

## Chapter 3. Eligibility and Classification



Photo by Jeff Parsons

The purpose of this Chapter is to document National Park Service findings relative to: 1) the “outstandingly remarkable” natural and cultural resource values associated with the upper Missisquoi and Trout Rivers Study Area; 2) the “free-flowing character” of the study segments; and 3) the preliminary “classifications” which would be appropriate if the segments are included in the National Wild and Scenic Rivers System.

### **Eligibility Criteria**

The subsections below describe the relevant eligibility (free-flowing and ORVs) and classification criteria as set forth in the Wild and Scenic Rivers Act, in the USDA/USDI Interagency Guidelines for Eligibility, Classification, and Management of River Areas as published in the Federal Register on September 7, 1982, and in the Technical Report of the Interagency Wild and Scenic Rivers Coordinating Council on the Wild & Scenic Rivers Study Process, IWSRCC, December 1999.

### *Free-flowing Character*

The National Wild and Scenic Rivers System is designed to protect eligible “free-flowing” rivers and sections of rivers that support significant resource values from the adverse impacts of federally-assisted water resource projects, such as construction of new dams. The Act’s definition of “free-flowing” is outlined in Section 16:

(b) “Free-flowing”, as applied to any river or section of a river, means existing or flowing in natural condition without

impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion: Provided, That this shall not be construed to authorize, intend, or encourage future construction of such structures within components of the national wild and scenic rivers system.

A river or river segment can be considered for designation if it is above or below a dam or is dependent on releases from a dam. Any section of river with flowing water, even if impounded upstream meets the definition of free-flowing, as long as existing flows are sufficient to support flow-dependent ORVs and water quality.

### *Outstandingly Remarkable Values*

To be considered eligible for inclusion in the National Wild and Scenic Rivers System a river segment, together with its adjacent lands, must support one or more “outstandingly remarkable” natural, cultural, or recreational resource values. Such resource values must be directly related to, or dependent upon, the river and its adjacent lands. In order to demonstrate that a resource is river related, they are generally within ¼ mile of the river, or within another geographic area as defined by the Study Committee. Though there is no specific terrestrial boundary (buffer) recommended for the designation of the upper Missisquoi and Trout Rivers, the NPS is committed to protecting Wild and Scenic River values wherever they are located. The NPS concluded that specific boundaries are not necessary as they have been traditionally delineated to indicate federal acquisition limits that are not relevant in this instance as there is no federal acquisition of land proposed. These boundaries (buffers) have also been used for permitted land uses along WSRs such as limits for

mining and mineral leasing on public lands; however, this is also not relevant as there are not public, federal lands in the proposed designation. The “outstandingly remarkable” threshold within the Act is designed to be interpreted through the professional judgment of the study team during the Wild and Scenic Study process.

The descriptions below provide examples to help interpret this “outstandingly remarkable” eligibility requirement.

- **Nationally Significant Values:** Resource values which are nationally significant clearly meet the “outstandingly remarkable” threshold. A nationally significant resource would be rare, unique, or exemplary at a national scale. For example, a recreational boating experience that draws visitors from all over the nation would qualify as a nationally significant recreational resource.
- **Regionally Significant Values:** Based upon the desirability of protecting a regional diversity of rivers through the national system, a river segment may qualify based on regionally rare, unique or exemplary resource values. The area, region, or scale of comparison is not fixed, and should be defined as that which serves as a basis for meaningful comparative analysis; it may vary depending on the value being considered. For example, physiographic regions are appropriate for geologic and biologic resources, while the region occupied by a particular culture is appropriate for archaeological resources.
- **Values Significant in Aggregate:** A river may qualify for a given resource value based upon an aggregate of important values, no one of which would confer eligibility standing alone. For example, a series of unusual and distinctive river-related geologic features may together qualify a segment as exhibiting an “outstandingly remarkable geologic value” even though no one element meets the criteria alone.

The Interagency Wild and Scenic Rivers Coordinating Council (IWSRCC) has characterized the determination as to whether a given resource value is river-related as based on three criteria. To be river-related a resource

value should:

- 1) Be located in the river or in its immediate shorelands (generally within ¼ mile on either side of the river)
- 2) Contribute substantially to the functioning of the river ecosystem
- 3) Owe their location or existence to the presence of the river

For the purposes of the Upper Missisquoi and Trout Rivers Wild and Scenic Study, the Study Committee and NPS explored all the locally recognized river values and used the above criteria to determine which would qualify as Outstandingly Remarkable Values within the ten municipalities: Berkshire, Enosburgh/Enosburg Falls, Jay, Lowell, Montgomery, Richford, Troy/North Troy, and Westfield. The legislatively authorized study segments as well as the major tributaries in these municipalities were established as the geographic range of consideration for the Missisquoi and Trout ORVs.

### *Classification*

The Wild and Scenic Rivers Act requires that all eligible or designated river segments be classified as **wild**, **scenic**, or **recreational**.

These classifications are based on the amount of human impact (degree of human influence and access to these rivers) and dependent on the water quality present at the time of classification. The WSR Act defines these classifications as follows.

- Rivers classified as **wild** have pristine water quality. They are those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- Rivers classified as **scenic** are those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

- Rivers classified as **recreational** are those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past

### **Upper Missisquoi and Trout Rivers Study Findings**

#### *Eligibility*

**[Segment 1: Headwaters in Lowell to North Troy/Canadian Border]** Of the approximately 25-mile segment of the upper Missisquoi from its headwaters in Lowell to the Canadian border in North Troy, 24.3 miles of the upper Missisquoi River are found eligible for designation. The hydroelectric facilities in Troy (0.3 miles) and North Troy (0.1 miles) make these portions of the river ineligible due to their lack of free-flowing character.

**[Segment 2: Canadian Border/Richford to Enosburg Falls]** Of the approximately 25-mile segment from the Canadian border in East Richford to Enosburg Falls, 19.3 miles of the upper Missisquoi River are found eligible for designation. Eligibility stops at the Route 108 crossing in Enosburg Falls just upstream of the property boundary of the hydroelectric facility.

**[Segment 3: Trout River]** Of the 20-mile segment of the Trout River from its headwaters to its confluence with the Missisquoi River, the entire 11.0 miles of the mainstem of Trout River from the confluence of Jay Brook and Wade Brook are eligible for designation.

**[Segment 4: Tributaries]** The specific tributaries listed below were studied in more detail, are free-flowing and contain ORVs which make them eligible for designation. Additional unlisted tributaries are expected to be similarly free-flowing and to have ORVs which would make them eligible for designation, but were not evaluated as a part of the Study.

Tributaries listed by municipality:

- ≈ Berkshire: Berry Brook and Trout Brook
- ≈ Enosburgh/Enosburg Falls: Beaver Meadow Brook
- ≈ Jay: Jay Branch

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- ≈ Lowell: Burgess Branch and East Branch of the Missisquoi River
- ≈ Montgomery: Hannah Clark Brook, Jay Brook, South Branch of the Trout River, Wade Brook and West Brook
- ≈ Richford: Black Falls Brook, Loveland Brook and Stanhope Brook
- ≈ Troy/North Troy: Beetle Brook, Cook Brook and Tamarack Brook
- ≈ Westfield: Coburn Brook, Mill Brook, Mineral Spring Brook and Taft Brook.

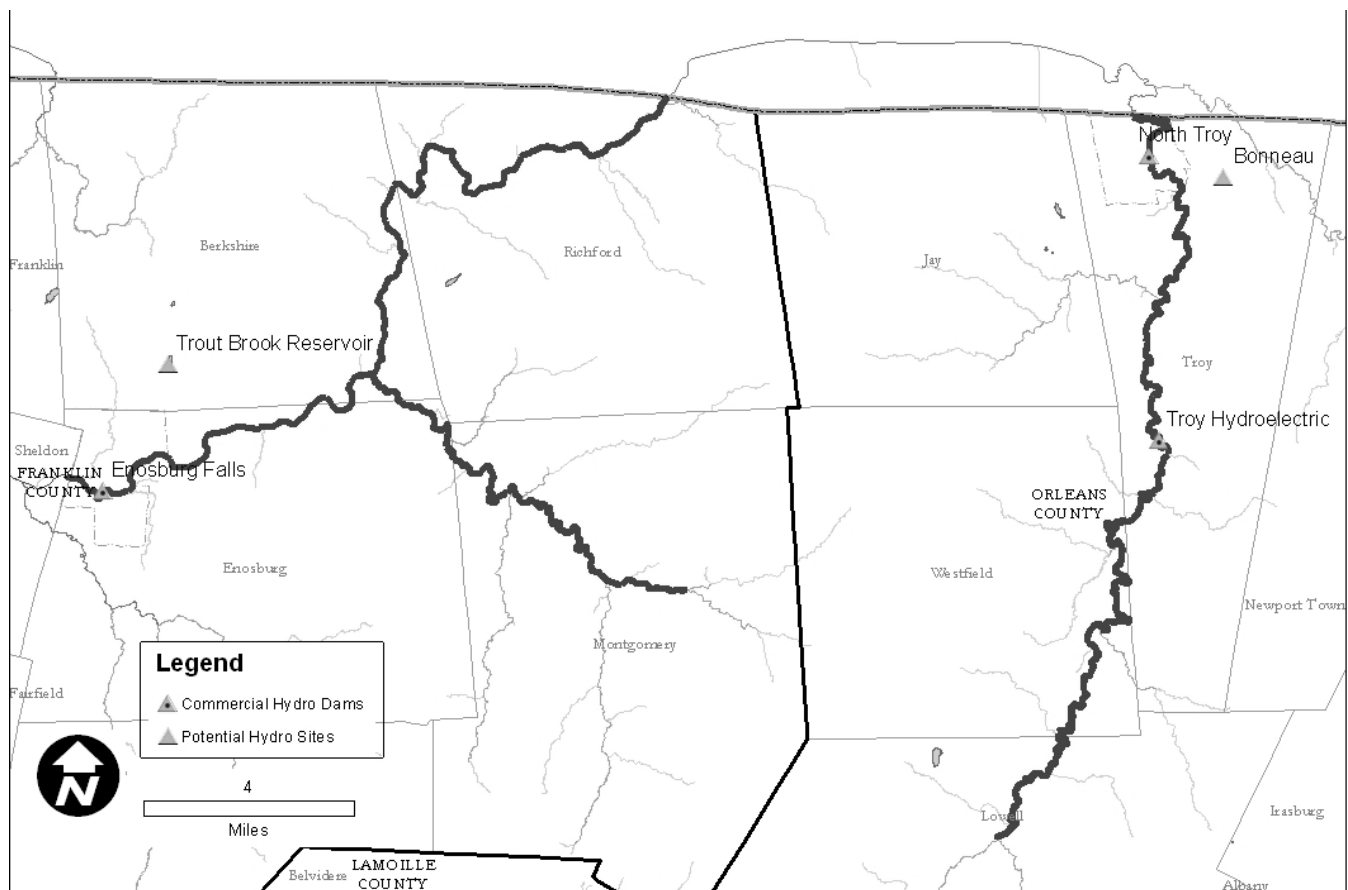
### *Free-flowing Character*

The Study area reaches of the Missisquoi and Trout Rivers are essentially natural from a free-flowing perspective. There is no flood control, and dams are run-of-river with no major dams that control flow through storage and release. Existing dams maintain

general river-like characteristics rather than creating large, lake-like impoundments.

