Vermont Agency of Natural Resources

Watershed Management Division

SOUTH LAKE CHAMPLAIN

TACTICAL BASIN PLAN

East Creek in Orwell (Photograph Credit - Mollie Klepack and Lighthawk)

The Southern Lake Champlain Basin - Water Quality Management Plan was prepared in accordance with 10 VSA § 1253(d), the Vermont Water Quality Standards[1], the Federal Clean Water Act and 40 CFR 130.6, and the Vermont Surface Water Management Strategy.

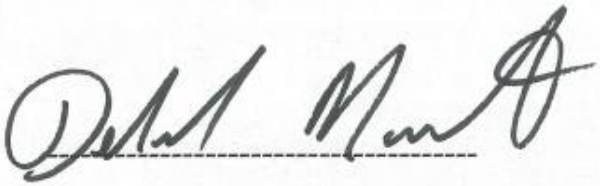
Vermont Surface Water Management Strategy

Approved:

6/20/14

David Mears, Commissioner — Date

Department of Environmental Conservation



6-20-14

Deb Markowitz, Secretary — Date

Agency of Natural Resources

1) Pursuant to Section 1-02 D (5) of the VWQS, Basin Plans shall propose the appropriate Water Management Type of Types for Class B waters based on the existing water quality and reasonably attainable and desired water quality management goals. ANR has not included proposed Water Management Types in this Basin Plan. ANR is in the process of developing an anti-degradation rule in accordance with 10 VSA 1251a (c) and is re-evaluating whether Water Management Typing is the most effective and efficient method of ensuring that quality of Vermont's waters are maintained and enhanced as required by the VWQS, including the anti-degradation policy. Accordingly, this Basin Plan is being issued by ANR with the acknowledgement that it does not meet the requirements of Section 1-02 D (5) of the VWQS.

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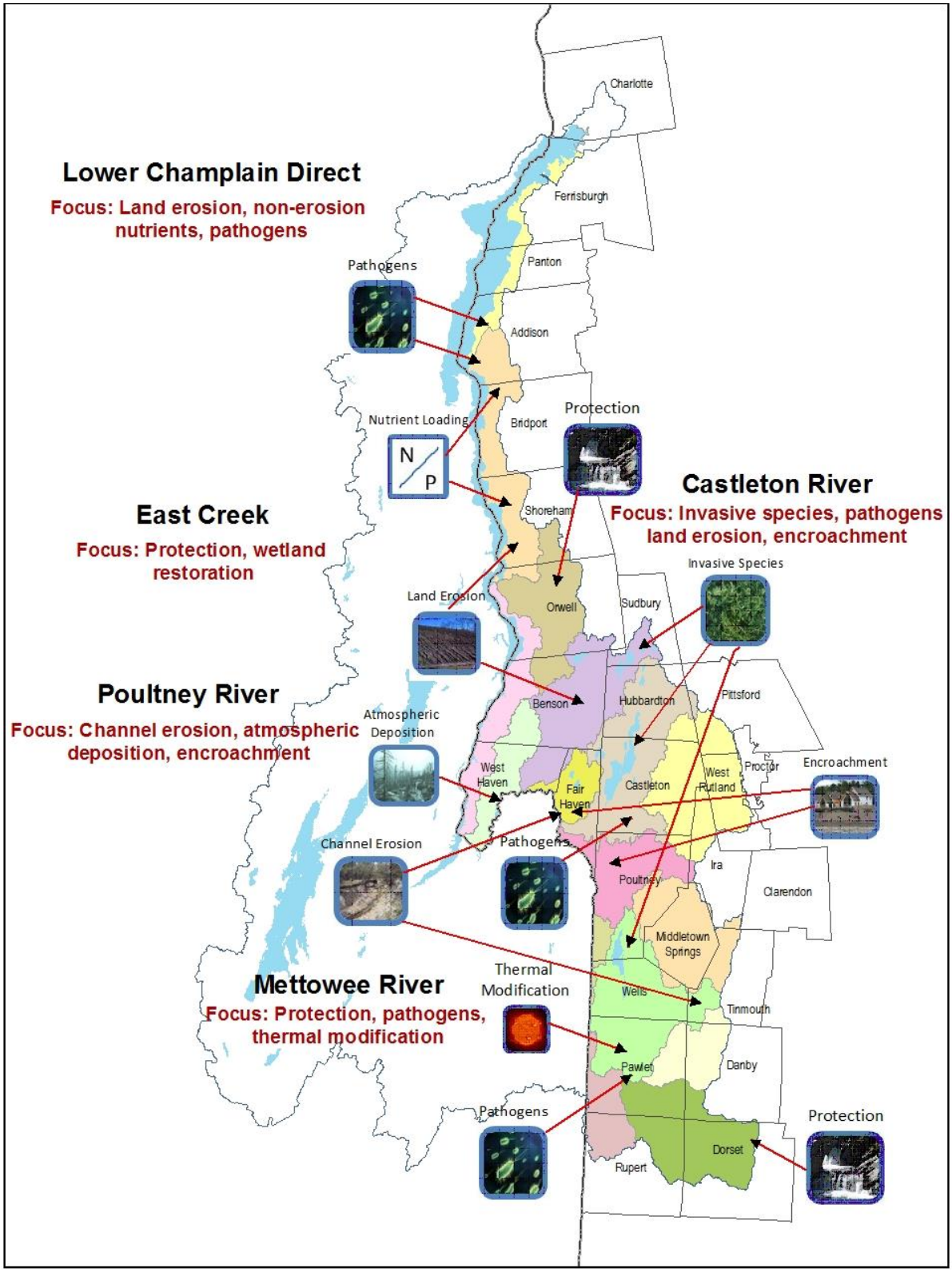
Southern Champlain Basin Tactical Plan Overview



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Southern Lake Champlain Basin with Major Sub - Basins

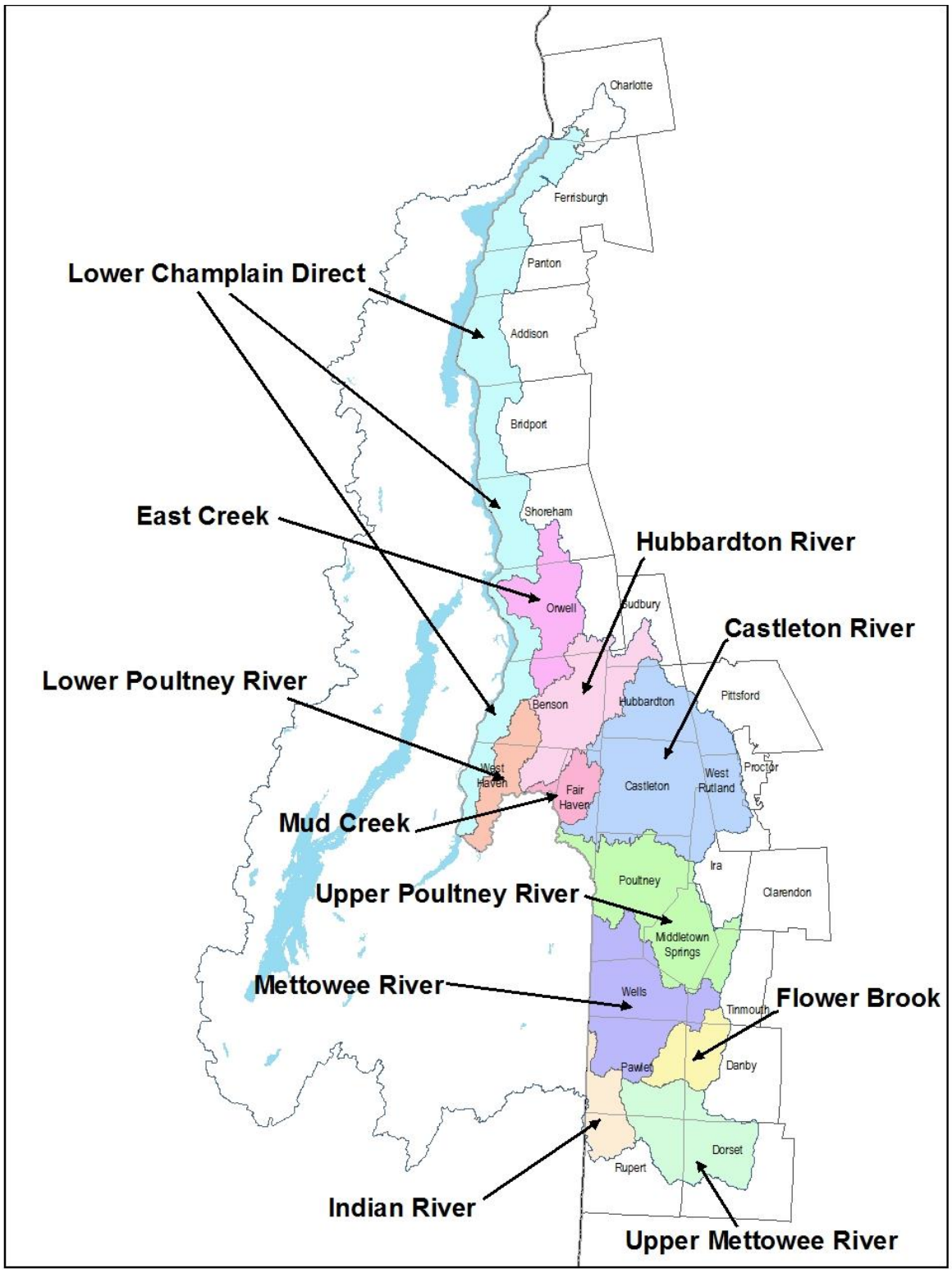


Figure 1. Southern Lake Champlain Watershed Map with Sub-watershed Delineations

Executive Summary

The Southern Lake Champlain Tactical Basin Plan provides an overall view of the health of the basin and defines on-going and future actions to address high-priority stressors (http://www.vtwaterquality.org/wqd_mgtplan/swms_ch1.htm).

High priority stressors in the Southern Champlain Basin include encroachments, channel erosion, invasive species, land erosion, pathogens, thermal stress, and flow alteration.

The Southern Champlain Basin is significant in representing the source waters of South Lake Champlain, as the Lake flows from South to North. The protection and improvement of the South Lake is reflected in the actions identified in this Tactical Basin Plan. However, there are also individual waters with elevated levels of pathogens, flood and erosion hazard risks, sediment and nutrients and basin waterways are a source of phosphorus pollution to Lake Champlain among other issues. The heart of this plan is the implementation table in chapter 4, which includes actions to protect or restore surface waters in the basin. Below are the goals and top priority strategies to complete these actions.

The Tactical Plan actions will protect, maintain, and improve surface waters by managing the activities that result in surface water stressors, and address the attendant pollutants associated with them. The actions will be strategically targeted to those sub-basins (Figure 1) and specific waters where their implementation would achieve the greatest benefit to water quality and aquatic habitat as well as being the most cost effective. In general, the Poultney (specifically the Castleton and Hubbardton drainages), Mettowee River (Flower Brook, Indian River drainages) and East Creek will be targeted for restoration and protection strategies while Lake Champlain direct drainages will be targeted for additional water quality and aquatic habitat monitoring and assessment work. This and all Tactical Basin Plans benefit from biennial implementation table updates. For this South Lake Champlain Tactical Plan, the phosphorus status of south Lake Champlain will be a featured priority in the first biennial review, to implement priority actions of the Lake Champlain "Total Maximum Daily Load" (TMDL) or restoration plan for the Lake.

On August 28, 2011, Tropical Storm Irene struck the central and southern portions of the State with over 10 inches of rain in many locations. The Castleton and Mettowee River Basins sustained flood damage in some areas due to erosion and flood inundation. This damaged or destroyed roads, bridges, culverts, private and public property, and farmland. This Plan will emphasize actions that will assist watershed

residents and towns to remediate Irene's impacts and enhance the flood resilience of the Basin against future flood events.

Top Ten Actions:

The top priority actions in the Southern Champlain Basin Tactical Basin Plan include the following:

- **Determine sources of E. coli and nutrient loads**, especially in the sub-basins such as the Poultney River and Flower Brook, and initiate Illicit Discharge Detection and Elimination (IDDE) and stormwater mapping for the town of Pawlet. See Appendix D for specific actions,
- **Implement high priority agricultural BMP** needs identified through Agricultural Environmental Management assessments, especially on Small Farm Operations (SFO) throughout the basin.
- **Develop and implement stormwater master plans** as well as implement the highest priority stormwater mitigation projects as identified in Basin towns via the (IDDE) projects (towns include Castleton, Fair Haven, and Poultney).
- **Reduce non-point source pollution from gravel roads** by preparing road erosion capital budgets and implementing Best Management Practices (BMPs) in the upper watersheds that address significant sediment sources (target towns include Castleton, Hubbardton, Middletown Springs, Pawlet, Poultney, Rupert, and Wells). See Appendix F.
- **Restore stream equilibrium and support improved aquatic organism passage (AOP) and habitat -** upgrade/replace high priority stream crossings that are geomorphically-compatible and thus can accommodate AOP. Actively restore aquatic habitat within both stream channels and riparian areas (priority sub-basins include Gully Brook (Castleton/ Poultney), Mud Brook (Fair Haven), Flower brook (Danby), Mettowee headwaters (Dorset), Vail Brook (Middletown Springs), Lewis Brook (Poultney).
- **Protect targeted river corridors and wetlands** - protect high priority river corridors and wetlands for sediment attenuation assets, flood resiliency, and aquatic and wildlife habitat, and **Minimize flood plain encroachments** - identify and remove high priority flood plain encroachments and implement projects that connect the active river channel to its flood plain (as identified in river basin corridor plans – Appendix G).
- **Coordinate with towns in the Basin** to update Town Plans and Zoning Regulations to incorporate enabling language for water quality protection and

remediation. Incorporate Low Impact development standards into Town Plans and Zoning Regulations to promote these stormwater mitigation strategies.

- **Map and protect undeveloped lakeshores** for the basin's lakes and ponds.
- **Protect public access to watershed swimming holes, recreational boating, and fishing areas.**
- **Raise awareness of aquatic invasive plants, animals, and pathogens spread prevention in the basin.**

Accompanying this public review draft, the Vermont Agency of Natural Resources has prepared an online mapping tool that allows the reader to identify the locations of many Southern Champlain Basin features, and actions identified in the Implementation Table. This resource is online via this link.

Summary of classification opportunities

Surface water recommended for reclassification to Class A1 (including town(s)):

- Giddings Brook, Hubbardton
- Belgo Brook, Castleton

Water identified as Very High Quality (including rationale):

- Hubbardton River — Excellent macroinvertebrates, very good fish
- Breese Pond Outlet — Excellent macroinvertebrates
- Castleton River — Excellent macroinvertebrates
- Giddings Brook — Excellent macroinvertebrates, very good fish
- Belgo Brook — Excellent macroinvertebrates
- Gully Brook — Excellent macroinvertebrates
- Poultney River — Excellent macroinvertebrates
- Mettowee River — Excellent macroinvertebrates, very good fish
- Flower Brook — Excellent macroinvertebrates

Water recommended for evaluation as prospective Outstanding Resource Waters (ORW):

- No waterbodies in the basin are recommended for ORW designation at this time.

Wetlands recommended for additional assessment to determine potential reclassification to Class 1:

- South Fork of East Creek
- Wards Marsh within the Lower Poultney River floodplain forest

Chapter 1 - Introduction

A. Basin Description

The DEC Poultney Mettowee Basin Assessment Report, 1999 indicates that the Poultney Mettowee River Basin encompasses 373 square miles and the Lower Champlain Direct is approximately 125 square miles totaling 498 square miles in Vermont draining portions of Addison, Bennington, and Rutland Counties. The Southern Champlain Basin and its sub-watersheds are described in detail in Chapter 2.

B. Purpose of the Tactical Plan

Tactical basin plans are developed according to the goals and objectives of the Vermont Surface Water Management Strategy to protect, maintain, enhance, and restore the biological, chemical, and physical integrity, and public use and enjoyment of Vermont's water resources, and to protect public health and safety. The Tactical Planning Process is outlined in Chapter 4 of the Surface Water Management Strategy.

ANR completed a Poultney Mettowee Basin Plan in 2005. That plan contained 91 recommendations to protect and restore water quality and aquatic habitat in the basin. Many of these recommendations have been implemented or are in progress by ANR and its watershed partners. This tactical plan builds upon those original plan recommendations by promoting specific, geographically explicit actions in areas of the basin that have been identified for intervention, using on-the-ground monitoring and assessment data.

C. Watershed Partners

There are several active organizations undertaking watershed monitoring, assessment, protection, restoration, and education and outreach projects in the Southern Champlain Basin. These partners are non-profit, state, and federal organizations working on both private and public lands.

The South Lake (Champlain) Workgroup

Partners in the Poultney and Mettowee River Basins as well as the Lower Champlain Direct drainage have been meeting regularly as the "South Lake Group," (a subset of the Lake Champlain Citizens Advisory Committee) to discuss issues and develop strategies for issues ranging from aquatic invasive species to phosphorus load reductions. Several resolutions regarding the South Lake initiative have been submitted to the Lake Champlain Citizens Advisory Committee for consideration. The group has

expanded to include the entire South Lake (South Lake "A" and "B") and has included partners on the New York side of the Lake as well.

A series of meetings were convened to present an overview of several ANR and AAFM programs and activities that have been implemented in the greater South Lake area in order to inform South Lake Group members of existing resources and assistance. In anticipation of the development of a workplan, meetings provided information on agricultural resource programs, river basin planning, stormwater management, river corridor planning and management, wetlands protection, and better backroads management.

This Tactical Plan provides an inventory of assessment information for the southern Lake Champlain river basins should serve as the foundation for continued refinement of a workplan for the South Lake. The research assessment will provide the South Lake Group with greater focus and direction on priority issues affecting the South Lake.

Other participants in the "South Lake Group" include representatives from The Nature Conservancy (Southern Lake Champlain Valley Chapter), Lake Champlain Committee, Lake Champlain Restoration Association, Lake Bomoseen Association, the Champlain Watershed Improvement Coalition of New York, the Poultney Mettowee NRCD, and DEC Water Quality Division.

The Poultney Mettowee Watershed Partnership (PMWP)

In 2000, the Poultney Mettowee Natural Resource Conservation District in Rutland County, Vermont, and the Washington County Soil and Water Conservation District in New York created the Poultney-Mettowee Watershed Partnership to coordinate projects in these bi-state watersheds.

The Poultney-Mettowee Watershed Partnership is funded by grant monies administered through the Conservation Districts. Past funding sources have included the Lake Champlain Basin Program, Vermont Agency of Natural Resources and the Department of Fish and Wildlife. In addition, many towns within the watershed contribute donations to be used for local assessments and educational programs.

The mission of the Poultney-Mettowee Watershed Partnership is to bring together the efforts of citizens and organizations that share the common vision of conserving, protecting, and enhancing the natural and cultural resources of the watershed.

<u>Partnership Goals:</u>

- To improve water quality.

- To enhance and interpret wildlife populations and habitats and other natural resources.
- Maintain a healthy agricultural-based economy while protecting, restoring, and conserving the soil and water resources of agricultural land.
- To educate youth, educators, adults, residents, and visitors about conservation practices and the environment around them.
- To maintain and enhance agriculture-related activities and nature-based recreational opportunities.

A steering committee, made up of representatives of many different stakeholder groups in the watershed, make recommendations to the Partnership for management priorities and on-the-ground project activities. This group meets once a year to review current research, projects and priorities.

The Nature Conservancy

The Southern Lake Champlain Valley Program is made up of three chapters of The Nature Conservancy - Eastern New York, Adirondack, and Vermont working together to implement the following strategies:

•Restore and protect clayplain forest and riparian systems.

•Advance conservation of and connectivity between the forested systems in the landscape.

•Reduce, prevent and manage establishment of invasive species.

•Advance scientific knowledge that will lead to informed decision-making by the Conservancy and other partners in management strategies.

•Manage Conservancy properties to maintain viable populations, communities and systems, and to ensure a positive experience by those who visit.

•Engage community members in conservation activities.

Poultney Mettowee and Otter Creek Natural Resources Conservation Districts (NRCD) are locally-led and operated organizations that promote and support soil and water conservation. The mission of the District(s) is to "help provide conservation assistance to the people living in the area through education programs and partnerships with federal, state, and local entities involved in natural resources management." Some specific programs include:

- The Cover Crop Incentives Program

- Agricultural Environmental Management Assessments (Appendix E)
- Portable Skidder Bridge Rental Program

Agricultural Resource Specialist (ARS) Program is offered by the Vermont Association of Conservation Districts (www.vacd.org) and is supported by funding from the Vermont Agency of Agriculture, Food, and Markets (VAAFM). Three main services are offered to farmers:

- Accepted Agricultural Practices Assistance (AAPA)
- Agricultural Environmental Management (AEM)
- Farm Well Water Testing (FWWT)

Better Back Roads Program (BBR) provides technical assistance, grant funding, and educational workshops related to transportation infrastructure and water quality. BBR provides funding for municipalities through the Better Back Roads Grants. Grant funding can be used to undertake road erosion inventories and capital budgets and to implement transportation infrastructure best management practices (BMPs) that address road erosion and improve water quality and aquatic habitat.

Vermont Agency of Transportation (VTrans) manages and maintains miles of State highway and stream crossings within the basin including Routes 4A, 22A, 30, 73, 133, 140, and Interstate 4. VTrans provides technical assistance in the form of hydraulic modeling for bridge and culvert replacements and transportation maintenance. VTrans also provides grant funding to basin municipalities including Structures and Transportation Enhancement grants.

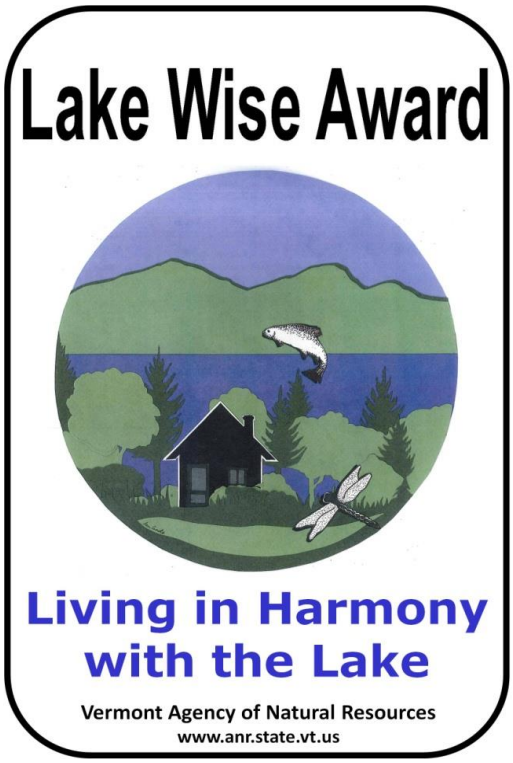
USDA Natural Resources Conservation Service (NRCS) provides cost-share, technical assistance, and targeted support of agricultural best management practices. Additionally, NRCS provides funding and technical assistance for forestry and wildlife habitat projects.

Watershed Municipalities - there are twenty-three towns wholly or partially within the Southern Champlain Basin within the counties of Addison, Bennington, and Rutland (Figure 1.2). Municipalities can protect water resources through town plan language and zoning bylaws. Additionally, towns are responsible for managing large networks of roads, drainage ditches, and stream crossings.

ANR Internal Partners- All Departments within ANR (Fish & Wildlife Department, Forest, Parks, and Recreation, and DEC) and Divisions within them, work collaboratively on a number of watershed assessment, restoration and protection projects. Additionally, FWD and FPR own and manage hundreds of acres of state-

owned lands within the basin. Annual stewardship plans are prepared by District Stewardship Teams and includes staff from FWD, FPR, and DEC. Long Range Management Plans of state-owned properties include restoration and protection of water resources. Some specific watershed restoration projects are described in this plan.

