Upper Missisquoi and Trout Rivers

Wild and Scenic Study

Management Plan

Appendices









Appendix 1. Programs and Abbreviations

Abbreviation	Full Name
AAP	Accepted Agricultural Practices
ACCD	Agency of Commerce and Community Development
AMP	Acceptable Management Practices
ANR	Vermont Agency of Natural Resources
ANR	Vermont Agency of Natural Resources
AOP	Aquatic Organism Passage
AOT	Agency of Transportation
ARMES	Division of Agricultural Resource Management and Environmental Stewardship under VAAFM
BMP	Best Management Practice
CREP	Conservation Reserve Enhancement Program
CSA	Can mean Community Supported Agriculture or the Critical Source Areas of phosphorous to Missisquoi Bay
CWA	Clean Water Act
DEC	Vermont Department of Environmental Conservation
DEP	Department of Environmental Protection
DFPR	Vermont Department of Forests, Parks and Recreation
DO	Dissolved oxygen
EPA	Environmental Protection Agency
FAP	Agronomic Practices program
FEH	Fluvial Erosion Hazard Program
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FNLC	Friends of Northern Lake Champlain
FPR	Vermont Department of Forests, Parks and Recreation
FSA	Farm Service Agency (of the USDA)
FWA	Farmer's Watershed Alliance
HMP	Hazard Mitigation Plans
IBA	Important Bird Area
LCBP	Lake Champlain Basin Program
LCC	Lake Champlain Committee
LFO	Large Farm Operation
LTP	Land Treatment Plan (for agricultural lands)
LWCF	Land and Water Conservation Fund
MAPP	Monitoring, Assessment and Planning Program within the Watershed Management Division
MFO	Medium Farm Operation
MNWR	Missisquoi National Wildlife Refuge
MOU	Memorandum of Understanding
MRBA	Missisquoi River Basin Association
NFCT	Northern Forest Canoe Trail

Abbreviation	Full Name
NFIP	National Flood Insurance Program
NHIP	Vermont State Natural Heritage Information Project
NMP	Nutrient Management Program
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service (formerly the Soil Conservation Service) of the USDA
NRHP	National Register of Historic Places
NRPC	Northwest Regional Planning Commission
NVDA	Northeastern Vermont Development Association
NVTRC&D	Northern Vermont Resource Conservation and Development Council (Better Backroads Program)
ORV	Outstandingly Remarkable Value
ORW	Outstanding Resource Waters
RTE	Rare, Threatened or Endangered Species
SCORP	Statewide Comprehensive Outdoor Recreation Plan, or Vermont Outdoor Recreation Plan
SGCN	Species of Greatest Conservation Need
USDA	United States Department of Agriculture
UVM	University of Vermont
VAAFM	Vermont Agency of Agriculture, Food and Markets
VABP	Vermont Agricultural Buffer Program
VACD	Vermont Association of Conservation Districts
VAST	Vermont Association of Snow Travelers
VIP	ANR's Vermont Invasive Patrollers Program
VRC	Vermont River Conservancy
VT DHP	Vermont Division of Historic Preservation
VTrans (also VT AOT)	Vermont Agency of Transportation
VTWSR	Upper Missisquoi and Trout River Wild and Scenic Study or Vermont Wild and Scenic River Study
VWQS	Vermont Water Quality Standards
W&S	Wild and Scenic
WMA	Wildlife Management Areas
WSMD	Watershed Management Division (Formerly Water Quality Division in the DEC under ANR)
WSR	Wild and Scenic Rivers
WWTP	Waste Water Treatment Plant

Appendix 2. FAQs About Wild and Scenic Designation

During its investigations, the Study Committee considered a number of questions about possible effects of Wild and Scenic designation. Some were questions that Committee members themselves had; others were the result of public input. For questions with clear answers, Study Committee found that there would not be negative effects (see summary below). The Study Committee determined that other, more ambiguous questions were unlikely to have negative effects, and could be easily mitigated through the voluntary implementation of recommendations and suggestions contained in this Management Plan. The Study Committee determined that overall the positive benefits of Wild and Scenic designation appeared to outweigh any possible impacts.

Below are some of the questions that the Study Committee felt can be addressed by implementation of the voluntary recommendations in this Plan:

Will designation result in increased tourism or recreational use of the rivers?
Not significantly. Tourism and recreational use on other rivers in the Wild and Scenic System have not seen dramatic increases in either tourism or recreational use attributed to Wild and Scenic designation. The degree to which such traffic increases largely depends on the extent to which the riverfront communities choose to promote Wild and Scenic designation.

Will any increased traffic negatively affect the rivers, adjacent property, or landowners?
Unlikely and manageable. It is possible that increased recreational use of the rivers, regardless of designation, could contribute to erosion at river access points. See the recreational ORV chapter for recommendations specific to access points.

How Does the Study affect my Land?
It does not. If you perceive any impacts at all, please contact the Committee right away.

What will happen to my property rights if the river is designated?
Nothing. Respect for private property rights and current land uses are fundamental components of long-term support for river protection.

How will my town benefit if this designation occurs? Such a designation would likely bring federal technical and financial resources to help enhance and protect the river. Some studies have shown that there is an economic benefit to communities that value their rivers and promote them as a recreational tourist destination (one such study is available on FRWA's website, www.frwa.org).

Could the Study or designation result in federal restrictions on my property?
No. The study is only that, a study. There is no authority for federal land use control associated with a Wild and Scenic designation. Town governments would continue their primary role in establishing and enforcing land use.

Will hunting and fishing be impacted if designation occurs?
No. Current regulations will continue to govern hunting and fishing, and will not be affected by designation.

Would a National Wild and Scenic River designation "federalize" the Missisquoi and Trout Rivers resulting in federal control of a corridor along the rivers?

No. The federal government will not take control of these rivers. There is no federal mandate requiring specific land use controls related to the National Wild and Scenic Rivers System that will affect how a landowner can use their property.

What regulations come with Wild and Scenic designation?

Remember that the only regulations which come with designation are:

No new dams or hydroelectric licenses, though existing dams and hydro facilities were left out of the proposed designated area so that they would not be impacted.

The Upper Missisquoi and Trout Rivers Wild and Scenic Study Committee is not generally against dams or hydropower; however, a central goal of the Wild and Scenic Rivers Act (1962) is to "preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations…To accomplish this, the act prohibits federal support for actions such as the construction of dams or other instream activities that would harm the river's free-flowing condition, water quality, or outstanding resource values."

According to Brian Fitzgerald, Vermont Agency of Natural Resources, and Duncan Hay, National Park Service's Hydropower Relicensing Program, most economically feasible and power producing hydropower sites in Vermont were identified and developed in the alternative energy boom in response to the oil crisis in the late 1970s and early 1980s. It is very unlikely that a new, large hydro project would be proposed and viable in our study area. The biggest potential would be at Big Falls which is a State Park, and one of the Study Committee's identified Outstandingly Remarkable Values (ORVs) as it is the tallest undammed falls in the state of Vermont.

Wild and Scenic designation would not prohibit small, non-FERC-jurisdictional projects on tributaries, though they would still fall under the purview of the State of Vermont and need to satisfy all existing, relevant state and local laws and regulations.

Federal projects are reviewed under Section 7 of the Wild and Scenic Act.

To be reviewed under Section 7 projects must be ALL of the following:

- ⇒ fully or partially federally funded or permitted (including FERC licensing)
- ⇒ construction and development
- ⇒ river related

These projects are reviewed to be sure the federal projects don't "invade or unreasonably diminish" or have "direct and adverse impact" on the designated area.

In the end, the Study Committee determined that in virtually every case the questions were speculative or easily addressed by Management Plan recommendations and that the benefits outweighed any potential costs of involvement in designation.

More information may be found on our website www.vtwsr.org

Scenic and Recreational Protections

Outdoor recreational opportunities abound in Vermont. Accordingly, outdoor recreation is a central part of most Vermonter's lives. Many people enjoy outdoor activities in all four seasons; canoeing and kayaking, hiking, biking, camping, fishing, hunting, wildlife viewing, skiing, snowmobiling and snowshoeing are just a few of the popular activities for residents of the Study area towns. The State of Vermont recognizes that recreational opportunities are important to its citizens, and has many programs in place to ensure the continued availability of recreational opportunities for all.

Federal Scenic and Recreational Protections

There are very few Federal laws that target protection of recreational resources. Federal ownership of land may be the most relevant recreational protection at the federal level; however, there currently are no federally -maintained parks or lands in the Study area towns. Inclusion on the National Register of Historic Places is the greatest federal protection currently available to recreational ORVs; this statute limits adverse effects caused by federally funded or permitted projects.[1]

State Scenic and Recreational Protections

Regulatory

As the State of Vermont acknowledges the importance of recreation to its citizens, legislation has been passed that encourages town, planning commissions and State agencies to engage in planning processes to maintain and enhance recreation opportunities in the State**.** *Vermont's Land Use Planning Law*, Title 24, Chapter 117 of the Vermont Statutes, states that "Growth should not significantly diminish the value and availability of outdoor recreational activities", and "Public access to noncommercial outdoor recreational opportunities, such as lakes and hiking trails, should be identified, provided, and protected wherever appropriate" (24 V.S.A. § 4302). These statutes empower planning groups at the town, county or State level to preserve or protect the resources that offer recreational opportunities. At the level of State government, these protections are supported through a variety of agencies and programs.

The primary State agency in charge of managing recreational opportunities for Vermont is the Department of Forests, Parks and Recreation[2] (DFPR). This Department is responsible for the conservation and management of Vermont's forest resources, the operation and maintenance of the State Park system, and the promotion and support of outdoor recreation for Vermonters and visitors. In addition, DFPR is responsible for the acquisition, planning, coordination and administration of all Agency of Natural Resources (ANR) lands.[2] The management of ANR lands is the responsibility of the Lands Administration[3] Division. The Division manages all lands held by the three major departments in the Agency of Natural Resources (Fish and Wildlife; Forests, Parks and Recreation; and Environmental Conservation). These lands include State parks, State forests, wildlife management areas, natural areas, boating access areas, conservation camps, stream bank parcels, flood control sites, fish hatcheries, and various other holdings.

Regulations regarding permitted activities on State lands are detailed in the DFPR Policy Document "Uses of State Lands."[4] In general terms, the Policy allows activities that support or do not affect natural resources, and

prohibits activities that conflict with intended uses of the land such as development of land and resource extraction.

The Vermont Fish and Wildlife[5] department is responsible for "the conservation of fish, wildlife and plants and their habitats for the people of Vermont." Other directives include providing quality fish and wildlife-based recreation. Wildlife Management Areas (WMAs) are lands managed by the Department of Fish and Wildlife. The Department's intent with these properties is to emphasize the conservation of fish, wildlife and their habitat, and to provide people with opportunities to enjoy these resources. All WMAs are open to hunting, trapping, fishing, wildlife viewing and other related outdoor activities. There is one WMA in the Study area – Avery's Gore WMA,[6] in Montgomery (an example of State ownership as protection).

There are three other State properties, each maintained by DFPR, in the Study area: Big Falls Natural Area and State Park (16 acres, in Troy), Hazen's Notch Natural Area and State Park (273 acres, in Westfield), and Jay State Forest (7,951 acres, in Jay, Montgomery, Richford, and Westfield). Only Big Falls State Park is along the river corridor of the Wild and Scenic Study area. This site includes the largest undammed waterfall remaining on a major river in the State. There are stands of large hemlock and white pine trees, as well as a diverse plant community with many uncommon species. Big Falls is a very popular site for recreation, attracting people for swimming, fishing and viewing the falls and gorge.

Vermont's Land Use Planning Law **(**24 V.S.A. 117)

As the state of Vermont acknowledges the importance of recreation to its citizens, legislation has been passed that encourages towns, planning commissions and state agencies to engage in planning processes to maintain and enhance recreation opportunities in the state**.** *Vermont's Land Use Planning Law*, Title 24, Chapter 117 of the Vermont Statutes, states that "Growth should not significantly diminish the value and availability of outdoor recreational activities", and "Public access to noncommercial outdoor recreational opportunities, such as lakes and hiking trails, should be identified, provided, and protected wherever appropriate" (24 V.S.A. § 4302). These statutes empower planning groups at the town, county or state level to preserve or protect the resources that offer recreational opportunities. At the level of state government, these protections are supported through a variety of agencies and programs.
Vermont's Landowner Liability Law (12 V.S.A. 5793)

Land which is not posted in Vermont is open for public use. This law protects the landowner from liability lawsuits by people using their land for recreation unless the landowner intentionally puts recreational users in harm's way. The law states that "an owner shall not be liable for property damage or personal injury sustained by a person who, without consideration, enters or goes upon the owner's land for a recreational use unless the damage or injury is the result of the willful or wanton misconduct of the owner." This law helps meet the goal of this Management Plan to maintain and increase recreational opportunities and access to the Missisquoi and Trout River.

Act 250

Act 250 is Vermont's development control law. The law provides a public, quasi-judicial process for reviewing and managing the environmental, social and fiscal consequences of major subdivisions and development in Vermont through the issuance of land use permits. There are ten separate environmental criteria (with sub-criteria) that may cause a construction project to require issuance of an Act 250 permit, consequently making

the project susceptible to both State and public review. The permitting process includes review of land use permit applications for conformance with the Act's ten environmental criteria, issuance of opinions concerning the applicability of Act 250 to developments and subdivisions of property, monitoring for compliance with the Act and with land use permit conditions, and public education.[7]

Environmental criterion number 10 of Act 250 is of particular note to the Wild & Scenic Study towns. This Criterion states that to obtain a permit, an applicant must demonstrate that a project is "…in conformance with any duly adopted local or regional plan or capital program under [24 V.S.A Chapter 117]." This means that town, through adoption of their town plans, have the ability to indicate that certain natural resources should be protected or conserved. In this case, any Act 250 project in conflict with the town plan would be in violation of Criterion 10, thereby giving towns regulatory power in the Act 250 process and greater involvement in the protection of natural resources.[8]

As previously stated, this Management Plan is non-regulatory. In order for this, or any, non-regulatory Management Plan to have a regulatory effect in Act 250 under Criterion 10, this Management Plan must be included in the town or regional plan and compliance with this Management Plan must be specifically mandated in the town or regional plan. This does not prevent participation in Act 250 hearings or permit reviews.

Under Criterion 8, Act 250 seeks to determine if a project will have an undue, adverse effect upon the scenic or natural beauty of an area. To determine if impacts are "adverse" Act 250 considers the following: 1) the nature of the project's surroundings; 2) whether the project's design is compatible with its surroundings; 3) whether the colors and materials selected for the project are suitable to the surroundings; 4) from where the project is visible; and, 5) what the impacts are on open space. If it's determined that a project has adverse impacts, an assessment occurs to determine whether or not a project's impacts are "undue." Essentially, a project is "undue" when a project: 1) violates a clear written community standard intended to preserve the aesthetics or scenic beauty of the area; or 2) offends the sensibilities of the average person, or is shocking or offensive and out of character with its surroundings, or significantly diminished the scenic qualities of the area; or 3) the Applicant has failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings. If undue impacts are assessed, the project can be denied an Act 250 permit or have conditions attached which alter the project and mitigate the aesthetic impacts.

Franklin and Orleans Counties have different Act 250 permit review specialists. To find the specialist in your Town, visit the VT DEC Permit Specialist Locator[9] webpage.

State Ownership

There is one WMA in the Study area – Avery's Gore WMA,[10] in Montgomery. There are three other State properties, each maintained by DFPR, in the Study area: Big Falls Natural Area and State Park (16 acres, in Troy), Hazen's Notch Natural Area and State Park (273 acres, in Westfield), and Jay State Forest (7,951 acres, in Jay, Montgomery, Richford, and Westfield). Only Big Falls State Park is along the river corridor of the Wild and Scenic Study Area.

Plans

Vermont Outdoor Recreation Plan

A Statewide comprehensive plan for outdoor recreation is a requirement for receiving federal support from the Land and Water Conservation Fund (LWCF). The LWCF, administered by the National Parks Service, has provided Vermont with tens of millions of federal dollars since 1965. These funds have helped the creation of nearly 500 recreation projects in over 100 Vermont communities, such as bike paths, parks, and playgrounds. On a federal level, these State's plans are knows as Statewide Comprehensive Outdoor Recreation Plan, or SCORP. Here in Vermont, the Plan is called the Vermont Outdoor Conservation Plan.[11] Though non-regulatory, the Vermont Outdoor Recreation Plan intends to provide the following resources to planning groups:

- A vision, along with goals and actions, in support of outdoor recreation endeavors throughout the State in five-year increments;
- Reference materials for towns, organizations, and recreationists to use when coordinating their activities with Statewide priorities, per requirements of some programs such as the LWCF;
- Vermont Trails and Greenways Plan; and
- Vermont Wetlands Conservation Strategy.

This Plan shows that studies undertaken by the State in 1992 and 2002 demonstrate "the importance of scenery to the people of Vermont. The quality of the State's scenic landscape scored higher than any other recreation resource evaluated in both surveys." Desired conditions for VT recreation in the Plan include: keeping the quality of Vermont's existing outdoor recreation facilities, programming, and operations high; meeting Vermont increasing needs for outdoor recreation by making more resources and diverse programming available; and continuing the precedent of the majority of private landowners in Vermont allowing recreational access to their land. The NVDA recognizes that "Issues that were identified as important by residents in the 1993 Statewide Comprehensive Outdoor Recreation Plan (SCORP) remain important for the region a decade later. These issues include: degraded water quality and an increase in aquatic nuisances, overdevelopment of shorelines around lakes and ponds, destruction of fish and wildlife habitat, loss of scenic resources and rural character, increasingly limited access to private lands (posting), and a lack of respect for private lands. All of these land use issues affect recreation. Additionally, survey results indicated that there are an inadequate number of recreation facilities to meet public needs, as well as inadequate funding for public recreation. It still appears there is a lack of public education regarding recreation and a lack of information on recreation opportunities in the region. Lastly, respondents felt there is a need for greater numbers of trails, paths, and greenways in the region…new issues for the region are vandalism and littering in recreation areas, threats to existing trail resources, and the need to coordinate the development and maintenance of recreation areas and facilities."[12] Leslie Mathews, former Aquatic Invasive Species Coordinator with VT ANR's Department of Environmental Conservation - Watershed Management Division states that phragmites and Japanese knotweed are issues in the watershed, but that we don't have extensive data on river invasives species in the area because they are not systematically surveyed. Efforts should be made to monitor and control any new invasives such as didymo (rock snot), emerald ash borer, or hemlock wolly adelgid in the region.

The State of Vermont periodically evaluates the quality and need for outdoor recreation and seeks public opinion regarding recreational opportunities throughout the State. More information about the Plan, the revision process, and the full-text document can be found on the Vermont Outdoor Recreation Plan website.[7]

Vermont Fish and Wildlife Strategic Plan

Assisted by public input, the Vermont Department of Fish and Wildlife developed a Strategic Plan to help direct its activities. The primary departmental goals in the Plan include managing wildlife and fisheries habitat. Another goal of the Plan is to support safe and sustainable recreational activities, namely fishing, hunting and wildlife viewing. The entire Plan can be viewed here.[12]

Regional Plans (Non-regulatory)

The Northwest Regional Planning Commission's (NRPC) Regional Plan for 2007-2012 contains directives (policy 3.20) that support the use of surface waters for a variety of appropriate recreational uses.[13] The Plan goes on to say that a water supply goal (4.3) is to "insure that water systems are not contaminated, depleted or degraded, that drinking water sources do not contain harmful contaminants and that there is sufficient quantity of water available for existing and anticipated recreational, residential, commercial and industrial needs." A summary of recreational goals from NRPC's regional plan is presented in Table A3.1 below.

Table A3.1. Pertinent Recreational Goals from the NRPC's Regional Plan.

4.18	Develop a high quality, sustainable recreational system based on the use of the Northwest's natural and cultural resources.
4.19	Develop a recreational environment that reflects the desires of local residents and minimizes conflicts between different user groups.
4.20	Preserve recreational opportunities and resources for current and future generations.
4.21	Develop a regional recreation system that provides objectives that meet the recreational needs and wants of people of various ages, physical abilities, incomes and educations.
4.22	Increase public knowledge of the existence and values of local and regional recreational resources and objectives.
7.14	Expand the amount of land available for a wide variety of natural resource-based recreational uses, ranging from town greens to remote hiking trails.

According to the Northeastern Vermont Development Association's (NVDA) Regional Plan (2006),[14] the goal of providing sufficient quantities of water to meet existing and future residential, agricultural, commercial, industrial and recreational needs should be maintained. A strategy in the Plan for the protection of natural resources encourages the maintenance and improvement of recreational opportunities as a means for natural resources stewardship. It supports the increase of ecotourism in the Northeast Kingdom if it is done in a way that minimizes the disturbance and impact to the region's natural resources. This Regional Plan recognizes that recreation is an important part of the economy in our Study area, and stresses the importance of balancing a "healthy and scenic" environment with the need for a healthy economy. A summary of recreational goals from NVDA's regional plan is presented in Table A3.2 below.

Table A3.2. Pertinent Recreational Goals from the NVDA's Regional Plan

Sufficient open space should be available for current and future outdoor recreational pursuits.
A variety of year-round and seasonal, indoor and outdoor recreation opportunities should be available for residents and visitors.
Public access to water bodies should be protected.

The Wild and Scenic Study Committee should work with the Regional Planning Commissions to, as NVDA[9] recommends, "support the protection and the acquisition of unique and irreplaceable recreational spaces open for the public to enjoy."

Local (Municipal Level) Scenic and Recreational Protections

All of the Study area municipalities' plans contain language about the value of recreational opportunities in the town, and the importance of supporting efforts to maintain and enhance those opportunities where possible. All towns except for Lowell and Montgomery have included ordinances related to recreational opportunities in their zoning bylaws.

Berkshire

The importance of the Missisquoi River to the Town of Berkshire is detailed in the Town's Plan (adopted 4/26/10). The Vermont Rivers Study (ANR, 1986) identified the section of the river in Berkshire as important for boating and fishing. The 10.5-mile segment that flows through Town was cited as a quality fishery for smallmouth bass and brown trout. Objectives in the Town Plan which prioritize the preservation of the Missisquoi River as a recreational resource include:

- Streams, rivers, ponds, and wetlands should be maintained in their natural State, and be protected from pollution through appropriate health and land use regulations. Local regulations should provide buffer areas to maintain the environmental, recreational, and scenic value of water courses, water bodies, and shorelines (pg. 49).
- …traditionally much of the privately owned land in Berkshire has been open to local residents for hunting and fishing, [but] the last decade has seen an increase in the posting of private land…. New development should be designed to ensure continued public access to outdoor recreational opportunities in the Town (pg. 76).

Although Berkshire's Zoning Bylaws do not create districts solely for purposes of conservation of recreational opportunities, recreation is stated to be an important component of land use decision making. For example, Planned Unit Developments are to be designed to preserve open space and common land for parks, recreation, scenic views, and critical areas identified in the Berkshire Town Plan, among other land use considerations (Section 9.5).

Enosburg Falls, Village of

The importance of recreation is included in many portions of the Enosburg Falls Village Plan (adopted by the Trustees 8/26/08). Most Statements regarding recreational opportunities relate directly to the Missisquoi River. It is noted in the Plan that the river offers many opportunities for recreation, tourism and enhancement of the Village Commercial District. In Chapter 4, which addresses the economy of the village, it is the intent of the Town to promote utilization of the Missisquoi River and Missisquoi Valley Rail Trail as recreational resources to attract visitors to the Central Business District. Policies set forth in Chapter 11 (Natural Resources) include protection of water quality for scenic and recreational benefits. To achieve this, the Plan recommends maintaining a 50 foot buffer or natural vegetation between any development and the Missisquoi River as well as its tributaries. Another policy included in the Town Plan is concerned with protecting public access to the Missisquoi River in the Village. River access for the public is currently provided by a small parcel of land on Duffy Hill road which is owned by the Village Light Department. It is the intent of the Town to maintain an

opportunity for public access to the Missisquoi River; that the access is currently on private land presents a possible future conflict. In Chapter 12 (Land Use), it is noted in the Plan that the village should be more effective in its use of the scenic natural features of the village, including the Missisquoi River, to improve business and to supply the recreational needs of the community.

It is one of the primary purposes set forth in the Enosburg Falls Zoning Bylaws that the Village should provide services for recreation, such as parks, open spaces and other recreation areas (Section 1.2). Consequently, a Recreation District has been established, which reserves areas for facilities that support current and future outdoor recreation. No other development type is intended to occur in this district (Section 2.3).

Enosburgh

The Town Plan of Enosburgh (approved by the Selectboard 9/9/08) emphasizes the importance of the Town's natural areas for their environmental, ecological, scenic, educational, and recreational uses - especially concerning the Missisquoi River. As such, the Plan notes that maintaining the quality of the river and its tributaries is of "extreme importance," as it effects not only the Town but the Missisquoi Delta and Lake Champlain as well (pg. 38).

The Zoning Bylaws of Enosburgh establish two separate districts with the goal of preserving recreational opportunities. The Conservation District (Section 560) was created to protect pristine and sensitive areas of the Town. These areas are primarily used for forestry and outdoor recreation, and are at elevations of 1,500 feet or greater. Some limited development is allowed in these areas, but all development is subject to [Section 306] Conditional Use Approval. The other provision for natural resource preservation is the Natural Resources Overlay (Section 570), which, among other provisions, intends to preserve natural resources and support recreational activities in the Town.

Jay

In the Jay Town Plan (adopted by the Selectboard 12/20/10), discussions of recreation are largely based around Jay Peak Resort. Since the Missisquoi River does not actually flow through Town owned land, the Plan does not contain specific reference to the Missisquoi River as a recreational asset of the community. According to the Plan, the Town of Jay supports the designation, acquisition, preservation and planning for development of recreational areas of the Town. The Town Plan also supports development of recreational opportunities in "non-growth" areas of the Town, with the goal of creating economic opportunities while protecting the rural character of the Town. Other goals of the Town regarding natural resources include leaving the maximum amount of open space possible on lands that are of significant value for agriculture, passive recreation or undeveloped condition, except within the confines of the Village Center Zoning District.

Jay has many zoning districts related to establishing or maintaining areas for recreation. The intent of the Recreation District (Section 305 of Bylaws) is to provide a high-density recreation, vacation, residential and commercial center, currently oriented around and supported by the Jay Peak Recreation Area and its facilities. The Conservation-Recreation District (Section 307) is comprised of community-owned land given to the Town of Jay solely for conservation and recreational use. Section 504.05 of the bylaws gives the Jay Planning Commission the authority to determine land use activities regarding Open Spaces and Recreation Areas in proposed development. The Planning Commission may also regulate the amount, location and degree of public access and use of some or all of the land in proposed development projects. Also under this provision, the Planning Commission requires that each proposed development project contains adequate opportunity for recreation for its residents.

Lowell

The Lowell Town Plan (re-adopted 4/14/09) recognizes the wealth of outdoor recreational opportunities in the Town. The Plan notes that most activities are directly tied to the quality of the Town's environment, making it necessary to maintain Lowell's natural resources and protect them from development. The Plan states that any development away from the village center should be sited to reduce negative visual impacts and be placed on lots large enough for adequate water supply and sewage disposal.

Lowell has no Zoning Bylaws that are specific to the maintenance or preservation of recreational opportunities.

Montgomery

The importance of recreation to the Montgomery community is emphasized in many portions of the Town Plan (amended and updated 8/2010). The Plan notes that varied recreational opportunities are vital to the community's quality of life and economic development. Accordingly, the maintenance of scenic beauty and natural resources related to recreation are integral to the implementation of goals set forth in the Town Plan. The Town intends to preserve areas for activities such as hiking, hunting and fishing. The protection of water quality is another important objective detailed in the Town Plan, as this directly affects fishing and swimming activities. The Town seeks to protect its waterways from adjacent development that may adversely impact the resource.

The Trout River travels mostly through Montgomery before joining the Missisquoi River in Berkshire. The Trout River is a valuable natural and cultural resource to Montgomery, according to the Town Plan. The Trout River provides many recreational opportunities for the Town and its visitors; therefore, maintaining the water quality of the Trout River is of extreme importance to the Town (pg. 54).

Montgomery has no Zoning Bylaws that are specific to the maintenance or preservation of recreational opportunities. *(As this W&S Management Plan is being written, Montgomery is beginning the process of revising its Town Plan.)*

Richford

The Richford Town Plan (2007) includes a discussion about the Missisquoi River as an important resource for recreation in the Town. The Plan cites Missisquoi, Memorial and Davis Parks, which provide boat accesses to the Missisquoi River, as a vital resource to the Town. The Missisquoi Valley Rail Trail passes through the Town and is also an important recreational resource.

Richford has two Zoning Districts that contain recreational purposes in their bylaws. The Recreation/ Conservation District is to provide areas with recreational opportunities and to protect environmentally fragile areas in the village district. Residential development is prohibited within the Recreation/Conservation District. The Forest/Conservation District was created to protect the scenic and natural resource values of sections of the Town for forestry, wildlife habitat, wetlands, and outdoor recreation. The Forest/Conservation District is reserved for land with limited suitability for community growth and development because of remote location, extreme topography and/or shallow soils. Only limited low density development is encouraged in this district.

Troy and North Troy, Village of

The Town of Troy and the Village of North Troy have a combined Town Plan (adopted 3/20/08) and Zoning Bylaws. Recreation is included in the central objectives of the Troy Town Plan. Specifically, it is indicated in the Plan that the Town will promote outdoor recreational opportunities and explore opportunities to protect existing natural and scenic areas. The Missisquoi River and its floodways were identified by local residents as an environmentally sensitive area that should be addressed in any development permitting processes. An objective in the Town Plan regarding this and other environmentally sensitive areas States that these areas should not be fragmented, but rather maintained in a continuous corridor that "complement the local landscape… and provide significant recreational opportunities" (pg. 8). The Town Plan also includes a number of specific goals for the conservation of natural resources, many of which relate to the continuance of outdoor recreation in the Town. Among these goals is a statement regarding planning for and protecting the quality of water resources (pg. 35). The Zoning Bylaws of Troy include a provision in Section 321, regarding Planned Unit Developments. This ordinance encourages "a more efficient use of land… to preserve open space, natural resources and recreational areas" (pg. 24).

Westfield

Landowner relations are a critical component to continued recreation opportunities for Westfield citizens. A central goal of the Westfield Town Plan (adopted 11/16/09), regarding recreation, is to help maintain local access to farm and forestland for snowmobiling, hunting, fishing, skiing and hiking. The Town Planners recognize the importance of recreation to the development of the Town's economy, and propose in the Town Plan that maintaining recreational opportunities in the Town is vital to the success of current and future local businesses, especially farms.

The Town of Westfield has established a Recreation-Residential District in their zoning bylaws, in order to have a district that is for the development of both residential and recreational land uses while maintaining the rural character of these areas.

Table A3-3. Many ORVs in the Scenic and Recreational category are covered by a variety of federal, state and/or local protections– not just the protections discussed in this chapter and the Appendices. This table contains a listing of Scenic and Recreational ORVs and the protection categories that pertain to each.

Scenic and Recreational ORVs	Protection Categories				
	Water Quality	Historical	Geological Features & Natural Areas	RTE Species & Communities	Recreation
Swimming Holes	X		X		X
Covered Bridges		X			X
Trail Systems			X		X
Waterfalls			X		X
Geological Features			X		X
Paddling	X				X
Fishing	X		X	X	X
Hunting			X		X
Camping	X		X		X
Wildlife Viewing			X	X	X

Endnotes

1. National Park Service Locations – Vermont Locations: http://www.nps.gov/state/vt/index.htm
2. Department of Forests, Parks and Recreation: http://www.vtfpr.org/index.cfm
3. Division of Lands Administration: http://www.vtfpr.org/lands/index.cfm
4. "Uses of State Lands" document: http://www.vtfpr.org/lands/UsesofStateLandsPolicy11.14.2008.pdf
5. Department of Fish and Wildlife: http://www.vtfishandwildlife.com/index.cfm
6. Avery's Gore WMA: http://www.vtfishandwildlife.com/library/maps/Wildlife%20Management%20Areas/Essex%20District/Averys%20Gore%20WMA.pdf
7. Paragraph taken directly from: www.anr.state.vt.us/dec/permit_hb/sheet47.pdf
8. "Conserving Vermont's Natural Heritage" - a publication of the State of Vermont Department of Fish & Wildlife. Available online: www.vtfishandwildlife.com/library/maps/Community_Wildlife_Program/complete.pdf
9. VT DEC Permit Specialist Locator: www.anr.state.vt.us/dec/ead/pa/index.htm
10. Avery's Gore WMA: http://www.vtfishandwildlife.com/library/maps/Wildlife%20Management%20Areas/Essex%20District/Averys%20Gore%20WMA.pdf
11. Vermont Outdoor Recreation Plan (SCORP): http://www.vtfpr.org/recreation/scorp/home.cfm
12. VT Fish & Wildlife Strategic Management Plan: http://www.vtfishandwildlife.com/library/reports_and_documents/Fish_and_wildlife/Strategic_Plan.pdf
13. The Northwest Regional Planning Commission's (NRPC) Regional Plan [Franklin and Grand Isle Counties] for 2007-2012 as adopted by the NRPC on August 29, 3007 (http://www.nrpcvt.com/Reports/RegionalPlan.pdf).
14. Northeastern Vermont Development Association's (NVDA) Regional Plan [Caledonia, Essex, and Orleans Counties] as adopted by the NVDA June 29, 2006 (http://nvda.net/TopNavBars/regionalplan.html).

Natural Resource Protections

Federal Protections

1973's Federal Endangered Species Act (P.L. 93-205)

This act protects endangered species of fish, wildlife and plants, and authorizes the federal government to maintain a list of those species which are endangered or threatened. No one is permitted to possess, sell or transport these listed species, and any person who violates the law may face legal penalties. Land and conservation funds may be used to conserve these species. Section 7 of the Endangered Species Act requires the federal government not to jeopardize the species, or modify their critical habitat. Recovery plans must be in place for listed species, and these plans must be reviewed every two years. If a species is delisted, it must be monitored for five years. The current list of federally endangered or threatened species documented in Vermont may be found online at website such as http://www.earthsendangered.com/search-regions3.asp.

State Protections

Act 250 - Geology

The rare and irreplaceable natural areas component of Criterion 8 of **Act 250** may be the most relevant protection to geological ORVs, especially since geologic ORVs support rare natural communities and the plants and animals associated with them. Unusual or uncommon natural communities and significant geological features can be and have been protected under Act 250 Criteria. Unusual geological features have also been protected such as significant paleontological sites, and important areas for interpreting geologic history or processes. If a site contains rare, threatened, or endangered species it may qualify for protection. Under Criterion 8, the public's enjoyment of a protected natural area can also be protected, and Act 250 has provided isolation buffers, both auditory and visual, to protect the public's enjoyment of these natural areas. In the Missisquoi and Trout River basin, some ORVs that may be protected under this criterion include geological resources such as numerous Serpentine Outcrops and waterfalls and gorges (see the Act 250, Appendix 9, for more information).

Municipalities in Vermont have the authority to set protections for natural resources at the local level. These laws are presented in Title 24, Chapter 117[1] of the **Vermont Statutes**. 24 V.S.A. §4401 states that all bylaws adopted under Chapter 117 must be consistent with goals established in law that includes the identification, protection and preservation of:

- significant natural and fragile areas;
- outstanding water resources (lakes, rivers, aquifers, shorelands, and wetlands);
- significant scenic roads, waterways, and views; and
- the quality of air, water, wildlife, and land resources[2]

Areas or features of geological significance may be designated as "fragile areas", per Title 10, Chapter 158 of the Vermont Statutes. A Fragile Area is defined as "an area of land or water which has unusual or significant flora, fauna, geological or similar features of scientific, ecological or educational interest" (10 V.S.A. § 6551). If

the Fragile Area is on private land, the landowner receives a certificate and stewardship guidelines to protect and manage the features of the area. The Vermont Fragile Area Registry is a voluntary, non-regulatory program and therefore carries no legal provisions. The registry is intended to provide a mechanism for identifying and documenting fragile areas; aid in state, regional and local planning; and provide information and assistance to owners of these areas so they will not be inadvertently destroyed. Registration does not subject the area to public access.[3] While designation of a feature as a "Fragile Area" bears no legal weight, inclusion of the area as a conservation priority in a town plan can help protect the feature from development activities (per 24 V.S.A Chapter 117).

While the Fragile Areas Registry is currently static, and the Committee that reviews such areas is disbanded, Laurence Becker, Vermont State Geologist and Director of the Vermont Geological Survey/Division of Geology and Mineral Resources under the VT Department of Environmental Conservation suggests seeking listing of the geologic resources under the Fragile Areas Registry. According to the State statute, there has to be landowner agreement to register on private land. This could be a State protection to explore in the future if desired.

The Vermont Fish and Wildlife Department helps review resources which may be protected under Vermont's Land-use Development Law Act 250, Vermont's Endangered Species Law, Vermont Wetlands Conditional Use Determination, Army Corps of Engineers General Permit, Stream Alteration and Stream Crossing Permits, and Dam Safety Permits. Projects which impact the geologic natural resources would likely be reviewed by the VT Natural Heritage Program under the VT Department of Fish and Wildlife. The Heritage Program statutes are typically linked to protecting the biological components, so the habitats, such as these geologic features, would have to be key to the biological components such as rare plants or natural communities.

- ***Criterion 8 of Act 250 is likely the most rigorous protection for geologic resources unless there are rare, threatened and endangered species present***
- ***Criterion 10 of Act 250, which ensures that projects adhere to adopted town plans, gives towns regulatory power in the permit review process. As previously stated, this Management Plan is non-regulatory. If this Management Plan was included in the town or regional plan, and compliance with the Plan was specifically mandated in the town or regional plan this Management Plan may then be seen as a 'regional plan' under Criterion 10. As this Plan was meant to be non-regulatory, towns could follow the recommendations listed as* Opportunities for Action *in this Management Plan, and adopt more stringent protections for geologic resources***

Act 250 - Soil

Act 250's Criterion 4 is meant to protect soil erosion. Criterion 4 ensures that regulated construction activities do not result in erosion of soil and help maintain water quality. This Criterion also helps maintain the water quality and, as a result, enhances and maintains ORVs such as swimming, fishing and scenic beauty.

In addition, Criterion 9 protects productive agriculture soils from conversion to development. In as much as the Missisquoi and Trout River landscape is dependent upon a healthy and vibrant farm economy, maintaining the agricultural land uses in the basin is important.

Rare, Threatened and Endangered Species (RTEs)

Vermont's Endangered Species Law

The Vermont Natural Heritage Program is tasked with the protection of rare species and natural communities. In some cases, rare species and communities are dependent upon unique geological features (such as serpentine outcrops[4]), which, in turn, become protected by their association with the rare species or community. Species with a State status of Threatened or Endangered are protected by Vermont's Endangered Species Law (10 V.S.A. Chapter 123). The law states that it is unlawful for anyone to "take, possess or transport wildlife or plants that are members of an endangered or threatened species"[5] and allows the Secretary of ANR to adopt rules for the conservation and protection of listed species, which includes protection of their habitat (10 V.S.A. § 5403).

State and global conservation ranks are informational categories regarding the rarity and extirpation/extinction risk of species or natural communities. The ranking system is used by conservation biologists worldwide, as it's an effective way to communicate the rarity of species and communities across habitat types and political boundaries. For species management, the ranks provide a way to prioritize conservation efforts for species or communities that may not be currently listed as Threatened or Endangered - designations which carry the legal ramifications described above. A brief explanation of these ranks can be found in the Natural Resource ORV chapter of this Plan. For a more thorough explanation of ranks and ranking, see the Vermont Natural Heritage Program's website[2].

To assign State-level rankings in Vermont, members of Scientific Advisory Groups to the Vermont Endangered Species Committee set ranks for birds, mammals, fishes, reptiles and amphibians, invertebrates and natural communities. The rankings are periodically reviewed and updated as needed. Global ranks are developed and reviewed by NatureServe[6] and its international network of natural heritage data centers (which includes the Vermont Natural Heritage Program).

A full discussion of tools available to municipalities for conservation may be found in Chapter 7 of "Conserving Vermont's Natural Heritage," a publication of the Vermont Department of Fish and Wildlife[2].

Table A4.1. State and Global Ranks and Ranking Definitions. Ranks are assigned that best characterize the relative rarity or endangerment of a native group (taxon) within Vermont's geographic boundary (State Ranking) or throughout its range (Global Ranking).

State/ Global Rank	Rank Definition
1	Very rare (Critically imperiled); At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors
2	Rare (Imperiled); At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors
3	Uncommon (Vulnerable); At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors
4	Common to uncommon (Apparently secure); locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors
5	Common (Secure); widespread and abundant
Additional Rankings	
H	Possibly extinct/extirpated; Missing; known from only historical occurrences but still some hope of rediscovery
X	Presumed extinct/extirpated; Not located despite intensive searches and virtually no likelihood of rediscovery
U	Unrankable; Currently unrankable due to lack of information or substantially conflicting information about status

Act 250 - Plants and Animals

Act 250's Criterion 8A protects endangered species. The State of Vermont and federal government maintain lists of legally Threatened and Endangered Species of plants and animals. Criterion 8A protects these species. Some of these species are part of natural communities, such as the Serpentine Outcrop ORVs, and significant natural communities within the Wild and Scenic Study Area.