Current river flows are adequate to support the in-stream values for which the rivers are being considered for designation. River flows are typically unaltered on the sections under consideration for designation, and areas where flow is altered, such as dams, are excluded from the section proposed for designation. More information on flow alterations may be found on the Vermont Agency of Natural Resources website or in the most recent version of the Missisquoi Basin Watershed Water Quality Management Plan.

The Study assessed the existing dams on the rivers with the help of the Agency of Natural Resource's Department of Environmental Conservation's Streamflow Protection Coordinator to see if they are



**Figure 7.** Dams and hydroelectric power facilities within the Upper Missisquoi and Trout Rivers Study Area.

compatible with the free-flowing river condition necessary for designation (Figure 7).

The free-flowing analysis by segment below includes assessment of non-dam infrastructure as well. These data on non-dam infrastructure are for the reaches of the Missisquoi and Trout River proposed for Wild and Scenic River designation where the Vermont Agency of Natural Resources (ANR), or its consultants, have completed fluvial geomorphic assessments, which is most of the proposed area. There are still some reaches in Berkshire and Enosburgh for which Phase 2 assessments have not been completed. Fluvial geomorphic assessments are widely used in Vermont and considered the best, most up-to-date, science-based approach to river management.

On the mainstem of the upper Missisquoi River there are approximately 2.7 miles with a history of previous bank stabilization, a limited number of bridges (14) and no culverts. On the Trout River mainstem there are approximately 1.7 miles with a history of previous bank stabilization, a limited number of bridges (10) and no culverts. Documented alterations have a minor effect on natural, free-flowing conditions. The Vermont Agency of Natural Resources (ANR) provided a table to the Study Committee listing the infrastructure along the upper Missisquoi and Trout Rivers on September 6, 2013. This alteration constitutes the “protect and enhance” baseline against which future proposals would be evaluated if the rivers are designated. Despite these projects, the rivers remain mostly in their natural condition. This list, and the geomorphic assessments, detail the man-made infrastructure and channel alterations on record at the Vermont of Natural Resources (ANR) (no digital information from Enosburg to Berkshire was available for bank armoring, but likely is present at some level), and establish a baseline condition for these projects in the upper Missisquoi and Trout Rivers. The assessments provide a scientific basis for analysis of any future stabilization work, if deemed necessary. As in the Trout River example on page 24, if human alterations must be made to stream channels in Vermont, a Stream Alteration Permit is required and

projects are designed to help maintain river values and habitat and recreational function.

### ***Free-flowing condition by segment:***

**Segment 1: Headwaters in Lowell to North Troy/ Canadian Border** the 24.7 miles of the Missisquoi River between Lowell and Canada are generally free-flowing with the exception of two short segments in the immediate vicinity of two dams (24.3 miles of the Missisquoi River in Orleans County are found eligible based on the free-flowing character). The following short sections of the Missisquoi are ineligible for designation due to their lack of free-flowing character.

- The Troy Hydroelectric project in Troy on the Missisquoi River makes 0.27 miles (1,408 feet) of the Missisquoi River ineligible due to lack of free-flowing character. This facility has not operated since 1998. The project received from the Federal Energy Regulatory Commission (FERC) an exemption (FERC Project Number P-13381). 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) would 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. A letter to this effect is included in the Appendix 5 of this Report.
- The North Troy Project (formerly Missisquoi River Technologies) on the Missisquoi River in the Village of North Troy makes 0.11 miles (585 feet) of the Missisquoi River ineligible due to lack of free-flowing character. This facility 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 are actively seeking to renew operations at the time of this Report. Designation would have no effect on the existing FERC exemption for this facility.

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### The Trout River Project

The Trout River Project is a one mile reach of the Trout River immediately downstream of Montgomery Center that was restored using natural channel design techniques to protect and preserve agricultural lands, stabilize property values, protect a state highway, and restore the river's ecological and recreational values. This project was completed by the Vermont Agency of Natural Resource's River Management Section and other partners using the science of fluvial geomorphology, rather than traditional dredging and armoring, to stabilize the channel.

The project consisted of a number of elements which are listed below:

- Rock vanes were built to slow velocities along the bank, collect sediments, and narrow channel width.
- A vortex rock weir was constructed across the channel, and keyed into rip-rap on the right bank along VT Route 118 above the bankfull elevation. It was built to maintain and deepen the pool at a natural ledge located just downstream to enhance swimming and fish habitat.
- Bulk toe rock revetment was installed along a 510 foot section of the right bank to repair existing rip-rap along VT Route 118.
- Fish lunger boxes were placed under a 120 foot section of traditional rip-rap along the right bank to provide cover for fish along the VT Route 118 highway where revegetation options were minimal.
- Eight root wad structures were added and repairs were made to existing root wads along the left bank to protect against further erosion and create scour pockets as fish habitat.
- A new channel was constructed to create a stable meander geometry with a radius of curvature of 337 feet.
- Earth berms were constructed to close off old channels and help redirect flow into new channel.
- A two-tier tree revetment was created to stabilize banks until revegetation took hold.
- Three earth filled rock covered structures were constructed to block high flows from entering old channels and flood chutes and significantly slow water velocities to allow for sediment deposition.
- Three log vanes were installed along the left bank to slow water velocities and enhance sediment deposition in the tree revetments.
- Participating landowners entered into WHIP (Wildlife Habitat Incentives Program) contracts with the Natural Resource Conservation Service (NRCS) to maintain a 35 foot wooded buffers along the Trout River for a period of 15 years.

This "Morphological Approach" to river management represented a major advancement in thinking in contrast to traditional river management approaches used in Vermont and elsewhere, which were typically short-term, expensive treatment of erosion-related symptoms rather than a system-wide approach. This demonstration project continues to be used as an educational opportunity. The Vermont Agency of Natural Resources' (ANR) Watershed Management Division, River Management Section, in cooperation with the USFWS Partners for Fish and Wildlife Program, the NRCS, and the Missisquoi River Basin Association have produced and made available educational materials, detailing that "...no other river restoration project in Vermont has been more visited, written about, or televised than the Trout River...state and federal agencies in Vermont are revamping their river programs to incorporate the techniques and lessons learned on the Trout River...[and landowners] have enthusiastically supported new river stabilization techniques that include protection of both property values and the natural resource values of river corridors." An online pdf with a full project description, with a map of the river reaches restored, may be found at <http://www.vtwaterquality.org/rivers/docs/report.pdf>.

In 2010, Arrowwood Environmental completed Phase 2 Geomorphic Assessment and a River Corridor Plan for the Missisquoi River in Orleans County (Lowell, Westfield, Troy and North Troy) and tributaries in Jay. On Segment 1 of the upper Missisquoi River there is approximately  $\frac{1}{4}$  mile of known reaches with a history of previous bank stabilization (0.28 mile), a limited number of bridges (8) and no culverts. This level of alteration does not render the river ineligible for Wild and Scenic River designation, but does constitute the “protect and enhance” baseline against which future proposals would be evaluated if the rivers are designated.

### **Segment 2: Canadian Border/Richford to Enosburg Falls**

19.3 miles of the Missisquoi River from the Canadian Border downstream to the Route 108 bridge are found eligible based on the free-flowing character. Eligibility stops at the Route 108 crossing in Enosburg Falls just upstream of the property boundary of the hydroelectric facility.

The free-flowing character of the lowermost 4.7 miles of this segment of Missisquoi River remains despite the inclusion this section in the FERC project boundary of the Enosburg Falls hydroelectric project.

- The Enosburg Falls Hydroelectric Facility (also known as the Kendall Plant) on the Missisquoi River is operating and licensed by FERC (FERC P-2905, license expires 2023). The river segment in the immediate vicinity of this project is found ineligible for designation due to the lack of free-flowing character. A 4.7 mile segment, though contained within the FERC project boundary of this hydroelectric facility (from Sampsonville to the Route 108 bridge crossing), is found eligible for designation based on the free-flowing character. Suitability findings on this segment are discussed in Chapter 4 of this Report.

In 2008, Phase 2 Geomorphic Assessment was completed for the Missisquoi main stem in Berkshire in Richford, the Jay Branch (Troy/Jay), and Mud Creek (Troy/Newport). On Segment 2 of the upper Missisquoi River there are approximately  $2\frac{1}{4}$  miles of

reaches with a history of previous bank stabilization (2.38 miles), a limited number of bridges (6) and no culverts. This level of alteration does not render the river ineligible for Wild and Scenic River designation, but does constitute the “protect and enhance” baseline against which future proposals would be evaluated if the rivers are designated.

**Segment 3: the Trout River** from its headwaters to its confluence with the Missisquoi River is free-flowing and has no dams. The entire 11.0 miles of the mainstem of the Trout River from the confluence of Jay Brook and Wade Brook are free-flowing and eligible for designation.

In 2007, the Johnson Company completed a Phase 2 Geomorphic Assessment and River Corridor Plan of the Trout River; this included 20 reaches in the Trout watershed (Montgomery, Berkshire, Enosburgh and Richford) with bridge and culvert assessments within these reaches. On the Trout River there are three known reaches with a history of previous bank stabilization (1.7 miles), a limited number of bridges (ten), and no culverts. Of these ten bridges, eight are in the digital database provided by VTrans and the Vermont ANR for bridges and culverts. The two additional bridges crossing the river are 1) a snowmobile bridge in Montgomery Center, and 2) a temporary steel bypass bridge located beside the currently closed Longley [Covered] Bridge that is awaiting repairs. It is of note that there are three additional bridges associated with, but not on, the Trout River that are important, both historically and culturally. The South Branch of the Trout River had the Hectorville [Covered] Bridge that used to cross Gibou Road over a tributary, which has been replaced with a concrete bridge and removed to offsite storage. The Hutchins [Covered] Bridge is on the South Branch of the Trout River (a tributary). West Hill Brook (another tributary) has the West Hill [Covered] Bridge as well.

