that are common include white snakeroot (*Eupatorium rugosum*), marginal wood fern (*Dryopteris marginalis*), common sweet-cicely (*Osmorhiza claytonia*), and round-lobed hepatica (*Hepatica Americana*; Thompson and Sorenson 2000). Mesic Maple-Ash-Hickory-Oak Forests are found within the Norton Ridge, Coy Mountain and Spoon Mountain priority areas (Table 5, Figures 19 and 35).

Northern Hardwood Forest –
As the most widespread type of forest in the state, the northern hardwood forest is called a matrix forest within which smaller communities are found. While broadly-defined and variable in composition, beech (*Fagus grandifolia*) and yellow birch (*Betula alleghaniensis*) are almost always present along with sugar maple (*A. saccharum*), but sometimes red maple

Figure 22 . Northern Hardwood Forest is the dominant type of forest within the Upper Poultney watershed.

(*A. rubrum*) is more abundant than sugar maple. The forest is found throughout Vermont below 2700' in relatively cool and moist settings on gentle to steep slopes. A number of other tree species occur in varying densities depending on moisture, soils and nutrient status. These include Eastern hemlock (*T. canadensis*), white ash (*Fraxinus americana*), white pine (*Pinus strobus*), black cherry (*Prunus serotina*), basswood (*Tilia americana*) and red spruce (*Picea rubra*). Hobblebush (*Viburnum alnifolium*) and striped maple (*Acer pensylvanicum*) are common shrubs. Dominant herbaceous species include intermediate wood fern (*Dryopteris intermedia*), Christmas fern (*Polystichum acrosticoides*), shining club moss (*Huperzia lucidula*) and sarsaparilla (*Aralia nudicaulis*). Northern hardwood forests provide habitat for a numerous species including black bear, porcupine and white-tailed deer and numerous songbirds such as hermit thrush, black-throated blue warbler and red-eyed vireo and amphibians including red-backed salamander, eastern newt and wood frog. As a widespread and common forest type (ranked S5), high quality examples of Northern Hardwood forests are abundant in Vermont (Thompson and Sorenson 2000). The occurrence in the Spruce Knob Habitat Block mapped at over 5600 acres (extending well beyond the boundaries of the study area) is considered state significant due to its size and landscape context (Table 5, Figures 19 and 31).

Mesic Red Oak Northern Hardwood Forest –
These forests are similar to Northern Hardwood Forests, but include a significant component of red oak in the canopy. White oak and hickories are absent reflecting the northern character of this natural community type and distinguishing this community from Mesic Maple-Ash-Hickory-Oak forest. This community develops in drier microsites than Northern Hardwood Forests, such as south- facing slopes. It occurs in areas with deeper soils than Dry Oak Forests or Dry Oak-Hickory-Hophornbeam Forest and is more commonly found (ranked S4 in Vermont, Table 1).

Figure 23. Mesic Red Oak – Northern Hardwood Forest in the Coy Mtn. area.

Canopy dominants along with red oak (*Q. rubra*) include sugar maple (*A. saccharum*) and American beech (*Fagus grandifolia*). White ash (*F. americana*), basswood (*T. americana*), butternut (*Juglans cinerea*), sweet birch (*B. lenta*) and Eastern hemlock (*T. canadensis*) may be locally abundant. Shrubs include striped maple (*A. pensylvanicum*), low sweet blueberry *(V. angustifolium*) and maple-leaf Viburnum (*V. acerifolium*) and serviceberry (*Amelanchier spp*.). Characteristic herbs include Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*) and intermediate wood fern (*Dryopteris intermedia*; Thompson and Sorenson 2000). Within the Upper Poultney River Watershed sizeable areas of this forest type were documented from the Spruce Knob Highlands and Susie Peak priority areas and assigned a preliminary rank of state-significant by Arrowwood Environmental based on their size and landscape condition (Table 5, Figures 19 and 35).

Montane Yellow Birch- Red Spruce Forest--
This natural community typically occurs on mountain slopes and low summits below 2900', with the maximum elevation decreasing from south to north in Vermont. Dominant species are yellow birch (*B. alleghaniensis*) and red spruce (*Picea rubens*), but sugar maple (*A. saccharum*), red maple (*A. rubrum*) and American beech (*F. grandifolia*) may be mixed in at lower elevations. Early successional trees found in canopy gaps include paper birch (*B. papyrifera*) and pin cherry (*Prunus pensylvanica*). Common shrubs include hobblebush (*Viburnum alnifolium*), striped maple (*A. pensylvanicum*) and mountain maple (*A. spicatum*). Herb diversity is sparse under a dense red spruce canopy, but includes bluebead lily (*Clintonia borealis*), common wood sorrel (*Oxalis acetosella*), Canada mayflower (*Maianthemum canadense*) and whorled aster (*Aster acuminatus*). Some birds commonly found in this natural community are winter wren, Blackburnian warbler and solitary vireo (Thompson and Sorenson 2000).

Figure 24. Typically occurring at elevations, over 2000 feet, habitat for this natural community is limited within the Upper Poultney River Watershed, and it was only documented from Tinmouth Mountain where it occurs on the steep upper elevation slopes (Table 5 and Figure 19).

Red Spruce-Heath Rocky Ridge Forest--
This community occurs on thin acidic, well-drained soils on low summits, ridgelines and exposed ledges typically between 1,500 – 2,500 feet. The canopy may be quite open and stunted depending on the amount of bedrock exposed. Red spruce (*P. rubens*) is the dominant tree. Other less abundant trees include balsam fir (*Abies balsamea*), paper birch (*B. papyrifera*), white pine (*P. strobus*) and American mountain ash (*Sorbus americana*). Low sweet blueberry (*Vaccinium angustifolium*) and velvet-leaf blueberry (*V. myrtilloides*) are the typical shrubs. Mosses are often abundant and herbs are generally sparse, but may include Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), star flower (*Trientalis borealis*) and tree club moss (*Lycopodium obscurum*; Sorenson 2006). Within the Upper Poultney River Watershed, this natural community was documented (by Arrowwood Environmental) from the Spruce Knob Highlands and Susie Peak priority areas (Table 5).

Red Pine Forest/Woodland-

Figure 25. A small Red Pine Forest was documented at the edge of the Coy Mtn priority site (Table 5)

Naturally-occurring red pine forests and woodlands are uncommon in Vermont (ranked S2). They are typically restricted to small patches on dry rocky, ridgetops in sites with shallow, dry, acidic soils. In most cases, they are believed to be maintained by fire and are not to be confused with red pine plantations that have been widely planted in Vermont. Red pine is well adapted to fire, due to its thick bark that is resistant to burning. The tree canopy dominated by red pine (*Pinus resinosa*) varies from being open to closed. Heath shrubs dominate the shrub layer, especially black huckleberry (*Gaylussacia baccata*), along with lower densities of blueberries (*Vaccinium angustifolium* and *V. pallidum*). Other shrubs may include serviceberry (*Amelanchier spp*) and striped maple (*Acer pensylvanicum*). Wintergreen (*Gaultheria procumbens*) is a dominant herb and Canada mayflower (*Maianthemum canadense*), bracken fern (*Pteridium aquilinum*) and star flower (*Trientalis borealis*) are among the other locally abundant species (*Thompson and Sorenson* 2000). At the edge of the Upper Poultney watershed, a patch of Red Pine forest (about .75 acre in size) was documented during this project. Another patch occurs nearby outside the study area (Table 5).

Potential Wildlife Linkage

To evaluate potential wildlife linkage in the Upper Poultney Watershed, two different sources of information were considered. First, the Wildlife Linkage Habitat Analysis (Vermont Fish and Wildlife Department 2006) was used to identify potentially important wildlife linkage areas within the watershed and places where major barriers to wildlife movement exist (Figure 27). Second, placing the Upper Poultney Watershed in a broader scale context, the map of likely habitat connections between the Adirondacks and the Green Mountains identifies the southern portion of the Upper Poultney watershed as part of an important East-West corridor (Figure 28). The two sources helped to identify and evaluate priority sites in terms of potential wildlife linkage. The following summarizes some of the observations.

Within the study area, Routes 140 and Route 133 appear to present the most substantial obstacles to wildlife movement. In particular, there are few identified high ranking wildlife linkages west to east across Route 133. The most promising linkages appear to be near the junction of Garron Road and about ½ mile south of Daisy Hollow Road (Figure 27). In these two areas, the South Brook Wetlands contribute to potentially important linkages as do the forested uplands east and west of Route 133 (Figure 35). Given the likely importance of an east – west wildife linkage in this region (Figure 28), focusing attention on restoring habitat to improve connectivity is recommended.

