

PROGRESS REPORT ON  
RIVER BASIN WATER QUALITY MANAGEMENT PLANNING  
DURING 2015

10 VSA 1253(d)

Submitted to the

HOUSE COMMITTEES ON:  
AGRICULTURE AND FOREST PRODUCTS  
NATURAL RESOURCES AND ENERGY  
FISH, WILDLIFE AND WATER RESOURCES

SENATE COMMITTEES ON:  
AGRICULTURE  
NATURAL RESOURCES AND ENERGY

VERMONT AGENCY OF NATURAL RESOURCES  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

JANUARY 15, 2016

Section 1) Introduction and Summary .....	3
Section 2) Tactical Basin Planning Process: Implementation of the Statewide Surface Water Management Strategy at the Basin Level .....	4
Progress in 2015.....	4
LEAN – Improvements in Tactical Basin Planning and in the Integration of CWI Funding for Enhanced and Restored waters.....	6
Water Quality Modeling to support Tactical Planning, and Phase II Implementation Plans for the Lake Champlain TMDL.....	6
The Role of Regional Planning Commissions in Tactical Basin Planning .....	7
An Added Focus on Protection .....	8
Section 3) Three year schedule for the development of Tactical Basin Plans .....	9
Section 4) Individual Basin Plan Contacts and Statements of Progress .....	10
Basin 1 Battenkill, Walloomsac, Hoosic .....	11
Basin 2 and 4: South Lake Champlain Basin, including Poultney, Mettowee.....	11
Basin 3 Otter, Little Otter, Lewis.....	13
Basin 5 Upper LC Direct, including LaPlatte, Malletts Bay, St. Albans Bay.....	14
Basin 6 Missisquoi Bay, including Pike and Rock .....	15
Basin 7 Lamoille.....	14
Basin 8 Winooski.....	15
Basin 9 White.....	16
Basin 10 Ottauquechee, Black, CT River Direct .....	16
Basin 11 and 13 Williams, West, Saxtons, Lower CT, Mill.....	17
Basin 12 and 13 Deerfield, Lower CT, Mill .....	17
Basin 14 and 16 Stevens, Wells, Waits, Ompompanoosuc, CT River Direct.....	18
Basin 15 and 16 Passumpsic and Northern CT River Watersheds .....	18
Basin 17 Memphremagog, Coaticook, Tomifobia.....	20

## Section 1) Introduction and Summary

In 2015, the Vermont Agency of Natural Resources, Department of Environmental Conservation (DEC, or Department) and its federal, state, municipal, regional and local watershed partners continued to be engaged in tactical basin planning process in all of Vermont's planning basins. The goal of the process is to develop tactical water quality watershed management plans for each of 15 planning basins that are built in a two-year timeframe, are revisited every five years, and for which implementation tables of priority actions are continually updated. The overall goal for each basin water quality management plan is to establish and carry out strategies that will protect, maintain, enhance or the surface waters of the basin by directing regulatory, technical assistance, and funding to highest-priority subwatershed areas. This report is prepared in fulfillment of 10 VSA §1253(d)(1).

Basin plans and the basin planning process are required by Vermont Statute in 10 V.S.A. Section 1253(d), Section 1-02D of the Vermont Water Quality Standards, and the U.S. EPA 40 Code of Federal Regulations Part 130, Section 130.6 – Water Quality Management Plans. In prior editions of this Report, DEC described the Vermont Surface Water Management Strategy and associated tactical basin planning process. This process is used to produce the tactical basin plans described throughout this report. The process is described in Chapter Four of the SWMS at [http://www.vtwaterquality.org/wqd\\_mgtplan/swms\\_ch4.htm](http://www.vtwaterquality.org/wqd_mgtplan/swms_ch4.htm).

During 2015, significant progress was achieved, with public review, responsiveness revisions, and approval by ANR Secretary Markowitz of the tactical basin plans listed below. With the signing of the Battenkill, Hoosic and Walloomsac Tactical Basin Plan, the DEC has now completed a full round of basin plan development for all major basins in the State.

- [North Lake Champlain Direct Tactical Basin Plan](#), August 25, 2015
- [Wells, Waits and Ompompanoosuc Rivers Tactical Basin Plan](#), August 27, 2015
- [West, Williams and Saxton's Rivers Tactical Basin Plan](#), Draft for public review October 30, 2015 signed Jan 4, 2016
- [Battenkill, Hoosic and Walloomsac Tactical Basin Plan](#), Draft for public review November 18, 2015 signed Jan 4, 2016.

The Department has put into place mechanisms to ensure that the production schedule for basin plans remains fully compliant with 10 VSA §1253(d). In addition, with the recent passage of Act 64, the tactical basin planning process is recognized as the vehicle by which certain water quality practices required by the Lake Champlain TMDL and accompanying Phase 1 Implementation Plan will be phased. In Section Two of this report, the reader will find descriptions of several process improvements resulting from a "Lean" business process analysis, to align the tactical planning process to the requirements of Act 64. Section Three of this report provides the statutorily required timeline for the production of tactical basin plans, and Section four presents individual descriptions of progress for each planning basin.

## Section 2) Tactical Basin Planning Process – Progress in 2015.

The Vermont Clean Water Act requires the development of Tactical Basin Plans for each of Vermont’s 15 river basins to be adopted on a five-year recurring cycle. These plans integrate watershed modeling, water quality monitoring, sector-specific pollution source assessments, and stakeholder input to document

geographically-explicit actions necessary to protect, maintain, enhance, and restore surface waters. These efforts are implemented through a combination of federal and state funding sources, partner support, internal agency support, and for certain protection efforts, the public rulemaking process.

In 2015, MAPP supported tactical planning across all basins in Vermont. The figure to the left indicates the current basin plan type that is available within each of Vermont’s 15 planning basins. Tactical basin plans are considered the modern standard, which present precise, geographically-explicit implementation tables identifying those projects necessary to protect, maintain, enhance, and restore surface waters. Certain planning basins are still covered by either traditional basin plans, which were developed using the 1990’s era Watershed Initiative Planning guidelines, or transitional, or hybrid traditional-tactical plans.

Table 1 (below) provides an indication of the planning status for each Vermont basin for the reporting period, with a more detailed view of activities in each planning basin. This report section also describes the results of several business process improvement efforts which the Watershed Management Division led, using Lean business process improvement approaches, to further modernize the tactical planning process. In addition, new modeling capabilities that have been

developed using resources conferred by Act 64 are also described. The required three-year plan production schedule is shown in Section 3 of this report. Every tactical basin plan that is produced by this schedule will adhere to the tactical planning process.



Vermont’s 15 Tactical Planning Basins, and the current status of each basin plan.