Additionally, there is a one mile reach of the Trout River downstream of Montgomery Center that contains a number of structures including tree revetments, rock weirs, earthen berms, and log vanes

that were installed in 1999-2000 by the Vermont Agency of Natural Resources' (ANR) Watershed Management Division, River Management Section as part of a natural channel design restoration project that applied the methods of fluvial geomorphology to stabilize the channel rather than traditional dredging and armoring (see the Text Box on the page 24 for a detailed description). This level of alteration does not render the river ineligible for Wild and Scenic River designation, but does constitute the "protect and enhance" baseline against which future proposals would be evaluated if the rivers are designated.

**Segment 4: the Tributaries** of the upper Missisquoi and Trout Rivers are generally free-flowing in nature and eligible for designation. There are no major dams on these tributaries, the other small dams in the Study area located on tributaries are outside of the area currently under consideration for designation. Those dams that exist on tributaries are very small, without impoundment, and do no impact the free-flowing nature of the tributaries.

### *Outstandingly Remarkable Values*

The following describes the resources supported by the upper Missisquoi and Trout Rivers that are deemed to meet the "Outstandingly Remarkable" threshold for Wild and Scenic designation. More detailed information on these resource values may be found in the Upper Missisquoi and Trout Rivers Wild and Scenic Management Plan and on the Study website at [www.vtwsr.org](http://www.vtwsr.org). All of the resources cited contribute to the overall eligibility of the upper Missisquoi and Trout Rivers for designation. Not all river reaches in the study area support all noted outstanding values, but there is no stretch of river which does not contribute to the viability of the whole. In fact, it is worth noting that the water quality in the watershed has a direct impact on these Outstandingly Remarkable Values (ORVs) for which the rivers are eligible for designation, and should be protected as such. Also, some ORVs overlap into multiple categories; they are listed here under the heading currently considered most appropriate.

The Wild and Scenic Study Committee was tasked with identifying and researching potential ORVs associated with the waterways as required by the Wild and Scenic Rivers Act. Not just one, but several potential ORVs were identified on the Missisquoi and Trout Rivers. The examination of these resources (as described in detail in the Management Plan and briefly below) was accomplished through substantial research that was conducted prior to and during the Study, and included evaluation of the significance of the resources within a state-wide and regional context by means of consultations with experts and professionals. The National Park Service participated in this process and provided technical assistance to ensure that the identification and characterization of potential ORVs would form an adequate basis to establish defined ORVs for the purpose of this Report and potential future Wild and Scenic River designation.

The resources fall within the following categories: **Scenic and Recreational, Natural Resource and Historic and Cultural.**

The ORVs which make the upper Missisquoi and Trout River segments eligible for inclusion in the National Wild and Scenic Rivers System are described in the following pages of this Report. More specific information about individual examples of ORVs, as well as an analysis of resources at the watershed scale and a list by municipality, may be found in the companion document: Upper Missisquoi and Trout Rivers Management Plan.

### ***Scenic and Recreational ORVs***

Scenic and recreational opportunities, which abound on the Missisquoi and Trout Rivers, consistently rise to the top of the list of outstanding resources identified by the communities in the Study area. Community members are tied to these rivers through their enjoyment of recreational activities, especially canoeing and kayaking, fishing and hunting, swimming, hiking and wildlife viewing. According to the Missisquoi Valley Rail Trail website the scenic views of the Missisquoi are a draw for those using the trail, artists are inspired to create landscape paintings



here and wildflowers and wildlife may be seen from the trail.

### *Swimming Holes*

The numerous swimming holes in the Study area are a popular destination for locals and visitors alike. Yankee magazine featured the Three Holes swimming area (on the Trout River in Montgomery) as the Best Local Secret and swimming hole in New England in their May/June 2010 Issue: "As the Trout River sluices down from the hills, it fills three natural basins deep in the woods, creating the swimming-hole trifecta: diamond-clear water, flat rocks for sunbathing, and freedom from raucous crowds." The countless pools and falls of the Trout River in Montgomery have created many swimming areas in the Town. There are also popular swimming holes in the towns of Lowell, Westfield and Troy. Not only are many swimming holes in existence because of the unique geology (Natural Resource ORV) in the Study area, but are also important scenic areas and often provide great fishing. Collectively they are certainly an important ORV of regional significance.

### **Swimming Holes**

- Black Falls Brook Swimming Holes, Black Falls Brook, Montgomery
- Gibou Bridge Swimming Holes, S. Branch Trout River, above and below Gibou Rd., Montgomery
- Gray Rocks Swimming Hole, Trout River, Montgomery
- Hippie Hole or Crystal Falls, West Hill Brook, near Creamery Covered Bridge, Montgomery
- Hutchins and Hectorville Bridges Swimming Hole, S. Branch Trout River, Montgomery
- Longley Bridge Swimming Hole, Trout River, near Longley Bridge, Montgomery
- Montgomery School House Swimming Hole, Trout River, north of Montgomery Center, Montgomery
- Three Holes Swimming Area, Trout River, Montgomery
- Tillotson Mill, Lockwood Brook, Lowell
- Twin Falls Swimming Hole, East Branch Missisquoi River, Lowell
- Bakers Falls, Missisquoi River, Troy
- Big Falls, Missisquoi River, Troy

- Troy Four Corners Swimming Hole, Jay Branch, east of Route 101, Troy
- Snider Brook Swimming Holes, Snider Brook, Westfield
- Taft Brook Falls Swimming Holes, Taft Brook, Westfield

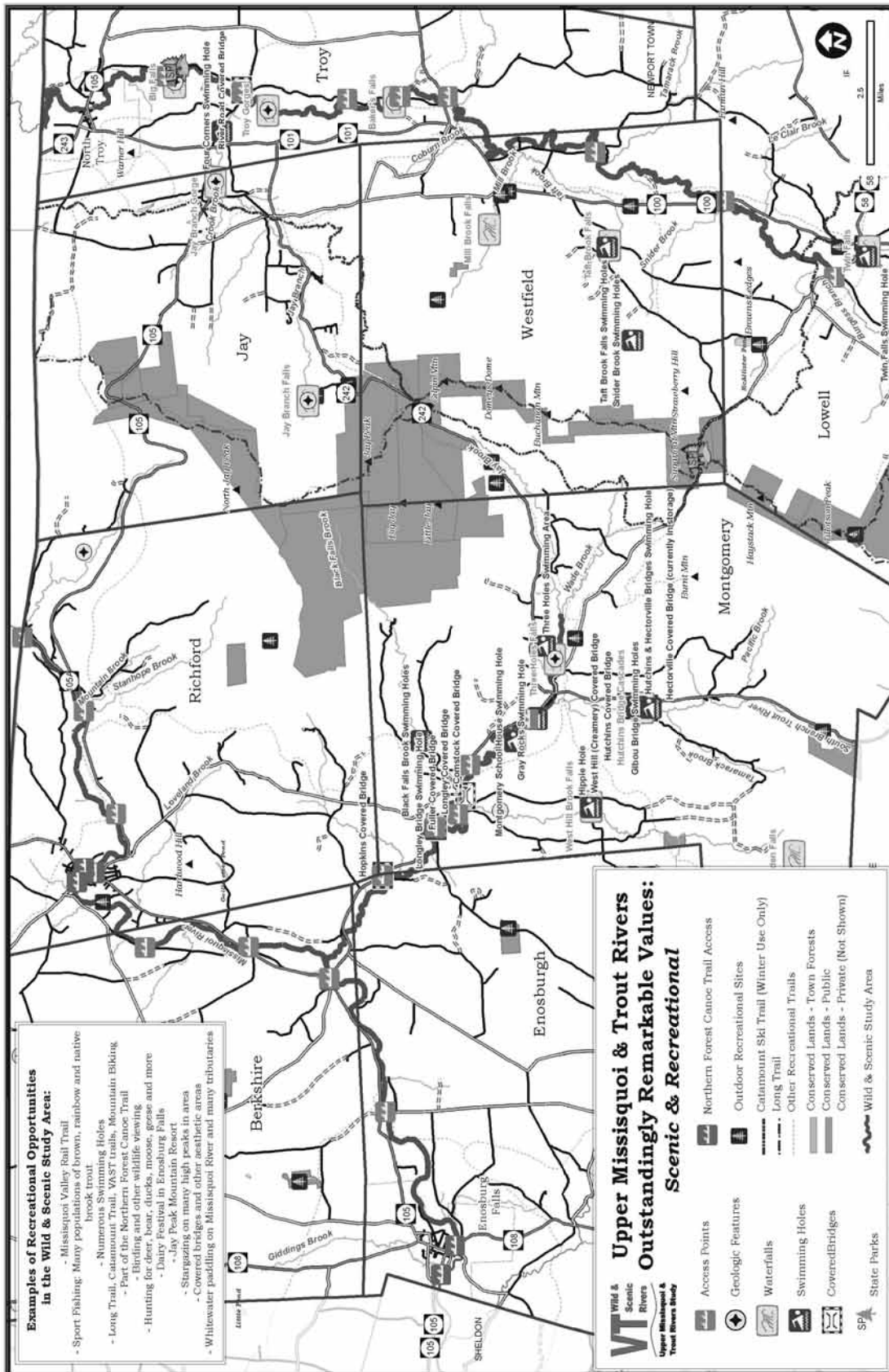
### *Fishing*

Fishing and hunting were historically important along the Missisquoi and Trout Rivers with the Abenaki peoples and remain important to the area residents on the upper Missisquoi and Trout Rivers. The rivers hold quality fish habitat throughout the Study area, supporting both warm- and cold-water fisheries (especially native fish populations of Brook trout). The upper reaches of the Missisquoi and the entirety of the Trout River offer excellent trout fishing, and serve as a destination for anglers across the region. The Trout River and many of its tributaries support especially healthy cold water fisheries. Many well-known trout fishing spots overlap with other features noted in the Management Plan. The Hopkins and West Hill Brook covered bridges and swimming holes are destinations for trout anglers. Black Falls Brook and Alder Brook are also good fishing spots in the Study area. Jay Branch, Hanna Clark and Wade Brooks all offer trout fishing in addition to whitewater paddling opportunities. Fisheries depend on the water quality of the Missisquoi River.