Figure 26. The road segment shown above, just west of Dayton Hill Road, provides one of the most likely opportunities for wildlife movement across Route 140.

Considering habitat movement from north to south, Route 140/Route 133 is a substantial barrier. Three of the most likely linkages across Route 140 are in the vicinity of the East Poultney Floodplains priority area (Figure 35) and are as follows: south of Hampshire Hollow Road, west of Dayton Hill Road and south of Norton Road (Figure 27).

In addition to barriers along the state highways, dispersed development along minor roads such as Garron Road appears to substantially restrict wildlife travel (Figure 27).

A number of linkage opportunities appear to exist across many of the more minor roads. However, wildlife linkage is limited across Fitzgerald Road, parts of Coy Hill Road and Dudley Road (Figure 27).

While information on hypothetical connections exist (Figures 27 and 28); more field-verified data on wildlife movement is needed to confirm the models and to evaluate linkage opportunities for different species. Compton et al (2007) provide a modeling framework for assessing the connectivity at different scales for amphibians that breed in vernal pools. This type of modeling might be conducted to evaluate connectivity for different species or groups of species.

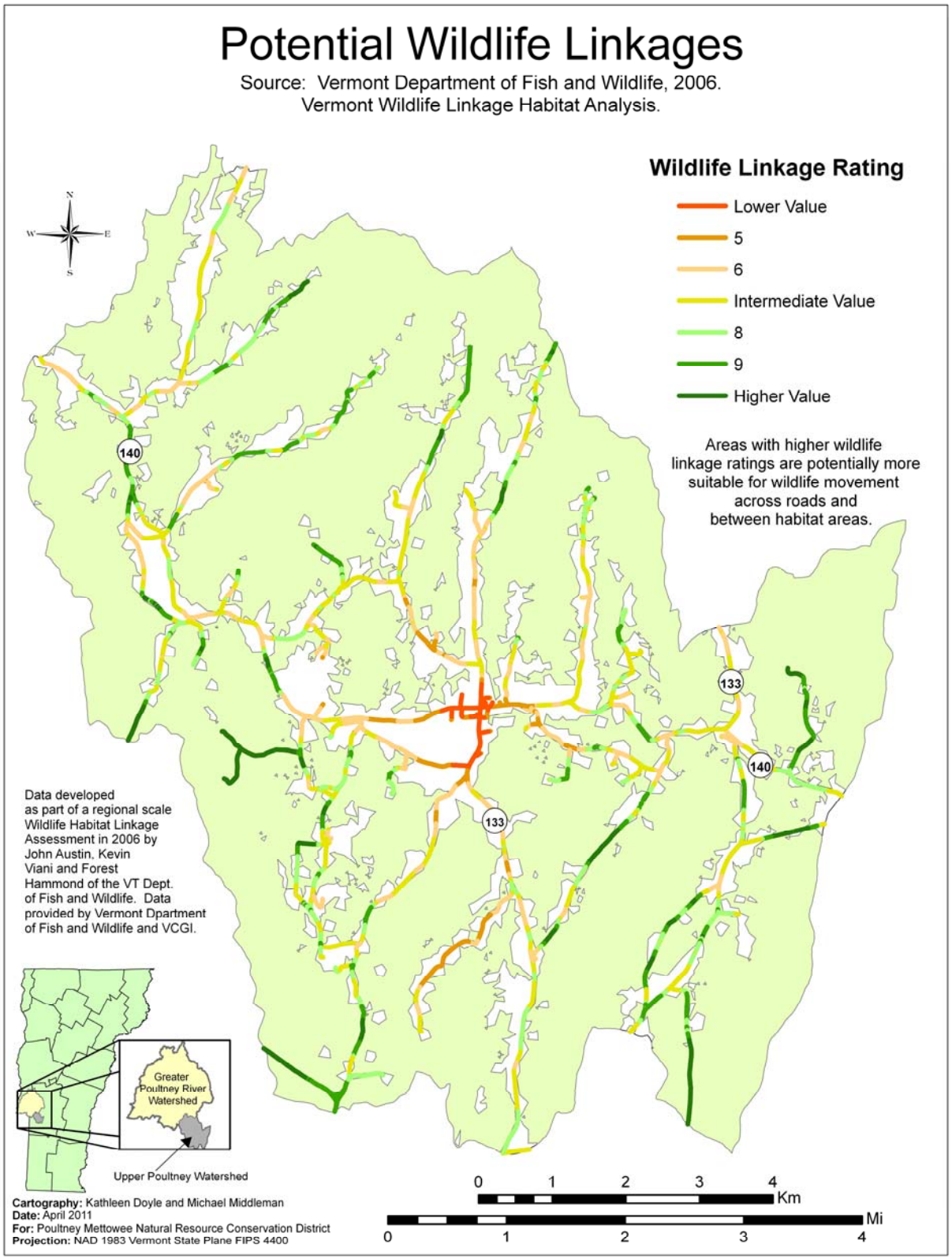

Figure 27. Wildlife linkage potential between habitats within the Upper Poultney River Watershed.

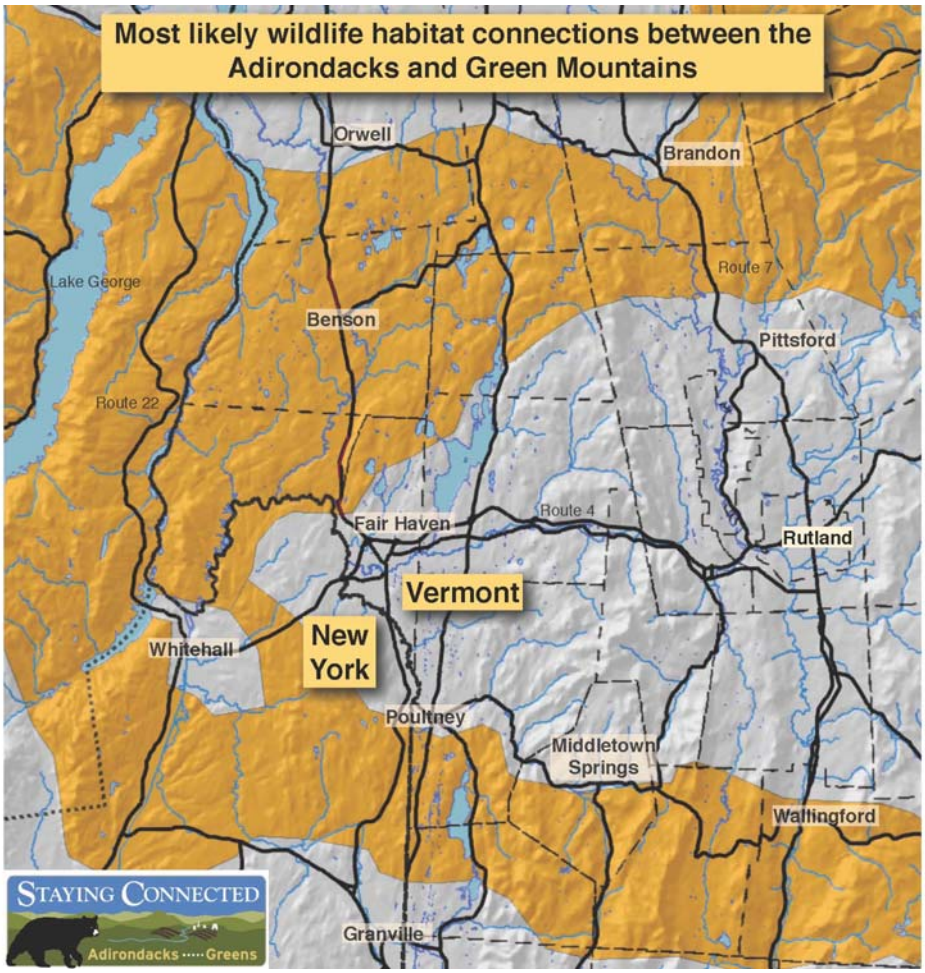

Figure 28. Map of two key habitat linkage areas connecting forests in the Green Mountains and the Adirondacks. Areas with the highest potential for wildlife movement between the Adirondacks and Green Mountains are shown in orange. Data are based on computer modeling by The Nature Conservancy for Staying Connected Initiative (Adirondacks to Green Mountains).