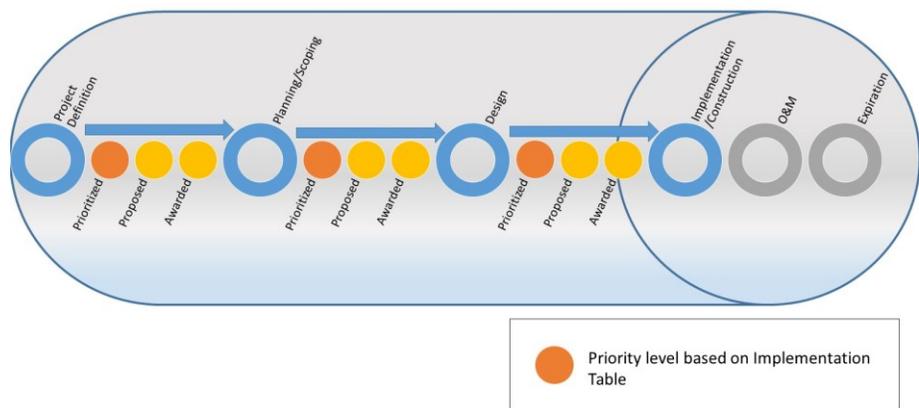
Table 1. Overall Status of Basin Planning as of 1/1/2015.

<b>Basin</b>	<b>Year of most recent plan issuance</b>	<b>Planning phase for 2015</b>
Basin 1 Battenkill, Walloomsac, Hoosic	2016 (Jan 4 <sup>th</sup> )	Implementation
Basin 2 and 4 Poultney, Mettowee, Lower Champlain Direct	2014	Implementation
Basin 3 Otter, Little Otter, Lewis	2012	Assessment, Implementation
Basin 5 Upper LC, LaPlatte, Malletts Bay, St. Albans Bay, Rock, Pike	2015	Implementation
Basin 6 Missisquoi	2013	Public review of new Tactical Plan fall 2016, including Lake Champlain Phase II BMP Implementation Plan.
Basin 7 Lamoille	2009	Public review of new Tactical Plan fall 2016, including Lake Champlain Phase II BMP Implementation Plan.
Basin 8 Winooski	2012	Implementation
Basin 9 White	2013	Assessment, Implementation
Basin 10 (13) Ottauquechee, Black	2012	Implementation
Basin 11 & 13 Williams, West, Saxtons, Lower CT,	2016 (Jan 4 <sup>th</sup> )	Implementation
Basin 12 & 13 Deerfield, Lower CT, Mill	2014	Implementation
Basin 14 Stevens, Wells, Waits, Ompompanoosuc	2015	Implementation
Basin 15 / 16 – Northern CT River Watersheds	2014	Implementation
Basin 17 Memphremagog, Coaticook, Tomifobia	2012	Implementation, development of Lake Memphremagog phosphorus TMDL, Tactical Plan being developed for public review fall 2016.

## Lean – Improvements in Tactical Basin Planning and in the Integration of CWI Funding for Enhanced and Restored waters

Finding and funding priority surface water remediation projects is critical to successful sediment and nutrient pollution reduction efforts that are the main intent of Act 64. During the past year, the Division used Lean business process evaluation tools to examine and improve approaches by which remediation projects are identified, prioritized, and funded. The most important outcome to the evaluation was the need for, and subsequent development of integrated criteria allowing prospective projects to be prioritized for implementation within tactical basin plans and funded using available federal and state funds. These so-called Stage Gate criteria are premised on the idea that any given project is completed thru a series of discrete phases; inception, scoping and feasibility, design, and finally construction. For any given project phase, or “Stage,” there are now developed predictable criteria, or “Gates,” that should be satisfied to move a project forward. This approach ensures that incrementally higher-cost investments necessary to move a project forward thru the stages are made on the most important projects first.

Pipeline of Projects  
Identified in TBP Implementation Tables



A project may also be fast-tracked if additional assessment and/or project feasibility is not necessary to move into project implementation, or the project meets criteria that affirms the urgency of immediate action. These types of projects can be time sensitive or represent a significant resource concern.

Graphic representing use of Stage Gate criteria in an electronic tactical plan implementation table.

Implicit in the stage-gate approach is the need to develop a robust database system allowing public access to view the breadth of projects to be undertaken, their stage, criteria-based prioritization, and status. This database is being developed as of this writing. The database will be able to track the lifespan of projects from proposal to design, implementation to O&M, and eventually termination. Goals of the database include tracking of funding events, BMPs implemented, and performance measures along with the stage-gate project prioritization framework. The database will also help facilitate reporting to the legislature, EPA, and the public. An online portal will allow the public to see real time status of projects. The first application of stage-gate criteria will be implemented within this database for the forthcoming Missisquoi and Lamoille tactical plans. The same database will be used to track and account for the full suite of clean water projects statewide to meet the reporting requirements of Act 64, and also to support the accountability needs of the Lake Champlain TMDL.

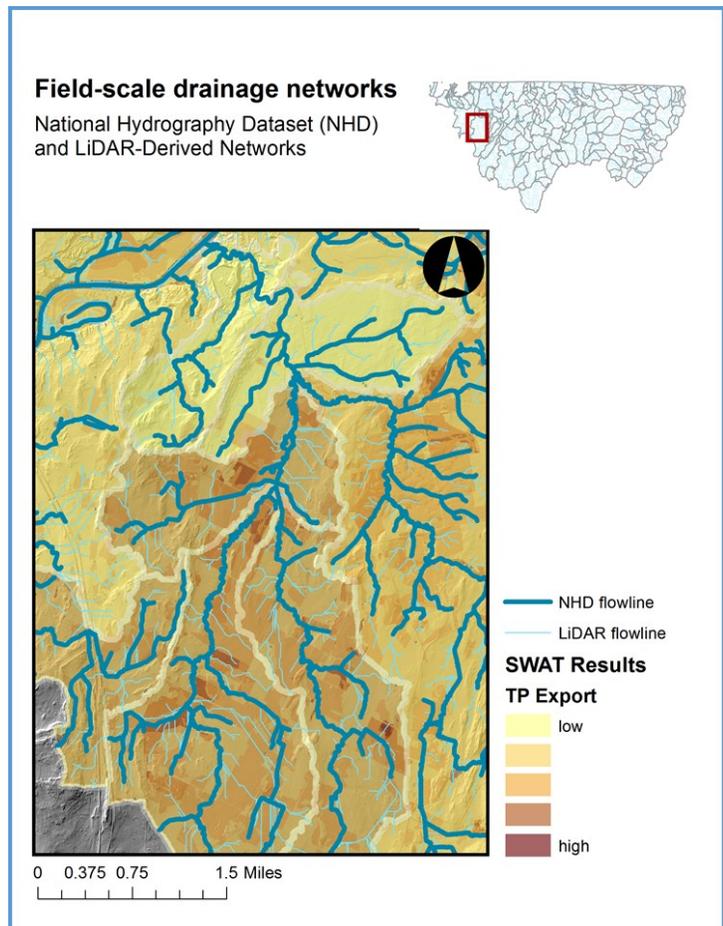
## Water Quality Modeling to support Tactical Planning, and Phase II Implementation Plans for the Lake Champlain TMDL

Under the US Environmental Protection Agency’s TMDL process, the programs and management approaches spelled out by the Lake Champlain TMDL Phase I Implementation plan need to be expanded into much more explicit descriptions by subwatershed. These explicit, “Phase-II” plans comprise the blueprints by which the

TMDL is to be accomplished. The Lake Champlain Phase I Plan and Act 64 identifies tactical basin planning as these “Phase II” vehicles by which the required rosters of best management practices and regulatory measures will be identified and phased-in, to accomplish the goals of the TMDL.

