PROGRESS REPORT ON
RIVER BASIN WATER QUALITY MANAGEMENT PLANNING
(TACTICAL BASIN PLANNING)

DURING 2019
per
10 VSA § 1253(d)

Submitted to the

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

SENATE COMMITTEE ON:
NATURAL RESOURCES AND ENERGY

VERMONT AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

JANUARY 15, 2020

Section 1) Introduction and Summary

In 2019, 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 within a two-year timeframe, are revisited every five years, and for which implementation tables of priority actions are continually updated (see Figure 1 below). Tactical basin planning is carried out for the Department by the Water Investment Division (Division). The Watershed Planning Program (WPP) bears primary responsibility for implementing the basin planning process, and fostering effective partnerships, particularly with watershed organizations (represented mostly through Watersheds United Vermont or WUV), Regional Planning Commissions, and the Conservation Districts of the Natural Resources Conservation Council.

The overall goal for each tactical basin water quality management plan is to establish and carry out strategies that will protect, maintain, enhance or restore the surface waters of the basin by directing regulatory, technical assistance, and funding to highest-priority sub-watershed areas. This report is prepared in fulfillment of 10 VSA §1253(d)(1), which states:

"The Secretary shall prepare and maintain an overall surface water management plan to assure that the State water quality standards are met in all State waters. The surface water management plan shall include a schedule for updating the basin plans. (…) On or before January 15 of each year, the Secretary shall report to the House Committees on Agriculture and Forest Products, on Natural Resources and Energy, and on Fish, Wildlife and Water Resources, and to the Senate Committees on Agriculture and on Natural Resources and Energy regarding the progress made and difficulties encountered in revising basin plans. The report shall include a summary of basin planning activities in the previous calendar year, a schedule for the production of basin plans in the subsequent calendar year, and a summary of actions to be taken over the subsequent three years."

Basin plans and the basin planning process are required by Vermont Statute in 10 V.S.A. 1253(d), Section 29A-103(e) 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. The surface water management plan described by 10 V.S.A. 1253(d), called the Vermont Surface Water Management Strategy, or "SWMS," was updated in 2016 to incorporate several new regulatory authorities conferred to Vermont pursuant to the Vermont Clean Water Act (Act 64 of 2015). The SWMS was also amended to incorporate by reference the allocations of the Lake Champlain Phosphorus Total Maximum Daily Load (TMDL), as required by 40 Code of Federal Regulations Part 130, Section 130.7(d)(2). Lastly, the SWMS was updated to incorporate the water quality commitments embedded in the September 2016 Lake Champlain Phase I Implementation Plan and the Vermont Clean Water Act. The complete SWMS may be found at http://dec.vermont.gov/watershed/map/strategy.

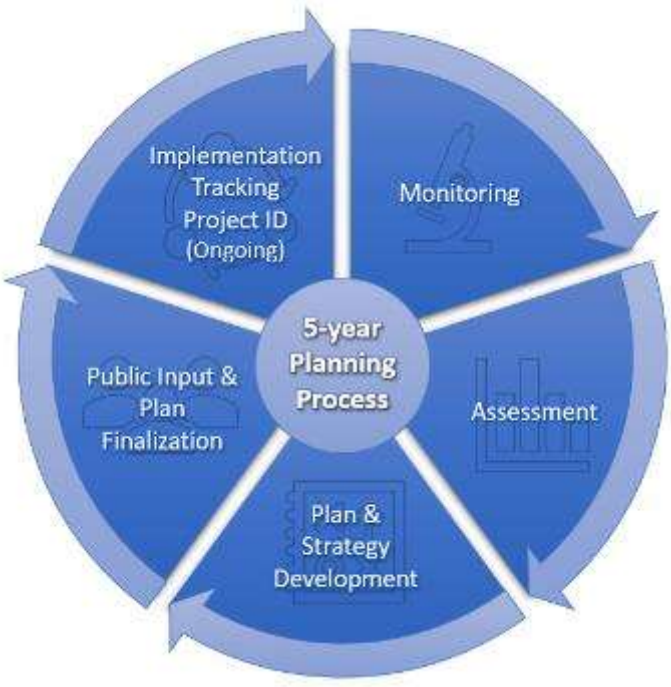
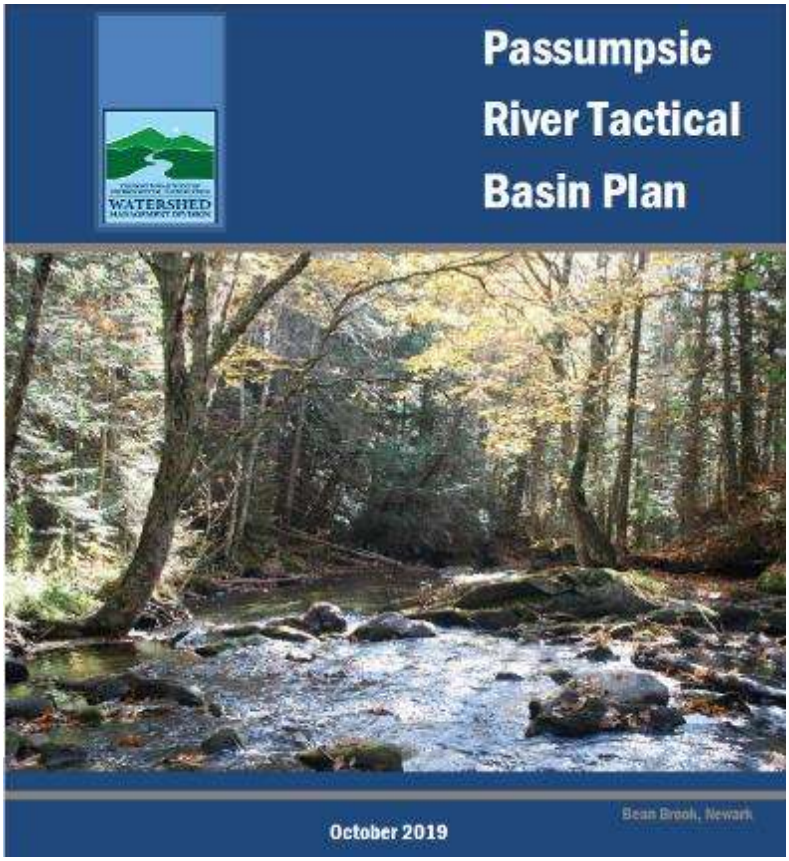


Figure 1. The Tactical Basin Planning process shown on a 5-year cycle of plan development leading to implementation.

During 2019, substantial progress was achieved in basin planning. In addition to the public review, responsiveness revisions, and approval by ANR Secretary Moore of the tactical basin plans listed below, the Department continued to modernize and evolve the tactical planning process to meet the challenges of the Lake Champlain TMDL, including the addition of the Phase II content for the Otter Creek Tactical Basin Plan, as well as some refinement to the TMDL Accountability Framework milestones and interim reporting. This evolution is described in section two of this report and comprises the Department's statement of 'progress and difficulties.' The summary of expected basin plan production over the coming year and three-year projection of actions is found in section three. Section four provides an overview of basin specific highlights.

Basin plans that were issued for comment and approved during the reporting period include:



Otter Creek Tactical Basin Plan

Deerfield, Green, and North River Basins

Passumpsic River Tactical Basin Plan

In addition to the Tactical Basin Plans developed during 2019, the Watershed Planning Program also developed companion "Story Maps," which are a form of interactive web mapping that combines electronic maps, narrative text, images, and other multimedia content to provide thematic information on our Tactical Basin Plan content, planning process, and project identification, development, and implementation efforts. Included above are the links to each Tactical Basin Plan story maps.