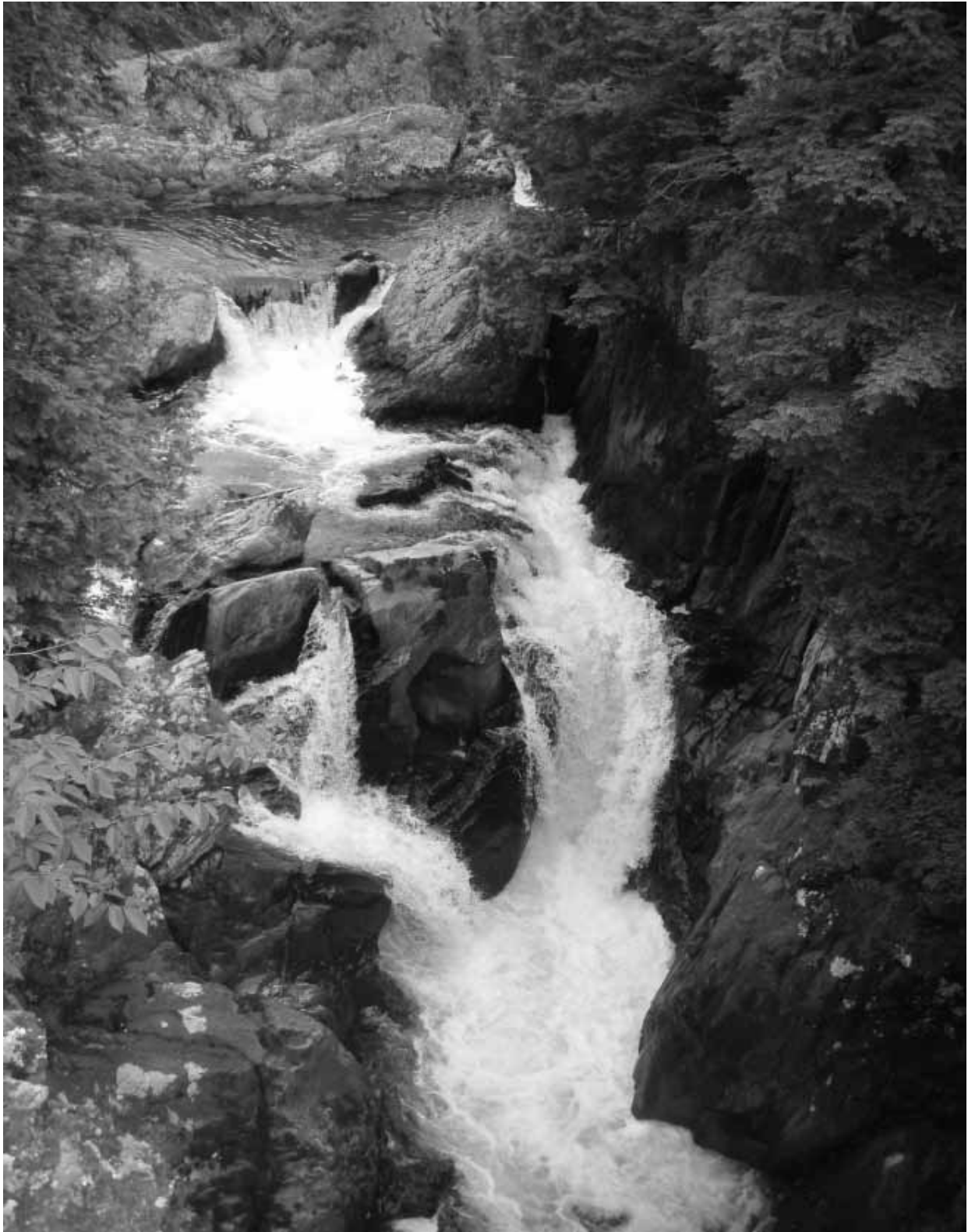
### *Paddling*

Canoeing and kayaking opportunities abound along the Missisquoi and Trout Rivers. The rivers offer unique experiences for all levels of paddling, from gentle meandering float trips to technical whitewater runs. The Study rivers wind their way through rolling forested hills, towering floodplain forests, and picturesque working farm fields. With approximately 25 distinct access sites along the 70 miles of the Study rivers, there are ample opportunities for nearly everyone to enjoy a day on the river.

The Missisquoi River is part of the Northern Forest Canoe Trail (NFCT), which is a 740-mile, long-distance paddling trail that connects waterbodies from the Adirondack mountains of New York to the unspoiled



**Figure 8.** A map of Scenic and Recreational ORVs within the Study area municipalities.



**Figure 9.** Featured ORV – The top of Big Falls, the largest undammed falls in Vermont. *Photo by Shana Stewart Deeds.*

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wilderness of northern Maine. The portion of the Study area that joins this nationally significant trail is the Missisquoi River from the Canadian Border in Richford to the downstream end of the Study area in Enosburgh Falls (Section 5). Walter Opuszynski, NFCT's Trail Director, states that paddlers within the Study area work their way from Canada downstream through a break in the Green Mountains and a unique NFCT landscape of verdant farmland. The NFCT has found great support from these communities, and an obvious desire to respect these waters for their natural beauty, history, and ecological importance. NFCT's paddlers rely on the opportunity to follow the historic travel corridors used by generations of inhabitants from the Abenaki to early settlers to present-day paddlers. The Missisquoi lies in the heartland of the Northern Forest Canoe Trail, and Walter Opuszynski feels it creates a unique connection of people and land including a significant international connection to Canada.

The NFCT has stewardship and work trips along the trail. NFCT's business partners in Canada working for scenic and recreational resource protection include: Camping Carrefour des Campeurs, Canoe & Co., and Vert le Mont.

According to Vermont Department of Environmental Conservation (DEC) staff, the localities in Canada have strong regulations on riverine and lakeshore buffer activities. Much enforcement comes down to the local level but some of the zoning regulations are set at the regional level. For example, there is a requirement that all municipalities have a five meter buffer requirement around Lake Memphremagog, which is part of the Northern Forest Canoe Trail. The local municipalities can then make this requirement more stringent by increasing the buffer to ten meters or more.

The Lake Champlain Basin Program's plan, Opportunities for Action, discusses Québec's commitments to the Missisquoi watershed, as does Québec's Missisquoi Bay Inter-Agency Advisory Committee's Action Plan (2010-2016). The Missisquoi Bay Inter-Agency Advisory Committee is made up of

several agencies and organizations that are involved in the Missisquoi Bay Watershed in Canada, i.e., the Ministère des Affaires municipales, des régions et de l'Occupation Territoriale (MAMROT); the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ); the Ministère des Ressources naturelles et de la Faune (MNR); the Ministère de la Santé et des Services sociaux; the Ministère des Transports (MTQ) and the Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP). These organizations, along with the Organisme de bassin versant baie Missisquoi (OBVBM) have agreed to cooperate with the community by:

- continuing educational opportunities
- supporting watershed groups
- implementing the Québec-Vermont agreement on Phosphorus reduction in the Missisquoi Bay
- implementing the MOU between Vermont, New York, and Québec concerning the cleanup of Lake Champlain.

For more detailed information on Canada's commitment to water quality and scenic/recreational protections, please see the existing protections section in the Suitability Chapter (Chapter 4).

The NFCT organization has five designated access areas along this reach of the river, as well as a number of campsites and informational kiosks. American Rivers, a national organization dedicated to protecting rivers and streams, recently partnered with the National Park Service to create River Stories, a collection of information and photographs highlighting water trails around the nation. According to their website, River Stories highlight ten U.S. rivers, including the Missisquoi section of the NFCT, in the U.S. which "offer outstanding recreational opportunities." Keith Sampietro, a local business owner of Montgomery Adventures, has worked with the Northern Forest Explorers Youth Program for youth to get them paddling on the upper Missisquoi. Business such as Keith Sampietro's are great examples of how healthy rivers, such as the Missisquoi and Trout, afford opportunities for rural economic development. NFCT was recently named "2011 Best Canoe Trail" by Outside Magazine, and is clearly one of

the Outstanding Remarkable Recreational and Scenic Values along the upper Missisquoi River.

### **Established Trail Systems in the Study Area**

- Missisquoi Valley Rail Trail (a multi-use trail constructed along the Missisquoi River): a river-related trail that owes its location to the gentle gradient created by the floodplain of the Missisquoi River and where users may appreciate the aesthetics of the Missisquoi River valley
- Northern Forest Canoe Trail (paddling along the Missisquoi River and other rivers): five established access points, six campsites and two informational kiosks in the Study area

### **Whitewater Paddling Opportunities**

- Missisquoi River – Troy to North Troy
- Trout River – upstream of VT Route 118
- West Hill Creek – from bridge near cemetery to VT Route 118
- South Branch Trout River – from Hutchins Bridge to Trout River
- Jay Branch – from golf course at Jay Peak to Missisquoi River
- Black Falls Brook – last 2 miles into Montgomery village to Fuller Bridge
- Wade Brook – near Westfield/Montgomery Line

### **Natural Resource ORVs**

#### *Geology*

The State of Vermont has a diverse geological history which is represented in the varied landscape seen today. The land that now constitutes Vermont has been at the edge of a continental plate throughout much of its history, which has subjected the area to the dynamic forces of colliding, pushing, thrusting, folding and wrinkling that happen through time at the edge of a great land mass. Much of Vermont was also historically underwater resulting in bedrock that mostly originated as sea sediments. Many hill farms and small homesteads existed in the region, and the geology directly impacted their success by giving rise to the topography, soils and waterways of their farmsteads.

The geology of the upper Missisquoi and Trout Rivers is especially unique on the Orleans side of the proposed designation. Margorie Gale, Geologist with the Vermont Geological Survey describes this geology as follows. The outcrops at Tillotson Peak and Tillotson Camp in Lowell, VT are metamorphosed mafic volcanic rocks and schist metamorphosed mafic volcanic rocks (**blueschists**). Blueschist and eclogite (very high pressure metamorphic rocks) are exposed in metamorphic belts throughout the world (China, California, Australia, Canada/Yukon...); however, they are not generally preserved or exposed in the Appalachians which makes this geology in Orleans County unique nationally and regionally. They are evidence that the rocks were subducted to a great depth and then quickly exhumed (brought back up). In conjunction with metamorphic age dates, this data helped define the timing for subduction in the State of Vermont. It was not that long ago that the theory of plate tectonics became common in textbooks, so the discovery by Jo Laird of blueschist in Vermont was really important for future explanations of geologic history. According to Barry Doolan, Professor of Geology at the University of Vermont, the blueschists found within the Study area, such as those found at in the Tillotson Peak area, are “unique geologically and provide habitat for unique flora associated with this rock.” Several rare, threatened or endangered plant species exist in these areas thriving on the soils formed by the unique chemical compositions of the mafic and ultramafic rocks found along this thrust fault. These rocks in the Tillotson Peak area, are described in field guides, and “geologists from all over the world visit this site because it is so unique.”