[As described in the May version of the Lake Champlain Phase I Plan](#) (Chapter 5F), this work requires a significant investment of water quality modeling capacity into the planning process. Staffing to support water quality modeling was secured in November of 2015 with the following enhanced capabilities.

High-resolution topographic data will be used to model how water moves over the landscape. This information will be combined with predicted nutrient loadings from the Lake Champlain Soil Water Assessment Tool “SWAT” model, other models, and other watershed characteristics (slope, soil type, etc.), to prioritize BMP selection and placement. This will allow us to apply and refine the broad recommendations from the Champlain TMDL Scenario Tool into very precise geographic prescriptions, in order to meet the load allocations of the TMDL. The nutrient loading reductions at the project-level can then be predicted, to account and track progress towards achievement of the allocations, as practices are put into place. New statistical capabilities to further analyze a range of monitoring data, including flow, water chemistry, and biology are also being developed. Options here include time series and trend analyses, statistical modeling and prediction, statistically valid site rankings and monitoring designs. These modeling approaches will improve tactical basin plans, and also fulfill Section 35 of Act 64 pertaining to data availability.



One use of the of the Missisquoi Basin “SWAT” model (LCBP, 2011), which shows the intersection of high levels of nutrient export, superimposed upon extremely high resolution water conveyance features derived from Lidar data. Note the precision with which high nutrient runoff potential areas can be integrated with conveyances that may connect to watercourses.

### The Role of Regional Planning Commissions in Tactical Basin Planning

During the past year, and as part of the implementation of Act 64 (Sec. 43), DEC has contracted with Regional Planning Commissions to fulfill the specific roles and responsibilities around the development of tactical basin plans as articulated in Sections 26 and 27. Through this cooperative process, the Vermont Association of Planning and Development Agencies (VAPDA) and DEC have set forth a series of activities that each Regional Planning Commission (RPC) shall undertake in support of tactical planning for all watersheds in the State. This new organizational alignment recognizes that significant municipal outreach is now needed to develop understanding of Act 64 authorities, develop tactical basin plans, and ultimately to track the implementation of the projects and BMP installations highlighted in tactical plans, that are carried out by municipalities or other partners. The roles and responsibilities articulated in the SFY2016

performance contract with RPCs specifically acknowledges the strengths of the RPCs in supporting municipal activities aimed at water quality protection and restoration. The contracted activities under the SFY2016 contract include:

- 1) Increase municipal awareness and readiness to implement Act 64 by conducting municipal outreach and education, and cross-program integration and coordination;
- 2) Promote resilience and water quality protection and improvement by providing municipal planning assistance;
- 3) Develop better information for municipalities by providing coordination of water quality monitoring, and oversight of independently funded assessments;
- 4) Provide municipal and regional input to assist in tactical basin plan development, including project prioritization;
- 5) Assist in the protection of high quality resources and documentation of restoration efforts by participating in tactical basin plan implementation.

For each RPC, the specific scope of work has been tailored to the current status of each tactical plan, and to the constituencies of each RPC. There are performance tasks that are required statewide, certain tasks that are required in Champlain watershed RPCs, and still other tasks that an RPC may elect as optional but valuable activities. The RPCs are providing tactical planning services that should substantially enhance DEC's ability to reach municipalities and other relevant stakeholders. Further, the contracted activities are developing augmented capacity in RPC's to support water quality protection and restoration. The development of this capacity during SFY2016 is timely insofar as a "gearing up" is necessary for all partners to optimize delivery of Act 64 requirements in the coming years. Thus, subject to the availability of funding that does not compete with other necessary support under Section 43 of Act 64, it is recommended that this partnership be expanded to maintain the momentum and capacity that is now developing through the DEC-RPC partnership.

### **An Added Focus on Protection**

In addition to implementation priorities, Chapter 4 of the Surface Water Management Strategy identifies processes by which additional surface water protections may be achieved, either through designations, or reclassification pursuant to 10 VSA §1253. During 2015, DEC continued to promote reclassification of a suite of surface waters within US Forest Service Lands to Class A(1), and also undertook a staff-led effort to re-envision the classification structure of the Water Quality Standards, to replace the poorly-understood "Water Management Types" with a robust and justifiable classification system that will support a transparent and predictable antidegradation rule. This proposed restructuring of the Water Quality Standards will be the focus of stakeholder outreach and hopefully formal rulemaking during 2016. Finally, the Wetlands Program continues to identify and prioritize wetlands for potential Class 1 wetland designation.

### Section 3) Three year schedule for the development of Tactical Basin Plans.

Basin and Most Recent Plan Status	Major Watershed	Activity	2016	2017	2018	
<b>Basin 15 – Passumpsic</b> June 2014 – Tactical Plan	<b>CT RIVER</b>	M+A	Assess			
		Planning		Start	Finish	
<b>Basin 16 – Northern Conn</b> June 2014 – Tactical Plan		M+A		Mon	Assess	
		Planning				
<b>Basin 17 - Memphremagog</b> June 2012 – Tactical Plan	<b>ST. LAWRENCE</b>	M+A				
		Planning	Finish			
<b>Basin 1 –Battenkill, Hoosic, Walloomsac</b> Tactical Plan 2016	<b>HUDSON</b>	M+A			Mon	
		Planning				
<b>Basin 2 and 4 – Poultney, Mettawee, South Lake</b> June 2014 – Tactical	<b>CHAMPLAIN</b>	M+A	Assess			
		Planning	Start	Finish		
<b>Basin 3 – Otter, Lewis, Little Otter</b> May 2012 – Traditional/Tactical Hybrid		M+A	Mon	Assess		
		Planning			Start	
<b>Basin 7 – Lamoille</b> February 2009 – Traditional Plan	<b>CHAMPLAIN</b>	M+A			Mon	
		Planning	Finish			
<b>Basin 9 – White</b> July 2013 – Tactical Plan		M+A				
		Planning		Start	Finish	
<b>Basin14–Wells,Waits, Ompompanoosac</b> August 2015 – Tactical Plan		M+A		Mon	Assess	
		Planning				
<b>Basin 5 – Northern L.C. Direct</b> August, 2015 – Tactical Plan	<b>CHAMPLAIN</b>	M+A	Mon	Assess		
		Planning			Start	
<b>Basin 6 – Missisquoi, Rock &amp; Pike</b> March 2013 – Traditional Plan		M+A			Mon	
		Planning	Finish			
<b>Basin 8 – Winooski</b> May 2012 – Traditional/Tactical Hybrid		M+A	Assess			
		Planning		Start	Finish	
<b>Basin 10 (13) – Black, Ottauquechee</b> May 2012– Traditional/Tactical Hybrid		<b>CT RIVER</b>	M+A			
			Planning	Start	Finish	
<b>Basin 11 &amp; 13 –West, Williams, Saxtons</b> Tactical Plan 2016	<b>CT RIVER</b>	M+A		Mon	Assess	
		Planning				
<b>Basin 12 &amp; 13 – Deerfield, Broad Brook</b> March 2014– Tactical Plan	<b>HUDSON</b>	M+A	Mon	Assess		
		Planning			Start	