Otter Creek Story Map

Section 2) Tactical Basin Planning Process – Progress in 2019

Tactical Basin Plans integrate watershed modeling, water quality monitoring, sector-specific pollution source assessments, water quality modeling, 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 2019, the Watershed Planning Program (WPP) supported tactical plan development and implementation across all basins in Vermont. Figure 1 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. In Lake Champlain watersheds, the Otter Creek Tactical Basin was recently updated to incorporate the "Phase II" content to support the Lake Champlain Phosphorus TMDL approved by USEPA (see below in this report). All of the six Lake Champlain Tactical Basin Plans now include the TMDL Phase II content, and subsequent iterations of these plans will include the Phase III content (see more on this approach on page 11). The Vermont Lake Champlain TMDL Phase III Tactical Basin Plans (i.e., the Vermont version of EPA's "Watershed Implementation Plans" or "WIPs" – referred herein as TBPs) will build on previous statewide, major river basin (e.g., Hydrologic Unit Code or "HUC-08"), implementation efforts as well as through the promulgation of the Vermont Clean Water Act (Act 64) as well as the recently passed Clean Water Service Delivery Act (Act 76). Prior years' Legislative Reports discussed the differences between the conventional approach to basin plan development (i.e., prior to 2010), the ~ 2010-2012 hybrid plans, and current "tactical" approach to basin plan development.

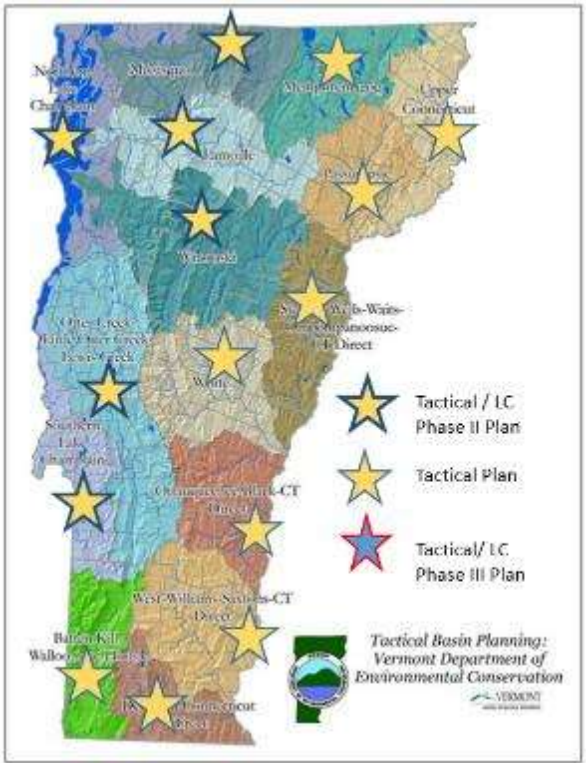


Figure 2. Vermont's 15 Tactical Planning Basins, and the status of each basin plan.

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 provided in Section four. Below, we describe the emerging approach for how we continue to refine water quality analytical support Tactical Planning, and development of the Phase III Implementation Plans for the Lake Champlain TMDL, to further modernize and align planning and funding activities per Act 76 and to meet the requirements of Vermont's Clean Water Act.

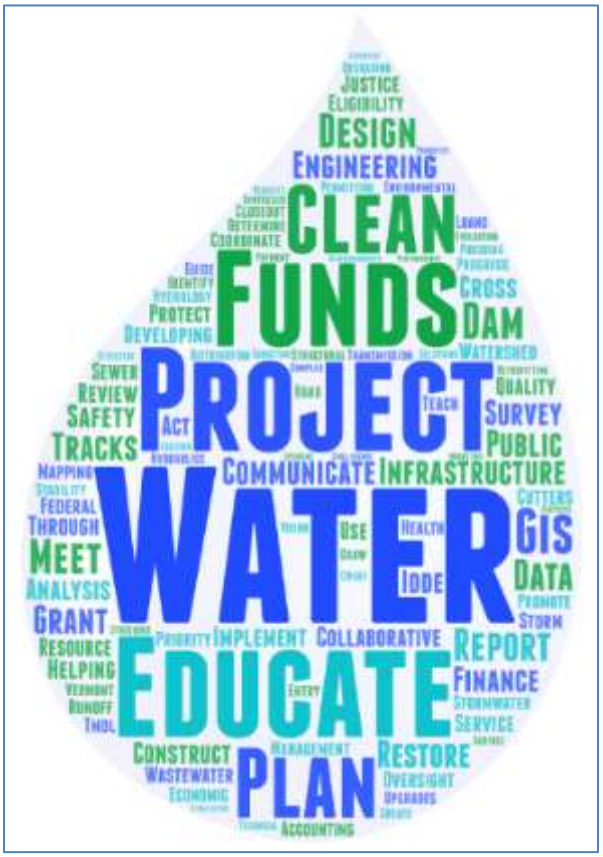
The required plan production schedule is shown below and in Section 3 of this report.

Table 1. Overall Status of Basin Planning as of 1/1/2020.

Basin	Year of most recent plan issuance	Planning phase for 2020
Basin 1 Batten Kill, Walloomsac, Hoosic	2016	Plan Update to commence in 2020
"South Lake" Champlain (Basin 2 and 4 - Poultney, Mettowee, Lower Champlain Direct)	2017	Monitoring, Implementation
Basin 3 Otter, Little Otter, Lewis	2019	Approved December 2019, includes Lake Champlain TMDL Phase II Implementation Plan
Basin 5 Northern Lake Champlain (Upper Champlain, LaPlatte, Malletts Bay, St. Albans Bay, Rock, Pike)	2017 Update (TMDL Phase II)	Plan revision underway and slated to be completed in mid-2020
Basin 6 Missisquoi	2016	Monitoring, Implementation Lake Champlain PTMDL Interim Report Card - 2019
Basin 7 Lamoille	2016	Monitoring, Implementation Lake Champlain PTMDL Interim Report Card - 2019
Basin 8 Winooski	2018	Approved December 2018, includes Lake Champlain TMDL Phase II Implementation Plan
Basin 9 White	2018	Monitoring, Implementation
Basin 10 (13) Ottauquechee, Black	2018	Monitoring, Implementation
Basin 11 (13) Williams, West, Saxton's, Lower CT, Mill	2016	Monitoring. Implementation
Basin 12 (13) Deerfield, Lower CT, Mill	2014	Approval anticipated by January 2020

Basin	Year of most recent plan issuance	Planning phase for 2020
Basin 14 Stevens, Wells, Waits, Ompompanoosuc	2015	Plan revision underway and slated to be completed in mid-2020
Basin 16 – Northern CT River Watersheds	2014	Monitoring, Implementation Plan underway and slated to be completed in 2020
Basin 15 - Passumpsic	2019	Approved December 2019 Monitoring, Implementation
Basin 17 Memphremagog, Coaticook, Tomifobia	2017	Monitoring, Implementation Lake Memphremagog phosphorus TMDL and Tactical Plan approved – November 2017

Introduction to the Water Investment Division



In August of this year, DEC's water-based financial and engineering sections were combined with the watershed planning section to form the new Water Investment Division (WID). The mission of WID is to provide comprehensive "clean water" planning, financing, technical assistance, and reporting on water infrastructure to support clean water project development and implementation for all Vermonters The three water based Divisions in DEC (Watershed Management, Drinking Water and Groundwater Protection, and now the Water Investment Division) provide regulatory oversight, resource protection, financing, and project delivery functions that serve Vermonters. In so doing, the Department supports local and statewide priorities. Given the public focus on clean and safe water, and the economic benefits that go along with that, newly formed Water

Investment Division has a high public profile that will evolve, especially now with the passage of Act 76[1] - an Act related to the delivery of clean water services.