The Vermont Lake Wise Program



The Lake Wise Program is offered through the Vermont Lakes and Ponds Section to provide trainings in lake friendly shoreland management to Lake Associations and shoreland property owners. Through Lake Wise, participants receive technical assistance to evaluate specific landscaping practices for fixing erosion and polluted runoff, while improving lake quality and wildlife habitat.

Lake Wise participants passing all four categories for driveway; structures and septic systems; recreation areas; and shorefront receive the Lake Wise Award, which can include a beautiful Sign that can be proudly displayed on the property. Lake Associations are also awarded the "Gold Award," depending on the percentage of shoreland owners participating in Lake Wise.

The goal of Lake Wise is to improve or maintain water quality and in-lake and on-shore wildlife habitat by encouraging lake friendly landscaping practices.
http://www.vtwaterquality.org/lakes.htm

D. Implementation Process

This Tactical Plan spells out clear, attainable goals and targeted strategies to achieve those goals. The plan contains an Implementation Table (Chapter 4) by which progress can be tracked with regard to measurable indicators of each major goal.

Actions defined in the Implementation Table will be addressed over the life of the Southern Lake Champlain Basin Tactical Basin Plan. Successes and challenges in implementing Actions will be reviewed and addressed in annual meetings with watershed partners. The Tactical Plan will not be a static document. Tropical Storm Irene has taught us that DEC and its partners have to develop adaptive management

techniques as new natural and anthropogenic events present themselves. In addition, the implementation of actions and Implementation table itself will be revisited biennially, and be modified accordingly to best address newly emerging information , unanticipated events, and new requirements such as are anticipated by the Lake Champlain TMDL.

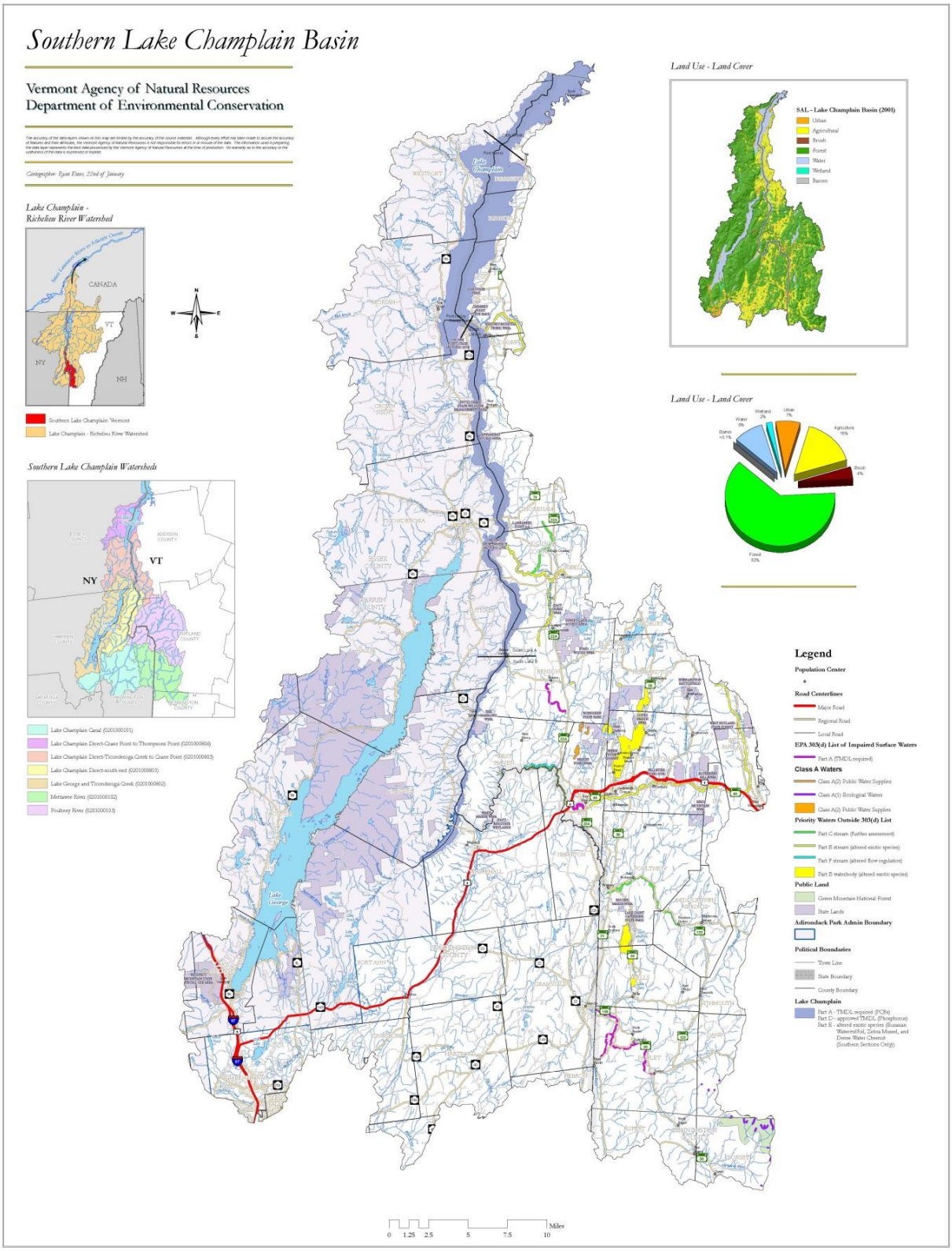


Figure 2. Southern Champlain Basin (in VT and NY) map with municipal delineations.

Chapter 2- Water Quality in the Basin

A. Watershed Description

The Southern Champlain Basin has two major tributaries: the Poultney River with a length of 40 miles and drainage area of 236 square miles; and the Mettowee River with a length of 17 miles and a drainage area of 137 square miles in Vermont. The sub-watersheds for the Poultney River (see Figure 2) include the Castleton River with a length of 20 miles and a drainage area of 99 square miles as well as the Hubbardton River with a length of 17 miles and a drainage area of 45 miles. The sub-watersheds of the Mettowee River (see Figure 3) include Flower Brook with a length of seven miles and a drainage area of 17 square miles as well as Wells Brook with a length of 10 miles and a drainage area of 34 square miles. Within the Lower Champlain Direct drainages (see Figure 4), the most significant sub-watershed is the East Creek, drains an area of 32 square miles and is comprised of two major forks (North and South) as well as several smaller tributaries. In addition, there are approximately a dozen more smaller tributaries with the Lower Champlain Direct drainage, including Braisted Brook, Horton Marsh Brook, Hospital Creek, and Whitney Creek.

The watershed was broken up into four priority sub-watersheds (including the two major tributaries for both the Poultney and Mettowee Rivers) for the purposes of presenting the information on the:

- McKenzie Brook Basin (including Hospital and Whitney Creeks)
- East Creek Basin
- Poultney River Basin
    - Castleton River
    - Hubbardton River
    - Mud Creek
- Mettowee River Basin
    - Flower Brook
    - Indian River
    - Wells Brook

In this plan, the following sub-watersheds are highlighted for specific intervention based on DEC's evaluation of monitoring and assessment data.

The Southern Champlain Basin is significant for providing the source waters of Lake Champlain, as the Lake flows northward into Canada from the South Lake. The Lower Poultney River has been designated as an Outstanding Resource Water (one of four in

the state) due to its exceptional natural, cultural and scenic values, and extensive flood plain forest where it enters southern Lake Champlain. In addition, the fishery in the Poultney River is very diverse; fish surveys have found that two thirds of the fish species in Vermont are found in the Poultney River. The lower Poultney River also supports the most diverse native mussel populations than anywhere else in the state.

The Mettowee River valley is one of the most bucolic areas of the state and is still largely dominated by agricultural activity. The Mettowee (also called the Mettawee) rises in the Taconic Mountain range in Dorset, Vermont and flows northwesterly into New York before entering southern Lake Champlain. The Mettowee River has long been prized for its exception recreational opportunities, including swimming, boating (including whitewater), and fishing due to its exceptional cold-water fishery.

The Southern Champlain valley is often referred to as the "banana belt" because it is low, warm, and comparatively dry. The Champlain Valley is uniquely different from other biophysical regions in Vermont and supports a very diverse assemblage of natural community types.[1] The smaller Lake Champlain direct drainages, such as East, Hospital, and Whitney Creeks, are characterized as small, slow-winder streams that typically occur below the first natural fall line above Lake Champlain.

ANR Natural Resource Atlas – Tactical Basin Planning theme

In December 2012 ANR introduced the **Natural Resource Atlas.** Many of the assessment, monitoring, and other information included in Chapter 2 is now accessible through the Natural Resource Atlas. The purpose of the **Natural Resources Atlas** is to provide geographic information about environmental features and sites that the Vermont Agency of Natural Resources manages, monitors, permits, or regulates. In addition to standard map navigation tools, the Natural Resources Atlas site allows the viewer to link from sites to documents where available, generate reports, export search results, import data, search, measure, mark-up, query map features, and print PDF maps.

The Natural Resource Atlas now includes a Tactical Basin Planning theme, which highlights the major priorities and implementation categories in each watershed planning basin. The Tactical Planning theme shows where in the basin actions will be targeted. Examples include candidate waters for protection and reclassification, high priority waters for nonpoint source mitigation, priority areas identified for aquatic

[1] Thompson, Elizabeth H. and Sorenson, Eric, 2000.Wetland, Woodland, Wildland, A Guide to the NaturalCommunities of Vermont. University Press, Hanover,NH

habitat restoration, opportunities for additional public access to surface waters, and priority waters for additional monitoring and assessment.

B. Sub-basin Descriptions

The older 1999 Basin 2 Water Quality & Aquatic Habitat Assessment Report (VDEC) has been updated with most recently available monitoring and assessment data (2012) to prepare the following sub-watershed specific summaries.

The Poultney River

The Poultney River drains 236 square miles in Vermont (Figure 2) and is 40 miles long within and along the borders of Vermont. It originates in the town of Tinmouth in the valley between Tinmouth and Spoon Mountains. From its source, the Poultney River flows northerly for about four miles and enters the town of Middletown Springs, from which point it flows westerly to its confluence with South Brook 6.7 miles downstream from its origin.

The Lower Poultney River begins at the Poultney – Fair Haven town line and extends 22 miles to a headwater region of Lake Champlain, referred to as "the elbow." From Poultney to U.S. Route 4, the river is a winding scenic corridor with undeveloped shorelands. At twenty-two miles in length, the Lower Poultney River has one of the longest segments of natural stream corridor of any stream in Vermont. Canoeing is excellent in this segment, and provides natural habitat for a diversity of plants and animals.

Carver Falls, the highest major falls in Vermont, contain two falls at the head of a limestone gorge. The falls have been altered by hydropower development since 1894. For 100 years before that date, they were harnessed to drive mill operations. The river above the falls lies in a ravine 100 feet deep. Below the falls, the ravine is 200 feet deep. A cave in a limestone cliff above the ravine is located about one mile below the falls. Indian artifacts have been found in the cave, as well as in the vicinity of Carver Falls, and in a field near Hackadam Road. Sunken boats from the War of 1812 can be seen at certain times of the year at the "Elbow" – an area of the river that turns north toward Lake Champlain. These historical artifacts are on the National Register of Historic Places.

In 1991, the Lower Poultney River Committee successfully petitioned the Water Resources Board to designate the Lower Poultney River as an Outstanding Resource Water due to its exceptional natural, cultural and scenic values. Based on this designation, the Vermont Agency of Natural Resources developed a management plan

for the Lower Poultney River that established the following goal: "For that portion of the Lower Poultney River within Vermont borders, the State will seek to manage certain activities affecting the water quality, flows, course, current, and cross-section of the Lower Poultney River to preserve and enhance the exceptional natural, cultural, scenic, and recreational values of the river and river corridor (refer to uses and values included in Section III of the VANR Management Plan for The Lower Poultney River, A Vermont Outstanding Resource)."

The Castleton River is the largest and most important tributary of the Poultney River, with a length of 20 miles and a drainage area of 99 square miles. The Classification of the Aquatic Communities of Vermont (1998) as well as the Vermont Natural Heritage Report (2002) cites the Castleton River as one of the best examples of a moderately sized mountain stream anywhere in the state. It originates on the southeastern slopes of Biddie Knob in the town of Pittsford. It flows southerly through Whipple Hollow, entering the town of West Rutland and proceeds through a large marsh northwest of West Rutland Village. The Castleton River then turns west and flows into the town of Castleton, where at a point 11 miles from its source, it is joined by North Breton Brook from the north. Several other steep gradient, mountain tributaries, such as Gully Brook, join the Castleton River as it travels from east to west along the Route 4 corridor.

The Castleton River proceeds westerly, passing to the north of Castleton Village and south of Castleton Corners and Hydeville. Downstream four miles from North Breton Brook, it is joined from the north by its principal tributary, the Lake Bomoseen outlet stream. Although the length of this stream is only 0.4 miles, it has a drainage area of about 40 square miles, being the terminus of several brooks draining the many lakes and ponds of this area of Rutland County. Below the Lake Bomoseen outlet brook, the Castleton River flows westerly for the final five miles of its course, entering the town of Fair Haven where it passes through Fair Haven Village and joins the Poultney River.

From its confluence with the Castleton River, the Poultney River flows northerly for three miles into the town of West Haven, to Carver Falls, where it cascades over a total drop of 126 feet. From this point, the Poultney River proceeds westerly for 2.4 miles, where it is joined by the Hubbardton River, which enters from the northeast.

The Hubbardton River has a length of 17 miles and a drainage area of 45 square miles. Flowing generally southerly and southwesterly for its entire course, the Hubbardton River begins at a wetland in the town of Orwell, passes through the town of Benson and into the town of West Haven, to its juncture with the Poultney River. A tributary from Lake Hortonia joins the Hubbardton River in Benson.

The Mettowee River

The Mettowee River has a length of 17 miles within Vermont and has a drainage area within the state of 137 square miles (Figure 3). It originates on the southern slopes of Dorset Mountain near the northern boundary of the Town of Dorset. From its source, the small stream tumbles rapidly down the mountainside, flowing in a southerly direction through Dorset Hollow and westerly onto the valley floor, entering the town of Rupert in East Rupert. In East Rupert, the Mettowee River becomes a slower and more meandering stream. It flows northwesterly through the town of Rupert and into the town of Pawlet. At a point 9.5 miles from its source and adjacent to the village of Pawlet, it is joined by Flower Brook from the east.

Flower Brook is seven miles long and has a drainage area of 19 square miles. This brook begins on the southern slopes of Tinmouth Mountain in the Town of Tinmouth, and flows southerly into the Town of Danby. After passing between Mount Hoag and Dutch Hill, Flower Brook flows southwesterly into the town of Pawlet to its confluence with the Mettowee River. Flower Brook is a flashy stream that has had a history of producing minor flooding (as well as the significant flooding that occurred during Tropical Storm Irene in 2011). Proceeding west then north from Pawlet Village, the Mettowee River forms a wide "S" loop at Butternut Bend and continues under Vermont Route 153. It passes through a rocky gorge and continues to the point where Wells Brook enters from the northeast, 6.9 miles downstream of Flower Brook.

Wells Brook is the largest tributary to the Mettowee River (Figure 4). This brook, generally flashy upstream of Wells Village, begins in the town of Tinmouth on the western slopes of Tinmouth Mountain. It flows southwesterly to the Wells town line, westerly past the village of Wells, and to a point nine miles from its source. Here it is joined by Mill Brook from the northeast. Mill Brook is the outlet brook of the Lake St. Catherine chain of lakes. It is two miles long and has a drainage area of 26.5 square miles. From its confluence with Mill Brook, Wells Brook proceeds southerly into the town of Pawlet, where one mile downstream of Mill Brook, it joins the Mettowee River. Wells Brook has a total length of ten miles and a drainage area (including Mill Brook) of 34 square miles.

Continuing westerly, the Mettowee River enters the State of New York at a point 0.6 mile below Wells Brook, and proceeds to its eventual union with the Champlain Canal south of Whitehall, New York. Another tributary of the Mettowee River within Vermont is the Indian River, which joins the Mettowee at Granville, New York. The Indian River is generally a meandering stream seven miles long in Vermont. It drains 39 square miles of land within the state. This stream begins at the watershed divide just

north of the village of Rupert and proceeds northerly into the town of Pawlet entering New York at West Pawlet Village.

The Mettowee River watershed in Vermont is a little more forested than the Poultney River watershed with 71% of the watershed either deciduous or coniferous forest. The land used for agricultural purposes is about the same –16% of the watershed area. Surface water covers 6% of the Mettowee watershed and wetlands cover 2%. Transportation and other developed land comprise 4%.

The East Creek

Lower East Creek is a slow-moving, nutrient-rich stream that flows into Lake Champlain and serves as host for 800 acres of contiguous wetlands. The creek drains 21,000 acres of surrounding land. East Creek includes a large area of high quality marshland that serves as important habitat for waterfowl and many species of fish. Located near the mouth of the stream, the marsh contains one of the largest stands of narrow-leaved cattail in the state, and is a haven for nesting waterfowl like the American bittern and the common moorhen[2]. At the confluence of the main creek and the north fork, there is a prime example of the floodplain forests that once dominated riparian areas in the Lake Champlain Valley.

The fertile portion of the Champlain Valley drained by East Creek has been farmed since early European settlement. The State sometimes bought good farmland and then swapped with farmers for wetland parcels to create the East Creek Wildlife Management Area in the Towns of Benson and Orwell. There are three dams on the East Creek that are managed to support fish and wildlife habitat, including migratory waterfowl. The Nature Conservancy (TNC) owns much of the remaining wetland in the lower reaches of East Creek. Thus, between TNC and State ownership, much of the East Creek wetland complex has been conserved.

Special Values and Features of Certain Basin 2/4 Surface Waters

Waterfalls, Cascades, Gorges, and Swimming Holes

Poultney River – Deep Rocks, Horses Heaven[3]

[2]http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/vermont/placesweprotect/east-creek-natural-area.xml

[3] Waterfalls, Cascades and Gorges, September 1985. Jerry Jenkins and Peter Zika for the Vermont Agency of Natural Resources, Department of Environmental Conservation, Water Quality Division.

A small gorge, cascades and a swimming hole are located in Lewis Brook in the Town of Poultney. This privately owned site is approximately three miles upstream from the confluence of the brook with the Poultney River, approximately two miles upstream of Cemetery Cedar Swamp.

A deep gorge with a waterfall and cascades at an old mill site in the center of the village of East Poultney has impressive cliffs but is not accessible for swimming.

Just upstream of East Poultney, and continuing for approximately one mile, are a series of gorges, waterfalls, pools and cascades. Two or three of these are accessible for swimming. There is a small cascade, waterfall, and approximately 20-foot deep gorge in an unnamed tributary to the Poultney River just north of the village of East Poultney. A Vermont Youth Conservation Corps Crew spent a day during the summer of 2001 removing garbage from an illegal dumpsite that was sliding down into the gorge.

Directly north of the Delaware and Hudson Railroad crossing in Fair haven, is an interesting geologic area known as the "Slide – swimming flume". This is a rock outcrop in the streambed, which has had recreational use over the years. Several other exceptional geological features are found downstream of the "Slide/swimming flume," including "Ranney's Rocks/Mud Turbidites/Boudinage Structure," "Layered Cliffs," "Poultney River Folds/Deep Sea Fan," "Carver Falls," and "Limestone Cliffs."

Mettowee – Button Falls, Flower Brook gorge

A fishing area is located on Mill Brook in Pawlet, at its juncture with the Mettowee River accessible from the Route 140 Bridge west of Blossoms Corners. Approximately one mile south of this juncture is Button Falls on the Mettowee River in Pawlet. The Jenkins Report describes it as a "wide gorge and superb swimming hole with a falls 15-20 feet high," on the south side of Button Falls Road. On the north side of the road, "there is a narrow limey gorge with some fine swimming pools and very handsome rocks." Jenkins rates it as "State significant", in a part of the state where cascades (i.e., waterfalls) are "rare". He also rates it as "significant for good swimming".

A small gorge and cascade is located on Flower Brook, a tributary to the Mettowee River, in the Village of Pawlet. The gorge is an old mill site, with a dam at the upper end, and is spanned by the village general store. The site is presently operated for hydroelectricity, and a penstock bypasses the gorge.

C. Assessments undertaken in the Southern Champlain Basin

Several types of assessments are conducted to support tactical basin planning. In the Southern Champlain Basin, geomorphic assessments, water quality monitoring, and biological monitoring are ongoing. Agricultural Environmental Management assessments have been conducted in certain sub-watersheds, and Better Back Roads inventories have been undertaken in several towns. Stormwater master planning and Illicit Discharge Detection and Elimination infrastructure mapping has been undertaken or is currently in process.

Table 2. Status of assessments for the Southern Champlain Basin

Sub-Basin	Geo-morphic Assess-ment	Water Quality Monitoring	Bio monitoring (completed / planned)	Agricultural Environmental Management Assessment	Better Backroads/ Road Erosion Inventory	Stormwater master plan or Illicit Discharge Detection
McKenzie		O	O	U	PC	
East Creek	C	O	O	U	PC	
Poultney River	C	O	O	U	PC	PC
Castleton	C	O	O	U	PC	PC
Hubbardton	PC	O	O	U	PC	
Mettowee	PC	O	O	U	PC	X
Flower	PC	O	O	U	PC	X
Wells	X	O	O	U	PC	

X= proposed in plan C= Completed PC= Partial Completed O= On-going U=Underway

Stream Geomorphic Assessments

Stream geomorphic assessments (SGA) provide the basis for stream alteration regulatory decisions, technical assistance for fluvial conflict resolution, stream corridor protection and restoration, flood hazard mitigation and water quality protection. The assessment data is critical to prioritization of riparian and fluvial process-related water quality restoration and protection projects, project design alternatives analyses, and project design criteria. SGA provides insight into the social, economic and ecological interrelationships between people and fluvial systems and as such, it is a valuable educational tool. All of the SGA datasets collected in Vermont are compiled in the Stream Geomorphic Assessment Tool database and related Vermont Online Bridge and Culvert Inventory Tool. These databases are used to ensure that projects are implemented in a manner consistent with and complementary to equilibrium conditions. Much of the Southern Champlain Basin has been subject to SGA at the Phase I or Phase II level (Figure 2), and Corridor Plans have been established for several watersheds, including the Poultney River (and Castleton River sub-basin), Mettowee, and East Creek. A description of geomorphic assessment and river corridor

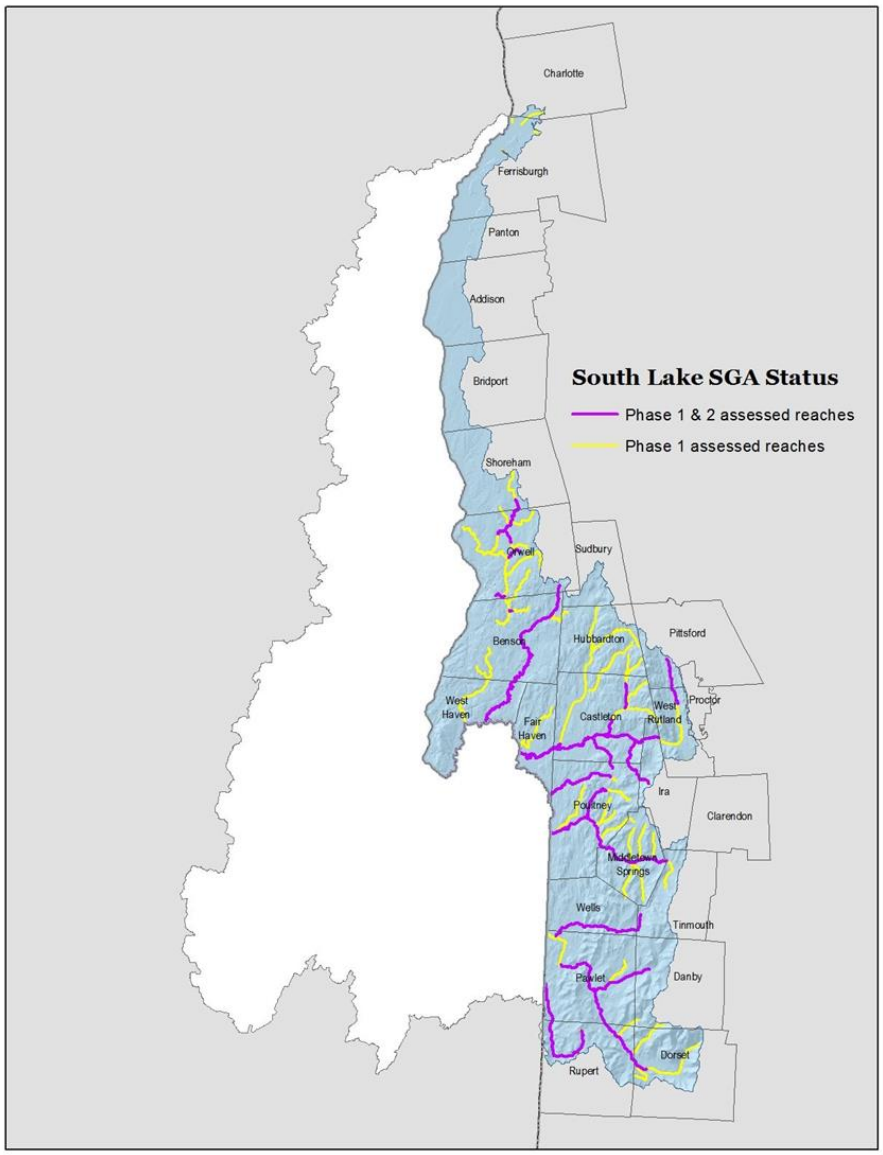


Figure 3. Stream geomorphic assessments conducted in the Southern Champlain Basin through 2013.

management summaries and recommendations from specific sub-watersheds is provided in Appendix G.