The blueschist and eclogite at Tillotson Peak and Tillotson Camp are part of a thrust fault slice which includes serpentinite. The ultramafic serpentinite rock may be found near the Tillotson outcrops, roughly ½ mile from the Camp or Peak. Along the river serpentinite is found in Lowell, Westfield and Troy. The blueschist in Vermont only occurs in the Tillotsen area, whereas serpentinite/ultramafic rock occurs sporadically within a belt or zone on the east flanks of the Green Mountains throughout the State. According to VanDiver’s Roadside Geology of VT and NH, the

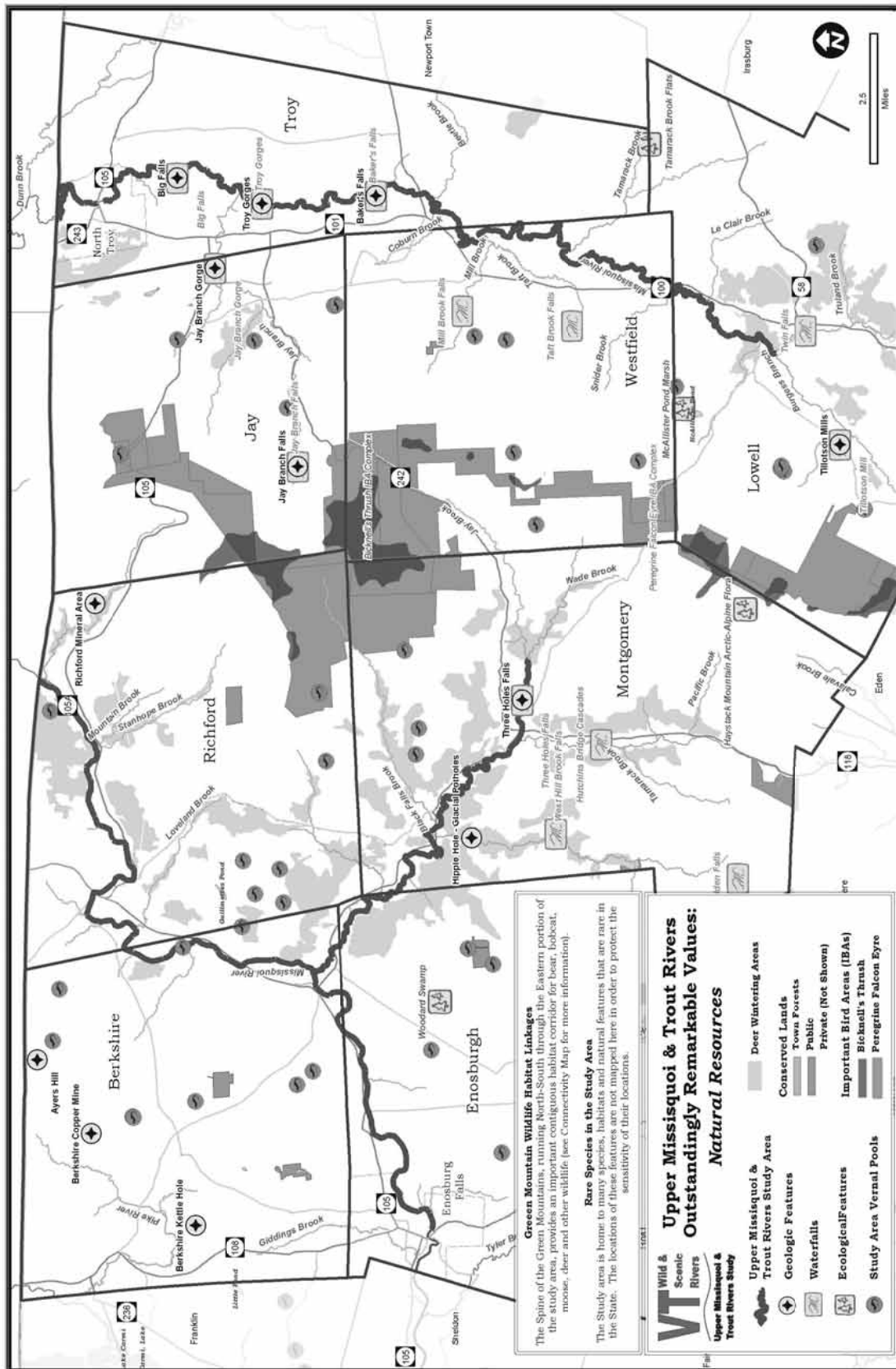


Figure 10. A map of Natural Resource ORVs within the Study area municipalities.

**Serpentine Outcrops** along the Missisquoi River in Lowell, Troy and Westfield represent a high concentration of these rocks in Vermont. These outcroppings are part of one of the largest ultramafic serpentine zones in the country. These serpentine rocks are tied to the Missisquoi drainage basin, and the bedrock origin and rock types affect the path and movement of the Missisquoi River. Serpentine outcrops appear in at least 10 locations along the Study corridor, and are associated with species of rare ferns. Serpentine outcrops are areas where serpentine bedrock is exposed. This ultramafic rock is unique because it is found more commonly deep in the Earth's mantle. Serpentine rocks are chemically distinct from other Vermont rocks; they are deficient in calcium, and rich in magnesium, iron, nickel and chromium which are often toxic to certain plant species. Occurrences of these outcroppings are tracked as rare occurrences by the Vermont Natural Heritage Information Project and are classified as S1 and G2, which means they are "very rare" and "rare" on State and global levels, respectively. The rarity of these types of rock attracts geologists from all over the world to this section of Vermont. According to Sorenson and Thompson's book *Wetland, Woodland, Wildland*, plant communities on these rare ledges and outcrops are also specialized, and low in diversity due to the challenges of living on this rock type. This is the only habitat in which several rare plant species can live in the state. "The Green Mountain maidenhair fern (*Adiantum viridimontanum*; S2, VT Threatened) grows only on serpentine soils, and its overall distribution is limited to northern Vermont and southern Quebec." Serpentine maidenhair fern (*Adiantum aleuticum*; S1), Large-leaved sandwort (*Arenaria macrophylla*; S2), and Marcescent sandwort (*Arenaria marcescens*) are additional rare and uncommon plants which are characteristic of serpentine outcrops.

### *Waterfalls, Cascades and Gorges*

The geology in Franklin and Orleans Counties also contributes to numerous unique waterfalls, cascades and gorges along the Missisquoi and Trout Rivers. The most well-known of these is **Big Falls** on the Missisquoi River in Troy, VT. Big Falls is a good example of the geologic history of the Study area

because there one may see the many folds and deformities in the rocks. The Burgess Branch Fault is visible through the topography of the area, and has been studied by geologists at the Vermont Geologic Survey and the University of Vermont. Big Falls is unique at the national and regional level as it is the largest undammed falls in Vermont that has been made into a State Park/Natural Area. Below the falls is a gorge over 200 feet long with 60-foot high walls. Jerry Jenkins describes Big Falls in his report for the State, *The Waterfalls, Cascades and Gorges of Vermont*: "The Site is about one-half mile long. Above the falls are rapids, braiding channels, low cliffs ten to 35 feet high, and many small islands. Immediately before the falls is a large pool about 100 feet wide. The falls themselves (actually steep cascades) consist of three channels and drop about 25 feet. The middle channel is beautiful and spectacular and very noisy. Below the falls there is a gorge about 75 yards long with walls about 60 feet high. The east walls are vertical, the west walls sloping. At the bottom of the gorge there is deeper water which makes good swimming, and several sandy beaches." The gorge also contains a number of rare vascular plants. Dorothy Allard, Virtual Herbarium Coordinator for UVM's Pringle Herbarium, led a 2005 inventory of bryophytes at Big Falls State Park and states that it was an "interesting place from a bryological standpoint." Both S2 and S1 species of bryophytes were found during this inventory. The site was ranked as "high importance" in the Waterfall Study due to its heavy recreational use, significant botanical character and its distinction of being the largest natural waterfall in the State. It has also been noted as a 'significant feature' of the Missisquoi basin in previous versions of the Agency of Natural Resources' Watershed Management (Basin) Plan. *Waterfalls, Cascades and Gorges of Vermont* states that with the "...alteration and destruction of waterfalls and gorges...combined with the number of people who use and appreciate the ones that remain, seems to us to argue for the defense of every important site we have left."

Other important waterfalls, cascades and gorges along the Missisquoi include:

- **Baker's Falls (Pierce Mill, Troy) – Missisquoi**



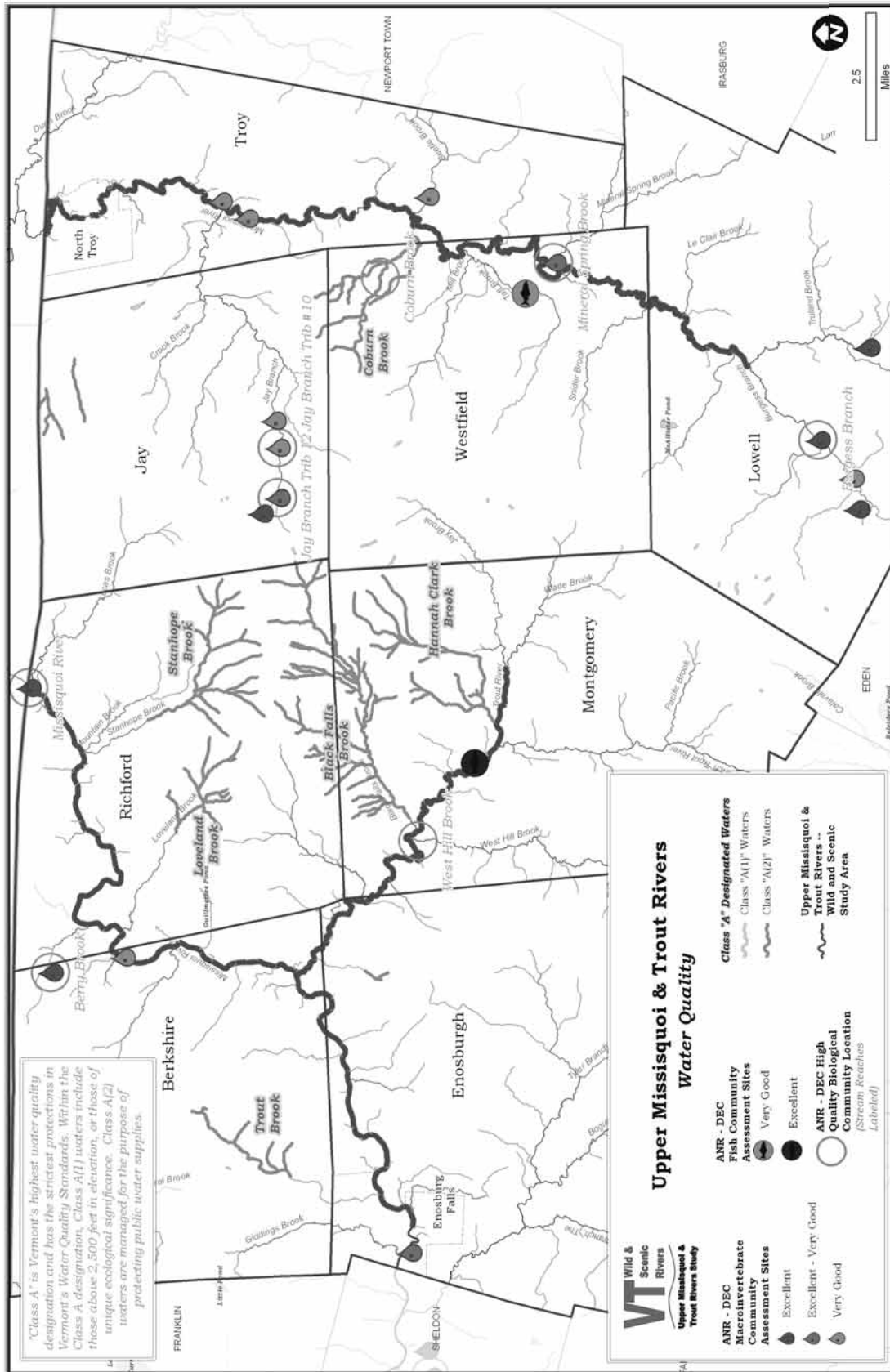


Figure 11. A map demonstrating the highest water quality within the Study area municipalities.