Citizen Wildlife Sightings

More than thirty-eight people contributed one hundred and thirteen sightings or observations of animal sign that were made between approximately 1999 and 2010 (Figure 30). The sightings are well distributed throughout the study area, although the majority of the sightings were made near roads. A group of sightings were gathered as part of a community tracking effort along transects organized with the help of *Keeping Track* (www.keepingtrack.org) in Tinmouth between 1996 and 2002. Ten species had three or more sightings reported (Figure 30). The greatest number of sightings (nineteen) was received for black bear and moose which probably reflects the enthusiasm generated by seeing these large mammal species, rather than their relative abundance. The next most commonly reported sightings were for red fox, coyote and bobcat with eighteen, thirteen and twelve sightings each, respectively. In addition to the ten species reported in Figure 30, nine species were reported two or fewer times including American river otter, gray fox, spotted salamander, Eastern newt, wild turkey, bald eagle, merganser, red-tail hawk and pileated woodpecker. The data provide an overall picture of species encountered, but no effort was made to verify the information received. Generating enthusiasm and involving many local citizens in a community conversation about wildlife was an important outcome of the Wildlife Sightings Project.

Figure 29. Sighting of a moose near the junction of Route 140 and Route 133. Photo by Jen Dattoli.

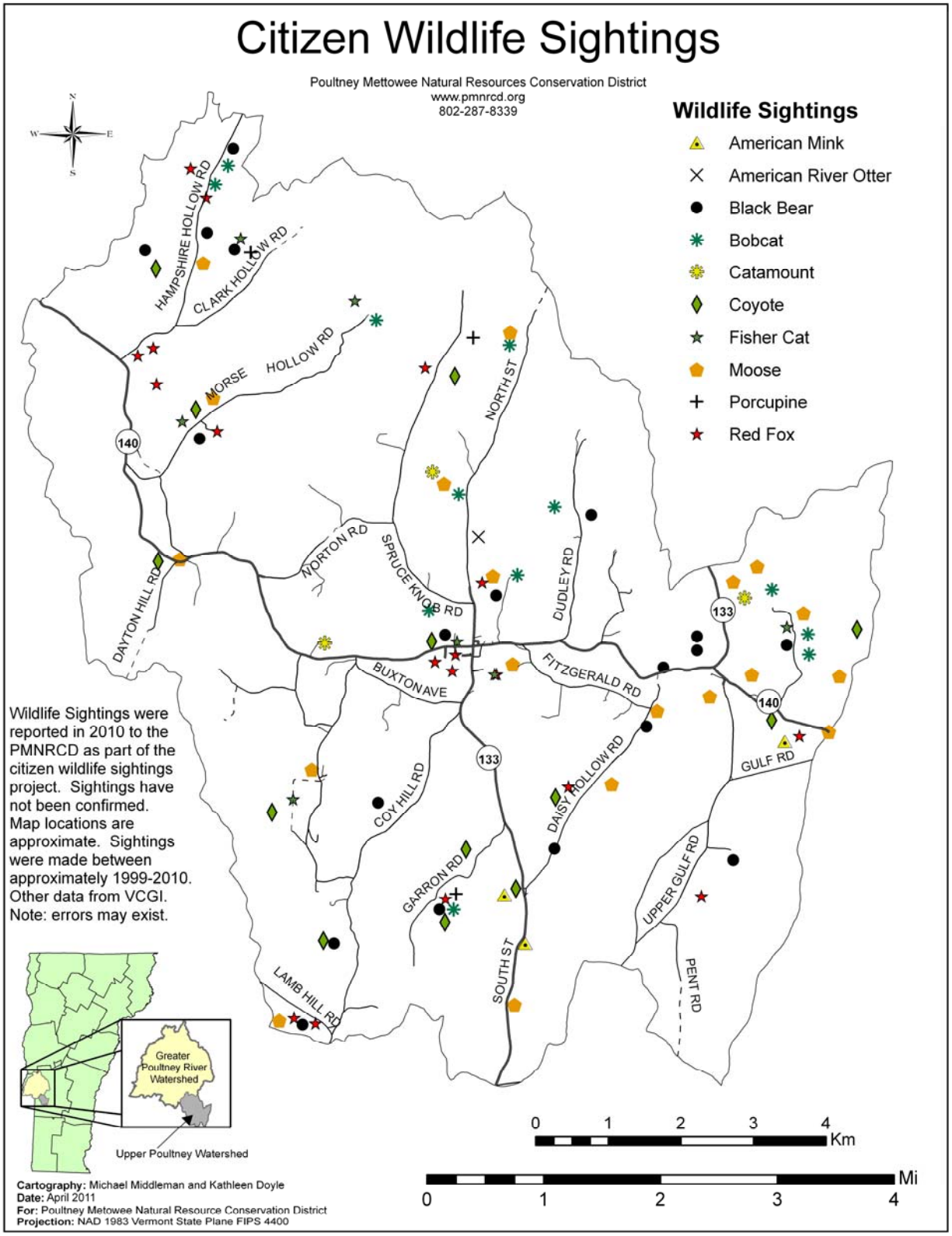

Figure 30. Map of Citizen Wildlife Sightings reported to Poultney-Mettowee Natural Resource Conservation District in 2010.

Habitat Block Mapping and Analysis
The habitat block and connectivity analysis data produced by Vermont Land Trust and Vermont Department of Fish and Wildlife (Osborne, Sorenson and Hilke) provide an effective means of visualizing and evaluating habitat connectivity within the Upper Poultney Watershed.
Within the study area, there are eight habitat blocks greater than 500 acres which are entirely or partially within the watershed boundary (Table 6). Habitat blocks were named based on prominent landmarks within the habitat block (Figure 31). Four of the habitat blocks within the Upper Poultney River Watershed encompass over 5000 acres of contiguous habitat, including land outside the watershed boundary. Five of the eight habitat blocks have 49% or more of the habitat defined as interior or core habitat (Table 6).

In analyzing the habitat block data, it is evident that dispersed development along roads, especially class four roads has the potential to significantly disrupt habitat continuity. For example, development along Norton Road (a class 4 road) increases fragmentation within the Spruce Knob Habitat Block (Figures 27 and 31). Efforts to curb sprawl can help maintain the value of connected habitat for wildlife and the integrity of ecosystems.

Table 6. Habitat Blocks over 500 acres found at least partially within the Upper Poultney River Watershed.

Habitat Block Name	Size of Habitat Block within Upper Poultney River Watershed (Acres)	Total Size of Entire Habitat Block (extending beyond Upper Poultney River Watershed) (Acres)	Percent of Entire Habitat Block classified as core area*
Hampshire Hollow #1	617	1,253	37%
Spruce Knob #2	7,361	23,611	63.6%
Susie Peak #3	1,271	5,255	68.5%
Coy Mountain #4	4,697	8,385	49%
Buxton Road #5	531	531	0%
Barber Mtn. #6	781	781	0%
Spoon and Tinmouth Mtns #7	2,867	10,896	66.8%
Lamb Hill Road #8	72	2,403	51.2%

Source of Data: Osborne, J., E. Sorenson, and J. Hilke. Habitat Block and Connectivity Analysis, Vermont Land Trust and Vermont Department of Fish and Wildlife
*Core area is defined as interior portions of habitat blocks generally 200 m from the habitat block edge and at least 250 acres in size.

Characterization of Habitat Blocks and Priority Sites
In the following pages, each habitat block and each priority site within the habitat block are described and evaluated based on the following factors: wetlands, upland natural communities, wildlife habitat linkages and contiguous habitat. A preliminary ranking of each priority site based on these factors is presented in Table 7.