Act 250 - Natural Communities (Significant Ecological Areas)

Act 250's Criterion 8A protects rare and irreplaceable natural areas. Rare and irreplaceable natural areas are essentially defined as areas where 1) natural processes dominate over human process; 2) areas with identifiable vegetation; and 3) areas which are unlikely to reoccur in the foreseeable future. Unusual or uncommon natural communities and significant geological features have been protected under Act 250 Criteria. Alpine plant communities, bogs, fossil quarries, and ledge communities are examples of areas protected under Criterion 8A. Unusual geological features can also be protected such as a significant paleontological site, or important area for interpreting geologic history or processes. If a site contains rare, threatened, or endangered species it may qualify for protection. Under this criterion, the public's enjoyment of a protected natural area can also be protected, and Act 250 has provided isolation buffers, both auditory and visual, to protect the public's enjoyment of natural these areas.

In the Missisquoi and Trout River basin, some ORVs that may be protected under this Criterion include: numerous Serpentine Outcrops, Haystack Mountain alpine flora, and waterfalls and gorges (see the Natural Resources ORV chapter for more information).

Vernal pools are significant ecological areas protected under Vermont's wetland laws. Under Vermont's Wetland Rules, vernal pools are considered significant wetlands under wildlife habitat, Section 5.4. Typically considered Class II wetlands, they are required to have a 50 foot buffer. Citizens and community groups may petition the Water Resources Panel to reclassify wetlands in order to recognize their importance to communities and ecosystems, as well as establish greater protections for them. Jim Andrews, Coordinator of the Vermont Reptile and Amphibian Atlas promotes the Best Management Practices for Vernal Pools which may be found, along with more information about wetland protections, in the Water Quality Protections Appendix 5 of this Management Plan.

Act 250 - Critical Wildlife Habitats

Act 250's Criterion 8A also protects necessary critical wildlife habitat. Necessary wildlife habitat has become defined as "concentrated habitat which is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period in its life including breeding and migratory periods." In effect, protecting "necessary wildlife habitat" protects wildlife habitat that if removed from the Vermont landscape would cause the decline and eventually the loss of a species of wildlife (both game and hunted species but also non-game or non-hunted species). Habitats such as deer wintering forests, Bicknell's thrush habitat, beech stands, wetlands that serve as important seasonal feeding habitats for bears, heron rookeries, gravel, vernal pools, and stream and river waters have been protected as important wildlife habitat. Act 250 seeks to determine if a regulated activity "destroys or significantly imperils wildlife habitat" and balances that loss with attempts by the developer to lessen or "mitigate" the loss of habitat and to measure the benefit to the public of the wildlife habitat.

Types of ORVs that are protected under Criterion 8A include: in-stream fish habitat; high elevation (generally over 2,700 feet) spruce-fir forests that harbor unique high-elevation birds species (including the Bicknell's thrush breeding habitat); peregrine falcon and heron rookeries; deer wintering habitat (typically conifer forests); bear habitat (beech/oak stands and certain wetlands); and vernal pools. Rare, threatened and endangered animal species that are currently, or will be identified in the future, will also be protected under this criterion. Any newly identified significant natural community will also be protected under Criterion 8A. The State of Vermont Natural Heritage Program tracks these communities as well as rare plants and animals (Please see the Natural Heritage Information Project through the VT Fish and Wildlife Department (http://www.vtfishandwildlife.com/) for more information.

Towns and Villages (Local Protections)

Towns and villages in Vermont have the opportunity to protect natural resources at the local level under existing State statutes and programs. Many of these protections are fully realized through adoption of town plans, which can become regulatory documents in some instances (such as the Act 250 permit review process). Notably, all of the Study towns and villages already have adopted town plans and zoning bylaws. If something in a Town Plan is listed as locally significant then its protection would depend on zoning. Some town plans have natural resources listed; however, it is unclear how forceful protections are without accompanying zoning if someone threatened the existence of the feature.

There are some town-owned lands which protect natural resources such as the Enosburg Falls Village Forest in Berkshire along the Trout River, and the Jay Peak State Forest in Jay along Black Falls Brook and Jay Branch (both listed as important in the VT Rivers Study).

Five of the ten Study area towns have language in their town plans regarding the conservation of rare, threatened or endangered (RTE) species and their habitat (Table A4.2 below). Only four towns have provisions for RTE species and habitat conservation in their zoning bylaws.

Berkshire

Berkshire defines critical areas in a similar fashion to Richford, also including areas of geological significance in their Town Plan (adopted 4/26/10). The Berkshire Town Plan notes three geological areas of unique and fragile character – Ayers Hill, the Berkshire Copper Mine, and the Berkshire Kettle Hole. It is the intent of the Town to protect these and other geological sites from development that "would affect their character, value, and integrity. Controlled public access, in cooperation with private landowners, should be encouraged for educational and scientific pursuits.

Berkshire's Town Plan reports three known occurrences of rare species in Town, but presents no specific management priorities for their habitats.

Enosburgh/Enosburg Falls

Enosburg Falls' Village Plan (adopted by the Trustees 8/26/08) includes a section (8.3) on site preservation and erosion control, in which the plan states that natural features of the site, including "unique geologic features… which the Development Review Board determines are assets to the site and/or the community shall be preserved."

The Town Plan for Enosburgh (approved by the Selectboard 9/9/08) highlights the importance of natural features, including geological areas, in Chapter 8. Geological areas are also part of the Town's Zoning Bylaws, as part of the Natural Resources Overlay District (Section 570 of bylaws). The District's description emphasizes "significant geologic features, unusual or important plant and animal qualities of scientific, ecological, or educational interest make lands in this district unsuitable for intensive development because of their local, statewide, national and global significance". The Town has the authority to limit development in this district in order to preserve the scenic and natural resource values of these lands.

Enosburgh includes the presence of RTEs as one of the reasons to apply its Natural Resources Overlay District (Section 570), which requires land uses and development to be compatible with needs of the RTE species and its habitat. Section 8.10 of the Enosburg Falls Zoning Bylaws require that proposed development projects in the Village take measures to protect natural areas, including known habitat of endangered species, by incorporating them into common areas or by avoiding development in those areas.

Jay

Lists Jay Branch as a scenic view/vista area, this would include Jay Branch Gorge. Little is stated specifically about geologic resources in the Jay Town Plan (adopted by the Selectboard 12/20/10).

Lowell

The Lowell Town Plan (re-adopted 4/14/09) mentions encouraging development methods that "preserves trees, outstanding natural topography and geologic features and prevents soil erosion" for construction of Planned Unit Development (PUDs).

Montgomery

Montgomery is the only Study Town that does not mention the preservation of geological features in either its Town Plan (amended and updated 8/2010) or Zoning Bylaws.

The Town of Montgomery's Town Plan lists (on page 9) a policy to provide protection and stewardship for wetlands and waterways, and the rare species that they contain, as part of the Town's goal of Natural Resource conservation. Montgomery's Zoning Bylaws (Sections 6.6.3.2) have requirements that wireless telecommunication towers greater than 20 feet high may not be placed in RTE species habitat.

Richford

Richford defines critical areas in their Town Plan (2007) as "natural areas requiring special protection from development. They include areas that have environmental, ecological, educational, and/or scenic value, such as…areas of biological, hydrological, or geological significance." The Plan notes that the Richford Mineral Area is the most significant geological site in Town; this well-known mineral collection site is approximately 10 acres in area.

In the Richford Town Plan (page 73), RTE species discussion focuses mainly on the expansive deer yards in the Town. Of importance to the Wild & Scenic Study rivers, many of these yards are located around waterways, including the Missisquoi River. The Richford Town Plans also mentions the presence of the rare fantail darter

(S3, G5) in the Missisquoi River, and that this fish's habitat should be protected through local land use planning.

Troy/North Troy

The Town of Troy and the Village of North Troy have a combined Town Plan (adopted 3/20/08) and Zoning Bylaws. The Troy Town Plan (which includes North Troy) describes Big Falls, Bakers Falls, Jay Branch Gorge and the Troy Four-Corners Swimming Hole as unique features of the Town but does not have language about their preservation or protection.

Troy's Town Plan (page 33) mentions several natural areas with rare species located in Town. Three sites containing RTE species have been identified through species inventories by the Vermont Natural Heritage program. One of these is Big Falls Natural Area and State Park, which contains many species of rare plants. As for locations under private ownership, the Troy Planning Commission "feels it would be unfair to restrict property owners' rights on certain properties simply because their property has been inventoried," and no other RTE management considerations are included in the Plan.

Westfield

The Westfield Town Plan (adopted 11/16/09) mentions one geological feature in the Town – Balance Rock – and notes that the feature is currently in private ownership.

Westfield's Town Plan (page 28) mentions several natural areas with rare species located in Town. In the Westfield Town Plan, the floodplain forest at the confluence of the Missisquoi River and Mineral Spring is noted for having several rare plants. Additional RTE habitats in Town include Jay State Forest, which has Bicknell's thrush nesting sites (S2B, G4) and the Hazen's Natural Area and State Park, which contains a boreal calcareous cliff natural community (S2), peregrine falcon nests (S3B, G4), and many rare plants. The Town of Westfield intends to use these locations identified by the Vermont Natural Heritage Program as "red flags" to indicate the need to involve NHP biologists if development is proposed with these sites. These areas will also help the Town to identify areas of significant local value for the Town, and places to consider acquisitions of conservation easements, right-of-ways, or cooperative agreements with landowners to secure long-term access. Westfield's Zoning Bylaws (Section 324.06) have requirements that wireless telecommunication towers greater than 20 feet high may not be placed in RTE species habitat.

Table A4.2. Presence of protections in town zoning regulations. Please see the Natural Resource Protections section of this Management and the town plans and zoning bylaws for the most up-to-date information.

Town	*Geological features mentioned in Town Plan?*	*Geological features addressed in zoning bylaws?*	*Rare, threatened or endangered species or natural communities mentioned in Town Plan?*	*Rare, threatened or endangered species or natural communities addressed in zoning bylaws?*
Berkshire	**Yes** The Berkshire Town Plan notes three geological areas of unique and fragile character. It is the intent of the Town to protect these and other geological sites from development that "would affect their character, value, and integrity	**No**	**Yes** Rare species are present in Town	**No**
Enosburg Falls	**Yes** Enosburg Falls' Town Plan includes a section (8.3) on site preservation and erosion control	**No**	**No** Enosburg Falls mentions RTE species in the Town Plan, but only to state that they have not yet been documented in the Town	**Yes** SECTION 8.10 SIGNIFICANT NATURAL AREAS AND FEATURES: A) Natural areas containing rare or endangered plants and animals, as well as other features of natural significance exist throughout the Village. Subdivision and site plan applicants shall take all reasonable measures to protect significant natural areas and features either identified in the Village Plan…avoiding their disturbance in areas proposed for development
Enosburgh	**Yes** The Town Plan for Enosburgh highlights the importance of natural features, including geological areas, in Chapter 8.	**Yes** Geological areas are also part of the Town's Zoning Bylaws, as part of the Natural Resources Overlay District (Section 570 of bylaws)	**No**	**Yes** Enosburgh includes the presence of RTEs in Natural Resources Overlay District (Section 570), which requires land uses and development to be compatible with needs of the RTE species and its habitat

Table A4.2. *Cont.*

Town	*Geological features mentioned in Town Plan?*	*Geological features addressed in zoning by-laws?*	*Rare, threatened or endangered species or natural communities mentioned in Town Plan?*	*Rare, threatened or endangered species or natural communities addressed in zoning bylaws?*
Montgomery	**No**	**No**	**Yes** NATURAL FEATURES - Provide for long-term stewardship and protection of wetlands and waterways that have significant functions and values for rare species habitat, wildlife habitat, or natural communities and prevent additional loss of wetlands within the Town… additions to the Non-Game and Natural Areas inventory should inform planning and development decisions in Town to conserve or otherwise protect those species and their habitats…Travel corridors can serve local populations of wildlife, or species with wide ranging habitat requirements. Efforts should be made to identify and map wildlife travel corridors in Town in an effort to protect these linkages between larger areas of core habitat	**Yes** Freestanding telecommunications towers or antennas over 20 feet in elevation may not be located in the habitat of any State listed Rare or Endangered Species (6.3)
Richford	**Yes** Richford defines critical areas in their Town Plan as "natural areas requiring special protection from development.	**No**	**Yes** Deer yards and other important wildlife habitat should be considered by local officials when making land use planning and development decisions. Once on the Vermont Natural Heritage Program's list of rare communities, the habitat of the fan-tailed darter fish should be protected in local land use planning. Deer yards and other important wildlife habitat should be considered by local officials when making land use planning and development decisions. The need to encourage conservation of these areas cannot be overstated.	**No**

Table A4.2. *Cont.*

Town	*Geological features mentioned in Town Plan?*	*Geological features addressed in zoning bylaws?*	*Rare, threatened or endangered species or natural communities mentioned in Town Plan?*	*Rare, threatened or endangered species or natural communities addressed in zoning bylaws?*
Jay	**Yes** Lists Jay Branch as a scenic view/vista area, this would include Jay Branch Gorge. Little is stated specifically about geologic resources in the Jay Plan.	**No**	**No**	**No**
Lowell	**Yes** The Lowell Town Plan mentions encouraging development methods that "preserves trees, outstanding natural topography and geologic features and prevents soil erosion" for construction of Planned Unit Development (PUDs).	**No**	**No**	**No**
Troy/ N. Troy	**Yes** The Troy Town Plan (which includes North Troy) describes Big Falls, Bakers Falls, Jay Branch Gorge and the Troy Four-Corners Swimming Hole as unique features of the Town but does not have language about their preservation or protection.	**No**	**Yes** The Vermont Non-game and Natural Heritage Program through the Vermont Department of Fish and Wildlife tracks and monitors sites that have either been identified as State-significant natural communities or include rare, threatened or endangered plant or animal species. This information is reviewed in permitting processes such as Act 250. The Planning Commission feels it would be unfair to restrict property owners' rights on certain properties simply because their property has been inventoried.	**No**

Table A4.2. *Cont.*

Town	*Geological features mentioned in Town Plan?*	*Geological features addressed in zoning bylaws?*	*Rare, threatened or endangered species or natural communities mentioned in Town Plan?*	*Rare, threatened or endangered species or natural communities addressed in zoning bylaws?*
Westfield	**Yes** The spine of the Green Mountains runs through the western side of Town. Hazen's Notch State Park/ Natural Area, a steep-walled gap, lies between Sugarloaf and haystack mountains. Cliffs of serpentine rock support rare alpine Plant species and has historically been a nesting place for peregrine falcons	**No**	**Yes** The Vermont Natural Heritage Program has identified sites including rare, threatened and endangered species, and significant natural communities in the Town. The Hazen's Notch area is particularly unique. Another area of significant importance is near the confluence of the Missisquoi River and Mineral Spring Brook. This floodplain forest is the site of several rare plants. Inside Jay State Forest is a boreal outcrop on the top of Jay Peak. A State-threatened plant species, the Great Laurel or Giant Rhododendron grow near the Westfield - Troy line. Close to the Lowell - Westfield border is a serpentine outcrop community, Brown's Ledges, where the Green Mountain Maidenhair Fern was discovered. This plant species has a global significance: there are fewer than six known sites in the world, and all are in Vermont. The Natural Heritage site designations on the map should be used as red flags which indicate the need to contact biologists with the Vermont Natural Heritage Program if there is development proposed with the site	**Yes** Additionally, freestanding telecommunications towers or antennas over 20 feet in elevation may not be located in any of the following locations: A. The habitat of any State listed Rare or Endangered Species

Endnotes

1. Title 24, Ch. 117 of the Vermont Statutes - "Municipal And Regional Planning And Development": www.leg.state.vt.us/statutes/sections.cfm?Title=24&Chapter=117
2. "Conserving Vermont's Natural Heritage" is a publication of the State of Vermont Department of Fish & Wildlife. Available online: www.vtfishandwildlife.com/library/maps/Community_Wildlife_Program/complete.pdf
3. Some text taken from Addison County, VT Regional Plan: http://www.acrpc.org/pages/publications/Reg_Plan/NR_2.htm
4. For description of Serpentine Outcrops, see thee Natural Resource ORV – Geology Section of this document, or visit: http://www.vtfishandwildlife.com/books.cfm?libbase_=Wetland,Woodland,Wildland
5. http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=10&Chapter=123&Section=05403
6. NatureServe website: www.natureserve.org

Water Quality Protections

Overview of Current Water Quality Protections

Recognizing existing protections of water quality and related natural resources at federal, state and town levels helps to identify gaps in protections that may threaten the outstanding resources in the Study area.

Federal and State laws generally govern the quality of surface waters (all lakes, ponds, rivers, streams and wetlands). A goal of the federal Clean Water Act (CWA) is that all U.S. waters be fishable and swimmable. To that end, the CWA establishes criteria to maintain or improve water quality in U.S. surface waters, including rivers. The Clean Water Act holds states independently responsible for upholding of the quality of their waters. In Vermont, local municipalities may place further protections on town waters, enabling towns to regulate the management of their own natural resources. All of the upper Missisquoi and Trout Rivers Study towns have adopted official town plans and zoning bylaws. Many of the town's bylaws regulate land use activities and natural resource management, specifically with respect to waterways.

The Wild and Scenic Study Committee has identified threats to each class of ORV in the Study area, some of which are of immediate concern because of gaps in existing water quality protections. To address these gaps in protection and threats to ORVs, the Study Committee has proposed voluntary recommendations for improving protection and enhancement of ORVs at the local level. The Committee encourages towns and villages in the Study area to make full use of the protection resources available at the State level, and any future Wild and Scenic funding, should designation occur, to maintain or improve the water quality within their municipality.

Federal Water Quality Protections

Clean Water Act

The federal Clean Water Act[1] (CWA) of 1972 is the over-arching statute that governs the quality of surface waters (lakes, ponds, rivers, streams and wetlands) in the United States. The purpose of the Clean Water Act is to provide a variety of tools that will help to reduce pollution of waterways from private and governmental sources.[2] These management tools may be either regulatory (pertaining to laws) or non-regulatory (voluntary programs, like landowner cost-sharing). The broader goal of the Act is to "restore and maintain the chemical, physical and biological integrity of the nation's waters… to support the protection and propagation of fish, shellfish and wildlife and recreation in and on the water."[1]

Early CWA programs worked largely on point-source (traceable to a particular outflow 'pipe') pollutants, such as discharges from municipal waste water treatment plants and industrial facilities. The NPDES (National Pollutant Discharge Elimination System) requires the State of VT to issue permits for these point source discharges. The U.S. Construction General Permit (mandated by the U.S. EPA and administered by the U.S. DEP) requires practices to manage stormwater pollution, including implementation of stormwater management plans to reduce movement of sediment and contaminates from construction sites into waterways, to be implemented in construction projects of one acre or more.

Section 404 of the CWA regulates, through the Army Corps of Engineers, addition of fill or dredged materials to waterways. Programs in recent years have focused more on non-point sources of water pollution, such as stormwater runoff from roads and agricultural areas. Often these sources of pollution are more difficult to pinpoint and regulate. Many current CWA efforts involve a holistic, watershed-based approach to water quality protection. These programs focus on restoring or maintaining water quality by addressing issues that are specific to a particular watershed, such as the Missisquoi Basin Watershed Water Quality Management Plan written by the Vermont Agency of Natural Resources along with community involvement. Click here[3] to read the entire text of the CWA.

Important Notes on the Clean Water Act

- ***The Vermont Agency of Natural Resources (ANR) is responsible for upholding the Federal Clean Water Act***
- ***ANR must provide the federal government with an assessment of the quality of all State waters, and identify waters that fail Vermont Water Quality Standards***
- ***The U.S. Environmental Protection Agency provides states with funding for the monitoring and assessment of surface waters***

Resource Conservation and Recovery Act (RCRA)[4]

The Resource Conservation and Recovery Act (RCRA) of 1976 addressed solid and hazardous waste management activities. A portion of the Act established the "cradle to grave" system, which governs the handling of waste from its point of origin to its disposal. RCRA is a federal statute, with oversight by the Environmental Protection Agency (EPA). The EPA has delegated the authority to implement the RCRA to nearly all 50 states. In Vermont, this is the responsibility of the Hazardous Waste Management Program, which is part of the Department of Environmental Conservation under the Agency of Natural Resources. RCRA requires any facility that creates, treats, stores or disposes of hazardous waste to obtain a permit from the governing body (here in Vermont, the Hazardous Waste Management Program). The permitting procedure requires that the applicant facility specify contingency plans, emergency procedures, recordkeeping and reporting requirements as well as other standard procedures to document the handling of these substances. There are also provisions within RCRA that govern cleanup of hazardous waste in the event of an unintended release. RCRA relates to rivers mostly through the management of solid wastes produced from wastewater treatment facilities or drinking water treatment plants. The Act also contains provisions to protect groundwater from leaking underground storage tanks.

Superfund

Superfund is the federal government's program, through the U.S. Environmental Protection Agency (EPA), to clean up U.S. hazardous waste sites. The Superfund cleanup process is complex. It involves the steps taken to assess sites, place them on the National Priorities List, and establish and implement appropriate cleanup plans (the long-term cleanup process). EPA's Superfund Program attempts to get interested parties and other stakeholders involved. Meetings and town votes were recently held in Lowell and Eden about the Vermont Asbestos Group (VAG) mine site and the potential for it being placed on the National Priorities List (NPL), commonly known as the Superfund List. The Towns of Lowell and Eden voted not to pursue Superfund involvement in cleaning up the asbestos mine at this time. This site was considered for inclusion due to the asbestos-containing sediments which could infiltrate and negatively impact waterways and wetlands, and thus

potentially violate the Vermont Water Quality Standards and the federal Clean Water Act. There are no sites in the Study area that are currently on the National Priorities List.

State Water Quality Protections

This is an overview of the protections which exist at the State level for water quality. The most up-to-date information may be found on the Vermont Agency of Natural Resources' Watershed Management Division's website (http://www.vtwaterquality.org/wqd_mgtplan/swms_appA.htm). Section 303[5] of the Federal Clean Water Act states that basic water quality protection and planning is the responsibility of individual states. In Vermont, these duties fall upon the Vermont Agency of Natural Resources (ANR) and the Vermont Agency of Agriculture, Food and Markets (VAAFM).

Until recently, the Vermont Water Resources Panel (formerly the Water Resources Board) was the authority for the management and protection of Vermont's water resources. This Panel is under the Natural Resources Board along with the Land Use Panel which oversees Act 250 permitting and district environmental commissions.

Now, the Agency of Natural Resources exercises the authority for the management and protection of Vermont's water resources, including promulgation of Water Quality Standards (VWQS) and Rules for the Use of Public Waters. The VWQS[6] provide a framework for the protection and management of Vermont's surface waters per the federal Clean Water Act. The VWQS are a set of regulations that classify each water body, establish designated uses (such as swimming and fishing) that must be protected, and set criteria for chemical, physical and biological attributes of State waters that must be attained in order to protect the designated uses

The following water quality policy for Vermont is set forth in 10 V.S.A. § 1250[7] of the Vermont Statutes, and addresses the directive of the Clean Water Act that requires states to maintain and restore the "chemical, physical, and biological integrity of the Nation's waters" (33 U.S.C. § 1250).[8]

It is the policy of the State of Vermont to:

1) *Protect and enhance the quality, character and usefulness of its surface waters and to assure the public health;*
2) *maintain the purity of drinking water;*
3) *control the discharge of wastes to the waters of the State, prevent degradation of high quality waters and prevent, abate or control all activities harmful to water quality;*
4) *assure the maintenance of water quality necessary to sustain existing aquatic communities;*
5) *provide clear, consistent and enforceable standards for the permitting and management of discharges;*
6) *protect from risk and preserve in their natural state certain high quality waters, including fragile high-altitude waters, and the ecosystems they sustain;*
7) *manage the waters of the State to promote a healthy and prosperous agricultural community, to increase the opportunities for use of the State's forest, park and recreational facilities, and to allow beneficial and environmentally sound development.*
8) *It is further the policy of the State to seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality.*[7]

The State of Vermont employs a variety of regulations to administer these policies. For example, there are prohibitions on discharges of waste and other materials into State waters (10 V.S.A. §1259). Another set of regulations specifically addresses one of the primary water quality issues in Vermont, and especially the Wild & Scenic Study area - excess phosphorus. Excess phosphorus in water can cause algal blooms, fish kills and critically low dissolved oxygen levels which can kill bottom-dwelling organisms and those that feed on them. (The Lake Champlain Basin Program (http://www.lcbp.org/) has great resources available on excess phosphorous issues and strategies for reduction). Discharge of phosphorus into Vermont surface waters is regulated by 10 V.S.A. §1266a, which places limits on the amounts and concentration of phosphorus allowable in discharges to waters that contribute to Lakes Champlain and Memphremagog. The application of phosphorus and nitrogen fertilizers to non-agricultural land is regulated by 10 V.S.A. §1266b. This provision (effective January 2012) regulates the application of phosphorus fertilizer to non-agricultural soils (or "turf"). Included in this provision, phosphorus fertilizer may not be applied to turf that is not deficient in phosphorus, to an impervious surface, to turf between October 15th and April 1st, to frozen turf, or to turf within 25 feet of State waters. More provisions related to water quality and pollution control (such as stormwater management, construction site maintenance, and allowable discharges) may be found in Title 10, Chapter 47[9] of the Vermont Statutes.

The VT Water Quality Standards are used by the Agency of Natural Resources (ANR) and the Agency of Agriculture, Food and Markets (VAAFM) to plan, manage and regulate programs to protect the quality of Vermont's surface waters. For ANR, most of these duties fall to the sections of the Watershed Management Division (see Table A5.1. below).[10] The purpose of this Division is to protect, maintain, enhance and restore the quality of Vermont's surface water resources. The Watershed Management Division is responsible for the water quality monitoring, assessing and planning for all lakes, ponds, rivers, streams and wetlands in Vermont. The management of stormwater and wastewater are dealt with in this Division as well. In the VAAFM, the Division of Agricultural Resource Management[11] deals with water quality issues that are most relevant to agricultural land use. Programs within this Division are both regulatory (State law) and voluntary in nature and are designed to help Vermont farmers protect their environment. Please see the following tables for a breakdown of the programs at the VT ANR and the VAAFM.

- ***The Vermont Agency of Natural Resources (ANR) and Vermont Agency of Agriculture, Food and Markets (VAAFM) are charged with upholding the federal Clean Water Act, and have various policies and programs in place to do so. The Study Committee supports their efforts to protect and enhance the water quality in Vermont.***

A5.1. Breakdown of programs and program roles within the ANR/DEC/WMD. The Watershed Management Division is under the Department of Environmental Conservation in the Vermont Agency of Natural Resources. This table breaks down the programs within the Watershed Management Division.

Program	Purpose
Watershed Management Division	The goal of the Watershed Management Division is to maintain and enhance the quality and quantity of Vermont's lakes, rivers and wetlands to support healthy ecosystems and appropriate public uses.
Monitoring, Assessment and Planning Program (MAPP)	Integrates three components of the Vermont water pollution control program. MAPP measures water quality indicators, evaluates these indicators in light of applicable standards or thresholds, and then develops watershed plans that target waters for protection or remediation.
Lakes & Ponds Management and Protection Section	Monitors the water quality of lakes, determines the causes of problems, and develops ways to solve them. Provides assistance regarding lake management and protection to municipalities, lake associations, and individuals. Administers permits for aquatic nuisance control activities and for encroachments into lakes.
Ecosystem Restoration Program	Takes action to accelerate the reduction of sediment and nutrient pollution, such as algae bloom-causing phosphorus, from uncontrolled runoff into our streams, rivers, ponds, wetlands, and lakes (Formerly Clean and Clear).
River Management Section	Supports and implements channel assessment and management practices that recognize and mitigate conflict around a stream's natural movement (migration and evolution). Provides regulatory review and technical assistance for protection, management, and restoration projects that affect streams and rivers.
Wetlands Section	Responsible for identifying and protecting wetlands and the functions and values they provide. Activities to achieve these goals include education, project review, and enforcement.
Stormwater Program	Provides regulatory oversight and technical assistance to ensure proper design and construction of stormwater treatment and control practices and construction-related erosion prevention and sediment control practices.
Wastewater Program	Provides technical assistance and educational opportunities to wastewater treatment facility operators and in cooperation with State, regional and national organizations.

Table A5.2 Agricultural and Conservation Groups working within our Study area in Vermont.

Program	Purpose
USDA NRCS (Federal)	United States Department of Agriculture's Natural Resource Conservation Service's goals are to reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. NRCS is offers financial and technical assistance to farmers in the Missisquoi Basin (currently through the American Great Outdoors funding). The Missisquoi Basin has been selected as a prioritized watershed in the Critical Source Areas (CSAs) computer model which identified phosphorus source areas to the Missisquoi Bay.
Vermont Chapter of the NRCS	The Study area falls under the jurisdiction of both the Northeast and Northwest VT regions. VT's NRCS Chapter provides technical assistance and funding to protect soils, water, air, plants and animals.
VACD (Non-governmental)	VT Association of Conservation Districts is a non-profit organization formed to conduct educational, scientific, charitable work concerning conservation, maintenance, improvement and development and use of land, soil, water, trees, vegetation, fish and wildlife and other natural resources in Vermont, and is made up of members from VT's Natural Resource Conservation Districts. These Conservation Districts were established to allow NRCS to be situated in local and regional offices, and to give federal employees the ability to work locally.
LCBP (Inter-governmental)	The Lake Champlain Basin Program works to coordinate and fund efforts which benefit the Lake Champlain Basin's water quality, fisheries, wetlands, wildlife, recreation, and cultural resources (including programs on private lands to reduce sediment and nutrient inputs in the Lake).
LCC (Non-governmental)	Lake Champlain Committee is dedicated to protecting Lake Champlain's environmental integrity and recreational resources for this and future generations through science-based advocacy, education and collaborative action. They support Best Management Practices for farms and the adoption of nutrient management plans to reduce phosphorus loading from agriculture, and helped establish numeric water quality standards for phosphorus levels in the lake.
MRBA (Non-governmental)	Missisquoi River Basin Association is a volunteer organization which mobilizes community members to conduct projects which improve water quality. On work days volunteers plant trees to create streamside buffers, line culvert outflows and ditches with rock, fence off livestock, and seed areas of bare soil. MRBA has recently begun the process of administering the Trees for Streams program on the Missisquoi through funds available from the Ecosystem Restoration Program.
Friends of Northern Lake Champlain (Non-governmental)	Works with projects on ag lands to clean and protect the waters of Northern Lake Champlain, and to reduce polluted land-use runoff into Lake Champlain.
FWA (Non-governmental)	The Franklin and Grand Isle Farmer's Watershed Alliance's mission is to insure environmentally positive solutions and enable the dairy industry through education and funding to better the soil, air, and water of the Lake Champlain Watershed while remaining economically viable. Secondly, to promote and defend dairy farming to further its future as one of the largest contributors to the State's economy.
VAAFM/ARMES	The Division of Agricultural Resource Management works to assist farmers in protecting water resources with the following programs.

Table A5.3. Voluntary and regulatory programs offered by the Division of Agricultural Resource Management and Environmental Stewardship (ARMES) under the Vermont Agency of Agriculture, Food and Markets (VAAFM).

VAAFM - ARMES VOLUNTARY PROGRAMS	
Vermont BMP Program	Cost-sharing for NRCS approved BMP implementation on farms.
Nutrient Management Incentive Grant Program	Assists in development and 3 years of update payments for NMPs on farms.
LTP	Land Treatment Plan assesses soil and water resource management practices and provides information for stewardship. This is the basis for the NMP, and requires no cost from the farmer due to USDA NRCS, VT Conservation Districts, and VAAFM funding.
FAP	VT's Agronomic Practices program reimburses farmers for field BMPs such as; cover cropping, no-till, ridge till, and rotation implementation.
AMM	Alternative Manure Management provides incentive dollars to implement new technologies aimed at improved water quality and waste management.
VABP	Vermont Agricultural Buffer Program pays farmers incentives to install and maintain grass or wooded buffers along State waterways.
CREP	Conservation Reserve Enhancement Program pays farmers incentives to install and maintain grass buffers along State waterways, and cost-shares for planting materials, fencing, watering facilities, animal walkways, and stream crossings.
Agricultural and Managed Forest Land Use Value Program or Current Use Program	Reduces the tax burden on productive farmlands.
VAAFM - ARMES REGULATORY PROGRAMS	
AAP	Accepted Agricultural Practices - the minimum management required by law for VT farms. As of 2006 a 10-foot vegetated buffer is now required along surface water with an additional 15' for a total of 25' at points of runoff.
LFO	Large Farm Operations (including >700 dairy cows, 1,000 beef cattle, 500 horses, 55,000 turkeys or 82,000 chickens) have additional laws including waste storage and nutrient management plans. LFOs must have individual permits and cannot discharge waste into State waters. According to the ANR "there are four permitted LFOs in the Missisquoi River watershed having 950 or more "animal units." A dairy farm in North Troy in the Upper Missisquoi watershed, a dairy farm in Richford in the Mid Missisquoi watershed, a dairy farm in Enosburg in the Tyler Branch watershed, and a dairy farm in Sheldon in the Lower Missisquoi watershed are all considered large farms and regulated as such."
MFO	Medium Farm Operations (including 200-699 dairy cows, 300-999 beef cattle, 150-499 horses, 16,500-54,999 turkeys or 25,000-81,999 chickens) have a General Permit to prevent the discharge wastes into State waters and requires farms to have and implement a nutrient management plan. [Small Farm Operations (SFOs), <200 Mature Dairy Cows, are not required to have permit coverage. SFOs may seek general permit coverage, but it is optional.]
CAFO	Confined animal feedlot operation regulations are under development for VT, and are currently regulated under federal laws.

As evidenced by the tables above, there are already many programs working to improve water quality such as employing agricultural Best Management Practices in the State. The Study Committee supports the existing programs occurring in the Missisquoi and Trout Rivers watersheds (including the goals articulated in the Draft Missisquoi Basin Plan,[12] efforts to maintain or improve riparian buffers and the current efforts to support agricultural best management practices), and wants to work in tandem, rather than at odds with these programs. Federal funds and permits are currently utilized in many of the agriculture best management practice programs and water quality initiatives currently employed along the Missisquoi and Trout Rivers; it is hoped and expected that these efforts will continue after Wild and Scenic designation, if it occurs, and no additional review or approval requirement is anticipated as a result of Wild and Scenic designation. It is anticipated that volunteer efforts and funding from Wild and Scenic designation, if sought, could fill gaps left between these various programs; if designation occurs, Section 7 reviews of individual projects within these programs are not generally necessary.

Post-designation Wild and Scenic Advisory Committees tend to help with coordination and communication between the many available programs, agencies, community groups and funding sources for water quality initiatives. The post-designation Advisory Committee could be very useful in linking local, state, and federal resources, especially since it would be made up, like the Study Committee, of locally appointed representatives and partners from local, state and federal organizations committed to the health of the Missisquoi and Trout watersheds. This Advisory Committee would have a website, regular meetings, local contacts, and paid staff to facilitate communication and coordination of local efforts. Because the Advisory Committee resources (time, energy, funding, etc.) will be very flexible and controlled locally by Committee itself, it can seek to fill gaps not being served by other existing programs. It is of note that there is no cost share or other such requirement or 'strings attached' for towns or partner organizations which participate in programs with the Wild and Scenic Committee. Additionally, designation brings with it other potential federal funding sources, and the ability to leverage resources and apply competitively for grant funds for larger-scale projects. Please see Chapter I of this Management Plan for more information about what designation does and does not mean including a more thorough discussion of Section 7 review.

Municipalities in Vermont have the authority to set additional protections on water quality and natural resources at the local level. These laws are presented in Title 24, Chapter 117[13] of the Vermont Statutes. Statute 24 V.S.A. §4401 states that all bylaws adopted under Chapter 117 must be consistent with goals established in law that includes the identification, protection and preservation of:

- significant natural and fragile areas;
- outstanding water resources (lakes, rivers, aquifers, shorelands, and wetlands);
- significant scenic roads, waterways, and views; and
- the quality of air, water, wildlife, and land resources[14]

Areas or features of geological significance in Vermont may be designated as "fragile areas", per Title 10, Chapter 158 of the Vermont Statutes. A Fragile Area is defined as "an area of land or water which has unusual or significant flora, fauna, geological or similar features of scientific, ecological or educational interest" (10 V.S.A. § 6551). If the Fragile Area is on private land, the landowner receives a certificate and voluntary stewardship guidelines to protect and manage the features of the area. The Vermont Fragile Area Registry is a voluntary, non-regulatory program and therefore carries no legal provisions. The Registry is intended to: 1) provide a mechanism for identifying and documenting fragile areas, 2) provide information and assistance to owners of these areas so they will not be inadvertently destroyed and, 3) aid in state, regional and local

planning. Registration does not subject the area to public access.[15] While designation of a feature as a "Fragile Area" bears no legal weight, inclusion of the area as a conservation priority in a town plan can protect the feature from development activities (per 24 V.S.A Chapter 117).

The regulatory power of town plans in the protection of natural resources is discussed below; however, a full discussion of tools available to municipalities for conservation may be found in Chapter 7 of "Conserving Vermont's Natural Heritage," a publication of the Vermont Department of Fish and Wildlife.[14]

Other State-Level Environmental Protections and Programs

Basin Planning - Water Quality Management Plans, formerly known as basin plans[16] and the basin planning process are required by Vermont Statutes (10 V.S.A. §1253(d), VWQS §1-02D) and Federal regulations (40 CFR Part 130, §130.6[17]). The Vermont Department of Environmental Conservation's Agency of Natural Resources (ANR) has prepared a document entitled "Vermont Watershed Initiative - Guidelines for Watershed Planning" (2007) to assist the public in understanding the requirements of the planning process. Basin planning is an on-going process designed to be compatible with the Vermont Water Quality Standards and other applicable State and federal laws. In general, the planning process serves to integrate topics of special local concern with water quality issues of State importance, and make management recommendations on these topics. Basin planning falls under the Statewide Surface Water Management Strategy which focuses management, planning, regulatory and funding efforts on basin-specific stressors, which are identified and prioritized in a collaborative effort among all stakeholders – state and local governments, landowners, watershed associations and regional planning commissions. The Basin Plan for the Missisquoi River was first completed in 1974. Revisions were completed in the 1980s and 1990s with the most current (2004) version under revision with the assistance of the Northwest Regional Planning Commission.[18] The Draft Missisquoi Basin Water Quality Management Plan is currently being reviewed by the VT ANR,[12] and will likely be available for public comment in the fall of 2012. Once the plan is complete, it will provide a comprehensive list of the major water quality stressors in the basin, the issues surrounding those stressors, and management recommendations to enhance water quality in the watershed. The Wild and Scenic Study Committee will be able to use the recommendations in the basin plan to enhance water quality in the upper Missisquoi and Trout Rivers.

- ***A revision of the Missisquoi's Basin Plan is in process and may be used by towns and the Upper Missisquoi and Trout Rivers Wild and Scenic Study to better understand water quality issues and encourage management recommendations in the watershed***
- ***Information about ANR Basin Planning in the Missisquoi watershed may be found on the VT ANR Missisquoi Basin Plan webpage***[19]

Act 250

Act 250 is Vermont's development and control law. The law provides a public, quasi-judicial process for reviewing and managing the environmental, social and fiscal consequences of major subdivisions and development in Vermont through the issuance of land use permits. There are ten separate environmental criteria (with sub-criteria) that may cause a construction project to require issuance of an Act 250 permit, consequently making the project susceptible to both State and public review. Permitting activities which must be followed include review of land use permit applications for conformance with the Act's ten environmental

criteria, issuance of opinions concerning the applicability of Act 250 to developments and subdivisions of property, monitoring for compliance with the Act and with land use permit conditions, and public education.[20] Environmental Criterion # 10 of Act 250 is of particular note to the Wild & Scenic Study towns. This Criterion states that to obtain a permit, an applicant must demonstrate that a project is "…in conformance with any duly adopted local or regional plan or capital program under [24 V.S.A Chapter 117]." This means that townships, through adoption of their town plans, have the ability to indicate that certain natural resources should be protected or conserved. In this case, any Act 250 project in conflict with the town plan would be in violation of Criterion 10, thereby giving towns regulatory power in the Act 250 process and greater involvement in the protection of natural resources.[14] This will be discussed in greater detail in Appendix 9 of this document.

Franklin and Orleans Counties have different Act 250 permit review specialists. To find the specialist in your town, visit the DEC Permit Specialist Locator[21] webpage.

- ***Criterion 10 of Act 250, which ensures projects adhere to adopted town plans, gives towns regulatory power in the permit review process.***

Act 110

Act 110[22] was enacted by the Vermont State Legislature in 2011 (10 V.S.A. Chapter 49 and 24 V.S.A. Chapter 11) in order to place protections on river corridors and buffers. There were several reasons for this legislation, including maintaining the safety of waterways (such as mitigation of flood risk), protecting water quality, preserving habitat for fish and other aquatic life, regulating building sites to reduce flooding and property damage, and allowing for multiple uses of State waters for all Vermonters. The Act also promotes the protection of vegetated buffers along rivers, which help to prevent and control water pollution, aid in channel, bank and floodplain stability, reduce flooding, and preserve the habitat for both aquatic and terrestrial wildlife. Act 110 empowers municipalities to adopt bylaws to regulate zoning and development activity along river corridors, and adopt Best Management Practices (BMPs) for river corridor and buffer maintenance. Additionally, financial incentives will be available from the State of Vermont to municipalities that adopt and implement zoning regulations protecting river corridors and buffers. Act 110 is significant for Wild and Scenic Study area towns because it allows them to influence land uses within the river corridor and promote naturally vegetated buffers to protect the quality of the river and its surrounding natural and human environment from flood hazards.[22]

- ***At the time of drafting this Management Plan, Act 110 has not yet been utilized in any of the ten towns and villages in the Study area. It is available, along with financial incentives, to protect floodplains and riparian areas.***
- ***Contact the VT DEC River Management Section[23] for more information on Act 110.***
- ***The Committee encourages towns to use Act 110, the National Flood Insurance Program and the Fluvial Erosion Hazard Program toaddress protection of river corridors and buffers the next time they revisit their town plans and town zoning bylaws. A Fact Sheet may be found on the ANR website.***

Vermont Wetland Rules

Vermont has a specific set of laws regarding the protections of wetlands, knows as Vermont Wetland Rules.[24] Wetlands in Vermont are placed into one of three Classes: I, II or III. Most mapped wetlands in Vermont (as part of the National Wetland Inventory) are Class II wetlands. Class I Wetland designation is reserved for those

wetlands that are "exceptional or irreplaceable in their contribution to Vermont's natural heritage and merit the highest level of protection."[24] Generally, the Vermont Wetland Rules require a 100 or 50 foot buffer zone for Class One and Class Two wetlands, respectively. These buffer distances are subject to review and may be adjusted for individual wetlands. These rules limit the activities that may occur within Class I and II wetlands and their buffer zones. State-issued wetland permits[25] are required for any development activity in Class I or II wetlands. Allowed land uses in these areas (provided there is no draining, dredging, filling, grading or alterations of water flow) include logging, agriculture, recreation and fish and wildlife management. The size of the buffer as well as the allowed land uses within a wetland and its adjacent buffer zone may be changed with a petition.