**River:** Cascades below an old dam, the first cascade is approximately 25 feet high, followed by two ten-foot cascades. Declared to be a significant site in the Missisquoi Basin Watershed Plan and described in *The Waterfalls, Cascades and Gorges of Vermont*.

- **Troy Gorges – Missisquoi River:** A series of four bedrock gorges located about a mile downstream of the River Road Bridge in Troy. Deep pools separate the gorges which range in length from about 400' to 1,500' along this 1-mile segment of the upper Missisquoi River. This reach also contains the foundation ruins of an old iron smelter.
- **Jay Branch Gorge (Four Corners Swimming Hole) – Jay Branch, Missisquoi River Tributary:** Listed by newenglandwaterfalls.com as a premier swimming hole in Vermont, this hole has beautiful waterfalls cut into the bedrock (Ottawaquechee Formation of black phyllite or schist with quartz). This swimming area is a series of drops on the Jay Branch called "Four Corners." They are a beautiful set of swimming holes just downhill of the junction of Route 105, Route 101 and the Veilleux Road. There are large potholes present, and it even used to be a destination for gold panning. Please see the potholes in the scenic and recreational ORV chapter of the Management Plan for more information.
- **Tillotson Mills, Lockwood Brook, Missisquoi River Tributary, Lowell:** This small woodland cascade is below a historic mill, and described in the *Waterfalls, Cascades and Gorges of Vermont*. This site is a waterfall and swimming hole, and also noted as a 'significant feature' of the Missisquoi basin in previous versions of the Agency of Natural Resources' Watershed Management Plan (Basin 6 - Missisquoi River Watershed Water Quality and Aquatic Habitat Assessment Report).
- **Twin Falls, East Branch of the Missisquoi River, Lowell:** These falls are located in Lowell Village on the East Branch. Cascading falls are made by a large waterfall split in two by a bedrock outcrop. There is a deep pool below the falls which is good for swimming. This place was described in the

1991 swimming hole survey.

- **Three Holes Area, Trout River, Montgomery:** This series of kettle holes along the Trout River in Montgomery is a popular swimming area voted by *Yankee* magazine as the Best Swimming Hole in New England in their May/June 2010 Issue. There is more information about this privately owned swimming hole in the Scenic/Recreational ORVs section.

### *Rare, Threatened and Endangered (RTE) Species and Communities*

According to the Vermont Wildlife Diversity Program (formerly the Vermont Nongame and Natural Heritage Program) there are many rare species of aquatic insects, amphibians, reptiles, plants and natural communities associated with the upper Missisquoi and Trout Rivers. These rare, threatened and endangered species and communities are given global and state rankings. For example, a RTE listed as G2 means that they are considered imperiled with very few populations (often 20 or fewer) in existence globally. State ranks are assigned similarly, with those with a State rank S3 or lower considered RTEs. These ranks are based on a species' vulnerability to extirpation (ceasing to exist in VT) or extinction (ceasing to exist on Earth). S3 ranking means species are vulnerable to extirpation, often due to declines to 80 or fewer occurrences in the State due to habitat restrictions or other reasons for decline. S2 ranking means species are imperiled and at high risk for extirpation, often due to declines to 20 or fewer occurrences in the State due to habitat restrictions or other reasons for decline. S1 ranking means species are critically imperiled and at very high risk for extirpation from the State, often due to declines to 5 or fewer occurrences in the State due to habitat restrictions or steep declines in numbers.

One such rare natural community, the **Serpentine Outcrops**, was discussed in the geology section above. The serpentine outcrop natural community is listed as G2, meaning that serpentine outcrops are considered imperiled with very few populations (often 20 or fewer) in existence globally. Another such community is the **Riverside Outcrop** (S3), an upland shore natural

### Chapter 3. Eligibility and Classification

community found along streams and rivers where there is exposed bedrock. Common near waterfalls, cascades and gorges, this community is found along large rivers in the State like the Missisquoi. Wetland, Woodland, Wildland lists the red-spotted ground beetle as a rare insect that may be found within this natural community. Some species of plants such as wild chives, shining ladies-tresses and several species of bryophytes (group of non-vascular plants which includes mosses, hornworts and liverworts) live in and on these harsh, riverside outcrops. **Silver Maple-**

**Ostrich Fern Riverine Floodplain Forest (S3)** is dominated by silver maple and ostrich ferns which are able to survive in the typical, annual flooding. Many migratory birds are known to use this riparian habitat along with otter, mink, muskrat, beaver, and several amphibian species. **Troy Colony of Great Laurels** is listed by the Vermont Rivers Study as a “relic colony of laurel shrubs” in its list of natural areas that are “recognized as excellent examples of Vermont’s natural heritage.” The **Great Laurel** is a State Threatened plant (*Rhododendron maximum*; S2). The Audubon Society Field Guide to the Northeast provides the following description: “The great laurel is a large and spectacular rhododendron usually found only in warmer climates than that of northern Vermont near the Canadian border. It is believed that this species was more common in northern Vermont about 6,000 years ago, when the region possessed a somewhat warmer climate. This period of time is known as the *climatic optimum*.... This relic colony of great laurels is one of only two that are found in northern New England.” This colony of laurels was listed in the Vermont Rivers Study.

Several species of rare dragonflies and damselflies are found in the Study area, and are directly linked to the quality of the Missisquoi and Trout Rivers and their surrounding wetlands. Their ranks are listed in the table below. According to Vermont Natural Heritage Data, there are 19 species of **dragonflies and damselflies** in Franklin and Orleans Counties which are ranked as S3 or lower (vulnerable to extirpation to critically imperiled). The dragonhunter dragonfly (*Hagenius brevistylus*) is the only species in this genus in North America. This amazing aerialist typically lives

near forested streams and rivers, but also near slower moving lakes or bays, where it hunts for other dragonflies which it catches on the wing. The zebra clubtail dragonfly (*Stylurus scudderi*) is named for the swelled, club-like end to its abdomen and the alternating black and yellow (or pale green) stripes along its body. This rare dragonfly lives in clear, clean, forested streams and small rivers including trout streams. You may see the males patrolling over the river guarding foraging and breeding territory.

The following are RTE reptiles and amphibians dependent on the Missisquoi and Trout Rivers and their surrounding wetlands. **Mink frogs (S3)** are green-faced frogs that, according to Jim Andrews, Coordinator of the Vermont Reptile and Amphibian Atlas, are reported to smell like garlic or onion. They prefer shallow bays and inlets and outlets of rivers, lakes and ponds. Conservation of undeveloped bays and marshlands, and education and monitoring of roads along waterways for mortality during summer breeding season would help protect this vulnerable amphibian species. **Wood turtles (S3, VT Species of Special Concern)** have red/orange flesh, black heads, and layered scutes (shell scales) which can look like the rings in a tree. Their plastron, the bottom of their shell, is yellow with black markings. Wood turtle habitat includes streams where they overwinter, and nearby uplands and fields where they feed. They need connectivity between their streams and neighboring woodlands. Protecting these habitats along with eliminating their collection as pets and reducing road mortality will help protect this species. **Four-toed Salamander (S2, VT Species of Special Concern)** – This salamander is small, and approximately the size and color of the common red-backed salamander often found in woodlands. This salamander is distinguishable by its creamy, almost opal, stomach which also has a smattering of black spots. They also only have four toes on their back feet whereas most salamanders have five hind toes. Preserving their preferred habitat of vernal pool edges and small, wooded swamps, such as red maple swamps will help protect this high priority species of concern in the state. The Vermont State Natural Heritage Information Project has mapped 64 distinct **vernal**

**Table 1.** Study area records for rare Dragonflies & Damselflies (Odonata) from the VT Natural Heritage Program.

| Common Name               | Genus species                   | SR | GR | Franklin | Orleans |
|---------------------------|---------------------------------|----|----|----------|---------|
| Spotted Spreadwing        | <i>Lestes congener</i>          | S3 | G5 | Yes      | Yes     |
| Elegant Spreadwing        | <i>Lestes inaequalis</i>        | S3 | G5 |          | Yes     |
| Vesper Bluet              | <i>Enallagma vesperum</i>       | S3 | G5 | Yes      | Yes     |
| Black-tipped Darner       | <i>Aeshna tuberculifera</i>     | S2 | G4 | Yes      | Yes     |
| Harlequin Darner          | <i>Gomphaeschna furcillata</i>  | S2 | G5 |          | Yes     |
| Lilypad Clubtail          | <i>Arigomphus furcifer</i>      | S2 | G5 | Yes      |         |
| Black-shouldered Spinyleg | <i>Dromogomphus spinosus</i>    | S3 | G5 | Yes      | Yes     |
| Beaverpond Clubtail       | <i>Gomphus borealis</i>         | S2 | G4 | Yes      | Yes     |
| Dragonhunter              | <i>Hagenius brevistylus</i>     | S3 | G5 |          | Yes     |
| Southern Pygmy Clubtail   | <i>Lanthus vernalis</i>         | S2 | G4 |          | Yes     |
| Maine Snaketail           | <i>Ophiogomphus mainensis</i>   | S2 | G4 |          | Yes     |
| Eastern Least Clubtail    | <i>Stylogomphus albistylus</i>  | S3 | G5 | Yes      | Yes     |
| Zebra Clubtail            | <i>Stylurus scudderi</i>        | S2 | G4 | Yes      | Yes     |
| Arrow Clubtail            | <i>Stylurus spiniceps</i>       | S2 | G5 | Yes      |         |
| Williamson's Emerald      | <i>Somatochlora williamsoni</i> | S3 | G5 |          | Yes     |
| Calico Pennant            | <i>Celithemis elisa</i>         | S3 | G5 | Yes      |         |
| Belted Whiteface          | <i>Leucorrhinia proxima</i>     | S3 | G5 | Yes      | Yes     |
| Twelve-spotted Skimmer    | <i>Libellula pulchella</i>      | S3 | G5 | Yes      | Yes     |
| Band-winged Meadow-hawk   | <i>Sympetrum semicinctum</i>    | S3 | G5 | Yes      | Yes     |