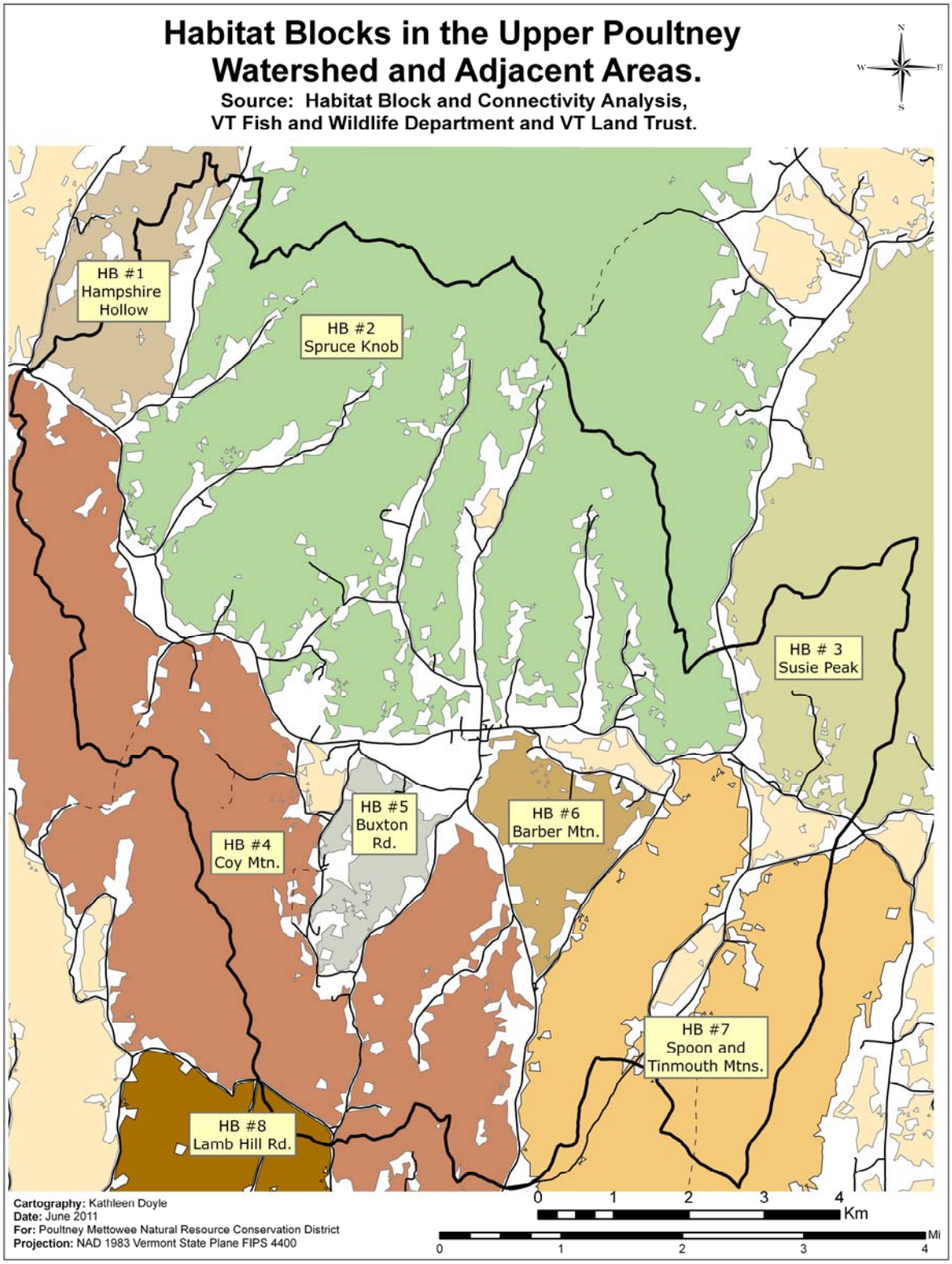

Figure 31. Map of Habitat Blocks over 500 acres found at least partially within the Upper Poultney River Watershed.

Hampshire Hollow Habitat Block (HB#1) --

Figure 32. Hampshire Hollow Habitat Block is bounded by agricultural fields and housing development.

The 1,250 acre Hampshire Hollow Habitat Block (almost half of which is included within the Upper Poultney Watershed; Table 6) provides a sizeable block of contiguous forest that is bounded by Route 140 and Finel Hollow and Hampshire Hollow Roads. Wildlife observed within the habitat block include frequent sightings of red fox and coyote, as well as recent sightings of black bear, bobcat and moose travelling through the area (Figure 30). The forest block however, is fragmented by development along the adjacent roads. Thirty-seven percent of the block is estimated to be 'core area' (Table 6). Wildlife linkages between this block and habitat to the east and south appear compromised by current land use and development along Hampshire Hollow Road and Route 140 (Figure 27).

Wetlands are found in the agricultural valley along Hampshire Hollow Brook (Figure 3) including emergent marsh, old field wetlands, shrub swamp and seepage forest. These wetlands collectively contribute water quality, erosion and flood control along Hampshire Hollow Brook, and provide wildlife habitat. This area was not evaluated for significant natural communities.

Spruce Knob Habitat Block (HB#2) –

In the Upper Poultney River Watershed, the Spruce Knob Habitat Block is the largest area of contiguous forest, encompassing more than 7,300 acres in northern half of the study area and 23,611 acres in total. The forest block is distinctive in being the second largest block of contiguous habitat in the Taconic Mountains. The habitat block contains a high percentage of core area (~64%; Table 6) a variety of state significant natural communities, a great deal of elevational diversity, all factors contributing to this area being considered a Rare and Irreplaceable Natural Area by the Vermont Department of Fish and Wildlife. Recent mammal sightings recorded from the habitat block (Figure 30) include black bear, moose, bobcat fisher cat and coyote. The habitat block is bounded by major State highways to the south, north, and east and wildlife linkages to surrounding areas are limited by development along these major roadways (Figure 27).

Figure 33. Spruce Knob Habitat Block includes much of the northern half of the Upper Poultney River Watershed and extends further north and east.

Roads penetrate into the Spruce Knob habitat block, extending north from Route 140, but are not 'through roads' or become class 4 or primitive roads. Based on the preliminary assessment of potential wildlife linkages, potential east to west wildlife corridors have been identified within the habitat block (VT Fish and Wildlife Department, 2006, Figure 27). Development along these north-south roads or fragmentation of adjacent forests could significantly diminish opportunities for wildlife movement within core areas within the block. In particular, several areas with higher wildlife linkage potential along North Street and Dudley Road that could be compromised by development in the future if habitat connections are not maintained.

Within the Spruce Knob habitat block, the following priority areas were identified as part of the landscape analysis and field evaluation: Spruce Knob Highlands, Spaulding Hill, Norton Ridge and Train Brook Ridge, all of which include core habitat (Capen 2000) and provide potential wildlife habitat linkages within the Habitat Block (Figures 27). A number of state-significant natural communities including a variety of oak-dominated forests, and an extensive Northern Hardwood Forest have been documented (Table 5, Figure 19). No locally or state significant wetland complexes have been documented within the habitat block, but smaller wetlands along tributaries provide important functions and values including wildlife habitat, surface water quality and flood water protection. Headwater areas of Train Brook and Morse Hollow Brook in particular are buffered by forests within the Spruce Knob Habitat Block contributing to water quality and wildlife habitat potential of these streams.

Spruce Knob Highlands (priority site # 1)

Figure 34. Spruce Knob is a prominent and cherished landmark and contributes high priority wildlife habitat, significant due to the variety and extent of uncommon natural communities and acreage of unfragmented wildlife habitat.

The Spruce Knob Highlands priority site includes some of the most remote habitat within the study area and provides important unfragmented wildlife linkage habitat in the region (Figure 35). A number of state significant natural communities have been documented by Arrowwood Environmental including extensive Dry Oak Forest on a predominantly southwest facing slope, smaller areas of Dry-Oak-Hickory-Hophornbeam Forest and Red Spruce-Heath Rocky Ridge Forests along the ridgeline (Figure 19). These natural communities along with patches of Mesic Red Oak Northern Hardwood Forest are surrounded by an extensive state-significant Northern Hardwood Forest (Table 5). This priority area was not visited during this project, but natural community survey data collected by Arrowwood Environmental was obtained from the Natural Heritage Database, VT Fish and Wildlife Department (2010). Sizeable wetlands have not been documented from this priority area, but water quality protection is provided to several streams that originate in this area due to the undisturbed nature of the forest. This priority area is considered one of the most significant within the upper Poultney watershed (Table 7).