## Section 4) Individual Basin Plan Contacts and Statements of Progress

Watershed Planning Basin	Contact and web links
<ul style="list-style-type: none"> <li>• Basin 1 Battenkill, Walloomsac, Hoosic:</li> <li>• Basin 2 and 4 Poultney, Mettowee, Lower Champlain Direct</li> <li>• Basin 3 Otter, Little Otter, Lewis</li> </ul>	<p>Ethan Swift, Watershed Coordinator            Department of Environmental Conservation            430 Asa Bloomer Building            Rutland, Vermont 05701            (802) 786-2503  <a href="mailto:Ethan.Swift@vermont.gov">Ethan.Swift@vermont.gov</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_battenkill.htm">http://www.vtwaterquality.org/planning/htm/pl_battenkill.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_poultney.htm">http://www.vtwaterquality.org/planning/htm/pl_poultney.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_ottercreek.htm">http://www.vtwaterquality.org/planning/htm/pl_ottercreek.htm</a></p>
<ul style="list-style-type: none"> <li>• Basin 5 Upper LC Direct, including LaPlatte, Malletts Bay, St. Albans Bay</li> <li>• Basin 6 Missisquoi Bay, including Pike and Rock</li> <li>• Basin 8 Winooski</li> </ul>	<p>Karen Bates, Watershed Coordinator            DEC Regional Office            111 West Street,            Essex Junction, VT 05452            802-879-2339  <a href="mailto:karen.bates@vermont.gov">karen.bates@vermont.gov</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_northernlcb.htm">http://www.vtwaterquality.org/planning/htm/pl_northernlcb.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_missisquoi.htm">http://www.vtwaterquality.org/planning/htm/pl_missisquoi.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_winooskibasins.htm">http://www.vtwaterquality.org/planning/htm/pl_winooskibasins.htm</a></p>
<ul style="list-style-type: none"> <li>• Basin 7 Lamoille</li> <li>• Basin 9 White</li> <li>• Basin 14 (+16) Stevens, Wells, Waits, Ompompanoosuc, CT River Direct</li> </ul>	<p>Danielle Owczarski, Watershed Coordinator            Department of Environmental Conservation            1 National Life Drive 2 Main            Montpelier, VT 05620-3522  <a href="mailto:danielle.owczarski@vermont.gov">danielle.owczarski@vermont.gov</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_lamoille.htm">http://www.vtwaterquality.org/planning/htm/pl_lamoille.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_whiteriver.htm">http://www.vtwaterquality.org/planning/htm/pl_whiteriver.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_stevens.htm">http://www.vtwaterquality.org/planning/htm/pl_stevens.htm</a></p>
<ul style="list-style-type: none"> <li>• Basin 10 Ottauquechee, Black, CT River Direct (Mill, Lulls, Hubbard)</li> <li>• Basin 11 (+13) Williams, West, Saxtons, Lower CT Direct (Commissary, Morse, East Putney, Sacketts)</li> <li>• Basin 12 (+13) Deerfield, Lower CT Direct, (Crosby, Whetstone, Broad, Newton)</li> </ul>	<p>Marie Levesque Caduto, Watershed Coordinator            100 Mineral Street, Suite 303            Springfield, VT 05156            802-885-8958  <a href="mailto:Marie.Caduto@vermont.gov">Marie.Caduto@vermont.gov</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_basin10.htm">http://www.vtwaterquality.org/planning/htm/pl_basin10.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_west.htm">http://www.vtwaterquality.org/planning/htm/pl_west.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_deerfield.htm">http://www.vtwaterquality.org/planning/htm/pl_deerfield.htm</a></p>
<ul style="list-style-type: none"> <li>• Basin 15 Passumpsic</li> <li>• Basin 16 Northern CT River Watersheds</li> <li>• Basin 17 Memphremagog, Coaticook, Tomifobia</li> </ul>	<p>Ben Copans, Watershed Coordinator            Department of Environmental Conservation            1229 Portland Street            St. Johnsbury, VT 05819            (802) 751-2610  <a href="mailto:ben.copans@vermont.gov">ben.copans@vermont.gov</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_passumpsic.htm">http://www.vtwaterquality.org/planning/htm/pl_passumpsic.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_upper_ct.htm">http://www.vtwaterquality.org/planning/htm/pl_upper_ct.htm</a>  <a href="http://www.vtwaterquality.org/planning/htm/pl_memphremagog.htm">http://www.vtwaterquality.org/planning/htm/pl_memphremagog.htm</a></p>

### **Basin 1: Battenkill, Walloomsac, Hoosic**

The Tactical Basin Plan for the the Batten Kill, Walloomsac, and Hoosic Rivers (tributaries to the Hudson River in New York) was recently approved by ANR Secretary Markowitz, and marks the completion of basin plans for all basins of the State. This plan has been developed to protect and restore surface waters for those watersheds, which includes all the land in Vermont that drains to the Hudson River in New York. The protection and improvement opportunities address high elevation surface waters that are impaired due to acidity, and other surface waters with elevated levels of sediment and nutrients. In addition, there is a good deal of focus on flood and erosion hazard risks in basin waterways. The heart of this plan is the implementation table in Chapter 4, which includes actions to protect or restore surface waters in the basin. High priority stressors in the Hudson River Basin include Acidity (atmospheric deposition), Encroachment, Channel Erosion, Invasive Species, Thermal Modification, and Land Erosion.

In general, the Batten Kill, Walloomsac, and Hoosic Rivers are targeted for protection and restoration strategies while various tributaries are 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 Hudson River Tactical Plan, ongoing efforts to build flood resiliency will be a featured priority in the first biennial review, to implement priority actions related to ongoing restoration efforts due to Tropical Storm Irene.

The Hudson River Tactical Basin Plan presents the integrated recommendations of State and Federal resource agencies (such the US Forest Service), the Bennington County Regional Planning Commission, Bennington County Conservation District, watershed organizations such as the Batten Kill Watershed Alliance and the Hoosic River Watershed Association, the Bennington County Regional Planning Commission, and individual citizens.