Since 2005, Partners in the planning process (RRPC and TNC) have conducted geomorphic assessments on the Castleton, Hubbardton and Mettowee Rivers and many of their tributaries to identify priority stream reaches for protection (with assistance from VTDEC – River Management Program)

Table 3. Stream Geomorphic Assessments in the Basin.

Date	Watershed	Sub-Watershed	Link to report
9/01/2005	Castleton River	Castleton River	Castleton River Phase 1 SGA
9/01/2005	Castleton River	Castleton River	Castleton River Phase 1 SGA
4/01/2007	Castleton River	Castleton River	Castleton River Phase 2 SGA
3/01/2007	Castleton River	Castleton River	Town of Castleton Corridor Plan
9/01/2005	Mettowee	Mettowee River	Mettowee River Phase 1 SGA
11/01/2007	Mettowee	Mettowee River	Mettowee River Phase 2 SGA
12/01/2013	Mettowee	Mettowee and tributaries	Mettowee River Corridor Plan
3/01/2006	Poultney-Hubbardton	Poultney - Hubbardton River	Hubbardton River Debris Project Summary

3/01/2006	Poultney	Poultney - Hubbardton River	Poultney and Hubbardton Alternatives Analysis
12/01/2006	Poultney	Poultney - Hubbardton River	Poultney River Phase 2 SGA and Corridor Plan
8/01/2006	Poultney tributaries	Poultney Tribs	Lewis Brook and Finel Hollow Brook Phase 2 SGA
5/01/2007	Poultney tributaries	Poultney Tribs	Select Poultney tributaries Phase 1 SGA
11/01/2007	Poultney tributaries	Poultney Tribs	Vail Brook Phase 2 SGA
05/25/2011	East Creek	East Creek and tributaries	East Creek Corridor Plan
9/28/2012	East Creek	East Creek and tributaries	East Creek Corridor Plan - Draft Wetland Restoration Addendum

General Fisheries Assessment

There is a wide variety of fish habitats found throughout the Southern Champlain Basin, from warm-water fisheries located in lakes, ponds, and rivers, to cold-water fisheries located in high mountain streams and where temperatures allow in valley surface waters. These fishery habitats range from high velocity riffles with cobble substrate to slow moving pools with sand substrate to seasonally flooded wetlands.

The Southern Champlain Basin is home to a wide diversity of fish species, many of which support popular recreational fisheries. The majority of the small streams within this watershed provide suitable habitat to support naturally reproducing, i.e. "wild"

trout populations, and most of the larger, warmer rivers are stocked with trout to provide fishing opportunities for anglers. Wild populations of native brook trout flourish in the colder, higher elevation streams. Some of the smaller tributaries of the Mettowee River also support naturalized populations of wild rainbow and brown trout. Both species were introduced to Vermont in the late 1800's, rainbow trout from the west coast and brown trout from Europe. These small tributaries are serving as spawning and juvenile rearing habitat for brook, brown, and rainbow trout living in the Champlain Basin.

Trout and other species also move upstream and downstream to meet other habitat needs. These movements may be localized or may involve a number of miles of travel. For example, during warm periods in the summer, trout often migrate to coldwater refuges such as the mouths of tributary streams or to areas of groundwater inflow. Likewise, trout may migrate in the fall to areas providing overwintering habitat.

In addition to stream fisheries, there is a wide diversity of lake and pond angling opportunities in these basins. It is important to note that ponds with wild populations of brook trout that are abundant enough to provide angling opportunities are exceedingly rare in Vermont. While the majority of small, coldwater ponds in Vermont were probably once home to brook trout, the widespread introduction of warmwater fish species have eliminated brook trout from nearly all of these waters.

The maintenance of quality fisheries requires the continued protection and enhancement of aquatic habitat including:

- *Forested riparian areas* - forested buffers along streams, rivers, lakes and ponds are extremely important in maintaining cool water temperatures and stable streambanks and shorelines, filtering pollutants and providing food and shelter for fish and other aquatic populations.
- *Habitat connectivity* – dams and poorly designed culverts can limit the movement of fish and other aquatic populations to critical spawning, feeding and refuge habitats.
- *Natural hydrologic regimes* – regulated stream flows from hydroelectric facilities and water withdrawals can reduce habitat availability and quality in downstream reaches. Lake level fluctuations often affect littoral zone habitats and can negatively affect fish and other aquatic populations.
- *Preventing the introduction of exotic species and pathogens* – A variety of non-native invasive aquatic species and harmful pathogens are present in Vermont or surrounding states. Limiting the spread of these detrimental species will help maintain healthy fisheries.

The following is by no means a comprehensive description of all fisheries in the basin, but rather a summary of fisheries in major waterbodies.

Poultney River – The headwaters are good habitat for Brook and Brown Trout, below the village of Poultney, which lacks spawning and nursery area. Sparse coverage exists for large fish as evidenced by a lack of deep holes or riffle areas. Spawning and nursery areas are very good throughout the upper sections of the Poultney. All tributaries feeding into the Poultney above Fair Haven have excellent Brook and Brown Trout spawning and nursery areas. No species of trout have been stocked since 1972. The fish community of the lower Poultney River holds two thirds of the fish species found in Vermont (note: 1999 Assessment Report notes over 55% of fish species known to Vermont found in the Poultney River). The following list provides a snapshot of fisheries conditions in the Poultney watershed:

• Hubbardton River and Coggman Creek – Supports a warm water fishery.

• Castleton River – Very good brown trout stream. Good spawning and nursery areas throughout the upper sections of the Castleton. The West Rutland Marsh provides good cover for larger trout. The lower reaches support brown trout while the upper reaches support brook trout.

• Sunset Lake – Supports lake and rainbow trout, northern pike and yellow perch.

Mettowee River – The mainstem of the Mettowee River and its tributaries generally support trout (brook, brown, and rainbow). The aquatic habitat and biota closer to the New York border becomes more marginal. The lower section of the river in Vermont runs through long stretches of open agricultural land. This has caused fish kills during periods of extreme high summer temperatures. Temperature data collection and modelling was conducted during the summers of 2000 and 2001 by VTDEC and VT Fish & Wildlife. The Mettowee has been classified as a wild trout stream with a "no-stocking" policy. Fish and Wildlife annual surveys have documented abundant natural reproduction. As of 2001, Vermont Fish & Wildlife has also targeted the Mettowee for special regulations regarding special protected slot limits and protected length limits for fish to be released. The protected size limit for the Mettowee is 10" to 14" with a two fish per day limit, which includes one fish that may be kept above the protected slot size. The following list provides a snapshot of fisheries conditions in the Mettowee watershed:

• Indian River – The Indian River experiences very low flow summers, and becomes a "losing stream" along certain reaches during the summer, meaning that the river bed

runs dry during these conditions. Abundant natural reproduction occurs, so it has been removed from the stocking list.

East Creek – Fish Lower East Creek has a variety of warmwater fish associated with Lake Champlain. This includes largemouth bass, northern pike, channel catfish, yellow and white perch, and black crappie. Upper East Creek contains brown bullhead and smaller species such as the golden and black chin shiner have been found. The lower reaches of East Creek serve as important spawning habitat for several Lake Champlain fishes.

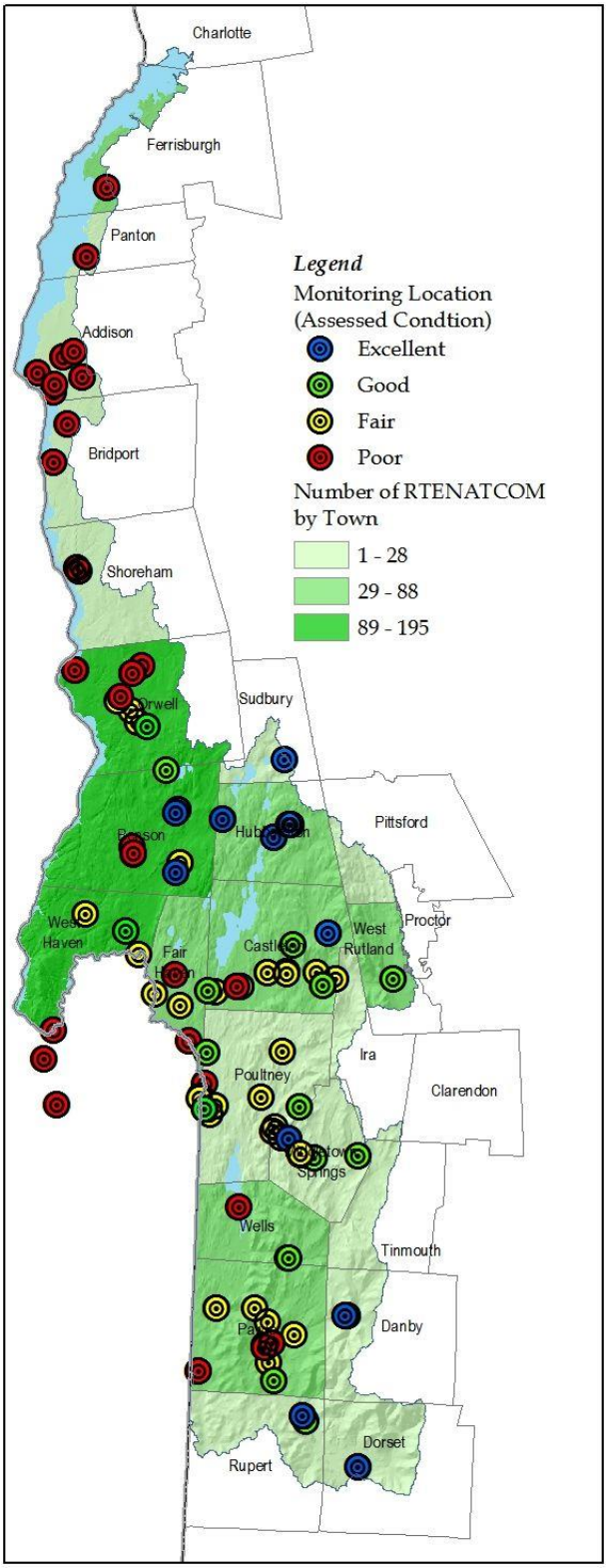
Other Assessments Used to develop the Southern Lake Champlain Tactical Basin Plan

Transportation Infrastructure Assessments:

- Better Backroad Category "A" Road and Culvert Inventories (Fair Haven, Pawlet, Poultney, Benson)
- Class 4 Roads Assessment (Poultney Mettowee NRCD and GMC) – App. F
- Water Quality Mapping and Culvert Assessment (Rutland RPC 604 Project, 2013)
- Bridge and Culvert Inventory and Assessment for AOP and SGA (TNC, 2012)

Land Use by Category:

- Agricultural Environmental Assessments (AEM), ongoing (AAFM, NRCDs)
- Detecting and Eliminating Illicit Discharges in Rutland County to Improve Water Quality, 2014 (Pawlet anticipated during the 2014 field season) – App D.
- Prioritizing Conservation Practices Through Flow Accumulation Modeling of Crop Field Drainage in West-Central Vermont (GMC and USDA-NRCS, 2009)
- VTANR Natural Resource Atlas (Biofinder), TNC Wildlife Corridor mapping



D. Surface waters exhibiting very high quality biological integrity or fisheries.

Biological integrity

There are several sub-watersheds in the Southern Champlain Basin that support very high water quality conditions. VTDEC assesses ecological integrity using biological assessments of macroinvertebrate and fish communities. VT Department of Fish and Wildlife assesses wild trout populations and important nursery areas to document very high quality recreational fisheries, which are typically found in surface waters that exhibit clean and cool conditions. Based on VTDEC's long-term sampling of stream locations in the Southern Champlain Basin, there are several streams that reliably exhibit ecological integrity consistent with very good or excellent conditions, based on these assessments (Table 3). Certain of these surface waters are candidates for reclassification to Class A(1).

Figure 4. Monitoring locations in the Basin reflecting assessed condition by color (sites include biomonitoring and chemical water monitoring locations. Assessed condition depicted as blue = "excellent", green = "good", yellow = "fair", and red = "poor."

Table 4. Basin streams that support exceptional ecological integrity*

Waterbody	Location	Supporting Data
Hubbardton River	Benson (RM* 10.7/ 10.9)	Excellent macroinvertebrates, very good fish
Breese Pond Outlet	Hubbardton (RM 4.7)	Excellent macroinvertebrates
Castleton River	Castleton (RM 8.7)	Excellent macroinvertebrates
Giddings Brook	Hubbardton (RM 1.1)	Excellent macroinvertebrates, very good fish
Belgo Brook	Castleton (RM 1.0)	Excellent macroinvertebrates
Gully Brook	Castleton (RM 0.5)	Excellent macroinvertebrates
Poultney River	Middletown Springs (RM 32.9)	Excellent macroinvertebrates
Mettowee River	North Rupert (RM 32.5)	Excellent macroinvertebrates, very good fish
Flower Brook	Pawlet (RM 0.5)	Excellent macroinvertebrates

*RM = river mile as measured from the mouth upstream

**Note - Biological data indicates a consensus very good or excellent condition by one or both groups of fish and macroinvertebrates. Age of data may range from 1 to 15 years, but as assessment data increases in age, other factors must be present (or compensate) for the designation to be made. These factors include a watershed in which there has been and continues to be relatively little human activity, e.g. National Forest Service lands. Also mitigating older biological assessment data is existing physical and chemical data (including geomorphic condition) that would support VHQ biota.*

Very High Quality Lakes

Best Lakes – Southern Champlain Basin

The Lakes and Ponds Management and Protection Section of DEC recently completed a process to identify high quality lakes in the state to prioritize conservation and protection efforts. Lakes were independently ranked in three separate categories using long-term datasets for water quality, biological diversity and unusual or scenic natural

features. Scores from the separate categories were combined to identify lakes with exemplary qualities in all three.

One pond in the Southern Champlain Basin, Hinkum, is ranked in the top 10% of the ***Best Lakes*** in Vermont, and four ponds are ranked in the top 25% - Perch, Spruce, Half Moon and Inman Ponds. Lake Bomoseen is in the top 5% of all lakes for biodiversity, and Half Moon and Perch were both in the top 20% for water quality. All four ponds as well as Lake Bomoseen were included in ANR's BioFinder Analysis, which means that they were determined to be the best examples of their lake type in Vermont. The **BioFinder** lake types were classified with physical data (trophic status, alkalinity and depth) that are known to influence biological communities. Many Lakes in the basin were ranked for one or more categories in the ***Best Lakes*** analysis, but not high enough to be among the overall highest ranked in the state. These lakes are presented in Table 5.

Table 5. Lakes and ponds in the Basin that exhibit Very High Quality based on DEC's Best Lakes analysis. Best Lakes Scores are presented under "Supporting Data" if lakes were ranked in any of three categories, along with the rank score from 1 (lowest) to 5 (best) in each: WQ - Water Quality, BD – Biological Diversity, USNF – Unusual or Scenic Natural Features.

Lake/pond	Location	Supporting Data
Hinkum Pond	Sudbury/ Hubbardton River headwaters	"Best Lake"- top 10% DEC state ranking: USNF (top 5%)
Perch Pond	Benson/ South Branch East Creek	"Best Lake"- top 20% DEC state ranking: water quality (top 20%)
Spruce Pond	Orwell/ South Branch East Creek	"Best Lake"- top 20% DEC state ranking
Half Moon Pond	Castleton/ Castleton River headwaters	"Best Lake"- top 25% DEC state ranking: water quality (top 20%)
Inman Pond	Fair Haven/ Poultney River	"Best Lake"- top 25% DEC state ranking
Lake Bomoseen	Castleton, Hubbardton/ Castleton River headwaters	"Best Lake"- top 10% DEC state ranking: biodiversity

Very High Quality waters that support recreational fishing

Abundant wild trout populations are defined as supporting multiple age classes of one or more species of wild trout (brook, brown, rainbow trout) at levels generally equal to

or greater than 1,000 fish/mile and/or 20 pounds/acre. It should be recognized that wild trout populations vary widely from year to year and therefore an individual population may sometimes go below or greatly exceed these values in a given year. Other waters that have not been surveyed may also support similar wild trout densities and may be identified in the future. Certain noteworthy streams are also important to support spawning and nursery habitat for the main stem of the White River. Tables 6 and 7, respectively, list streams supporting wild trout populations and nursery tributaries. An updated survey of recreational fishery should be conducted regularly within the basin to update wild trout age classes, species, and quantities.

Table 6. Basin streams supporting Very High Quality significant wild trout populations

Sub-watershed	Streams Surveyed	Description (entire unless otherwise described)
Mettowee River	Mettowee River	Upstream of confluence with Flower Brook
	Wells Brook	
	Flower Brook	
	Sykes Hollow Brook	
	Kirby Hollow Brook	
	Hagar Brook	
	Jenks Brook	
	Dayton Brook	
	Indian River	Upstream of Dry Brook
Poultney River	Poultney River	Upstream of Burnham Hollow
	Drew's Crick	
	South Brook	
	Castleton river	Upstream of confluence with Lake Bomoseen outlet stream

Table 7. Very High Quality spawning and nursery tributaries in the Southern Champlain Basin

Sub-watershed	Streams Surveyed	Description
Poultney River	Lower Poultney	Lower reaches below Carvers Falls
East Creek	Lower East Creek	Lower reaches below fall line

Significant Natural Communities and Rare, Threatened and Endangered Species of the Basin

There are 1106 occurrences of species or natural communities in the Southern Champlain Basin watershed that are considered state significant. Of these 1106 occurrences, 744 are plant species, 274 are animal species, 87 are natural communities, and one is a bat hibernaculum.

Some of the significant natural communities are various unique and interesting wetland communities including Red Maple-Black Ash Seepage Swamp, Northern White Cedar Swamp, Silver Maple-Sensitive Fern Riverine Floodplain Forest, and the Red Maple-Northern White Cedar Swamp among others.

The watershed consists of many natural communities including floodplain forests, oak-hickory forest, rich northern hardwood forest, birch-beech-maple forest, emergent marsh, hardwood-cedar swamp, shrub swamp, calcareous outcrop and talus slope.

Extensive wetland complexes are adjacent to and are interdependent with the Poultney River in Fair Haven and West Haven: Steves Marsh, Blue Hole, Schoolhouse Marsh, Corroscaden Marsh, Billings and Reed Marshes, Coggman Pond and Cemetery Cedar Swamp. Cemetery Cedar Swamp drains to the Poultney in Fair Haven, between Routes 22A and 4. The Vermont Natural Heritage program lists Cemetery Cedar Swamp as one of the largest cedar wetlands in Vermont. It is an example of a forested-swamp type of wetland and adds many species of flora and fauna to that of the river proper.

The Poultney River and East Creek and adjacent floodplain and wetland communities are important for a number of social and ecological reasons including:

- Providing important habitat for migrating waterfowl,
- Filtering out phosphorus and nitrogen, which reduces nutrient and sediment loading to Lake Champlain.
- The ability of these habitats to store of floodwaters and reduce the magnitude of downstream flooding.
- Where unconstrained by existing infrastructure, these floodplains can also provide locations for the natural migration of the Poultney River to support a return towards the equilibrium condition. The Poultney River has been straightened in many locations in the upper watershed (Fields, 2004) and in many places is working to reestablish it natural sinuosity.
- The potential for the restoration of significant areas floodplain forest habitat, which has largely been lost through the conversion of this natural community to

agricultural lands. These habitats support many plant and animal species some of which are rare or uncommon in Vermont.

- Benefits to the aquatic community adjacent to and downstream from floodplain forests from increased shading and improved adjacent aquatic habitat.
- As a migration pathway facilitating for the movement of wildlife between larger habitat blocks.

E. Stressors, and Causes and Sources of Impairment

Stressors and related pollutants

The Vermont Surface Water Management Strategy (VDEC 2012) lays out the goals and objectives of the Watershed Management Division to address pollutants and stressors that affect the designated uses of Vermont surface waters. The strategy discusses the 10 major stressors that are managed to protect and improve surface waters. A stressor is defined as a phenomenon with quantifiable damaging effects on surface waters resulting from the delivery of pollutants to a waterbody, or an increased threat to public health and safety. Stressors result from certain activities on the landscape, although occasionally natural factors result in stressors being present. Managing stressors requires the management of associated activities. When landscape activities are appropriately managed, stressors are reduced or eliminated, resulting in the objectives of the Strategy being achieved, and the goals met. The pictures at the right link to the stressor chapters of the Surface Water Management Strategy that describe in detail the stressor its causes and sources and the Divisions approach to addressing the stressor through monitoring, technical assistance, regulations and funding.

VTDEC uses monitoring and assessment data to assess individual surface waters in relation to Vermont Water Quality Standards and other relevant guidelines (e.g., stream equilibrium standard). The 2011 Assessment and Listing Methodology articulates three categories of surface waters where degradations are noted.

Stressed waters support designated uses, but the water quality and/or aquatic biota/ habitat have been disturbed to some degree by point or by nonpoint sources of human origin and the water may require some attention to maintain or restore its high quality. In some instances, stressed waters may have documented disturbances or impacts and the water needs further assessment to confirm impairment.

Figure 5. List of Stressors

Altered waters are affected by lack of flow, water level or flow fluctuations, modified hydrology, physical channel alterations, documented channel degradation or stream type change is occurring and arises from some human activity, OR where the occurrence of exotic species has had negative impacts on designated uses. The aquatic communities are altered from the expected ecological state.

Impaired waters are those surface waters where there are chemical, physical and/or biological data collected from quality assured and reliable monitoring efforts that reveal 1) an ongoing violation of one or more of the criteria in the Water Quality Standards and 2) that a pollutant of human origin is the most probable cause of the violation. Impaired waters are those that require pollution control efforts under one or more provisions of the Clean Water Act. The most common mechanism to address an impaired water is the development and promulgation of a Total Maximum Daily Load.