The Water Investment Division coordinates investment of State and federal funding to all types of clean water and drinking water infrastructure in Vermont. The Division manages the State Revolving Loan Funds (SRF) for clean water and drinking water infrastructure, and the Department's proportion of annual Clean Water Fund and Capital Fund dollars that support water infrastructure throughout Vermont. The Division coordinates annual reporting for all funds, publishing annual State Revolving Fund, Clean Water Investment, and Tactical Basin Planning Reports, and serves to integrate other agencies of State Government that also participate in clean water funding, such as Agency of Agriculture, Commerce and Community Development, and Transportation. The Division provides project engineering and implementation services to the Agency for a variety of projects, including construction and maintenance of state park facilities, fish culture stations, access areas, and dams. The Division also operates the Dam Safety Program, which regulates non-power, non-federal dams and endeavors to protect public safety relative to dams.

The majority of the focus of our new Division is on the support, financing, delivery, and tracking of prioritized water infrastructure projects of all types that are ultimately executed by external partners. While traditionally we think of water infrastructure as pipes, valves, conveyance, and treatment, our new Division has a more expansive charge. Infrastructure means grey and green infrastructure, natural infrastructure, and even the human infrastructure that supports clean water or drinking water. Infrastructure spans the range from Burlington Waste Water Treatment Facility (WWTF) or Champlain Water District, to river corridor easements, buffer restorations, or conserved lands that support the quality of surface and source water. The external partner network of consulting engineers, contractors, watershed associations, and to-be-developed Clean Water Service Providers, are another form of "infrastructure" that supports clean and safe water.

With the intent of providing an introduction for staff to the myriad activities our new Division oversees, I am providing the following admittedly brief descriptions of our programs. These descriptions paint a high-level picture of our current and forthcoming activities. Those of you within these programs will note many omissions in the descriptions, as each program is complex, has numerous business processes, and many aspects about which I am not yet fully aware. As we begin to work together, we will learn from each other, and evolve our work to capitalize on the advancements that are described below. The building blocks of our new Division include, in no particular order:

State Revolving Loan Fund (SRF) Engineering Services Program: Engineering services that support SRF funded projects. These are the engineers whom work with contractors, engineering consultants, municipalities, and our finance staff to make sure that traditional and "green" water infrastructure projects are built to the requirements of the SRF. The program relies on an IT system known as the Loans and Grants Tracking System – LGTS - that tracks SRF project compliance with federal and state requirements. SRF Engineers also provide technical assistance to communities in the development of water, wastewater, and stormwater infrastructure.

Agency Facilities Engineering Program: Engineering Services that support internal Agency facilities and water infrastructure on Agency-owned lands. These engineers and technicians conduct design services, engineering review and procurement, and consulting engineering services, including a newly developing portfolio of clean water engineering design work. This program relies on an infrastructure maintenance and tracking system for agency-owned facilities known as CUPPS.

Dam Safety Program: Engineering services that support dam owners statewide to ensure the safety of dams. Dam Safety staff are also responsible for the maintenance and operation of state-owned flood control facilities and are involved in clean water projects involving removal of larger dams (>500,000 cubic feet of storage). The

[1] Act 76

Dam Safety Program is presently engaged in standing up Act 161 of 2017, which requires the development of rules for the operation, maintenance, inspection, and design of dams. As part of this work, a comprehensive Dam Inventory database is being developed.

Watershed Planning Program: Planning services that integrate information from Watershed Management Division regulatory and monitoring/assessment activities, and data and information from external partners. This Program publishes, through tactical basin plans (TBPs) and related information technology (IT) systems, regulatory or protection and enhancement actions that the Agency will undertake, and water quality projects that partners will undertake. TBP staff also conduct certain project development activities. In compliance with Act 76, the program will develop complex pollution accounting methodologies and will be responsible for assigning pollution reduction targets to clean water service providers.

Clean Water Initiative Program: Grant program development and pollution tracking and reporting services. As part of Act 76, CWIP will be undertaking a substantial workplan to develop new grant programs and further refine tracking mechanisms for projects for which pollution reduction estimates are not yet available. CWIP staff also conduct certain project development functions. CWIP oversees the development of an IT system known as the Watershed Projects database that has multiple clean water project staging, tracking, and reporting functions. CWIP engages across all agencies of State government to compile and report clean water project efforts annually, and in partnership with the Agency, provides support to the Clean Water Board.

Water Finance Program: State Revolving Loan Funds (SRF), capital, Clean Water, and Federal funds administration in support of water infrastructure projects of all types. This program conducts infrastructure funding development activities for municipal wastewater, stormwater, and community as well as Non-Transient Non-Community (NTNC) water systems. The Program also develops novel funding approaches for the use of the SRF loan fund, such as Water Infrastructure Sponsorship Programs (WISPr), bridge loans, and private clean water financing, as consistent with Act 185 of 2017. Rolling three-year SRF project lists are published within the annually issued Intended Use Plans (IUPs) which also indicate priority pursuant to the municipal pollution control priority rule. Areas of envisioned evolution involve the development of unified single funding applications for water infrastructure and strengthening the linkage between IUPs and TBPs.

Watershed Planning Program Overview

The Watershed Planning Program of WID is charged with developing and implementing watershed management plans that summarize existing water quality conditions and associated attainment with surface water uses, with identified priorities for surface water protection and restoration of degraded waters. The Vermont Water Quality Standards as well as Vermont's Clean Water Act (2015) require the development of Tactical Basin Plans for each of Vermont's 15 river basins to be adopted on a five-year recurring cycle.

Tactical basin plans identify and prioritize the projects or actions needed to protect or restore specific waters and identify appropriate funding sources to complete the work, based on monitoring and assessment data. Since these tactical plans will guide all watershed work supported by the Water Investment Division, the issues identified in these plans are the ones that will be prioritized for management actions, including funding. Tactical Basin Plans integrate priority issues and actions from, including River Corridor Plans, Stormwater Master Plans, Road Erosion Inventories, and other sector-based assessments.

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 Clean Water Initiative funding, partner support, internal agency support, and public rulemaking processes.

The WPD provides a clearinghouse of projects by sector (e.g., stormwater from developed lands and roads, agriculture, river and wetland restoration opportunities, etc.) for all of the major river basins in the state and is

constantly updated as sector-based assessments (e.g., stormwater master plans and river corridor plans) are used to identify and upload additional projects that are referenced. At present, the WPD does not include each and every project that are required by regulatory programs, although some projects may ultimately achieve those obligations. Currently, stakeholders may review the Watershed Projects Database and the projects identified, by clicking that link to see specific identifiable projects, and searchable by basin, town, and/or project types (see Figure 3 below).