Vernal Pools are considered significant wetlands under wildlife habitat, Section 5.4 of the Vermont Wetland Rules. Typically considered Class II wetlands, they are required to have a 50 foot buffer. Jim Andrews, Coordinator of the Vermont Reptile and Amphibian Atlas promotes the following Best Management Practices for Vernal Pools and other important amphibian and reptile habitat:

- A 100 foot no-cut buffer with intact native vegetation of hardwoods or mixed hardwoods, and a 600 foot buffer with limited impact in up to 25% of area, while maintaining abundant coarse woody material, standing dead snags, native vegetation with an intact canopy and deep leaf litter. If logging occurs, winter is preferred under very dry conditions in the remaining 75% of this area
- A minimum 50 foot no-cut buffer in smaller 1st order streams and seeps to protect amphibian habitat
- A minimum 100 foot no-cut buffer for larger streams (with flexibility for crossings and 50 feet of penetration in some instances) and beaver flowages to protect amphibian habitat

The Vermont Center for Ecostudies and Arrowwood Environmental are conducting the ongoing Vermont Vernal Pool Mapping Project. See the Project website for more information, and to submit details of the location of a vernal pool near you.

Class III wetlands are those wetlands that are not found to provide significant function and value according to the Vermont Wetland Rules. These wetlands are not protected by the Rules, and State Wetland Permits are not required for activities in these wetlands; however, Class III wetlands may be protected by other local, state or federal regulations.

Citizens and community groups may petition to have wetlands reclassified in order to recognize their importance to communities and ecosystems, as well as establish greater protections for them. There are currently no Class I wetlands in the Upper Missisquoi and Trout Rivers Wild and Scenic Study area. For more information on Wetlands in Vermont, see the Vermont Agency of Natural Resources Watershed Management Division's Wetlands Section webpage.[26]

- ***All mapped (Class II) wetlands in VT have at least a 50' buffer zone that excludes development activity; "exceptional or irreplaceable" (Class I) wetlands generally have a 100' buffer. The Vermont Wetland Rules regulate the allowable activities within these wetlands and their buffers.***
- ***There are currently no Class I wetlands in the Study area. Community members may petition to reclassify wetlands in the State.***

Towns & Villages (Local Water Quality Protections)

Each of the ten Wild & Scenic Study area towns and villages have adopted town plans and zoning bylaws. Additionally, all of the towns and villages describe water quality goals in their respective town plans. These town plan goals may be general or specific; however, only a few of the towns have regulatory bylaws that intend to protect the waterways or natural resources of the towns (Table A5.4).

The Northern Vermont Resource Conservation and Development Program (RC&D) provides grants for programs which inventory and mitigate road related erosion problems through their Better Backroads program "Clean Water You Can Afford" (http://www.nvtrcd.org/bbr.html). Several of the Study area towns have utilized these funds, though none in 2011. In 2010 Enosburgh and Richford received grants (see the 2010 Report http://www.nvtrcd.org/2010_BBR_Report.pdf). Berkshire, Enosburgh, Lowell, Montgomery and Richford have received technical assistance site visits since 2005. This is a great program that offers funds for projects which improve the water quality of the Missisquoi and Trout Rivers.

Berkshire

Only Berkshire and Enosburgh have zoning provisions regarding adequate treatment of stormwater runoff, which helps to mitigate the sediments and pollutants that wash off the land during storm events.

Most towns (all except for Lowell, Troy and North Troy) have bylaws regulating land use in designated Flood Hazard Areas (FHA), which are generally defined as the 100-year floodplain or as determined by the National Flood Insurance Program. Commonly, these provisions limit or prohibit construction of buildings in floodways and FHAs unless granted a special exception.

Berkshire and Montgomery allow land uses such as agriculture or forestry in the flood hazard areas, while most towns with FHA provisions have specific language prohibiting the placement of junkyards or storage of hazardous materials in the floodway (Westfield, Jay, Montgomery, Richford, Enosburgh and Enosburg Falls).

A number of the Study area towns and villages have bylaws establishing a building setback distance from waterways – a minimum allowable buffer between development and any river, stream, lake or pond (wetlands have their own set of applicable State laws, as detailed above). Berkshire has a static setback requirement of 100 feet (Table A5.4). Their zoning bylaws indicate that "In order to protect water quality in the Town of Berkshire, no new structures of any kind shall be built within one hundred (100) feet of any river, wetland, stream, lake, or pond."

Enosburgh/Enosburg Falls

Only Enosburgh and Berkshire have zoning provisions regarding adequate treatment of stormwater runoff, which helps to mitigate the sediments and pollutants that wash off the land during storm events.

Most towns (all except for Lowell, Troy and North Troy) have bylaws regulating land use in designated Flood Hazard Areas (FHA), which are generally defined as the 100-year floodplain or as determined by the National Flood Insurance Program. Commonly, these provisions limit or prohibit construction of buildings in floodways and FHAs unless granted a special exception.

Most towns with FHA provisions have specific language prohibiting the placement of junkyards or storage of hazardous materials in the floodway (Enosburgh and Enosburg Falls, Westfield, Jay, Montgomery, and Richford).

A number of the Study area towns and villages have bylaws establishing a building setback distance from waterways – a minimum allowable buffer between development and any river, stream, lake or pond (wetlands have their own set of applicable State laws, as detailed above). Enosburgh and Enosburg Falls both have sliding scales of setback distances. In Enosburgh the setback distance depends on the slope of the land (Table A5.5, in Enosburgh Falls the distance is dependent upon the zoning district where the development is proposed (Table A5.6). The bylaws of Enosburgh and Enosburg Falls include requirements that the natural vegetation within the setback buffer be maintained. Enosburgh also includes stipulations that limit or prohibit destructive activities within the buffer, including the disruption of the natural vegetative buffer, storage of motor vehicles or other potential contaminating materials, presence of septic fields or tanks, excavating or disturbing the soil or dumping waste, among other exclusions.

Enosburgh has specific bylaws prohibiting a number of activities in the buffer around their waterways. This comprehensive list offers strong protections for maintaining water quality. The prohibitions include:

a) No alteration of streambed or bank, except to reduce erosion, perform AAPs and maintenance of stream crossings for agricultural purposes;
b) In general, disturbances to natural vegetation are prohibited. These include disturbances by tree removal, clearing, burning, and spraying. No pesticide use or storage;
c) No septic fields in the buffer;
d) No storage for motorized vehicles. No use of motorized vehicles except for approved maintenance and emergency use;
e) No sewage disposal systems may be located within 300 feet of normal high water level of a water supply or within 200 feet of the banks of any stream that feeds into a water supply;
f) No soil disturbance from grading, plowing, except with approved soil conservation and water quality plan;
g) No mining or excavation, except existing uses, no dredging except as permitted by State law;
h) No deposit or landfill or reuse, solid or liquid waste; fill allowed only as approved by the Army Corps of Engineers;
i) No storage of materials;
j) No dumping;
k) No fill to expand development area.[27]

Enosburgh and Enosburg Falls both have instituted progressive zoning districts that afford additional protections to natural resources in the towns. Of note, Enosburgh has a Natural Resources Overlay District (§570 of Zoning Bylaws), which includes

> *"significant geologic features, unusual or important plant and animal qualities of scientific, ecological, or educational interest make lands in this district unsuitable for intensive development because of their local, statewide, national and global significance. Included are steep slopes, rare and endangered species, waterways… and significant wildlife habitat. Designation of this district is intended to protect…scenic and natural resource values."*

Enosburgh and Enosburg Falls both have Conservation Districts, which intend to add a layer of protection to areas found to be important for the value of their natural resources. The Enosburg Falls Conservation District (§2.3 of Enosburg Falls zoning bylaws) was established *"…to protect the scenic and natural resource value of lands which lack direct access to public roads, are important for wildlife and wildlife habitat, and which are poorly suited for development".* These districts place strict protections on allowable land uses in natural areas deemed to be of environmental or recreational significance. Zoning districts such as these can help to further protect the Study area rivers and their surrounding environments.

Jay

Most towns (all except for Lowell, Troy and North Troy) have bylaws regulating land use in designated Flood Hazard Areas (FHA), which are generally defined as the 100-year floodplain or as determined by the National Flood Insurance Program. Commonly, these provisions limit or prohibit construction of buildings in floodways and FHAs without special exceptions.

Most towns with FHA provisions have specific language prohibiting the placement of junkyards or storage of hazardous materials in the floodway (Jay, Westfield, Montgomery, Richford, Enosburgh and Enosburg Falls).

A number of the Study area towns and villages have bylaws establishing a building setback distance from waterways – a minimum allowable buffer between development and any river, stream, lake or pond (wetlands have their own set of applicable State laws, as detailed above). Jay has a static setback requirement of 50 feet (Table A5.4).

The Town of Jay has a 50 foot setback for buildings from all waterways, including man-made ponds. There are no stipulations regarding maintaining vegetated buffers or specifics about alternate land uses. However, §402.01 of the Jay Bylaws state that "*Development will not result in the pollution of air, ground or surface waters*", which may serve as a catch-all provision for activities that degrade water quality.

Lowell

Lowell has no zoning bylaws regulating land use in designated Flood Hazard Areas (FHAs).

Lowell has no zoning bylaws prohibiting development or other activity near waterways.

Montgomery

Most towns (all except for Lowell, Troy and North Troy) have bylaws regulating land use in designated Flood Hazard Areas (FHA), which are generally defined as the 100-year floodplain or as determined by the National Flood Insurance Program. Commonly, these provisions limit or prohibit construction of buildings in floodways and FHAs unless granted a special exception.

Montgomery and Berkshire allow land uses such as agriculture or forestry in the flood hazard areas, while most towns with FHA provisions have specific language prohibiting the placement of junkyards or storage of hazardous materials in the floodway (Westfield, Jay, Montgomery, Richford, Enosburgh and Enosburg Falls).

Montgomery and Richford are the first towns in the Study area to include language for Fluvial Erosion Hazards and the National Flood Insurance Program in their Hazard Mitigation Plans.

A number of the Study area towns and villages have bylaws establishing a building setback distance from waterways – a minimum allowable buffer between development and any river, stream, lake or pond (wetlands have their own set of applicable State laws, as detailed above). Montgomery has no general setback requirements from water; however, they do have to comply with the FEMA flood maps which have restrictions for building if the property is located in a Flood Hazard Area. Montgomery is considering changes to their zoning bylaws which may include a setback (Table A5.4).

Montgomery has no zoning bylaws prohibiting development or other activity near waterways.

Richford

Most towns (all except for Lowell, Troy and North Troy) have bylaws regulating land use in designated Flood Hazard Areas (FHA), which are generally defined as the 100-year floodplain or as determined by the National Flood Insurance Program. Commonly, these provisions limit or prohibit construction of buildings in floodways and FHAs unless granted a special exception.

Most towns with FHA provisions have specific language prohibiting the placement of junkyards or storage of hazardous materials in the floodway (Richford, Westfield, Jay, Montgomery, Enosburgh and Enosburg Falls). Montgomery and Richford are the first towns in the Study area to include language for Fluvial Erosion Hazards and the National Flood Insurance Program in their Hazard Mitigation Plans.

Richford has no zoning bylaws prohibiting development or other activity near waterways.

Richford has size limit requirements for lots located in the Water Supply Zoning district (e.g., Stanhope Brook watershed) and Recreation/Conservation District (in village near river), but there are no requirements concerning buffers or distance from water to development.

Troy/North Troy

The Town of Troy and the Village of North Troy have a combined Town Plan (adopted 3/20/08) and Zoning Bylaws. No zoning bylaws exist in Troy or North Troy regulating land use in designated Flood Hazard Areas (FHAs).

Troy and North Troy have no zoning bylaws prohibiting development or other activity near waterways.

The Troy and North Troy Zoning Bylaws state that "*the intent of the Town is to conserve its rural character, its air and water quality, and its productive lands in a manner consistent with the purpose set forth herein and the Town Plan*." It is worth noting that Troy and North Troy include these statements in their zoning bylaws, while statements like this one are typically only common in town plans in our Study towns. Only a few towns have developed language that specify measures taken by the towns to protects waterways and other natural resources (see Table A5.4 below). Segments of plans and zoning bylaws relevant to water quality protection for each of the Study towns may be found in this Appendix.

Westfield

Most towns (all except for Lowell, Troy and North Troy) have bylaws regulating land use in designated Flood Hazard Areas (FHA), which are generally defined as the 100-year floodplain or as determined by the National Flood Insurance Program. Commonly, these provisions limit or prohibit construction of buildings in floodways and FHAs unless granted a special exception.

Most towns with FHA provisions have specific language prohibiting the placement of junkyards or storage of hazardous materials in the floodway (Westfield, Jay, Montgomery, Richford, Enosburgh and Enosburg Falls).

A number of the Study area towns and villages have bylaws establishing a building setback distance from waterways – a minimum allowable buffer between development and any river, stream, lake or pond (wetlands have their own set of applicable State laws, as detailed above). Westfield has a static setback requirement of 50 feet (Table A5.4). The bylaws of Westfield also include requirements that the natural vegetation within the setback buffer be maintained.

Table A5.4. Water quality protection in local planning and zoning in Upper Missisquoi and Trout River Wild and Scenic Study area towns.

	TOWN PLAN	**LAND USE REGULATIONS (ZONING & SUBDIVISION)**				
Municipalities	**Water Quality Goals?**	**Require Preservation of Natural Resources?**	**Include Stormwater Mgmt Standards?**	**Reference ANR Stormwater Manual?**	**Include Flood Hazard Area Regulations?**	**Require Setback/ Buffer?**
Berkshire	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes (100')**
Enosburg Falls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes (50-100')**
Enosburgh	**Yes**	**Yes**	No	No	**Yes**	**Yes (25-110')**
Montgomery	**Yes**	No	No	No	**Yes**	**No***
Richford	**Yes**	No	No	No	**Yes**	**No**
Jay	**Yes**	No	No	No	**Yes**	**Yes (50')**
Lowell	**Yes**	No	No	No	No	No
North Troy	**Yes**	**Yes**	No	No	No	No
Troy	**Yes**	**Yes**	No	No	No	No
Westfield	**Yes**	No	No	No	**Yes**	**Yes (50')**

* Montgomery is considering changes to their zoning bylaws which may include a setback.

Table A5.5. Setback distances for Enosburgh, based on the slope of the adjacent land and size/type of waterway. Distances are in feet. Town requires an undisturbed naturally vegetated buffer strip be maintained from the shores of lakes and ponds and from each bank of streams and rivers (measured from the ordinary high water mark).

Slope of adjacent Land	Seasonal (intermittent) streams and permanent streams less than 10 ft in avg channel width	Lakes, Ponds, and streams greater than 10 ft in avg channel width
0-10%	25	50
11-20%	45	70
21-30%	65	90
31-40%*	85	110

Table A5.6. Setback distances for Enosburg Falls, based on the slope of the adjacent land. Distances are in feet.

District	Minimum river/ stream setback distance
Agricultural/ Rural/ Residential	50
Central Business District	Avg of front yard setbacks of buildings adjacent to structure, never > 25 feet
Commercial District	100
Conservation District	The DRB may specify dimensional req'ts.
Flood Hazard Overlay District	Same as underlying District.
High Density Residential District	50
Industrial District	100
Low Density Residential District	50
Recreation District	50

- ***All towns except for Lowell, Richford, Troy and the Village of North Troy have zoning bylaws regulating land use in the Flood Hazard Areas (FHAs)***
- ***Berkshire, Enosburg Falls, Enosburgh, Jay, Montgomery and Westfield have bylaws prohibiting development of areas near waterways. Lowell, Troy, North Troy and Richford do not..***
- ***All Study towns except for Lowell, Richford, Troy and the village of North Troy have setbacks or buffers required by their zoning bylaws. Allowable activities within these buffers vary.***
- ***The progressive zoning districts implemented by Enosburgh and Enosburg Falls may be a good model for all the Study area towns; however, standardized buffers may be easier to understand and enforce.***
- ***Funding and assistance from ANR through Act 110 could help towns and villages decide on flood hazard mitigation and buffer language to include in their town plans and zoning bylaws.***

Endnotes

1. Federal Clean Water Act Summary: www.epa.gov/owow/watershed/wacademy/acad2000/cwa/index.htm
2. Ground water is not specifically addressed in the CWA. Drinking water is addressed directly in the Safe Drinking Water Act, which is overseen by the EPA Office of Water and requires that states develop EPA-approved programs to carry out assessments of all sources of drinking water in the state.
3. www.epa.gov/lawsregs/laws/cwa.html
4. http://www.epa.gov/agriculture/lrca.html#About; http://www.anr.state.vt.us/dec/wastediv/rcra/rcrahome.htm
5. Section 303 of the CWA: water.epa.gov/lawsregs/guidance/303.cfm
6. Full text of the Vermont Water Quality Standards: www.state.vt.us/nrb/wrp/publications/wqs.pdf
7. The Vermont Statutes are referenced throughout. Find the complete statutes online: www.leg.state.vt.us/statutesmain.cfm
8. Chapter 33, Section 1250 of the U.S. Code: www.gpo.gov/fdsys/pkg/USCODE-2010-title33/pdf/USCODE-2010-title33-chap26-subchapI-sec1251.pdf
9. Vermont Statutes, Title 10, Chapter 47: www.leg.state.vt.us/statutes/sections.cfm?Title=10&Chapter=047
10. Watershed Management Division (formerly Water Quality Division) webpage: www.vtwaterquality.org/
11. ARMES Division Webpage: www.vermontagriculture.com/ARMES/awq/AWQ.html
12. Agency of Natural Resources, Draft Basin 6 [Missisquoi Basin Watershed] Water Quality Management Plan, dated November, 2012.
13. Title 24, Ch. 117 of the Vermont Statutes - "Municipal And Regional Planning And Development": www.leg.state.vt.us/statutes/sections.cfm?Title=24&Chapter=117
14. "Conserving Vermont's Natural Heritage" is a publication of the State of Vermont Department of Fish & Wildlife. Available online: www.vtfishandwildlife.com/library/maps/Community_Wildlife_Program/complete.pdf
15. Some text taken from Addison County, VT Regional Plan: http://www.acrpc.org/pages/publications/Reg_Plan/NR_2.htm
16. ANR Basin Planning homepage: www.vtwaterquality.org/planning.htm
17. Federal statute referring to basin planning: www.law.cornell.edu/cfr/text/40/130/6
18. Northwest Regional Planning Commission webpage: www.nrpcvt.com/
19. Missisquoi Basin Plan Information: www.vtwaterquality.org/planning/htm/pl_missisquoi.htm
20. Text taken directly from: www.anr.state.vt.us/dec/permit_hb/sheet47.pdf
21. VT DEC Permit Specialist Locator: www.anr.state.vt.us/dec/ead/pa/index.htm
22. VT DEC, River Management Program, Act 110 Summary Document: www.vtwaterquality.org/rivers/docs/rv_act110_rcmp_%20summary.pdf
23. VT DEC River Management Program: vtwaterquality.org/rivers.htm
24. Vermont Wetland Rules, full text: www.nrb.state.vt.us/wrp/publications/VWR%207-16-10.pdf
25. Wetland Permit Information: www.vtwaterquality.org/permits/htm/pm_cud.htm
26. VT DEC Wetlands Program: www.vtwaterquality.org/wetlands.htm
27. Enosburgh Zoning Bylaws: http://enosburghvermont.org/Forms/Enosburgh%20Zoning%20Bylaws.pdf

Appendix 6. Protections - Historic and Cultural Resources

Historic and Cultural Protections

Opportunities to explore historic and cultural resources draws visits from local Vermonters and those from abroad. The State of Vermont recognizes that preserving historic resources is vital, and has many programs in place to ensure the continued protection of these resources through review and support from the Vermont Division of Historic Preservation under the Vermont Department of Economic, Housing and Community Development. The following are the current Federal, State and local protections for historical and cultural resources.

Federal Historic and Cultural Protections

The National Register of Historic Places

The National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.[1] Historic sites may be entered in the National Historic Register after nominations are submitted by historians and/or archaeologists, usually employed by the property owner. In Vermont, the nominations are generally prepared cooperatively with the State Division for Historic Preservation. In the towns where nominations are being prepared, planning commissions and property owners are given the opportunity to support or reject listing in the National Register. Nominations are reviewed by the Vermont Advisory Council on Historic Preservation before they are submitted to the National Park Service, which oversees the National Registry and makes the final determination regarding the site's inclusion in the National Register. For more on the National Register application process, see: http://www.cr.nps.gov/nr/national_register_fundamentals.htm.

Designation of a site or building on the National Historic Register, though an honor of recognition, does not qualify the site for special protections from development or alteration, nor does it impose any legal requirements on the property owner. Owners of the registered site or building are free to alter the property as they wish using private funds. However, designation does regulate the use of federal money for projects that may affect the site. Designation of a site on the National Historic Registry protects the site from any federally assisted, licensed, or permitted projects that may adversely affect the site or its surroundings. For example, a federally-funded road improvement project may not lawfully impact an historic site or its surroundings.

A historic district is a group of buildings that are related architecturally and/or historically and are listed together in the National Register. The downtown area of Richford, on Main and River Streets, is an example of a historic district in the upper Missisquoi and Trout Rivers Study area. The same rules for sites apply to individual buildings in a historic district; the owner of a building in a historic district is free to alter the building using private funds.

The National Register of Historic Places is the most relevant, current federal protection regarding the historic resources in the upper Missisquoi and Trout Rivers Wild & Scenic Study Area. However, there are many national laws and acts that have led to and affected the National Register which are listed below. A full discussion of these acts is available here: http://www.nps.gov/archeology/public/publicLaw.htm.

The first national preservation policy signed into law was the Antiquities Act of 1906,[2] which authorized the President to set aside historic landmarks, historic or prehistoric structures, or other objects of historic or scientific interest on lands controlled by the federal government as national monuments. This Act created penalties for the unauthorized disturbance or collection of historic or prehistoric ruins or monuments on federal lands. The Historic Sites Act of 1935[3] declared the preservation of historic sites, buildings, and objects to be a national policy, and created the National Park Service Advisory Council on Historic Sites.

The National Register of Historic Places was created through the National Historic Preservation Act of 1966[4] (NHPA). The Register of Historic Places includes properties of State and local significance, National Historic Landmarks (NHLs), and historic units of the National Park System. The Act allowed for historic preservation grants to assist the preservation of properties listed in the National Register. National Historic Landmarks are also eligible for these preservation grants. **Section 106 of the NHPA requires federal agencies to consider properties included in or eligible for the National Register during federal project planning and allows the Advisory Council on Historic Preservation an opportunity to comment before funding, licensing, or assisting projects that would affect them**.[5] [Emphasis added by Management Plan author.]

The also NHPA allows for contemporary archaeological investigations to be performed as part of the environmental review process. Importantly, the act also enables archeological sites to be listed on the National Register of Historic Places. The Archaeological Resources Protection Act of 1979[6] and the Native American Graves Repatriation Act of 1990[7] place further protections on historically significant locations and their artifacts.

State Historic and Cultural Protections

State Register of Historic Places

There is no digital list in Vermont of the State Register of Historic Places. One may have access to the paper archives at the Vermont Division for Historic Preservation in the National Life Building, 2nd Floor, Montpelier, VT. Some information may also be found on the Division for Historic Preservation websites (http://historicsites.vermont.gov/; and http://accd.vermont.gov/strong_communities/preservation).

The State of Vermont intends that municipalities, regional planning commissions and State agencies continue to identify, protect and preserve important natural and historic features of the Vermont landscape, including important historic structures, sites, or districts, archaeological sites and archaeologically sensitive areas (24A V.S.A. § 4412). The placement of wireless telecommunication towers is also restricted when the facility may adversely impact an historic site (24 V.S.A. § 2291).

The Vermont Division for Historic Preservation reviews and comments on projects involving State funding, licenses or permits under The Vermont Historic Preservation Act (22 V.S.A. Chapter 14). This review looks at possible negative impacts on historic resources including those sites listed on the Vermont Register of Historic Places and any potentially historically, architecturally, archeologically or culturally significant sites.

The Vermont State Archaeologist has the authority to designate a site as a "State Archaeological Landmark" if the site is determined to be of significance to scientific study or represents the state's historical, pre-historical or aboriginal past. This designation allows the State to restrict access and field investigation privileges on State lands in order to preserve and protect historical resources that may be present there (22 V.S.A. § 762). All

State agencies managing public lands that hold these sites must cooperate to insure the protection of these landmarks. **State Archaeological Landmarks on private lands will not be designated without the written consent of the landowner** (22 V.S.A. § 763). [Emphasis added by Management Plan author.] Information regarding the location of these Landmark sites will remain confidential, but the State archaeologist may share the information with qualified individuals or organizations for scientific research or preservation and planning purposes (22 V.S.A. § 761). It is against State law to dig, collect or disturb archaeological resources or burial grounds on any public land or under State waters (22 V.S.A. § 762, 764, 782). On private land, archaeological sites and the artifacts there belong to the landowner. Burial sites, however, are protected from disturbance on both public and private lands (13 V.S.A. § 3761, 3764; 18 V.S.A. § 5212).

The Vermont Division of Historic Preservation is authorized to take steps for the preservation of Historic Bridges, nine of which exist over sections of the Study rivers. The Division may accept transfer of bridges from the Agency of Transportation that have been deemed appropriate for preservation by the Secretaries of the Agency of Transportation (AOT) and the Agency of Commerce and Community Development (ACCD). After ownership of the bridge is transferred, a right-of-way is maintained so that public use of the bridge may continue. The Division of Historic Preservation is further authorized to maintain, preserve, protect and control the use of historic bridges, bridge sites and bridge approaches. The Division is also authorized to remove the bridge to an off-site location for repairs (19 V.S.A. § 317), as is the current situation of the Hectorville Covered Bridge in Montgomery.

Act 250

Environmental Criterion 8 of Act 250 (10 V.S.A. Chapter 151) is of particular note to the historic and cultural resources in the Wild & Scenic Study towns. The Vermont Division for Historic Preservation reviews and comments on projects involving State funding, licenses or permits under Criterion 8. This review looks at possible negative impacts on historic resources when considering the issuance of an Act 250 permit. All sites on the National or Vermont State Register of Historic Places are considered "historic sites" under Act 250. Projects requiring a Certificate of Public Good under Section 248 of Title 30 from the Public Service Board are also evaluated using the ten Criteria of Act 250.

Act 250 imparts a 3-tier approach to protecting historic, archeological, and paleontological resources. Act 250 first asks "Is a historic or archeological site present?" If so, it then determines if a project's impact is "adverse", and, if in the affirmative, are the project's impacts "undue"?

If a site is not currently listed as an archeological site but evidence suggests that the site was occupied by Pre-Europeans, Act 250 can require that an archeological investigation be conducted at the site previous to any land development and granting of an Act 250 permit.

For more information on Act 250, please see the Act 250 chapter in Appendix 9, or contact your local District Coordinator.

The Downtown Development Act

Downtowns, including villages, may be designated and become eligible for funds for revitalization efforts. Enosburg Falls, Montgomery Center and Village and Richford are so designated, and thus eligible to receive

priority for grant funds. Landowners in designated areas are also eligible to receive tax credits for renovation and revitalization projects.

Regional Plans (Non-regulatory)

The Northwest Regional Planning Commission's (NRPC) Regional Plan for 2007-2012 states that "Historic structures, community facilities, and other buildings should be preserved and adapted for re-use." They also suggest utilizing federal, state, and local programs for developing or preserving local cultural and historic assets."

The Northeastern Vermont Development Association's (NVDA) Regional Plan (2006) suggests a 200 foot buffer to protect archeologically significant areas found along the Missisquoi and Trout Rivers. Goals in this Plan include preserving important historical structures and mapping potential archeological sites.

Towns and Villages (Local Historic and Cultural Protections)

All of the Study towns reference the importance of maintaining and preserving historical and/or archaeological sites in their respective town plans. However, only five of the ten towns and villages (those in Franklin County) have provisions in their zoning bylaws that offer regulatory protection to these cultural resources. Lowell, Westfield, Jay and Troy and North Troy (which share a Town Plan and Zoning Bylaws) have no zoning bylaws protecting historic resources. Montgomery and Richford have provisions regarding the placement of wireless telecommunication towers and facilities; specifically, that the facility may not have an adverse aesthetic impact on historic sites, including the view from those areas. Berkshire's Bylaws state that all roads and planned unit developments must be laid out in such a way that natural areas and historic sites are preserved and protected. Enosburgh prohibits any development from having an adverse impact on historic, cultural, and archaeological areas. Enosburg Falls is explicit in its provisions for the preservation of historic places, including a specification that "adaptive reuse" of historical buildings may be employed "to continue the viability, reuse, restoration and rehabilitation of historically, culturally or architecturally significant structures within the Village of Enosburg Falls."

Berkshire

The following information is listed in Berkshire's Town Zoning Bylaws:

> **Section 8.6 ROADS AND PEDESTRIAN ACCESS**: Roads shall, to the extent feasible, be designed and laid out to: avoid adverse impacts to natural, historic, cultural and scenic resources
>
> **Section 9.5 OPEN SPACE AND COMMON LAND**: A) Intent. Planned Unit Developments shall be designed to preserve open space and/or common land for parks, recreation, critical areas as identified in the Berkshire Comprehensive Town Plan, agricultural land, scenic views, and/or historic site protection.

The Berkshire Town Plan (adopted 4/26/10) also sets forth the goal to protect in good quality the abundant natural and historic resources in Berkshire.

Enosburg Falls, Village of

The following information is listed in the Village of Enosburg Falls' Town Zoning Bylaws:

SECTION 8.11 HISTORIC STRUCTURES AND SITES: A) Subdivision and development plans shall be designed to protect existing historic resources of all classes. The protection of an existing historic resource shall include the conservation of the landscape immediately associated with and significant to that resource, to preserve its historic context. Where, in the opinion of the Development Review Board, a plan will have an impact upon a historic resource, the developer shall mitigate that impact to the satisfaction of the Development Review Board by modifying the design, relocating proposed lot lines, providing landscape buffers, or other approved means. See also Section 5.2 Adaptive Reuse of Historic Structures.

SECTION 5.2 ADAPTIVE REUSE OF HISTORIC STRUCTURES: A) Adaptive reuse is intended to encourage the continued viability, reuse, restoration and rehabilitation of historically, culturally or architecturally significant structures within the Village of Enosburg Falls. The adaptive reuse of such a structure is allowed in certain zoning districts as provided in Table 2.1 and is subject to conditional use review under Section 3.2, site plan review under Section 3.3, and the provisions below.

Telecommunications Facilities: E) Additional Conditional Use Criteria. In addition to the Conditional Use Standards in Section 3.3 and the construction standards in (E) above, the Development Review Board shall approve an application for a Wireless Telecommunications Facility when it finds that the application does not impose more than a de minimus impact on the following criteria:

1. The Facility will not unreasonably interfere with the view from any public park, natural scenic vista, historic building or district, or major view corridor.
2. The Facility will not have an undue adverse aesthetic impact. In determining this, the Development Review Board shall consider the following factors:
   i. Any significant disruption of a viewshed that provides context to an important historic or scenic resource.

Section 6. Planned Unit Development; SECTION 6.3 GENERAL STANDARDS: A) The following shall be met in order for the Development Review Board to approve the application:

1. The project shall be consistent with the Enosburg Falls Municipal Plan.
6. The development shall be an effective and unified treatment of the project site, and make appropriate provision for preservation of streams, stream banks, visual and physical access to the Missisquoi River, slopes greater than 25%, wetlands, soils, *historic sites*, natural areas, wildlife habitat, flood plain, and views.

SECTION 8.3 SITE PRESERVATION AND EROSION CONTROL (GRADING, EXCAVATION, AND DEVELOPMENT ON STEEP SLOPES): A) Existing Features. Site amenities including trees, surface waters, historic sites, farmland, ridgelines, unique geologic features, archaeological resources or any other unusual features, which the Development Review Board determines are assets to the site and/or the community shall be preserved.

The Enosburg Falls Village Plan (adopted by the Trustees 8/26/08) also sets forth the goals to consider historic/ scenic character in decisions regarding paving, widening of streets, installation of sidewalks, and development

permits; and support the efforts of the Enosburg Historical Society in protecting the historic character and buildings of the Village and in informing the public about local history.

Enosburgh

The following information is listed in the Village of Enosburg Falls' Town Zoning Bylaws:

> **SECTION 460 REVIEW OF CONDITIONAL USES *and* SECTION 455 INITIATION OF CONSTRUCTION: (E) Conditional Use Specific Review Standards -** In order to find that the development will satisfy the above criteria, the Development Review Board shall specifically find, where applicable, that the proposed project will: **(5)** not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, or cultural and historic sites; or important environmental resources, wildlife habitat, wetlands, streams, rivers and ponds, or rare or irreplaceable natural areas identified in the Enosburgh Town Plan (approved by the Selectboard 9/9/08);
>
> **Article VI, Section 640:** (F) In the design of developments, significant natural and fragile areas including critical wildlife and plant habitat; water resources such as lakes, rivers, aquifers, and wetlands; historic, cultural, and archaeological areas; significant scenic roads and views; unfragmented forest and woodlands; and significant landforms shall be preserved in accordance with the standards set out in this bylaw or the Subdivision Regulations, whichever is applicable.
>
> **SECTION 765 PLANNED UNIT DEVELOPMENTS:** (1) Open space land shall provide for the protection of resources on the site including agricultural land, productive woodland, wildlife habitat, natural areas, aquifer protection areas, wetlands, views and vistas, streams, stream banks, bodies of water, and historic sites.
>
> The Enosburgh Town Plan also sets forth the goal to protect and preserve the archaeological, historic and scenic features in Enosburgh for future generations.

Jay

The Town of Jay does not have Zoning Bylaws directly related to protecting historical and cultural resources.

Policy #4 in the Town of Jay's Town Plan (adopted by the Selectboard 12/20/10) states that Jay should provide for the preservation of the history of the town.

Lowell

The Town of Lowell does not have Zoning Bylaws directly related to protecting historical and cultural resources.

The Lowell Town Plan (re-adopted 4/14/09) states that the revision of the Lowell Zoning Bylaw should also include provisions that will protect Lowell's natural, scenic, and historic resources for the future benefit and enjoyment of all of Lowell's residents, both human and otherwise.

Montgomery

The following information is listed in the Town of Montgomery's Town Zoning Bylaws:

> ***With regard to telecommunication tower placement:*** 6.6.3 Additionally, freestanding telecommunications towers or antennas over 20 feet in elevation may not be located in any of the following locations: 6.6.3.3 Within 500 ft. horizontally from any Historic District or property eligible to be listed on the Federal Historic Register. 6.6.3.7 Within 1 ~ x height horizontally of any known archeological site. 6.12 **Tower and Antenna Design Requirements:** Proposed facilities shall not unreasonably interfere with the view from any public park, natural scenic vista, *historic building or district*, or major view corridor.

The Montgomery Town Plan (amended and updated 8/2010) also sets forth the goal to recognize the role of Montgomery's archeological, historic, and scenic resources in shaping the town's present quality of life and future opportunities.

Richford

The following information is listed in the Town of Richford's Town Zoning Bylaws:

> ***With regard to telecommunication tower/facility placement:*** **E) Additional Conditional Use Criteria:** 4) The [Telecommunications] Facility will not unreasonably interfere with the view from any public park, natural scenic vista, historic building or district, or major view corridor. 5) The Facility will not have an undue adverse aesthetic impact. In determining this, the Development Review Board shall consider the following factors: i. Any significant disruption of a viewshed that provides context to an important historic or scenic resource.

The Richford Town Plan (2007) also sets forth the goal to recognize the role of Richford's archeological and historic resources in shaping the town's present quality of life and future opportunities.

Troy/North Troy

The Town of Troy and the Village of North Troy have a combined Town Plan (adopted 3/20/08) and Zoning Bylaws.

The Town of Troy does not have Zoning Bylaws directly related to protecting historical and cultural resources.

The Troy Town Plan specifically mentions the archeological potential and rich history of the Town and Village. The Plan specifically lists the two known archeological sites, the River Road Covered Bridge and the North Troy Border Station as historical and pre-contact resources.

Westfield

The Town of Westfield does not have Zoning Bylaws directly related to protecting historical and cultural resources.

The Westfield Town Plan (adopted 11/16/09) specifically lists the Hitchcock Museum and Library as Westfield's most important community/historic landmark, and states that the Missisquoi River through Westfield is a corridor of "expected archeological sensitivity."

Table A6.1. Presence of protections in town zoning regulations. Please see the *Protections* section of this Management and the town plans for more information.

Town	Number of Sites in National Register of Historic Places	Protection of Historical/ Archaeological features referenced in Town Plan?	Historical/Archaeological protections in Zoning Bylaws? *(with relevant sections of Bylaws)*
Berkshire	0	Yes	• Roads shall be designed and laid out to avoid adverse impacts to historical, cultural and scenic resources (*Section 8.6*) • Planned Unit Developments shall be designed to preserve open space and/or common land for historic site protection. (*Section 9.5*)
Enosburg Falls	1	Yes	• Subdivision and development plans shall be designed to protect existing historic resources of all classes. The protection of an existing historic resource shall include the conservation of the landscape immediately associated with and significant to that resource, to preserve its historic context. (*Section 8.11*) • Adaptive reuse shall be used to continue the viability, reuse, restoration and rehabilitation of historically, culturally or architecturally significant structures within the Village of Enosburg Falls. (*Section 5.2*) • No telecommunications facility may unreasonably interfere with the view from any historic building or district, as determined by the DRB. (*Section 5.13*) • All new development shall make appropriate provisions for preservation of historic sites. (*Section 6.3*) • Site Preservation - Existing site amenities, including archaeological resources, which the DRB determines are assets to the site and/or the community, shall be preserved. (*Section 8.3*)
Enosburgh	5	Yes	• Development must not have an undue adverse effect on the scenic or natural beauty of significant natural and fragile areas, which include historic, cultural, and archaeological areas. (*Sections 455, 460, 640 and 765*)
Mont-gomery	8	Yes	• Telecommunication towers may not be placed within 500 ft. of any Historic District or property eligible to be listed on the Federal Historic Register, or within 1x the height of any known archaeological site. Telecommunication facilities must also not interfere with the view from any of these areas. (*Sections 6.6 and 6.12*)
Richford	5	Yes	• Telecommunication facilities must not interfere with the view from any natural area including historic buildings and major view corridors. The facility cannot have an adverse aesthetic impact, as determined by the DRB. (*Section 5.9*)
Jay	0	Yes	No
Lowell	0	Yes	No
Westfield	0	Yes	No
Troy	1	Yes	No

Potential Gaps in Protections:

- Federal and State laws prohibit the disturbance of historic and archaeological sites on public lands. Since there is very little public land in the Study area, many sites in the area have little if any protection from disturbance.
- Only sites in the National Register of Historic Places have protection from Federally funded projects, other historic sites do not. Privately funded projects on private lands are allowed even if they impact historic places in the National Register.
- Vermont laws state that archeological sites and their artifacts on private land belong to the landowner. This is especially relevant in the "Areas of Archaeological Sensitivity" that have been identified along the Study rivers throughout most of the Study area. Many of these areas have not had thorough archaeological investigations, and remain in the hands of private landowners.
- Lowell, Westfield, Jay, Troy and North Troy do not have township-level bylaws about the protection or preservation of historical or archaeological sites, even though sites likely exist in all of these towns.
- Montgomery's and Richford's bylaws regarding the protection of historical and archaeological sites are limited to regulating the location of new telecommunication towers. With Montgomery's abundance of covered bridges (which are all in the National Register of Historic Places), more explicit provisions regarding the protection and preservation of sites may be important.

Endnotes

1. http://www.cr.nps.gov/nr/index.htm
2. http://www.cr.nps.gov/local-law/FHPL_AntiAct.pdf
3. http://www.cr.nps.gov/local-law/FHPL_HistSites.pdf
4. http://www.cr.nps.gov/local-law/FHPL_HistPrsrvt.pdf
5. National Historic Landmarks: http://www.cr.nps.gov/nr/publications/bulletins/nhl/nhlpt2.htm
6. http://www.cr.nps.gov/local-law/FHPL_ArchRsrcsProt.pdf
7. http://www.cr.nps.gov/local-law/FHPL_NAGPRA.pdf

Appendix 7. Bird Resources of the Missisquoi Watershed

Bird Resources of the Missisquoi Watershed

Missisquoi National Wildlife Refuge

The Missisquoi National Wildlife Refuge (MNWR) in Swanton is an Important Bird Area that provides critical habitat for a large number of Vermont Species of Greatest Conservation Need such as great blue heron, osprey, the state-threatened black tern, pied-billed grebe, and least bittern. The 6,729 acre refuge was established in 1943 to protect important stopover habitat for large flocks of migratory birds, particularly waterfowl. This area includes most of the Missisquoi River delta where it flows into Missisquoi Bay. The quiet waters and wetlands are fed by the waters of the Upper Missisquoi and Trout Rivers in the Study area, and attract large flocks of migratory birds. In addition, the refuge also hosts a large great blue heron rookery, the largest black tern population in Vermont, and nearly a third of the nesting ospreys in the state which was over 30 active nests in 2009 (GMAS website, 2012). Wood Ducks are also abundant in the refuge, and the grasslands on Tabor Road host the largest bobolink population in Vermont.