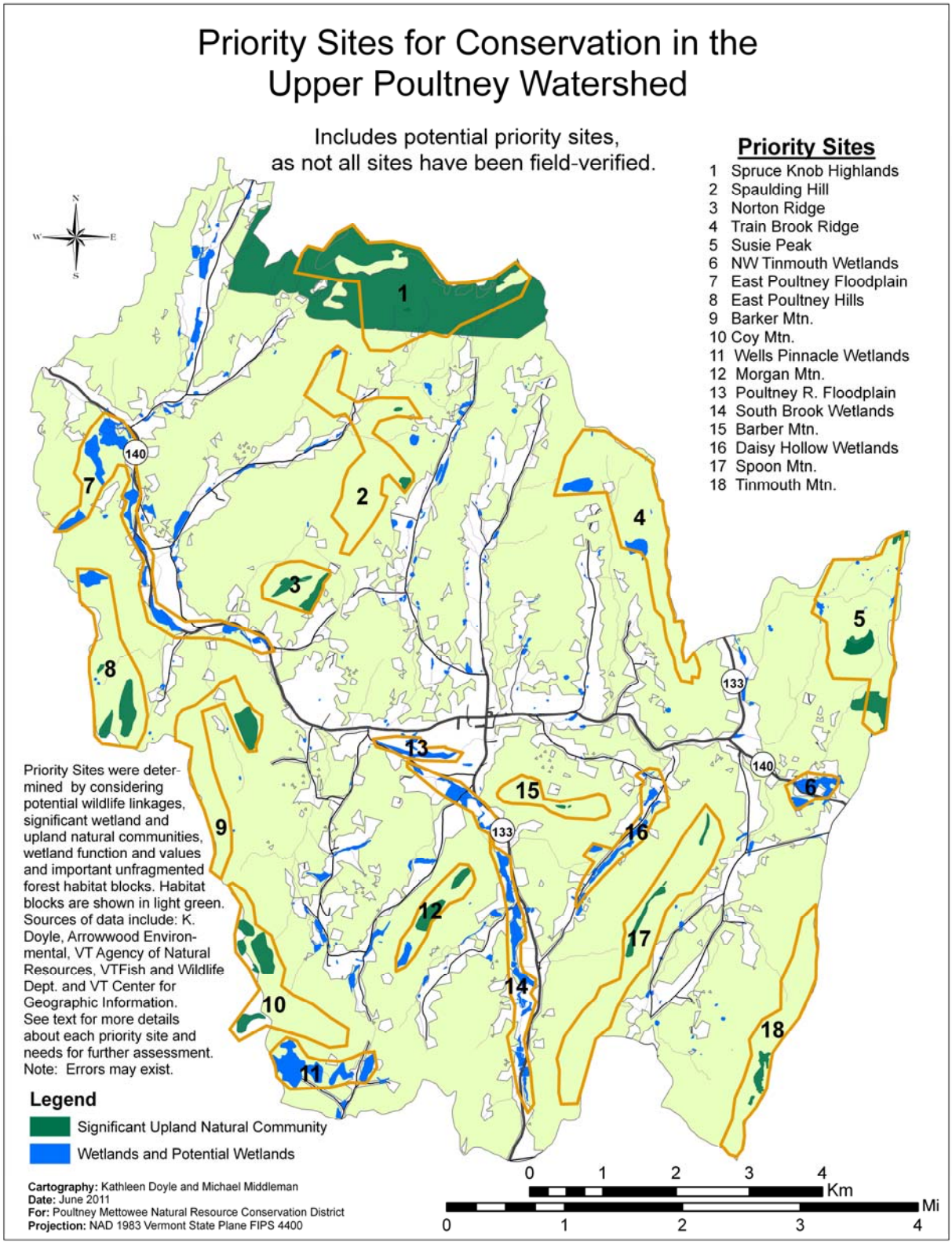

Figure 35. Priority Sites for Conservation within the Upper Poultney River Watershed.

Table 7. Preliminary Ranking of Priority Sites within Upper Poultney River Watershed.

HB #	Priority Site Name (ID#)	Overall Priority	Priority Habitat Block	Priority Wildlife Linkage	Priority Upland Natural Communities	Priority Wetlands	Assessment Needs
2	Spruce Knob Highlands (#1)	High	High	High	High	Low	Assessed by AE**.
2	Spaulding Hill (#2)	Med.	High	Med.	Med.	Low	Partially assessed
2	Norton Ridge (#3)	Med. - High	High	Med.	Med - High	Low	Partially assessed.
2	Train Brook Ridge (#4)	Med.	High	High	Unknown	Unknown	Not assessed this project.
3	Susie Peak (#5)	Med.	High	Med.	Med.	Low	Assessed by AE**
3 & NA	NW Tinmouth Wetlands (#6)	Low	Low	Low	Low	Med.	Partially assessed.
4	East Poultney Floodplain (#7)	High Potential	High	High	Low	High/ Potential	Partially assessed
4	East Poultney Hills (#8)	High	High	High	High	Med.	Partially assessed.
4	Barker Mtn.(#9)	Med.	High	Med.	Med.	Low	Assessed by NHIP*.
4	Coy Mtn. (#10)	High	High	High	High	Low	Partially assessed.
4	Wells Pinnacle Wetlands (#11)	High	High	High	Low	High	Partially assessed.
4	Morgan Mtn. (#12)	Med.- High	High	Med.	Med.	High	Assessed by NHIP* and this project.
NA	Poultney River Floodplain (#13)	Med. Potential	No	Low	Low	High Potential	Not assessed this project.
NA	South Brook Wetlands (#15)	Med..	Low	High	Low	High	Partially assessed.
6	Barber Mtn. (#16)	Med.	Low	Med.	Med./ Potential	Low – Med.	Partially assessed.
7	Daisy Hollow Wetlands (#17)	Med.	Med.	High	Low	High	Partially assessed.
7	Spoon Mtn.(#18)	Med. – High	High	High	Med.	Low	Partially assessed.
7	Tinmouth Mtn. (#18)	Med. – High	High	High	Med.	Med.	Partially assessed.

*Data provided by Natural Heritage Database (2010), VT Department of Fish and Wildlife;
**Data collected by Arrowwood Environmental and provided by Natural Heritage Database (2010).

Spaulding Hills (priority site # 2)

Figure 36 . The Spaulding Hills priority area includes unfragmented forests on a series of hills south of Spruce Knob Peak.

The Spaulding Hills Priority Site includes a series of hills including Spaulding Hill approx. 1500 – 1700 feet in elevation. The boundary (Figure 35) was delineated to include core forest areas that contribute to important north-south and east-west wildlife habitat connections, but exclude younger forest (areas mapped as 'open land' on a 1964 USGS topographic map). A potentially important west to east habitat linkage that crosses Morse Hollow Road is included in the priority area (Figure 27).

This priority area includes areas of somewhat calcareous bedrock (Figure 2); notably areas with rich herb diversity were encountered during the field assessment. A field assessment was conducted of Spaulding Hill and the hill to the south. A state-significant occurrence of Dry Oak-Hickory-Hophornbeam Forest was observed on the two hilltops (Figure 19). A field assessment is needed of the southern and northern portions of the priority area to determine if additional areas of significant natural communities exist.

Norton Ridge (priority site #3)

The Norton Ridge priority site includes a mosaic of state-significant natural communities. Notably shagbark hickory is more prevalent here than in other areas visited and with the exception of disturbance to the understory observed on the eastern portion of the ridgeline, the natural communities are in good condition

Figure 37. The steep slope of the Norton Ridge Priority Site can be seen from Route 140.

On the un-named ridgeline (1400 – 1480') Dry Oak-Hickory-Hophornbeam Forest is found. On the predominantly steep south facing slope the Dry Oak Forest is characterized by a canopy dominated by red oak, white oak and white pine and infrequent red pine, with an understory dominated by heath shrubs. On slopes with more easterly exposure, Mesic Maple-Ash- Hickory-Oak Forest occurs; here, red oak, shagbark hickory, sugar maple and American beech are the most common trees and the understory is diverse. Natural communities described were visited during this project, but areas north of the ridge were not surveyed (Figures 19 and 35).

Train Brook Ridge (priority site #4)

The Train Brook Ridge priority site was not visited during this study, thus surveying the area both for potentially significant upland and wetland natural communities remains a priority.

Figure 38. The ridge east of Train Brook provides important linkage habitat between Spruce Knob and Susie Peak habitat blocks.

The boundary of the priority area was delineated to include core forest habitat and potential wetlands that have not been surveyed (Figure 35). The wildlife linkage dataset indicates that this area contributes to a potentially important habitat linkage (outside the study area) connecting the Susie Peak and Spruce Knob habitat blocks which abut Route 133 and also may contribute to north-south habitat linkage across Route 133/140, connecting with the Spoon/Tinmouth Mtn. habitat block (Figure 31).

Susie Peak Habitat Block (HB#3) and Susie Peak Priority Site #5 —

The Susie Peak habitat block encompasses over 5,250 acres of unfragmented forest, about 25% of which occurs within the northeastern corner of the Upper Poultney River Watershed (Figure 31). The habitat block has high connectivity; more than 2/3 of the habitat block is classified as core area (Table 6).

Figure 39. Looking north toward the Susie Peak habitat block located in Tinmouth, Ira and extending into Clarendon.

The habitat block includes the potentially-locally significant *Northwest Tinmouth wetlands* (Table 4) as well as a number of smaller wetlands that have not been field-verified. While the habitat block was not visited during this study, state significant upland natural communities have been mapped and preliminarily assessed by Arrowwood Environmental. These include an extensive Red Oak-Northern Hardwood Forest that extends outside the study area to encompass almost 500 acres and smaller occurrences of state-significant natural communities include Red Spruce-Heath Rocky Ridge and Dry Oak Forest (Table 5, Figure 19). Wildlife observed within the habitat block include moose, bobcat and black bear (Figure 30).

Potentially important habitat linkages associated with this area include linkages identified across Route 133 (see Train Brook priority site description), as well as potential linkages to habitats blocks east and north of the Upper Poultney River Watershed (Figure 27). The Susie Peak priority site (#5) was delineated to encompass interior forest, state-significant natural communities and potential wetlands associated with headwater streams (Figure 35). The Northwest Tinmouth Wetlands are described separately (see page 24).