Based upon the available monitoring and assessment data, the highest priority stressors for streams in the Southern Champlain Basin are shown by Table 8 and for lakes in Figure 6. The specific pollutants or conditions that cause stress or impairment on the designated uses of surface waters in the Southern Champlain Basin that result from each stressor are shown for streams in Table X8, and for lakes and ponds in Fig 5. Primary pollutants include nutrients (and sediment), temperature, pathogenic bacteria, and invasive species. Mercury deposition from atmospheric sources affects all lakes in the basin, and the lower Poultney River.

Table 8. Major stressors affecting surface waters in the Basin (a complete description of each stressor, including management intervention, is available by hyperlink from each stressor icon). Causes and sources resulting in Impaired (I), Altered (A), or Stressed (S) stream conditions in the Southern Lake Champlain sub-basins along with assessment priority and needs (VDEC 2012a, VDEC 2012b, VDEC 2012c).

Stream segment(s)	Stressor	Source(s)	Mileage (condition)	**Assessment Priority** / Assessment need
Flower Brook	 Pathogens	Illicit discharges, failing septic, agriculture	.5 (I)	**High**/ IDDE planned for 2104
Mettowee River		Illicit discharges, failing septic, agriculture	8.2 (S)	**Medium**/ Further assessment needed
Castleton River		Combined sewer overflows	.5(I)	**Low**/ Adams St pump station needs final effectiveness evaluation
Unnamed tributary to the Hubbardton		Benson WWTF, agriculture,	3(I)	**Medium**/ Further assessment needed for WWTF sources (check

Stream segment(s)	Stressor	Source(s)	Mileage (condition)	**Assessment Priority** / Assessment need
River		wildlife sources Strongs Swamp		303(d) status)
Poultney River (Buxton Hollow downstream to the D&H Rail Trail)		unknown	7.8(S)	**Medium**/ Stretch includes AG land, villages. Natural sources also possible – stressed listing based on *E. coli* sampling.
Gully Brook	 Channel erosion  Land Erosion	Channelization bank erosion, road runoff	.5 (S)	**Low** / Floodplain restoration project completed 2004, additional berm removal 2010
Finel Hollow Brook		Morphological instability	? (S)	**Medium** / Phase 1 and 2 SGA completed
Lewis Brook		Morphological instability, agriculture	? (S)	**Medium** Further assessment needed
Mettowee River		Agriculture, backroad erosion	8.2(S)	**High**/ Phase 2 SGA/ Corridor Plan Completed/ AEM underway
Poultney River		Urban (stormwater), Agriculture, backroad erosion	?	**Low**/ Phase 2 SGA completed/ AEM, BBR assessments needed
Hubbardton River, (from Pleasant Valley road downstream to mouth)		Agricultural runoff, streambank erosion, road erosion	15(S)	**Medium**/ AEM and BBR assessments needed
East Creek (North Fork)		Agriculture	2.2(S)	**Medium**/ AEM, additional water quality monitoring needed
Hospital Creek		Agriculture	3(S)	**High**/ AEM, additional water quality monitoring needed
Whitney Creek		Agriculture	3(S)	**High**/ AEM, additional water quality monitoring needed

Stream segment(s)	Stressor	Source(s)	Mileage (condition)	**Assessment Priority** / Assessment need
All Lake Champlain tributaries	 Non-Erosion Nutrients  Channel erosion  Land Erosion	Developed (stormwater) and agricultural lands, morphological instability, WWTF	Basin-wide	**High /** Phosphorus loading basin-wide. Revised Lake Champlain Phosphorus TMDL Spring 2014
Lower Poultney River	 Atmospheric Deposition  Toxic substances	Long range transport of air pollutants, medical waste incinerators, mercury waste disposal	10.4	**Medium** / Biological Assessment Elevated levels of mercury in fish tissue. TMDL approved December 20, 2007.
Castleton River (below old Fair Haven landfill)		Trash, high pH Fair Haven landfill	.2(S)	**Low/** Monitoring wells do not indicate that leachate is occurring. Landfill needs proper capping.
Tributary to Mettowee River in West Pawlet		Metals (iron & zinc) Pawlet landfill leachate	.2(I)	**Medium**/ Surface water sampling May 2011 still showing high metals number

Stream segment(s)	Stressor	Source(s)	Mileage (condition)	**Assessment Priority** / Assessment need
Mettowee River	 Thermal Modification	Loss of riparian vegetation. Ag land uses, removal of riparian veg, streambank erosion	8.2(S)	**Low** – thermal monitoring and assessment ID highest priority reaches for re-buffering.
Flower Brook		Loss of riparian vegetation		
Castleton River	 Invasive species	EWM - human transport of exotics then spread	(A) Downstream of Lake Bomoseen	
Discrete areas of lower Poultney River		WC - human transport of exotics then spread	(A)	Handpulling ongoing by TNC
East Creek		WC - human transport of exotics then spread	3(A)	Handpulling ongoing by TNC
East Creek (South fork)		EWM - human transport of exotics then spread	2.2(A)	
Whitney Creek		EWM/ WC - human transport of exotics then spread	1(A)	Handpulling ongoing by TNC
Hospital Creek		EWM/ WC - human transport of exotics then spread	.5(A)	
Indian River (below West Pawlet WWTF)	 Non-erosion nutrients	Low D.O. - WWTF	(S)	**High**/ re-assessment prior to permit renewal/ re-licensing
Tributary 7 to Hubbardton River (below Benson WWTF)		Low biological integrity	(S)	**Medium/** re-assessment prior to permit renewal/ re-licensing

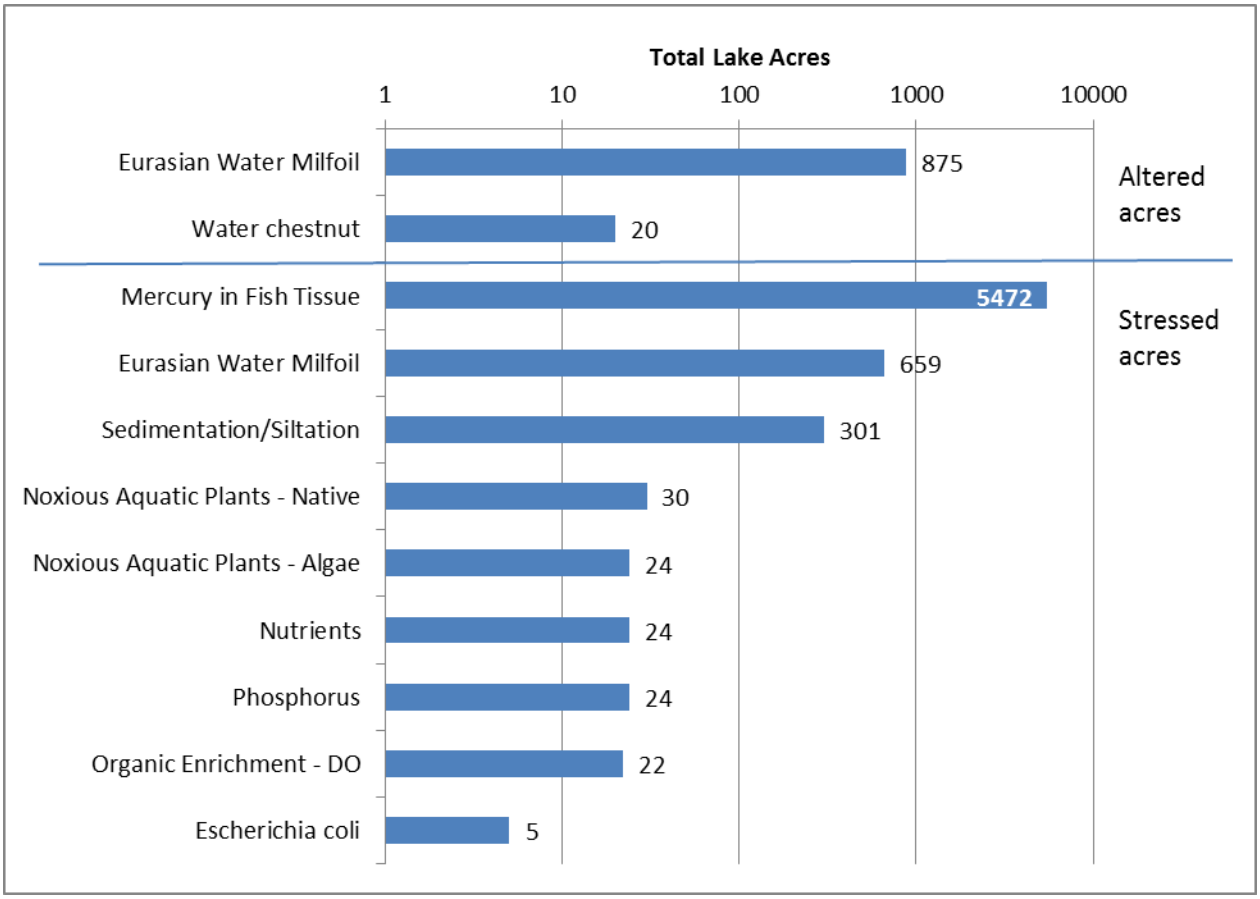


Figure 6. Pollutants or conditions that alter or stress water quality or habitat in Basin lakes and ponds.

***"Altered" in this instance, refers to non-native invasive species present in densities sufficient to alter native biological communities. For example, overall plant density is classified as "moderate," indicating locally abundant (50% or greater coverage) growth, or "heavy," (75% or greater littoral cover overall) indicating growth in most shoreline areas.**

Specific surface waters that are in need of further assessment, and impaired waters in need of a TMDL or other Clean Water Act pollution control effort are shown in Table 8 above and the subwatershed-specific sections of this Plan.

The Lakes Scorecard

There are 31 lakes and ponds over 20 acres in size in the Southern Champlain Basin. Lake and pond water quality and habitat conditions are monitored through numerous study programs including the Spring Phosphorus and Lake Assessment Programs and by the Lay Monitoring Program among others. While many fully support the requirements of the VWQS, most lakes and ponds are affected by atmospheric deposition of pollutants from sources outside of Vermont., and several lakes and ponds exhibit high levels of fish mercury.

This lake-specific information is compiled to create the Vermont Lake Score Card, which has been developed to convey a large amount of data gathered and analyzed through these monitoring efforts. The Score Card rates Vermont lakes in terms of water quality, invasive species, atmospheric deposition, and shoreland condition. Table 9 provides an assessment of individual lakes from the Vermont Lakes Scorecard.

Table 9. Assessment of basin lakes and ponds from the Vermont Lakes Scorecard

Lakes Score Card

	Good Conditions
	Fair Conditions
	Stressed or impaired Conditions
	Unassessed

Mettowee River	**Town**	Shoreland	Invasives	Atmospheric	Water Quality
Lake Saint Catherine	Poultney/ Wells				
Little Lake	Wells				
Lily Pond	Poultney/ Wells				
NE Developers	Wells				
Poultney River	**Town**	Shoreland	Invasives	Atmospheric	Water Quality
Billings Marsh	West Haven				
Coggman Marsh	West Haven				
Root Pond	Benson				
Parsons Mill Pond	Benson				
Perch Pond	Benson				
Sunrise Lake	Benson				
Sunset Lake	Benson				
Doughty Pond	Benson				
Spruce Pond	Orwell				
Johnson Pond	Orwell				
Hough Pond	Sudbury				
Hinkum Pond	Sudbury				
Burr Pond	Sudbury				
Hortonia Lake	Sudbury/ Hubbardton				
Echo Lake	Hubbardton				
Beebe Lake	Hubbardton				
Austin Pond	Hubbardton				
Roach Pond	Hubbardton				
Breese Pond	Hubbardton				
Black Pond	Hubbardton				
Half Moon Pond	Hubbardton				
Glen Lake	Fair Haven/ Benson/ Castleton				
Inman Pond	Fair Haven				
Old Marsh Pond	Fair Haven				
Lake Bomoseen	Castleton/ Hubbardton				
Loves Marsh	Castleton				
Pine Pond	Castleton				

Table 10. Lakes and ponds that are Impaired (I), Altered (A), or Stressed (S) in the Southern Lake Champlain basin, along with current management approach

Lake	Stressor	Management intervention
St. Catherine (S) Lily (Poultney, S) Burr Pond (Sudbury, A) Hortonia (A)	 Invasive species	Eurasian milfoil control employing coordinated chemical, harvesting, and handpulling approaches
Bomoseen (A) Coggman Pond (A) Mill Pond (Benson, A) Beebe (S) Hinkum (S) Little (Wells, S) Parson's Mill Pond (S) Sunrise and Sunset (S) South Lake Champlain		Eurasian milfoil or water chestnut control employing non-chemical, approaches
Black Pond (A) Glen (A)		Limited management
Little (Wells, S)	 Land Erosion	-Experimental aeration-based control of rapid sediment accumulation. -Hydraulic dredging to remove excessive sediment accumulation on W. shore. -Shoreline management planning to mitigate sedimentation from shoreline development.
South Lake Champlain (I)	 Toxic substances (mercury)	Subject to the Northeast Regional Mercury TMDL (approved 2007).

The Importance of Basin Planning in the Face of Tropical Storm Irene

The Southern Lake Champlain river basins experienced flood damage during Tropical Storm Irene in 2011, including localized damage to major roads and bridges along significant sub-basins, especially within the southern portion of the Mettowee River Basin in Bennington and Rutland Counties.

The many opportunities presented by Irene for the enhancement of resiliency are by the limited funding for restoration of these areas. Given the need for protection of critical

flood attenuation assets and new pollution control fixes for non-flood related problems, Basin Planning emerges as a critical prioritization tool for Vermont's restoration and resiliency efforts. In recognition of this, DEC planners and river scientists have engaged in a collaborative process with Regional Planning Commissions to map critical infrastructure damage, and prioritize restoration.

Flower Brook overtopping Route 30, Village of Pawlet, Vermont during Tropical Storm Irene (Photo credit: Many Hulett)

Managing stormwater runoff

Stormwater runoff from developed lands including road network is one of the greatest threats to water quality in Vermont. Stormwater runoff is any form of precipitation that flows over the land during or after a storm event or because of snowmelt. On undeveloped lands, a portion of this runoff is absorbed into the ground through infiltration and the rest takes a slow path to nearby rivers, lakes and ponds. On developed lands, however, infiltration is reduced by impervious surfaces such as roads, rooftops, and driveways. This leads to an increased frequency and intensity of flooding as well as a greater likelihood that runoff will become contaminated with pollutants. The result is increased erosion and property damage, endangered or degraded aquatic

and terrestrial habitats, and threats to public health via recreation sports and contaminated drinking water.

Stormwater runoff management is a major priority within the Southern Champlain Basin because of the chronic nutrient enrichment condition in the South Lake, which is a high priority for restoration and water quality attainment per the Lake Champlain Phosphorus TMDL. While a majority of the urbanized areas of the South Lake exist in New York State (including the communities of Glens Falls, Lake George, and Queensbury), there are urban areas and rural road networks within the Vermont portion of the basin that contribute stormwater runoff. Unmitigated runoff results in channel erosion, land erosion, nutrient loading, and even thermal stress. Although the South Lake Basin in Vermont is predominantly rural, some developed areas do exist (Castleton, Fair Haven, and Poultney, etc.) and are recommended for stormwater master planning to better understand and deal with the effects of stormwater runoff in the basin. Actions listed in Table 12 will address the current data gaps related to stormwater runoff.

Given the history of stormwater issues in other watersheds (Winooski and Otter Creek); it is prudent that the issue be addressed pro-actively. Many of the stormwater issues associated with developed lands can be mitigated and prevented using Low Impact Development (LID) and Green Infrastructure (GI) systems and practices. These emerging concepts strive to manage stormwater and pollutants by restoring and maintaining the natural hydrology of a watershed. Rather than funneling stormwater off site through pipes and infrastructure, these systems focus on infiltration, evapotranspiration, and storage as close to the source as possible. Typical practices include green roofs, rain gardens, cisterns, porous pavements, infiltration planters, buffer zones, and sustainable site design. These practices could go a long way towards preventing future stormwater problems.

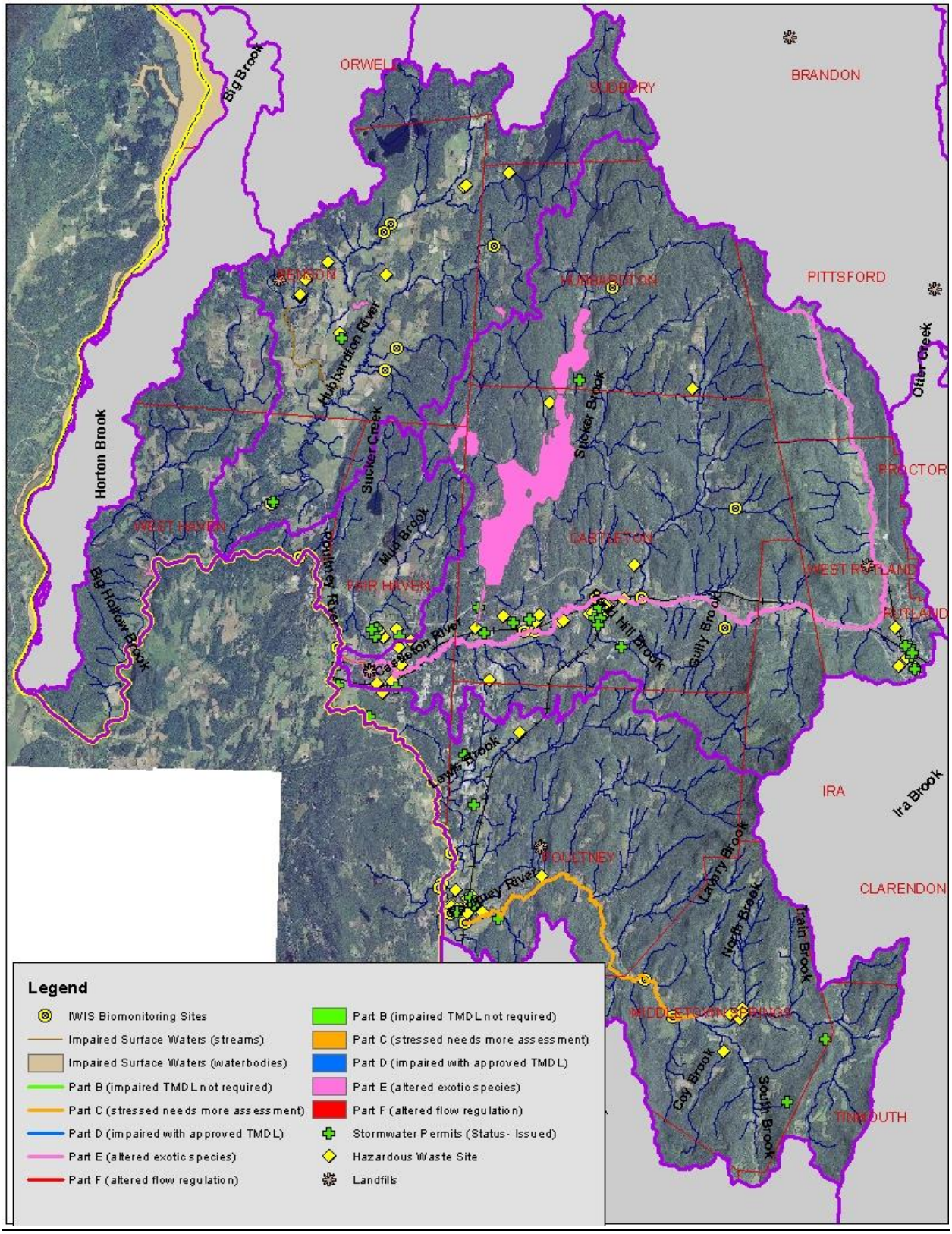


Figure 7. Impaired, altered, or stressed waters on the Vermont Priority Waters List (Poultney River Basin)

F. Direct discharges to surface waters in the Southern Champlain Basin

Overview

There are six municipal wastewater treatment facilities that are subject to NPDES discharge permits in the Southern Champlain Basin (Table 11). All of these facilities are subject to State of Vermont issued NPDES permits.

An overarching consideration for the issuance of discharge permits for wastewater facilities in the South Lake Champlain Basin is the Lake Champlain TMDL for phosphorus. This TMDL is in the final stages of analysis as of this writing, and promulgation of the TMDL is expected in summer, 2014. As of the issuance of this Plan, all facilities are presently operating under administrative continuance of existing permits, which were issued in conformance with the allocations in place under the remanded 2002 Lake Champlain TMDL. The NPDES wastewater discharge permits in place in the South Lake Champlain Basin are shown in Table 11.

As part of a necessary refinement of the facility-specific phosphorus wasteload allocations, WSMD, with assistance from certain municipalities, is conducting an extensive sampling effort to document the current loading conditions for phosphorus, and determine the "reasonable potential" that WWTP's have to cause or contribute to downstream water quality impairment. In addition, the forthcoming Lake Champlain TMDL will present a wasteload allocation for phosphorus loads, to which each facility in the basin will adhere.

Table 11. Southern Lake Champlain Basin Wastewater Treatment Facilities and other Facilities Subject to NPDES Direct Discharge Permits

Facility (permit #)	Permit expiration date	Design Flow MGD	IWC* 7Q10/LMM	CSO^{+} outfalls which do not comply with the Vermont CSO Control Policy	Receiving Water
Fair Haven (3-1307)	9/30/2009	0.5	0.087 / 0.019	1	Castleton River
Pawlet (3-1220)	9/30/2008	0.04	0.072 / 0.021	None	Indian River
Orwell (3-1214)	6/30/2012	0.033	N/A	None	South Fork Of East Creek Impoundment
Poultney (3-1231)	3/31/2010	0.5	0.294 / 0.077	None	Poultney River
Benson (3-1166)	12/31/2011	0.018	0.733 / 0.212	None	Tributary to Hubbardton River

Facility (permit #)	Permit expiration date	Design Flow MGD	IWC* 7Q10/LMM	CSO+ outfalls which do not comply with the Vermont CSO Control Policy	Receiving Water
Castleton (3-1238)	12/31/2008	0.48	0.154 / 0.035	None	Castleton River

* Instream Waste Concentration – or the proportion of river flow at lowest base (7Q10) and low median monthly (LMM) flow attributable to discharge, for the facility design flow. Note that the IWC is specific to the flow of receiving water.

Facility-specific information

Fair Haven

The Fair Haven facility consists of an activated sludge treatment process, chemical addition for phosphorus removal, chlorination for disinfection followed by de-chlorination prior to discharge. Historically, the Adams Street pump station experienced periodic overflows, which affected recreational uses of ½ mile of the Castleton River downstream of the overflow site. These overflows were addressed by upgrades to the system in 2002. As there remains the possibility of overflow, a ½ mile reach of receiving water downstream of the pump station remains listed as impaired for recreational uses due to the possibility of overflow until an Effectiveness Study conducted at the pump station assessing the abatement work confirms compliance with the VT ANR Combined Sewer Overflow Policy.

Pawlet

The Pawlet facility has parallel series septic tanks, aerated equalization tanks, a rotating biological contact chamber, clarification, and ultraviolet disinfection.

Orwell

The Orwell facility consists of an aerated lagoon system with chlorination for disinfection.

Poultney

The Poultney facility consists of sequential batch reactors (SBRs), chemical addition for phosphorus removal, and ultraviolet (UV) disinfection.

Benson

The Benson facility is an aerated lagoon system with chlorination for disinfection followed by decholorination prior to discharge. Biologicla monitoring downstream of the facility

Castleton

The Castleton facility consists of SBRs with chemical addition for phosphorus removal and ultraviolet disinfection.

Town of Castleton municipal sewer service is currently available on the east shore of Lake Bomoseen, including Bomoseen village and extending as far north as the Crystal Beach/ Crystal Haven area. An engineering facilities plan (Aldrich & Elliot, 2013) for the east shore of Lake Bomoseen recommends extension of sewer service to Crystal Heights, an existing suburban style street of about 14 homes. This street is located near Crystal Beach, but higher and further away from the lake, on the east side of Route 30. The facilities plan also addresses the Floating Bridge Road area at the north end of Lake Bomoseen, in Castleton, but it does not recommend sewer extension to that area, because of high cost.