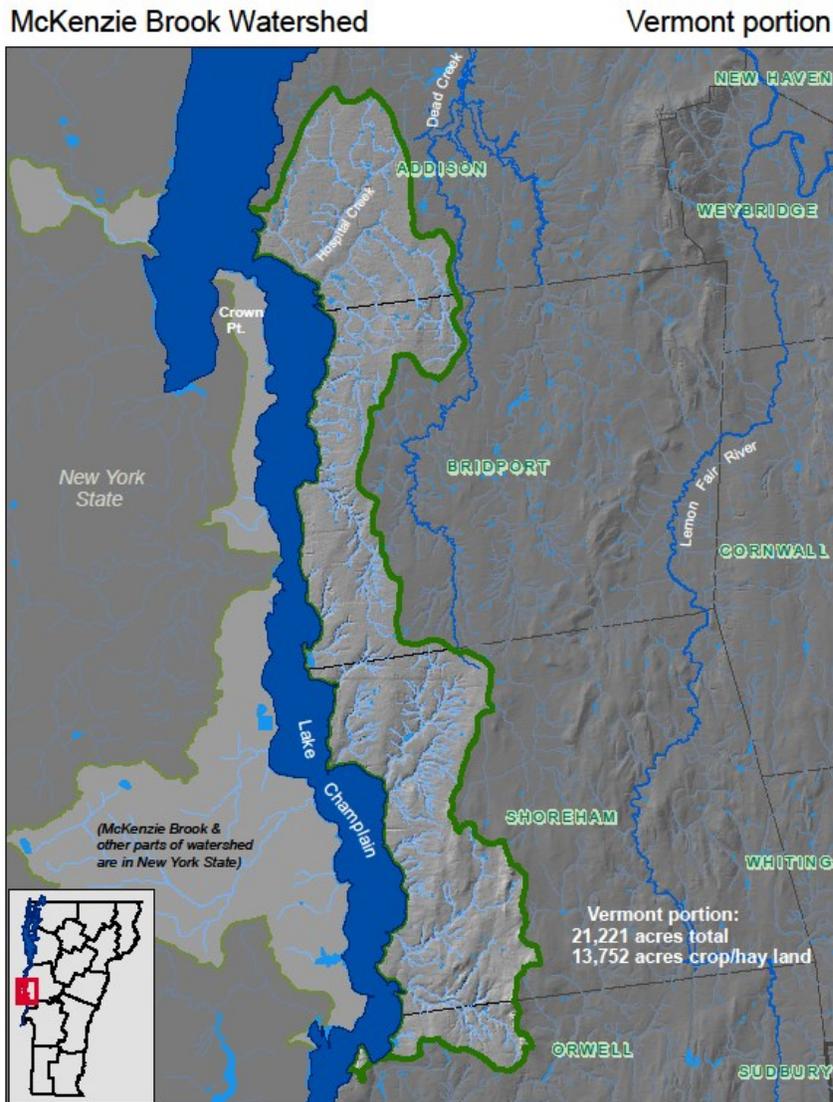
Recently funded projects through the State's Clean Water Initiative program include an alternatives analysis for a floodplain restoration project along the Roaring Branch of the Walloomsac River in Bennington (with the Bennington County Natural Resource Conservation District), and the development of a river cooridor plan for the Hoosic River with the Bennington County Regional Planning Commission. In addition, a Stormwater Master Plan was developed for the Town of Rupert that included a rural road focus to identify and mitigate sediment and nutrients from stormwater runoff into the White Creek and Mill Brook.

### **Basin 2 and 4: South Lake Champlain Basin, including the Poultney and Mettowee Rivers**

Recent focus on the South Lake and priority sub-basins has led to a multi-partner planning and BMP implementation effort as a result of the Lake Champlain Basin Regional Conservation Partnership Program (RCPP). The resource concerns addressed in this proposal include the national priorities of water quality and soil health. The primary resource concern is water quality, due to excess nutrients and sediment pollution. The funding through the USDA has been awarded for the accelerated implementation of agricultural and forestry conservation practices in the Lake Champlain Watershed of Vermont and New York. Within the South Lake Basin, the McKenzie Brook watershed was selected due in part to the high percentage of agricultural land use and available water quality monitoring and assessment data in order to develop a targeted Watershed Improvement Plan for the McKenzie Brook sub-basin within the South Lake.

This watershed plan, developed by Vermont USDA-NRCS and partners (State of Vermont Agency of Agriculture, Food and Markets, and Agency of Natural Resources) is meant to address the need for more effective practice implementation of conservation plans on agricultural lands in the Lake Champlain Basin. Past conservation practice implementation efforts have been broad in scope and have not resulted in any measurable improvements in water quality. In response to the pending new phosphorus TMDL for Lake Champlain and the availability of increased NRCS funding for the next five years NRCS in Vermont has decided to use a more strategic and focused process for conservation practice implementation. Under this new process NRCS will collaborate with the Vermont Department of Environmental Conservation (VTDEC) to contribute information to the agricultural sections of Tactical Basin Plans (TBP's). These agricultural

watershed plans will provide a comprehensive inventory of land use and resource conditions in each of the targeted watersheds.



This information will then be used by Local Watershed Teams working in each watershed to identify and target specific farms and fields for further resource assessment and the development of practice alternatives, this will become their Local Watershed Team Action Plan. These Local Watershed Teams will be initially established by NRCS, but will be directed by an appropriate local partner to bring all agricultural partners together to work in a coordinated and strategic effort. The Local Watershed Teams will also determine the length of the project for each watershed and what amount of phosphorus reduction they would like to achieve during that time period. The timeline and amount of practice implementation may be determined to some extent by the amount of funds likely to be available and the staff available to implement the Local Watershed Team Action Plan.

Accomplishments and priority projects funded during 2015 include:

- The Flower Brook Stormwater Master Plan (a tributary to the Mettowee River in Pawlet) – stormwater priority project identification with the Poultney Mettowee Natural Resource Conservation District to identify high priority projects that will reduce sediment and nutrient enrichment.
- A Stormwater retrofit design for municipal properties in the Town of Middletown Springs (in order to reduce phosphorus and sediment loading to the Poultney River).
- A Stormwater Master Plan for the Sucker Brook – a tributary to Lake Bomoseen that brought down a tremendous amount of sediment during Tropical Storm Irene – with the Poultney Mettowee Natural Resource Conservation District.
- The York Street stormwater retrofit project that will address stormwater runoff from roughly one-third of properties within the Town of Poultney.

The South Lake Champlain Tactical Basin Plan is slated to commence this year (2016) following on refreshed surface water quality monitoring and assessment data to take stock of known priority water quality issues and identify emerging trends. Stakeholders in the tactical basin planning process will be engaged to contribute to and inform our understanding of surface water conditions and management strategies.

### **Basin 3: Otter Creek, Little Otter Creek, Lewis Creek**

The Otter Creek Basin – Water Quality Management Plan was completed and approved by the Secretary of the Agency of Natural Resources and DEC Commissioner in May of 2012. This Plan was one of the last “hybrid” versions of watershed planning between the older “Watershed Initiative” basin plan format and the current tactical basin planning process. The Otter Creek Basin Plan contains priority recommended actions for improving and protecting surface waters in the Otter Creek Basin (including several large tributaries), as well as identifying dozens of potential river restoration projects designed to build flood resiliency and reduce private property losses that occurred following Tropical Storm Irene. The Otter Creek Basin Plan addresses the priority water quality stressors that affect surface waters in the Otter Creek Basin as well as the specific water quality concerns identified by the stakeholders in the basin planning process.

The Otter Creek Basin Tactical Basin Plan is slated for a rewrite following a comprehensive water quality monitoring and assessment data review process that will commence in 2018.

Accomplishments and priority projects funded during 2015 include:

- The Lewis Creek Association’s “Ahead of the Storm Project” - Preparing Local Watersheds for Flood Resilience and Reducing Runoff in the towns of Shelburne, Charlotte and Hinesburg.
- The Cold River Project Alternatives Analysis and Project Development
- The East Creek Stormwater Master Plan priority project development and implementation – with the Rutland Natural Resource Conservation District and the City of Rutland
- Stormwater Mitigation (Adams Street Outfall Retrofit) Project working with the City of Rutland.
- Various stormwater reduction projects in the Towns of Middlebury and Vergennes (stormwater retrofits and low impact development projects - such as rain gardens in Middlebury).