Coy Mountain (HB#4)—
The Coy Mountain Habitat Block is the second largest unfragmented forest block within the Upper Poultney River Watershed (Figure 31, Table 6). Approximately 4,700 of the total 8,400 acres occur within the southwestern portion of the study area providing an important block of contiguous forest that encompasses high quality upland and wetland natural communities.

Wetlands are particularly well represented within and adjacent to this habitat block including East Poultney Floodplain, Wells Pinnacle Wetlands, South Brook Wetlands, East Poultney Hills Wetland and Morgan Mountain Swamp (Table 3, Figure 35). A number of state or locally significant or potentially significant examples of Red Maple-Black Ash Seepage Swamp, floodplain forest, alder swamp, beaver wetlands and vernal pools are represented (Figures 3, 17). In addition there are a number of high quality examples of smaller mapped wetlands along Coy Brook and other tributaries that contribute important functions and values, as well as undoubtedly other significant wetlands that have yet to be documented.

In addition to significant and priority wetlands, a number of exemplary upland natural communities have been documented within the following priority areas: East Poultney Hills, Barker Mountain, Coy Mountain, and Morgan Mountain (Figure 35). However, not all areas have been fully assessed, and it is expected that there are other examples of state or locally significant natural communities yet to be documented (Figure 19, Table 5). The exemplary natural communities as well as the vital surrounding matrix forest provide important wildlife habitat. Some larger mammals that have been observed in the area include moose, black bear, coyote, red fox, and less frequently, bobcat, fisher cat, porcupine and American mink (along South Brook). In addition, habitat is provided for a diversity of birds, amphibians, invertebrates, smaller mammals and other wildlife.

Figure 40. Morgan Mountain (on the right is a prominent feature within the Coy Mountain Habitat Block.

The influence of habitat fragmentation along roads is evident, as this habitat block contains a lower percentage of interior or core forest area, 49% compared with >63% for the other large habitat blocks (Table 6). Major roads -- Route 30 to the northwest, Route 140 to the north and Route 133 to the east -- and secondary roads -- Coy Hill, Lamb Hill, and Endless Brook Roads – form the boundary of this habitat block. Wildlife linkage potential across the major roads is limited (Figure 27). There are few potentially important linkages across Route 133. In addition, even though it is not a through road, Garron Road appears to provide a significant barrier to animal movement within the habitat block. Potentially important north to south habitat linkages across Route 140 (between Hampshire Hollow Road and Dayton Hill Road) should be assessed further, as it is a priority to restore or protect existing quality linkage habitat.

East Poultney Hills (priority site #8)

The East Poultney Hills area is one of the highest ranked priority sites within the Upper Poultney River Watershed (Table 7). The boundary of the priority site was delineated to include high quality examples of Dry Oak Forest and nearby hills that are likely to support Dry Oak Forest, as well as important wetlands and vernal pools within a matrix of unfragmented forest that likely serves as an important wildlife corridor (Figure 35).

Figure 41. East Poultney Hills priority site is notable for its exemplary Dry Oak Forest.

The extensive state-significant Dry Oak Forest was documented from hills and slopes ranging in elevation from 1100'- 1400 feet (Table 5, Figure 19). Red oak (*Quercus rubra*), chestnut oak (*Q. prinus*) and white oak (*Q. alba*) share dominance in this area, which is notable because red oak was the dominant oak species found in other Dry Oak Forests surveyed further to the east. White pine (*Pinus strobus*) was another canopy associate and the understory was dominated by heath shrubs including huckleberry (*Gaylussacia baccata*), low sweet blueberry (*Vaccinium angustifolium*) and hair grass (*Deschampsia flexuosa*). Good regeneration of oaks was observed and charred wood was noted suggesting the area may have burned in the past. The plentiful oaks provide high quality food for a variety of wildlife and contribute to the overall diversity of the area. Highly-ranked wildlife linkages across Route 140 and Dayton Hill Road suggest that this priority area also contributes significantly to wildlife movement in the area (Figure 27).

In addition to exemplary upland natural communities, important wetlands contribute to the ecological significance of this area. Significant wetlands include a 13-acre forested wetland that has not been field-verified, two Hemlock-Balsam Fir-Black Ash Seepage Swamps. (see description of East Poultney Hills Wetlands), and two potential vernal pools that warrant field evaluation during the amphibian breeding season (Figures 3, 17 and 35). The northern portion of the priority area and the extreme southwestern knoll were not visited during this project and remain a high priority for additional field evaluation in order to better characterize both the extent and condition of Dry Oak Forest and other natural communities in the area and the character of the northernmost forested wetland (Figure 35).

Barker Mountain (priority site #9)

The Barker Mountain priority site includes Barker Mountain and the hills to the west and south which range in elevation from ca. 1400 – 1600'. A Dry Oak-Hickory-Hophornbeam Forest on Barker Mountain was documented in 1991 by Natural Heritage Database and although it was not visited during this project, it was described as a good example of the natural community and fairly undisturbed (Figure 19). It was estimated to be approximately 25 acres and thus is fairly large in extent. Interestingly, while shagbark hickory, red oak, sugar maple and white ash are dominant canopy trees and hophornbeam is dominant in the understory, sugar maple and.

Figure 42. Barker Mountain priority area includes a series of low hills within the Coy Mtn. habitat block.

white ash are described as more common than the 'classic' example of this community. The hills to the south and west of Barker Mountain may also support significant natural communities, as they occur on similar topographic situations. The boundary of this priority area was delineated to include areas with the potential to support significant natural communities and include core forest as well (Capen 2000, Figure 35). This entire area warrants field evaluation to ascertain the present condition and characteristics of upland natural communities. In addition, the area is associated with a potentially important habitat linkage across Route 140 in the vicinity of Norton Road (Figure 27) and contributes to an important north – south wildlife corridor along the ridgeline as well.

Coy Mountain priority site #10)

Figure 43. The Coy Mountain priority area includes a ridgeline and a series of summits near the southwestern boundary of the watershed.

The Coy Mountain priority site includes a series of five summits and adjacent slopes in the vicinity of the southwestern boundary of the watershed (Figure 35). This area supports a mix of state-significant natural communities (Figures19 and Table 5). All summits were visited except "The Pinnacle' which is located to the southeast. Dry Oak Forest occurs in three areas, two extend outside the boundary of the watershed. The northernmost example occurs on the southern half of the ridgetop and upper west, south and east facing slopes. The smallest example occurs on the 1870' ridgetop and adjacent south facing slopes. In the southernmost and largest example of the three, the Dry Oak Forest is associated with west facing slopes. In all three occurrences red oak and white pine are the dominant trees and heath shrubs are dominant in the understory. Chestnut oak and white oak were not found.

On the upper west-southwest facing slopes adjacent to the Dry Oak Forest on the 1870' peak is a small Red Pine forest that is just under 1-acre is size. Red pine forests are typically small and are considered rare in Vermont (ranked S2). The Coy Mountain example has an open and patchy understory dominated by huckleberry (*Gaylussacia baccata*), low-sweet blueberry (*Vaccinium angustifolium*) and woodland sedge (*Carex pensylvanica*). Another red pine forest occurs nearby outside the watershed boundary (Natural Heritage Database, VT Fish and Wildlife Department, 2010). Another ridgetop area to the north of the 1870' peak supports a Sugar Maple-Hophornbeam forest. In this occurrence, sugar maple was the dominant tree with a subcanopy of hophornbeam; red oak and bitternut hickory were present but uncommon. An extensive Mesic Maple-Ash-Hickory-Oak Forest is found on the upper east facing slopes of Coy Mountain. In

contrast with the drier ridgetops, sugar maple and white ash are dominant canopy species with some bitternut and shagbark hickory. The area supports a lush and diverse herbaceous understory. As mentioned, 'The Pinnacle' was not visited during this project and is a priority for future field evaluation. This entire area is an important core forest area (Capen 2000) and is likely critical to wildlife linkage in the area. It is part of an important East-West linkage indentified by Staying Connected Initiative (Figure 28).

Morgan Mtn. (priority site #13)

Figure 44. Morgan Mountain as seen from Barber Mountain supports a diversity of wetland and upland natural communities.

The Morgan Mountain priority site was delineated to include Dry Oak-Hickory-Hophornbeam Forest, two vernal pools and a locally-significant Red-Maple-Black Ash Seepage Swamp (Figures 3, 17 and 35; see also page 19). The Dry Oak-Hickory-Hophornbeam Forest was documented on the two knolls of Morgan Mountain during a 1991 Natural Heritage Program field survey and described as rather undisturbed examples of the natural community type. The 1991 Natural Heritage survey also documented two vernal pools in the area. Field visits to the vernal pools to assess amphibian breeding and to the Dry-Oak-Hickory-Hophornbeam Forest is recommended. The variety of upland and wetland natural communities within the core forest provide a mix of habitat for a diversity of wildlife. Since the roadside areas on three sides of Morgan Mountain are fragmented by development, the core forest area offers important habitat and can provide important wildlife linkage to Barber Mountain and other habitats to the northeast (Figure 31).