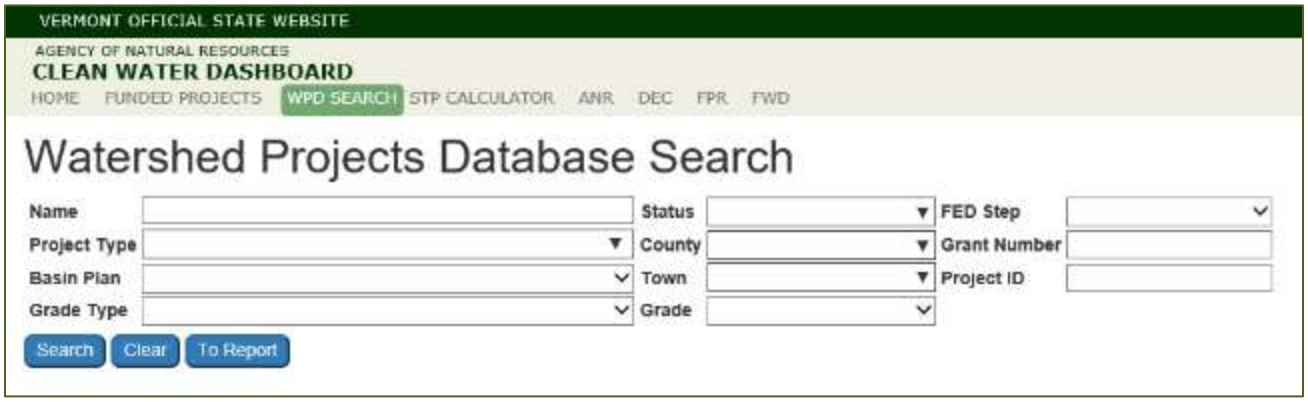


Figure 3. The Watershed Projects Database provides an online, searchable list of completed, funded, and proposed projects

Within the database, project development is an ongoing process in order to update descriptions, environmental benefits, and in order to prioritize projects using a standard set of criteria for each sector, as well as incorporating local and regional metrics that are applied by key planning partners such as Regional Planning Commissions and Natural Resource Conservation District staff, based on factors such as nutrient reduction benefit, hazard mitigation or other co-benefits, municipal factors, and compliance with State water quality policies. DEC planning staff are working with Regional Planning Commissions and Natural Resources Conservation Districts to populate and update project information in the WPD with value added attributes as projects move through the development queue for all 15 planning basins in the state. DEC envisions that the Watershed Projects Database will continue to be populated to contain existing projects for all planning basins regardless of where they are in the planning cycle, and as relevant project elements are identified and added to the Watershed Projects Database.

The value of the WPD extends beyond tactical basin planning. As projects move from planning, design, and then are funded for implementation, they are tracked for implementation status, phosphorus and other pollutant reduction, and other indicators. The anticipated "Clean Water Initiative Dashboard" will be an online, interactive platform to make information on clean water projects, funded by state agencies, available to the public. The 2019 Clean Water Initiative Funding Report coordinated by the Water Investment Division's Clean Water Initiative Program pursuant to Act 64 provides a set of financial, social, programmatic, and environmental indicators that are being produced by the Watershed Projects Database.

The Water Investment Division now maintains the Watershed Project Explorer mapping tool, which provides the ability to geographically locate any project that has been identified using spatial coordinates, and includes projects that are either proposed, under development, or which have been implemented (see figure 4).

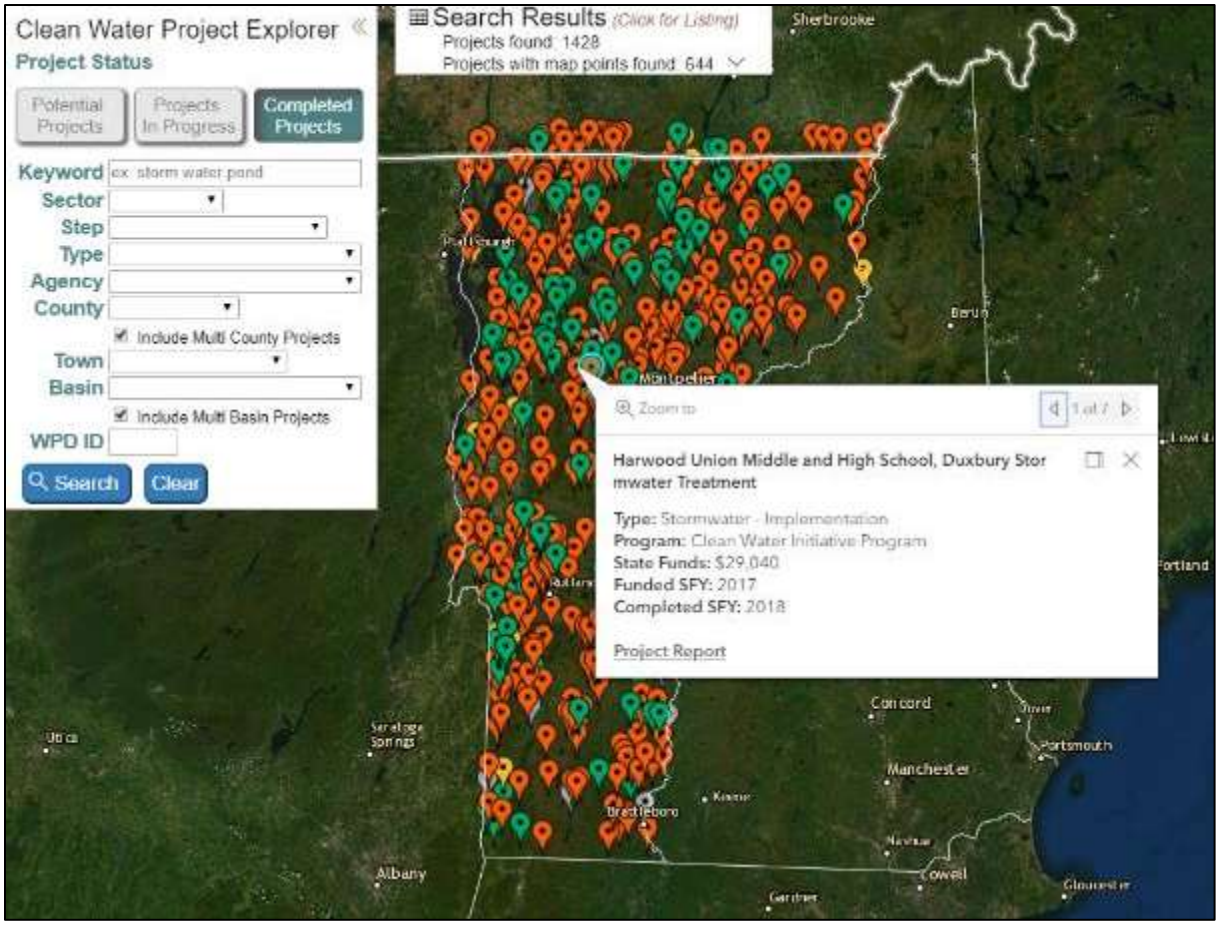


Figure 4. Watershed Projects Explorer mapping application.

Lake Champlain TMDL Reporting and Phase III Implementation Plan Development

The 2016 *Phosphorus TMDLs for Vermont Segments of Lake Champlain* include an Accountability Framework that establishes a process to ensure implementation of the TMDL moves forward at a steady rate. A major part of the Accountability Framework is DECs development of basin-specific Tactical Basin Plans. These plans are developed on a 5-year rotating basis that, in part, include Implementation Tables that lay out priority actions essential to implementation of the TMDL. It's through review of the Implementation Tables, and the progress made in accomplishing the tasks, that EPA intends to track implementation progress in each basin. Review will occur midway through and at the end of each 5-year planning cycle whereby EPA will develop a "report card" reflecting the sufficiency of progress made.

At the end of the 2019 calendar year, DEC submitted two Tactical Basin Plan "Report Cards" to EPA per the Accountability Framework to demonstrate progress made towards achieving target load reductions in those lake segments – the Missisquoi River (Basin 6) and the Lamoille River (Basin 7) – and are submitted herein. These Tactical Basin Plans were finalized at the end of 2016 and are the first two plans due for review and approval under the Accountability Framework. The following sections describe the Implementation Tables for each basin and include information to help EPA assess the status of each action item listed. A status condition is provided for each item (e.g. complete, ongoing, etc.) as well as a narrative description of actions taken. In some instances, performance measures based on implementation data are included to provide a quantitative measure of implementation. However, calculations of phosphorus mass loading reductions to the lake are not presented as

part of this exercise. Mass loading reductions will be presented in the annual year-end 2019 Clean Water Performance Report to allow comparison to the TMDL phosphorus allocations.