**The Cold River in Rutland County was significantly affected by Tropical Storm Irene**

### **Basin 5 Upper LC Direct, including LaPlatte, Malletts Bay, St. Albans Bay**

The plan was signed in August 2015. The planning process drew heavily from assessment information including water quality results obtained this year with the help of volunteers working with the Regional Stormwater Education Program and the South Chittenden County River Watch (formerly the LaPlatte Watershed Partnership) who have received financial and technical assistance from the WSMD. This Basin Five plan presents discrete, geographically explicit project implementation opportunities. This Plan is also the first that will be entered into the project tracking database described in Section 2 of this report.

Completed projects this year have already addressed strategies in the plan including:

- Crooked Creek gully stabilization design
- The *Ahead of the Storm* project, headed by the Lewis Creek Assn and other partners, has begun to develop designs for the installation of more optimal stormwater management practices for a variety of properties listed in the tactical basin plan.
- Assessments of farms in the St. Albans bay by AAFM and mapping of ditches
- Designed and constructed two experimental treatment systems to reduce phosphorus loading from a tile drain on a Franklin County farm with the Friends of Northern Lake Champlain.
- Stormwater bioinfiltration basin built to reduce erosion on Lake Iroquois Recreation District Beach.

## Basin 6 Missisquoi Bay, including Pike and Rock

The present plan dated March 2013, will be replaced in late 2016 with a new Tactical Basin Plan. Presently, the water quality assessment and internal review process for the 2016 tactical basin plan is underway. During the year, assessment work supported in the plan included Missisquoi River Basin Association and the Franklin Watershed Committees (Lake Carmi watershed) volunteer water quality monitoring program with financial and technical assistance from the WSMD. WSMD also provided resources to analyze over five years of data to provide a list of priority areas for remediation based on high phosphorus and sediment levels. The Missisquoi tactical basin plan will also be one of two that will present a completely staged and prioritized electronic implementation table as described in Section two of this report, providing the “Phase II” implementation scenarios for this basin to begin implementation of the Lake Champlain TMDL. Further, the first local implementation action team was convened by WSMD staff for the Lake Carmi watershed, to assist with the development of strategies for the 2015 plan, and to help coordinate implementation of the plan among interested partners.

Examples of a few of the plan strategies that were completed this year included:

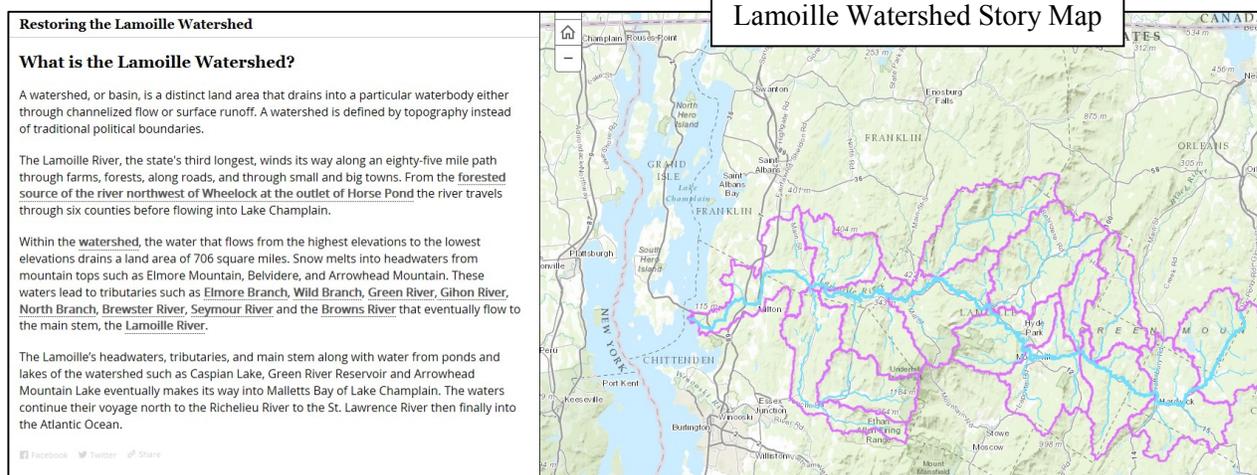
- AAFM continues to assess *all* farmsteads in the Franklin County
- Stormwater treatment bioretention practices in have been installed in Sheldon
- The Upper Missisquoi and Trout river became Vermont’s first National Wild and Scenic River
- Riparian buffer plantings have been put into place by the Friends of Northern Lake Champlain and the Missisquoi River Basin Association

## Basin 7 Lamoille

The previous basin plan was completed in 2009. Nearly seventy-five percent of the basin plan’s action items have been implemented or are currently being developed. The water quality assessment and internal review process for the 2016 tactical basin plan is underway. The Lamoille tactical basin plan will also be one of two that will present a completely staged and prioritized electronic implementation table as described in Section two of this report, providing the “Phase II” implementation scenarios for this basin to begin implementation of the Lake Champlain TMDL.

Some priority watershed protection and restoration projects and technical assistance provided in 2015 include:

- Flood resiliency grant awarded to the Lamoille County Planning Commission (LCPC), for a flood modeling and mitigation project for Johnson, Cambridge, Wolcott and Jeffersonville. This project includes the replacement of undersized culverts and buyouts of vulnerable floodplain areas. The flood resiliency grant was received through the High Meadows Fund.
- Development of the [Lamoille Watershed Story Map](#). LCPC developed an interactive web map to demystify river corridor planning language and highlight river corridor planning and restoration projects



being accomplished by many organizations and partnerships throughout the Lamoille watershed. The project was funded through a Watershed Grant provided by the Vermont Department of Fish and Wildlife

- Grant agreement prepared for the Lamoille Natural Resource Conservation District's (NRCD) Stormwater Low Impact Development (LID) project in the Town of Hyde Park that will cover stormwater survey, design, cost estimates and implementation of LID and gully stabilization practices.
- Brewster River Corridor plan developed and completed. Multiple projects were identified in the Brewster River corridor with Smuggler's Notch Resort, VTDEC Rivers Management Program (RMP), Lamoille NRCD and Lamoille RPC including: the upgrading of 4 stream crossings, removal of 2 berms, re-location of a resort road, parking lot runoff remediation, and arresting channel incision to address an iron-impaired stream adjacent to a major parking lot.
- Field project implemented by the Lamoille River Paddlers Association including: upgrading several canoe access areas, improving portage trails, inventorying possible river camp sites, and conducting educational paddles, as well as GIS mapping efforts along the entire Lamoille River.
- Lamoille Rail Trail from Cambridge to Morrisville completed to provide for recreational access to the Lamoille River for fishing, swimming and boating.
- Permanent public access attained for a local swimming hole in Johnson on the Gihon River by the Vermont River Conservancy (VRC) in partnership with the Johnson Conservation Commission.
- Better Back Roads grants approved for 4 towns including Eden, Hyde Park, Cambridge and Belvidere.
- Two-day River-Roads training presented by VTDEC RMP and VTrans Local Roads Program for the Village of Jeffersonville.
- A significant area of valley wall and river corridor delineations completed within the main stem of the Lamoille River.
- Flume demonstration completed with VTDEC RMP to the Wolcott Planning Commission and Development Review Board.
- Green Mountain Power (GMP), VTDEC, and Lake Champlain Tributaries grant project funds received to protect lower Lamoille River sites with perpetual riparian buffer easements. Partners were VTDEC, GMP, Vermont Land Trust and VRC.