Barber Mountain Habitat Block (HB#6) and Barber Mountain Priority Site (#16)—

Figure 45 . Barber Mountain is centrally-located southeast of the center of Middletown Springs.

Barber Mountain is an important 781-acre habitat block near the center of Middletown Springs and at the heart of the upper Poultney watershed (Figure 31). Routes 133 and 140, Daisy Hollow Road and Fitzgerald Road surround the habitat block which is part of the East-West priority wildlife linkage identified by the Staying Connected Initiative (Figure 28). Opportunities for wildlife movement appear to exist across Daisy Hollow Road, while other roads appear to provide significant barriers to wildlife movement (Figure 27). Further evaluation of possible linkages and the potential for restoration is warranted. Development along these roads influences the forest conditions, such that none of the habitat block is characterized as 'core habitat' (See Table 6). Wildlife observed include red fox, coyote, fisher, moose and black bear (Figure 30).

The boundaries of the Barber Mountain priority area were delineated to include some small examples of fairly undisturbed Dry Oak-Hickory-Hophornbeam Forest, a vernal pool, and areas to the west along the Barber Mountain ridgeline that warrant field survey to determine if significant natural communities exist (Figure 35). Additionally, the vernal pool should be assessed in the spring to determine if it is a viable pool for amphibian breeding (Figure 17). The Dry Oak-Hickory-Hophornbeam Forest visited during this project is dominated by a canopy of red oak and a subcanopy of hophornbeam. Less abundant trees include sugar maple, shagbark hickory, white pine and white ash. Woodland sedge (*Carex pennsylvanica*) is dominant in the understory.

Spoon and Tinmouth Mountains (HB#7)

The Spoon and Tinmouth Mountain Habitat Block, at almost 10,900 acres (Table 6), is the second largest block of contiguous habitat associated with the Upper Poultney River Watershed; almost 2,900 acres of the habitat block are located in the southeast corner of the watershed (Figure 31). A high percentage of the habitat block (ca. 67%) is considered 'core area' (Table 6). Main roads that form the boundary of the habitat block include Route 133 and Daisy Hollow Road on the west, Route 140 to the north, the Danby-Pawlet Road to the south and Danby-Tinmouth Road to the east. More potential for habitat linkage appear to exist to the south and east due to more significant barriers presented by Route 140 and Route 133 (Figure 27).

Daisy Hollow wetlands, South Brook Wetlands and NW Tinmouth Wetlands occur near the boundaries of the habitat block and provide important wildlife habitat and other wetland functions (Figure 35). The headwaters of the Poultney River are located on the western slope of Tinmouth Mountain and smaller wetlands occur the river and its tributaries within the habitat block. Wildlife species observed in the area include moose, black bear, coyote, red fox and mink (observed near the peripheral wetlands; Figure 30). Based on a partial survey of two priority areas -- the Spoon Mountain priority site and Tinmouth Mountain priority site – a variety of significant natural communities have been documented (Table 5, Figure 19).

<u>Spoon Mountain (Priority Site #18)</u>

The Spoon Mountain Ridgeline includes a series of knolls ranging in elevation from ca. 1840' – 1980'. The priority area was delineated to encompass core habitat on Spoon Mountain that includes areas where significant natural communities have been documented or are likely to occur. Much of the ridgeline in the northern half of the priority area was surveyed, however adjacent slopes and the southern half of the priority area warrant further evaluation (Figure 35).

Figure 46 . A variety of natural communities with oak and hickory occur along the ridge and upper slopes of Spoon Mountain.

Upland natural communities identified include Dry Oak-Hickory-Hophornbeam Forest and Mesic Maple-Ash-Hickory-Oak Forest (Table 5). Some of these examples are recovering from recent harvesting; the canopy openness and understory composition differs from undisturbed examples of this type (Thompson and Sorenson 2000). A vernal pool was also documented along the ridgeline and warrants a survey during the spring to determine if amphibian breeding is successful (Figure 17). There is good potential

for habitat connectivity east and west of Spoon Mountain, however habitat connections are limited across Route 133/140 to the north (Figure 27).

Tinmouth Mountain (Priority Site #19

Tinmouth Mountain at 2486' elevation is the highest elevation in the Upper Poultney River Watershed. The mountain's forested slopes provide water quality protection to the headwaters of the Poultney River and important core forest habitat (Table 6, Figure 31). A state-significant Montane Yellow Birch-Red Spruce Forest occurs at circa 2200-2300'. This type of forest typically is found as a transition forest between northern hardwood forests and higher elevation Montane Spruce and Fir Forest. Interestingly, on Tinmouth Mountain, Northern Hardwood Forest occurs on the lower slopes as well as on the ridge above this forest type. Also included within the Tinmouth Mountain priority site is a vernal pool on a bench below the Montane Spruce and Fir Forest (Figure 17). A field survey in the spring is recommended to determine if the pool provides opportunities for successful amphibian breeding. The southern portion of the priority area (Figure 31) was visited, and the mapped extent of the natural community was determined from aerial photography. Tinmouth Mountain is an important component of the East- West wildlife linkage identified as a priority by the Staying Connected Initiative (Figure 28).

Figure 47. The matrix forest on Tinmouth Mountain provides wildlife habitat and provides water quality protection to the headwaters of the Poultney River.

Lamb Hill Habitat Block (HB#8)

The Lamb Hill Habitat Block includes only about 72 acres within the Upper Poultney watershed, however this block of contiguous forest which extends south to Wells Road encompasses a total of 2,400 acres (Table 6, Figure 31). Good connectivity appears to exist between the Lamb Hill and Coy Mountain habitat block (Figure 27). The unfragmented forest provides an important buffer to the Wells Pinnacle Wetlands (Figure 35). This area may provide habitat for significant natural communities, but was not surveyed. Additionally, this habitat block is an important part of the likely wildlife connection between the Adirondacks and the Green Mountains (Figure 28).

Figure 48 . The Lamb Hill Habitat Block includes Northeast Mountain south of the Upper Poultney watershed. .

COMMUNITY-BASED CONSERVATION INITIATIVES

The goals of this project are to inventory and assess wildlife habitat, identify conservation and restoration priorities and assist landowners and local and regional planning efforts to conserve or restore wildlife habitat. There are a number of ways that landowners, citizens and organizations can be involved in conservation initiatives in the Upper Poultney River Watershed. The following provide some examples of conservation initiatives that require community involvement.

Ongoing Inventory and Assessment

The inventory and assessment of the Upper Poultney River Watershed provides a framework that is intended to serve as a starting point that can be added to or amended as new information becomes available. Continuing efforts to survey the region's wildlife habitat are called for because not all mapped features were confirmed in the field, some priority areas have not been assessed fully and additional significant features have yet to be documented. Moreover, wildlife movement patterns and habitat connectivity have not been evaluated on a local scale for individual species. For the inventory to have the most value, it is important that citizens participate in ongoing inventory and assessment. Updates and revisions to the maps and information can be forwarded to the Poultney-Mettowee Natural Resource Conservation District (www.pmnrcd.org). The following are other opportunities for citizens to become involved:

The Staying Connected Initiative (http://stayingconnectedgreensadks.wordpress.com/related-events/) compiles information on citizen wildlife sightings in Rutland County in an effort to learn more about animal movements and help make animal crossings safer for wildlife and people. In addition, a volunteer wildlife tracking program is in the planning stages.

The Vernal Pool Mapping Project (VPMP) **(**www.vtecostudies.org/VPMP/background.html) encourages people to report the location of vernal pools they discover and to field-verify pools that have been mapped remotely. VPMP is a collaborative effort between The Vermont Center for Ecostudies and Arrowwood Environmental.

The Natural Heritage Information Project (NHIP), VT Fish and Wildlife Department (http://www.vtfishandwildlife.com/wildlife_nongame.cfm) maintains information on Vermont's nongame wildlife, native plants, and natural communities. Survey forms are available for documenting and submitting information on rare plants, animals and natural communities.

Bird Sightings -- E-bird (http://ebird.org/content/ebird/about) is an on-line program organized by the Cornell Lab of Ornithology and National Audubon Society whereby professional and recreational bird watchers can submit and query bird sightings and survey data from different areas.