Recreational Birding

Like across much of the US, birding is an important and thriving industry in Vermont. A quick web search will give you information about birding organizations, books to buy, bird tours, places to bird watch, and a VT birding email list. Birders living in Vermont spend money on bird seed, birding paraphernalia, and travel, and out-of-state birders from around the globe make Vermont one of their birding vacation destinations. Trails, signs, boardwalks, viewing blinds, and platforms are all important parts of creating easy and meaningful access for recreational birders. The Lake Champlain Birding Trail unifies and connects 88 birding sites – including the Missisquoi National Wildlife Refuge (MNWR) - along the Lake Champlain shoreline and uplands in Vermont and New York into a cohesive and marketable unit. Though not directly within our Study area, the water quality of our area directly promotes quality bird habitat in the MNWR, and this trail (trail map and brochure) could bring visitors to the uplands in our area.

Significant Ecological Areas in the Study area important to birds:

McAllister Pond Marsh: Listed in the VT River Study as an important resource, this 20-acre pond and marsh habitat complex in Lowell supports many species of waterfowl as well as a trout fishery.

Jarvis Brook Heron Rookery: Multiple pairs of Great blue herons sometimes congregate at group nesting sites, called rookeries. There are 32 known Heron Rookeries in Vermont, and the largest one (~500 nests) is in Missisquoi Bay. The Jarvis Brook Heron Rookery is in the town of Enosburgh. From the town plan – "This is a partially wooded, deep marsh area which supports a great blue heron nesting colony on a half-mile stretch of an unnamed tributary of the Jarvis Brook."

Critical Wildlife Habitats

Bicknell's Thrush IBA Complex: The high-elevation forests and ridges of the Green Mountains in Jay State Forest are part of the statewide Bicknell's Thrush IBA Complex. In Vermont, this rare species is at the southern extent of its range and only nests on the highest mountain tops. Threats to this species

include habitat degradation and fragmentation due to ski area, communications tower, and wind turbine development. Atmospheric pollution may be affecting forest health, and climate change could profoundly impact long-term viability of montane balsam fir forest habitats. Research and monitoring, such as that conducted through Mountain Bird Watch, are critical for understanding and responding to how this species reacts to ongoing threats.

Peregrine Falcon IBA Complex: The cliffs located in Hazen's Notch in Lowell are a known nesting site for peregrine falcons and are part of the Peregrine Falcon IBA Complex. This rare species was recommended for delisting from the state endangered species list in 2003 after the population began to rebound. Increased survival rates are attributed to banning of use of DDT and protection and monitoring of nests sites across the state conducted by the Vermont Peregrine Project. Human disturbance on or near nesting cliffs is the greatest known problem to peregrines nesting in Vermont. Continuing to monitor nest sites throughout the state and work with landowners and recreational user groups to reduce/minimize human disturbance at nesting cliffs through access closures during the breeding season are important strategies for protecting this species.

Forest Bird Habitat

Vermont's forests provide critical breeding habitat for a high diversity of forest birds that is significant at a continental and global scale. The Atlantic Northern Forest of Vermont, New Hampshire, Maine and New York provide breeding habitat for dozens of bird species like the Black-throated Blue Warbler, Canada Warbler, Wood Thrush and the Bicknell's Thrush. These species and dozens more have in some cases 90% of their global population breeding in this region. Although common in our region, many of these birds are seeing long-term declines that, like the proverbial "canary in the coal mine," may be indicating larger ecosystem problems.

The North American Bird Conservation Initiative (NABCI) defines birds like these as *responsibility birds*. A responsibility bird has a high proportion of its global population breeding in the region, and therefore species conservation efforts should be focused in this area. The concept is simple. Rather than wait for a bird species to become vulnerable and end up on a threatened or endangered species list, we can take action to conserve birds in the core of their population range. The advantage to this approach is that low-cost stewardship activities, education and monitoring can help maintain or increase the populations of these birds.

Audubon Vermont's Forest Bird Initiative is integrating science, education, public policy and forest management expertise to conserve forests within Vermont that are important to birds, by identifying, monitoring and stewarding a network of forest Important Bird Areas (IBA) that support a significant number of breeding forest birds to maintain viable global populations of responsibility bird species. None of these forest IBAs fall within the Study area (though Audubon Vermont is currently in the process of mapping continental and global forest IBAs in cooperation with other states along the Atlantic Flyway); however, there are large blocks of unfragmented forest present in the Study area, particularly around Jay Peak, that are high quality habitat for the full suite of forest responsibility birds. In addition to providing high-quality habitat for birds and other wildlife, extensive areas of upland forest play a critical role in protecting the water quality within the Upper Missisquoi and Trout River watersheds by minimizing soil erosion and landslides, stabilizing stream channels, absorbing and mitigating floodwaters, and filtering water.

Forested Bird Habitat - Threats:

- Loss and degradation of forest habitat caused by conversion from forestlands to other land uses

- Forest fragmentation (when there is no connectivity between habitats, the forested landscape can become unconnected, small pockets of forested land rather than continuous stretches)
- Global climate change (please see more information at the end of this appendix section)
- Lack of structurally diverse, high-quality forest habitat (meaning there is a lack of forest age class diversity, many ages of trees rather than a uniform age, across the landscape and lack of old, 100+ year old trees, in the forest)

Forested Bird Habitat – Opportunities for Action/Recommendations:

≈ Assist landowners and foresters with planning for forest management that enhances bird habitat for responsibility species (those species with a high proportion of its global population breeding in our region, discussed above, such as the veery, black-throated blue warbler, or wood thrush)

≈ Promote ways of generating income (such as maple syrup production) from forest parcels as an alternative to sale, development, or parcelization (cutting one large piece of land into small subsets)

≈ Work with interested towns and initiatives such as Staying Connected to protect large blocks of forest and key wildlife habitat in town plans and zoning bylaws

Riparian Bird Habitat

Riparian ecosystems along the streams and rivers in the Study area provide important habitat for a high diversity of birds. General river and stream riparian habitat types include: floodplain forests, forested swamps, shrub swamps, marshes, wet meadows, and shores. Additionally, the river itself provides important habitat for birds such as mergansers, solitary sandpipers, killdeer, kingfisher, herons, and more. The following table lists some bird species that are likely associated with these riparian ecosystems within the Study area:

Riparian Habitat Type (Links to Wetland, Woodland, Wildland text)	**Associate Bird Species**
Floodplain Forests	Veery+* Eastern wood pewee+ Blue-grey gnatcatcher Yellow-throated vireo
Forested Swamps	Veery+* Canada warbler+* Red-shouldered hawk* Wood duck White-throated sparrow+ Northern parula+
Shrub Swamps	Alder flycatcher+ American woodcock+* Veery+*
Marshes and Wet Meadows	American bittern* American black duck* Great blue heron* Blue-winged teal*
River Shores	Great blue heron*
Rocky-bottomed Forest Streams	Louisiana waterthrush+

+ = Audubon Vermont Forest Responsibility Species
* = Vermont Species of Greatest Conservation Need

In addition to providing quality bird habitat, riparian (riverside) ecosystems also buffer aquatic plants and animals from disturbance; prevent wetland and water quality degradation; mitigate flooding; and provide organic matter, structure, and nutrients for aquatic systems.

Riparian Bird Habitat - Threats:

- Loss and degradation of forest habitat caused by conversion from forestlands to other land uses
- Riparian Buffer/Forest fragmentation (when there is no connectivity between habitats, the forested landscape can become unconnected, small pockets of forested land rather than continuous stretches
- Non-native invasive species (see the water quality chapter for a greater discussion on invasive species)
- Alteration within the river including dredging, armoring or straightening, or changes to water flow
- Pollution input to the rivers from runoff from the land or carried in by the tributaries
- Incompatible recreation including intense use of river shores which could cause degradation of water quality, important habitat and food sources and trampling near nests

Riparian Bird Habitat - Opportunities for Action/Recommendations:

≈ Many initiatives to maintain good water quality in the Missisquoi and Trout Rivers would also support preservation of critical wildlife habitat including surveys of and protection of riparian (riverside) habitats

≈ Provide technical assistance and support to private landowners, towns and regional planning commissions to maintain and enhance riparian habitats, and reduce invasive species abundance

≈ Identify those areas with greatest conservation potential, and work with willing landowners to protect those with the greatest number of Species of Greatest Conservation Need (SGCN) such as osprey, peregrine falcon, or great blue heron or rare, threatened or endangered species

≈ Help to avoid placing access areas located in ecologically sensitive sites, and help manage those that are already established

≈ Promote education and use of forest management practices in floodplains and forested swamps that protect the ecological integrity of these sensitive ecosystems

Grassland Bird Habitat

Hayfields, meadows, and hedgerows associated with agricultural use along the river valleys in the Study area are able to provide quality nesting habitat for several birds of Greatest Conservation Need (SGCN) in Vermont. Bobolinks utilize large (5+ acre) expanses of grassland or fallow hay fields with little or no alfalfa, high litter cover and scattered broad-leafed forbs for nest-site cover (Vermont's Wildlife Action Plan, 2005). Northern Harrier habitat includes marshy meadows, wet, lightly grazed pastures, old fields, mesic grasslands, and drained marshlands. Upland Sandpipers prefer large grassland areas (20-40 ha) with a mosaic of grassland types as areas of short grass are used for feeding while areas of taller grass (10-30 cm) are used for nesting. American Kestrels nest in cavities or nest boxes in most open areas. Other grassland birds of high conservation need include Eastern meadowlark and field sparrow. These aforementioned species, bobolink, harrier and upland sandpiper, benefit from grasslands that are not subjected to early (before July 15) mowing.

Grassland Bird Habitat - Threats:

- Habitat degradation caused by early hay harvests and heavy grazing rotations
- Loss and degradation of forest habitat caused by conversion from forestlands to other land uses
- Forest fragmentation (when there is no connectivity between habitats, the forested landscape can

become unconnected, small pockets of forested land rather than continuous stretches)
- Loss of field habitat due to field abandonment and ensuing natural succession back to forest

Grassland Bird Habitat - Opportunities for Action/Recommendations:

≈ Encourage managing grasslands using the USDA/NRCS pamphlet which promotes delaying mowing until after breeding (August 15 if possible or at least until after July 15)

≈ Vermont Fish and Wildlife recommends including language in your town plan which states "Where appropriate, encourage management of existing grasslands larger than five acres, including artificial habitats, in a manner compatible with successful grassland bird nesting. Identify and maintain or increase populations of rare grassland birds in the town."

≈ Develop education and outreach program to provide information about grassland/hedgerow dependent species and management options to enhance their populations in Vermont, including cost -share programs, such as NRCS, and support the excellent management already in progress in our Study area

Climate Change: Impacts on Vermont Birds and Forests

Taken from: *Managing Your Woods with Birds in Mind: A Vermont Landowner's Guide. Put out by* Audubon Vermont and the Vermont Department of Forests, Parks, and Recreation. 2012.

Global climate change is having regional impacts on Vermont forests and birds. Though implications for individual species can appear benign, potential disruptions of complex ecosystem connections and process are far-reaching and serious for forests, birds, other wildlife, and people. Forest landowners should keep the following trends in mind as they plan for the future of their forests:

Climate changes in Vermont	*Impacts on Birds*	*Impacts on Forests*
Longer growing seasons. More frequent winter thaws and earlier springs. Less winter precipitation falling as snow and more as rain. Increased heavy downpours. Earlier spring snowmelt resulting in earlier peak river flows. More frequent short-term droughts in late summer and fall. More frequent hot (over 90° F), humid days.	**Shifts in bird ranges.** Nearly 60% of bird species that winter in North America have moved their ranges northward or inland over the past 40 years with shifts that can exceed hundreds of miles. **Changes in the timing of bird migration and life cycle events.** Many birds are arriving on their breeding grounds and are laying their eggs earlier. Birds that arrive too early are at risk for exposure to late spring storms. **Bird stress and mortality are anticipated to increase** in association with increased exposure to extreme weather events, more frequent mismatches in time and space between birds and their food, exposure to new pests and pathogens, and lack of suitable habitat in new ranges.	***Changes in forest types and plant species distribution.*** Spruce-fir forests are being replaced by hardwoods at high elevations. At lower elevations, oak-pine forests will likely replace forests dominated by sugar maple and other northern hardwoods. ***Increased spread of forest pests***, such as hemlock wooly adelgid, that can survive milder winters and take advantage of stressed trees. Non-native, invasive plants may also spread. ***Forest-based economy will be impacted*** by changes in timing and extent of peak fall foliage, shortened winter logging season, stresses on maples in sugarbushes, and reduced snow fall for winter recreation.

What you can do

≈ Increase the chances that your forest and its inhabitants can successfully adapt to climate change by creating a diverse forest that includes a variety of species, stand structures, and age classes.

≈ Maximize the resiliency of your forest to climate change by reducing other stresses on your forest through invasive plant management, reducing frequency of harvests, and other strategies.

≈ Help scientists learn more about how birds are responding to climate change by entering when and where you observe birds – whether in the woods or your backyard – into the online citizen science database eBird: www.ebird.org Add to 10 years' worth of contributions from amateur birdwatchers – more than 28 million observations!

Additional Resources

- Northeast Kingdom Audubon Society: www.nekaudubon.org
- Green Mountain Audubon Society: www.greenmountainaudubon.org
- Missisquoi National Wildlife Refuge: www.fws.gov/northeast/missisquoi
- Lake Chaplain Birding Trail: http://www.champlainvalleynhp.org/lc_birding_trail/index.html
- Vermont Breeding Bird Atlas: http://www.vtecostudies.org/vbba/
- Vermont Bird Listserv: http://birdingonthe.net/mailinglists/VTBD.html
- All About Birds – online bird guide: www.allaboutbirds.org
- North American Bird Conservation Initiative: http://www.nabci-us.org/
- eBird – online citizen science database: www.ebird.org
- Vermont Center for Ecostudies: http://vtecostudies.org/
- Mountain Bird Watch: http://www.vtecostudies.org/MBW/
- Vermont Fish and Wildlife Department: www.vtfishandwildlife.com
- Vermont Wildlife Action Plan: http://www.vtfishandwildlife.com/swg_cwcs_report.cfm
- Vermont Invasives: www.vtinvasives.org
- Vermont Department of Forests, Parks, and Recreation: www.vtfpr.org
- Vermont Natural Resources Conservation Service (NRCS) – EQIP and WHIP financial incentives and cost-share programs: www.vt.nrcs.usda.gov
- Vermont Coverts: www.vtcoverts.org
- Vermont Woodlands Association – includes association of consulting foresters: www.vermontwoodlands.org

Books and Publications

Audubon Vermont:

- *Managing Your Woods with Birds in Mind: A Vermont Landowner's Guide.* Audubon Vermont and the Vermont Department of Forests, Parks, and Recreation. 2012. PDF available at: http://vt.audubon.org/sites/default/files/documents/landowner_packet_5-2012_small.pdf
- *Foresters for the Birds Toolkit.* Audubon Vermont and the Vermont Department of Forests, Parks, and Recreation. 2012. PDF available at: http://vt.audubon.org/foresters-birds

Others:

- *The Northern Forest* by David Dobbs and Richard Ober, 1996.
- *Northern Woodlands* Magazine. http://northernwoodlands.org
- *The Tree Identification Book* by George W.D. Symonds, 1958.
- *The Sibley Field Guide to Birds of Eastern North America* by David Allen Sibley, 2003.
- *Sibley's Birding Basics* by David Allen Sibley, 2002.
- *New England Wildlife: Habitat History, and Distribution* by Richard M. DeGraaf and Mariko Yamasaki.
- *Wetland, Woodland, Wildland:A Guide to the Natural Communities of Vermont* by Elizabeth Thompson & Eric Sorenson, 2000.
- *The Nature of Vermont; Introduction and Guide to a New England Environment* by Charles W. Johnson, 1980.
- *More Than a Woodlot: Getting the Most from Your Family Forest* by Stephen Long, 2012. Published by Northern Woodlands.
- *Working with Your Woodland: A Landowner's Guide* by Mollie Beattie, Charles Thompson, and Lynn Levine, 1993, revised ed.
- *Landowner's Guide to Wildlife Habitat: Forest Management for the New England Region* by Richard M. DeGraaf, Mariko Yamasaki, William B. Leak, and Anna M. Lester, 2005.
- *The Audubon Society Guide to Attracting Birds:Creating Natural Habitats for Properties Large & Small* by Stephen Kress, 2006.
- *Trees, Shrubs, & Vines for Attracting Birds* by Richard M. DeGraaf, 2002.

Appendix 8. Organizational Structure of the Taunton River Stewardship Council

This is a potential example of how the post-designation Advisory Committee could be organized.
Excerpt from:
http://vc.bridgew.edu/cgi/viewcontent.cgi?article=1005&context=taunton_riv_ref

III. ORGANIZATIONAL STRUCTURE

Taunton River Stewardship Council (Post-designation Advisory Committee)

Purpose
The purpose of the Taunton River Stewardship Council (Council) is to promote the long-term protection of the river by 1) bringing together on a regular basis various parties responsible for river management; 2) facilitating agreements and coordination among them; 3) providing a focus and a forum for all river interests to discuss and make recommendations regarding issues of concern; and 4) coordinating implementation of the Taunton River Stewardship Plan.

The Council will continue the efforts of the Study Committee to create a participatory and cooperative management framework. The Council will ensure that there is communication among all partners in the protection of the Taunton River, and will provide a forum for discussion of river issues, priorities and proposed actions.

The Council will be the principal entity devoted to the implementation of the Taunton River Stewardship Plan, and will establish priorities, workplans, action plans and similar strategies to advance implementation of the Plan.

Advisory Function
The Council will work to complement and support the roles and activities of partners working in the Taunton River Watershed. It will not have a regulatory role, but will act on an advisory basis to existing entities that have management or regulatory authority on the river, including the individual member entities of the Council.

The Council may undertake projects directly or sponsor projects in partnership with its individual member entities and partners.

Responsibilities
The Taunton River Stewardship Council will have the following responsibilities:

- Meet on a regular basis with all meetings open to the public.
- Develop annual action plans/workplans based on the Taunton River Stewardship Plan and priorities set by the Council.
- Report annually to the member institutions of the Council on Council activities, accomplishments, plans, etc.
- Advise the National Park Service, the Commonwealth of Massachusetts, communities and other entities on issues and concerns related to the Taunton River.
- Periodically review the plan and consider revisions and updates as appropriate.

Membership

Core membership: The following entities will constitute the core membership of the Stewardship Council.

- Town of Bridgewater
- Town of Halifax
- Town of Middleborough
- Town of Raynham
- City of Taunton
- Town of Berkley
- Town of Freetown
- Town of Dighton
- Town of Somerset
- City of Fall River
- Commonwealth of Massachusetts
- National Park Service
- SRPEDD
- Wildlands Trust of Southeastern Massachusetts
- Natural Resources Trust of Bridgewater
- Taunton River Watershed Alliance (TRWA)
- Save the Bay
- The Nature Conservancy
- The Council Oak Wampanoags, Massachusetts

Appointments

Each member entity will be encouraged to appoint one representative and one alternate. Appointments shall be made by each institution as appropriate, expected to be as follows, Boards of Selectmen (Towns); City Council (Taunton, Fall River); Regional Director or designee (National Park Service); Governor or designee (Commonwealth); Boards of Directors or designee(non-profits). In the case of a **designee** making an appointment, the authority under which the designee has acted shall be reported to the Council.

Suggested Appointees

Suggested appointees would include members of local government boards, riverfront landowners, local experts about a specific outstanding resource, and those who would provide active committee representation.

Additional members:

Membership may be changed to include other interests based on the following provisions:

- Interested parties may be added to the Council if they request membership and are approved by a 2/3 majority of the existing members.
- Representatives of any new member institutions will be appointed by the governing body of that institution or an appropriate designee.

Procedures

Decision Making
The Council will endeavor to act by consensus whenever possible and will be governed by the open meeting laws of Massachusetts. Formal votes may be taken from time to time at the discretion of the Chair or by request of any member. A formal vote will require a 2/3 majority of Council members to be approved.

Officers
The Council shall elect a Chair and a Vice-Chair. Other officers may be elected by vote of the Council, such as Treasurer and Secretary.

Bylaws
The Council may choose to develop detailed by-laws that expand upon the administrative provisions of this Plan. Such expanded by-laws shall be consistent with the intent and provisions of this Plan.

Revision of the Plan
The Council shall conduct a thorough review of the Plan and its recommendations at least every five years. If and when the Council determines that meaningful annual action plans cannot be developed consistent with the parameters of the existing plan, the Council should undertake a formal, public revision.

Funding/Staff

National Park Service Support
It is anticipated that the National Park Service will provide a basic level of staff support and funding to the Council and its operations through the National Wild and Scenic River Designation, dependent upon congressional appropriations. This support may be directly from the NPS, or the NPS may enter into cooperative Agreements with members of the Council, as was done during the Study through SRPEDD, to provide such funding and staff support. (Note: it is not anticipated that the NPS could enter into Cooperative Agreements with the Council as an entity, as it lacks the sufficient legal foundation)

There will be no annual dues or other financial contribution required of Council members. Members appointed by communities will not be expected to contribute financially, nor will any member receive funding from the Council for travel or time reimbursement.

Appendix 9. Act 250

Act 250 Protections with Regard to Wild and Scenic River Designation

Jeff Parsons

Vermont's Land Use and Development Law, "Act 250" was adopted in 1970 and constitutes the main land-use regulation that applies statewide. Act 250 is a permit program that directly or indirectly protects several of the Missisquoi and Trout River Outstandingly Remarkable Values (ORVs – please see the ORV chapters of this Management Plan for further explanation and description of these resources). In order to have certain projects approved, a project proponent must satisfy 10 Criteria and receive a permit from the Act 250 authorities.

Within Act 250 the State of Vermont is divided into several District Commissions based on a common geography. For our purposes, the Missisquoi and Trout River watersheds fall within Districts 6 & 7 with offices in Essex Junction and St. Johnsbury, respectively. In order to participate in a hearing or permit proceedings, party status must be obtained. Parties who are automatically granted party status include towns in which the project is located, state government agencies, abutting property owners, and, in some cases, those who have a "particularized interest" in a project.

Only larger projects are reviewed under Act 250. For example: any subdivisions of land with the intent of building houses (6-10 houses depending on whether towns have zoning), industrial or commercial developments involving more than 1 acre of land, and logging or agricultural development above 2,500 feet in elevation. Consult the Act 250 rules and regulations for other jurisdictional projects.[1]

There are a total of 10 Criteria that Applicant's must satisfy to receive an Act 250 permit which allows a project to be built. It should be mentioned that there are other town and state permits that have to be obtained before many development projects can commence (ex. septic permits, wetlands permits, subdivision permits…). However in some cases, gaining a necessary state or local permit creates a rebuttable presumption that a Criterion has been partially or fully satisfied.

The 5 Criteria and sub-criteria (further subdivisions of the Criteria) that apply most directly to the Wild and Scenic River designation and Missisquoi and Trout ORVs are as follows: Project

1. Will not result in undue water or air pollution. Included are the following considerations: (A) Headwaters; (B) Waste disposal (including wastewater and stormwater); (C) Water Conservation; (D) Floodways; (E) Streams; (F) Shorelines; and (G) Wetlands.
4. Will not cause unreasonable soil erosion or affect the capacity of the land to hold water.
8. Will not have an undue adverse effect on aesthetics, scenic beauty, historic sites or natural areas, and (A)will not imperil necessary wildlife habitat or endangered species in the immediate area.
9. Conforms with the Capability and Development Plan which includes the following considerations: (A) The impact the project will have on the growth of the town or region: (B) Primary agricultural soils; (C) Productive forest soils; (D) Earth resources; (E) Extraction of earth resources; (F) Energy conservation; (G) Private utility services; (H) Costs of scattered developments; (J) Public utility services; (K) Development affecting public investments; and (L) Rural growth areas.
10. Is in conformance with any local or regional plan or capital facilities program

Criteria 1: Water

Criterion 1 seeks to protect headwaters, floodways, shorelines, and wetlands of streams and rivers. It also protects waterways from the potential negative effects of improper wastewater disposal and stormwater runoff. In general, through Act 250, the State of Vermont seeks to implement 25-50 foot vegetated buffers for streams and rivers (depending on the size and year-round nature of water flow).

Criterion 1A, the headwaters provision, protects small streams and their shorelines above 1,500 feet in elevation. The headwaters provision will help to protect water quality within the higher elevations of the Wild and Scenic River watersheds.

Criterion 1B, addresses waste disposal (often septic systems) and stormwater runoff. Projects must meet Vermont Water Quality Standards and applicable health and environmental standards. Wastewater disposal sites along the Missisquoi and Trout Rivers could be covered.

Criterion 1D protects floodplains; it recognizes their importance both in preventing floods but also as significant natural communities. The Act 250 definition of floodways has expanded to include flood corridors beyond the 100 year floodplain. This criterion seeks to protect the dynamic nature of these floodplains and has not granted permits for projects that seek to stabilize the shorelines of floodplains with rip-rap. Projects that significantly increase the peak discharge of waterways or endanger the health, welfare, or safety of the public and riparian owners are further cause to deny permits under Criterion 1D.

Criterion 1E protects streams. Streams are defined as "a current of water which is above 1,500 feet above sea level or which flows at any time at a rate of less than 1.5 cubic feet per second. Act 250 has applied this criterion to other larger stream and rivers as well. Depending on site-specific conditions, 50-100 foot buffers between disturbed land and streams are typically protected.

Criterion 1 F protects shorelines. This provision seeks to maintain shorelines and shoreline vegetation in their natural condition, stabilize stream banks and prevent erosion, and continue to provide public access to waterways. Act 250 does not allow projects on shorelines unless it can be proved that the project cannot be located elsewhere and is dependent on the shoreline to fulfill its purpose.

Criterion 1G incorporates the Vermont Wetland Rules which protects wetlands and their functions and values. In general, VT wetlands are afforded a 50 foot protective buffer and most types of human development activities within that buffer area or the wetland itself require a state wetlands permit. Projects that require an Act 50 permit must also meet the requirement of the state wetland regulations. Act 250 can also seek to protect wetlands that are considered Class III and outside of the jurisdiction of the Vermont Wetland Rules. These Class III wetlands may receive protection as well as a buffer that is generally 25-50 feet in extent.

Criterion 1A, 1B, 1D, 1E, and 1F collectively work to protect water quality through maintaining clean water, preventing shoreline and floodplain encroachments, and maintaining the public trust in Vermont's waters. Criterion 1G protects wetlands and vernal pools within the Wild and Scenic River basins. These criteria collectively protect the physical, chemical, and biological integrity of the Missisquoi and Trout Rivers and their tributaries. ORVs that are focused on water quality including recreational use such as canoeing, swimming, fishing, and continued public access to the water are dependent on the continuing quality of the Trout and Missisquoi Rivers.

Criterion 4: Soil Erosion

Criterion 4 ensures that regulated construction activities do not result in erosion of soil and help maintain water quality.

This criterion helps maintain the water quality that enhances and maintains ORVs such as swimming, fishing and scenic beauty.

Criterion 8: Historic and Archeological Resources

Criterion 8 protects historic, archeological, and paleontological resources. Act 250 imparts a 3-tier approach to protecting historic, archeological, and paleontological resources. Act 250 first asks "Is a historic or archeological site present?" If so, it then determines if a project's impact is "adverse", and, if in the affirmative, are the project's impacts "undue"?

In Act 250, a "historic site" is defined as any site, structure, district, or archeological landmark which has been officially included in the National Register of Historic Places or which is established by testimony of the Vermont Advisory Council on Historic Preservation as being historically significant. Such a site has to be able to yield information important to history or prehistory. Typically a building or structure can be listed on or eligible for historic register if it is at least 50 years old.

If a site is not currently listed as an archeological site but evidence suggests that the site was occupied by Pre-Europeans, Act 250 can require that an archeological investigation be conducted at the site previous to any land development and granting of an Act 250 permit.

ORVs that could be protected under the historic rubric include covered bridges, old dam sites, remains of old buildings, old bridges, and archeological sites.

Criterion 8: Aesthetics and Natural Beauty

Act 250 seeks to determine if a project will have an undue, adverse effect upon the scenic or natural beauty of an area. To determine if impacts are "adverse" Act 250 considers the following: 1) the nature of the project's surroundings; 2) whether the project's design is compatible with its surroundings; 3) whether the colors and materials selected for the project are suitable to the surroundings; 4) from where the project is visible; and, 5) what the impacts are on open space. If it's determined that a project has adverse impacts, an assessment occurs to determine whether or not a project's impacts are "undue." Essentially, a project is "undue" when a project: 1) violates a clear written community standard intended to preserve the aesthetics or scenic beauty of the area; or 2) offends the sensibilities of the average person, or is shocking or offensive and out of character with its surroundings, or significantly diminished the scenic qualities of the area; or 3) the Applicant has failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings. If undue impacts are assessed, the project can be denied an Act 250 permit or have conditions attached which alter the project and mitigate the aesthetic impacts.

In terms of the Wild and Scenic River designation, any ORV that is dependent upon the quality of the aesthetic resource might be protected under the aesthetic criterion. If the aesthetic resources of the immediate Missisquoi and Trout Rivers are important to the overall quality of the wild and scenic experience, a broad

range of potential developments that are regulated under Act 250 could be subject to aesthetic interpretations under the law.

Criterion 8A: Necessary Wildlife Habitat

Necessary wildlife habitat has become defined as "concentrated habitat which is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period in its life including breeding and migratory periods." In effect, protecting "necessary wildlife habitat" protects habitat that if removed from the Vermont landscape would cause the decline and eventually the loss of a species of wildlife (both game and hunted species but also non-game or non-hunted species). Habitats such as deer wintering forests, Bicknell's thrush habitat, beech stands, wetlands that serve as important seasonal feeding habitats for bears, heron rookeries, gravel, vernal pools, and stream and river waters have been protected as important wildlife habitat.

Act 250 seeks to determine if a regulated activity "destroys or significantly imperils wildlife habitat" and balances that loss with attempts by the developer to lessen or "mitigate" the loss of habitat and to measure the benefit to the public of the wildlife habitat.

Types of ORVs that are protected under Criterion 8A include: in-stream fish habitat; high elevation (generally over 2,700 feet) spruce-fir forests that harbor unique high-elevation birds species (including the Bicknell's thrush breeding habitat); peregrine falcon and heron rookeries; deer wintering habitat (typically conifer forests); bear habitat (beech/oak stands and certain wetlands); and vernal pools. Rare, threatened and endangered animal species that are currently, or will be identified in the Wild and Scenic River basin in the future, will also be protected under this criterion. Any newly identified significant natural community will also be protected under Criterion 8A. The State of Vermont Natural Heritage Program tracks these communities as well as rare plants and animals (Please see the Natural Heritage Information Project through the VT Fish and Wildlife Department (http://www.vtfishandwildlife.com/) for more information.

Criterion 8A: Endangered Species

The State of Vermont and federal government maintain lists of legally Threatened and Endangered Species of plants and animals. Criterion 8A protects these species. Some of these species are part of natural communities, such as the Serpentine Outcrop ORVs, and significant natural communities within the Wild and Scenic Study area. Other state Threatened or Endangered species and their habitats also enhance the biological diversity of the region and are also ORVs.

Criterion 8A: Rare and Irreplaceable Natural Areas

Rare and irreplaceable natural areas are essentially defined as areas where 1) natural processes dominate over human process; 2) areas with identifiable vegetation; and 3) areas which are unlikely to reoccur in the foreseeable future. Unusual or uncommon natural communities and significant geological features have been protected under Act 250 Criteria. Alpine plant communities, bogs, fossil quarries, and ledge communities are examples of areas protected under Criterion 8A. Unusual geological features can also be protected such as a significant paleontological site, or important area for interpreting geologic history or processes. If a site contains rare, threatened, or endangered species it may qualify for protection. Under this criterion, the public's enjoyment of a protected natural area can also be protected, and Act 250 has provided isolation buffers, both auditory and visual, to protect the public's enjoyment of these natural areas.

In the Missisquoi and Trout River basin, some ORVs that may be protected under this criterion include: numerous Serpentine Outcrops, Haystack Mountain alpine flora, and Waterfalls and Gorges (see the Natural Resources ORV chapter for more information).

Criterion 9: Primary Agricultural Soils

Criterion 9 protects productive agriculture soils from conversion to development. In as much as the Missisquoi and Trout River landscape is dependent upon a healthy and vibrant farm economy, maintaining the agricultural land uses in the basin is important.

Criteria 10: Local and Regional Plans

Criteria 10 mandates that projects be in compliance with duly (under Vermont State law) adopted local (municipal) and regional plans (multi-town plans). The town plans of the Missisquoi and Trout River basin area are the primary documents that compliance would be based upon regardless of designation. In addition, the regional plans of Orleans and Franklin Counties would be considered under this Criterion as well. The regional plan for Franklin County towns is called the Plan for the Northwest Region 2007-2012 developed by the Northwest Regional Planning Commission, and the regional plan for Orleans County is called the Regional Plan for the Northeast Kingdom adopted in 2006 and developed by the Northeastern Vermont Development Association.

Local and regional planning documents encompassing the 10 basin towns and villages variously address and seek protection of many of the ORVs addressed in this document. Wildlife habitats, forests, alpine areas, wetlands, waterfalls, gorges, covered bridges and historic structures are some of the ORVs that are protected in town and regional planning documents within the Wild and Scenic River region.

Geoffrey Green,[2] Coordinator for District 6, Franklin and Grand Isle Counties, when asked if this Missisquoi and Trout River Wild and Scenic River Management Plan would hold force as a regional plan under Criteria 10 of Act 250 (considered a duly adopted regional plan or capital program, and thus help guide projects which fall under Act 250 permitting) stated the following:

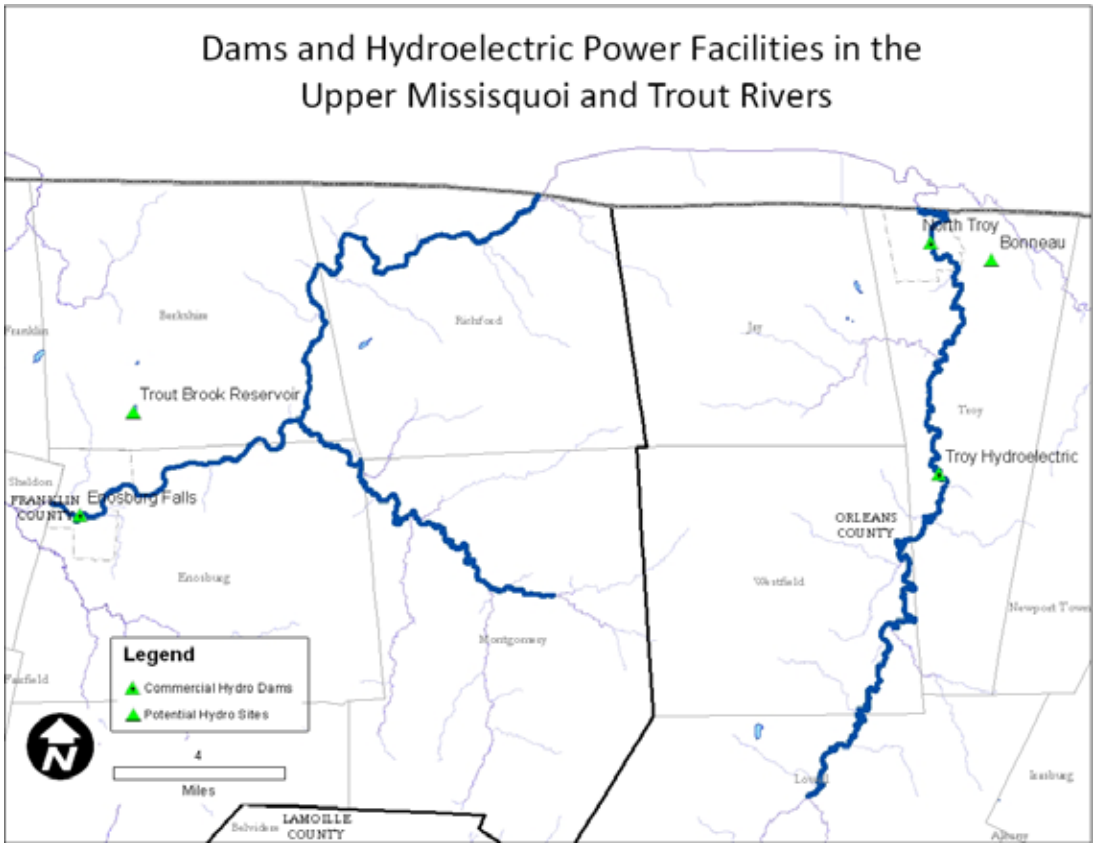
In order for your [this Management] Plan to have regulatory effect in Act 250 under Criterion 10 your Management Plan must be included in the town or regional plan and compliance with the plan must be specifically mandated in the town or regional plan.

However, this does not preclude your participation or your organization's participation in any Act 250 application where a nexus or particularized interest can be established between your organization's goals and interests and any impacts the project may have on said interests.

Endnotes

1. The website of the Land Use Panel of the VT Natural Resources Board has the most current information regarding Act 250 (http://nrb.state.vt.us/lup/index.htm). Information may also be obtained by contacting the appropriate District Commission members and staff (http://nrb.state.vt.us/lup/commission_members.htm).
2. Geoffrey W. Green; 879-5657, geoffrey.green@state.vt.us; http://nrb.state.vt.us/lup/commission_members.htm#district6

Upper Missisquoi and Trout Rivers Wild and Scenic Study Committee Fact Sheet on Dams and Hydroelectric Power



The origin of the Wild and Scenic Act, in 1968, was at a time when large-scale dam building was occurring in the U.S. The Act was established to try to create a balance between the Federal Energy Regulatory Commission's (FERC) licensing of hydropower facilities and free-flowing rivers.

Wild and Scenic Act: § 1278. Restrictions on water resources projects (a) Construction projects licensed by Federal Energy Regulatory Commission

> "The Federal Energy Regulatory Commission shall not license the construction of any dam, water conduit, reservoir, powerhouse, transmission line, or other project works under the Federal Power Act (41 Stat. 1063), as amended (16 U.S.C. 791a et seq.), on or directly affecting any river which is designated in section 1274 of this title as a component of the national wild and scenic rivers system or which is hereafter designated for inclusion in that system, and no department or agency of the United States shall assist by loan, grant, license, or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river was established, as determined by the Secretary charged with its administration. Nothing contained in the foregoing sentence, however, shall preclude licensing of, or assistance to, developments below or above a wild, scenic or recreational river

area or on any stream tributary thereto which will not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on the date of designation of a river as a component of the National Wild and Scenic Rivers System."

The Federal Energy Regulatory Commission (FERC) has jurisdiction, under the Federal Power Act, over navigable waters. The Federal Power Act states:

"Navigable waters" (for which the Commission has jurisdiction under the Commerce Clause) are defined to include "streams or other bodies of water over which Congress has jurisdiction to regulate commerce among foreign nations and among the States" (16 U.S.C. 796). The Commission is authorized to issue licenses to construct, operate and maintain dams, water conduits, reservoirs, and transmission lines to improve navigation and to develop power from any streams or other bodies of water over which it has jurisdiction (16 U.S.C. 797(e)).

Typically navigable waters are defined as those which could be navigated by boat, even a canoe or kayak, though historic log drives have also been used as a basis for determining navigability. The mainstem of both the Troy and Missisquoi Rivers are considered navigable waters.

All projects which are **federally assisted through funding or permits (for example an Army Corps permit, a Clean Water Act Permit (NPDES), etc…) AND are construction or development projects (not just a study), AND are water related, AND have a direct relationship to the designated river are reviewed**, as outlined under Section 7 of the Wild and Scenic Act, by the local Advisory Committee and the National Park Service (NPS). Please see below for an outline as to how such a review impacts new hydro and dam projects, the only explicitly prohibited activities under the Act.

If other proposed projects are reviewed under Section 7 and found to have "a direct and adverse effect on the values for which such river was established," then the National Park Service and the local Advisory Committee would suggest changes to the project to eliminate this impact. Since the Committee meets monthly, projects are reviewed quickly to avoid unnecessary delays. Typically there are few or no comments from the NPS or the Advisory Committee. Occasionally, there is something to say about a project. An example of such a comment would be suggesting the creation of a gap in a guardrail in order to lessen the impact to recreation by this road project because guardrails would otherwise block access to the site or mar its historic or aesthetic value. If the adverse impacts of the project were not remedied, the NPS could utilize its veto power over such a project. In the history of Partnership Wild and Scenic Rivers (those owned privately rather than federally) in New England, there has never been a project vetoed by the NPS. One project did not go through after the proposed changes would increase the time and expense of the project prohibitively. This project was extreme and required 24 hour/day dredging for 3 years in order to allow passage of large ships up river to a liquefied natural gas facility.

Ask first - is it a federally funded or permitted project? If not, then it doesn't fall under Section 7 review and cannot be prohibited by Wild and Scenic designation. Most hydroelectric and dam construction projects do fall under federal jurisdiction, therefore Wild and Scenic designation will preclude development of these new projects on designated river segments, and could limit those upstream, downstream or on tributaries if they would "invade or unreasonably diminish" the values of the designated Wild and Scenic River area.