The west shore of Lake Bomoseen currently lacks municipal sewer service. The engineering feasibility study report discusses options for sewer service for the west shore, and does not recommend a municipal sewer extension on the west shore, because of high cost. Municipal sewer service now extends only to Hydeville, at the south end of the lake. The feasibility report also addresses cluster options for decentralized wastewater treatment, but ultimately recommends a "homeowner awareness" (aka "best fit") model, because of shallow ledge, shallow groundwater, setback distances, etc. The Kehoe State Conservation Camp already has an onsite system on the best soils for wastewater treatment on the west shore.

Chapter 3- Management Goals for Surface Waters in the Southern Lake Champlain Basin

The protection or improvement of water quality and water-related uses can be promoted by establishing specific management goals for particular bodies or stretches of water. The management goals describe the values and uses of the surface water that are to be protected or achieved through appropriate management. In Chapter 2 of this plan, a number of waters were identified as being of notable high quality, and these, as well as other unique areas, may be candidates for establishing alternate management goals or augmented protections through one of the processes that are further described below.

- Opportunities for reclassification of waters.
- Identification of existing uses
- Opportunities for designation of Outstanding Resource Waters.
- Classification of wetlands
- Designation of waters as warm and cold water fisheries.

The Agency of Natural Resources is responsible for determining the presence of existing uses on a case by case basis or through basin planning, and is also responsible for classification or other designations. Once the Agency establishes a management goal, the Agency manages state lands and issues permits to achieve all management goals established for the associated surface water. Before the Agency recommends management goals through a classification or designation action, input from the public on any proposal is required and considered. The public may present a proposal for establishing management goals for Agency consideration at any time. When the public develops proposals regarding management goals, the increased community awareness can lead to protection of uses and values by the community and individuals.

Public involvement is an essential component to restoring and protecting river and lake ecology. The Vermont Water Quality Standards state "Public participation shall be sought to identify and inventory problems, solutions, high quality waters, existing uses and significant resources of high public interest." Emphasis on the identification of values and expectations for future water quality conditions can only be achieved through public contributions to the planning process.

A. Class A(1), A(2) and B Waters

Presently in all basins across Vermont, waters above 2,500 feet in elevation are classified A(1) by Vermont statute. In the Southern Lake Champlain Basin, the only A(1) waters include those above 2,500 feet in elevation. The management objective for A(1) waters is to maintain their natural condition. DEC has documented that certain streams have the biological integrity to be so designated. Surface waters currently attaining Class A(1) biological integrity are Belgo and Giddings Brooks in Castleton and Hubbardton.

Surface waters used as public water supplies are classified A(2). The only class A(2) waters in Basin 2/4 that is currently actively used is Inman Pond and its watershed including Sucker Creek.

B. Existing Uses

There are many identified special uses, features, and values of the Southern Champlain Basin and its numerous tributaries including waterfalls, cascades, whitewater boating stretches, and swimming holes. All surface waters in Vermont are managed to support uses valued by the public including swimming, boating, and fishing. The degree of protection afforded to these uses is based on the water's class as described above. In particular surface waters, however, the existence of uses is protected absolutely if the Agency of Natural Resources identifies them as existing uses under the anti-degradation policy of the Vermont Water Quality Standards. Specifically, this means that an existing use may not be eliminated by the issuance of a permit or other action where compliance with the Water Quality Standards is assessed (DEC Anti-degradation Procedure, 2012). The Agency identifies existing uses of particular waters either during the basin planning process or on a case-by-case basis during application reviews for state or federal permits. During the Southern Lake Champlain Basin planning process, DEC has identified:

- The existing use of the waters for swimming;
- The existing use of waters for boating;
- The existing use of the water for water supply, and
- The existing use of water for recreational fishing.

It is DEC's long-standing stipulation that all lakes and ponds in the basin have existing uses of swimming, boating and fishing. During the planning process, DEC has collected sufficient information to identify the existing uses listed in Appendix A. The list is not meant to be exhaustive. The public is encouraged to nominate other existing uses, which may be included in the basin plan or catalogued for a more thorough

investigation when an application is submitted for an activity that might adversely affect the use. The list of Existing Uses is found in Appendix __.

C. Outstanding Resource Waters

In 1987, the Vermont Legislature passed Act 67, "An Act Relating to Establishing a Comprehensive State Rivers Policy." A part of Act 67 provides protection to rivers and streams that have "exceptional natural, cultural, recreational or scenic values" through the designation of Outstanding Resource Waters (ORW). Depending on the values for which designation is sought, ORW designation may protect exceptional waters through the permits for stream alteration, dams, wastewater discharges, aquatic nuisance controls, solid waste disposal, Act 250 projects and other activities.

As indicated in Section 2.B. (above, the lower Poultney River has been designated as an outstanding resource water for natural, cultural and scenic values. At the present time there are no other ORW designations in the Southern Champlain Basin or candidates that were brought forth during the planning process, for this basin plan.

D. Other High Quality Waters

Many of the Southern Champlain Basin's rivers and streams, lakes and ponds, and wetlands currently achieve a very high quality of water and aquatic habitat and are exceptional places to swim, fish, boat, and otherwise enjoy. Some of these are identified in Chapter 2 (above). In addition to protecting and improving water resources by managing stressors, there is the opportunity to protect surface waters by identifying and documenting the very high quality and preserving those conditions or features through various classifications or designations. Several statewide references and reports available to the exceptional ecological quality or recreational uses of Vermont surface waters. A major new resource, the Agency's BioFinder, provides a statewide application identifying surface water and riparian areas with a high contribution to biodiversity.

Class 1 Wetland Designation

It is policy of the State of Vermont to identify and protect significant wetlands and the values and functions they serve in such a manner that the goal of no net loss of such wetlands and their functions is achieved. Based on an evaluation of the extent to which a wetland provides functions and values it is classified at one of three levels:

Class I: Exceptional or irreplaceable in its contribution to Vermont's natural heritage and therefore, merits the highest level of protection

Class II: Merits protection, either taken alone or in conjunction with other wetlands

Class III: Neither a Class I nor Class II wetland

There is currently one Class I wetland in the Southern Champlain Basin. The Dorset Marsh lies at the headwaters of both the Batten Kill and the Mettowee and is one of very few "Class I" wetlands in Vermont. As part of the development of this tactical basin plan, a handful of wetlands that warrant study for Class I potential. These wetlands are also listed below. As part of the implementation of this tactical basin plan, the Department will develop and implement procedures and documents to enable submission, evaluation, and implementation of petitions to classify wetlands as Class I. Those wetlands that satisfy criteria for designation may be proposed for such designation through Departmental rulemaking authority, and as consistent with the Vermont Wetland Rules.

Wetlands in the Southern Champlain basin that warrant further study for Class I potential include the East Creek wetlands in Orwell and Benson (South Branch), and Wards Marsh Complex in West Haven.

Fish Habitat Designations

Warm Water Fish Habitat

All wetlands and the following waters are designated as warm water fish habitat for purposes of the Vermont Water Quality Standards:

- All waters west of Vermont Route 22A
- Austin Pond, Hubbardton
- Beebe Pond, Hubbardton
- Billings Marsh Pond, West Haven
- Burr Pond, Sudbury
- Coggman Pond, West Haven
- Echo Lake (Keeler Pond) Hubbardton/Sudbury
- Half Moon Pond, Hubbardton
- Hinkum Pond, Sudbury
- Lake Hortonia, Hubbardton/Sudbury
- Inman Pond, Fair Haven
- Lily Pond, Poultney
- Little Pond, Wells
- Love's Marsh, Castleton

- Mill Pond (Parson's Mill Pond), Benson
- Northeast Developer's Pond, Wells
- Old Marsh Pond, Fair Haven
- Pine Pond, Castleton
- Poultney River from Carvers Falls in West Haven to its confluence with Lake Champlain
- Sunrise Lake, Benson/Orwell

The WQS specifies a lower minimum dissolved oxygen concentration than waters in the remainder of the basin, which are Cold-Water Habitat.

- No changes to warm water fish habitat designations are proposed at this time.

Cold Water Fish Habitat

All waters not designated as warm water fish habitat above are designated as cold-water fish habitat for the Southern Lake Champlain Basin, as noted in the Vermont Water Quality Standards, 2010. No changes to cold-water fish habitat designations are proposed in this basin plan at this time.

E. Irrigation and Animal Watering

Irrigation and animal watering are considered designated uses under the Vermont water Quality Standards. Designated use means any value or use, whether presently occurring or not, that is specified in the management objectives for each class of water as set forth in sections 3-02(A), 3-03(A), and 3-04(A) of the Water Quality Standards (2012).

Water from the Southern Lake Champlain Basin system is an important resource for agriculture. While all livestock require watering, vegetables, orchards, berries, and nursery stock are also supported by irrigation. In 2007, combined total water withdrawals for animal watering and irrigation accounted for 12% of the total water withdrawals by all uses in Addison and Rutland counties (statewide, agriculture accounted for 2%). The majority of water withdrawals are for public supply, domestic, industrial and thermoelectric uses.

Chapter 4- Watershed Improvement Actions and the Implementation Table

The tactical plan implementation table (Table 12) identifies objectives for the Southern Lake Champlain Basin, and frames-out specific actions to achieve the stated objectives. Action items include both necessary data collection and assessment efforts, and specific implementation activities. It is envisioned that the action items will be accomplished within the next five years. Action items reflect many of the primary goals and objectives identified in the Statewide Surface Water Management Strategy. This implementation table serves to identify high priority implementation actions and tasks that provide opportunities for all stakeholders in surface water management across each major river basin to pursue and secure technical and financial support for implementation. Specific locations for target actions are being mapped coincident with the release of this public review draft, and will be displayed online at this link.

Watershed Projects and Assessments Completed by ANR and/or its Partners during the Planning Process

DEC recognizes that several important projects were completed during the planning process by DEC's watershed partners, either independently or with DEC support. The projects include:

- Mettowee River Corridor Planning and Project Identification completed by the Poultney Mettowee NRCD in winter, 2014.
- Bridge and culvert inventory/ assessment for geomorphic compatibility and aquatic organism passage (AOP) and the prioritization and identification of implementation projects in the Poultney and Mettowee River Watersheds completed by TNC in 2012
- Water Quality Mapping and Culvert Assessment Project for the Southern Lake Champlain Basin completed by the Rutland RPC in 2013.
- Stormwater Management Project, including Hydroseeder purchase and deployment by towns, Raingarden installation, and Class 4 Assessment project completed by PMNRCD in 2012
- Various municipal back road assessments conducted as part of the Category "A" funding through the VT Better Backroads Program, ongoing. Towns include Benson, Pawlet, Poultney, and Wells
- Small Farm Operations (SFOs) Agricultural Environmental Management Assessments, ongoing, completed by VACD-AG Resource Specialists and the Southern Vermont Nutrient Management Program (PMNRCD).

- Riparian buffer plantings scheduled for spring 2014 (VACD Trees for Streams project)
- River corridor protection projects – DEC, VLT, VRC
- Floodplain encroachment removals (Castleton, West Pawlet)
- Post-Irene remediation - home buyouts (Danby)
- Review of municipal floodplain bylaws- towns, RPC's

Project Highlight- Class 3 and 4 Roads Project (Poultney Mettowee NRCD)

The Poultney and Mettowee watersheds contain approximately 271 miles of Class 3 and Class 4 roads, many of which are in close proximity to surface waters and have the potential to affect water quality. Past experience with town road crews indicates a strong willingness to address these issues, but a need for assistance in prioritization based on water quality concerns, because many road issues are managed using other prioritization criteria, such as landowner concerns, cost, and access issues.

For each culvert that passed water from a drainage area of greater than 0.25 square miles, culvert assessment data has been collected and entered into the Vermont Data Management System. The data is currently available through the Vermont DEC Stream Geomorphic Assessment (SGA) DMS interface. The database includes two models that allow for viewing the coarsely-screened aquatic organism passage score and geomorphic compatibility score, making the data extremely useful for ranking future culvert replacement projects in each town. This data is available in an excel file and an ArcGIS shapefile, both of which will be kept on record for each town for future reference. The Aquatic Organism Passage (AOP) and GC screening tools were not available at the time that this grant was written and those scores are not included as part of this report.

Project Highlight- Southern Lake Champlain Basin Hydroseeder Program (Poultney Mettowee NRCD)

The purpose of this project was to purchase a hydroseeder for use by municipalities to address nutrient loading to South Lake Champlain. The goal was to use the hydroseeder along road sides in ditches and swales, and near culverts to reduce and remediate gravel road stormwater runoff and soil erosion in ditches, both of which contribute to non-point source pollution. The District partnered with some of the highway departments of the municipalities in the district to reduce roadside erosion by regrading or creating swales & ditches and seeding them with the hydroseeder to slow the flow of stormwater runoff to reduce erosion and allow nutrients to be absorbed by vegetation. The hydroseeder has made a good impression and based on post project

evaluations, has had a positive effect on reducing stormwater runoff with the evaluation of roads where it was used. The positive feedback from the highway crews will help create a location matrix for future remediation projects.

The hydroseeder provides a quick and easy way to ensure seed coverage of an area that could easily erode, if left unseeded, causing soil particles to enter the stormwater system and then a watercourse that drains into Lake Champlain. Two grants (from the Agency of Natural Resources, Ecosystem Restoration Program and the Lake Champlain Basin Program) covered the purchase cost of the hydroseeder with the operating and loan to municipalities covered by funding received from the Vermont Community Foundation.

During meetings held in 2010, eight of the eleven towns in the Poultney-Mettowee Natural Resources Conservation District (PMNRCD) showed interest and support for the purchase and maintaining a hydroseeder in exchange for the use of the equipment. Before the equipment was purchased, a presentation was given at the Rutland County road commissioners meeting in the spring of 2011and then smaller presentations were given to municipal planning commissions or town supervisors. A road commissioner from Addison County who developed a shared-use hydroseeder program in that county helped to promote the use of equipment. In July 2011, the PMNRCD came to an agreement and purchased an Easy Lawn HDL90 through a VDEC Ecosystem Restoration Grant. The hydroseeder has been used by several towns to stabilize ditches and raw slopes throughout the basin since its acquisition.

The Town of Pawlet road crew using the hydroseeder to seed newly ditched roadway in Pawlet.

The Tactical Plan Implementation Table

Table 12 below is organized in five columns, the first of which describes the action, the second lists the partners that will be implementing the actions, the third includes the potential funding sources, the fourth column identifies primary partners, and the fifth column includes the status and/or target location for the action to be completed. All actions identified here are considered high priority recommendations and every effort will be made to implement these actions within five years following the approval of this plan. That said, unforeseen events such as landowner unwillingness to move forward, lack of funding, or changes on the ground may prohibit the implementation of certain actions. Other actions will likely develop after the initial distribution of the plan and may be addressed within the same time period or in future updates to this plan.

The implementation of these strategies and actions through this basin plan is expected to meet the goals and corresponding objectives identified through the Southern Lake Champlain basin planning process, the Poultney Mettowee and Otter Creek NRCDs, the Addison and Rutland RPCs, The Nature Conservancy and other stakeholder organizations and agencies, lake associations, municipalities, watershed residents, and landowners.

Implementation Table - Restoration, Protection and Assessment and Monitoring Actions – all Actions are scheduled to be implemented from 2014-2019

Objective # 1 – Develop a framework for identifying, prioritizing, and remediating critical source areas

#	Strategy - Action	Tasks	Geographic Area	Partners	Status/ Timeline
1	ID gaps in data and sub-basins (tribs) to target for enhanced water quality monitoring and assessment	Coordinate with BASS, PMNRCD, OCNRCD, Middlebury College, and ACRWC to ID gaps and supplement water quality monitoring & assessment	Target area: Lower Champlain Direct tribs (esp. WWLG), Mettowee (AG NPS), and water in need of assessment (303(d) – Part "C" List)	VDEC (BASS), PMNRCD (SVNMP), OCNRCD, ACRWC	**Ongoing**
2	Expand water quality monitoring and assessment Priority (1) waterways include Basin 4 tributaries: (2) Ongoing monitoring and assessment of priority tributaries	Revise and implement sampling plan	Stoney Brook, Braisted Brook, East Creek, Hospital, Whitney Creeks	VT DEC LaRosa Lab Analytical Services And partners in monitoring	Underway – third year of monitoring *2013 focus – Braisted Brook and Stony Brook (Shoreham)
3	ID critical source areas and development of protocol for assessment and ranking for project implementation.	Using remote sensing, water quality monitoring data, and other indicators (i.e., SWAT modeling)	Lower Champlain Direct tribs, Poultney, Mettowee River Basins	VDEC, VAAFM, NRCS, EPA, GMC	Cross reference with revised Lake Champlain Phosphorus TMDL Implementation Plan - SWAT modeling, LiDAR, and Flow Accumulation mapping (NRCS). See VDEC Draft 2014 Phase I Champlain TMDL Implementaiton Plan, Chapter V. Also, a CSA "lite" project completed for PM Basin in 2012 by GMC. Groundtruth GMC GIS-CSA project
4	Perform geospatial (GIS) analysis and mapping to evaluate the frequency and location of specific combinations of landscape	Once mapping is completed, groundtruth for field level verification	Target: Lower Champlain Direct tribs, Mettowee and Hubbardton River Basins	PMNRCD/ GMC/ RRPC	CSA "lite" project completed for PM Basin in 2012 (PMNRCD received grant from Clean & Clear Program)

#	Strategy - Action	Tasks	Geographic Area	Partners	Status/ Timeline
	features (e.g., slope, soil type, cropping system), similar to the *Missisquoi Areawide Plan*				
5	Continue efforts to coordinate with NY (CWICNY, DEC, Lake George Ass'n) Include PMWP → SL partnership to share data and enhance assessment condition of basin surface waters	Coordinate with CWICNY to model and pilot NY SWCD AG BMP approaches in VT	Target: Lower Champlain Direct tribs, Mettowee and Hubbardton River Basins	SVNMP (PMNRCD), OCNRCD, CWICNY, NYDEC, VDEC, VAAFM Also – SVNMP coordinates with Wash. Co. SWCD	Develop opportunities for bi-state collaboration of resources and programs (.e.g. VT AAFM to pilot AEM) VAAFM now using AEM assessment tool
6	Pilot a protocol for the identification and management BMPs for ditches versus streams Provide outreach…	1. Schedule a training workshop	Lower Champlain Direct, Hubbardton	VTANR (RMP staff) and VAAFM	Use of field seasonal workshops will be promoted to educate resource professionals regarding issue

Objective # 2 – Reduce the non-point source pollutant load that is being generated by runoff from developed lands

Stressors addressed → Land erosion (nutrients), Pathogens, Encroachment, Channel Erosion, CEC, and Thermal Modification

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
7	Survey existing infrastructure in village centers to identify and prioritize retrofit opportunities; IDDE surveying of stormwater outfalls – Castleton, Fair Haven, and Poultney (VT) and Whitehall, Ticonderoga, Fort Ann, Lake George (NY)	- IDDE mapping of towns - Meet with towns on recommendations - Determine highest priority needs, pursue grant funding for project implementation	ERP, EPA 319	VDEC, Basin towns - Castleton, Fair Haven, Pawlet, and Poultney (VT) and Whitehall, Ticonderoga, Fort Ann, Lake George (NY)	IDDE Mapping/ surveying completed for Castleton, Fair Haven, and Poultney (Spring 2013) – See Appendix D. Coordinate with ERP – stormwater program to follow through with towns (VT) Pawlet is priority for 2014 IDDE Mapping/ surveying
8	Map and analyze impervious areas (e.g., roofs, roads,	Towns include: – Castleton, Fair Haven,	EPA 604(b)	RRPC, LCLGRPB	LiDAR data collection is necessary first step

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	sidewalks) and drainage patterns in village centers -	and Poultney (VT) and Whitehall, Ticonderoga, Fort Ann, Lake George (NY)			Underway (anticipated in Fall, 2014)
9	Provide incentives to municipalities and developers that would increase the amount of SGI/ LID practices that could be applied to existing (retrofit) and future impervious areas	- Target ERP funding for Castleton, Fair Haven, Poultney LID projects - Target stormwater tradeshows for E&O	ERP-GSI LCBP – LIG grants EPA 319/ 604(b)	Towns via pass-through funding	CWICNY stormwater tradeshow ongoing Aligned with phase 1 TMDL plan.
10	Implement high-profile demonstration projects that showcase non-traditional stormwater treatment practices	- Outreach with towns to determine interest and feasibility. - ID high profile demonstration projects for implementation (esp. as ID'ed in SWMP)	LCBP – E&O grants EPA 319 VT Watershed Grants	VDEC, PMNRCD, OCNRCD, towns, CWICNY	Develop stormwater demonstration projects Implemented for the Towns of Benson, Castleton, and Poultney in VT. MS4 Towns in NY include Queensbury. Priority towns include Fair Haven and Middletown Springs
11	Develop outreach materials/ model ordinances for towns to use when: - reviewing building permit applications - For municipal development projects that do not fall under state (VDEC) stormwater jurisdiction	- Coordinate with RPC's - Apply for grant funding - develop a protocol related to obtaining a stormwater permit (construction and operational) on all municipal building and zoning permit applications - Develop a "lake-friendly" certification for new homes and development	LCBP E&O grants EPA 604(b)	Addison/ Rutland RPC LCLGRPB VLCT VDEC Lakes and Ponds Division	Support RPC efforts to pursue a 604(b) (or other grant opportunities) to develop educational materials
12	Distribute educational materials for towns/ landowners interested	Design outreach campaign (showcase LID practices	VT Watershed grants LCBP- E&O grants	VLCT, RPC's PMNRCD/ OCNRCD	Implement collaborative outreach program with VLCT,

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	in using low-impact development practices	installed throughout basin)		UVM Sea Grant	RPC's, UVM Sea Grant (ACRPC developed LID outreach materials in 2009)
13	Develop and install at least four "green street" linear rain gardens and bio-retention swales within the public ROW (between the road and the sidewalk) in town centers (target Fair Haven).	Coordinate with UVM-Sea Grant to gage interest with towns in supporting Southern Lake pilot, akin to on-going effort in St Albans Bay	ERP EPA 319 LCBP – LIG VT Watershed Grants	VDEC, Lake Champlain Sea Grant, PMNRCD, towns	Partnership with UVM Sea Grant underway Target towns: Castleton, Fair Haven, Poultney
14	Develop a program for "Green Towns" and/or "Green Villages" and seek LEED certification for municipal stormwater utilities/ facilities	- Research GI strategies/ projects completed in VT - Pursue funding for demonstration project in the Basin (based on IDDE mapping)	ERP (Stormwater SGI) 604(b)	VDEC stormwater program RPC's/ towns EPA	

Objective # 3 - Reduce Non-Point Source Pollution from Agricultural Operations

Stressors addressed → Land erosion (nutrients), Pathogens, Encroachment, Channel Erosion, and Thermal Modification

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
15	Complete AEM assessments on SFOs (LFO – every year/ MFO – every 3 years is standard). Determine sources of *E. coli* and nutrient loads, especially in the sub-tributaries, and implement high priority agricultural BMP needs identified through Agricultural Environmental Management assessments	- Complete assessments/ inspections - Seek funding for highest priority BMP needs *Results of ARS's assessment work - % of SFO farms assessed	AAFM BMP fund ERP – VACD grant for additional AEM assessment work/ SFO BMP implementation	VTAAFM, VDEC, NRCS, VAAFM, VACD, PMNRCD (SVNMP), UVM Extension	Ongoing AEM approach now widely used – target Basin SFO's for 2014
16	Continue surveying small farms in the South Lake draining basin to	- Tier 1 assessment for 18 farms in the South Lake	ERP – VACD grant for additional ARS positions/	District ARS staff NRCS – LTPs, etc	Renewed focus of VAAFM, VACD (ARS)