**Table 2:** Important Sites of High Water Quality Supporting ORVs

|  |
|--|
| <b>Macroinvertebrate Community Assessment Rankings</b>     |
| <i>Excellent:</i>  |
| • Missisquoi River (Richford)                              |
| <i>Excellent – Very Good:</i>                              |
| • Missisquoi River (Enosburgh)                             |
| <i>Very Good:</i>  |
| • Missisquoi River (Richford)                              |
| <b>High Quality Aquatic Insect Community/"High Quality</b> |
| • Missisquoi River (Richford)                              |
| <b>Fish Community Assessment Rankings</b>                  |
| <i>Excellent:</i>  |
| • Trout River (Berkshire)                                  |

**pools** in the Study area watershed, see the Vermont Vernal Pool Mapping Project, with two very close to the Missisquoi: 1) an old oxbow in Berkshire, and 2) another in Richford. Vernal pools, often forested, swamp natural communities present throughout the Study area, are seasonally temporary wetlands important to biological diversity, forest function and watershed processes. These pools are formed from spring rains and snow meltwater in small woodland depressions. Because these vernal pools are ephemeral (temporary) they are not able to maintain populations of fish species. This makes them important as breeding areas for amphibians, especially those sensitive to predation by fish such as wood frogs, and to the biological diversity and watershed functions of an area. Many species of aquatic insects, salamanders, frogs and turtles depend on vernal pools as critical habitat. Fairy shrimp are small crustaceans which only live in vernal pools. Vernal pools are considered uncommon in the State and nationally, and 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 though many may be better protected with a larger one.

Water quality is particularly important to the rare fish species found in the Missisquoi and Trout Rivers.

**Fantail Darter** (S3) is described by the book, *Fishes of Vermont*, as living in shallow areas of streams and rivers where they hunt for aquatic macroinvertebrates between rocks. This fish species is at the northeastern edge of its distribution, and is only found in Vermont in the Missisquoi River and some of its tributaries. The **Brassy Minnow** (S1, *VT Species of Special Concern*) is on the "extreme eastern edge of its distribution," being found in few areas in Vermont including two Missisquoi River tributaries. This minnow predominately eats algae, making it one of two true herbivore fish species in the State. For this reason, they prefer waterway reaches with muddy substrate rich in organic matter. The **Brook trout**, though not rare, threatened or endangered in the State, are the only char species native to Vermont. This salmonid

species has seen decline in numbers in recent years due to impacts by stocked trout species which are competitors for food and habitat, along with habitat alterations. These fish are coldwater species, and require temperatures typically below 65-72°F. With loss of riparian trees, and increased runoff to streams water temperatures are often above levels which stress this species sometimes leading to relocation or mortality. The Wild and Scenic Study Committee promotes water quality initiatives that protect these important aquatic species, and recognizes the need to maintain high water quality in the region. The tributaries of the Missisquoi including the Trout River, include headwater streams and river sections of high quality waters. Please see Figure 11 for a map of streams within the Study area with high water quality.

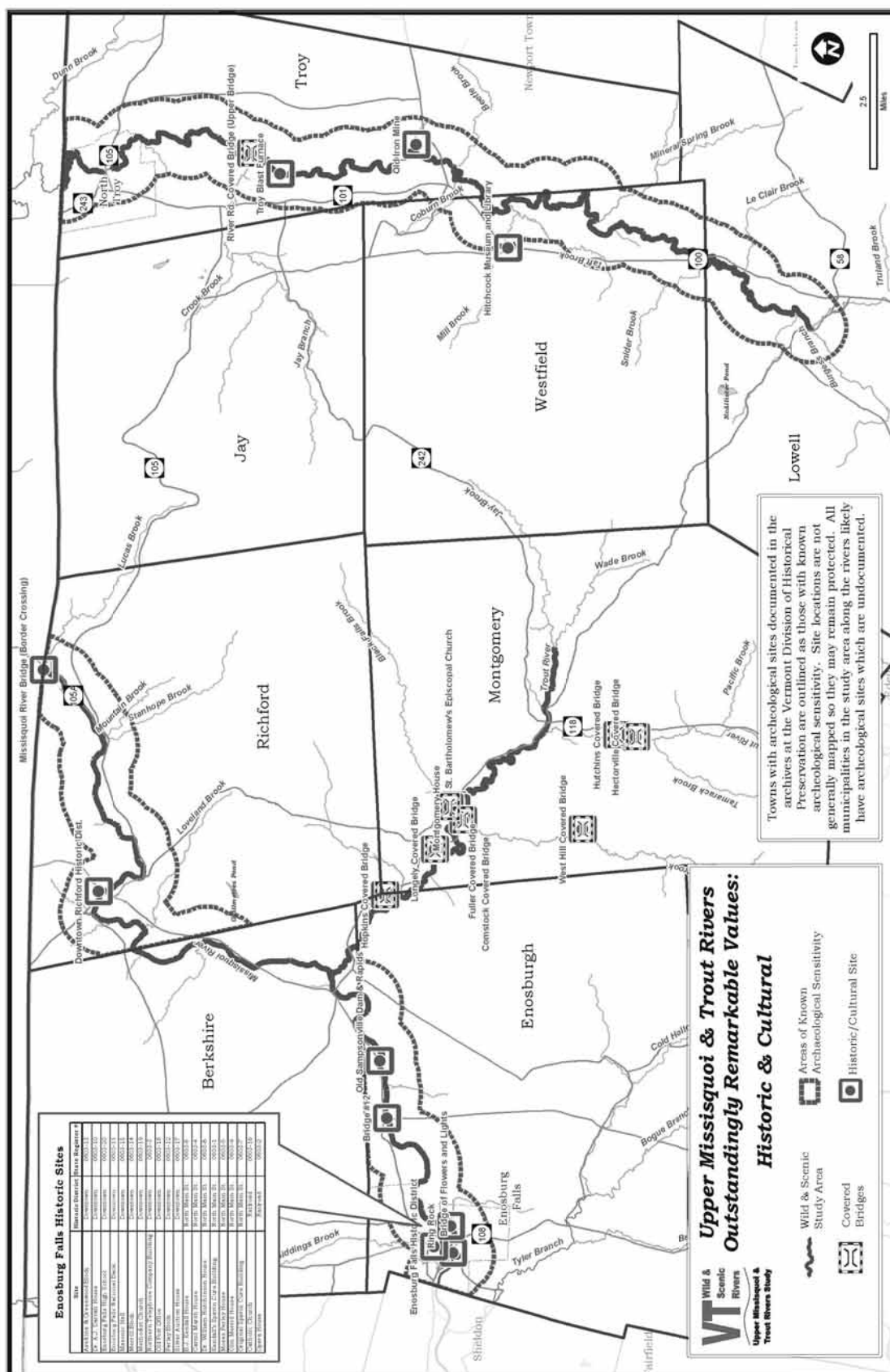
Sites where the Vermont Agency of Natural Resources' (ANR) Watershed Management Division has determined aquatic communities (macroinvertebrates and/or fish) to be "Very Good" or "Excellent" are also identified as supporting the Missisquoi and Trout ORVs. The occurrences of communities of this quality are indicative of the best water quality and outstanding aquatic habitats in the state of Vermont. Additionally, ANR biologists have further classified a subset of river and stream reaches as "High Quality Biota," indicating that these habitats support naturally functioning, exceptionally healthy biological communities. These High Quality Biota sites are identified as supporting the Natural Resource and other ORVs as well.

Overall, the combination of important geology; waterfalls, cascades and gorges; and rare, threatened and endangered species and natural communities make up the Natural Resource ORVs which are rare and important at both the national and regional scale.

### **Historic and Cultural ORVs**

#### *Archeological Sites*

Lowell, Westfield, Troy, North Troy, Richford, Enosburgh, and Enosburg Falls have known archeological sites documented in the Vermont Division of Historical Preservation archives or have



**Figure 12.** A map of Historic and Cultural ORVs within the Study area municipalities.

known archeological sensitivity. All municipalities in the Study area along the Missisquoi and Trout Rivers likely have archeological sites which are undocumented. Of the documented sites, Native American Site, VT-FR-162 is in Enosburg Falls. There is evidence here of a large camp or village based on the low density of prehistoric artifacts (early to middle Woodland Period) over a large area. Chert and quartz flakes, fire-cracked rock, charcoal, and hearth features were found. According to the Division of Historic Preservation VT-FR-162 “is important in that it is at present the largest known site on the Missisquoi [River] above Enosburg Falls. It is probably a Woodland Period camp/village site which was not intensely used. This suggests it could be...a sensitive temporal marker if dated...” This settlement was on the banks of the Missisquoi River, and likely owed its location to the falls in present-day Enosburg Falls. The settlement was river dependent with the changing riverine environment a probable explanation for the temporal use of the camp/village. Users of the site surely took advantage of the broad floodplain and easy canoe routes available at that site. Additionally, combined, Native American Sites VT-FR-331– VT-FR-333 are one of the few known archeological sites on the upper Missisquoi River. Artifacts at this site are few, and likely indicate a small, short-term hunting camp. Artifacts are likely from Paleoindians (9000-7000 B.C.E.) or middle Woodland peoples (1-1000). This site is currently protected by the 100’ Vermont wetland buffer, and may be eligible for inclusion on the National Register of Historic Places (NRHP). In phase two assessment, protection from river erosion by geotextile fiber was recommended along with seeking inclusion on the NRHP. Because of their importance in understanding the Native American culture of the area, and their uniqueness in the State on the upper Missisquoi River, these archeological sites are considered Historic and Cultural ORVs.