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 are being expanded into geographically explicit planning-level load and wasteload sub-allocations, by subwatershed. These explicit, "Phase-II" plans comprise the blueprints by which the TMDL allocations are assigned to relevant geographic scales, such as municipality, or sub-watershed.

As described in the final Champlain Phase I Plan, this work has required a significant investment of water quality modeling capacity into the planning process. Two complementary efforts have come together to provide for high-resolution phosphorus discharge modeling for very fine scale sub-watersheds of the Lake Champlain Basin. These are 1) the Clean Water Roadmap, and 2) the publication of the Phase II TMDL plans within the tactical plans for the Lamoille, Missisquoi, Northern Lake Champlain, Otter Creek, South Lake (Champlain), and Winooski Basins.

EPA and Vermont anticipate that the assessment and updates to the Tactical Basin Plans "Phase II Content" will benefit not only from what has been learned from each specific TBP implementation, but from lessons learned across different sectors via both regulatory and non-regulatory programmatic promulgation. Over the next five years (through 2025), each revised Tactical Basin Plan will constitute the third phase of TMDL implementation. Subsequent iterations of each Tactical Basin Plan would constitute further phases of TMDL(s) implementation. The Otter Creek TBP is the last in this series that is currently undergoing an update of the Phase II content.

The Water Investment Division is now in the process of developing the Lake Champlain TMDL Phase III framework and content pursuant to the reporting requirements of the Accountability Framework.

The Phase III Approach

The Vermont Lake Champlain TMDL Phase III Tactical Basin Plans (i.e., the Vermont version of EPA's "Watershed Implementation Plans" or "WIPs" – referred herein as TBPs) will build on previous statewide, major river basin (i.e., HUC-08), and local implementation efforts. Basin-specific goals, statewide policies, and robust local and regional engagement are essential to success, now and in the future. Phase III TBP content will be developed based on a midpoint assessment of progress and scientific analyses that are currently underway. Phase III TBPs will provide information on actions that Vermont (local, regional, state, and federal jurisdictions) intends to implement (in 5-year increments) to meet Lake Champlain restoration goals.

The TMDL is being implemented using an "Accountability Framework" that guides restoration efforts using four elements. These elements include Tactical Basin Plan implementation, five-year (and 2.5 interim report card) milestones, EPA's tracking and assessment of restoration progress and, as necessary, specific federal actions if the "state" does not meet its commitments (i.e., "backstops").

Under the Accountability Framework, EPA committed to conduct ongoing oversight of state programs to ensure that implementation efforts are on track to meet the TBPs goals and attendant five-year milestones (Figure 5).

The first step, following the Lake Champlain TMDL "Phase I" Implementation Plan (DEC, 2016), was to establish target load reductions for each lake segment that include quantifiable "base" loads (estimated through the SWAT model analysis). These are the load and wasteload allocations published by the Lake Champlain and Lake Memphremagog TMDLs. The second phase, (i.e., "Phase II") was to develop a downscaled version of the SWAT analysis that allows for a quantifiable estimate of the load reductions required on the sub-basin scale by each land use sector that will ensure that we can effectively meet the target load reductions for each lake segment

by directing water quality projects to the most appropriate locations. Each of the latest iterations of the tactical basin plans that drain into Lake Champlain now include the Phase II content with the recent approval of the Otter Creek Tactical Basin Plan.

Through the Tactical Basin Planning process, the WPP, as laid out in Act 76 of 2019, will calculate five-year target load reductions by pollutant source sector within each of the 12 Lake Champlain lake segments (in Vermont). The amount and location of loads from individual or aggregate point sources and nonpoint source sectors will be included. In this process, the WPP will determine the current phosphorus loading levels, and use modeling to assess regulatory program sufficiency to meet the wasteload allocation targets established in the TMDL. In doing so, DEC will coordinate with other sector-based regulatory programs in state government (e.g., the agricultural and forestry sectors) to continually evaluate programmatic capacity to achieve the target loads established in the TMDL.

As each Champlain and Memphremagog TBP is published going forward , the Division will continue identify the gaps between achieved reductions in total loads, and additional incremental reductions needed to fully attain the final target loads for the 12 Lake Champlain lake segments (in Vermont) as well as for the Memphremagog Basin. Once those target load reductions are established for each sector (by basin) WPP will need to affirm the commitment and strategy to fill gaps, such as required by Act 76 for the natural resource restoration targets, and systematically fill the gaps (in resources) identified from the gap analysis. As part of this iterative Phase III process, DEC will develop tracking and continue to improve upon reporting protocols which will provide a description of efforts underway or planned, to improve transparent and consistent monitoring, tracking, reporting, and the effectiveness of implementation actions.

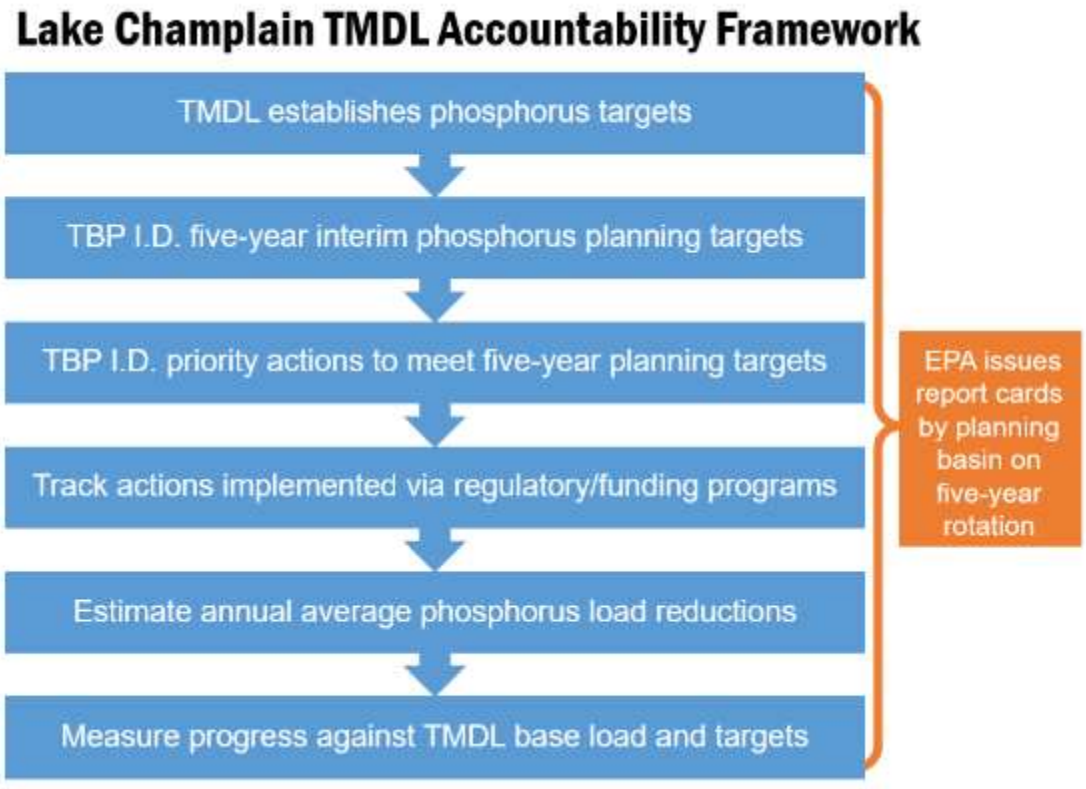


Figure 5. Flow chart showing the relationship between Tactical Basin Plans and the TMDL Accountability Framework

Lake Champlain TMDL External Variable Analysis

As part of the LC TMDL Phase III content, DEC has worked to developed 'external variable' reports on factors which may influence the ability of managers to meet EPA's phosphorus targets. These external variables include population growth, land use change, climate change, and agricultural trends. For example, an analysis of USGS streamflow data at sites classed as 'unregulated' or 'slightly regulated' – i.e., gage sites where streamflows are considered to be largely natural – clearly indicates that daily mean and median streamflows have increased throughout Vermont, in several cases by more than 50% (Figure 5). Climate change in Vermont is increasing the amount of water moving through these smaller watersheds. Interestingly, a companion analysis of large rivers discharging to Lake Champlain does not reveal a similar jump in total water delivered. Depending on watershed condition and stream geomorphology, this increased streamflow can represent an important transport mechanism for sediment and pollutant loading. These trends highlight the importance of managing runoff, preserving and restoring wetlands, and allowing rivers access to floodplains.