The Vermont Reptile and Amphibian Atlas (http://community.middlebury.edu/~herpatlas/) collects and maintains records of reptile and amphibian sightings in Vermont. This project works in collaboration with the Natural Heritage Information Project.

Forest Management and Conservation

For many forest landowners, managing their forests for a sustainable yield of high quality timber products while protecting soils and water quality is a feasible way to provide for the conservation of the forested landscape over the long term. Vermont's Use Value Appraisal (UVA) provides tax benefits for landowners who enroll in the program and follow a management plan approved by the County Forester. The UVA program provides landowners with opportunities to protect ecologically important areas within the context of timber production. Special treatment areas can be identified in the management plan and managed differently than their surroundings in order to protect significant features. Under new UVA guidelines adopted in 2008, ecologically sensitive areas including vernal pools natural communities of statewide significance, rare, threatened and endangered species, forested wetlands, old forests and riparian areas can be designated "Ecologically Significant Treatment Areas" and managed following protocols other than the silvicultural or timber management guidelines that would apply to other areas. The program guidelines allow a landowner to designate up to 20% of a property as ESTAs, as long as these areas meet the established criteria. Provisions also exist for adopting alternative management guidelines (other that silvicultural guidelines) for important wildlife habitat such as deer wintering areas, concentrated areas of American beech, oak, cherry, bat habitat, vernal pools, wildlife corridors and other special features. Learn more about the UVA program, how to designate special treatment areas and how to contact the Rutland County Forester, from The Vermont Department of Forest, Parks and Recreation, Forestry Division -- http://www.vtfpr.org/htm/for_forstaff.cfm.

Invasive species

Another way for citizens to become involved in conservation is to help to prevent the spread of non-native invasive species that impact native plants, animals and natural communities. A complete survey of non-native invasive species was beyond the scope of this project, however a number of invasive species were observed during the field surveys and efforts to control garlic mustard (*Alliaria petiolata*), goutweed (*Aegopodium podagraria*), Japanese knotweed (*Fallopia japonica*), Bush honeysuckles (*Lonicera morrowii/tatarica*), Norway Maple (*Acer platanoides*), barberry (*Berberis spp*.) and others are needed. The State of Vermont regulates the importation, movement, sale, possession, cultivation and distribution of certain invasive plants included on the State's Quarantine Rule (6 V.S.A., Chapter 84). Information on the impacts of invasive species, how landowners can manage invasive plants (Holton and Plumb 2010), the Vermont Quarantine Rule and other state-wide control efforts are available from The Vermont Invasive Exotic Plant Committee (http://www.vtinvasiveplants.org).

Figure 49 . Garlic mustard (*Alliaria petiolata*) has increased quickly over the last decade in the Upper Poultney River Watershed. It is abundant in some areas such as along Spruce Knob Road (shown here). Controlling a species before it spreads into natural communities is an important conservation priority.

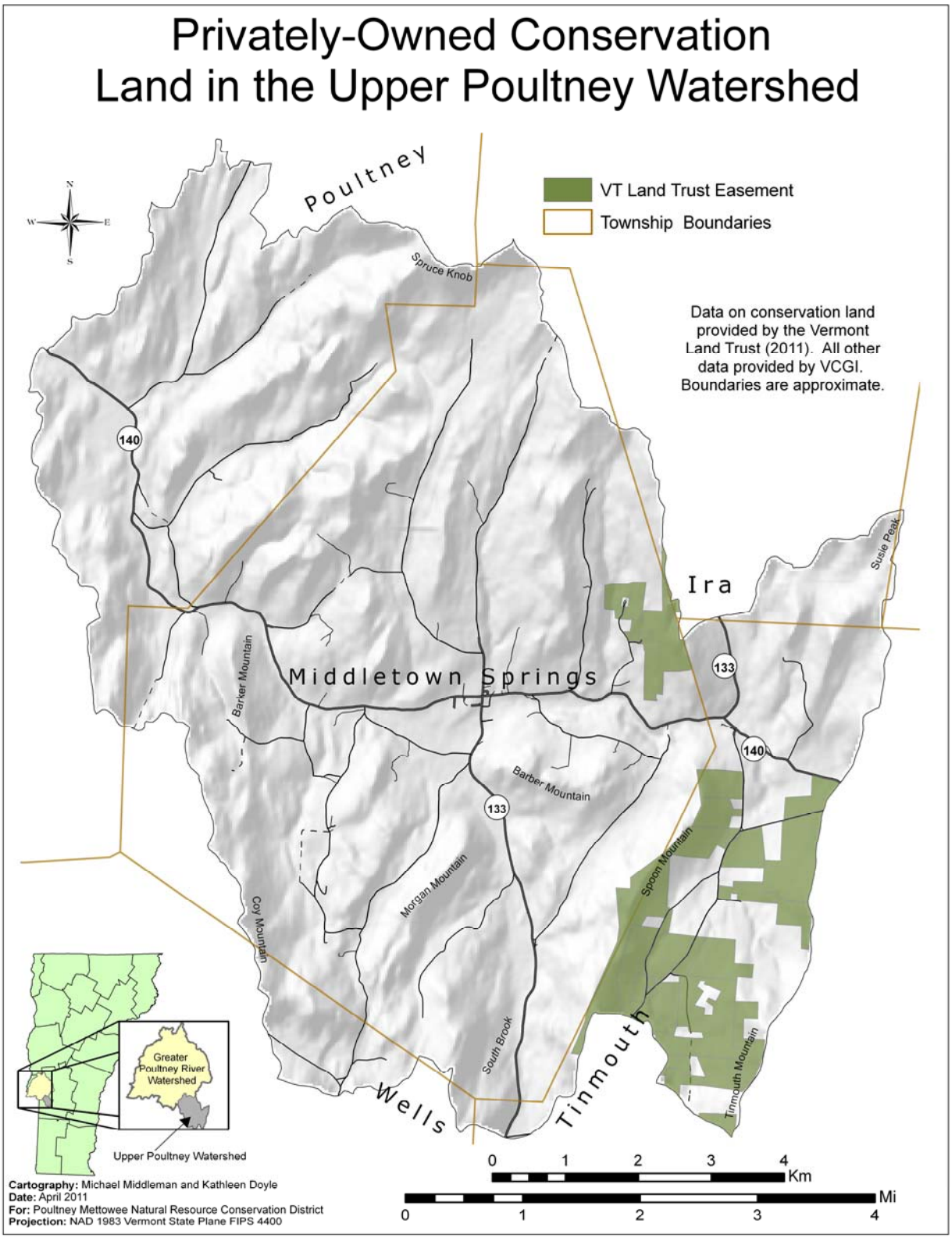

Figure 50. Privately-owned conservation land within the Upper Poultney River Watershed.

Land Conservation

Long term protection of priority conservation areas (Table 7, Figure 35) is an important part of an overall conservation strategy for an area. Within the Upper Poultney River Watershed, approximately 1,728 acres of private land is conserved through conservation easements held by the Vermont Land Trust. The conserved acreage includes forestland and farm land (Figure 50) and is located almost exclusively in Tinmouth within the Tinmouth/Spoon Mountain Habitat Block with a small percentage in the eastern portion of Middletown Springs in the Spruce Knob Habitat Block (Figure 31). No state or federally-owned lands are found within the study area, although the town of Middletown Springs owns a small 14-acre town forest, Sullivan Educational Woods, on Fitzgerald Road. With only about 7% of the 23,850 acres conserved, the amount of conservation land in the Upper Poultney River Watershed is significantly lower than the state average of 19 – 20%, and is also lower than the estimated 10% for the Taconic region (Thompson 2002).

CONCLUSIONS

Wildlife and the natural ecosystems they depend on face increasing challenges. In the Upper Poultney River Watershed, the pressures on wildlife and their habitats include the demand for telecommunications facilities and new sources of energy (including forest biomass and industrial-scale wind), habitat fragmentation and habitat loss, increasing road traffic, the spread of invasive species, and a changing climate. Humans depend on the natural environment to sustain biodiversity and perform a variety of ecosystem services, including regulating climate, maintaining clean air, water and productive soils, providing food, timber, and places for hunting, recreation and spiritual rejuvenation. It is critical that citizens engage in conversations and planning efforts to ensure that special places and natural features are sustained (Austin et al. 2004). This inventory proposes areas that are a high priority for conservation (Table 7, Figure 35), and identifies features on the landscape including wetlands, significant natural communities, unfragmented habitat, and wildlife linkages that need to be carefully regarded when making land use decisions. The identification of priority areas does not diminish the importance of other areas. As noted by Ehrenfeld (2002), conservation efforts are not adequate if the areas surrounding priority sites are degraded; thus it is important that our actions reduce the burdens on all species and ecosystems if the important values they provide are to be conserved.

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