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	identify conservation needs	- Tier 2 assessment for 6 farms in the South Lake - Completed AG section of So. Champ. TBP	SFO BMP implementation	ARS/ NRCD's	**Underway** * esp. Lower Champlain Direct, Mettowee Valley
17	Increase participation in and access to state and federal cost-share programs to implement high priority best management plans. Maintain AG technical resource funding to continue funding for critical staff positions	- Maintain staff available to provide one-on-one assistance to farmers about program and individual needs - Ensure adequate program promotional materials is available to technical staff and partners - Fund highest priority BMP projects	NRCS cost share programs, VAAFM BMP fund, ERP Need: Sustainable funding for ARS's, agronomists	NRCS, VTAAFM, NRCD's, SVNMP, UVM Extension	Ongoing *Funding needed for continuation of staff positions – half of resource staff funding expires in 2014
18	Increase implementation of on-farm BMPs and nutrient management practices where AEM assessments have identified high priority resource concerns and appropriate BMPs	- Maintain (sustain) staff available to provide one-on-one assistance to farmers about program and individual needs by securing funding for 1 additional agronomist for the South Lake. - Provide on-farm demonstrations of new aerator equipment on 4 farms in the South Lake region. - Hold ongoing farmer meetings with	VAAFM, NRCS, UVM – Extension, LCBP, VACD, SVNMP (PMNRCD) – funding secured (ERP)	VTAAFM, VACD (SVNMP) UVM – Extension, NRCS District ARS staff, LTP's	4 demonstrations by spring 2014 - Use of no-till drill - Demo of aerways equipment NRCS, UVM – Extension – tracks participation in classes/ workshops

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
		representatives of agencies and organizations about various program opportunities for farmers (FAP, BMP, NRCS Farm bill programs, SVNMP). - Increase nutrient management planning (testing and plan completion) on a minimum of 15 farms			

Objective # 4 – Implement erosion control practices on annual cropland emphasizing nutrient management and riparian buffers

Stressors addressed → Land erosion (nutrients), Pathogens, Encroachment, Channel Erosion, and Thermal Modification

	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
19	Facilitate use of strategies for alternative liquid manure application, crop residue and tillage management	- Increase participation in NRCS CSA program - Identify lands that could benefit from cover cropping and alternative nutrient management practices through remote sensing (GIS-CSA) - Use FAP program and other resources to increase use of cover cropping through staff and new agronomist position - Promote VT Ag Buffer Program and increase application along ditches on	NRCS, VAAFM, UVM-Extension, LCBP, Great Lakes Initiative	VTAAFM, NRCS, UVM-Extension, VACD (SVNMP), District ARS staff	**Underway** *Target Lower Champlain Direct tribs/ Mettowee River Valley

	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
		annual cropland - Hold farmer meetings with representatives of agencies and organizations about various program opportunities for farmers (FAP, BMP, NRCS Farm bill programs, SVNMP) - Pursue shared use of spreading equip? - Tech program to repair broken equipment?			
20	Determine base acreage used for various land use and evaluate NMP need.	- Complete mapping project (GIS) to evaluate land use (where acreage has NMPs or not) - Use VAAFM NMP to help fund NMP development - Work with VAAFM and NRCS to determine NMP gaps - ID high priority NMP needs (Need "NMP lite" for small farms)	VAAFM-NMP Program, NRCS, UVM-Extension	VDEC, VAAFM, District ARS staff, VACD, NRCS, SVNMP	Ongoing Focus on priority sub-basins: Lower Champlain Direct (Hospital, Whitney Creeks), Hubbardton, Flower brook
21	Identify lands that could benefit from cover cropping and utilize the FAP program along with additional resources to implement large-scale cover cropping in basin.	Funding has been allocated for all fall cover cropping by the Agency of Agriculture.	LCBP aerial seeding grant proposal to target the South Lake	VAAFM, UVM-Extension, SVNMP, LCBP	Farmers send in applications for cover cropping. New applications will be available on the VAAFM website beginning July 1 each year.
22	Promote the Vermont Agricultural Buffer Program	Plan for spring 2014 implementation	CREP/VABP funds from Capital Funds VAAFM	VAAFM, VACD-ARS, LTP, SVNMP, UVM-Extension	VAAFM does not have staff devoted to this program for

	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	(VABP) to get 10' minimum buffers along all ditches on annual cropland CREP – "*lite*"			*NRCS staff will now do CREP Assessments as part of EQIP program*	planning purposes, yet they do have program administrative staff that can provide some limited tech assistance. ↑CREP in the South Lake Basin has occurred especially in the East Creek Basin.
23	Determine base acreage utilized for annual, perennial and pasture land in the Basin and then figure out the need for NMP development on farms. Utilize the VAAFM NMP program to help farmers with the financial portion of NMP development.	- Run that list by VAAFM NMP staff to identify those that do not have a state funded NMP. - Take this list to NRCS for same review.	Funding may be limited in 2013; however showing need for 2014 funds is equally as important.	VAAFM, VACD-ARS, LTP, SVNMP, UVM-Extension	ARS - Basin Planners work together to figure out the base acreage Basin-wide. Aerator project funded for South Lake. **No till drill funded – UVM-Ext. 2011-2012**

Objective # 5 – Protect river corridors, lakes, wetlands and undeveloped floodplains

Stressors addressed → Land erosion (nutrients), Pathogens, Encroachment, Channel Erosion, and Thermal Modification

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
24	Perform a riparian buffer gap analysis and determine goals for the watershed.	- Work with agencies to set goals by reviewing results of project. - Review SGA and lakes shoreland condition to inform priorities	EPA 604(b), VDEC RMP – Phase 2 SGA	PMNRCD, NRCS, FSA, VAAFM, VDEC RMP	Some high priority areas identified as part of the SVNMP mapping project for farms in the Poultney Mettowee Basin
25	Review existing livestock exclusion strategies and	- Work with farmers	In-house VAAFM	VAAFM	

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	provide alternatives to help farmers reduce the water quality impacts associated with livestock access to surface waters.	and partners to identify gaps in existing programs, develop a report of these findings. - Identify funding sources and develop grant agreements to implement identified solutions.	ACAP agronomists Livestock exclusion funding (VAAFM)	SVNMP UVM-Extension	
26	Inventory all livestock operations in the Southern Lake Champlain watershed and identify those with existing livestock access to surface waters and promote programs that provide livestock exclusion and the development of alternative watering systems through enhanced technical assistance	- LFO/ MFO info collected and needs compilation. - SFO AEM surveys underway* *Inspection on small farms	VAAFM-AEM, ERP	VAAFM, VACD-ARS, LTP, SVNMP, UVM-Extension *AEM Assessment results ID/ determine priorities	MFO/LFO inspections underway/ ongoing and enforcement process being utilized where needed AEM survey underway in Rutland and Addison County for South Lake. *Priority for revised TMDL Implementation Plan
27	Identify and implement 5 wetland conservation projects, as identified in *The Lake Champlain Wetlands Restoration Plan*	- Work with agencies to work with landowner candidates who have demonstrated interest. - Groundtruth Pursue highest priority projects for funding	WRP, ERP, USFWS Assessment project for East Creek completed under ERP (2012)	VDEC, USFWS NRCS, DU	
28	Complete SGA Phase 1 on the significant tribs in the Lower Champlain Direct	ID highest priority tribs for assessment	ERP	VDEC – RMP	South Lake Phase 2 SGA funded – under contract

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
					*Corridor Planning completed in East Creek (2013) SGA needed for other Lower Champlain Direct (Hospital, Whitney, Stoney, Braisted)
29	Re-buffer priority properties around basin lakes and ponds to improve littoral habitat, reduce erosion, and filter out NPS	Conduct shoreland assessment and work with Lake Association to target members/ properties in need of re-buffering	UVM-Sea Grant VT Watershed Grants ERP	UVM-Sea Grant Lake associations VDEC Lake & Ponds Section	Lake Saint Catherine/ Little Lake Lake Bomoseen Lake Hortonia Beebe Lake
30	Complete Fluvial Erosion Hazard (FEH) mapping for 7 communities (we have SGA for 8 out of 11). Work with 5 communities to implement FEH zones in pre disaster mitigation plans and local zoning ordinances (last task in process).	- Finish FEH mapping where data exists – Have 2 communities adopt by 2015 - Individual outreach with towns w/RRPC, VLCT	ERP, 604(b) project	RRPC (lead), VDEC-RMP, PMNRCD	Outreach to Castleton, Wells, Middletown Springs, Pawlet, Rupert
31	Conduct Active River Area river assessment for all reaches of Hubbardton, Poultney, and Castleton Rivers. Outputs will be a conservation blueprint identifying conservation strategies and objectives for protecting riparian habitats, floodplain forests, material contribution areas, meander belts, and terraces	- Develop objectives, scope, workplan, and project schedule with partners - Coordinate with partners and communities regarding outcomes/ recommendations	TNC funded (2009) LCBP funded habitat grant	TNC – lead, VDEC, PMNRCD	PM NRCD Habitat Connectivity Grant for the Upper Poultney completed
32	Complete and implement geomorphic-based river corridor plans for the Mettowee and Hubbardton Rivers. Seek projects to reconnect floodplain where	Form Mettowee Project Prioritization Steering committee to	ERP	VDEC-RMP, PMNRCD, RRPC	Mettowee - Highest priority stream instability issues identified and

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	possible	review priority river restoration projects within different sub-basins - ID priority projects Completed 01/2014			prioritized (Mettowee River Corridor Plan, 2013). Potential projects identified and ranked based on likely degree of success due to degree of nutrient/ sediment attenuation, landowner willingness, and availability of funding. Mettowee River Corridor Planning process and project identification completed. Projects vetted for funding (see Appendix G)
33	Work with VLT to include riparian corridor protection in new and existing easements.	ID in conservation easement process and break these areas out of easement.	ERP, VLT	VLT, VDEC-RMP	VLT doing demo projects on the Mettowee. VRC has talked with some landowners. Pursue funding for river corridor easements.
34	Work with VRC to conserve high priority river corridors as identified in the River Corridor Protection Plans	- Must work with RMP - Outreach to landowners	VRC (VHCA), ERP – River Corridor easement program	RMP (issue with staff/ funding)	Current river corridor plans exist for East Creek, Castleton, Poultney, and Mettowee – see Appendix __
35	Work with towns to develop and implement comprehensive floodplain protection language in town zoning and ordinances	Develop a workshop series for municipal officials and town planners to promote floodplain protection	Incentivized by Act 138	RRPC – lead (604(b)) VLCT	*In progress*

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
36	Inventory high priority (prior, converted) agricultural wetlands for restoration. High priority wetlands are those that have been identified as sediment and phosphorus attenuation areas.	Groundtruth the Lake Champlain Wetland Restoration Plan with respect to priority sub-basins.	ERP,NRCS Wetland Reserve and DU funding Assessment project for East Creek completed under ERP (2012)	DEC, Ducks Unlimited, Otter Creek, PM NRCD's, AAFM, and NRCS	Wetland Restoration potential project sites identified in the East Creek Corridor Plan (2012)

Objective # 6 - Reduce erosion associated with transportation infrastructure, both formal and informal

Stressors addressed → Land erosion (nutrients), Encroachment, Channel Erosion, and Thermal Modification

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
37	Implement high priority municipal infrastructure projects that seek to remedy issues identified in geomorphic assessments and corresponding river corridor plans	- ID highest priority projects ID'ed in existing Corridor Plans (see Appendix __) - Seek assessment on priority tributaries where towns and landowners are interested in remediation strategies.	ERP, BBR, Vtrans LTG	Towns of Benson, Fair Haven, Castleton, Middletown Springs, Pawlet, Poultney, Wells	Implement high priority projects based on these inventories and assessments.
38	Determine where existing B&C surveys exists. Seek opportunities with towns to conduct additional inventories and prioritize structures for repair and/ or replacement.	- Review existing B&C culvert inventory in existing Corridor Plans – ID highest priority replacement projects – cross reference with AOP/ VOBCIT assessment. - Work with towns to develop capital expenditure plans for when to replace structures and help find	VT Better Backroads program RRPC 604(b) grant (2013) assessment intersection of SGA/ AOP/ and VOBCIT ID highest priorities	RRPC, VDEC-RMP, PMNRCD	Wells survey and compilation of data underway. BBR grants-projects have been pursued in both Poultney and Wells. Lake Bomoseen Water Quality Committee engages in this approach for lake- basin (towns of Hubbardton and Castleton)

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
		additional funds so the structures are geomorphically compatible and do not cause fish migration issues			
39	Conduct Better Backroads inventories for road-related erosion problems for towns in the South Lake. Use road inventories to identify the highest priority projects on backroads in towns.	- Highest priority backroad runoff issues identified and prioritized. - Comprehensive listing of runoff/ issues described and catalogued for potential funding sources. - Conduct GIS project to ID all Backroads greater than 5% grade and in close proximity to surface waters	VT Better Backroads program FY'15 RRPC-604(b)	VDEC, RPC's, PMNRCD Towns RRPC, VDEC	ID towns that have/ have not participated – outreach program to towns that have not Status – PMNRCD class 4 roads project completed – see high priority recommendations Appendix F Currently working with Castleton (Spring 2014)
40	Promote skidder bridge initiative and expand it to the South Lake region	- OCNRCD to assume admin on Add. Co. program (completed) - Host workshop on western side of Addison/ Rutland County	ERP	ANR (DEC and FPR) PMNRCD OCNRCD	Expand to New York side Skidder bridges are being used in the South Lake. Implement Watershed Forestry Initiative

Objective # 7 - Reduce lakeshore erosion and subsequent nutrient enrichment, by stabilizing shoreland areas and promoting landowner Best Management Practices (BMPs) - Stressors addressed → Land erosion (nutrients), Encroachment, Channel Erosion, Invasives, and Thermal Modification

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
41	Map areas of erosion along lakeside areas – Identify areas with stabilization potential based on slope and soil	- Using maps, identify areas of stabilization potential - Implement high priority stabilization projects - Break out inland lakes vs. Lake Champlain	CC grant LCBP grant to PM NRCD to target inland lakes (as continuation	PMNRCD RRPC Towns	Highest priority erosion issues identified and prioritized. Comprehensive listing of runoff/ erosion issues described and

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	type. Implement stabilization projects.		of LEAP effort)		catalogued for potential funding sources.
42	Promote landowner best management practices – promote the DEC Lakewise Program throughout Lake Champlain and inland lakes.	1. Promote DEC Lakewise Program 2. Promote LCC lake protection pledge Adapt to inland lakes as appropriate http://www.lakechamplaincommittee.org/get-involved/protection-pledge/	LCC, LCBP, UVM Sea Grant	UVM Sea Grant, PMNRCD LEAP program, VDEC L&P, FOVLAP	UVM Sea Grant to focus on South Lake
43	Increase awareness about water quality runoff issues regarding lakeshore development. Promote the work of lake associations in the South Lake to develop and implement long-term strategic management plans. Promote LEAP program	- Conduct Workshops and night meetings on specific topics/ issues; provide volunteer training on inventory and surveying; - Sponsor stormwater vendor tradeshow for contractors and excavators; - Provide municipal planning assistance for lake towns.	LEAP, 604(b)	UVM Sea Grant Lakes and Ponds	Target Lake Bomoseen basin - **underway**
44	Promote the Clean Marine campaign	Woodard Marine (Lake Bomoseen) actively pursuing certification	EPA Pollution Prevention	EPA, DEC (lakes), Woodard Marine	

Objective # 8 – Address nutrient loading associated with discharges of improperly or untreated sewage **Stressors addressed → Non-erosion (nutrients), pathogens**

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
45	Promote healthy and properly designed septic systems. Promote proper maintenance and	- New landowner toolkit - Webpage and outreach materials such as Lakewise	ERP, LCBP Pollution Prevention, VT Community Foundation	NeighborWorks, DEC WsMD – WWTF CWICNY (has pilot project)	NeighborWorks offers low interest loans for folks that qualify for assistance in septic

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
	landowner BMPs related to septic systems.	- Research grant to determine % of problem		PMNRCD, lake associations	designs and systems.
46	Ensure that each of the facilities in the watershed have an approved sewage spill prevention plan for the treatment plant and collection system by 2012.	Recertification concurrent within each tactical basin planning cycle	ANR-SRF	VDEC-WsMD	In review * highlight and prioritize WWTF * New Requirement – required by NPDES within 5 years of renewal
47	Work with towns to conduct feasibility analyses for the development of or extension of municipal wastewater treatment infrastructure to service lakeshore development areas. Where feasibility analysis does not recommend a municipal project, pursue the "homeowner awareness" model, aka "best fit" for individual properties.	Meet with towns that have undertaken recent feasibility analyses, including lake towns: - Lake Bomoseen (towns of Castleton, Hubbardton) - Lake Saint Catherine (towns of Poultney and Wells) Work with lake associations to implement "best fit" where the municipal model is not recommended.	SRF, USDA low interest loans for small community wastewater systems	VDEC, VFED, inland lake basin towns, lake associations	The town of Castleton has recently completed a feasibility analysis which recommends extension of sewer service to Crystal Heights on the East side of Bomoseen but not including the residential area accessed by the float bridge
48	Identify illicit and unmitigated stormwater discharges to Flower Brook , assess treatment options, identify and seek funding for treatment	- Conduct IDDE in Pawlet Village, review existing data, assess on-site and other wastewater treatment in Pawlet Village, ID sources of E. coli	SRF, ERP, USDA	VDEC, Town of Pawlet, PMNRCD	Proposed IDDE for 2014

Objective # 9 – Conduct Ongoing Education and Outreach Regarding Priority Water Quality Issues in the Basin (All Stressors)

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Status/ Timeline
49	Explore the concept a South Lake Education and Research Center	Combine with the PMNRCD Education Center		PMNRCD, TNC, GMC and partners	In progress (TNC recently relocated to the GMC campus)

Objective # 10 – Protect and restore high quality waters in the basin through reclassification to A(1) or Class 1 Wetland designation of streams, ponds or wetlands Related potential stressors Encroachment and Land Erosion Priority areas: Select sub-basins and tributaries, high quality wetlands and ponds.

#	Strategy - Action	Tasks	Budget/ Funding	Participants	Priority/ Status
50	ANR recommends that Belgo and Giddings Brook are candidates for Class A1 reclassification	Supplement biomonitoring in these streams to confirm very high quality condition	n/a	**VANR/** consultants	High
51	Complete biological assessments and other assessments to evaluate reclassification potential of streams in the Basin that have the potential to meet VHQW criteria	Supplement biomonitoring in these streams to confirm very high quality condition	n/a	**VANR/**consultants	High
52	Support the evaluation of the Ward's Marsh wetlands complex and South Fork of the East Creek wetlands complex for reclassification as Class 1 Wetlands.	Supplement wetland biomonitoring and assessment for these wetland systems	n/a	**TNC/** VANR,	High
53	ID - High priority lakes for protection or reclassification	Supplement biomonitoring and chemical assessments of VHQW lakes and ponds in the basin	n/a	VANR Lakes and Ponds	Medium

54	Improve lakeshore buffer protections in town zoning bylaws for lakes and ponds in the basin.	Review municipal town plan and zoning regulation bylaws for adequacy	604(b)	**Towns/**RRPC, VDEC, NRCD's, Lake Assn.	High
55	Support easements or conservation of undeveloped lakeshore habitat on priority lakes and ponds(tbd)		VHCB	**VANR/** Lake Assn., Land trusts, landowners	Medium

List of Acronyms:

319	Federal Clean Water Act, Section 319
604(b)	Federal Clean Water Act, Section 604b
AAFM	Agency of Agriculture, Food, and Markets
AAPs	Accepted Agricultural Practices
ACRPC	Addison County regional Planning Commission
AEM	Agricultural Environmental Management
AEP	American Electric Power
AMA	Agricultural Management Assistance Program
AMPs	Acceptable Management Practices (for logging)
ANR	Agency of Natural Resources
ANS	Aquatic Nuisance Species
AOP	Aquatic Organism Passage
ARS	Agricultural Resource Specialists
BASS	VDEC Biomonitoring and Aquatic Studies Section
B&C	Bridge and Culvert
BBR	Better Backroads
BMP	Best Management Practices
CCPI	Cooperative Conservation Partnership Initiative
CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
CWICNY	Champlain Watershed Improvement Coalition
CWSRF	Clean Water State Revolving Fund
DEC	Vermont Department of Environmental Conservation
DFPR	Vermont Department of Forests, Parks and Recreation
DFW	Vermont Department of Fish and Wildlife
DPW	Department of Public Works
DWSRF	Drinking Water State Revolving Fund
EBTJV	Eastern Brook Trout Joint Venture
EQIP	Environmental Quality Incentive Program
EPA	Environmental Protection Agency
ERP	Ecosystem Restoration Program
EU	Existing Use

FAP	Farm Agronomic Practices
FEH	Fluvial Erosion Hazard
FERC	Federal Energy Regulatory Commission
FPR	Department of Forests, Parks, and Recreation
FSA	Farm Service Agency (USDA)
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
GMC	Green Mountain College
IDDE	Illicit Discharge Detection (and) Elimination
LCBP	Lake Champlain Basin Program
LCC	Lake Champlain Committee
LCLGRPB	Lake Champlain Lake George Regional Planning Board
LCRA	Lake Champlain Restoration Association
LFO	Large farm Operation
LID	Low Impact Development
LiDAR	Light Detection and Ranging
LIG	Local Implementation Grants (LCBP)
LIP	Landowner Incentive Program
LTP	Land Treatment Planner
LWD	Large Woody Debris
MAPP	Monitoring, Assessment and Planning Program
MFO	Medium Farm Operation
NEMO	Nonpoint Education for Municipal Officials
NMP	Nutrient Management Plan
NEGEF	New England Grassroots Environmental Fund
NFWF	National Fish and Wildlife Foundation
NOFA	Northeast Organic Farming Association of Vermont
NPDES	National Pollution Discharge Elimination System
NPS	Non-point source pollution
NRCD	Natural Resource Conservation District
NRCS	Natural Resources Conservation Service
(NY) DEC	New York Department of Environmental Conservation
OCNRCD (VT)	Otter Creek Natural Resource Conservation District
ORW	Outstanding Resource Water

PDM	Pre-Disaster Mitigation
PFW	Partners for Fish and Wildlife
PMNRCD (VT)	Poultney Mettowee Natural Resource Conservation District
RRPC	Rutland Regional Planning Commission
R, T&E	Rare, Threatened and Endangered Species
RCP	River Corridor Plan
RMP	River Management Program
RPC	Regional Planning Commission
SEP	Supplemental Environmental Program
SFO	Small Farm Operation
SGA	Stream Geomorphic Assessment
SPA	Source Protection Area
SVNMP	Southern Vermont Nutrient Management Program
SWCD (NY)	Soil and Water Conservation District (New York)
SWMP	Stormwater master plans
TFS	Trees for Streams
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TU	Trout Unlimited
USDA	United States Department of Agriculture
USDA – NRCS	US Department of Agriculture – Natural Resource Conservation District
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
USGS	United States Geological Survey
UVA	Use Value Appraisal program, or Current Use Program
UVM	University of Vermont
VAAFM	Vermont Agency of Agriculture, Food and Markets
VABP	Vermont Agricultural Buffer Program
VANR	Vermont Agency of Natural Resources
VDEC	Vermont Department of Environmental Conservation
VDHP	Vermont Department of Historic Preservation
VDH	Vermont Department of Health
VEM	Vermont Emergency Management

VFB	Vermont Farm Bureau
VFWD	Vermont Fish and Wildlife Department
VGS	Vermont Geological Survey
VHCB	Vermont Housing and Conservation Board
VHQW	Very high quality waters
VINS	Vermont Institute of Natural Science
VIP	Vermont Invasive Patrollers
VLCT	Vermont League of Cities and Towns
VLRP	Vermont Local Roads Program
VLT	Vermont Land Trust
VRC	Vermont River Conservancy
WWLG	Warm water low gradient

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Glossary

10 V.S.A., Chapter 47 - Title 10 of the Vermont Statutes Annotated, Chapter 47, Water Pollution Control, which is Vermont's basic water pollution control legislation.