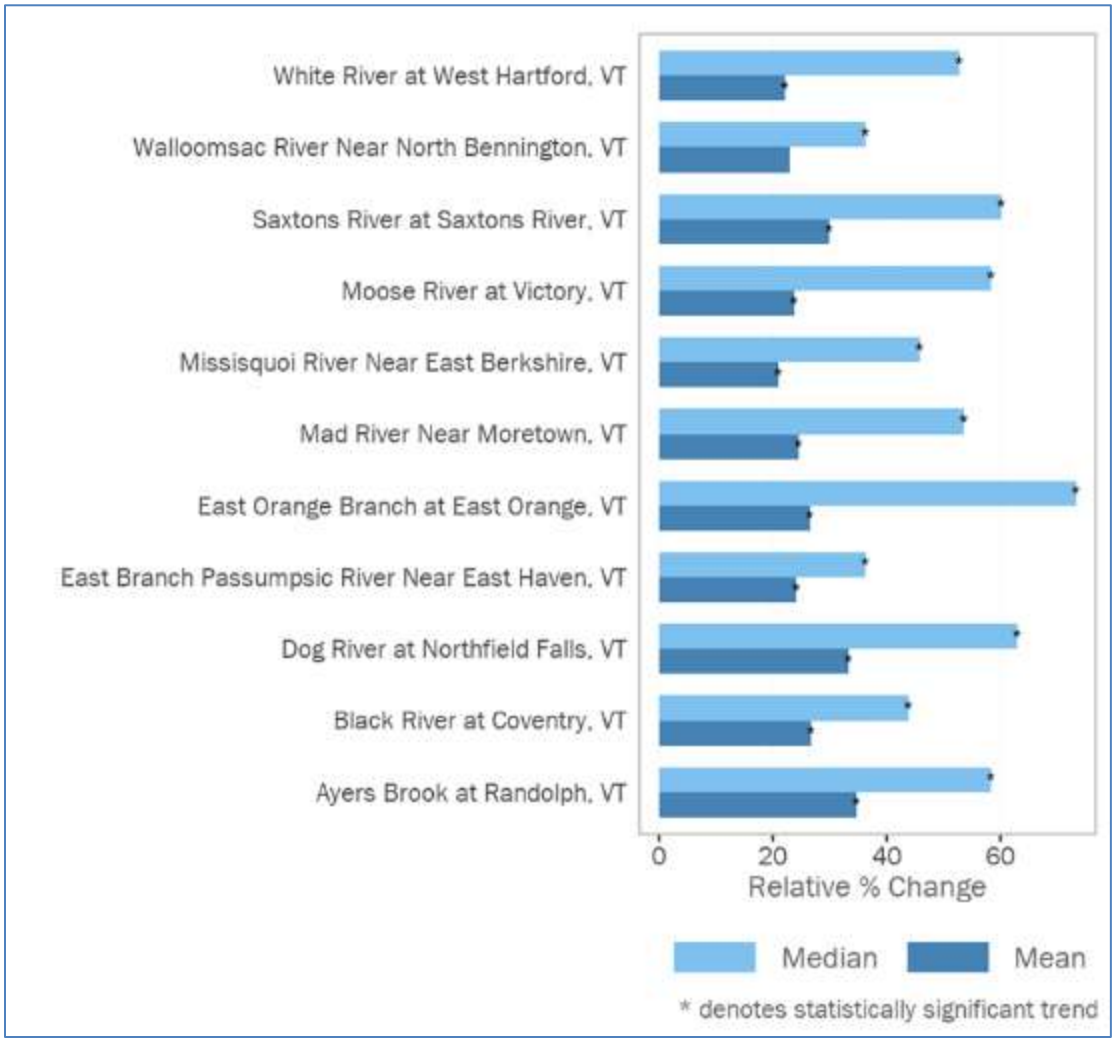


Figure 6. Relative percent change in mean and median daily streamflow over the baseline period of record. Each site has at least 50 years of data, and all sites contain post-2010 data.

Clean Water Service Delivery – An Overview of Act 76

Act 76 of 2019 establishes a water quality project delivery framework to support Vermont's clean water goals. In addition to securing a new long-term funding source for the Clean Water Fund, three of the most fundamental aspects of this law are:

- Provides assurances to meet non-regulatory targets: Act 76 prioritizes program delivery and funds for non-regulatory projects. Non-regulatory projects include sub-jurisdictional stormwater management practices and natural resource restoration projects such as floodplain reconnections, wetlands restoration, forestland best management practices, and forested riparian buffer restoration. While not required through existing regulatory programs, these projects are essential to achieve the water quality goals spelled out in the Lake Champlain and Lake Memphremagog TMDLs.
- Establishes interim phosphorus reduction targets: Act 76 requires formula dispersal of funds for non-regulatory projects in the Lake Champlain and Lake Memphremagog basins. Formula is based on interim phosphorus reduction targets and a standard cost per unit phosphorus reduced, consistent with "pay for performance" models.
- Establishes Clean Water Service Providers: Act 76 establishes new regional organizations called clean water service providers (CWSP). CWSPs will be established for each Tactical Basin Planning watershed in the Lake Champlain and Lake Memphremagog basins. CWSPs are responsible for partnering with Basin Water Quality Councils to identify, implement, operate, and maintain non-regulatory projects to meet non-regulatory interim phosphorus reduction targets.

For more information, see:

Clean Water Service Delivery Act (Act 76 of 2019) Factsheet

Clean Water Service Delivery Act (Act 76 of 2019) Frequently Asked Questions

Clean Water Service Delivery Act (Act 76 of 2019) (As Enacted)

The Role of Statutory Partners in Tactical Basin Planning (per 10 VSA § 1253)

During the past year with the passage of Act 76, the Division will work with watershed organizations, Regional Planning Commissions (RPC), Natural Resources Conservation Districts (NRCD), and municipalities to identify and construct water quality projects to achieve reduction targets. Per revisions to 10 VSA § 1253(d), the Division will engage with Watersheds United Vermont (WUV), the Regional Planning Commissions (VAPDA, or RPCs), and the Natural Resource Conservation Districts (NRCDs) to serve on Basin Water Quality Councils (BWQC) for each major river basins in through the basin planning process in order to:

- participate in the basin planning process, and assist in developing and reviewing tactical basin plans
- provide technical assistance and data collection activities to inform municipal officials and the State in making water quality investment decisions;
- coordinate municipal planning and adoption or implementation of municipal development regulations better to meet State water quality policies and investment priorities; and
- assist the Secretary in implementing a project evaluation process to prioritize water quality improvement projects within the region to ensure cost effective use of State and federal funds.