### **Basin 8 Winooski**

The Basin 8 plan was completed in May 2012. Ongoing assessments supported by strategies in the plan include the development of a stormwater master plan for the upper Winooski River for the towns of Plainfield, Calais and Marshfield. The plan will prioritize culvert replacements, and projects that will address stormwater runoff from roads and other impervious areas in the villages. The planning process also includes an illicit discharge detection and elimination plan. The Friends of the Winooski River, Huntington River group, and Friends of the Mad River continued their volunteer water quality monitoring of rivers in the basin with financial and technical assistance from the WSMD.

Completed strategies include:

- 10 acres of tree planting to enhance river buffers;
- Stormwater management planning in 2 upper Winooski watershed towns along with a design of a stormwater management practice in Plainfield; and,
- Two green stormwater infrastructure projects designed and installation begun in Northfield in a continuation of the town's efforts to manage stormwater along the Dog River.

### **Basin 9 White**

The tactical basin plan was completed in July 2013. Fifty-one high priority actions were identified and over half of those actions have either been completed or are underway.

Some priority watershed protection and restoration projects and technical assistance provided in 2015 include:

- Flood resiliency funding approved for Granville, Pittsfield, Hancock, Rochester, and Stockbridge managed by the Quintown Collaborative (QC), a multi-town partnership. The flood resiliency grant was received through the High Meadows Fund. The QC is currently working on an interactive community flood tour to identify projects implemented in the watershed and opportunities for flood protection. The grant also makes QC eligible for funding for implementation projects during the next grant round.
- LaRosa grant approval received by the White River Partnership (WRP) for water quality monitoring.
- Meeting held to assist the development of a water quality sampling protocol for the Hartford Firing Range with the WRP, VT Waste Management, VT Fish and Wildlife, and VT Monitoring, Assessment, and Planning Program (MAPP) aquatic biologists.
- Assistance provided to the Two River Ottauquechee Regional Commission (TRORC) in developing a 604(b) proposal around developing a workshop related to stormwater master planning.
- Riparian buffer planting completed along the West Branch with the White River Partnership, US Fish and Wildlife (USFS), and a group of middle school students.
- Development of the Third Branch dam removal project in Randolph.
- Other projects in Basin 7 include: additional riparian buffer plantings, culvert replacements for aquatic organism passage and flood resiliency, Class 4 road remediation project, Vermont Youth Conservation Corp river clean ups, river corridor easements and floodplain buyouts.

### **Basin 10 Ottauquechee, Black, CT River Direct**

The Basin 10-13 Basin Plan was adopted in 2012. Progress has been made on both the Black and Ottauquechee rivers with on-going project work taking place.

Several projects have been completed or are underway in the Ottauquechee River watershed including the post-Irene restoration of a portion of Pinney Hollow Brook in Bridgewater where removal of a motel left the brook devoid of aquatic habitat and riparian buffers. Channel restoration and buffer planting as well as fish habitat improvements are underway. In the Basin buffers have been installed in Woodstock, Bridgewater, Ludlow, Hartford and West Windsor covering over 6 acres of streambank. A focused study of Kedron Brook will begin in 2016 to look at flood resiliency and water quality concerns.

River corridor easements are completed for two important floodplain properties in the Black River watershed in Cavendish upstream of the “Cavendish Chasm” where a buffer was also planted and in Plymouth along Money Brook. Money Brook work has also involved planting vegetation on the lower slopes of the mass failure to help slow erosion and removing a berm along the lower brook to allow flood waters to flow through the field and drop sediment before it enters the Black River.

Several projects on Buffalo Brook adjacent to Camp Plymouth State Park have been installed to mitigate sediment discharge from eroding logging roads and plans are in place to remove berms along the Black River and Patch Brook to increase floodplain access.

Volunteer water quality monitoring is happening on both the Ottauquechee and the Black by the Black River Action Team and Ottauquechee River Group.

Mill Brook has a completed River Corridor Plan and the three towns in the watershed, Reading, West Windsor and Windsor are all involved in a flood resiliency project funded by the High Meadows Foundation. Extensive outreach and community involvement meetings are taking place to line up restoration projects throughout the watershed.

### **Basin 11 and 13 Williams, West, Saxtons, Lower CT, Mill**

The newly signed Tactical Basin Plan for Basin 11-13 is now ready for implementation.

All of the data gathering is complete for the River Corridor Plan on the Williams River which is due to be completed in spring of 2016. Potential projects are being evaluated and prioritized for implementation in the coming seasons.

The Saxtons River is also conducting a High Meadows resiliency project with the towns of Windham, Grafton, Westminster and Rockingham all participating. A river education center is in the development stages, buffer plantings are planned and discussions in the towns regarding floodplain ordinance review and model river corridor bylaws are planned. A land management workshop for riverfront landowners, held in October was very well received.

In the West River watershed, Adams Brook in Newfane will be restored following a post-Irene road repair that blocked flow and fish passage. The assessment and preliminary design is being finalized for removal work next summer.

Volunteer water quality monitoring continues on all three major rivers in the Basin by the Southeastern VT Watershed Alliance.

2015 was the second year of *Samplepalooza*, a one day water quality sampling event coordinated by the Connecticut River Watershed Council and supported by all three basin planners along the river, several MAPP staff, as well as NH DES, MA DEP and Yale University, monitored a total of 79 sites in Vermont, New Hampshire, Massachusetts and Connecticut. Twenty-two of the sites are in Vermont and ten sites on the mainstem of the Connecticut River. This study provides baseline data on total nitrogen, total phosphorus, chloride and dissolved organic carbon.

### **Basin 12 and 13 Deerfield, Lower CT, Mill**

The Deerfield River Tactical Basin Plan was completed in 2014 and is now being implemented.

The Corridor Plan for the Green River is complete and prioritized projects are ready to be funded and implemented.

Funding is in place to assess the East Branch of the North River to draft its Corridor Plan in 2016-17. The North River is also the focus of a bi-state coalition of federal, state and local agencies and organizations working in the Deerfield River watershed to develop the Deerfield Watershed Cooperative. This group is working to create a better approach for all levels of river stewards to work together to impact the quality and habitat of a river. The North River, due to its cross-border reach covering federal, bi-state and private property, has been chosen as the pilot river for concerted effort by all participants to focus project work and evaluate if a combined effort can achieve results.