Accepted Agricultural Practices (AAP) - land management practices adopted by the Secretary of Agriculture, Food and Markets in accordance with applicable State law.

Acceptable Management Practices (AMP) - methods to control and disperse water collecting on logging roads, skid trails, and log landings to minimize erosion and prevent sediment and temperature changes in streams.

Aquatic biota - all organisms that, as part of their natural life cycle, live in or on waters.

Basin - one of fifteen planning units in Vermont. Some basins include only one major watershed after which it is named such as the Lamoille River Basin. Other Basins include two or major watersheds such as the Poultney/ Mettawee Basin.

Best Management Practices (BMP) - a practice or combination of practices that may be necessary, in addition to any applicable Accepted Agricultural or Silvicultural Practices, to prevent or reduce pollution from nonpoint source pollution to a level consistent with State regulations and statutes. Regulatory authorities and practitioners generally establish these methods as the best manner of operation. BMPs may not be established for all industries or in agency regulations, but are often listed by professional associations and regulatory agencies as the best manner of operation for a particular industry practice.

Classification - a method of designating the waters of the State into categories with more or less stringent standards above a minimum standard as described in the Vermont Water Quality Standards.

Designated use - any value or use, whether presently occurring or not, that is specified in the management objectives for each class of water as set forth in §§ 3-02 (A), 3-03(A), and 3-04(A) of the Vermont Water Quality Standards.

Existing use - a use that has actually occurred on or after November 28, 1975, in or on waters, whether or not the use is included in the standard for classification of the waters, and whether or not the use is presently occurring

Fluvial geomorphology - a science that seeks to explain the physical interrelationships of flowing water and sediment in varying land forms

Impaired water - a water that has documentation and data to show a violation of one or more criteria in the Vermont Water Quality Standards for the water's class or management type.

Improved Barnyards - a series of practices to manage and protect the area around the barn, which is frequently and intensively used by people, animals, or vehicles, by controlling runoff to prevent erosion and maintain or improve water quality. Practices may include: heavy use area protection, access roads, animal trails and walkways, roof runoff management, and others.

Mesotrophic – An intermediate level of nutrient availability and biological productivity in an aquatic ecosystem.

Natural condition - the condition representing chemical, physical, and biological characteristics that occur naturally with only minimal effects from human influences.

Nonpoint source pollution - waste that reaches waters in a diffuse manner from any source other than a point source including, but not limited to, overland runoff from construction sites, or as a result of agricultural or silvicultural activities.

pH - a measure of the hydrogen ion concentration in water on an inverse logarithmic scale ranging from 0 to 14. A pH under 7 indicates more hydrogen ions and therefore more acidic solutions. A pH greater than 7 indicates a more alkaline solution. A pH of 7.0 is considered neutral, neither acidic nor alkaline.

Point source - any discernible, confined and discrete conveyance including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which either a pollutant or waste is or may be discharged.

Reference condition - the range of chemical, physical, and biological characteristics of waters minimally affected by human influences. In the context of an evaluation of biological indices, or where necessary to perform other evaluations of water quality, the reference condition establishes attainable chemical, physical, and biological conditions for specific water body types against which the condition of waters of similar water body type is evaluated.

Riparian vegetation - the native or natural vegetation growing adjacent to lakes, rivers, or streams.

Sedimentation - the sinking of soil, sand, silt, algae, and other particles and their deposition frequently on the bottom of rivers, streams, lakes, ponds, or wetlands.

Thermal modification - the change in water temperature

Turbidity - the capacity of materials suspended in water to scatter light usually measured in Jackson Turbidity Units (JTU). Highly turbid waters appear dark and "muddy."

Waste Management System -a planned system in which all necessary components are installed for managing liquid and solid waste, including runoff from concentrated waste areas and silage leachate, in a manner that does not degrade air, soil, or water resources. The purpose of the system is to manage waste in rural areas in a manner that prevents or minimizes degradation of air, soil, and water resources and protects public health and safety. Such systems are planned to preclude discharge of pollutants to surface or ground water and to recycle waste through soil and plants to the fullest extent practicable.

Water Quality Standards - the minimum or maximum limits specified for certain water quality parameters at specific locations for the purpose of managing waters to support their designated uses. In Vermont, Water Quality Standards include both Water Classification Orders and the Regulations Governing Water Classification and Control of Quality.

Waters - all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs and all bodies of surface waters, artificial or natural, which are contained within, flow through or border upon the State or any portion of it.

Watershed - all the land within which water drains to a common waterbody (river, stream, lake pond or wetland).

Southern Lake Champlain Basin Plan Appendices

Appendix A. Existing Use Tables

Appendix B. Review of Town Plans and Zoning Regulations

Appendix C. Lakes and Ponds Assessment for the Southern Champlain Basin

Appendix D. Detecting and Eliminating Illicit Discharges in Rutland County to Improve Water Quality

Appendix E. Vermont's Agricultural Environmental Management (AEM) Program for the Southern Champlain Basin

Appendix F. Medium and High Priority Basin Class 4 Road Sites for Restoration

Appendix G. Southern Champlain Basin River Corridor Planning Summaries and High Priority Project Recommendations

Appendix H. Regulatory and Non-regulatory Programs that contain BMPs Applicable to Protecting and Restoring Waters in the Southern Champlain Basin

Appendix I. Southern Champlain Basin Plan Public Comments and Responsiveness Summary

Appendix A – Existing Use Tables

Determination of existing uses of waters for swimming in the Southern Champlain Basin (Basins 02/04)

Surface Water	Location of Use	Watershed	Town(s)	Basis for Determining the Presence of an Existing Use
Poultney River	Multiple access locations	Poultney River	Tinmouth, Middletown Springs, Poultney, Fair Haven, West Haven	Multiple access locations along Route 140, Coggman Road and Bay Road. Popular swimming hole access from the D&H Rail Trail bridge in Poultney.
Beebe Pond	Route 30	Castleton River	Hubbardton	Multiple access locations along Route 30
Black Pond	Black Pond Rd	Castleton River	Hubbardton	Regular access from Black Pond Rd
Breeze Pond	Black Pond Rd			
Lake Bomoseen	Crystal Beach (municipal public beach), Lake Bomoseen State park, multiple access	Castleton River	Castleton, Hubbardton	
Burr Pond	Burr Pond Rd	Hubbardton River	Sudbury	
Glen Lake	Multiple access locations off Moscow Rd	Castleton River	Castleton	
Halfmoon Pond	Half Moon State Park	Castleton River	Castleton	
Hinkum Pond		Hubbardton River	Sudbury	
Lake Hortonia	Multiple access locations off Routes 30 and 140	Hubbardton River	Sudbury, Hubbardton	Multiple access locations off Routes 30 and 140
Perch Pond	Multiple access locations off Perch Pond Rd	Hubbardton River	Benson	
Spruce, Doughty	Pond Woods WMA	Hubbardton River	Benson, Orwell	
Sunrise Lake	Access from Sunset Lake Rd	Hubbardton River	Benson, Orwell	
Sunset Lake	Access from Sunset Lake Rd	Hubbardton River	Benson	
Castleton River	Multiple access locations	Castleton River		Multiple access locations off Route 4A
Mettowee River	Multiple access locations Button Falls, Blossoms Corner	Mettowee River	Dorset, Rupert, Pawlet, Wells	Multiple access locations off Route 30
Lake Saint Catherine	VT DFW Boat Access Area, Lake Saint Catherine State Park	Mettowee River	Poultney	Lake Saint Catherine State Park State VDFW Access area
Little Lake	VT DFW Boat Access Area		Wells	Access from Lake Saint Catherine by boat

Lily Pond	VT DFW Boat Access Area		Poultney	Access from Lake Saint Catherine by boat
Flower Brook	Multiple access locations			Multiple access locations off Route 133
Wells Brook	Multiple access locations			Multiple access locations off Route 140
Indian River	Multiple access locations			
Lake Champlain	Multiple access locations		Benson, Bridport, Orwell, Shoreham, West Haven	

Determination of existing uses of waters for fishing in the Southern Champlain Basin (Basins 02/04)

Surface Water	Location of Use	Watershed	Town(s)	Basis for Determining the Presence of an Existing Use
Poultney River	Multiple access locations	Poultney River	Tinmouth, Middletown Springs, Poultney, Fair Haven, West Haven	Multiple access locations along Route 140, Coggman Road and Bay Road. Popular swimming hole access from the D&H Rail Trail bridge in Poultney.
Beebe Pond	Route 30	Castleton River	Hubbardton	Multiple access locations along Route 30
Austin Pond	Hortonia Rd	Castleton River	Hubbardton	Access from Hortonia Rd
Echo Lake	Route 30	Castleton River	Hubbardton	Access location along Route 30
Roach Pond	Hortonia Rd	Castleton River	Hubbardton	Access from Hortonia Rd
Burr Pond	VDFW access	Hubbardton River	Sudbury	Burr Pond Rd (including state VDFW access)
Glen Lake	VDFW access	Castleton River	Castleton	Multiple access locations off Moscow Rd (including state VDFW access)
Halfmoon Pond	Half Moon State Park	Castleton River	Castleton	
Hinkum Pond		Hubbardton River	Sudbury	
Lake Hortonia	Multiple access locations off Routes 30 and 140	Hubbardton River	Sudbury, Hubbardton	Multiple access locations off Routes 30 and 140, (including state VDFW access off Routes 140, Fishing Access RD, and the Lake Hortonia dam (outlet))
Perch Pond	Multiple access locations off Perch Pond Rd	Hubbardton River	Benson	
Spruce, Doughty	Pond Woods WMA	Hubbardton River	Benson, Orwell	
Sunrise Lake	Access from Sunset Lake Rd	Hubbardton River	Benson, Orwell	
Sunset Lake	Access from Sunset Lake Rd	Hubbardton River	Benson	
Castleton River	Multiple access locations	Castleton River		Multiple access locations off Route 4A
Mettowee River	Multiple access locations Button Falls, Blossoms Corner		Dorset, Pawlet, Rupert, Wells	Multiple access locations off Route 30, including VDFW Access Area on Route 30 in Rupert

Lake Saint Catherine	VDFW access			Multiple access locations, including VDFW Access Area and Lake Saint Catherine State Park
Little Lake	VDFW access			Access from former Delaney Farm
Lily Pond	VDFW access			
Flower Brook	Multiple access locations			
Wells Brook	Multiple access locations			
Lake Champlain	Multiple access locations VDFW access			Benson Landing F&W Access and the Singing Cedars (George Davis) Access Area located off Route 73 in Orwell.
East Creek	Multiple access locations VDFW/VWA access	East Creek	Benson, Orwell	East Creek Wildlife Management Area (WMA) is located in west central Vermont in the towns of Orwell and Benson. The property is along East Creek and is in two separate parcels. The northern parcel is most easily accessed by boat from Lake Champlain via the mouth of East Creek. The southern parcel has a parking area by the dam on Mt. Independence Road in Orwell, and also on Cook Road. A small portion of this WMA is closed as a refuge and is clearly marked and signed (see map). The 419 acres comprising the WMA are owned by the State of Vermont and managed by the Vermont Fish & Wildlife Department.

Determination of existing uses of waters for public water supplies in Southern Champlain (Basin 02-04)

Surface Water	Watershed	Town	Basis for Determining the Presence of an Existing Use
Inman Pond	Poultney River	Fair Haven	Designated A2 - 6/15/67 - 79 acres (Pond only) Inman Pond and all waters within its watershed in Fair Haven.
Sucker Brook	Poultney River	Fair Haven	Sucker Creek (0.6 mile) - Sucker Creek and all waters within its watershed upstream of the Howard Dam and Sheldon Dam, both of which are located in Fair Haven.

Determination of existing uses of waters for recreational boating in Southern Champlain (Basin 02-04) – Flat water

Surface Water	Watershed	Town	Basis for Determining the Presence of an Existing Use
All lakes and ponds in the basin	Basin-wide		Designated use
Lower Poultney River	Poultney	West Haven	Designated use, widely observed existing use, school programs
Castleton River	Poultney	West Rutland, Ira, Castleton, Fair Haven	widely observed existing use, school program
Lower East Creek	East Creek	Orwell	widely observed existing use, school program
Lake Champlain	Champlain Basin	West Haven, Benson, Orwell, Shoreham, Bridport, Addison, Panton, Ferrisburgh	VDFW access areas, designated use, widely observed existing use

(1) Jenkins and Zitka, The Waterfalls, Cascades, and Gorges of Vermont, VTANR, 1988.

Determination of existing uses of waters for recreational boating in Southern Champlain (Basin 02-04) – Whitewater

Surface Water	Watershed	Town	Basis for Determining the Presence of an Existing Use
Mettowee River	Mettowee	Pawlet/ Wells	Listed on VPA website from Route 30 to Route 153

(2) Jenkins and Zitka, The Whitewater Rivers of Vermont, VTANR, 1992.

Appendix B – Assessment of Basin Towns for Water Quality Protection

Towns in the Basin (wholly or partly):

- Addison
- Benson
- Bridport
- Castleton
- Danby
- Dorset
- Fair Haven
- Ferrisburgh
- Hubbardton
- Ira
- Middleton Springs
- Orwell
- Panton
- Pawlet
- Pittsford
- Poultney
- Rupert
- Shoreham
- Sudbury
- Tinmouth
- Wells
- West Haven
- West Rutland

NAMES	County	RPC	NFIP Participant	Lake over 20 acres	Building_setback_from_stream_lake	Lakeshore_buffer_width	Stream_buffer_width
Addison	Addison	AC	yes	yes	100 ft		
Benson	Rutland	RR	yes	yes	75 ft		
Bridport	Addison	AC	yes	yes			
Castleton	Rutland	RR	yes	yes			
Cornwall	Addison	AC	yes	yes			
Danby	Rutland	RR	yes	yes			
Fair Haven	Rutland	RR	yes	yes	50 ft		
Hubbardton	Rutland	RR	yes	yes	25 ft	25 ft	
Middletown Springs	Rutland	RR	yes	no			
Orwell	Addison	AC	yes	yes	50 ft	50 ft	
Panton	Addison	AC	yes	yes			
Pawlet	Rutland	RR	yes	no			
Poultney	Rutland	RR	yes	yes	50 ft		
Poultney Village	Rutland	RR	yes	no			
Rupert	Bennington	BC	yes	no			
Shoreham	Addison	AC	yes	yes	20 ft		
Tinmouth	Rutland	RR	no	yes	50 ft		
Wells	Rutland	RR	yes	yes			
West Haven	Rutland	RR	yes	yes	200 ft		
West Rutland	Rutland	RR	yes	no			50 ft
Whiting	Addison	AC	no	no			

Appendix C - Lakes and Ponds Assessment for the Basin

LakeID	Water Quality Score	Biology Score	Unusual Natural Scenic Feature Score	Combined	BestLake Score	Best Lake Category	Comments
HINKUM		4	5	9	5	1	Top ~5% "best lakes" - overall score; Top ~5% "best lakes"- UNSF
PERCH (BENSON)	4	4		8	5	1	Top ~10% "best lakes"- overall score; Top ~10% "best lakes"- water quality
SPRUCE (ORWELL)		4	4	8	5	1	Top ~10% "best lakes"- overall score; Top 20% for biodiversity
HALF MOON	4	3	0	7	5	1	Top ~20% "best lakes"- overall score; Top ~10% "best lakes"- water quality
INMAN	2	3	2	7	5	1	Top ~20% "best lakes"- overall score
GLEN	0	4	2	6	5	1	Large and diverse plant community present at N end of N. arm. Natural Heritage rare plant site there. ...
OLD MARSH	2	4		6	5	1	Top 20% for biodiversity
SUNRISE		4	2	6	5	1	Top 20% for biodiversity; Presence of Utricularia gibba (VT threatened). Scenic lake bottom noted along south shore.
BOMOSEEN		5		5	5	1	Top 5% for biodiversity
HOUGH		5		5	5	1	Top 10% for biodiversity
LOVES MARSH	2	3		5	5	1	
SUNSET (BENSON)		2	3	5	5	1	
BEEBE (HUBDTN)		4		4	5	1	Top 20% for biodiversity
BURR (SUDBRY)	0	4		4	5	1	
ECHO (HUBDTN)	0	4		4	5	1	
HORTONIA		4		4	5	1	
LILY (POULTY)		4		4	5	1	
LITTLE (WELLS)		4		4	5	1	
ST. CATHERINE		4		4	5	1	
COGGMAN	0	2		2	5	1	
ROACH		2		2	5	1	
CHOATE	0	1		1	5	1	
DOUGHTY		1		1	5	1	
HALFMOON		1		1	5	1	
MILL (BENSON)		1		1	5	1	
MUD (BENSON)		1		1	5	1	
BULLHEAD (BENSON)	0			0	1	5	
MUD (ORWELL)				0		NR	

Appendix D – Detecting and Eliminating Illicit Discharges in Rutland County to Improve Water Quality

Seven towns participated in the Rutland County Illicit Discharge Detection and Elimination (IDDE) Project: Benson, Castleton, Fair Haven, Poultney, Proctor, Wallingford, and West Rutland (Appendix C, Map 1). The goal of the project was to improve water quality by identifying and eliminating contaminated, non-stormwater discharges entering stormwater drainage systems and discharging to the Otter Creek, the Poultney River, and their tributaries. The geographic scope included the entire extents of the municipal closed drainage systems in these towns. Prior to this assessment, the Vermont Department of Environmental Conservation (DEC) prepared stormwater infrastructure maps for all seven towns. This infrastructure mapping was used to plan the assessment in each town and to guide further investigations in systems with suspected illicit discharges.

The results of the IDDE assessment work for the Poultney River Basin (including the Castleton River) that include the towns of Benson, Castleton, Fair Haven, Poultney, and West Rutland are included here.

Table 1. Summary of stormwater drainage systems assessed in 2013

Town	Closed Drainage Systems Assessed	Suspected Illicit Discharges	Confirmed Illicit Discharges
Benson	6	0	0
Castleton	26	1	0
Fair Haven	36	5	4
Poultney	16	1	1
West Rutland	64	4	1
Total	**148**	**11**	**6**

BENSON

No illicit discharges were confirmed in the stormwater system.

CASTLETON RESULTS

Of the 26 stormwater drainage systems assessed in Castleton, an illicit discharge was suspected in only one, system CA180 (see description below). Through extensive bracket sampling, the apparent contamination (ammonia) in this system was determined to be of natural origin. Therefore, there were no confirmed illicit discharges in Castleton.

FAIR HAVEN RESULTS

Of the 36 stormwater drainage systems assessed in Fair Haven, an illicit discharge was suspected in five. An Illicit discharge was definitively identified in four of these systems. The fifth system, FH080, appears to intercept a small flow of treated municipal water; however, detailed water leak detection is beyond the scope of this study.

Actions:

- FH280 - Town of Fair Haven to address an illicit connection to system - badly leaking house sewer lateral.
- FH350 - Town of Fair Haven to address failed septic system upstream of the M&B Snack Bar property as the source of elevated *E. coli* in the stream.

POULTNEY RESULTS

Of the 16 stormwater drainage systems assessed in Poultney, an illicit discharge was suspected in only one, system PY140. Further investigation of this system confirmed the presence of an illicit discharge of sanitary wastewater in this system, but did not resolve a specific source. Town of Poultney is currently conducting an alternatives analysis for a stormwater project intended to alleviate drainage problems on York Street, provide stormwater treatment, and eliminate the problematic section of repurposed sanitary sewer now discharging at PY140.

WEST RUTLAND RESULTS

Of the 64 stormwater drainage systems assessed in West Rutland, an illicit discharge was suspected in four. Upon further investigation, no illicit discharges were found in three of these systems. Only system WR460 had a confirmed illicit discharge and this has reportedly been resolved.

Appendix E - Vermont's Agricultural Environmental Management (AEM) Program for Basin 2/4.

The Agricultural Resource Specialist (ARS) Program is offered by the Vermont Association of Conservation Districts (VACD) and supported by funding from the Vermont Agency of Agriculture. One service ARS staff offers to farmers is the Agricultural Environmental Management (AEM) program. The AEM program is a statewide, confidential, and voluntary program that helps landowners protect the quality of their natural resources—the foundation of a farm is economic viability and longevity. Farmers are important stewards of Vermont's working landscape and through the five-tiered AEM program, ARS staff helps landowners: 1) assess conservation needs, 2) document farm practices, 3) prioritize farm improvements, 4) gain access to State, Federal and Conservation District cost-share programs, and 5) evaluate results to maximize efficiency of farm management practices.

By farmer request, or through outreach efforts, ARS Staff meet on the farm with stakeholders over several planning visits. Over the course of these visits, ARS Staff draw on local natural resource conservation specialists—engineers, agronomists, and other planners—to ensure that conservation recommendations and practices are planned and tailored to match each farm's unique characteristics. This collaborative process seeks to identify the most effective means to solve a resource concern to benefit both the natural environment and farm efficiency as much as possible. For example, in planning a livestock exclusion project for streambank protection, discussion with stakeholders can bring up points which illustrate both the conservation benefit and the improved farming efficiency of a practice. With the installation of exclusion fencing along the brook, and a watering trough installed in each paddock, thirsty livestock no longer need to travel a half mile to drink in the brook. Now, animals are off of the streambank and more of their time can be spent grazing and ruminating, improving weight gain rates and profits for a beef operation.

The VACD ARS program actively seeks out small farms that are willing to collaborate in the conservation planning process. For 2013, ARS staff statewide are using the AEM process to develop and implement up to nine simple, cost-effective conservation projects funded through an Ecosystem Restoration Grant from Vermont's Agency of Natural Resources. Project examples include: improvement of animal trails and laneways, upgrading and improving barnyard areas, and installation of fencing and stream crossings to limit uncontrolled access to waterways by farm animals. Where projects identified for implementation are more costly, ARS staff will help farmers apply for alternative funding sources through State and Federal cost-share programs. The AEM process aims to take a holistic look at a farm operation and help farmers connect with the resources required to meet their management challenges.

Appendix F. Medium and High Priority Basin Class 4 Road Sites for Restoration[4]

Town	Road	# impairments	# culverts	Priority
Benson	East Road	4 impairments	14 culverts (including paved section)	medium priority
	Mill Pond Road	3 impairments	3 culverts	3 culverts
	Sunset Lake Road	1 impairment		medium priority
Castleton	Staso Road	1 impairment	5 culverts	medium priority
	Pencil Mill Road		2 culverts	low priority
	Birdseye Road	no impairment survey	10 culverts	high priority
Danby	Kelley Hill Road	1 impairment	1 culvert	medium priority
	Lilly Hill Road	5 impairments	7 culverts	medium priority
	Little Village Road		13 culverts (many fail geomorphic compatibility screen)	high priority for culvert replacements
Dorset	Lower Hollow Road	1 impairment	8 culverts	medium priority
	Upper Hollow Road	1 impairment	7 culverts	high priority

[4] "Managing Stormwater at the source: Working with communities to address stormwater runoff issues." Poultney-Mettowee Natural Resources Conservation District, Final Report – October 30, 2012.