DEC will continue to contract with Regional Planning Commissions, Natural Resources Conservation Districts, and watershed organizations to fulfill the specific roles and responsibilities around the development of tactical basin plans as articulated in Sections 26 and 27 of Act 64 as well as Act 76. Through this cooperative process,

VAPDA, the NRCC, and WUV have set forth a series of activities that each Regional Planning Commission, Natural Resource Conservation District, as well as watershed organizations shall undertake in support of tactical planning for all watersheds in the State. This relatively new organizational alignment recognizes that significant (and ongoing) municipal and landowner outreach is needed to develop understanding of emerging Act 76 authorities, develop tactical basin plans, assist landowners and municipalities, and ultimately track the implementation of projects and BMP installations that are carried out by municipalities, landowners, RPCs, NRCDs, and other stakeholders. The roles and responsibilities articulated in the State Fiscal Year 2020 (SFY20) performance contract with RPCs and NRCDs specifically acknowledges their strengths in supporting landowner, municipal, as well as other stakeholder activities aimed at water quality protection and restoration. The contracted activities under the SFY2020 contracts include:

1) Assistance in the drafting and development of Tactical Basin Plans, including the vetting and review with other stakeholders including the RPC Clean Water Advisory Committees and regional coordination workgroups with NRCDs,
2) Coordination of landowner, municipal, and regional input to assist in tactical basin plan development, including project prioritization;
3) Increase outreach for landowner, municipal, and stakeholder awareness and readiness to implement Act 64 by conducting landowner and municipal outreach and education, and cross-program integration and coordination;
4) Promotion of stormwater master planning and other assessments for municipalities identified by the relevant Tactical Basin Plans as in need of such assessment
5) Promotion of flood resilience and water quality protection and improvement by providing natural resource and municipal planning assistance;
6) Enhanced outreach and delivery of information for municipalities by providing coordination of water quality monitoring, and oversight of independently funded assessments;
7) Assistance in the coordination of regional partner meetings to address high priority water quality issues such as through Clean Water Advisory Committees and agricultural partner and other sector workgroup meetings;
8) Assistance in the protection of high-quality resources and documentation of restoration efforts by participating in tactical basin plan implementation.

For each RPC and NRCD, the specific scope of work has been tailored to the development process associated with the timeframe of each tactical basin plan, and to the constituencies of each partner. There are performance tasks that are required statewide, certain tasks that are required for specific watersheds, and still other tasks that an RPC and/or NRCD may elect as optional but valuable activities. These partner organizations highlighted the following successful aspects of the partnership this year:

- Enhanced review and public outreach around the development and review of draft Tactical Basin Plans (including for basins 3, 5, 8, 9, 12, 14, 15, and 16). In doing so, both the VAPDA and NRCD educated landowners, municipalities, and other stakeholders about the TBP process and facilitated incorporation of water quality related data, concerns, issues, and opportunities into each of these planning processes.
- Progress towards prioritization of individual projects incorporating local and regional considerations.
- Substantially augmented communication between DEC and partner organizations over implementation of Act 64, focused thru the tactical planning process and partner coordination efforts.
- Increased incorporation of DECs monitoring and assessment information in partner-led outreach.
- Augmented collaboration with municipalities, prompted by the requirements of Act 64.
- Integration of tactical basin planning with other important planning activities, such as flood resiliency and transportation planning.

- Opportunities to enhance reclassification and designation of surface waters to achieve higher levels of protection.

The RPCs and NRCDs, and in the coming year WUV, are providing tactical planning services that substantially enhance DEC's ability to reach landowners, municipalities, and other relevant stakeholders. Further, the contracted activities are developing augmented capacity in RPCs and NRCDs to support water quality protection and restoration. The outreach process undertaken in late 2019 by RPCs and NRCDs in support of the draft tactical plan release and public comment has benefitted the Department by bringing municipalities into the planning process in a more forthright manner. In coming years, RPCs, NRCDs, and watershed organizations anticipate the opportunity to continue to assist municipalities and landowners with implementation of requirements of Act 76, including clean water project delivery services. The WPP will continue to seek the means to strengthen and expand these partnerships in order to maintain the momentum and capacity that has been cemented with these entities and which have enhanced coordination.

Section 3) Schedule for the development of Tactical Basin Plans and Subsequent Actions

In this section, a five-year schedule for tactical basin plan production is provided, along with a statement of action items that are being undertaken over the coming three years. Figure 2 provides the 2019 status of planning across all watersheds, while Table 2 provides an overview the coming years.

Chapter 10 VSA 1253 also directs that this annual legislative report present a summary of actions to be undertaken over the subsequent three years. In any given tactical basin plan implementation table, those actions identified as required assessments to implement a regulatory requirement (e.g., municipal roads inventory, or phosphorus control plan for a community that is regulated under the municipally-separated storm sewer permit program), will necessarily be accomplished during the initial stages of basin plan implementation, in compliance with the requirements of the permit programs. For follow-up implementation projects, it is difficult to project with specificity which actions from any given basin plan's implementation table will be executed over the coming year, and thus summarizing those actions in a report of this nature presents some speculation. We interpret the legislative intent of this charge as a requirement to document the overall "game plan" at a high-level.

The Implementation Table Summaries presented in the new Otter Creek, Deerfield, and Passumpsic Tactical Basin Plans give a strategic-level view of actions at the basin scale, and these are supplemented by expansive project and assessment lists in the Watershed Projects Database. In an effort to provide useful information to the Committees and other stakeholders at the level of specificity appropriate to an annual legislative report, the following is offered.

Generally, the Lake Champlain and recently approved Lake Memphremagog TMDLs are envisioned to be implemented over a 20-year timeframe.

Table 2. Tactical basin plan production schedule.

Basin Number and Name	2019	2020	2021	2022	2023	2024	Major Watershed	Planner
Basin 1 – Hoosic, Battenkill	Assess	Start	Finish / Imp	Imp	Mon	Assess	Hudson	Angie Allen
Basin 2 and 4 – Poultney, Mettawee, South Lake	Mon	Assess	Imp / Start	Finish	Imp	Mon	Lake Champlain	
Basin 3 – Otter, Lewis, Little Otter	Finish	Imp	Mon	Assess	Start	Finish		
Basin 5 – Northern Lake Champlain Dir.	Start	Finish / Imp	Mon	Assess	Imp / Start	Finish	Lake Champlain	Karen Bates
Basin 6 – Missisquoi, Rock, Pike	Assess	Imp / Start	Finish	Imp	Mon	Assess		
Basin 8 – Winooski	Imp	Mon	Assess	Start	Finish / Imp	Imp		
Basin 7 – Lamoille	Assess	Imp / Start	Finish	Imp	Mon	Assess	Lake Champlain	Danielle Owczarski
Basin 9 – White	Imp	Mon	Assess	Start	Finish	Imp	Connecticut River	
Basin 14 (16) – Stevens, Wells, Waits, Ompompanoosuc, CT Direct	Start	Finish / Imp	Imp	Mon	Assess	Start		
Basin 10 (13) – Black, Ottauquechee	Mon	Assess	Imp / Start	Finish	Imp	Mon	Connecticut River	Marie Caduto
Basin 11 (13) – West, Williams, Saxtons	Imp	Start	Finish / Imp	Mon	Assess	Imp / Start		
Basin 12 (13) – Deerfield, Broad Brook	Finish	Imp	Mon	Assess	Start	Finish / Imp		
Basin 15 – Passumpsic	Finish / Imp	Mon	Assess	Imp / Start	Finish	Imp	Connecticut River	Ben Copans
Basin 16 – Northern Connecticut	Imp / Start	Finish	Imp	Mon	Assess	Start		
Basin 17 - Memphremagog	Mon	Assess	Start	Finish / Imp	Imp	Mon	Memphremagog	

The capability for the State to compel reductions in the first five-year iteration of tactical plans for these TMDL watersheds is limited by the timelines set forth by Act 64 for the establishment and promulgation of the permit programs. In other words, the State cannot compel, for example, the reduction of phosphorus from specific municipal road segments, until: 1) that permit program has been established; 2) the municipality has applied for coverage under that program; and, 3) the municipality has completed their road assessment, and staged a plan for implementation based on the most effective phosphorus reduction efforts. Figure 7 provides the timelines for permit promulgation, permit application and assessment/inspection, and implementation. These timelines do not, however, preclude any particular landowner or municipality from taking action sooner on specific projects, and many owners or municipalities have done so. These caveats provided, Table 3 presents the categories of priority actions that are identified by tactical basin plan implementation tables that will be conducted in the initial years of a basin plan implementation cycle, by sector.