HYDRO

New Hydro

If you are considering a new hydro project, it will likely require Federal Energy Regulatory Commission (FERC) permitting.

Projects on the main stem of the Missisquoi and Trout Rivers will require a license or exemption issued by FERC. The Wild and Scenic Act states that FERC cannot permit new hydro (see excerpt above), so if the area in which you propose a hydro project is within an area designated Wild and Scenic, and FERC is involved, the project will not be permitted.

This prohibition applies to the designated reach, while proposed new projects upstream, downstream or on tributaries are subject to review to ensure that they will not "invade or unreasonably diminish" the values of the designated Wild and Scenic River area. For example, if there was a proposal to build a dam downstream of the designated area that would back water up into the designated area this may be prohibited because it would "invade" the designated area. If there was a project proposed on a tributary that would block fall spawning runs of trout significant to the designated river then it may be prohibited because it "unreasonably diminishes" the Wild and Scenic River segment. If changes were made to eliminate these diminishments to the valued resources in the designated area, then it may proceed.

> Regardless of Wild and Scenic designation, new hydroelectric projects proposed in Vermont would have to meet Vermont Water Quality Standards. In general, Vermont does not permit the construction of new dams or the raising of the height of existing dams. Furthermore, most projects are required to operate in a "run-of-river" mode, where inflow at the dam equals outflow below the project on an instantaneous basis. Additional considerations include maintaining flows to protect habitat, providing fish passage where appropriate, maintaining downstream sediment transport and avoiding the creation or perpetuation of flood hazards.

If the project is a very small project and does not tie into the electrical grid, then it will likely not fall under FERC jurisdiction. Though **Wild and Scenic designation would not prohibit these small, non-FERC-jurisdictional projects**, they would still fall under the purview of the State of Vermont and need to satisfy all existing, relevant state and local laws and regulations. These regulations may include maintenance of proper flow, and wetland, wildlife, and habitat impacts (including adequate bypass to maintain sediment and fish movement). Potential impacts to recreational access would also be evaluated, including the need to provide, maintain, or upgrade access to ensure adequate portage. This type of small project would still have to meet the state's Water Quality Standards, and would be reviewed to be sure dam safety standards are met.

Existing Hydro

Wild and Scenic designation can be handled a few ways for existing hydro facilities. The Study Committee may decide that it makes the most sense to carve out existing hydro facilities and recommend that they not be designated. The Study Committee may also decide that it is most beneficial to include these facilities within the designated area. These facilities would run under the requirements of their current exemptions or licenses with or without designation (or even if the designation included some or all of their project boundaries). In each case, the primary impact of designation would be to trigger Wild and Scenic review under

Section 7 of the Act. If these facilities were to make any significant changes that could affect the outstanding values for which the river was designated (for example, increase their operating capacity) that could trigger a review. Such reviews are on a case-by-case basis based on the proposed projects and their potential impacts to ensure that they will not "invade or unreasonably diminish" the values of the designated Wild and Scenic River area (see discussion above).

These are the existing hydro facilities which we know of near or within the Wild and Scenic Study Area (if you know of another, please inform us immediately).

- The Troy Hydroelectric project in Troy on the Missisquoi River has not operated since 1998. The project received from the Federal Energy Regulatory Commission (FERC) an exemption (FERC Project Number P-13381 in 2001). As of October 2012, work is underway on the civil works to restart the project. The NPS and Study Committee have already indicated to FERC in writing that this project (including the project lands owned by the Chase family) will be excluded from the designated area, and that its proposed operation as a run-of-river facility will not have an adverse impact to potential Wild and Scenic River areas upstream or down.
- The North Troy Project (formerly Missisquoi River Technologies) on the Missisquoi River in the Village of North Troy is not-operating and has a FERC exemption (FERC P-10172) issued in 1989. The project was acquired by Missisquoi River Hydro, LLC, and the new owners who are actively seeking to renew operations (perhaps as early as the fall of 2012). Designation would have no effect on the existing FERC exemption for this facility. This facility, at the beginning of the backwater of this impoundment, will be excluded from the designated area. Wild and Scenic designation should have no effect on this facility unless there are significant changes proposed for this operation - in which case the changes would need to be reviewed to ensure no adverse impact to the designated area.
- The Kendall Plant in Enosburg Falls on the Missisquoi River, operating and licensed by FERC (FERC P-2905, license expires 2023). This facility will not be part of designation, since the designated area will be defined as beginning at the backwater of this impoundment. Wild and Scenic designation should have no effect on this facility unless the there are significant changes proposed for this operation - in which case the changes would need to be reviewed to ensure no adverse impact to the upstream designated area.
- The Swanton Dam Hydroelectric Project (P-2547, 11.5) is located in the village of Swanton, considerably downstream of the Study segment. The Village currently holds a preliminary permit P-14085, permit expires March 2014) for the construction of a new powerhouse at the existing dam. Most changes to this facility would not impact the Study area.
- The Sheldon Springs plant is the largest hydroelectric development on the Missisquoi River (P-7186, expires 2024). It is also well downstream of the Wild and Scenic Study segment, therefore most changes to this facility would not impact the Study area.

If the project is a small project that does not tie into the grid, or is on a non-navigable waterway, then it does not fall under FERC jurisdiction. There could be these small backyard projects or projects which were grandfathered in when FERC licensing began within our Study area. FERC calls these non-jurisdictional. Since they are not under the jurisdiction of FERC then Wild and Scenic designation would not affect them, but they would still fall under the purview of the state of Vermont.

Potential Hydro

According to Brian Fitzgerald, Vermont Agency of Natural Resources, and Duncan Hay, National Park Service's Hydropower Relicensing Program, most economically feasible and power producing hydropower sites in Vermont were identified and developed in the alternative energy boom in response to the oil crisis in the late 1970s and early 1980s. It is very unlikely that a new, large hydro project would be proposed and viable in our Study area. The biggest potential would be at Big Falls which is a State Park, and one of the Study Committee's identified Outstandingly Remarkable Values (ORVs) as it is the tallest undammed falls in the state of Vermont. According to VCGI and the Vermont Renewable Energy Atlas there are two potential hydro sites within the Study area:

- The Bonneau Dam in Troy on Mud Creek, a tributary of the Missisquoi River is currently a private damused to create recreational opportunities. It could potentially be developed to produce less than 10 kW of energy.
- The Trout Brook Reservoir in Enosburgh managed by the town of Enosburgh on Trout Brook, a tributary to the Missisquoi. It could potentially be developed to produce less than 10 kW of energy.
- There are some smaller potential facilities listed in the Department of Energy's Virtual Hydropower Prospector. Wild and Scenic designation would likely not affect the potential to develop such tributary projects (unless the tributary itself were to be designated Wild and Scenic), as there would be no opportunity for such a project to "invade" the designated area. Any project which would "unreasonable diminish" the values of the Missisquoi and Trout Rivers would not likely pass through the state and federal permitting and environmental review necessary for such projects regardless of Wild and Scenic designation. They are also likely too small to be economically feasible, so small or remote that they would not fall under federal jurisdiction, or unlikely to be permitted under Vermont's Water Quality Standards.

It is worth noting that there are environmental, economic and permitting hurdles to surmount irrespective of Wild and Scenic designation, and that these are likely not hydro-producing facilities because they are not economically feasible or because the owners do not wish to pursue it. Developing hydropower at these dams would fall under *New Hydro* above.

DAMS

New Dams

If the dam is federally funded, all or in part, or requires a federal permit, and is within an area designated Wild and Scenic the project will not be permitted. This applies to the designated reach, with some lesser protections for those areas up and downstream from the designated section, and for tributaries if they are not within the designated area. Proposed new dams upstream, downstream or on tributaries are subject to review to ensure that they will not "invade or unreasonably diminish" the values of the designated Wild and Scenic River area (for more, see the *New Hydro* section above). State or privately funded projects on very small, non-navigable tributaries would likely not require an Army Corps 404 permit, and could not be denied due to the Wild and Scenic designation. It is unlikely that a new dam proposed for a free-flowing reach would conform to Vermont Water Quality Standards. Any new dams would also be subject to dam safety requirements of the State of Vermont.

Existing Dams
Wild and Scenic designation does not prevent the retrofit of existing dams for purposes other than hydro, such as improving a reservoir for recreation or drinking water.

NEW TECHNOLOGIES

Each river designated into the national system receives permanent protection from federally licensed or assisted dams, diversions, channelizations and other water projects that would have a direct and adverse effect on its free-flowing conditions and special resources. New technologies, such as instream turbines and tidal energy projects that do not involve the construction of a dam, would also fall under FERC's review authority, and, therefore, be subject to Wild and Scenic review. Despite the improvements in technology for hydro facilities and dams, it would take a change to the Wild and Scenic Act to allow such projects, even with new technologies; this seems unlikely.

If you know of existing or potential hydro sites which were not listed above, please contact the Study Committee immediately at 802-393-0076 or* info@vtwsr.org. *These sites need to be identified prior to designation when there remains some flexibility on new dams and hydro projects, and designation boundaries.

Please also consider joining us for one of our Study Committee Meetings at 7 p.m. on the third Thursday of each month, and consider visiting our website for more information **www.vtwsr.org including the minutes from our *September 15, 2011 meeting on hydroelectric dams and Wild and Scenic designation.***

Upper Missisquoi and Trout Rivers Photo Tour

Rt. 100, South of Monastery to Loop Road in Westfield (4.3 mi)

This is a well-buffered stretch of the Upper Missisquoi with native ferns, dogwoods and silver maple floodplain forests. These portions of the river are well-shaded, which helps to keep the water cool. Invasive species such as Japanese Knotweed are very sparse along this section. There are beautiful bedrock outcroppings and ledges of rare serpentinite rock along the river, especially directly behind the monastery. Glimpses of the green mountains may be seen at several spots along this section of the river. The substrate along this section is largely gravel and sand.

This section of the river is overall a moderate paddle, with one section of rapids that require some paddling technique. Low-flow conditions would make paddling this stretch of the river difficult. There are some areas along this section of the river that represent opportunities for water quality improvement projects. Gaps in riparian buffer vegetation have destabilized some areas of the river bank, and many sections in these areas are eroding into the river creating sedimentation and nutrient enrichment situations. Opportunities for action include working with landowners who may wish to reduce erosion or nutrient enrichment by creating riparian buffers or preventing direct access to the river by livestock.

Section Highlights:

- ≈ *Serpentinite geology*
- ≈ *Gorge & Rapids behind the Monastery*

1. Paddling past ledges of serpentinite rock behind the Monastery on the Missisquoi River in Wesfield (photo – Shana Stewart Deeds).

2. Committee member Keith Sampietro on the Missisquoi River in Lowell (photo by Shana Stewart Deeds).

3. Paddling through the gorge behind the Monastery on the Missisquoi River in Westfield (photo by Ave Leslie).

4. Paddling though the rapids below the Monastery on the Missisquoi in Westfield (photo by Ave Leslie).

5. An intact buffer of native vegetation along the Missisquoi River in Westfield (photo by Shana Stewart Deeds).

Loop Road in Westfield to River Road at Chase Dam in Troy (6.8 mi)

This paddle begins in a section of the river where the Missisquoi jumped its bank and created a new channel through a farm field during the spring floods of 2011.

Portions of this reach of river have some vegetated riparian buffers, the best examples of which are intact silver-maple floodplain forests. However, many sections of this paddle travel through open or narrowly-buffered agricultural fields. Outcroppings of rare serpentinite bedrock dot the river bank as you travel downstream. Spectacular views of Jay Peak and the Green Mountains may be seen from this part of the river. As the river becomes larger in this stretch, wildlife is seen in greater abundance. Waterfowl like mergansers and great blue Herons, dragonflies and damselflies, turtles, frogs and otters might be seen during a paddle along this section of the Missisquoi.

After you cross under Rt. 100 in Troy, the water slows as the river winds through forested banks towards the Chase Dam. Here the river splits, bisecting its course as it travels around an island. There are more interesting rock formations in this stretch as more bedrock is exposed around this island. The take-out point is just above the dam just before the River Road bridge. From here, the river travels over the dam and Baker's Falls. This section of river is an easy-moderate paddle. There are some swift-water features, but these may be navigated by paddlers with some experience.

There are several areas along this section of the river that offer opportunities for water quality enhancement projects. Gaps in riparian buffer vegetation have destabilized sections of the river bank, and these areas are eroding into the river creating sedimentation and nutrient enrichment situations. Planting native vegetation to fill gaps in riparian buffers, as well as implementing best management practices to deal with storm water runoff from agricultural fields are the primary strategies to deal with water quality issues in this part of the Missisquoi River.

Section Highlights:

- ≈ *Serpentinite geology and gorges*
- ≈ *Outstanding views of Jay peak and the northern Green Mountains*
- ≈ *Exposed bedrock and island near Troy Dam*

6. Setting off on the Missisquoi River from Loop Road in Westfield (photo by Shana Stewart Deeds).

7. A well-shaded sandbar along the Missisquoi in Wesfield (photo by Shana Stewart Deeds).

8. A beautiful intact silver maple floodplain forest along the Missisquoi River in Westfield (photo by Shana Stewart Deeds).

9. Paddling along serpentinite geology on the Missisquoi River in Westfield (photo by Shana Stewart Deeds).

10. Outcrop along the Missisquoi in Westfield (photo by Shana Stewart Deeds).

11. A flock of young merganser ducks on the Missisquoi River in Westfield (photo by Barry Kade)

12. John Little and Cynthia Scott on the Missisquoi River in Westfield, enjoying the view of Jay Peak and the Northern Green Mountains. Note the lack of riparian vegetation and resulting bank erosion in this location; this allows the release of excess sediment and nutrients into the river (photo by Shana Stewart Deeds).

13. The Missisquoi River in Troy above the hydro dam and Baker's Falls, where the river becomes still and deep. The dense riparian vegetation provides good habitat for both aquatic and terrestrial wildlife (photo by Shana Stewart Deeds).

14. Bedrock outcrop on the island above Chase Dam and Baker's Falls in Troy (photo by Shana Stewart Deeds).

Baker's Falls to Canada (10.7 mi)

Paddling opportunities for most will be limited below Baker's Falls, as this portion of the river contains many areas of rapids and waterfalls, including the Troy Gorges and Big Falls State Park, along with its waterfalls and gorge. The river still may be viewed and accessed at many spots along this reach, as River Road follows the Missisquoi all the way to the Canadian border. Notable access spots include the River Road covered bridge and Big Falls state park. Big Falls consists of three separate channels dropping about 25 feet, the highest undammed waterfall in Vermont. Below the falls is a gorge over 200 feet long with 60-foot high walls.

Downstream of Big Falls, the river flows through the village of North Troy, then meanders through farm fields and forest before it reaches the Canadian border.

Much of this section of the Missisquoi travels through intact vegetated buffers, but there are gaps in buffers where agricultural fields or development associated with the village of North Troy are adjacent to the river. Establishing buffers in these areas and managing both non-point runoff in this section are potential actions that could enhance water quality here. There are two wastewater treatment plants along this section of the river (Troy/Jay and North Troy), so management of point-source discharges is also a consideration here.

Section Highlights

- ≈ *Baker's Falls below Troy Dam*
- ≈ *Big Falls State Park – Waterfalls and gorges*
- ≈ *Troy Gorges*
- ≈ *River Road Covered Bridge*

15. Baker's Falls, below the dam in Troy (photo by Shana Stewart Deeds).

16. River Road covered bridge, off of River Rd. in Troy (photo by Shana Stewart Deeds).

17. The top of Big Falls waterfall in Big Falls State Park, Troy (photo by Shana Stewart Deeds).

18. The Big Falls cascading waterfall, in Big Falls State Park, Troy (photo by Shana Stewart Deeds).

19. The gorge below Big Falls waterfall. The gorge is about 60 feet tall and 200 feet long (photo by Shana Stewart Deeds).

Canadian Border (Rt. 105A) to Richford (6.1 mi)

This paddle begins below the Historic Bridge on Rt. 105A at the border with Canada. The river is noticeably larger at this point, as it has gained significant size in its watershed since it crossed the border in North Troy. Much of this section of the river is well-buffered, though agricultural fields are more common as you get close to Richford. A diversity of wildlife such as waterfowl, turtles, and deer may be seen along this stretch. This stretch concludes as the river reaches Richford's downtown historic district, with river access at Davis Park just downstream of town.

There are areas of moderate swift water (Stevens Mills Rapids) in this section that may present a challenge to some inexperienced paddlers, but these sections may be portaged around. The majority of this section of the Missisquoi is flat, slow-flowing water that may be paddled by boaters with any level of experience.
This part of the Missisquoi River is largely forested close to Canada, as it flows closer to Richford there are more gaps in riparian vegetation. Managing these areas for buffer gaps and non-point runoff are opportunities for water quality improvement projects here.

Section Highlights

- ≈ *Historic Missisquoi River Bridge at border crossing*
- ≈ *Steven's Mill Rapids*
- ≈ *Richford's Downtown Historic District*

20. **John Little starts his paddle from the Canadian Border to Richford, with the Historic Border Crossing Bridge in the background (photo by Ken Secor).**

21. Many sections of the Missisquoi River between Canada and Richford are slow-flowing and welcome paddlers of all levels (photo by Ken Secor).

22. John Little surveys the Stevens Mill Rapids above Richford before paddling them. Paddlers should always survey unknown sections of rivers before they are attempted (photo by Ken Secor).

23. John Little navigates Stevens Mill Rapids above Richford (photo by Ken Secor).

24. Merganser ducks on the Missisquoi above Richford (photo by Ken Secor).

25. A snapping turtle on the bank of the Missisquoi above Richford (photo by Ken Secor).

26. Canada geese take off from the Missisquoi above Richford (photo by Ken Secor).

Richford to East Berkshire (6.4 mi)

This section begins at Davis Park, in Richford, just west of downtown on River Street. The river here is flat, slow -flowing and wide with the occasional riffle to paddle through. The landscape is rolling hills and dairy farms, and offers dramatic views of the northern Green Mountains. This portion of the Missisquoi follows the Route 105 Corridor.

The river is wider here and more of the native vegetation has been cleared. This has allowed the invasive plant Japanese Knotweed to become well-established along this stretch. Knotweed eradication offers one opportunity for water quality enhancement, as well as filling gaps in buffers with native vegetation and implementing agricultural runoff best management practices.

Section Highlights

- ≈ *Wonderful Views of the northern Green Mountains*
- ≈ *Working Dairy Farms*

27. Setting off from the river access at Davis Park, just west of Richford's downtown historic district (photo by Shana Stewart Deeds).

28. Silver maples along the Missisquoi below Richford - this riparian area is a good example of an intact buffer (photo by Shana Stewart Deeds).

29. Rolling hills, dairy farms and the Northern Green Mountains frame this portion of the Missisquoi River (photo by Shana Stewart Deeds).

East Berskshire to Enosburgh Falls (7 mi)

The most downstream section of the Upper Missisquoi and Trout Rivers Wild & Scenic Study area is a seven-mile paddle on the Missisquoi from East Berkshire to Enosburgh Falls. This section is much like the Richford to East Berkshire section, but is considerably wider. A major feature of this section of river is the Old Samsonville Dam and Rapids, which may offer a navigational challenge to some paddlers, though the rapids may be portaged around. Other than the Samsonville rapids, the river here is wide and slow-flowing, past rolling hills and dairy farms. Spectacular views of the Green Mountains may be seen along this entire stretch. This section ends at the dam in Enosbugh Falls, near the downtown historic district. The falls and dam may be viewed from the historic Bridge of Flowers and Light, which spans the river over the falls.

The river is wider here and more of the native vegetation has been cleared. This has allowed the invasive plant Japanese Knotweed to become well-established along this stretch. Knotweed eradication offers one opportunity for water quality enhancement, as well as filling gaps in buffers with native vegetation and implementing agricultural runoff best management practices.

Section Highlights

- ≈ *Wonderful Views of the northern Green Mountains*
- ≈ *Working Dairy Farms*
- ≈ *Samsonville Dam & Rapids*
- ≈ *Historic Bridge #12 at Boston Post Rd.*
- ≈ *Enosburgh Falls Downtown Historic Distric*
- ≈ *Enosburgh Falls Dam, and Historic Bridge of Flowers and Light*

30. The river at the put-in at East Berkshire is very calm and still (photo by Shana Stewart Deeds).

31. The invasive plant Japanese Knotweed becomes very common along the banks of the Missisquoi as the river gets larger (photo by Shana Stewart Deeds).

32. This section of the river parallels Rt. 105 to Enosburg Falls. There are many gaps in vegetated buffers, as shown in the riparian area (photo by Shana Stewart Deeds).

33. Some reaches of the river do have a vegetated buffer, although this buffer should be wider to optimize bank stabilization and maintain water quality (photo by Shana Stewart Deeds).

34. The one water feature to navigate on this section of the Missisquoi River is the Old Sampsonville Dam and rapids. The dam breeched long ago, and the river now flows over its remnants (photo by Shana Stewart Deeds).

35. An example of a gap in riparian buffer vegetation. With no buffer, stormwater runoff from the lawn, barn and farm may enter the river without being filtered of nutrients and other pollutants. Buffers also slow down stormwater, lessening its erosive effect on river banks (photo by Shana Stewart Deeds).

36. Some sections of the Missisquoi in Enosburgh still have an intact riparian buffer. These buffers help maintain water temperatures cool enough to support native fisheries (photo by Shana Stewart Deeds).

37. Paddling below historic bridge #12 (Boston Post Rd.), with the Northern Green Mountains in the background (photo by Shana Stewart Deeds).

38. Paddling within view Jay Peak (photo by Shana Stewart Deeds).

39. Another benefit of paddling the Missisquoi: being able to buy fresh cheese at one of the farms along the river (photo by Shana Stewart Deeds).

40. The dam and falls at Enosburg Falls, taken from the historic Bridge of Flowers and Light (photo by Shana Stewart Deeds).

Trout River (11 mi)

The Wild and Scenic study portion of the Trout River extends from its confluence with the Missisquoi River in East Berkshire to its headwaters east of Montgomery, marked by the confluence of Wade and Jay Brooks.

The upper Trout River may be paddled in high water conditions by experienced white-water paddlers. Lower on the river, closer to the Missisquoi, the water is slower and accessible to a variety of paddling levels. Outside of paddling The Trout River in is renowned for its abundance of swimming holes, covered bridges, fishing spots, and countless other recreational opportunities. Three holes, grey rocks and Longley Bridge swimming holes are just three of the areas along the trout river that are popular with both locals and visitors.

The watershed of the Trout River is largely undeveloped, but many areas along the mainstem of the river are developed. The settlements of Montgomery and Montgomery Center are along the banks of the river, as are many agricultural fields along the lower portion of the river. Addressing gaps in vegetated buffers and management of stormwater from the towns and agricultural fields are the opportunities for water quality enhancement projects along the Trout. Other river-related projects could be Japanese Knotweed eradication and management of popular access spots to prevent erosion and litter accumulation from excessive use.

Section Highlights

- ≈ *Three Holes Falls and Swimming Hole*
- ≈ *Gray Rocks, School House and Longley Bridge Swimming Holes*
- ≈ *Comstock, Longley and Hopkins Covered Bridges*
- ≈ *Many more waterfalls, swimming holes and covered bridges on Trout River tributaries*

41. Three Holes waterfalls and swimming area, east of Montgomery Village on the Trout River (photo by Shana Stewart Deeds).

42. A moose near Hopkins Covered Bridge near the Enosburgh/Montgomery town line (photo by Frank Wirth).

43. Both locals and visitors are drawn to the Trout River for swimming in the summer months (photo by Ken Secor).

44. Fishing on the Trout River is very popular, with numerous access areas and a variety of fish habitats (photo by Brenda Elwood).

We are always looking for information about paddling and fishing and access points. Please let us know about your favorite paddles on the Missisquoi and Trout Rivers. Please also send along photos you'd like us to add to our photo tour, and be sure to tell us where the photo was taken (www.vtwsr.org).

Staying Connected in the Northern Green Mountains: Identifying Structural Pathways and other Areas of High Conservation Priority

Louise Gratton, Robert Hawk, Corrie Miller, Conrad Reining

Summary

This paper describes the process of identifying critical areas of fine-scale wildlife connectivity, or structural pathways, within the Northern Green Mountains of Vermont. The Northern Green Mountains are one of eight large-scale wildlife linkages in the Northern Appalachians Forest. The analyses focused on road crossing areas connecting large habitat blocks of unfragmented forest greater than 3,000 acres. Thirty-four pathways were identified and categorized, and the landowner parcels within them identified and ranked for importance of connectivity within the pathway. In addition, parcels within the habitat blocks themselves were identified and ranked for importance in contributing to *regional* connectivity.

The Staying Connected Initiative

The Staying Connected Initiative (SCI) was formed in 2009 to protect and maintain landscape connectivity across the Northern Appalachians of the United States and Canada for the benefit of wide-ranging, forest dwelling wildlife such as bear, moose, lynx, marten and bobcat. SCI is an innovative 21-member, multi-state partnership that includes 13 non-profit organizations and eight state agencies from Vermont, New Hampshire, Maine, and New York. The initiative focuses on eight priority landscape linkages (Figure 1), most of which were identified by Two Countries, One Forest (2C1forest.org; Trombulak et al. 2008) as important for ecoregional connectivity.

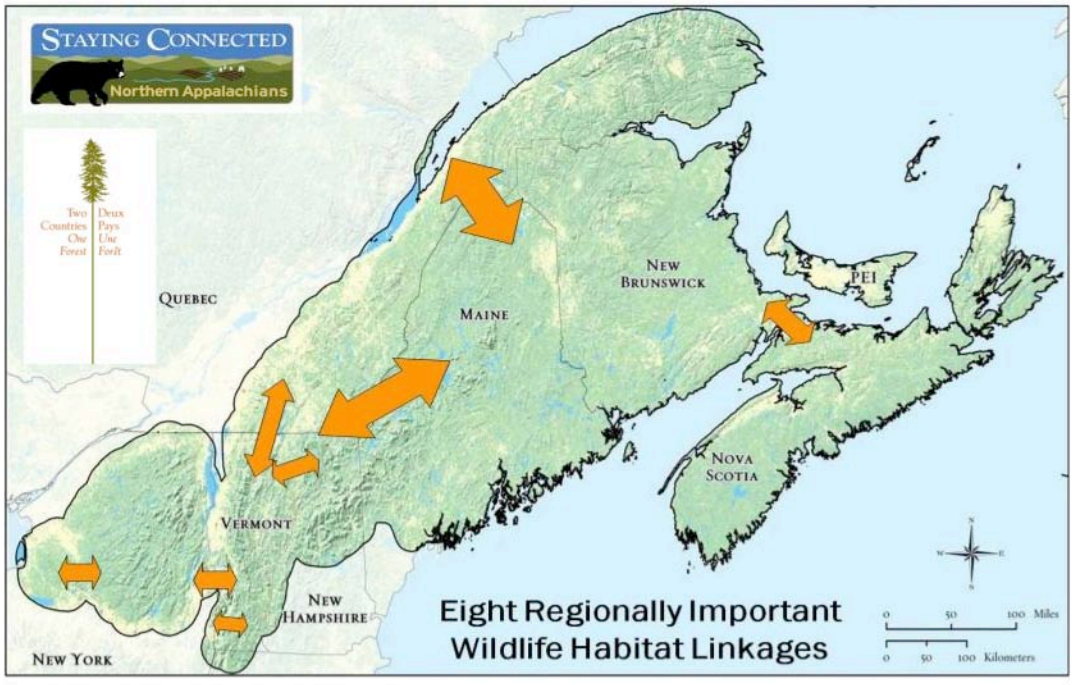


Figure 1. Eight Landscape Linkages originally identified by the Staying Connected Initiative and Two Countries, One Forest (2C1Forest) in response to 2C1Forest's report on conservation priorities in the Northern Appalachians (Trombulak et al. 2008). Northern Appalachian Ecoregion is outlined in black.

SCI defines a landscape linkage as a *broad region of comparatively greater or more concentrated connectivity important to facilitate the landscape or regional-scale movement of multiple species and to maintain ecological processes between core areas*, and where structural connectivity is at risk. Structural connectivity occurs when *similar landscape elements, such as habitat patches or natural vegetation, are physically connected to each other.*

Within each linkage, SCI partners are pursuing a suite of conservation strategies designed to succeed in a region of predominantly private lands. These include: 1) using conservation science and GIS modeling analyses to identify critical areas of fine-scale connectivity within each linkage; 2) providing outreach, education, and assistance to individuals, landowners, municipalities, and community groups to better understand and protect wildlife connectivity; 3) providing technical assistance for municipal land use planning in safeguarding wildlife and other conservation values; 4) collaborating with state and local transportation departments to facilitate better, safer wildlife movement across important crossing areas; and 5) protecting land in targeted areas.

The Northern Green Mountains Landscape Linkage

This document describes the process used to identify and rank Structural Pathways and land parcels within the US portion of the Northern Green Mountains (Figure 2) as well as the process used to refine the Northern Green Mountain Landscape Linkage boundary.

SCI defines a structural pathway as an *area with sufficient structural connectivity to function as a habitat corridor.* A habitat corridor occurs when those *components of the landscape provide a continuous or near continuous pathway that may facilitate the movement of target organisms or ecological processes between areas of core habitat.*

The Northern Green Mountains are among the wildest, yet least protected, landscapes in the Northern Appalachians. Ranging from Mount Mansfield, Vermont, in the south to Mount Orford, Québec, in the north (Figure 2), these mountains and their slopes are remarkably diverse, containing all major ecosystem types of the Northern Appalachians.

The Northern Green Mountains serve a crucial role in regional landscape connectivity, tying the Adirondacks and the central Appalachians to the Northern Appalachians of Maine and Canada, thus providing an important north-south and east-west corridor for wildlife. The complexity of the terrain in the Northern Greens, and the relatively large elevation gain over the surrounding Champlain Valley and Piedmont, provide species with flexibility to move and adapt in face of climate change (Anderson et al. 2011).

Due to initial funding source requirements, the first phase of the SCI project was implemented only in the US portions of the eight linkages.

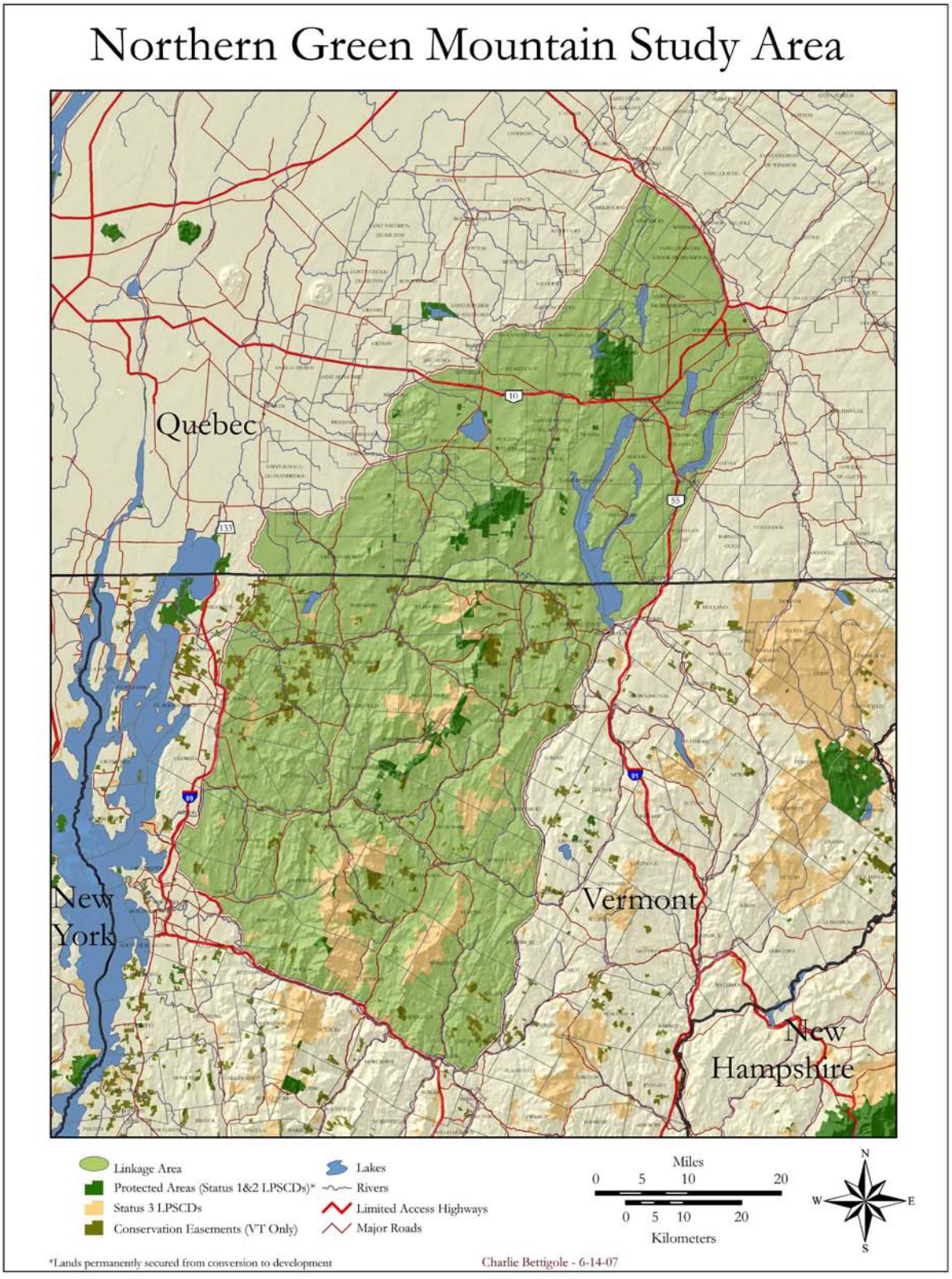


Figure 2. Initial Northern Green Mountain Study Area at outset of process to identify critical areas of fine-scale wildlife connectivity, or structural pathways.

Identifying Structural Pathways in the Northern Green Mountains

The first step the authors (hereafter "we") used to delineate structural pathways was to determine the location of existing unfragmented areas. Vermont Fish and Wildlife Department (VFWD) and Vermont Land Trust (VLT) had previously conducted a study to improve the understanding of the statewide distribution of contiguous habitat blocks. Specific undertakings of the study, finalized in 2011 (Sorenson and Osborne; see Appendix #1 for further details), included:

- Identification of habitat blocks (contiguous areas that are undeveloped, uncultivated, greater than 20 acres, and lacking class 1 – 3 roads) using NOAA & C-CAP Land Cover data (Figure 3);
- Determinations of "cost" to wildlife for crossing each land cover type and creation of a cost grid for Vermont;
- Ranking relative importance of habitat blocks for their contribution to biological and conservation value and the potential threat to them.

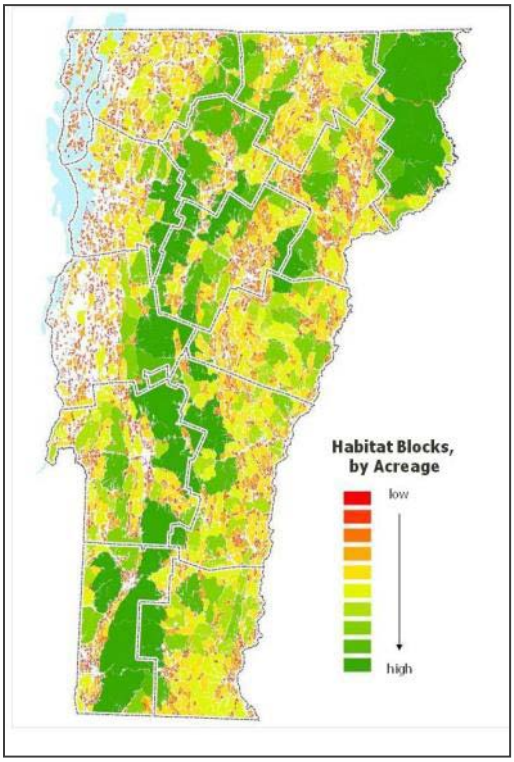


Figure 3. Habitat Blocks across Vermont, colored according to acreage, from Sorenson and Osborne (2011)

We used the Sorenson and Osborne Habitat Block analysis data (2011) to view habitat blocks by acreage in the U.S portion of the Northern Green Mountains Landscape Linkage area. After experimenting with various acreage thresholds, we identified those habitat blocks greater than or equal to 3,000 acres (Figure 4). We consider these large habitat blocks as the core forested area in the Northern Greens, but are aware that appropriate thresholds depend largely on landscape context.

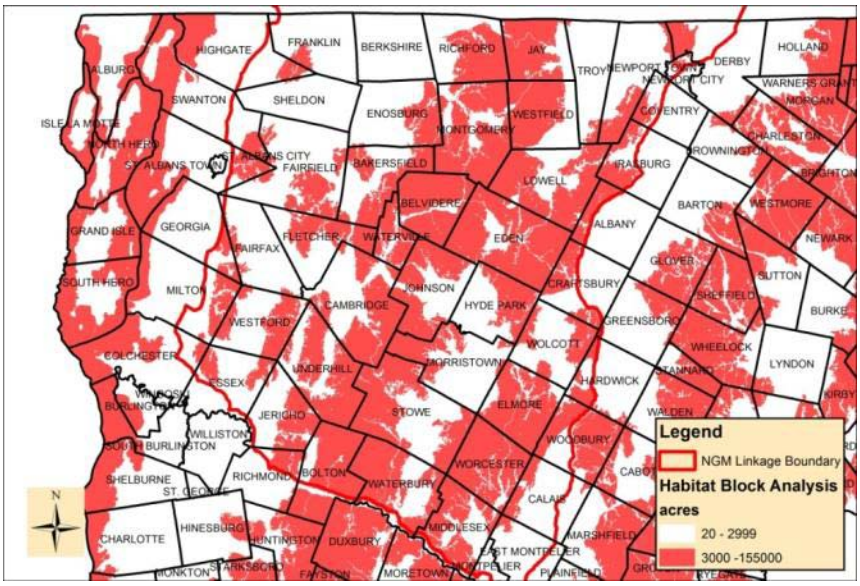


Figure 4. Habitat blocks 3,000 acres or larger are shown in red.

Jens Hilke, a Conservation Biologist with VFWD had used the results of Sorenson and Osborne (2011) to develop a "Habitat Network" of habitat blocks and the lands connecting them, by overlaying a series of Least Cost Path (LCP) analyses. (Figure 5).

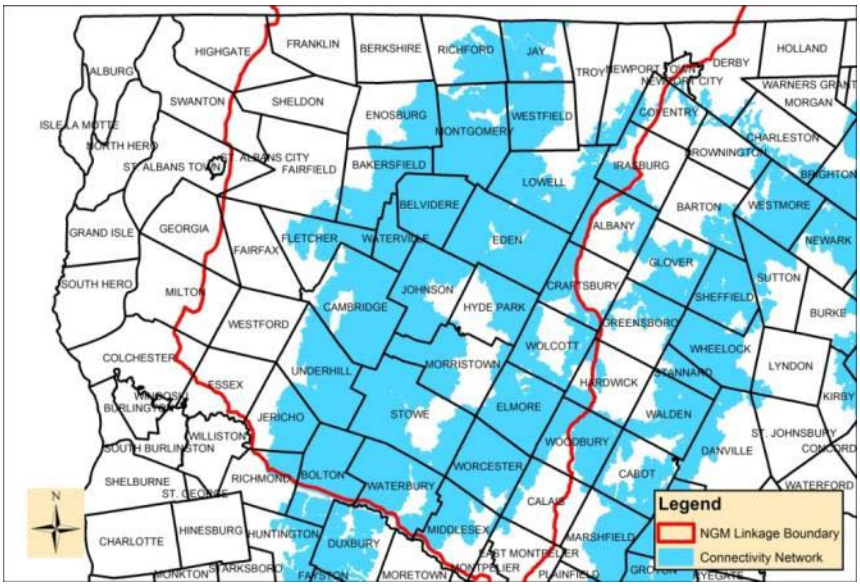


Figure 5. "Habitat Network" as developed by Jens Hilke of VFWD in 2010, based on a draft of Sorenson and Osborne's study.

To highlight areas of connectivity, we overlaid Hilke's Habitat Network with identified habitat blocks greater than 3,000 acres (Figure 6). In Figure 6, areas in purple are the overlap with Hilke's Habitat Network while light blue represents areas of potential connectivity among habitat blocks.

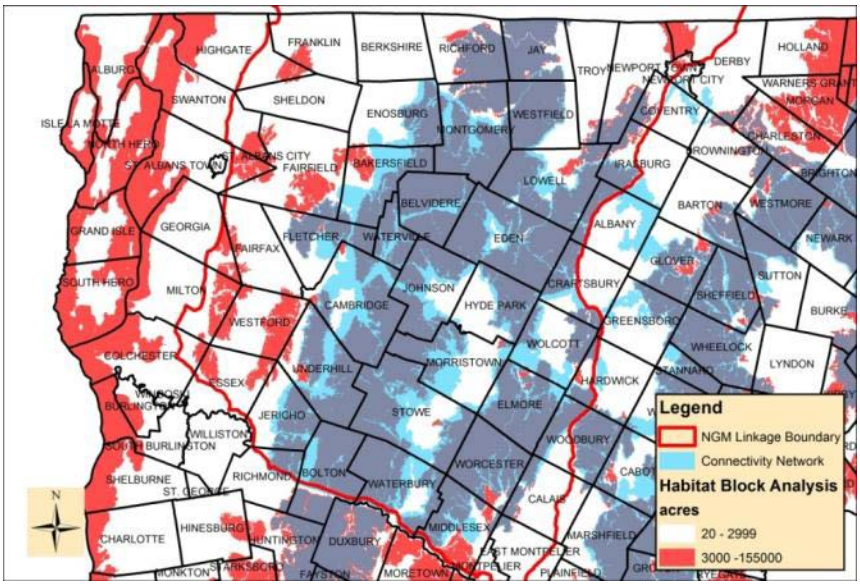


Figure 6. US portion of the Northern Greens showing Habitat Blocks (in red and purple) and areas of potential connectivity (light blue).