Fair Haven	Bigelow Road	2 impairments	2 culverts	high priority
Hubbardton	Ganson Hill Road	3 impairments	1 culvert	medium priority
	Gill Road	1 impairment	1 arch culvert	low priority
	Woods Road	2 impairments	2 culverts	low priority
Middletown Springs	Fitzgerald Road	1 impairment	8 culverts	low priority
	Haley Road	1 impairment	2 culverts	medium priority
	Mountain Road	4 impairments	2 culverts	medium priority
	North Street	4 impairments	7 culverts	medium priority
	Norton Road	2 impairments	7 culverts	medium priority
	Orchard Road	2 impairments	2 culverts	low priority
	Spruce Knob Road	4 impairments	8 culverts	high priority
Pawlet	Andrus Road	1 impairment	5 culverts	medium priority
	Bett's Bridge Road	0 impairments	4 culverts	low priority
	Kelley Hill Road	1 impairment	4 culverts	medium priority
Poultney	Birdseye Road	5 impairments	9 culverts	high priority
	DuBonis Quarry Road	not assessed for impairments	3 culverts	
	Hampshire Hollow Road	2 impairments	6 culverts	medium priority

	Jones Road	2 impairments	2 culverts	low priority
	Morse Hollow Road	2 impairments	8 culverts	medium priority
	Pond Hill Ranch Road	2 impairments	10 culverts	high priority
	River Road	3 impairments	2 culverts	high priority
	Watkins Hill Road	4 impairments	3 culverts	high priority
Rupert	Lewis Road	1 impairment	1 culvert	high priority
Sudbury	Hough (Huff) Pond Road	1 impairment	4 culverts	low priority
Tinmouth	Lower Gulf Road	2 impairments		not a priority road, but some impairments and sediment drains directly to the Poultney River headwaters
Wells	Butts Hill South Road	2 impairments		medium priority
	Saw Mill Hill Road	2 impairments	11 culverts	medium priority
	Wells Brook Road	1 impairment	5 culverts, lots of new culvert work	low priority

Appendix G- Basin River Corridor Management Plan Summaries and High Priority Recommendations

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
Castleton River/ Poultney	Town of Castleton Corridor Plan	Ira Birdseye tributary -remove berm/ restore floodplain (similar to Gully Brook project)/ T2.12	VDEC, Town, landowners/ ERP	Restoration	High
Castleton River/ Poultney	Town of Castleton Corridor Plan	Conserve functioning wetland and remove former Ski Area access road/ T2.12	Landowner, NRCS/ ERP, WHIP	Wetland Conservation	Medium
Castleton River/ Poultney	Town of Castleton Corridor Plan	Restore channel access to flood chutes and floodplain southwest of current channel /T2.11-B	Landowner, NRCS/ ERP, WHIP	Active Channel Restoration	Medium
Castleton River/ Poultney	Town of Castleton Corridor Plan	Possible removal of historic dam just downstream of North Bretton Brook Confluence/ T2.09	Landowner, TU, USFWS/EBTJV, ERP, WHIP	Dam Removal	Medium
Castleton River/ Poultney	Town of Castleton Corridor Plan	Passive geomorphic approach to conserve ample woody vegetation prevent future encroachments where the Castleton River is undergoing active lateral adjustments and attenuating sediments/ T2.09	Landowner, NRCS, ANR-RMP, VRC/ ERP,	Corridor Conservation	Medium
Hubbardton/ Poultney	Hubbardton River Debris Project Summary	Reforesting riparian corridor along the river mainstem and creating engineered log (debris) jams to simulate to the function of large woody debris in the system: trapping sediment, aggrading the river channel, and eventually reducing channel instability	Landowner, TNC, VDFW, USFS/ ERP, TU, USFS (EBTJV)	Active Channel Restoration	Medium
Poultney	Poultney River Corridor Plan	Restore incised reach, remove berm. Analyze active vs. passive approach, Study watershed scale stressors, Pursue landowner agreements, Complete more detailed survey &	WSMD-RMP, landowners/ ERP	Restoration	High

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
		design, Secure funding/ M02			
Poultney	Poultney River Corridor Plan	Protect River Corridor. Riparian restoration (plant buffers). Pursue landowner agreements, Secure funding/ M03	WSMD-RMP, landowners/ ERP	Riparian Corridor Protection and Restoration	High
Poultney	Poultney River Corridor Plan	Protect River Corridor. Riparian restoration (plant buffers), Remove/Replace old abutments Structures. Pursue town &/or VTRANS agreements, Complete more detailed survey and design, Analyze property protection & bed stabilization measures needed./ M06	WSMD-RMP, Vtrans, town of _ landowners/ ERP	Riparian Corridor Protection and Restoration	High
Poultney	Poultney River Corridor Plan	Protect River Corridor. Potential Restoration/Protection – Restore incised reach. Project to remove berm, replace old abutments /structures. Pursue town &/or VTRANS agreements, Complete more detailed survey and design, Analyze property protection & bed stabilization measures needed. Secure funding/ M09	WSMD-RMP, Vtrans, town of Poultney landowners/ ERP	Riparian Corridor Protection and Restoration	High
Poultney	Poultney River Corridor Plan	D&H Rail Trail Bridge resizing - Pursue town &/or VTRANS/ VANR agreements, Complete more detailed survey and design, Analyze property protection & bed stabilization measures needed- Secure funding/ M10	WSMD-RMP, DFPR, Vtrans, town of Poultney, landowners/ ERP	Restoration	High
Poultney	Poultney River Corridor Plan	Protect River Corridor. Potential Restoration/Protection – Restore Aggraded Reach – Stabilize Stream	WSMD-RMP, Vtrans, town of _ landowners/ ERP	Riparian Corridor Protection and Restoration	High

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
		Banks (M14A), Restore incised reach (M14C). Project Remove berm (M13), Replace (resize) bridge. Pursue town &/or VTRANS agreements, Complete more detailed survey and design, Analyze property protection & bed stabilization measures needed.- Analyze watershed scale stressors, Pursue landowner agreements, Complete more detailed survey & design, Secure funding/ M14			
Poultney	Poultney River Corridor Plan	Remove Structures (Old Abutment) – Daisy Hollow, Pursue landowner agreements, Pursue town &/or VTRANS agreements, Complete more detailed survey and design, Analyze property protection & bed stabilization measures needed, secure funding./ M16B	WSMD-RMP, Vtrans, town of Middletown Springs, landowners/ ERP	Restoration	High
Beaver Brook/ Mettowee	Mettowee River Corridor Plan	BMP improvements needed for conventional dairy to install livestock fencing along streams, barnyard roof gutter diversion and manure management structure needed/ M05T03.02S01.02, Beaver Brook Unnamed Tributary to Beaver Brook	NRCS, VAAFM, WSMD-ERP, landowners	Restoration (water quality) with Exclusion Fencing, Clean Water Diversion, Alternative Manure Management	High
Mettowee	Mettowee River Corridor Plan	Livestock exclusion fencing and stream crossing were completed in September, 2013/ Mettowee River, M07 downstream of Sykes Hollow Brook confluence, M08 upstream, and Sykes Hollow Brook M07T04.01	AAFM Livestock Exclusion funding, Landowners, PMNRCD, Southern Vermont Nutrient Management Program (SVNMP)	Restoration (water quality) with Exclusion Fencing, stream crossing	Completed
Flower brook/	Mettowee River	Protection of a critical sediment	Landowners, PMNRCD,	Protection	High

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
Mettowee	Corridor Plan	attenuation area at the Flower Brook/Beaver Brook confluence/ Flower Brook M05T03.02, downstream of the confluence M05T03.03, upstream of the confluence M05T03.02S01.01, Beaver Brook	Vermont Land Trust (VLT), VT Agency of Natural Resources (ANR)/ Conservation Reserve Program/ Conservation Reserve Enhancement Program (CRP/CREP), VANR Ecosystems Restoration Program (ERP),		
Flower Brook/ Mettowee	Mettowee River Corridor Plan	Exclusion Fencing Clean Water Diversion/ Unnamed Tributary to Flower Brook Tributary to upstream end of reach M05T03.01C	Landowners, PMNRCD, Southern Vermont Nutrient Management Program (SVNMP)/ AAFM Livestock Exclusion funding, CREP	Restoration (water quality) with Exclusion Fencing, buffer planting	High
Mettowee	Mettowee River Corridor Plan	Chop and Drop, adding large woody debris to attenuate sediment and nutrients in the headwater reaches/ Mettowee River headwaters M15 and M16	PMNRCD, USFS, VANR/VDFW	Restoration (geomorphic and aquatic habitat)	High
Flower Brook/ Mettowee	Mettowee River Corridor Plan	Lilly Hill Road, Danby - Stormwater Back road drainage improvement/ Flower Brook, which flows to the Mettowee River Upstream end M05T03.04	Danby Road Crew, PMNRCD, VTANR/ Better Back Roads Grant, ANR Ecosystems Restoration Program, VCF Lake Champlain and Tributaries Grant, LCBP Pollution Prevention Grant	Restoration (geomorphic and aquatic habitat)	High
Flower Brook/ Mettowee	Mettowee River Corridor Plan	Pawlet Village Stormwater/septic Assessment	Town of Pawlet, PMNRCD, DEC-FED	Restoration (water quality)	High
Flower Brook/	Mettowee River	Flower Brook headwaters additional	WSMD-RMP, Vtrans,	Restoration	High

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
Mettowee	Corridor Plan	assessment/gully stabilization	town of Pawlet, landowners/ ERP	(geomorphic and aquatic habitat)	
Flower Brook/ Mettowee	Mettowee River Corridor Plan	Waite Farm Resource Concerns (multiple)	Vermont Land Trust (VLT), VT Agency of Natural Resources (ANR)/ Conservation Reserve Program/ Conservation Reserve Enhancement Program (CRP/CREP), VANR Ecosystems Restoration Program (ERP), VAAFM BMP Program	Restoration (water quality) with Exclusion Fencing, buffer planting	High
Flower Brook/ Mettowee	Mettowee River Corridor Plan	Tree plantings	PMNRCD Trees for Streams, USDA-NRCS, VAAFM (CRP/ CREP)	Restoration (geomorphic and aquatic habitat)	High
Flower Brook/ Mettowee	Mettowee River Corridor Plan	Woodlawn NPS AG project	VT Agency of Natural Resources (ANR)/ Conservation Reserve Program/ Conservation Reserve Enhancement Program (CRP/CREP), VANR Ecosystems Restoration Program (ERP), VAAFM BMP Program	Restoration (water quality) with Exclusion Fencing, buffer planting	High
Sykes Hollow Brook/ Mettowee	Mettowee River Corridor Plan	Assessment and potential stabilization combined with forestry BMPs/ Sykes Hollow Brook flows to the Mettowee River, reach 07 M07T04.02-03 and upstream headwaters	Landowners, PMNRCD, VTANR/ Vermont ANR Watershed Grants, Ecosystem Restoration Grants, Vermont Community Foundation (Lake Champlain and	Restoration and assessment	High

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
			Tribs or Innovations and Collaborations Grant), Lake Champlain Basin Program		
Mettowee	Mettowee River Corridor Plan	Culvert Replacement projects (multiple) – Mettowee headwaters, Dorset Hollow/ M14	Landowners, PMNRCD, Town of Dorset, USFS, VTANR/ State Revolving Loan Fund, ERP, VCF, LCBP, USFWS, VFWS, Trout Unlimited, Orvis	Restoration (geomorphic compatibility, AOP)	High
Royce Brook/ East Creek	East Creek Corridor Plan	Culvert Replacement - Brown Lane culvert is undersized-width is only 45%of the bankfull channel width/ T4.02S2.02 #2 Royce Brook (Orwell)	VTDEC, Town of Orwell/ ERP	Active Restoration Structure Retrofit/ Replacement	High
North Fork, East Creek	East Creek Corridor Plan	Natural attenuation site and an easement would help to mitigate the sediment passing through upstream transport converted reaches/ T4.03 #1 North Fork (Orwell)	VRC, VTDEC, Landowner	Passive Restoration/ Corridor Conservation	High
North Fork, East Creek	East Creek Corridor Plan	Corridor protection will enable sediment that is transported from upstream reaches to settle out before entering reach T4.04/ T4.07 #1	VRC, VTDEC, Landowner	Passive Restoration/ Corridor Conservation	High
North Fork, East Creek	East Creek Corridor Plan	Corridor protection will enable sediment that is transported from upstream reaches to settle out in developing meanders/ T4.08 #1 Entire reach, right and left banks	VRC, VTDEC, Landowner	Passive Restoration/ Corridor Conservation	High
Orwell Village trib, East Creek	East Creek Corridor Plan	Corridor protection will enable sediment that is transported from upstream reaches to settle out in developing meanders/ T5.01-A #1	VRC, VTDEC, Landowner	Passive Restoration/ Corridor Conservation	High

River/ Basin	Corridor Plan	Action/ Reach	Partners/ Funding	Project type	Priority
Orwell Village trib, East Creek	East Creek Corridor Plan	Culvert Replacement - North Orwell Road crossing at the upstream segment break with T5.01C/ T5.01-B #1 - Orwell Village Tributary	VTDEC, Landowner, NRCS, US F&W	Active Restoration/ Structure Replacement	High
Doughty Hill Tributary/ East Creek	East Creek Corridor Plan	Corridor protection will enable sediment that is transported from upstream reaches to settle out in developing meanders/ T7.01A #2 and T7.01B#1	VTDEC, Landowner, NRCS, US F&W	Passive Restoration/ Corridor Conservation	High
Cranberry Swamp, East Creek	East Creek Corridor Plan	Riparian buffer project with native woody vegetation in areas lacking canopy cover. Increase the buffer width between the adjoining landuses and the channel/ T9.01B #1	VTDEC, OCNRCD, Landowner	Passive Restoration/ Corridor Conservation	High
Cranberry Swamp, East Creek	East Creek Corridor Plan	Culvert Replacement - Replace the culvert with a new structure (culvert or bridge) which is adequately sized and aligned to the stream/ T9.01B #3	VTDEC, Landowner	Active Restoration/ Structure Replacement	High
EC Wetland Addendum	East Creek Corridor Plan	Greatest potential acreage identified for potential wetland restoration and do not have buffer planting projects underway/ T4.02, S2.02 Royce Brook	NRCS, VTDEC, Landowner/ WRP, ERP	Wetland restoration	High
EC Wetland Addendum	East Creek Corridor Plan	Greatest potential acreage identified for potential wetland restoration and do not have buffer planting projects underway/ T5.01A Orwell Village Trib.	NRCS, VTDEC, Landowner/ WRP, ERP	Wetland restoration	High

Appendix H - Regulatory and Non-regulatory Programs Applicable to Protecting and Restoring Waters in Basin 2-4

The Vermont Surface Water Management Strategy maintains a continually updated roster of regulatory and non-regulatory technical assistance programs.

Regulatory programs may be accessed at:

http://www.vtwaterquality.org/wqd_mgtplan/swms_appA.htm

Non-regulatory programs may be accessed at:

http://www.vtwaterquality.org/wqd_mgtplan/swms_appD.htm

Appendix I - Basin Plan Public Comments and Responsiveness Summary

Comments are summarized by topic

E. coli

- Comment: There have been landowners upstream of town (of Pawlet) with *E. Coli* in their wells – 2 people reportedly had *E. coli* poisoning (brought up by the woman who owns a shop in town)
    - Response: Town Health Officer in attendance and aware of issue. Follow up monitoring and assessment work underway. The commenter should be aware that E. coli itself is rarely pathogenic, but rather is an indicator of the potential presence of other pathogens that may be in water.
- Question regarding sources of *E. coli*
    - Response: MST Tracking study points to both humans and ruminants as potential sources. Though, In the Mettowee River base-flow sample, humans were an unlikely source of major fecal contamination.
    - http://pubs.usgs.gov/sir/2011/5113/
- Q: What is the meaning of *E coli* numbers?
    - Response: VT Water Quality Standards define allowable limits. Vermont is in the process of revising the E. coli water quality criteria to be consistent with USEPA scientific guidance and Department of Health beach management guidance, and to correct historic misinterpretation which caused the current *E. coli* standard to be erroneous. The new criteria for class B waters are proposed to be as follows:

  In all Class B waters - not to exceed a geometric mean of 126 organisms /100ml obtained over a representative period not less than 30 days, and no more than 10% of samples above 235 organisms/100 ml.
- Q: What are risks to wildlife?
    - Response: none.
- Q: Work of Paul Stamets may be relevant to address *E. coli* in runoff … he is growing oyster mushrooms in ag areas, with zero E. coli counts in DS waters.
    - Response: So noted.

On-site septic

- Comment: Need to address small plots/septics/old septics – Lake Bomoseen

- Response: The so called Creek Road (west shore Bomoseen) wastewater feasibility study report does not recommend a municipal project, because of excessive cost (over $11 million) to connect to the Town of Castleton sewer system, and lack of suitable soil and groundwater conditions for neighborhood cluster subsurface treatment systems. Instead, the report recommends the "homeowner awareness" model, aka "best fit" on individual properties. However, the facilities plan for the east shore of Lake Bomoseen *recommends* extension of sewer service to Crystal Heights, an existing suburban style street of about 14 homes. This street is located near Crystal Beach, but higher and further away from the lake, on the east side of Route 30. The facilities plan also addresses the Floating Bridge Road area at the north end of Lake Bomoseen, in Castleton, but it does not recommend sewer extension to that area, because of high cost.

- Comment: Sewage issues in Lake St. Catherine – problem that he has brought up to town health officers with no improvement. Has this process improved? What if there is raw sewage going into the lake.
  - Response: This is the role of the town health officer (THO). If there is evidence of septic system failure, then the matter can be pursued by the state (WSMD and CED). If the commenter is aware of specific locations where raw sewage is affecting the lake, these should be brought to the attention of the THO and Watershed Coordinator.
  - Response from Pawlet town health officer – the health office has the authority to require immediate remediation. The town(s) can also call state and Pawlet has had good response working with state officials.
  - In addition, during the late 1990's, VTDEC worked with the LSCA and Agency of Agriculture to successfully address an identified bacteria source to Lake St. Catherine.
- Comment from Town of Pawlet, Health Officer – interested in the *E. coli* impairment in Flower brook – first time he has heard of this. Assumes it is from (failed, failing) septic systems. Can you tell if it is a couple houses or a large group in the area?
  - Response: Asked where Flower brook samples are taken – PMNRCD District Manager discussed where samples have been taken per their LaRosa water quality monitoring program. Also discussion of going door to door for education and assessment in this area (by PMNRCD). Discussion of Stormwater Infrastructure mapping and IDDE (Illicit Discharge Detection and Elimination) monitoring and assessment planned for summer, 2014. Provided some information regarding wastewater feasibility analysis and options for community systems and on-site alternatives if illicit discharges are identified. Also discussed status of West Pawlet WWTF and funding sources (SRF and USDA Rural Development) if WWTF feasibility Analysis recommended additional municipal system.
- Question: Is the state looking at alternative septic systems?
  - Response: Innovative/Alternative (I/A) systems and products may be authorized by the Secretary for General Use (§ 1-1001), Pilot Projects (§ 1-1002) or Experimental Designs (§ 1-1003) under the Wastewater System and Potable Water Supply Rules, effective September 29, 2007 (Rules). The application process for approval of I/A systems and products is described in § 1-1004 of the Rules. Each approval for an I/A system or product will contain conditions under which the system or product may be used. Approvals

- Question: When residences change hands, the furnace needs to be inspected. Should/could we do this with septic systems and make it part of the sale?
    - Response: discussion of the triggers that require on-site suitability assessment – when use changes from seasonal to year round or when a complete tear down and rebuild occurs, but not for a change in internal plumbing or for an increase in the # of bathrooms (however, this may trigger municipal zoning regulations if in place).

Better Backroads

- Comment: Important to make sure that BBR is supported and that education and outreach continues to happen.
    - Response: So noted and actively promoted with towns (and per the SL Plan).

Lake Champlain

- Question: regarding phosphorous vs nitrogen in Lake Champlain basin
    - Response: Discussion of how both N and P can be co-limiting, especially for cyanobacteria.
- Questions: Is VT working with NY on basin plans?
    - Response: Yes and No - Discussion of Lake Champlain P-TMDL, TBPs, workgroups, CWICNY in the South Lake (septic pumpout program in NY)
- Question: How do we know that our efforts to address LC are worth it if NY State is not carrying their fair share?
    - Response: All major tributaries sampled on both sides. NYS Also is subject to the TMDL. ES explained the relationship btw the old TMDL that applies to NY and the forthcoming TMDL applied to VT. Brief description of Reasonable Assurances.
- Question: Please describe TMDL Process and potential ramifications to landowners.
    - Response: in RS, refer readers to most recent updated LC Phase I Implementation Plan.

Inland lakes

- Question: Plans need to identify high priority areas. Commissioner Mears has said ANR doesn't have management plans for each lake. Why not. We need plans and priorities.
    - Response: ES described the TBP process and pointed to past efforts to develop comprehensive watershed management assessment and planning for inland lake watersheds.
- Question: about more sampling in Lake Bomoseen –
    - Response: Discussion of Lay Monitoring Program already in existence on lakes in question. PMNRCD took names and will be in touch about LaRosa assistance.

TBP Planning Process

- Question: How does a regular citizen participate in decision making over how resources are deployed by the State thru the plan?
  - Response: ES responded using SL Workplan as example of stakeholder and citizen input.
- Question: Is this the Plan sent to EPA?
  - Response: EPA is aware of the importance of these plans and in fact supports many aspects of the underlying monitoring, assessment, and planning that goes into them. For all tactical basin plans in the Lake Champlain Basin, EPA scrutiny is expected to increase significantly once the Lake Champlain TMDL is finalized.

Nature of the Basin

- Question: What have been the LU changes in direct to lake areas?
  - Response: loss of pasture to a degree. Conversion of large tracts (esp AG) to residential (parcelization) in some cases.
- Question: What percentage of land along streams that is forested?
  - Response: Discussion of buffers and incentive programs. Some discussion of the Shoreland Protection Bill (specific regulations uncertain at this time).

M&A

- Questions: please explain red dots on monitoring map in the vicinity of Orwell?
  - Response: Those are monitoring sites – biology or water quality (Data shown are bug assessments). Discussion of ANR NR Atlas as a tool.
- Question: What is the role of excessive flows in driving nutrient and sediment loading from high watershed sources? Is that overwhelming efforts in agricultural areas?
  - Response: ES described prior LU history and role of legacy sediments. Need to focus on resilience?
- Comment: Sediment accumulation of legacy sediments could pose safety hazard

Mercury

- Question: High levels of Hg in Poultney – Is this associated with the old thermo factory?
  - Response: Hg sources are really not local, but include atmospheric deposition from coal fires power and possibly from now defunct MARECO mercury retort (recycling) facility in Albany.

Climate change

- Question: Effects of climate change on lake?

- Response: Much attention being put to this right now. State developing and implementing climate change action plan. 67% increase in heavy precipitation events in recent years. Has a huge effect on river mgmt. and also P loading. The commentor should also refer to the section of the Phase I Lake Champlaion TMDL implementation plan for a comprehensive discussion on climate change.

Issues not related to the Plan (pipelines, etc)

- Question: Is the State aware of transport of heavy crude on NYS side rail lines? What are safety standards in place?
  - Response: Not sure of safety standards, but this has very recently come to the attention of ANR, who will take a regulatory interest. Not sure the form this will take, but ANR's OPLA will be filing comments.
- Question: How does DEC deal with the winds that move debris to the VT side of the lake?
  - Response: We have not heard that Q before. Not sure how to address this? If litter, maybe NYS waste management could be brought to bear?
- Question: What is role of ANR in dealing with power lines and also VGS pipeline?
  - Response: These are in regulatory review. NCK described a little about proposed technology to lay in lines or directional bore VGS line, and regulatory processes involved.
- Question: What is in sludge bed?
  - Response: best answer to this is contained in the Lake Champlain Sediment Toxics Assessment of 1992, which was written by Dr. Al McIntosh from UVM, and is available
- Comment: I do not like Shorelands bill. I did not like editorial that showed up in Rutland Herald.
- Comment: Why is ANR and Comm. Mears not responding to my request for information regarding VGS. Also, how does a citizen engage in the regulatory process?
  - Response: Best opportunity is either thru PSB, or instead, thru 401 WQ Cert. public meetings.
- Question: I have bluelines (VHD layer) on ANR Atlas on my farm. Are they streams?
  - Response: Probably but not necessarily. If there are clear errors, they can be fixed. Best bet is to contact ARS or SA engineer to determine if these are jurisdictional.