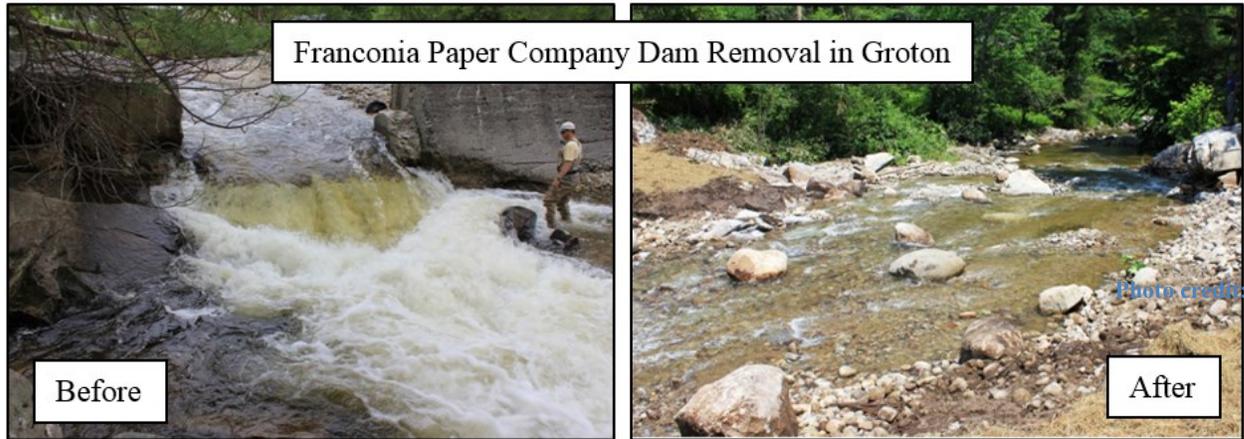
The Whetstone Brook in Marlboro/Brattleboro is the focus of an effort to increase flood capacity upstream of the town of Brattleboro to relieve downtown flooding. Several undeveloped parcels are under consideration and discussions are taking place with landowners to place river corridor easements on these lands to prevent future development from encroaching on the brook and enabling future work to reconnect the brook to the floodplain to hold more water during storm events.

### **Basin 14 and 16 Stevens, Wells, Waits, Ompompanoosuc, CT River Direct**

The majority of the work done in this year centered around the development of the 2015 Tactical Basin plan, which included: discussion of potential A1 reclassification reaches, the new aquatic habitat Existing Use, solidifying the Agriculture Environmental Management (AEM) and river corridor plan priorities, and stormwater mapping plan projects. After reviewing assessment and monitoring data, collaborating with internal and external partners and stakeholders, drafting plans, and taking and incorporating public comment, the tactical basin plan was released in winter of 2015.

Some priority watershed protection and restoration projects and technical assistance provided in 2015 include:

- Completion of the removal of the Franconia Paper Company dam, on the Wells River in West Groton, which interfered with upstream movement of resident trout, thermal regulation, flood prevention, and sediment transport, restoring vital riverine habitat.



- Completion of the Transportation Infrastructure Capitol Budget for the Town of Groton, which identified the top 9 road erosion and stream crossing sites, and prepared construction quantities, and cost estimates to upgrade these sites.
- Completion of the Upper Wells River Corridor Plan.
- Community meeting held with the White River Natural Resource Conservation District (WRNRCD), and others, to inform the public about the three town bacteria TMDL on the Ompompanoosuc River.
- Completion of the 2015 Ompompanoosuc bacteria sampling. A meeting in December followed to review the data with volunteers and discuss recommendations for next steps to target agricultural inputs and domestic inputs. The report is being written for January 2016 and results will be included in each town plan within the sampling area.
- Funding approved for a multi-year invasive species control and buffer project on the Wells River with the WRNRCD and the Town of Newbury. Invasive species removal and buffing planting was completed along the Wells River with the WRNRCD, the Town of Newbury Conservation Commission, and other volunteers funded by the Ecosystem Restoration Program.
- Funding approved for a shared no-till drive to reduce farm runoff with WRNRCD and Agriculture Resource Specialist.
- Road Erosion Inventories completed and on-going for Groton and Orange in the Wells River watershed.
- Commencement of Upper Wells River watershed River Corridor Management Plan and Culvert assessment.

## **Basin 15 /16 Passumpsic and Northern CT River Watersheds**

A number of the actions identified in the 2014 Passumpsic and Northern Connecticut River basin were completed or initiated in 2015. Many of these actions are a result of strong partnerships between DEC, the Essex and Caledonian County NRCD's, NVDA, NorthWoods Stewardship Center as well as private landowners in the basin.

- A number of high priority retrofit projects were identified through Dish Mill Brook watershed stormwater master planning effort and a rain garden installed at the base lodge at Q Burke resort.
- A roads and rivers workshop hosted with over 35 participants and partners assisted with targeted road erosion inventories in 5 communities
- An ERP grant supported the Northwoods Stewardship Center Conservation Corps installing 12 road erosion BMP's.
- The St Johnsbury stormwater master planning effort was initiated through ERP funding and funding was received for a major stormwater retrofit project in St Johnsbury to be installed in 2016.
- The Burke Conservation Commission completed a first year of water quality monitoring in Dish Mill Brook and other town streams with technical support from DEC and a LaRosa partnership grant.
- A Water Andric project development grant was completed by the Caledonian County NRCD which led to a project to replace an significantly undersized culvert, and a weir which are both barriers to aquatic species passage and a proposal has been submitted to conserve over 7,000 feet of shoreline.
- Buffer plantings were completed on Passumpsic and Connecticut Rivers and conservation projects and strategic wood placement along the Nulhegan River and Paul Stream.

## **Basin 17 Memphremagog, Coaticook, Tomifobia**

Since release of the Basin 17 water quality management plan in January of 2012, three quarters of the actions identified in the plan have been initiated or completed. Significant progress was made in modeling that is necessary to support the development of a phosphorus TMDL for Lake Memphremagog. Chloride loading to the lake was used to create a lake exchange "bathtub" model similar to the one used in the Lake Champlain TMDL. With this completed a land use phosphorus export model is being developed along with a lake phosphorus model that are necessary to support the TMDL development in collaboration with partners in Quebec so this can model the lake accurately across both countries. This model will allow for estimates of phosphorus reductions from BMP installation which is necessary to support a reasonable assurance that the phosphorus TMDL will meet water quality standards through project implementation. The tactical basin planning process will be initiated in 2016 to update the 2012 basin plan and this basin plan will be the implementation plan for the Lake Memphremagog Phosphorus TMDL.

A number of specific project have been implemented in 2015 including:

- The NorthWoods Stewardship Center planted riparian buffers at ten sites covering over 4 acres within the Lake Memphremagog watershed through the Trees for Streams Memphremagog (TFSM) program and the Lakeshore Buffering (NEKLB).
- The Essex County NRCD worked with the town of Brighton to complete a stormwater master plan and the town has received over 300,000 to implement stormwater retrofits in the town.
- A tributary water sampling program was continued and directly supported farmers in addressing barnyard runoff issues, installing cover cropping, filter strip and no till practices to address nutrient runoff issues where water sampling identified elevated levels phosphorus runoff.
- An illicit discharge and detection and elimination project was completed in the basin and four illicit discharges were identified and eliminated.

- The Memphremagog watershed association continued a rain barrel sale program and installed two rain gardens in downtown Newport.
- A stormwater master planning ERP grant has been initiated for all major communities in the basin by the Memphremagog Watershed Association.
- A \$674,000 RCPP grant was submitted in partnership between the VT DEC and the Orleans County NRCD to support agricultural best management practices and nutrient management planning in the Lake Memphremagog Watershed.