To broaden the geography that Hilke covered and refine his analysis for the Northern Greens, we ran additional LCP analyses. Various "start" and "end" points for the LCP analyses were run, acknowledging the region's value for both East-West and North-South connectivity. Eric Sorenson of VFWD assisted in these analyses (Figure 7).

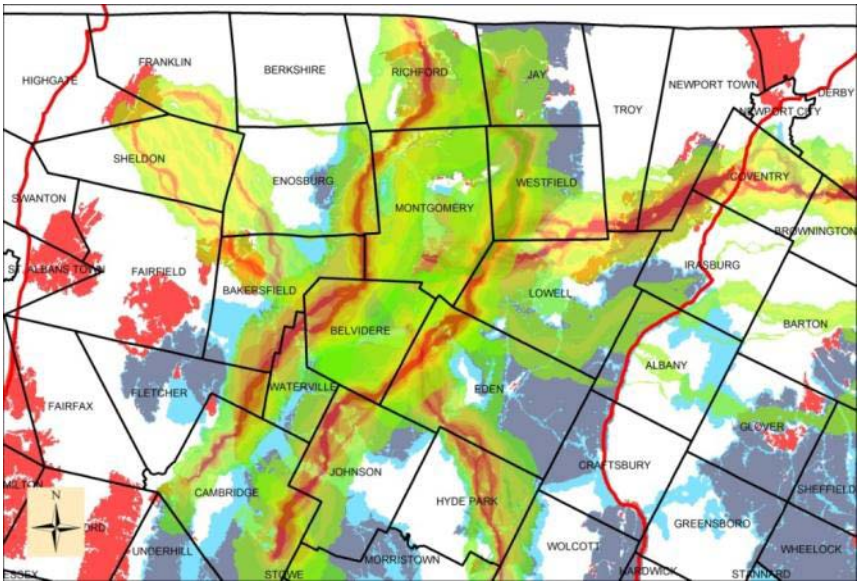


Figure 7. Combined Least Cost Path analyses: Red, yellow, green, and then clear coloration show the paths of increasing resistance between two habitat blocks.

We also took into consideration the results of the Critical Paths Project (Leoniak et al. 2009), which surveyed 38 sites throughout the state where east-west roads cross the spine of the Green Mountains. A team of state biologists and conservation organizations assessed the physical features of the crossings and the natural features of adjacent landscapes. They also tracked and monitored wildlife movement patterns at each crossing, three times each during one winter and one spring.

From this work they were able to identify 11 critical "Priority Crossing Zones" along the spine of the Green Mountains that are essential to North-South wildlife movement. Detailed strategies are being developed for road mitigation, roadside improvements for traffic safety and wildlife crossing, land conservation, and local land use planning for these zones. Where one of these Priority Crossing Zones occurred in the Northern Green Mountain Linkage area, we considered it in our analysis. This is the only work, through 2012, that spoke to *functional* connectivity.

We next identified those general areas (in the light blue "connecting lands") with *best available* current structural connectivity between habitat blocks (Figure 8). These are areas where it is particularly important to maintain connectivity so that blocks stay structurally connected.

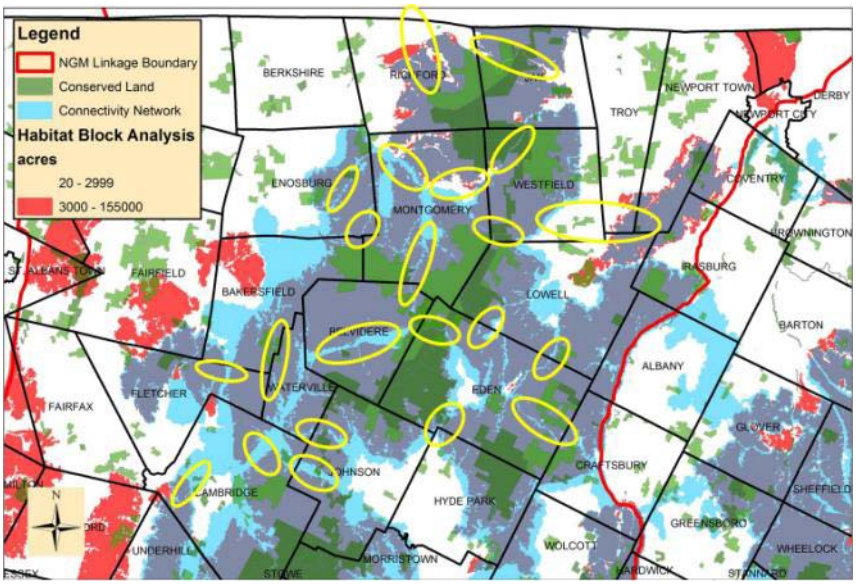


Figure 8. General "Connecting Lands" between habitat blocks.

Although roads fragment the landscape, certain landscape features contribute to or weaken the structural connectivity between large blocks despite roads. In order to further refine the general connecting lands areas, we took into account the presence of these features. Features we considered to promote structural connectivity in our refinement process included: forest cover on both sides of the road, hedgerows, riparian buffers, culverts, bridges, and wetlands. (Identification by the Critical Paths or LCP analyses of likely road crossings also highlighted specific areas). Features that we considered to weaken structural connectivity were human development, roads, agricultural fields, and sometimes guardrails.

With the Connecting Lands defined, we took a systematic approach to delineating the structural pathways. The first step was to isolate a given connecting area and then identify the large habitat blocks and conserved lands around the connecting area (Figure 9).

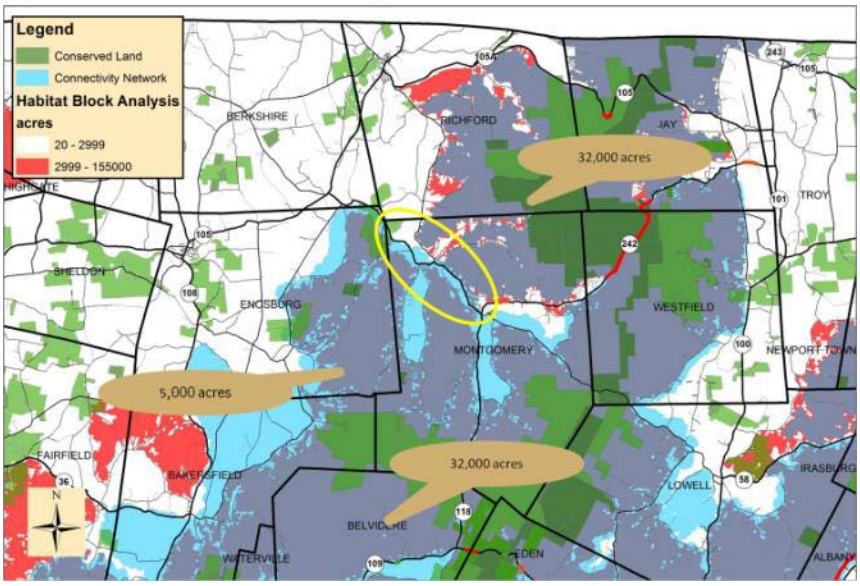


Figure 9. A closer look at a general "Connecting Lands" area in Montgomery, VT. shows surrounding large habitat blocks and conserved land.

We then reviewed high-resolution Ortho photos (Figure 10) and conducted drive-by visual analyses

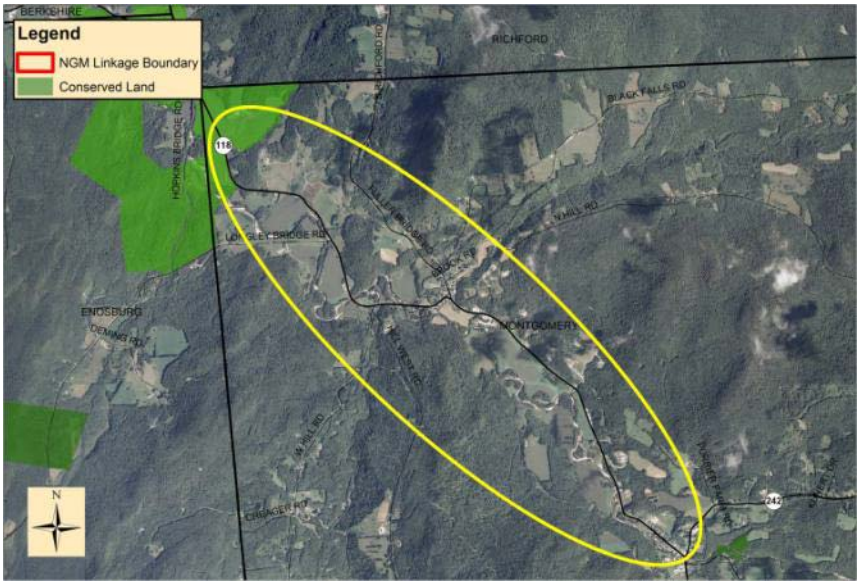


Figure 10. Montgomery, VT, Connecting Lands Area shown on Ortho photograph overlaid with nearby conserved land.

The Ortho photos allowed us to "zoom in" on the connecting area to explore connecting features in more detail. Figure 11shows the general connections between two sets of habitat blocks, as illustrated by the double-headed arrows. These arrows will be the basis for the delineation of a structural pathway.

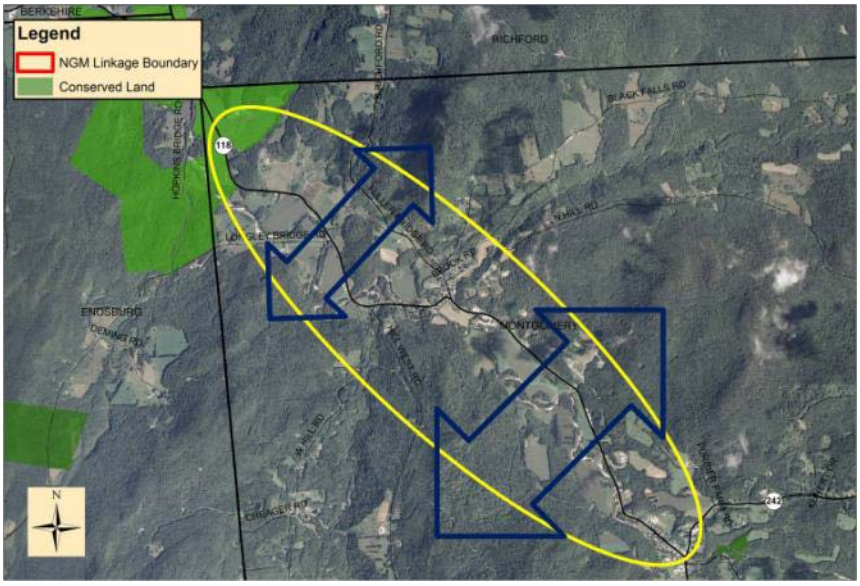


Figure 11. Montgomery, VT. General connections between two sets of habitat blocks shown by dark blue arrows.

Specific features that aid or hinder movement, such as hedgerows, riparian buffers, and agricultural fields, can be tagged at this fine scale of analysis. Figure 12 shows this analysis for one of the double-headed arrows, with red stars highlighting important features.

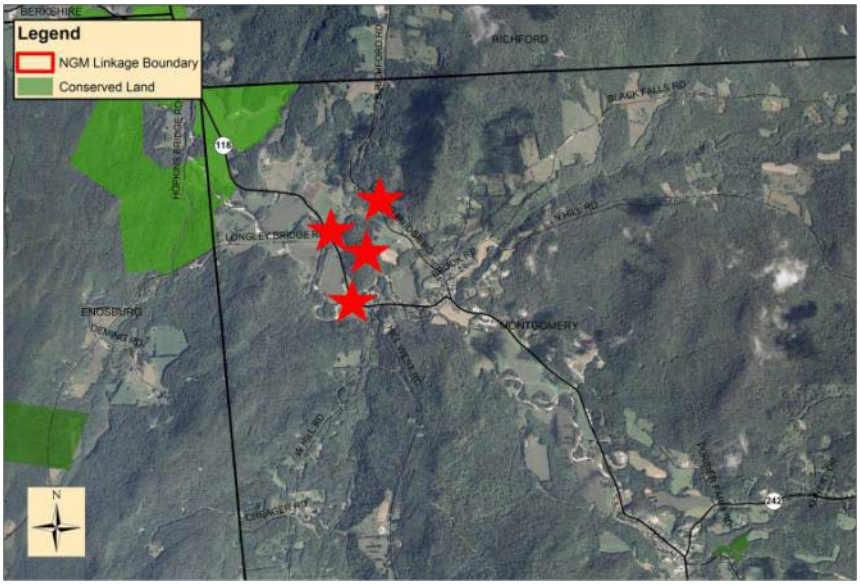


Figure 12. Montgomery, VT. Features that aid movement shown with red stars, including, top to bottom: forest up to both sides of a road, riparian buffers, a forested "stepping stone," and a bridge underpass.

Some of those specific features are highlighted in Figures 13 and 14.

Figure 13. RT 118 bridge over Trout River in Montgomery, VT looking north from West Hill Road. (photo: Bob Hawk, 5/7/12)

Figure 14. RT 118 looking north toward Longley Bridge (on left behind trees). Note riparian buffer on upper left (photo: Bob Hawk, 5/7/12).

Once the connectivity-supporting features were identified, we delineated structural pathway polygons with boundaries 500 meters into the forest (from the road or from the forest edge, whichever was greater). See example in Figure 15.

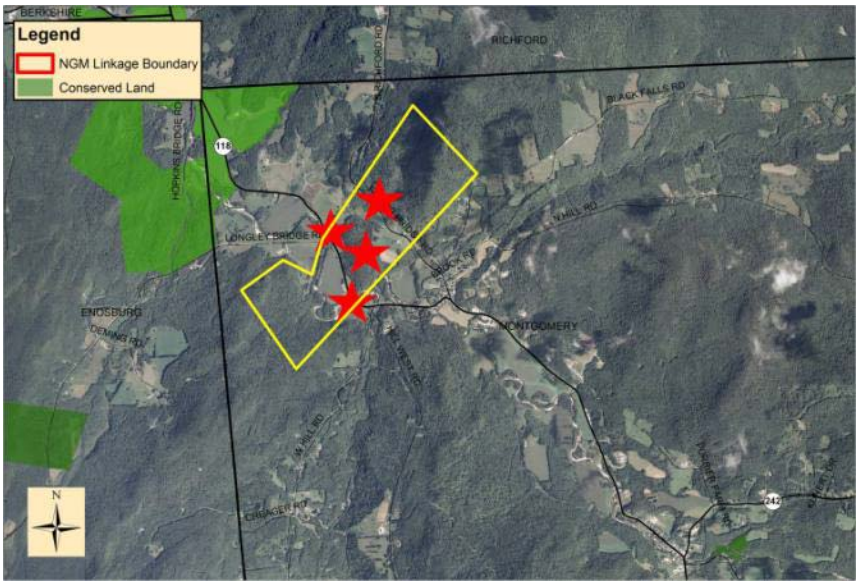


Figure 15. Montgomery, VT. An example of a Structural Pathway polygon extending 500 meters into the habitat block on either side, encompassing connectivity supporting landscape features, and representing the most structurally connected pathway between the two larger blocks.

Using a combination of fieldwork and GIS analysis (described above) we assigned each polygon (ID 1-34) with a category that represents its level of structural connectivity based on the presence or absence of the connectivity promoting and weakening features (Figure 16).

1. Existing Connectivity with *Mostly Intact* Forest Cover (16 total)
2. Existing Connectivity with *Moderately Fragmented* Forest Cover (7 total)
3. Potential Connectivity – *Potential for Improved* Forest Cover, with remediation (e.g. riparian plantings, hedgerow development) (4 total)
4. Possible Future Focus – areas that may become at risk for future disconnection (7 total)

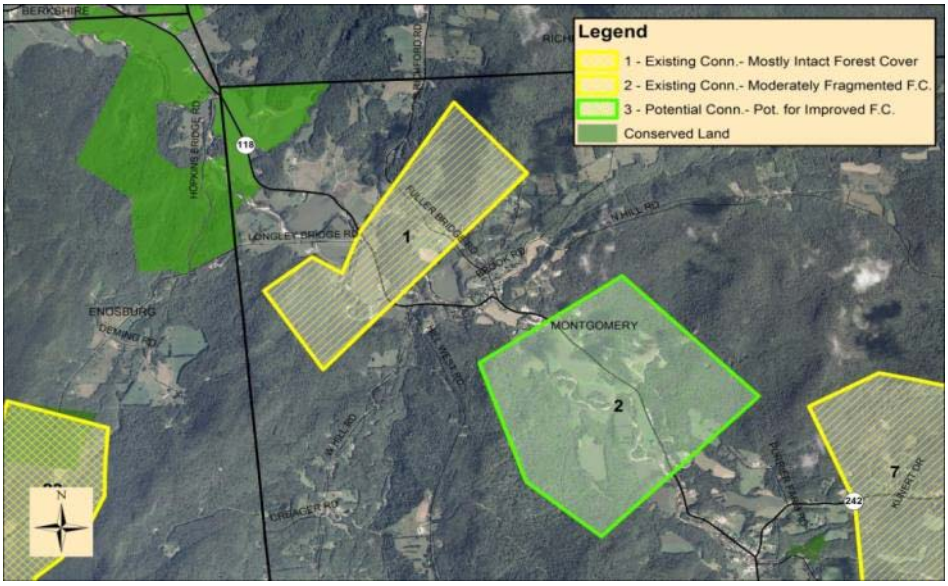


Figure 16. Structural Pathways of varied levels of structural connectivity. The number in the center of the polygon refers to that polygon's ID number (1-34).

We chose to narrow the final analyses to the 27 Structural Pathways with Existing or Potential Connectivity (categories 1-3 above). The final suite of Structural Pathways is shown in Figure 17. **It is imperative to note that Structural Pathways are not synonymous with *actual* wildlife crossings, known as *functional pathways.***

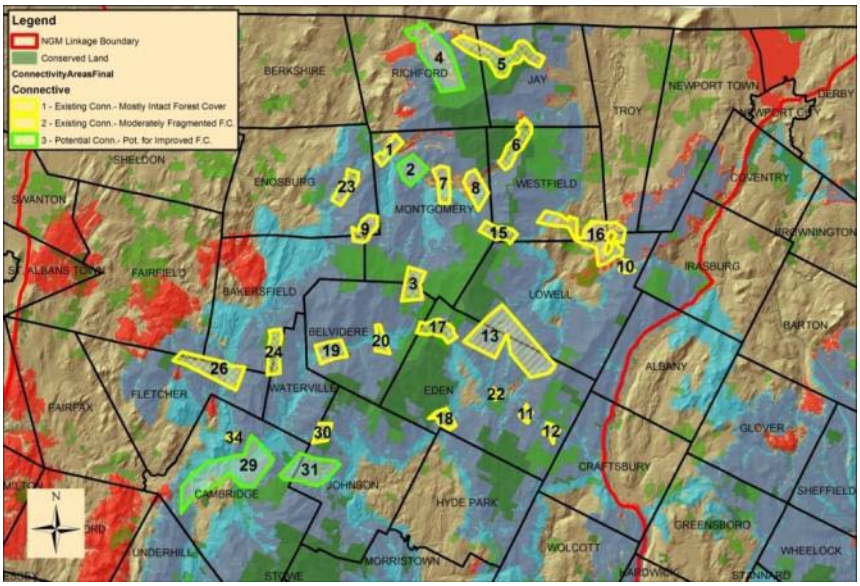


Figure17. Northern Green Mountain Structural Pathways. Again, the numbers are for identification purposes only, and do not indicate rank.

We then further assigned each Pathway a Regional Ranking of Highest, High, Medium, or Low, to prioritize Structural Pathways at the linkage-level. This ranking was based on:

- Acreage of habitat blocks connected by Structural Pathway (larger acreage scored higher);
- Proximity to conserved lands (closer to large areas of conserved land scored higher);
- Distance between habitat blocks (smaller distances scored higher);
- Critical Paths crossing presence within Structural Pathway;
- Centrality to spine of Northern Greens (closer to spine scored higher).

Those Pathways scoring "Highest" are outlined in bright yellow and green in Figure 18.

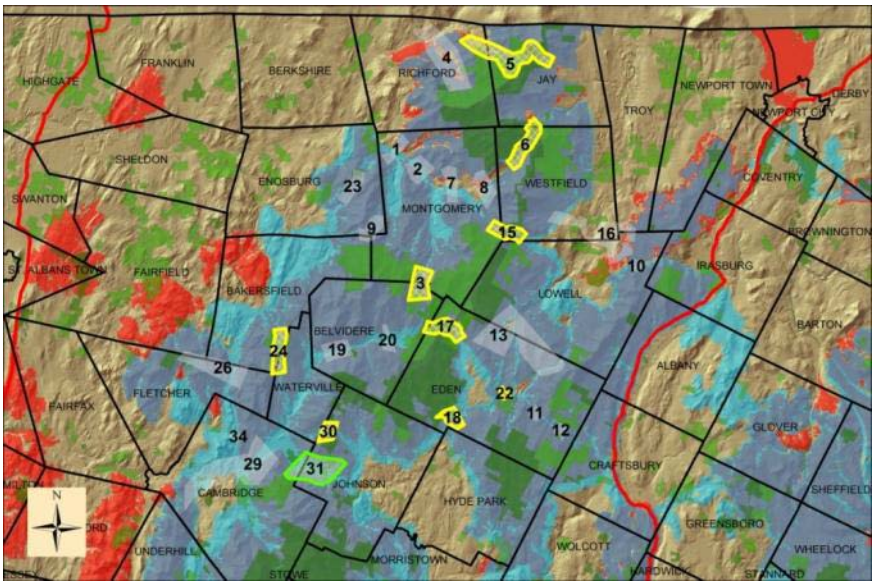


Figure 18. Structural Pathways with "Highest" Regional Rank.

In summary, we took the following steps to define structural pathways:

1) Identified the area's large habitat blocks, among which wide ranging mammals need to be able to travel.

2) Identified areas of connecting lands between habitat blocks.

3) Identified the sections within these connecting lands with best current structural connectivity (considering land cover, culverts and bridge data, topography, wetlands).

4) Created polygons extending 500 meters into the connected habitat blocks in the areas most conducive – in current state – for wildlife crossing. These polygons are the Structural Pathways.

5) Assigned each Structural Pathway polygon to a category representing its level of structural connectivity.

6) Assigned each Structural Pathway a Regional Rank –Highest, High, Medium, Low.

Identifying Unconserved Land Parcels Within Structural Pathways

With the Structural Pathways established we could then overlay parcel data with the boundaries of each Pathway and view all the unconserved land parcels within each Structural Pathway.

Within the GIS database we associated the Structural Pathway ID # with each parcel at least partially within that Pathway's bounds.

Each parcel was then assigned a value, based on its contribution to the structural connectivity across that Pathway. Factors that increased a parcel's value included: predominant forest cover, spanning parcel geometry, large acreage, forested road frontage, spanning across a road (same owner on each

side of road), and high habitat value (wetland, riparian area, saddle, ridgeline, beech stand, etc…). Although the assigned value reflects a subjective decision of the authors, specific factors guided the ranking of each parcel. Generally, this scoring method can be described:

- Three or more factors → **High**
- Two or more factors → **Med**
- One factor → **Low**
- No factors → **Un-scored or Lowest**

An example of High and Medium Priority Parcels in the Route 105 Structural Pathway are shown in Figure 19.

Figure 19. Example of High and Medium Priority Parcels in the Route 105 Structural Pathway. Note how high scoring pink parcel is large, spans across the landscape, crosses the road, and encompasses wetlands.

We identified a total of 1,084 unconserved parcels within the 27 structural pathways, 175 of which were deemed "High" or "Med" priority.

Avoiding "Bridges to Nowhere:" Identifying Habitat Block Core Areas (HBCA)

Having delineated structural pathways and important associated parcels we were faced with the question of whether we had created "bridges to nowhere" by not considering the integrity of habitat blocks that are linked together by the pathways. To address this issue, we examined the Sorenson and Osborne habitat blocks themselves for priority parcels. Our focus was on ensuring *regional* connectivity by identifying areas, and ultimately parcels within them, that best connect the Structural Pathways to each other and to already conserved lands within the habitat blocks. As a means to an end (with the end goal being the identification of important parcels in the core habitat blocks), we delineated structurally connected areas of unconserved land (within habitat blocks) between Structural Pathways, and called them Habitat Block Core Areas (HBCA). HBCA boundaries were loosely drawn using a combination of structural pathway boundaries; roads, parcel lines, and forest cover (Figure 20).

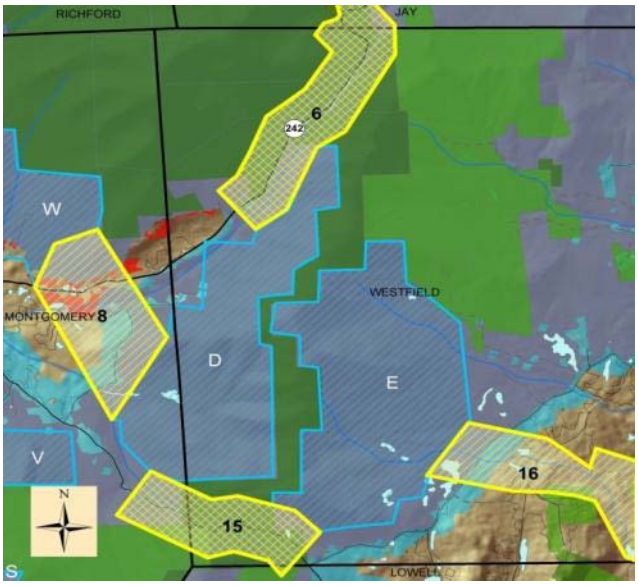


Figure 20. Examples of Habitat Block Core Areas (outlined in light blue) and associated structural pathways (outlined in yellow). Note how HBCAs represent the general area of land connecting Structural Pathways with each other and with conserved land.

As was done within Structural Pathways, we associated all parcels within each HBCA with that area's ID letter (A-Z). The parcels were given a subjective rank of "high", "medium" or "low." Factors that increased a parcel's value included: proximity to conserved land, proximity to a Structural Pathway, predominant forest cover, spanning parcel geometry, large acreage, spanning across a road (same owner on each side of class 4 or higher road), and high habitat value (wetland, riparian area, saddle, ridgeline, beech stand, etc…). The goal was to explain visually how to best connect the Structural Pathways to each other through the Sorenson and Osborne habitat blocks using a regional connectivity lens. See Figure 21for the final set of Structural Pathways and HBCAs, but keep in mind the HBCAs were only a means to identify important parcels within habitat blocks and have no meaning in and of themselves.

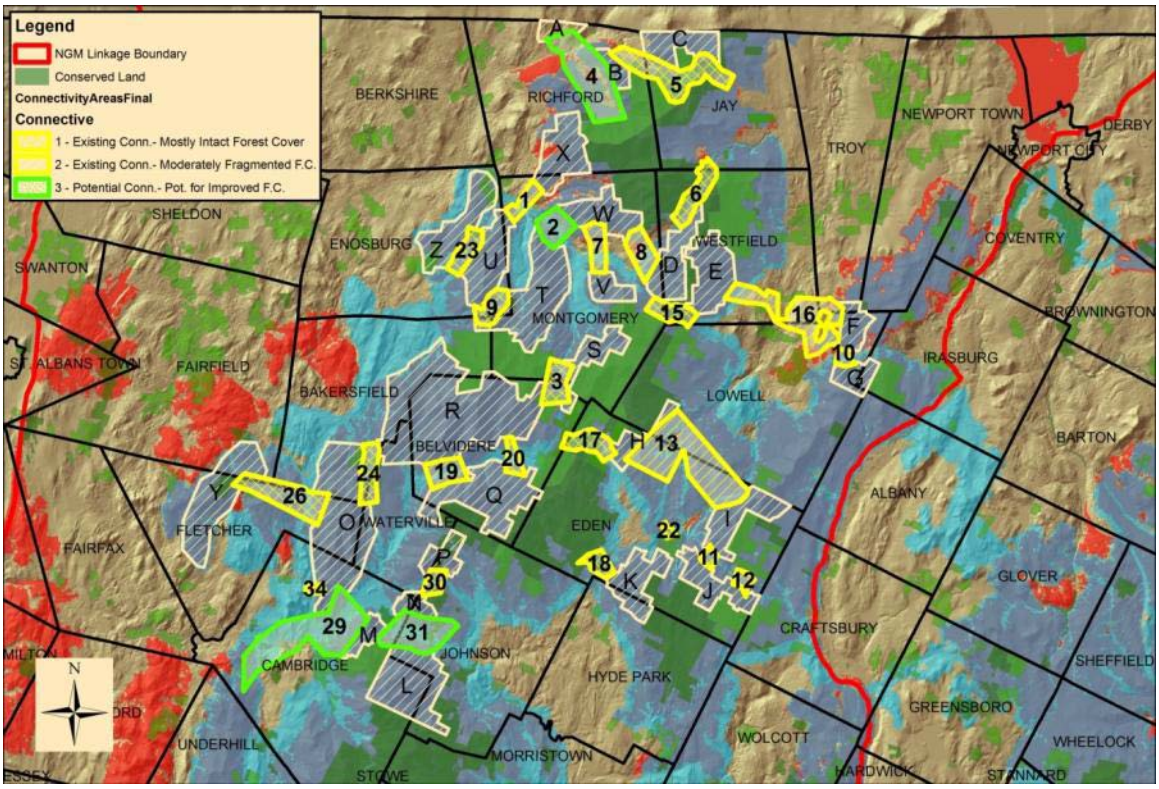


Figure 21. Final set of Structural Pathways (ID=1-34) and Habitat Block Core Areas (ID=A-Z). Together with conserved land, they make up critical network of connectivity in the Northern Greens.

Final Step: Parcel Attributes

We have so far described how we developed two types of spatial polygons: 1) Structural Pathway polygons and 2) HBCA polygons. We have also described how we assigned connectivity values to individual parcels within Northern Greens parcel database to provide information most applicable to the land conservation field. As a final product, we developed on GIS a shapefile of all Northern Greens parcels with associated attribute data related to connectivity (see Appendix 2). This product can be used to prioritize and narrow down important parcels based upon the interests of a given user. Within the attribute table of this shapefile, a parcel can be associated with:

- A Structural Pathway or HBCA that encompasses it – the specific Structural Pathway or HBCA will be identified by ID number or letter;
- The Regional Rank value of the Structural Pathway or HBCA encompassing it;
- Current Landowner feasibility (anecdotal information for CHC region towns only);
- 2C1F Threat/Importance Value for hexagon encompassing it;
- "Cost" for animal to travel through parcel (from Sorenson and Osborne, 2011, Habitat Block Analysis cost surface);
- Identification as a "Phase 1 parcel" – identified on Jan 26, 2011 at priority setting meeting (~88 parcels) among SCI partners. A landowner address is included for approximately 68 parcels;
- Identification as a "Phase 2 parcel" – identified as a priority after Jan 2011 meeting. These are all parcels that scored a "High," "Med," or "Low" (low is still of value, as lowest value

parcels were not scored at all) priority within Structural Pathway or HBCA and includes about 365 parcels.

- ~178 are in Structural Pathway polygons
- ~159 are in HBCA polygon
- ~28 are in both Structural Pathway and HBCA polygons

Refining the Linkage Boundary

During the just discussed process of identifying polygons of significance for connecting the habitat network and sustaining its core, it became clear that our original Northern Greens Landscape Linkage boundary was too broad. To refine the boundary, we followed edges of habitat blocks greater than 3,000 acres as well as connecting lands identified by Hilke (Figure 22). We focused on the spine of the Northern Greens, as opposed to "outlying" large blocks. In an effort to keep the boundary simple and with an eye towards future restoration, we didn't exclude some areas from the polygon, despite their current disconnected status.

The same methodology was used by the Appalachian Corridor in the Quebec portion of the Northern Greens Landscape to identify habitat blocks that delineate the linkage boundary. Structural pathways shown in Figure 22, and in greater detail in Figure 23 ("Corridor naturel"), were identified by LCP analysis followed by field work to ground proof their actual potential (Robidoux and Guérin, 2010). Validating their use by wildlife is ongoing by tracking teams (Robidoux and Bouthot, 2011).

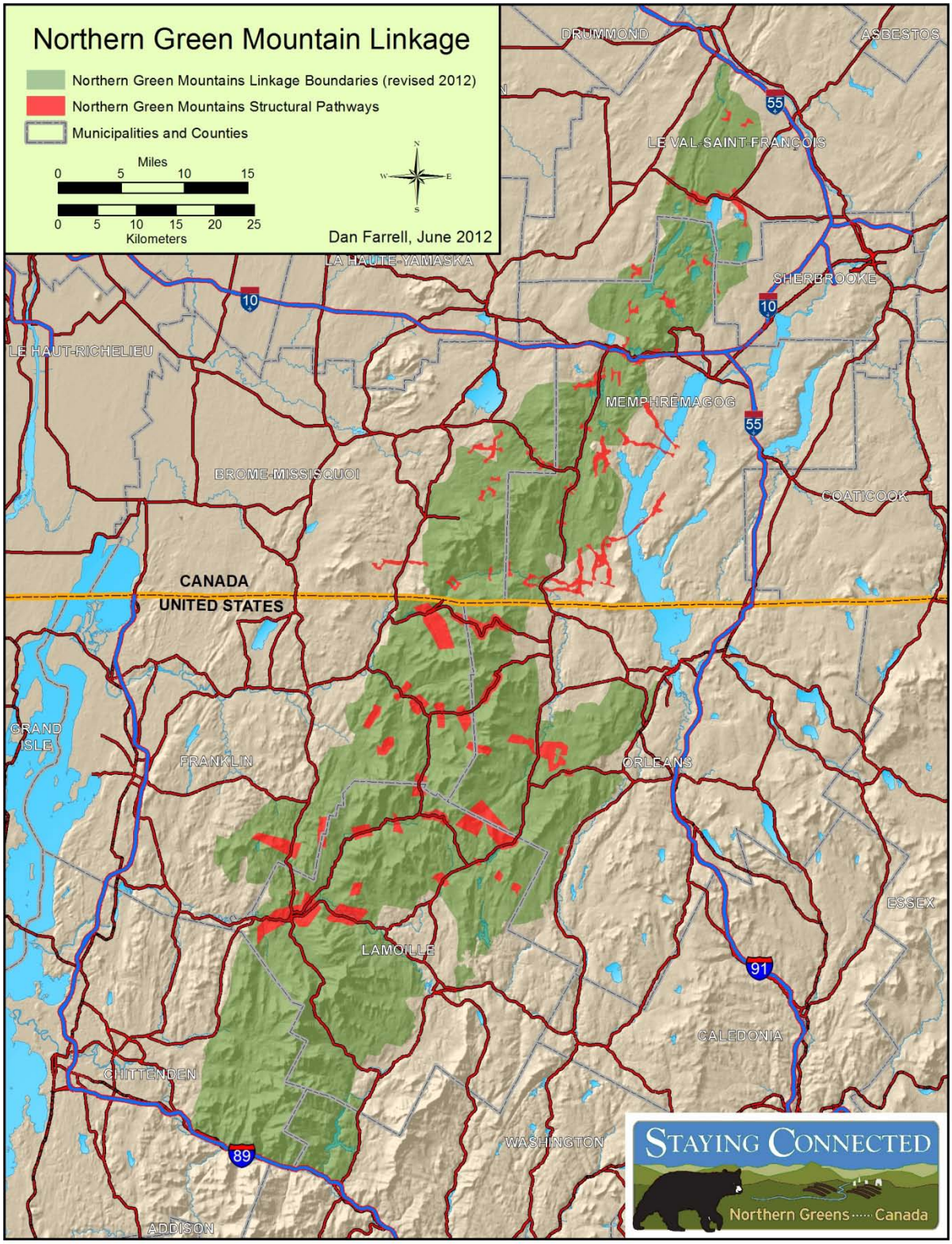


Figure 22. Final, refined boundary of the bi-national Northern Green Mountains Linkage colored green, with Structural Pathways colored red.

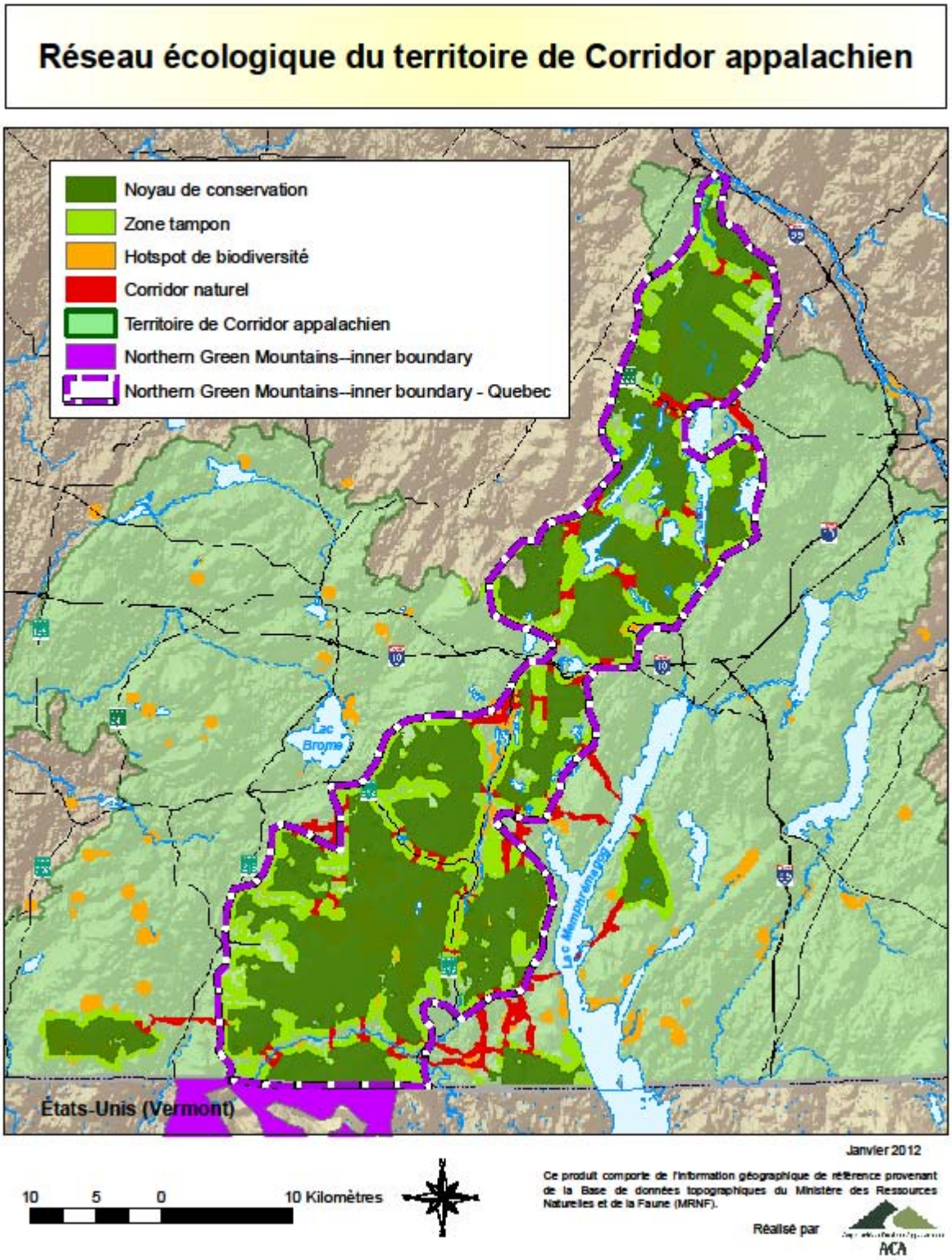


Figure 23 Structural Pathways ("Corridor naturell") in the Canadian section of the Northern Green Mountains.

Discussion

This analysis was developed to give local communities, land trusts, town and regional planning entities, the Vermont Fish and Wildlife Department and the Vermont Agency of Transportation information on those places in the Northern Green Mountains that contribute most significantly to the conservation of landscape connectivity at local and regional scales. We identify a set of Structural Pathways that tie together relatively large habitat blocks in a strategic and efficient manner, as well as those parcels within the pathways whose conservation, and in some cases restoration, will contribute the most to ensuring the long-term structural integrity of those pathways. We also sought to identify those places – the Habitat Block Core Areas – whose conservation will contribute to the long-term viability of the region's Habitat Network.

Many of the Structural Pathways span roads with traffic volumes that exceed 1,000 vehicles per day, and three that exceed 3,000, a rate that likely acts as a barrier for many species of wildlife (Clevenger and Huijser, 2011; Seiler, 2005). The road segments that fall within the structural pathways need greater study to understand just how much of a barrier the roads associated infrastructure constitute, and what might be done to mitigate their effects. A wildlife monitoring system should be established that includes cameras, track plates, GPS/radio collar data, DNA analysis and other tools to provide the hard facts and compelling evidence transportation agencies and conservation organizations need before investing millions of dollars to improve infrastructure or buy conservation land and easements. Such a system can be designed to incorporate data generated by citizen scientists and professionals alike. This could add presently missing functional connectivity information to the puzzle.

The authors acknowledge that this document is a work in progress. Unresolved issues include:

- Where to "stop" the analyses along the edges in East/West connectivity (e.g., towns of Fletcher and Lowell)?
- Different analysis necessary on both sides of the border because Habitat Block Analysis data is only available for Vermont.
- Border complications using least cost path analyses for start/end points in Richford and Jay because of lack of compatible data from Canada.
- Subjectivity of "high," "med," "low".
- Whether this analysis leaves out important terrain/habitat in lower elevations because those habitats aren't available in blocks of 3,000 acres or greater. Some species may prefer or need lower elevation areas, even if they are relatively small, for their life cycles. This study does not capture these smaller, lower elevation blocks.