### *Bridges with Historic and Cultural Significance*

**Covered bridges** are a sought-after recreational attraction for people interested in cultural heritage and scenic beauty. Early settlers in the Study area were fortunate to have ample forest and farm land, as well as plentiful running water, to power mills and

transport forest products. The waterways created a separate challenge for overland travel; a growing economy and an abundance of rivers and streams in the area created the need for many bridges. The bridges were built with roofs to shield them from the elements – rain, ice, and lots of snow. Twelve covered bridges were built in the Town of Montgomery alone, all by the same builders – the Jewett brothers. These bridges are so important that Montgomery’s 2010 Town Plan stated a vision for the future of Montgomery was to “maintain and preserve Montgomery’s six covered bridges, for they represent our community’s history and an appreciation of Vermont’s cultural heritage.” By 1940, there were 13 covered bridges in Montgomery. The president of the Montgomery Historical Society, Scott Perry, states that these bridges were often built to provide access to more trees for harvest. Six of these covered bridges are still in use today and one (Hectorville Bridge, from Gibou Road) is currently in off-site storage awaiting repair. These are ORVs of national and regional significance as they represent the most covered bridges within one town in the country. The six Montgomery bridges, as well as the one in Enosburgh and another in Troy, are popular destinations for



**Figure 13.** Comstock Bridge, Montgomery, VT. Photo by Ken Secor

sightseers and bring many tourists to the area. The Hopkins and West Hill Brook covered bridges and swimming holes are important recreational destinations for trout anglers and swimmers. The Hopkins Bridge, Hopkins Bridge Rd., Enosburgh (also a Jewett brothers’ bridge added to the NRHP 1974), is

near the Enosburgh/Montgomery town line. According to Scott Perry from the Montgomery Historical Society the fact that it was also built by Montgomery's Jewett brothers and its closer proximity to downtown Montgomery Village than Enosburgh often lead them to "claim" it for Montgomery. These bridges add to the unique local character and quaint New England Charm of the Study towns. All of these covered bridges were listed on the National Register of Historic Places between November 1974 and December 1974. As such, these bridges are recognized as significant at the community, state, and national level.

### Covered Bridges, Trout River

- Comstock Bridge, Comstock Bridge Rd., Montgomery
- Fuller Bridge, Fuller Bridge Rd., Montgomery
- Hectorville Bridge, Gibou Rd., Montgomery (currently in off-site storage awaiting repair)
- Hopkins Bridge, Hopkins Bridge Rd., Enosburgh (near border with Montgomery)
- Hutchins Bridge, Hutchins Bridge Rd., Montgomery (Crosses the South Branch of the Trout River, a tributary)
- Longley Bridge, Longley Bridge Rd., Montgomery (has been closed temporarily and is bypassed by an additional steel bridge that also crosses the Trout River)
- West Hill (Creamery) Bridge, Creamery Bridge Rd., Montgomery (crosses West Hill Brook, a Trout River tributary)

### Bridges, Missisquoi River

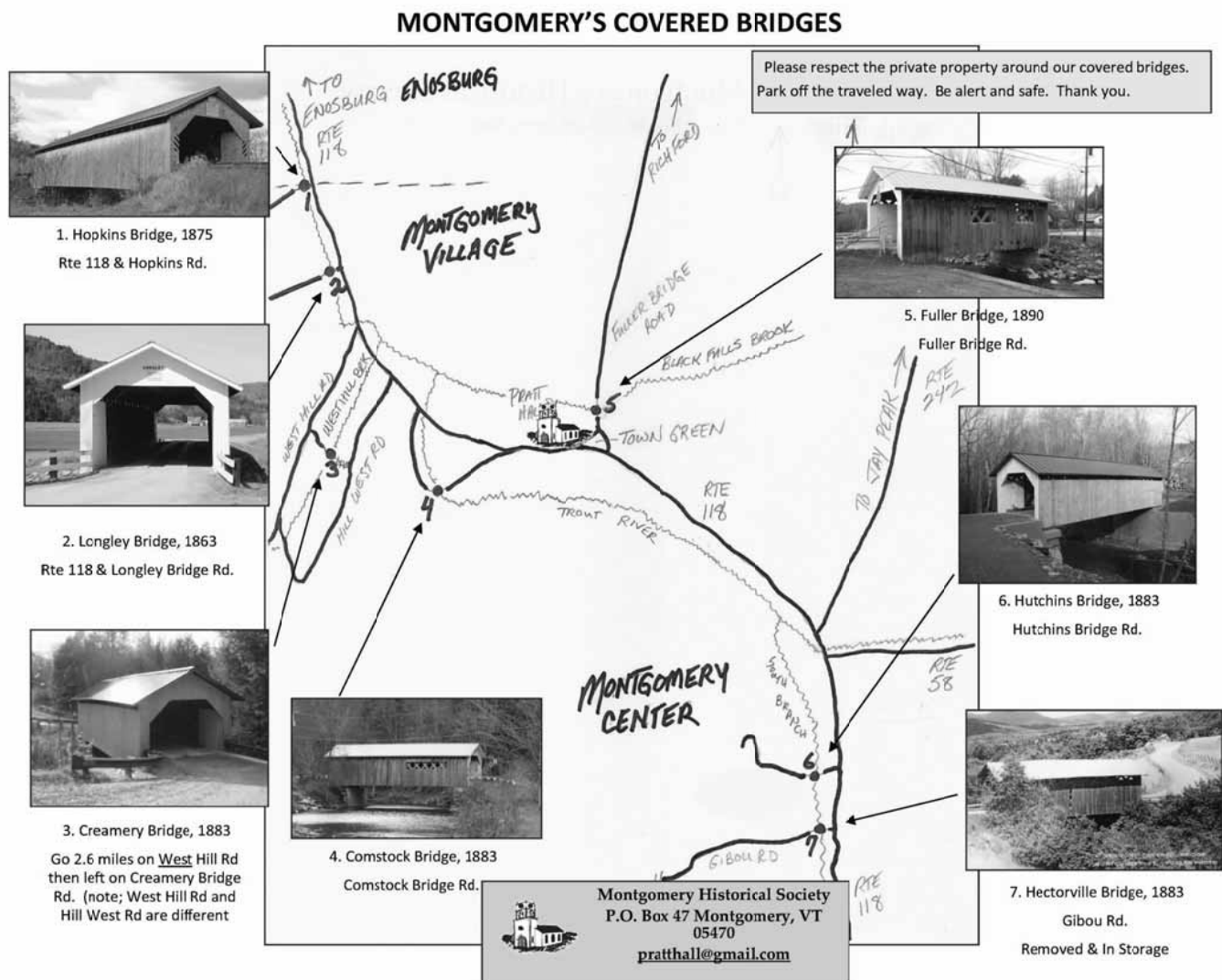
- River Road Covered Bridge (Upper Bridge), River Rd., Troy was added to the NRHP 1974.
- Town Highway Bridge #12 (Boston Post Road, Enosburgh, VT) is an iron bridge over the Missisquoi River that was added in 2007 to the National Register of Historic Places.
- Missisquoi River Bridge at the Canada/VT border crossing on Route 105 between Richford, Vermont and Abercorn, Quebec is on the National Register of Historic Places. It was the first of ten truss bridges spanning the Missisquoi River.

The border crossing bridge on Route 105 is owned jointly by the U.S. and Canada. The communities have cooperated across the international boundary to maintain the bridge. In fact, VTTrans has a project under development with Canada to rehabilitate the old steel truss. They are hoping to begin construction in calendar year 2016.

VTTrans and Regional Planning staff indicate that the covered bridges are municipally owned and maintained. Funding for maintenance or



**Figure 14.** Study Committee members identifying ORVs at a monthly meeting. *Photo by Shana Stewart Deeds*



**Figure 15.** Graphic by the Montgomery Historical Society of the seven Jewett brothers' covered bridges in Montgomery.

rehabilitation needs traditionally comes from local, state and sometimes federal transportation programs. If damage is related to a presidentially declared disaster, the town owning the public infrastructure may apply for help from the Federal Emergency Management Agency's (FEMA) Public Assistance Program. In addition to local maintenance budgets, many (if not all) of the bridges have received some state and federal funding for repairs or rehabilitation. Potential funding sources can include: VTrans Structures Grant, Town Highway Bridge Program, Transportation Alternatives Program (formerly Transportation Enhancement Program) and the

National Historic Covered Bridge Preservation Program. Though the National Historic Covered Bridge Preservation Program was not funded in the last federal transportation bill, Vermont did receive \$850,000 for the Longley Bridge rehabilitation in the previous cycle.

### Classification

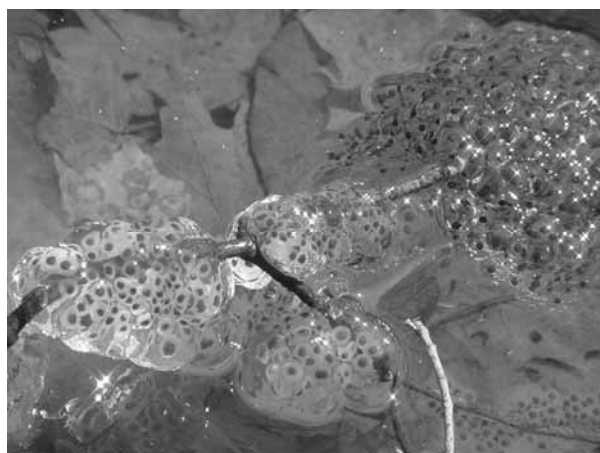
Based on applicable criteria, the National Park Service (NPS) has assigned a preliminary classification of **recreational** to the segments of the upper Missisquoi and Trout Rivers that are eligible for designation. The



NPS and Study Committee, though recognizing that some smaller reaches with possible **scenic** classification exist, concluded that the overall classification that best fits **Segments 1, 2 and 3** is **recreational**. Should further action to designate tributaries (**Segment 4**) take place, an evaluation of the classification of these segments would occur at that time.



**Figure 16.** Students identifying macroinvertebrates during a Bugworks workshop cosponsored with the Study Committee by the Missisquoi River Basin Association. *Photo by Shana Stewart Deeds*



**Figure 17.** Spotted salamander and wood frog eggs in a vernal pool (left). Adult wood frog (right). *Photos by Shana Stewart Deeds.*

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*The free-flowing segments of the upper Missisquoi and Trout Rivers are found eligible for designation based on the presence of multiple Outstandingly Remarkable Values. These segments meet the classification definition of a recreational river area due to the level of human access and alteration.*



**Figure 18.** Cyclists enjoying the Missisquoi Valley Rail Trail. *Photo by David Juaire.*

### ***Additional Resources***

Determining Acceptable Minimal Stream Flows: [www.anr.state.vt.us/dec/waterq/rivers/docs/rv\\_flowprocedure.pdf](http://www.anr.state.vt.us/dec/waterq/rivers/docs/rv_flowprocedure.pdf)

Missisquoi Bay Watershed Planning in the VT Watershed Management Division:

[www.anr.state.vt.us/dec/waterq/planning/htm/pl\\_missisquoi.htm](http://www.anr.state.vt.us/dec/waterq/planning/htm/pl_missisquoi.htm)

User's Guide to Dam Removal in VT: [www.anr.state.vt.us/dec/waterq/rivers/docs/drw\\_usersguide.pdf](http://www.anr.state.vt.us/dec/waterq/rivers/docs/drw_usersguide.pdf)