Despite these issues, we hope that this work contributes to the establishment of a healthy and resilient network of habitat in the region, and that this network will in turn allow for the movement, migration, and dispersal of wide-ranging mammals.

References

Anderson, M.G. and A. Olivero Sheldon. 2011. Conservation Status of Fish, Wildlife, and Natural Habitats in the Northeast Landscape: Implementation of the Northeast Monitoring Framework. The Nature Conservancy, Eastern Conservation Science. 289 pp.

Clevenger, Anthony P. and Marcel P. Huijser. 2011. Wildlife Crossing Structure Handbook, Design and Evaluation in North America. Federal Highway Administration-CFL/TD -11-003, March 2011.

Leoniak, G., T. Scharf, J. Fidel, J. Nunery, M. Ripps, S. McIntyre, G. Gay, F. Hammond, J. Hilke. 2009. Critical Paths: Enhancing Road Permeability for Wildlife in Vermont. Recommendations for "On the Ground" Improvements at Priority Road Crossing Zones in the Green Mountain Corridor. Draft Report. Montpelier, VT: National Wildlife Federation. www.nwf.org/~/media/PDFs/Regional/Northeast/NRC_Critical_Paths_Report.pdf

Robidoux, C. and J.-R. Guérin, 2010. Identification et validation des corridors naturels du territoire du Corridor appalachien. Phase 1 (2009-2010). Corridor appalachien, Lac-Brome, 22 p.

Robidoux, C. and G. Bouthot, 2011. Validation des corridors naturels sur le territoire du Corridor appalachien. Phase 2 (2010-2011). Corridor appalachien, Lac-Brome, 32 p.

Seiler, Andreas. 2005. Predicting locations of moose-vehicle collisions in Sweden. Journal of Applied Ecology, 42, 371-382.

Sorenson, E. and J. Osborne. 2011. Vermont Habitat Blocks and Wildlife Corridors: An Analysis using Geographic Information Systems. Vermont Fish and Wildlife Department and Vermont Land Trust. Draft report.

Staying Connected – Connectivity Measures. 2011. Terms and Definitions Workgroup. [Need to figure out the best way to reference this…maybe provide a web link eventually]

Trombulak, S.C., M.G. Anderson, R.F. Baldwin, K. Beazley, J.C. Ray, C. Reining, G. Woolmer, C. Bettigole, G. Forbes, and L. Gratton. 2008. The Northern Appalachian/Acadian Ecoregion: Priority Locations for Conservation Action. Two Countries, One Forest Special Report No. 1. URL: http://www.2c1forest.org/en/resources/resources_docs/Special_Report_1.pdf

APPENDIX 1

Habitat Block Weights in Sorenson and Osborne (2011).

Habitat blocks were evaluated using 11 factors to assess their contribution to biological and physical diversity and given a weighted score (see Figure 3):

- Cost distance to core area – 15%
- ELU Weighted Average – 15%
- Element Occurrence count – 10%
- Percent core (250 acre blocks = core) – 15%
- Block size – 15%
- Roads (miles of roads/square miles of habitat block) – 10%
- Percent ponds – 5%
- Percent wetlands – 5%
- Exemplary aquatic features – 5%
- Rivers/Streams (miles) – 5%
- Percent TNC Matrix block – 5%

APPENDIX 2

Description of GIS Shapefiles and Attributes for Structural Pathways, Habitat Block Core Areas and Priority Parcels

Connectivity Areas – "ConnectivityAreasFinal" shapefile

Attributes:

- "ID" = 1:34
- "Connective" =
    - "1 - Existing Conn.- Mostly Intact Forest Cover" (16 total)
    - "2 - Existing Conn.- Moderately Fragmented F.C." (7 total)
    - "3 - Potential Conn.- Pot. for Improved F.C." (4 total)
    - In "ConnectivityAreaFull" shapefile there is also "Connective" = "4 - Future Threat?" (7 total)
- Regional Rank – "RegionRank" =
    - Highest
    - High
    - Med
    - Low

Habitat Block Core Areas – "HabitatBlockCoreArea" shapefile

Attribute:

- "CoreAreaID" = A:Z (26 total)
- Regional Rank
    - High
    - Med
    - Low

Parcels of Interest – "NG_CombinedParcelsFinal"

Attributes:

- *Related to Connectivity Areas*
    - "Focus_2" refers to parcel's location within Connectivity Area and is marked with the Identification Number of that Connectivity Area ("ID" attribute in "ConnectivityAreasFinal" shapefile; "Focus_2" = "1": "34")
    - "Phase1_Par" = "Yes" identifies this parcel as a conservation priority for SCI partnership; determined at meeting on January 24, 2011. We have determined ownership data for these parcels, as possible (80%). "Discarded" refers to parcels that were determined important on January 24, but because location of some Connectivity Areas changed, they are no longer inside a Connectivity Area. 88 of these. 20 with unknown addresses.
    - "Phase2_Par" = "Yes" identifies this parcel as a conservation priority for connectivity in the Northern Greens, at both scales – CA and HBCA; determined by Corrie Miller and Bob Hawk in GIS analysis during Spring 2011. 365 of these (178 CA value only, 159 HBCA value only, 28 that are valuable at both scales).
    - "ConnPriori"- "Phase2_Par" and "Phase1_Par"= "Yes" parcels can have a connectivity priority of either "high," "med," "low," or "lowest." Parcels that made it to Phase 1 list but were determined to be of lowest significance upon a second look are labeled "lowest." "Low" parcels are still important, just lowest tier importance of important parcels.
- *Related to Habitat Block Core Areas*
    - "Focus_3" refers to parcel's location within a Habitat Block Core Area and is marked with the Identification Letter of that Habitat Block Core Area ("CoreAreaID" attribute in "HabitatBlockCoreArea" shapefile; "Focus_3" = "A": "Z")
    - "CorePriori" – all "Focus_3" parcels were determined to have a habitat area core priority of "high," (had 2 or more attributes) "med,"(had 1 attribute) or a blank field (low). If "Focus_3"places parcel in a Habitat Block Core Area, but this field is blank, that's when priority is lowest (note: attributes included adjacent to already conserved, adjacent to connectivity area, large area, good geometry for connectivity, landscape features that would support wildlife (wetlands, ridge top, beech stand, etc…)
- Feasible – Yes Maybe No, blank = unknown; based on Nancy Patch's dataset.
- 2C1Fthreat – Two Countries, One Forest threat and importance value of hexagon containing parcel

Appendix 13. Existing Uses of Surface Waters in the Missisquoi Bay Basin

In keeping with its obligations under the Federal Clean Water Act, the Vermont Water Quality Standards include an anti-degradation policy (WRP, 2008). The policy requires that "existing uses" of surface waters in the state, and the water quality needed to support them, be protected and maintained. Existing uses, such as fishing, contact recreation, and water supply, are those that have actually occurred in or on waters on or after 11/28/1975, whether or not the use is presently occurring. Determination of existing uses for a given waterbody can occur during basin planning or when someone is seeking a permit for a regulated activity that might affect water quality.

During this basin planning process, ANR has identified existing uses of contact recreation, fishing, boating and public drinking surface water supplies in the Missisquoi Bay watershed (Table A13.1) using the procedure in the *Draft Vermont Anti-Degradation Implementation - Existing Use Determination For Use During River Basin Planning* (VTDEC, 2008). Note the following general principles applied in this process:

- All lakes and ponds within a river basin area have existing uses of fishing, contact recreation and boating. This presumption may be rebutted on a case-by-case basis during a permit application process.
- The list includes only certain well-known existing uses in the Missisquoi Bay watershed. It is not intended to be comprehensive. Additional areas and existing uses may be identified during consideration of a permit application and subsequent basin planning efforts.
- For contact recreation and recreational boating in flowing waters, the existing use is established if there is more than an incidental level of the use. There must be both public access and evidence of the presence of "attractive sites" for the use.
- For recreational fishing in flowing waters, ANR recognizes that fishing occurs in all lakes and ponds and in certain reaches of flowing waters (i.e. streams and rivers). This planning process identified only well recognized and documented sites where there is more than an incidental level of fishing use. For reaches to be eligible, there must be public access and either evidence of sites to fish or documentation of special regulations for fishing, or documentation of waters that are stocked by the State.
- For public drinking surface water supply, existing use is established if there is more than an incidental use. The existing use does not apply to non-public or domestic water supply withdrawals. There must be evidence that that the specified waters are used as a source for public drinking water supply.

Information provided by ANR's Karen Bates via personal communication (email) 7-18-12

Table A13.1. Existing Uses in the Wild and Scenic Study Area Towns and Villages.

Area or Reach	Waterbody	Town	Use	Info Source/ Comments
Big Falls	Missisquoi River	Troy	Contact Recreation	(1) (2)
Troy Four Corners	Jay Branch	Troy	Contact Recreation	(1) (2)
Hectorville Bridges	Trout River	Montgomery	Contact Recreation	(1) (2)
Hutchins Covered Bridge	Trout River	Montgomery	Contact Recreation	(1) (2)
Montgomery School House	Trout River	Montgomery	Contact Recreation	(1) (2)
Longley Covered Bridge	Trout River	Montgomery	Contact Recreation	(1) (2)
Kidder's	Tyler Branch	Enosburgh	Contact Recreation	(1) (2)
Creamery Covered Bridge	West Hill Brook	Montgomery	Contact Recreation	(1) (2)
Hippy Hole	West Hill Brook	Montgomery	Contact Recreation	(1) (2)
East Richford to Enosburg Falls	Missisquoi River	Richford/Enosburgh	Recreational Boating	(3) (4) (5)
Upper Missisquoi River	Missisquoi River	Troy	Fishing	(3)
Tyler Branch	Tyler Branch	Enosburgh	Fishing	(3)
Kane Road (TH-3) bridge to Enosburg Falls Dam	Missisquoi River	Sheldon/Enosburgh	Fishing	(7) Special Regulations
Burgess Branch	Burgess Branch	Lowell	Fishing	(8) Stocked
Hazen Notch Brook	Hazen Notch Brook	Lowell	Fishing	(8) Stocked
Jay Branch	Jay Branch	Jay	Fishing	(8) Stocked
Missisquoi River-East Branch	Missisquoi River	Lowell	Fishing	(8) Stocked
Upper Missisquoi River	Missisquoi River	Troy/Westfield	Fishing	(8) Stocked
Bridge on TH-3 (Kane Rd) upstream to confluence with Tyler Branch	Missisquoi River	Enosburgh	Fishing	(8) Stocked
Confluence w/ Tyler Branch upstream to top of the dam in Enosburg Falls	Missisquoi River	Enosburgh	Fishing	(8) Stocked
The Branch		Enosburgh	Fishing	(8) Stocked
Trout River		Berkshire/ Montgomery	Fishing	(8) Stocked
Tyler Branch		Enosburgh	Fishing	(8) Stocked
Stanhope Brook		Richford	Public Water Supply	(9)(10) Class A2
Loveland Brook		Richford	Public Water Supply	(9)(10)
Old Spring/Upper Reservoir		Troy	Public Water Supply	(9)
Mountain Brook and tributary		North Troy	Public Water Supply	(10) Class A2
Coburn Brook Reservoir and Tributaries		North Troy	Public Water Supply	(10) Class A2
Unnamed tributary to Trout River		East Berkshire	Public Water Supply	(10) Class A2
Hannah Clark Brook		Montgomery Ctr.	Public Water Supply	(10) Class A2
Trout Brook and Enosburg Reservoir		Enosburg Falls	Public Water Supply	(10) Class A2
Black Falls Brook		Montgomery Ctr.	Public Water Supply	(10) Class A2
(1) VTDEC, 2004 (2) Jenkins and Zika, 1985 (3) DeLorme, 1996 (4) AMC, 2002 (5) Jenkins and Zika, 1992 (6) AMC, 1992 (7) VTDFW, 2008 (8) DFW Website (9) VTDEC pers. Com (10) VTWRP, 2008				

Appendix 14. Biological Community Assessments and Calculations of Metrics

Biological Community Assessments and Calculations of Metrics

How Water Quality is Measured: Abiotic and Biotic (Biological Community) Assessments

The VT Water Quality Standards are a set of regulations that classify each waterbody, establish uses (such as swimming and fishing) that must be protected, and set standard criteria for chemical, physical and biological attributes of state waters that must be attained. The federal Clean Water Act (CWA) regulations do not generally protect man-made water-bodies unless they are connected to other bodies or water, but the state law covers small farm ponds under surface water as a water of the state.

When water quality is assessed, water samples, typically tested for abiotic factors such as temperature, dissolved oxygen, pH, and nutrient, bacteria, and turbidity levels, give us information about a single point in time. We can determine, at that moment the sample was taken, the water quality in the system. This information is valuable, especially in understanding whether or not it is safe to swim and recreate in the rivers and streams assessed. After collecting samples over years, or above and below potential problem areas in the watershed, trends begin to emerge. Understanding a longer-term history of the water quality and overall watershed health also requires the assessment of the biota (living organisms) in the rivers and streams. These assessments are called Biological Community Assessments. Macroinvertebrates (aquatic insects such as dragonflies, damselflies, mayflies, stoneflies, and caddisflies) are one such *bioindicator,* living organisms which can tell us about health of the rivers and streams to support life. Macroinvertebrates are key indicators of water quality and aquatic habitat conditions because their life histories often contain both aquatic and terrestrial stages, and because of their limited mobility in their aquatic forms. Their limited mobility in this phase of their life cycle generally confines insects to one area of a river or stream; therefore, their presence is usually indicative of the water quality and habitat conditions where they are found. Alternatively, fish are more mobile and may only be passing through an area when they are sampled, so not necessarily residing there. As such, fish communities may also provide information about the larger watershed, not just about the reaches of rivers and streams where they are found. More information about using organisms for assessment is included below.

The Vermont Water Quality Standards (effective date December 30, 2011) provide the authority and basis to use communities of aquatic insects (macroinvertebrates) and fish to measure the quality of Vermont's rivers and streams. The Water Quality Standards also empower the Secretary of the Vermont Agency of Natural Resources to authorize the use of these numerical biological indices, which measure different aspects of biological communities such as the number of individuals within a species, the number of species, and the tolerance to pollution of the species present, to determine whether the biological communities indicate that the stream is fully supporting its "aquatic life use" classification (e.g., Class A(1), A(2), or B). The responsibility of monitoring the aquatic communities and relating the data to the water quality standards falls on the Watershed Management Division of the Vermont Department of Environmental Conservation (DEC). DEC Biologists use a set of established methods and statistical analyses to assess the condition of biological communities across the state. These consistent methods provide an indication of the quality of the water as well as the condition of the aquatic habitat for all plants and animals that live in these environments. An outline of how these metrics and indices are calculated is below. For a full description of methods and analyses, see the 2003 Report from the DEC.

Biological assessment (or "bioassesssment") of aquatic habitats is an effective indicator of water quality and habitat condition because species differ in their tolerance for different "stressors" that degrade aquatic habitat. Species can be sensitive, somewhat sensitive, or tolerant to a variety of stressors and pollutants in rivers and streams. The species found in a biological (especially those that tend to dominate over multiple assessments) can tell you whether the quality of the water being assessed is excellent, very good, good, fair or poor. For example,

- Many species of stoneflies (order Plecoptera) are very sensitive to levels of dissolved oxygen and will not be found in streams where dissolved oxygen is not present in adequate levels. (Very high temperatures, stagnated water or chemical pollutants may affect oxygen levels in surface waters).

- Some species of mayflies (order Ephemeroptera) are sensitive to acidic waters and will not be found in streams with acid impairment. (Mayflies are one group of macroinvertebrates very important to fish, and many people who fly fish try to time their fishing during hatches [mass emergence] of these insects.)

- Midges (Order Diptera, family Chironomidae) are a very common fly that exists in many types of aquatic habitats. Several species of midge are tolerant to organic pollution such as nutrient enrichment. (The presence of large numbers of midges suggests that there may be nutrient issues in the watershed.)

- Native brook trout and other salmonid fish, characterized by their tendency to swim upstream in fresh water to spawn, are generally sensitive to changes in water temperature. In order for a river or stream to have suitable habitat for brook trout, the water must not be too warm (the upper limit for suitable water temperature for brook trout is usually 65-72°F) for extended periods of time. (A vegetated riparian (riverside) buffer, such as the silver maple trees shading some areas of the Missisquoi River, helps to keep the water temperature at a level which can sustain trout populations.)

- Presence of largemouth bass and yellow perch indicate warm water temperatures for a significant portion of the year. (These species are found more frequently in lakes, ponds, and slower-flowing sections of rivers and streams).

Using numerical values related to the presence of various species found in a stream, biologists calculate "metrics" which provide numerical scores of the quality of the water and habitat. This is how scientists are more easily able to compare one water body to another, or compare the present water quality of a water body to historical records. For some metrics, species are assigned a tolerance value from 0 to 10 based on their level of tolerance to pollution. A score of 0 means that the species is generally intolerant of any pollution, and a score of 10 indicates that the species is very tolerant of pollution and its presence is likely indicative of severely degraded habitats. Low tolerance scores for the entire stream community can be a general indicator of low levels of aquatic pollution. For other metrics, the method of feeding (or "functional feeding group") is used to calculate scores for the sample. For example, the percentage of species in a macroinvertebrate community that graze the surface of rocks in the stream bottom for algae ("scrapers") will generally decrease as a stream becomes more polluted. Conversely, the proportion of scavengers and generalist feeders will often increase in as water quality declines. To properly evaluate a stream community several metrics are used for each stream sample so that a variety of characteristics about the river and habitat may be measured. Though this type of sampling takes time, it provides a more complete picture of the health of the water body than abiotic sampling alone could produce.

Macroinvertebrate Community Assessments

Macroinvertebrates (aquatic insects) are most often juvenile life stages of insects such as mayflies, stoneflies, caddisflies, dragonflies and other insects that spend the first portion of their lives in streams before they emerge from the water as the winged adults which are often seen near waterways. Macroinvertebrates are especially useful as indicators of water quality, because they spend most of their lives (as eggs, larvae and adults) in or near the water where they're found. This means that their presence in a water body provides long-term information about the quality of the river or stream, as opposed to a chemical analysis which is more of a 'snapshot' sample that reflects present conditions on the day of sampling.

The Vermont Department of Environmental Conservation (DEC) assesses the water quality of Vermont's surface water typically on a 5-year rotating basis. When sampling a stream or river reach, DEC scientists use eight separate measurements, called metrics, to score and evaluate the macroinvertebrate community. Each metric (such as pollution tolerance, biological diversity, and feeding preference) independently measures a different aspect of the community structure, and therefore a different aspect of water quality and habitat condition. The various metrics are calculated to assess interactions between the macroinvertebrate communities and their waterway such as:

- The pollution tolerance of the resident macroinvertebrates - this evaluates the level of organic and/or inorganic pollution present in the stream
- The taxonomic structure of the macroinvertebrate community - this evaluates the biological diversity (number of different species) within the community
- The composition of various feeding guilds present within the macroinvertebrate community – understanding the number of individuals with a particular feeding type (grazers, scavengers, predators…) allows scientists to evaluate the prevalence of different trophic (feeding) levels in the habitat and help evaluate the amount of pollution and the health of the macroinvertebrate community

For each measurement, threshold scores have been set to determine whether or not the community meets the standard for this measurement. These values are based on data from reference streams (high quality streams similar to the one studied), which are in minimally disturbed watersheds where the macroinvertebrate community exists in close-to-natural condition. Since stream-dwelling animals will vary with stream type, thresholds have been established for three types of streams that are common in Vermont: Small High Gradient, Medium High-Gradient and Warm-Water High Gradient. Metrics for slow-gradient streams are in development at the time of publication of this Management Plan.

A stream site will receive a pass or fail grade for each of the eight macroinvertebrate metrics based on the standards set for each stream type. If the score for a metric exceeds the threshold score, it will "pass"; if the metric score does not meet the minimum score for that stream type, it will "fail" for that particular metric. Whether or not a stream reach is determined to *Support Aquatic Life Use* (meet water quality standards) or *Not Support Aquatic Life Use* (fails to meet water quality standards) depends on how many metrics are determined to pass:

- Aquatic Life Use is *supported* when five or more metrics pass and none fail
- Aquatic Life Use is *not supported* when one or more metrics fail

- If a community is not found to meet either of the above criteria, the DEC will make an *indeterminate* designation for the stream and it will require further assessment

Fish Community Assessments

Fish metrics are calculated similarly to macroinvertebrate metrics, and represent various aspects of the structure of fish communities and their interactions with their environment. Information on native species abundance, tolerance of resident fish species to different stressors , diversity and density of fish species and the presence of differing trophic (feeding) levels are all included in the metrics for fish community evaluation. The Vermont DEC compiles fish metrics into an Index of Biotic Integrity (IBI), which provides a single score that is the combination of all fish metrics. When the IBI is compiled, each fish metric will receive a standard score of 1, 3 or 5 which is based on the data generated in the field survey conducted by state scientists. These calculations are outlined in the tables and examples below. The VT DEC uses two fish IBIs: one for cold water fisheries (CWIBI) and one for mixed water fisheries (MWIBI). For the purposes of applying an IBI, all *wadeable* streams in Vermont located at elevations of over 500 feet will be designated as cold water; this applies to streams in the Study area. Many of the streams in the Study area are above 500 feet and thus considered cold water fisheries (excluding Enosburg Falls which is below 400 feet). All streams below 500 feet are classified as warmwater streams unless naturally-reproducing coldwater species are present. The indices are not designed for slow- flowing, sand-bottomed streams or large non-wadeable rivers.

Calculations for the two indices are summarized in below. For a thorough description of the IBIs, their calculation and utilization in determining aquatic life use standards, please refer to the original VT DEC document.

Cold-Waters Index of Biotic Integrity (CWIBI)

Table A14.1. The CWIBI for fish is calculated as follows:

CWIBI - For cold water streams naturally supporting from two to four native fish species	**Score for Metric**		
Metric	**5**	**3**	**1**
1. Number of intolerant species (one exotic trout species may be substituted for brook trout)	2	1	0
2. Proportion of individuals as coldwater stenotherms (survive in limited temperature range)	> 75%	50-75%	< 50%
3. Proportion of individuals as generalist feeders	< 5%	5-9%	> 9%
4. Proportion of individuals as top carnivores	> 35%	25-35%	< 25%
5. Brook trout density (#s/100m^2-1 pass)	> 4.0	2.0-4.0	< 2.0
6. Brook trout age class structure (young-of-the-year = < 100mm, adult=>100mm); [yoy = Young of Year]	yoy and adults present	yoy only	yoy absent

Example: If a fish survey on a reach on the Missisquoi River yields:

1. 1 intolerant species (score of 5)
2. 78% of the fish are coldwater fish species (score of 5)
3. <5% of which are generalist feeders (score of 5)
4. 30% are top carnivores (score of 3)
5. Brook trout density is 3 (score of 3)
6. YOY and adults are present in the stream (score of 5)

The total score is 26. If you multiply this by 1.5 (see Table 14.3), the CWIBI = 39 which indicates *Very Good* water quality.

CWIBI Conditions for Use:

1. Only fishes over 25mm (about 1 inch) in length should be considered
2. Only naturally reproducing salmonids are to be considered
3. Only species represented by more than a single individual will be entered into metrics 1 and 6
4. Since the number of metrics differ between IBIs, the CWIBI scores are multiplied by 1.5 so that cold water sites scores are comparable with mixed-water site scores (MWIBI).

Fish Community Assessments

Rich Langdon from the ANR notes that the IBIs apply only to wadeable waters, approximately a water level at knee height. Only portions of the Missisquoi River small enough in which to wade are assessable using the IBIs. All of the Trout River and much of the upper Missisquoi River from the headwaters to Troy/North Troy are wadeable. Determining which to use requires initial sampling of the native fish species present (2-4 species is the CWIBI and >4 MWIBI. The lower reaches of the Trout River are assessable using the MWIBI, and the upper reaches using the CWIBI.

Mixed-Waters Index of Biotic Integrity (MWIBI)

The calculation of the MWIBI is more intricate, as it represents a greater diversity of species, habitats and water conditions than the CWIBI. There are more metrics (nine instead of six), and any metrics have two separate thresholds based on elevation or size of the watershed. The metrics in the MWIBI are parsed into three main categories:

- Species richness and composition: evaluates the number of native species, number of species intolerant and tolerant of pollution, and the number of species that indicate a well-functioning fish community
- Trophic Composition: examines the structure of the community from the perspective of the various feeding guilds present in the resident fish species
- Fish Abundance and Condition: measures 1) the total number of fish caught in the sample, and 2) the occurrence of abnormalities in individual fish, which may be indicative of toxins in the water body

Table A14.2. The scoring for the MWIBI for fish is calculated as follows:

For mixed-water streams naturally supporting more than four native species				Score for Metric		
Metric Category	***Metric***	***Site Elevation Criteria***		**5**	**3**	**1**
Species Richness and Composition	1. Total number of native fish species	n/a		*Follows maximum species richness lines*		
	2. Number and identity of native, intolerant species (*A non-native trout may be substituted for brook trout when absent*)	>400 ft		>1	1	0
		<400 ft		>0	--	0
	3. Number and identity of native benthic insectivores (bottom dwelling insect eaters)	<400 ft., Site drainage <25 km^2		>0	--	0
		All other sites		>1	1	0
	4. Proportion of individuals of white suckers and creek chubs (more tolerant species)	n/a		<11%	11-30%	>30%
Trophic Composition	5. Proportion of individuals as generalist Feeders	>500 ft		<20%	20-45%	>45%
		<500 ft		<30%	30-60%	>60%
	6. Proportion of individuals as water column and benthic insectivores (score a "1" if blacknose dace is >60% of total assemblage or 100% of insectivores)	>500 ft		>65%	30-65%	>30%
		<500 ft		>55%	20-55%	>20%
	7. Proportion of individuals as top carnivores (*Non-native trout included)*	Cold water assemblage		>15%	5-15%	<5%
		Warm water assemblage, site drainage >25 km^2.		>10%	3-10%	>3%
		Warm water assemblage, site drainage <25 km^2		0	-	-
Fish Abundance And Condition	8. Proportion of individuals with Deformities: fin erosion, lesions or tumors	n/a		>1%	1-4%	>4%
	9. Abundance in Sample (100m^2 sampling area) (*non-native species included*)	Site Elevation <500 ft		>20	10-20	<10*
		Site Elevation <500 ft	Alk. >9 mg/L	>10	7-10	<7*
			Alk. >9 mg/L	>6	3-6	<3*

*If these scores are obtained, the site is automatically scored "Poor".

MWIBI Conditions for Use:

1. For wadeable streams only
2. Site should naturally support at least five native species
3. Only individuals more than 25mm (about 1 inch) total length are to be entered into the score
4. Only species with more than one individual captured are entered into the score
5. Stocked fish are not considered in determinations

Since the number of metrics differ between IBIs, the CWIBI scores are converted so that cold water sites scores are comparable with mixed-water site scores (Table A14.3 below).

Table A14.3. An example site calculation for converting the CWIBI. Multiplying the CWIBI scores by 1.5 makes them compatible with MWIBI scores so that sites across habitat types may be compared. The factor of 1.5 is accounted for by the different number of metrics in each IBI; there 6 in CWIBI and 9 in MWIBI.

Metric	Actual Data from Field Survey	Metric Score	Converted Metric Score
1. Number of intolerant species	1	3	4.5
2. Proportion of individuals as coldwater stenotherms (survive in limited temperature range)	80%	5	7.5
3. Proportion of individuals as generalist feeders	10%	1	1.5
4. Proportion of individuals as top carnivores	37%	5	7.5
5. Brook trout density (#s/100m^2-1 pass)	4	5	7.5
6. Brook trout age class structure (young-of-the-year = < 100mm, adult=>100mm)	yoy only	3	4.5
Total Site Score		22	**33**
Community Ranking		***Good***	

Table A14.4. Fish Community Ranking and the comparable IBI scores:

CWIBI Score	MWIBI Score	Fish Community Ranking
42-45	41-45	*Excellent*
36	37	*Very Good*
33	33	*Good*
27	27	*Fair*
<27	<27	*Poor*

As with the macroinvertebrate metrics, the fish IBIs are used to assign an overall water quality ranking to a stream reach (see the Table below). The rankings are based on the overall IBI score, and are presented below. **Sites that have been identified as *Very Good* and *Excellent* have been selected for Water Quality ORVs in this Management Plan.**

Using Fish Indices to Determine Support of Water Quality Standards

All possible scores for Coldwater and Mixed-water Indices of Biotic Integrity and the corresponding water quality classification contained in the Vermont Water Quality Standards are presented in the table below. If a site meets the required score for its corresponding Water Quality Standard (e.g., A(1), B(2), etc.), then it supports its designated aquatic life use standard established under the Clean Water Act and Vermont Water Quality Standards. If the score fails to reach the corresponding standard for the water body, then that water body is in "non-support" of its designated water quality standard use and is placed on the 303d list.

The 303d List

Failing during the assessment of a Biotic Index is one way a water body is determined to be "impaired." In this instance, it is the aquatic life "use" that the waterbody fails to attain, thus it is added to the 303(d) list of impaired waters that is reported to and approved by the EPA annually. This list contains all waters identified as impaired in Vermont, and may be found in Appendix 17. For many of these impaired waters, depending on the impairment, TMDLs (Total Maximum Daily Loads) are established. TMDLs are the maximum levels of pollutants allowed into surface water in order to get the waterway back in compliance with water quality standards.

Scores in the table below range from 9 (very poor) to 45 (excellent).

Table A14.5. Table 8 from the 2004 report *Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers* by the Water Quality Division of the VT DEC found on their website (http://www.vtwaterquality.org/bass/docs/bs_wadeablestream2.pdf).

Water Quality Standards Classification Range	Range	Possible Scores	
		CWIBI	MWIBI
A-1	41-45	42, 45	41, 43, 45
Best professional judgment determines placement into A-1 or B1 designated use criteria	39	39	39
B-1	36-37	36	37
Best professional judgment determines placement into B1 or A2, B2-3 designated use criteria	35		35
A-2, B-2, B-3	33	33	33
Best professional judgment determines placement into Class B-2,3 or Non-Support	29-31	30	31, 29
Non-Support	<29	27, 24, 21, 18, 15, 12, 9	27, 25, 23, 21, 19, 17, 15, 13, 11, 9

Appendix 15. Buffers

Vegetated Buffers

Vermont currently has no comprehensive, statewide law regarding requirements for vegetated buffers along state waterways; however, many State Agencies and local groups recognize the value of vegetated buffers for the reduction of land erosion and preservation of water quality and habitat. Examples of a variety of buffer recommendations by Vermont State Agencies are presented below.

Vermont Agency of Natural Resources (ANR)

There is an excellent guidance document from the ANR on their suggestions for riparian buffers. **Guidance Document for Resource Managers:** *Riparian Buffers and Corridors: Technical Papers.* Vermont Agency of Natural Resources, Waterbury, Vermont, 2005. (www.anr.state.vt.us/site/html/buff/buffer-tech-final.pdf)

Vermont Department of Forests, Parks and Recreation

From the Vermont Division of Forestry Website:

Acceptable Management Practices (AMP) Program

The 1986 Vermont Legislature passed amendments to Vermont's water quality statutes, *Title 10 V.S.A. Chapter 47: Water Pollution Control* which stated that, "it is the policy of the state to seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality". The revised state law requires permits for discharges of "any waste, substance or material into the waters of the state." Individual permits are not required for any discharges that inadvertently result from logging operations if responsible management practices are followed to protect water quality. *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont(AMP's)* were developed and adopted as rules to Vermont's water quality statutes and became effective August 15, 1987. The AMP's are intended and designed to prevent any mud, petroleum products and woody debris (logging slash) from entering the waters of the State. They are scientifically proven methods for loggers and landowners to follow for maintaining water quality and minimizing erosion.

The AMPs (effective in 1987 and reprinted in 2009) suggest that during logging:

Protective Strips

14. Except for necessary construction of stream crossings, a protective strip shall be left along streams and other bodies of water in which only light thinning or selection harvesting can occur so that breaks made in the canopy are minimal and a continuous cover is maintained. Log transport machinery must remain outside a 25 foot margin along the stream or water body. Including this 25 foot margin, the width of the protective strip shall be according to Table 4.

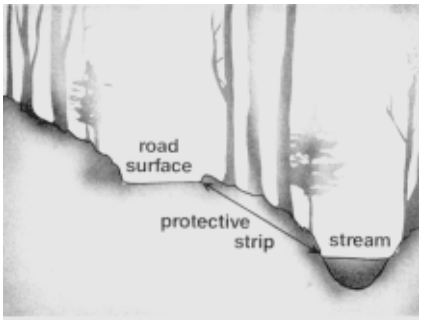


Figure A15.1. A protective strip prevents sediment from reaching streams and maintains shade and stream bank stability.

16. Landings shall not be located in protective strips. The width of the protective strip shall be in accordance with Table 4.
    - ◊ Careful location of log landings will protect water quality and improve operating conditions for the logger.
    - ◊ Divert upslope drainage from skid roads around landing area.

17. Silt fencing, hay bale erosion checks or water diversions shall be used to prevent sediment from landings from entering streams and other surface waters.

(http://www.vtfpr.org/watershed/ampprog.cfm)

→ ***Bottom line***: A forestry buffer strip of at least 25' is maintained without log transport machinery but light thinning or selection harvesting can occur. If the forestry AMPs are followed, though they are currently being reviewed to incorporate the latest river science, it seems that the state can't fine you for a water quality violation. Both forestry and agriculture have Best Management Practices they recommend, but only the Accepted Management Practices are regulated and enforced.

Table 4: Protective Strip Width Guide

Slope of Land Between Roads or Landings and Stream banks or Lake Shores (percent)**	Width of Strip Between Roads or Landings and Stream (Feet Along Surface of Ground)
0-10	50
1-20	70
21-30	90
31-40*	110

*Add 20 feet for each additional 10 percent side slope.
**See Slope Chart (Figure 1).

Vermont Agency of Agriculture, Farms and Markets (VAAFM)

All entities have to comply with the State of Vermont's Accepted Agricultural Practices (AAPs). The most current version was effective April 24, 2006 and may be found here: http://www.vermontagriculture.com/ARMES/awq/AAPs.htm

The following is language taken directly from the AAPs:

INTRODUCTION

This introduction is intended to provide a general explanation of the Accepted Agricultural Practice Rules and is not part of the rules.

Recognizing the need to protect and improve water quality through improved agricultural practices, the Vermont legislature charged the Agency of Agriculture, Food and Markets with creating a comprehensive Agricultural Nonpoint Source Pollution Reduction Program including Accepted Agricultural Practices and Best Management Practices. The legislature also recognized the need to balance water quality improvements with the need to sustain a healthy, economically viable agricultural industry…Accepted Agricultural Practices and Best Management Practices are two different levels of practices to reduce agricultural nonpoint source pollution. Accepted Agricultural Practices are statewide restrictions designed to reduce nonpoint pollutant discharges through implementation of improved farming techniques rather than investments in

structures and equipment. The law requires that these practices must be technically feasible as well as cost effective for farmers to implement without governmental financial assistance. Best management practices are more restrictive than Accepted Agricultural Practices and will be site specific practices prescribed to correct a problem on a specific farm. Best Management Practices typically require installation of structures, such as manure storage systems, to reduce agricultural nonpoint source pollution. While farmers may realize an economic benefit from Best Management Practices, it is unlikely that they will be affordable without governmental cost sharing…Accepted Agricultural Practices are intended to reduce, not eliminate, pollutants associated with nonpoint sources such as sediments, nutrients and agricultural chemicals that can enter surface water, groundwater and State Significant Wetlands that would degrade water quality.

ii. Vegetative buffer strips

Vegetative buffer strips shall be maintained between annual cropland and adjoining surface waters. Buffer strips help to filter out sediments, agricultural chemicals, and nutrients such as phosphorus from surface runoff. Nutrients and sediments contained in runoff adversely affect fish, natural plant growth, water turbidity, as well as other water quality values, and promote nuisance aquatic plant growth. Buffer strips also help to stabilize stream banks reducing the amount of cropland lost to natural stream bank erosion as well as land lost due to excessive tillage. Vegetative buffer strips also help to prevent activities on or over the tops of stream and river banks that can negatively affect water quality.

SECTION 3: ACCEPTED AGRICULTURAL PRACTICES

3.1 Persons engaged in agricultural operations who follow the agricultural practices as defined in Section 3.2 of these rules and who comply with the conditions and restrictions contained in Section 4 shall be presumed to be pursuing Accepted Agricultural Practices.
3.2 Agricultural practices that are governed by these regulations include, but are not limited to, the following:

a) The confinement, feeding, fencing, and watering of livestock.
b) The storage and handling of livestock wastes and by-products.
c) The collection of maple sap and production of maple syrup.
d) The preparation, tilling, fertilization, planting, protection, irrigation and harvesting of crops.
e) The ditching and subsurface drainage of farm fields and the construction of farm ponds.
f) The stabilization of farm field streambanks..
g) The construction and maintenance of farm structures and farm roads.
h) The on-site production of fuel or power from agricultural products or wastes produced on the farm.
i) The on-site storage, preparation and sale of agricultural products principally produced on the farm.
j) The on-site storage of agricultural inputs including, but not limited to, lime, fertilizer and pesticides.
k) The handling of livestock mortalities.

SECTION 4: ACCEPTED AGRICULTURAL PRACTICE CONDITIONS AND RESTRICTIONS

4.06 Buffer Zones

A vegetative buffer zone of perennial vegetation shall be maintained between annual croplands and the top of the bank of adjoining surface waters consistent with (a) through (f) below, in order to filter out sediments, nutrients, and agricultural chemicals and to protect the surface waters from erosion of streambanks due to excessive tillage. Vegetative buffer zones are not required along intermittent stream channels such as those occurring in annual croplands or along drainage ditches.

a) adjoining surface waters shall be buffered from annual crop lands by at least 10 feet of perennial vegetation.
b) an additional 15 feet of perennial vegetation shall be established at points of runoff to adjoining surface waters.
c) no manure shall be applied within vegetative buffers.
d) use of fertilizer for the establishment and maintenance of the vegetative buffer is allowed.
e) tillage shall not occur in a vegetative buffer except for the establishment or maintenance of the vegetative buffer.
f) harvesting the vegetative buffer as a perennial crop is allowed.

→ ***Bottom line***: It seems is that there is a 10' buffer of perennial vegetation required by farmers along surface waters, but intermittent stream channels and drainage ditches are exempt. No tilling can occur once it's established, no manure spreading can occur, but fertilizer can be used and the perennial vegetation can be harvested (i.e. haying can occur right up to the stream bank).

Vermont State Regulations

The State of Vermont encourages a buffer, often a minimum of a 50-100' buffer along waterways.

The Vermont Department of Fish and Wildlife website states:

> Your specific Conservation Goals will dictate how large an area you want to consider for riparian habitat conservation. But in general, a naturally vegetated 100-foot-wide riparian buffer on each side of a stream will protect many of the functions associated with healthy riparian habitat. A 330- foot buffer will protect nearly all the functions we value in riparian habitat, including high quality cover for many wildlife species. They suggest including "specific language in the town plan supporting the stewardship, protection, and restoration of riparian habitat.
> Sample Language**:** *Lakes, ponds, rivers, and streams will be protected from encroaching development, including roads and driveways, by maintaining and/or establishing undisturbed, naturally vegetated riparian buffers on their banks."*
>
> (http://www.vtfishandwildlife.com/cwp_elem_comm_rh.cfm)

Act 110, passed in July 2010, states:

> It is in the public interest to encourage and promote protected river corridors and buffers adjacent to rivers and streams of the state, where:
>
> "Buffer" means an undisturbed area consisting of trees, shrubs, ground cover plants, duff layer, and generally uneven ground surface that extends a specified distance horizontally across the surface of the land from the mean water level of an adjacent lake or from the top of the bank of an adjacent river or stream, as determined by the secretary of natural resources.
>
> **A River Corridor Management Program will be established by the ANR Secretary to aid and support the municipal adoption of river corridor and buffer bylaws.**
>
> No later than February 1, 2011, state financial incentives shall be offered to municipalities through existing grants and pass-through funding programs which encourage municipal adoption and implementation of zoning bylaws that protect river corridors and buffers. The Agency of Natural Resources will define the minimum standards for a municipality to be eligible for financial incentives.
>
> Under the River Corridor Management Program, beginning February 1, 2011, the secretary shall: (1) upon request, provide municipalities with maps of designated river corridors within the municipality. A river corridor map provided to a municipality shall delineate a recommended buffer that is based on site-specific conditions. The secretary shall provide maps under this subdivision based on a priority schedule established by the secretary in procedure; and (2) develop recommended best management practices for the management of river corridors and buffers.
>
> (http://www.vtwaterquality.org/rivers/docs/rv_act110_rcmp_%20summary.pdf)

→ ***Bottom line***: Buffers are encouraged and there are financial incentives and assistance from ANR to establish them. Specific, set buffer distances are not set presumably so that ANR can work with the towns to recommend buffers based on the specific location, the conditions of the waterways in the town and the latest science. No towns in the Study area have taken advantage of the opportunities offered in Act 110 at this time. Possibly they will consider using the resources available from this Act when they revise their town plans and zoning bylaws.

Act 250 Regulations Relating to Buffers

From "GUIDANCE FOR AGENCY ACT 250 AND SECTION 248 COMMENTS REGARDING RIPARIAN BUFFERS" (Pg. 4):

> **2. Streams**
>
> The minimum buffer zone width recommended for regulated projects on streams is dependent on several site- and project-specific factors, including:
>
> • Physical characteristics of the site and the watercourse and its banks and floodplain;

- Aquatic and terrestrial populations and communities dependent on the watercourse and riparian corridor; and,
- Nature and extent of the proposed development and existing encroachments, including the potential for erosion and overland flow of pollutants.

Detailed descriptions of these features and the associated functions of riparian buffers are included in Appendix C of this Guidance. Further, the Agency's *Riparian Buffers and Corridors Technical Papers* summarize and provide reference to the scientific studies that provide the foundation for recommendations contained in this Guidance. While it is difficult to offer generalizations encompassing the wide range of stream conditions and resource needs found throughout Vermont, the Agency will generally make recommendations of either a 50-foot or 100-foot buffer for regulated project on streams based on evaluation of the site attributes summarized below.

Summary of Key Stream Riparian Buffer Functions and Typical Recommended Widths Function	50-foot Buffer Recommendation	100-foot Buffer Recommendation
Protection of channel and floodplain stability	Small to moderate sized streams that are at low risk for lateral or vertical channel adjustment and have small floodplain requirements.	Small to moderate sized streams with the potential for significant lateral or vertical channel adjustment. Streams with large belt width and floodplain requirements (includes most large rivers).
Protection of aquatic and terrestrial wildlife habitats	Aquatic populations dependent upon stream habitat and/or water quality either directly associated with or in close proximity to the project site. Project sites without significant wildlife travel corridor and/or riparian dependent species and/or significant natural communities identified on or in	Sites with significant wildlife travel corridor and/or identified riparian dependent species (e.g., riparian breeding birds), and/or significant natural communities either directly associated with or in close proximity to the project site.
Protection of water quality	Site soils and slope indicate low risk of erosion; proximity of project to receiving water and amount of resulting impervious cover indicate low potential for overland flow of pollutants.	Site characteristics indicate increased risk of erosion and/or potential for overland flow of pollutants.

3. Agency Recommendation for Wider or Narrower Buffers

As previously stated, recommended buffers for regulated projects will generally be 100 feet on lakes and either 50 feet or 100 feet on streams. There are some lake and stream sites, however, where recommended buffers may be wider than these minimums. These include areas where:

- Rare, threatened, endangered, or sensitive species, *sensitive* significant natural communities, and/or necessary habitats (as defined in Appendix C) are either directly associated with or in close proximity to the project site; and
- Actively adjusting channels are undergoing channel lengthening and floodplain development. In determining the floodway area needed to protect channel stability the Agency may also apply the *Procedure on ANR Floodway Determination in Act 250*.

Similarly, there are certain types of lake and stream sites where narrower buffers may be acceptable. These include areas where:

- Riparian functions and values will be adequately protected by a narrower buffer, such as sites adjacent to small, stable intermittent streams; or
- The location and extent of existing encroachments severely limits the ecological benefits that would be derived from a wider buffer.

(http://www.anr.state.vt.us/site/html/buff/BufferGuidanceFINAL-120905.pdf)

→ ***Bottom line***: The minimum buffer zone width recommended for regulated projects on streams 100 feet on lakes and either 50 feet or 100 feet on streams, though there are some projects where wider or narrower buffers are recommended.

Intact buffer on the Missisquoi on a paddle from Westfield to Troy, VT

Shana Stewart Davis

Please see ANR's **Guidance Document for Resource Managers:** *Riparian Buffers and Corridors: Technical Papers.* Vermont Agency of Natural Resources, Waterbury, Vermont, 2005. (www.anr.state.vt.us/site/html/buff/buffer-tech-final.pdf), and the ANR website for the most up-to-date information.

See the Water Quality ORV and Protections chapters of this Management Plan for more information. The online Paddle Tour also has some examples of intact buffers (www.vtwsr.org).

Appendix 16. Example Protocol Agreement Between FEMA and NPS Regarding Wild and Scenic Rivers

PROTOCOL AGREEMENT BETWEEN FEMA AND NATIONAL PARK SERVICE FOR REVIEWING PROJECTS INVOLVING WILD AND SCENIC RIVERS DURING DR-1895-MA, DR-1892-NH AND DR-1904-CT.

A. Projects involving construction activity within the bed or banks of designated Wild and Scenic River areas or official Study Rivers, or on a direct tributary of such segments.

1. To ensure compliance with Section 7 of the Wild and Scenic Rivers Act, all such projects will be reviewed by the National Park Service, and shall require a written sign-off from NPS as a part of FEMA's environmental review process.

B. Project not directly associated with the river bed or banks, but involving construction within the Wild and Scenic River area or official Study River corridors:

1. In those instances where FEMA conducts formal consultation with a Federal or State agency regarding resources that could affect Wild and Scenic River values of interest to the NPS (historic properties, endangered species, etc.), FEMA will include NPS in the consultation process.
2. In those cases where formal consultation between FEMA and another Federal or State environmental agency is not required, no consultation with NPS is required.

ROLES AND RESPONSIBILITIES

For Category A Projects, FEMA will provide:

- A scope-of-work sufficient to understand the nature of each project and the area of potential effect;
- GPS coordinates and a USGS topographic map with the project location identified;
- One or more photographs of the project area, if available;
- The request for comment and site specific information will be transmitted to NPS designed point(s) of contact by e-mail or fax with appropriate attachments. This may be preceded by informal consultation by e-mail or phone to assess NPS interest. Designated NPS points-of-contact are: for DR-1895-MA Jamie Fosburgh; for DR-1904-CT Liz Lacy; and for DR 1892-NH Jim MacCartney.

For Category A Projects, NPS will:

- Provide initial notice by phone or e-mail of any projects of concern to facilitate adequate project reviews. NPS will attempt to provide such notice within 5 working days of receipt of information.
- Respond in writing to FEMA, providing either its comment that the project will have no adverse effect under the WSRA, and/or specific conditions on project implementation, or request further consultation to address specific issues. Written comments will be sent via e-mail attachments. Initial comments will be followed with a hard copy, if this is required as part of NPS protocol.

For Category B.1 Projects, FEMA and NPS will:

- FEMA will provide initial notice to the point-of-contact by phone or e-mail of any project that may be of concern to NPS with sufficient documentation to understand the project.

- NPS will provide written notification by e-mail for any individual project NPS wishes to invoke review under the Wild and Scenic Rivers Act. NPS will attempt to provide such notification to FEMA within 5 working days of receipt of information.
- In those instances where NPS wishes to invoke Wild and Scenic River Act review, FEMA will forward the consultation package prepared for review by another Federal or State environmental agency for NPS review.
- NPS will respond in writing to FEMA, providing either its comment that the project will have no adverse effect under the WSRA, and/or specific conditions on project implementation, or request further consultation to address specific issues. Written comments will be sent via e-mail attachments. Initial comments will be followed with a hard copy, if this is required as part of NPS protocol.

For Category B.2 projects, written sign-off from NPS will not be required.

Appendix 17. List of 303(d) List Impaired Waters in Wild and Scenic Study Area

STATE OF VERMONT 2010 303(d) LIST OF WATERS
PART A - IMPAIRED SURFACE WATERS IN NEED OF TMDL

June 2012
(Approved by EPA Region 1)
Prepared by: Vermont Department of Environmental Conservation, Watershed Mangagement Division
http://www.vtwaterquality.org/mapp/docs/mp_2012_303d_Final.pdf

- **Part A**. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL
- **Part B** - Impaired Surface waters, no TMDL required
- **Part D** - Waters with completed and EPA approved TMDLs

	Part A	**Part A**	**Part A**	**Part A**
Waterbody ID	VT06-04	VT06-04	VT06-04	VT06-04
ADB Code(s) for EPA tracking	01	02	03	04
Segment Name/Description	BERRY BK, MOUTH UP TO AND INCLUDING NO. TRIB (APPROX. 1 MI)	Godin Brook	Samsonville Brook	Trout Brook, Upstream from mouth for 2.3 mi
Pollutants	Sediment, Nutrients	Nutrients, Sediment	Nutrients, Sediment	Nutrients
Use(s) Impaired - ALS is Aquatic Life Support, CR is Contact Recreation (i.e. swimming)	ALS	ALS	ALS	ALS
Surface Water Quality Problem(s)	Agricultural Runoff, Aquatic Habitat Impacts	Agricultural Runoff, Aquatic Habitat Impacts	Agricultural Runoff, Aquatic Habitat Impacts	Agricultural Runoff
TMDL Priority - An indication of priority as to when TMDLs will be completed (H=high 1-3 years, M=medium 4-8 years, L=low 8+ years).	H	H	H	H
Location in study area	Berry Brook and its North Branch originate in Quebec, flow south-easterly through Berkshire and into Richford where Berry Brook joins the Missisquoi River.	Godin Brook originates in Berkshire and flow south/southeasterly to the Missisquoi River.	Samsonville Brook originates in Berkshire and flow south/ southeasterly to the Missisquoi River.	Trout Brook runs through Berkshire and Enosburgh before emptying into the Missisquoi

	Part A	Part A	Part A	Part A
Waterbody ID	VT06-08	VT06-08	VT06-08	VT06-08
ADB Code(s) for EPA tracking	03	04	05	06
Segment Name/ Description	Mud Creek, from VT/QC border up to RM 6.5	Coburn Brook (Mouth to RM 0.2)	Burgess Brook, RM 4.9 to 5.4	Burgess Brook Tributary #11, Mouth to RM 0.5
Pollutants	Nutrients, Sediment	Nutrients	Sediment	Sediment
Use(s) Impaired - ALS is Aquatic Life Support, CR is Contact Recreation (i.e. swimming)	ALS	ALS	ALS	ALS
Surface Water Quality Problem(s)	Agricultural Runoff, Nutrient Enrichment	Agricultural Activity and Runoff	Asbestos mine tailings erosion, asbestos fibers	Asbestos mine tailings erosion, asbestos fibers
TMDL Priority - An indication of priority as to when TMDLs will be completed (H=high 1-3 years, M=medium 4-8 years, L=low 8+ years).	H	H	L	L
Location in study area	Mud Creek originates south of Newport Center a few miles and flows in a northerly direction to and through Newport Center.	Coburn Brook flows southeasterly through Westfield and Troy and enters the Missisquoi River just southeast of Troy.	Lowell	Lowell

	Part B	Part D	Part D	Part D
Waterbody ID				
ADB Code(s) for EPA tracking				
Segment Name/ Description	Jay Branch River upstream and Tributary #9	BERRY BK, MOUTH UP TO AND INCLUDING NO. TRIB (APPROX. 1 MI)	Godin Brook	Samsonville Brook
Pollutants	Sediment	E.coli	E.coli	E.coli
Use(s) Impaired - ALS is Aquatic Life Support, CR is Contact Recreation (i.e. swimming)	ALS	CR	CR	CR
Surface Water Quality Problem(s)	Erosion from Land Development Activities; flow alteration	Agricultural Runoff, Aquatic Habitat Impacts	Agricultural Runoff, Aquatic Habitat Impacts	Agricultural Runoff, Aquatic Habitat Impacts
TMDL Priority - An indication of priority as to when TMDLs will be completed (H=high 1-3 years, M=medium 4-8 years, L=low 8+ years).				
Location in study area	Jay	Berry Brook and its North Branch originate in Quebec, flow south-easterly through Berkshire and into Richford where Berry Brook joins the Missisquoi River.	Godin Brook originates in Berkshire and flow south/ southeasterly to the Missisquoi River.	Samsonville Brook originates in Berkshire and flow south/southeasterly to the Missisquoi River.

Appendix 18. Abenaki Resources

FAIRBANKS MUSEUM & planetarium

1302 Main Street • St. Johnsbury VT • 05819-2224

tel: 802-748-2372 • fax 802-748-1893 • www.fairbanksmuseum.org

Courtesy of the Fairbanks Museum and Planetarium, the following resources are related to the Abenaki:

Recommended Books

The Western Abenakis of Vermont, 1600 – 1800
by Colin G. Calloway (University of Oklahoma – Norman, 1990)
This book is the definitive synthesis of all written historical accounts of Abenakis, with an emphasis on the Vermont region, during the tumultuous centuries following European contact.

The Abenaki
by Colin G. Calloway (Chelsea House, 1989)
This book is mainly directed to a young audience, and it focuses more on Eastern Abenaki people. Nonetheless, it has many illuminating photographs of Penobscot Abenaki life during the early 20th century.

Aunt Sarah: Woman of the Dawnland
by Trudy Ann Parker (Dawnland Publications, 1994)
Written by one of her descendants, this book combines family history and local records to construct a narrative of the long life of Sarah Somers, an Abenaki from Lunenburg, VT.

Hidden Roots
by Joseph Bruchac (Scholastic Press, 2004)
Written by today's most prolific Abenaki writer and storyteller, this novel (written for teens) tells the story of one Abenaki family that had to hide its identity in order to avoid the forced sterilizations ordered by the Vermont Eugenics Survey in the 1930's. Though the characters are fictional, this story was regrettably common for real Vermont Abenakis.

1491: New Revelations of the Americas before Columbus
by Charles C. Mann (Knopf, 2005)
This book pieces the latest archaeological findings and the historical record to present a "big picture" view of the many nations of the Americas. Though not focused on Abenaki history, this excellent book includes an account of the "mooning" of Giovanni da Verrazano in 1524.

The New England Indians: Second Edition
by C. Keith Wilbur (Globe Pequot Press, 1996)
This illustrated encyclopedic guide to American Indian material culture is filled with excellent drawings based on actual archaeological discoveries, with bibliographic and museum source references as well.

Recommended Web Sites

http://tribal.abenakination.com/
This is the site maintained by the Missisquoi Abenaki Tribal Council,
based in Swanton, VT. Contact info as of June 2012: Abenaki Tribal Council of Missisquoi, PO Box 133, Swanton, VT 05488; Dawnland@Missisquoi.comcastbiz.net

http://www.cowasuck.org
This incredibly informative website is maintained by the Cowasuck – Pennacook Band of Abenakis. Their newsletter, Aln8bak News, will keep you informed of upcoming events.

http://www.abenakitribe.org/
This is the site for the recently state-recognized Nulhegan Abenaki Tribe, based in Brownington, VT

http://www.koasekabenaki.org
This site was created by Abenaki folks from Koas (Cowass,Coos, and Cohase are some common spellings) which is today known as Newbury, VT and Haverhill, NH. Be sure to check out their history which features photographs of archaeological findings from the historic Oxbows of Koas!

http://www.museedesabenakis.ca
This is the newly renovated Museum in Odanak, Quebec. (Unless you're a francophone, click on the "English" button near the top right of the page.)

http://www.uvm.edu/~eugenics/
This is the extensive archive of all documents relating the infamous "Eugenics Survey of Vermont," a principal cause for many Abenaki families' apparent "disappearance."

Appendix 19. Opportunities for Action
(Working List in Excel at www.vtwsr.org)

#	ORV Category	Action Type	Action Opportunities	Potential Partners
SR1	***Scenic and Recreational - Swimming Holes***	Volunteer Opportunities - Access	Adopt an access program for swimming holes and fishing/boating access. At least one in each town should be monitored and cleaned up twice per year by volunteers	Local Volunteers
SR2	***Scenic and Recreational - Swimming Holes***	Volunteer Opportunities	Opportunities for trash collection, find someone bus the trash to the local transfer station	Local Volunteers
SR3	***Scenic and Recreational - Swimming Holes***	Work with Private Landowners	More formal agreements for access/public permission at swimming holes	Private Landowners, Towns and Villages, VT Agency of Ag, Food and Markets, Northern Forest Canoe Trail
SR4	***Scenic and Recreational***	Volunteer Opportunities - Access	Partner with local organizations to negotiate landowner agreements and otherwise maintain and improve access at official access points	Private Landowners, Towns and Villages, VT Agency of Ag, Food and Markets, Northern Forest Canoe Trail
SR5	***Scenic and Recreational***	Volunteer Opportunities - Access	Support the Enosburg Falls River Access Park initiative	Vermont River Conservancy
SR6	***Scenic and Recreational***	Volunteer Opportunities - Access	Assist with the upkeep of river access points by continuing river cleanups and other stewardship opportunities	Local Volunteers, Missisquoi River Basin Association
SR7	***Scenic and Recreational***	Education and Outreach	Help educate landowners on the liability protections available to them	Private Landowners
SR8	***Scenic and Recreational***	Local Planning - Recreation	Work with towns who wish to increase recreational ecotourism in the area, ideas include a tour of covered bridges in conjunction with revitalizing the Hectorville Covered Bridge in Montgomery, and establishing a Wild and Scenic Rivers Boating Trail akin to that established by the Sudbury, Assabet and Concord Wild and Scenic River Stewardship Council	Local municipalities, other Wild and Scenic Rivers, Northern Forest Canoe Trial
SR9	***Scenic and Recreational***	Education and Outreach	Work with local groups to educate landowners and recreational boaters to reduce the spread, control existing, identify threats, and monitor the study area for non-native invasive species. One example ongoing in the study area is the Montgomery Conservation Commission's work on controlling Japanese knotweed along the Trout River	Montgomery Conservation Commission, MRBA, ANR (VT Invasive Patrollers program), Lake Carmi Association, Franklin Watershed Committee

#	ORV Category	Action Type	Action Opportunities	Potential Partners
SR10	***Scenic and Recreational***	Local Planning - Recreation	Support and partner with local organizations which work toward vibrant recreational opportunities in the Missisquoi and Trout Watershed which are compatible with river water quality and protection	Northern Forest Canoe Trail, Hazen's Notch Association, Trout Unlimited, Missisquoi Valley Rail Trail Association, town historical societies
SR11	***Scenic and Recreational***	Local Planning - Recreation	Work with local partners to reestablish a healthy native trout population for recreational fishing	VT Fish and Wildlife, ANR, Trout Unlimited, local fishing guides
SR12	***Scenic and Recreational***	Work with Private Landowners	Work with local farmers who are required to have recreational access points in conjunction with conservation programs, such as farmland easements or CREP programs, on their lands	Private Landowners, VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, Missisquoi River Basin Association
SR13	***Scenic and Recreational***	Local Planning - Access & Recreation	Work with the Regional Planning Commissions to enhance nature-based recreational activities in the region while also working to increase sustainable access points so increased traffic doesn't strain already limited access areas	Northwest Regional Planning Commission, Northeastern Vermont Development Association
SR14	***Scenic and Recreational***	Local Planning - Access & Recreation	Work with the Regional Planning Commissions to help share local, state and federal funds (perhaps helping to leverage funds from the federal government's American Great Outdoors program and the National Park Service's Rivers, Trails and Conservation Assistance program)	Northwest Regional Planning Commission, Northeastern Vermont Development Association, National Park Service
SR15	***Scenic and Recreational***	Local Planning - Access & Recreation	Work with the Regional Planning Commissions to create a network of feedback and maps for recreational users (along with an ingoing survey of use numbers) so that recreational opportunities may be coordinated throughout the study area that best meet user needs – perhaps there might be a formation of a Recreational Working Group for the region as none of the towns have recreation committees	Northwest Regional Planning Commission, Northeastern Vermont Development Association, Vermont Department of Forests, Parks and Recreation
SR16	***Scenic and Recreational***	Local Planning - Recreation	Work with efforts which came out of the VT Recreational Plan including rewarding landowners for providing recreational use of their land, and encouraging the legislature to give tax breaks and continue to reduce liability to landowners who allow recreation on their lands	Vermont Department of Forests, Parks and Recreation, Private Landowners

#	ORV Category	Action Type	Action Opportunities	Potential Partners
SR17	***Scenic and Recreational***	Education and Outreach	Work with VTrans and ANR to educate the community on appropriate road and stream crossings which allow for aquatic community passage and reduced flood hazards	Vermont Agency of Transportation, ANR, local road crews, FEMA
SR18	***Scenic and Recreational***	Local Planning	Encourage Lowell and Montgomery to include ordinances related to recreational opportunities in their zoning bylaws	Towns and Villages, Town Selectboards
HC1	***Historical and Cultural - Archeological Sites***	Education and Outreach	Education of the public about the rich history of the Missisquoi and Trout Rivers through, perhaps, a guide, written in conjunction with the VT Division of Historic Preservation and the Abenaki bands, about the Abenaki activities in the upper Missisquoi and Trout River valleys	Vermont Division for Historic Preservation, Abenaki at Missisquoi or Nulhegan (Memphremagog)
HC2	***Historical and Cultural - Archeological Sites***	Education and Outreach	Add a written description to one of the NFCT kiosks describing the Abenaki activities in the region	Vermont Division for Historic Preservation, Abenaki at Missisquoi or Nulhegan (Memphremagog)
HC3	***Historical and Cultural***	Local Planning	Encourage towns to adopt priorities in town plans and zoning bylaws to protect historical resources. Assist in this process as much as possible	Town Selectboards
HC4	***Historical and Cultural***	Local Planning	Encourage Lowell, Westfield, Jay, Troy and North Troy to include protection or preservation of historical or archaeological sites in their zoning	Town Selectboards
HC5	***Historical and Cultural***	Local Planning	Encourage Montgomery and Richford to expand their zoning protections for historical and archaeological sites	Town Selectboards
HC6	***Historical and Cultural***	Funding	Seek ways to fund maintenance and repair of covered bridges	Vermont Agency of Transportation, NPS, local road crews, FEMA
HC7	***Historical and Cultural***	Education and Outreach	Seek ways to support archeological explorations in priority areas that have not previously been surveyed - perhaps test pit surveys. Touch base with students at local colleges, such as UVM, to help with these surveys	Vermont Division for Historic Preservation, University of VT, Vermont Historical Society
HC8	***Historical and Cultural***	Resource Identification	Work with VT DHP during Section 106 Review to be sure archeological sites are identified and preserved when possible	Vermont Division for Historic Preservation
HC9	***Historical and Cultural***	Local Planning	Help all communities, if desired and eligible, to become designated under the Downtown Development Act	Vermont Division for Historic Preservation, Town Selectboards

#	ORV Category	Action Type	Action Opportunities	Potential Partners
HC10	***Historical and Cultural***	Local Planning - Revitalization and Tourism	Help those towns with Historic Districts related to the rivers improve tourism and revitalization of downtowns/villages whenever appropriate	Vermont Division for Historic Preservation, Town Selectboards, local Historical Societies, Vermont Historical Society
HC11	***Historical and Cultural***	Resource Identification	Explore possibilities for protection of archeological and historical sites in private ownership	Private Landowners
HC12	***Historical and Cultural***	Volunteer Opportunities	Work with landowners to help stabilize actively eroding archeological sites with suggested methods such as geotextile fiber. One of the largest threats to these sites seems to be erosion, so water quality protections to prevent erosion in the floodplain will help protect archeological sites as well	Private Landowners, ANR
HC13	***Historical and Cultural***	Resource Identification	Work with landowners (and the VT DHP) who may wish to add historical/cultural sites on their land to the National or Vermont Register of Historic Places where eligible	Private Landowners, Vermont Division for Historic Preservation, Vermont Historical Society, VT Folklife Center
HC14	***Historical and Cultural***	Funding	Help towns and organizations achieve preservation of historical and cultural sites within the study area by leveraging State resources	Vermont Division for Historic Preservation, Town Selectboards
HC15	***Historical and Cultural***	Work with Private Landowners	Support the preservation of working farms in the study area, especially those which utilize Best Management Practices to protect water quality (please see the water quality section of this management plan for more specific goals)	Private Landowners, VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, Missisquoi River Basin Association, VT Land Trust
WQ1	***Water Quality***	Education and Outreach	Highlight willing and interested farmers on the Wild and Scenic website that are using Best Management Practices (BMPs) in their agricultural operations	Private Landowners, VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, Missisquoi River Basin Association, VT Land Trust
WQ2	***Water Quality***	Education and Outreach	Promote the value of vegetated buffers through education and outreach events; have examples of intact buffers on our website	Private Landowners, VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, Missisquoi River Basin Association, Vermont Agency of Natural Resources (ANR)

#	ORV Category	Action Type	Action Opportunities	Potential Partners
WQ3	***Water Quality***	Education and Outreach	Help educate local residents about the River Corridor Management Program, established by the recently passed Act 110, which deals with the regulation of flood hazard areas, river corridors, and stream alteration	Private Landowners, Vermont Agency of Natural Resources (ANR)
WQ4	***Water Quality***	Education and Outreach	Support projects which protect current wetlands, educate citizens on the importance of wetlands, and restore those with the greatest restoration potential (see ANR map)	Private Landowners, Vermont Agency of Natural Resources (ANR)
WQ5	***Water Quality***	Education and Outreach	Encourage implementation of the Better Back Roads Program by the towns in Franklin and Orleans Counties	Private Landowners, Northern Vermont Resource Conservation and Development Program (RC&D)
WQ6	***Water Quality***	Education and Outreach	Assist with river dynamics education, such as flume workshops, for all road crew employees in Franklin and Orleans counties	Private Landowners, Vermont Agency of Natural Resources (ANR)
WQ7	***Water Quality***	Education and Outreach	Encourage efforts for river and water quality education in local schools	Missisquoi River Basin Association (MRBA), Vermont Agency of Natural Resources (ANR)
WQ8	***Water Quality***	Education and Outreach	Support efforts to educate landowners about reduced pesticide and fertilizer use, vegetated buffers to prevent erosion, removal of invasives and native plant landscaping. Educate landowners about provision 10 V.S.A. §1266b which regulates the application of phosphorus fertilizer to non-agricultural soils (or "turf") including the prevention of phosphorus fertilizer application to turf that is not deficient in phosphorus, to an impervious surface, to turf between October 15th and April 1st, to frozen turf, or to turf within 25 feet of state waters.	Private Landowners, Missisquoi River Basin Association, Vermont Agency of Natural Resources (ANR), Natural Resource Conservation Service (NRCS)
WQ9	***Water Quality***	Local Planning	Assist town and village planning commissions in the creation of priorities for water quality protection in their respective town plans, thereby giving towns regulatory power concerning development projects under Criterion 10 of Act 250	Town Selectboards, Town Planning Commissions, Regional Planning Commissions

#	ORV Category	Action Type	Action Opportunities	Potential Partners
WQ10	***Water Quality***	Local Planning	Work with towns and villages who may wish to adopt language in their town plans and zoning bylaws to regulate zoning and development activity along river corridors, and adopt Best Management Practices (BMPs) for river corridor and buffer maintenance, encourage use of State financial incentives through Act 110 to adopt and implement zoning regulations protecting river corridors and buffers	Town Selectboards, Town Planning Commissions, Regional Planning Commissions
WQ11	***Water Quality***	Local Planning	Support efforts by Montgomery and Richford as they review their town plans this year and work to include language for Fluvial Erosion Hazards and the National Flood Insurance Program, encourage them to include this language in their bylaws during their next zoning review	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, Vermont Agency of Natural Resources (ANR)
WQ12	***Water Quality***	Local Planning	Support towns which adopt at least the minimum standards for buffers, setbacks, and National Flood Insurance Program regulations	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, Vermont Agency of Natural Resources (ANR), federal flood hazard mitigation efforts such as the Flood Mitigation Assistance (FMA) program
WQ13	***Water Quality***	Local Planning	Provide assistance to close gaps in Phase I and II geomorphic assessments	Vermont Agency of Natural Resources (ANR), local environmental consulting organizations, such as Arrowwood Environmental, which have completed these assessments
WQ14	***Water Quality***	Local Planning	Encourage all towns to work with ANR and their regional planning commission to have an up-to-date and approved Hazard Mitigation Plan. Orleans County plans have expired, which makes them less eligible for funding in a disaster. Montgomery and Richford are up-to-date. The status of the remaining Franklin County towns is unknown.	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, Vermont Agency of Natural Resources (ANR)

#	ORV Category	Action Type	Action Opportunities	Potential Partners
WQ15	***Water Quality***	Local Planning	Assist with communities who wish to petition the Vermont Water Resources Panel to increase the size of the buffer as well as limit the allowed land uses within a wetland and its adjacent buffer zone	Private Landowners, Missisquoi River Basin Association, Vermont Agency of Natural Resources (ANR), Natural Resource Conservation Service (NRCS)
WQ16	***Water Quality***	Local Planning	Help communities implement best stormwater management practices, such as Low Impact Development, to reduce erosion which carries sediment, nutrient and pollutant runoff to the Missisquoi and Trout Rivers and their tributaries	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, Vermont Agency of Natural Resources (ANR), Lake Champlain Basin Program
WQ17	***Water Quality***	Local Planning	Encourage hazardous waste and pharmaceutical disposal days at each transfer station in the ten towns and villages	Solid waste districts, local transfer stations, pharmacies, town governments
WQ18	***Water Quality***	Local Planning	The progressive zoning districts implemented by Enosburgh and Enosburg Falls may be a good model for all the study area towns; however, standardized buffers may be easier to understand and enforce	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, Vermont Agency of Natural Resources (ANR)
WQ19	***Water Quality***	Local Planning	Assist town and village planning commissions in the creation of zoning bylaws that protect water quality, especially in towns without such provisions. Adoption of bylaws may include: - Building and development setbacks - Establishment or maintenance of vegetated buffers (at least the minimum of a 25-50 foot native vegetated buffer – see the gaps illustrated in the NRCS map) - Low Impact Development techniques - Agricultural, Development and Forestry Best Management Practices	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, Vermont Agency of Natural Resources (ANR)
WQ20	***Water Quality***	Project Review	Assist in review of large-scale development projects to help ensure erosion control techniques are utilized and maintained (including road construction)	Town Selectboards, Town Planning Commissions, Regional Planning Commissions, NVDA, Vermont Agency of Natural Resources (ANR)

#	ORV Category	Action Type	Action Opportunities	Potential Partners
WQ21	***Water Quality***	Project Review	Maintain water quality and aquatic habitat and reduce thermal stress by encouraging appropriately designed and timed water withdrawals from the rivers, and only when necessary	Vermont Agency of Natural Resources (ANR), FEMA, organizations that withdrawal water
WQ22	***Water Quality***	Project Review	Work with VTrans to help implement sound river science in their decision making. Participate in NEPA and ACT 250 project reviews if designation occurs. Promote local and state construction and maintenance standards that limit road salt and sanding, increase the use of native vegetation buffers, protect riparian buffers and promote aquatic organism passage and reduced flood hazards	local road crews, VTrans, federal transportation programs
WQ23	***Water Quality***	Project Review	Help the Vermont Department of Forests, Parks, and Recreation ensure the use of "Acceptable Management Practices (AMPs) for Maintaining Water Quality on Logging Jobs in Vermont"	Vermont Department of Forests, Parks, and Recreation, Vermont Agency of Natural Resources (ANR)
WQ24	***Water Quality***	Project Review	See the Appendix for a draft MOU for the Wild and Scenic Advisory Committee and FEMA; assist in efforts to update FEMA's reimbursement scheme after disasters to include improvements for flood mitigation and water quality rather than just replacements	Federal Emergency Management Agency (FEMA), Vermont Agency of Natural Resources (ANR)
WQ25	***Water Quality***	Project Review	The post-designation Wild and Scenic Advisory Committee and the NPS may draft an MOU, if designation occurs, and if desired by the relevant State agencies, such as VAAFM, to guide the Section 7 Review process	VT Agency of Ag, Food and Markets, National Park Service
WQ26	***Water Quality***	Project Review	Review development projects which may impact the water quality of the Missisquoi and Trout Rivers when applicable, including projects on high quality stretches and on those reaches listed as impaired waters on the annually updated 303d list available on the Water Quality Division's website	Vermont Agency of Natural Resources (ANR), National Park Service

#	ORV Category	Action Type	Action Opportunities	Potential Partners
WQ27	***Water Quality***	Volunteer Opportunities	Support the volunteer water quality monitoring efforts of MRBA, through data analysis and other tasks, as part of the partnership between MRBA and the VT DEC Larosa Lab. Work with MRBA and ANR to address any gaps in Water Quality Monitoring; pursue solutions to fill in those gaps – perhaps help fund or work with local waste water treatment plants to provide E. coli testing and distribution of data at important swimming holes. Of note for MRBA to considering adding to or maintaining in their sampling schedule are those sampling sites of high quality – for example T-TJB (Jay Branch) and T-LBB (Burgess Branch), to continue to document any changes to reaches already listed as impaired – such as and T-NTMC (Mud Creek), and establish sampling sites on those not monitored which are listed as impaired but not sampled regularly by MRBA (Coburn, Berry, Godin, Samsonville and Trout Brooks)	Vermont Agency of Natural Resources (ANR), Missisquoi River Basin Association (MRBA)
WQ28	***Water Quality***	Volunteer Opportunities	Partner with organization such as MRBA to co-sponsor tree planting events, and support their Trees for Streams initiatives and other riparian planting programs	Missisquoi River Basin Association (MRBA)
WQ29	***Water Quality***	Volunteer Opportunities	Partner with the Vermont Outdoor Guide Association (VOGA), if desired, which has an interest in creating an annual river cleanup event when rivers are generally low in August or September – a “Blue Up Day”	Missisquoi River Basin Association (MRBA), Vermont Outdoor Guide Association (VOGA), Green Up Day efforts
WQ30	***Water Quality***	Volunteer Opportunities	Encourage efforts to restore native brook trout populations	Trout Unlimited, local sportsmen groups, Vermont Traditions Coalition, Vermont Agency of Natural Resources (ANR), Vermont Department of Fish and Wildlife
WQ31	***Water Quality***	Work with Private Landowners	Encourage agricultural Best Management Practices such as native vegetation field buffers, reduction of bare ground corn plantings, reduction of tillage, increased use of aeration machines	Private Landowners, VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, Missisquoi River Basin Association, Vermont Agency of Natural Resources (ANR)

#	ORV Category	Action Type	Action Opportunities	Potential Partners
WQ32	***Water Quality***	Work with Private Landowners	Help Agency of Agriculture, Food and Markets implement the Conservation Reserve Enhancement Program (with assistance from the USDA and NRCS) and similar efforts in study area	Private Landowners, VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, Missisquoi River Basin Association, Vermont Agency of Natural Resources (ANR)
WQ33	***Water Quality***	Work with Private Landowners	Encourage the development and use of approved Best Management Practices for forestry in the state	Vermont Department of Forests, Parks, and Recreation, Vermont Agency of Natural Resources (ANR)
WQ34	***Water Quality***	Work with Private Landowners	Help identify landowners who may be interested in creating Riparian Buffer easements	Private Landowners, Vermont Agency of Natural Resources (ANR), Vermont and local Land Trusts
WQ35	***Water Quality***	Work with Private Landowners	Assist with implementation of the Missisquoi Basin Water Quality Management Plan, once completed, especially portions of the plan that influence ORVs in the Wild & Scenic Study area	Vermont Agency of Natural Resources (ANR)
WQ36	***Water Quality***	Work with Private Landowners	Encourage local landowners to enroll in the Use Value Appraisal (Current Use) program, a conservation measure that taxes land on its value for agricultural, natural resource and forestry uses rather than its development potential	Vermont Department of Taxes
WQ37	***Water Quality***	Work with Private Landowners	Support and educate landowners about Vermont Water Resources Panel, Agency of Natural Resources and Vermont Agency of Agriculture, Food and Markets regulations and voluntary programs. Promote Best Management Practices to reduce sediment, nutrient and pollutant inputs into and maintain healthy riparian areas for the Missisquoi and Trout Rivers and their tributaries	Private Landowners, VT Agency of Ag, Food and Markets, Vermont Agency of Natural Resources (ANR)
NR1	***Natural Resources***	Education and Outreach	Educate landowners about the importance and best management practices of vernal pools and other ecologically sensitive areas	Vermont Agency of Natural Resources (ANR), Vermont Department of Fish and Wildlife, VT Reptile and Amphibian Atlas

#	ORV Category	Action Type	Action Opportunities	Potential Partners
NR2	***Natural Resources***	Education and Outreach	Work with programs such as the Staying Connected Initiative and Cold Hollow to Canada to educate communities about the importance of habitat connectivity and the location of corridors in their towns	Vermont Wildlife Diversity Program (Natural Heritage Program), local organizations which monitor amphibians, Vermont Center for Ecostudies/Vermont Vernal Pool Mapping Project
NR3	***Natural Resources***	Education and Outreach	Sponsor educational workshops or hikes designed to inform community members about Vermont's geology, including the serpentine outcrops of the region	University of Vermont, Vermont Geological Survey
NR4	***Natural Resources***	Help Promote Best Management Practices	Identify road/stream crossings with inadequate aquatic organism passages; utilize available programs and technical assistance form Vermont Fish and Wildlife to restore passages	Vermont Agency of Natural Resources (ANR), VT Fish and Wildlife
NR5	***Natural Resources***	Help Promote Best Management Practices	Utilize the recommendations from Vermont Fish and Wildlife and information found starting on page 85 of Conserving Vermont's Natural Heritage to manage for deer yards and other wildlife habitat; help towns which wish add management goals regarding the protection of critical wildlife habitat such as connectivity corridors, vernal pools, and deer wintering areas into their town plans and zoning	Vermont Wildlife Diversity Program (Natural Heritage Program), Vermont Center for Ecostudies/Vermont Vernal Pool Mapping Project, Town Planning and Zoning Commissions, Regional Planning Commissions, VT Reptile and Amphibian Atlas, Staying Connected, Cold Hollow to Canada
NR6	***Natural Resources***	Help Promote Best Management Practices	Many initiatives to maintain good water quality and reduce invasive species in the Missisquoi and Trout Rivers would also support preservation of critical wildlife habitat	Montgomery Conservation Commission, MRBA, ANR (VT Invasive Patrollers program), Lake Carmi Association, Franklin Watershed Committee, USDA, NRCS, LCBP
NR7	***Natural Resources***	Help Promote Best Management Practices	Encourage the management of grasslands using the USDA/NRCS pamphlet which promotes delaying mowing until after bird breeding (August 15 if possible or at least until after July 15)	VT Agency of Ag, Food and Markets, Farmer's Watershed Alliance, USDA, NRCS

#	ORV Category	Action Type	Action Opportunities	Potential Partners
NR8	***Natural Resources***	Local Planning	Support efforts for all towns to have conservation commissions	Local municipality governments, existing conservation commissions
NR9	***Natural Resources***	Local Planning	Support efforts to fill protection gaps of significant ecological areas and critical wildlife habitat areas	Vermont Wildlife Diversity Program (Natural Heritage Program), Vermont Center for Ecostudies/Vermont Vernal Pool Mapping Project, Town Planning and Zoning Commissions, Regional Planning Commissions, VT Fish and Wildlife
NR10	***Natural Resources***	Local Planning	Assist town and village planning and conservation commissions in the creation of priorities for natural resource preservation in their respective town plans	Vermont Wildlife Diversity Program (Natural Heritage Program), Vermont Center for Ecostudies/Vermont Vernal Pool Mapping Project, Town Planning and Zoning Commissions, Conservation Commissions, Regional Planning Commissions, VT Fish and Wildlife
NR11	***Natural Resources***	Local Planning	Assist town and village planning and conservation commissions in the creation of zoning bylaws that protect natural resources, especially in towns without such provisions	Vermont Wildlife Diversity Program (Natural Heritage Program), Town Planning and Zoning Commissions, Conservation Commissions, Regional Planning Commissions, VT Fish and Wildlife
NR12	***Natural Resources***	Local Planning	Only Enosburgh has zoning bylaws about geologic features. Assist other towns which wish to add language about geological feature protection into their zoning	Town Planning and Zoning Commissions, Conservation Commissions, Regional Planning Commissions, VT Fish and Wildlife, University of Vermont, Vermont Geological Survey
NR13	***Natural Resources***	Local Planning	Only four towns or villages include RTE species in zoning, and there are no provisions in place at any governmental level to protect the population or the habitat of rare species – help towns which wish to survey for these species and to prioritize conservation of important habitat and water quality to protect rare, threatened and endangered species	Vermont Wildlife Diversity Program (Natural Heritage Program), Town Planning and Zoning Commissions, Conservation Commissions, Regional Planning Commissions, VT Fish and Wildlife

#	ORV Category	Action Type	Action Opportunities	Potential Partners
NR14	***Natural Resources***	Volunteer Opportunities	Help reduce effects of 'overuse' of swimming holes, geologic features, and other natural areas that attract visitors. Coordinated maintenance of trails, litter removal and education could help preserve these resources for future generations' use and enjoyment	local municipality governments, existing conservation commissions, VT Department of Forests, Parks and Recreation, Solid waste districts, local transfer stations, waste haulers
NR15	***Natural Resources***	Volunteer Opportunities	Help survey and determine presence and location of additional RTE species and habitats, perhaps through Vermont Heritage Program inventories or a BioBlitz	Vermont Wildlife Diversity Program (Natural Heritage Program), Vermont Center for Ecostudies, Town Planning and Zoning Commissions, Conservation Commissions, Regional Planning Commissions, VT Fish and Wildlife
NR16	***Natural Resources***	Volunteer Opportunities	Identify significant ecological areas and critical wildlife habitat in the Study area	Vermont Wildlife Diversity Program (Natural Heritage Program), Vermont Center for Ecostudies, Town Planning and Zoning Commissions, Conservation Commissions, Regional Planning Commissions, VT Fish and Wildlife
NR17	***Natural Resources***	Volunteer Opportunities	Identify vernal pool locations in the Study area and share information with the Vernal Pool Mapping Project	Vermont Wildlife Diversity Program (Natural Heritage Program), Vermont Center for Ecostudies/Vermont Vernal Pool Mapping Project, Town Planning and Zoning Commissions, Regional Planning Commissions, VT Fish and Wildlife, VT Reptile and Amphibian Atlas
NR18	***Natural Resources***	Work with Private Landowners	Work with interested landowners to explore conservation easement opportunities in critical areas for natural resources, geological features and water quality preservation	VT and local land trusts
NR19	***Natural Resources***	Volunteer Opportunities	Help towns get data online for public access (ex – time, date and location of Selectboard meetings, town government official listings, town owned lands with public access, etc.)	local municipalities, local internet and web service providers