Table 3. Three-year outlook for actions established by tactical basin plans.

Land Use Source	Category	State actions	Permittee / municipal / landowner actions
Forest	All lands	-Implement AMP rule -Identify landowners with upcoming harvests, and conduct targeted outreach	-Implement revised AMPs (as of 08-18) -Engage with Conservation Districts and State Foresters to employ WQ friendly practices such as portable skidder bridges -Provide TA to landowners to implement forest management plans that exceed base standards -Consider revising forest management plans to emphasize use of ESTAs
Stream Channels	All streams	-Support funding of highest-priority floodplain or corridor protection projects -Implement Floodplain and River Corridor Rule	-Adopt municipal zoning to protect river corridors -Enter into agreements to secure easements for key corridor protection of flood attenuation assets

Agriculture	Fields/pastures Production Areas	-Implement RAP Rule (ongoing) -Conduct inspections annually for LFO, every three years for MFO, every seven years for CSFO -Conduct high-resolution targeted BMP planning to assist landowners. -Engage watershed teams to provide technical assistance -Provide financial assistance -Target enforcement	- Conduct farm assessments (esp. SFOs) - Implement RAPs - Engage in AAFM or NRCS cost-share programs to offset costs of BMP installations.
Developed Land	VTrans owned roads and developed lands	-Implement "TS4" permit program (ongoing)	-Conduct assessments on a HUC12 scale -Implement priority projects resulting from assessments -Sequence implementation with planned major road upgrade projects.
	Roads MRGP	-Implement MRGP permit program (ongoing) -Provide funding for targeted municipalities to conduct road inventories through Better Roads or other funding sources -Continue to support MRGP Grant-in-Aid program	-Conduct inventories to derive capitol road improvement plans. -Apply for coverage for MRGP by 2021 -Implement capital improvement plans over 20-year timeframe.
	MS4	-Implement MS4 permit program (ongoing) -Provide financial support thru Clean Water Initiative or SRF funding	-Develop phosphorus control plans coincident with revised MS4 permit. -Implement Phosphorus Control Plans and Flow Restoration Plans over 20-year timeframe.
	Larger unregulated parcels	-Implement "Three-acre" permit by 2020 -Provide financial support for designs	-Inventory three-acre parcels -Develop and implement designs to manage runoff in accordance with Stormwater manual.
	ALL	-Provide financial and technical support for stormwater master plans to identify highest priority stormwater management actions	-Apply for support to implement priority projects.
Wastewater	WWTF discharges	-Update NPDES direct discharge permits in accordance with wastewater policy set forth in TMDL, within two year after basin plan issuance	-Operate WWTF in accordance with permit conditions. -Initiate engineering performance reviews when capacity approached TMDL threshold trigger for augmented phosphorus reduction.

Section 4) Individual Basin Plan Contacts and Statements of Progress

Watershed Planning Basin	Contact and web links
• Basin 1 - Batten Kill, Walloomsac, Hoosic • Basin 2 and 4 - Poultney, Mettowee, Lower Champlain Direct • Basin 3 - Otter, Little Otter, Lewis	Angie Allen, Watershed Coordinator Department of Environmental Conservation 430 Asa Bloomer Building Rutland, Vermont 05701 802 490-9081 Angie.Allen@vermont.gov
• Basin 5 - Upper LC Direct, including LaPlatte, Malletts Bay, St. Albans Bay • Basin 6 - Missisquoi Bay, including Pike and Rock • Basin 8 - Winooski	Karen Bates, Watershed Coordinator DEC Regional Office 111 West Street, Essex Junction, VT 05452 802 490 6144 karen.bates@ vermont.gov
• Basin 7 - Lamoille • Basin 9 - White • Basin 14 (+16) - Stevens, Wells, Waits, Ompompanoosuc, CT River Direct	Danielle Owczarski, Watershed Coordinator Department of Environmental Conservation 1 National Life Drive 2 Main Montpelier, VT 05620-3522 802 490 6167 danielle.owczarski@vermont.gov
• Basin 10 - Ottauquechee, Black, CT River Direct (Mill, Lulls, Hubbard) • Basin 11 (+13) - Williams, West, Saxton's, Lower CT Direct (Commissary, Morse, East Putney, Sacketts) • Basin 12 (+13) - Deerfield, Lower CT Direct, (Crosby, Whetstone, Broad, Newton)	Marie Levesque Caduto, Watershed Coordinator 100 Mineral Street, Suite 303 Springfield, VT 05156 802 490 6142 Marie.Caduto@vermont.gov
• Basin 15 - Passumpsic • Basin 16 - Northern CT River Watersheds • Basin 17 - Memphremagog, Coaticook, Tomifobia	Ben Copans, Watershed Coordinator Department of Environmental Conservation 374 Emerson Falls Road, Suite 4St. Johnsbury, VT 05819 802 490 6143 ben.copans@vermont.gov
All tactical basin plans are available at this link: Watershed Planning Program | Department of Environmental Conservation	

Basin 1: Batten Kill, Walloomsac, Hoosic

The 2016 Tactical Basin Plan for the the Batten Kill, Walloomsac, and Hoosic Rivers (tributaries of the Hudson River in NY) represented the first Tactical Basin Plan for this basin. The plan's implementation table specifies **83 actions** to address the key stressors in the basin including: acidity (atmospheric deposition), encroachment, channel erosion, invasive species, thermal modification, and land erosion.

Biomonitoring of Basin 1 was conducted in Summer 2018 and sample processing was completed in 2019. The basin is now in its assessment phase and the next Tactical Basin Plan will be finalized in 2021.

Project Status: The basin planning process supports on-going identification, funding, and implementation of projects in Basin 1. Of the 150 projects identified in the Watershed Projects Database (WPD), 35 were completed in SFY18.

By land use sector, most were road improvement projects (14), followed by natural resource projects such as floodplain and river restoration (5), then wastewater (2) and stormwater projects (2). The remainder of the projects provided education and outreach (i.e., workshops, trainings, and public/stakeholder meetings) and technical support (i.e., targeted, one-on-one interactions) to Vermont's landowners, stakeholders, business owners and other members of the public.

In SFY 2019, 28 clean water projects received $6,508,455 in funds from state agencies in Basin 1 (Appendix A, 2019 Clean Water Performance Report). Of those, 25 road improvement projects were funded through the Grants in Aid program in the towns of Bennington, Dorset, Manchester, Pownal, Rupert, Sandgate, Shaftsbury, Stamford, and Sunderland. As a result, a total of nine municipal road drainage and stream culverts were replaced in SFY 2019. The majority of SFY 2019 funding went to one wastewater project. Specifically, the Bennington – Wastewater Treatment Facility Refurbishment project received Clean Water State Revolving Funds totaling $5,967,600.

Watershed Partner Coordination:

- Regional coordination meetings with watershed partners including representatives of the Bennington County Regional Commission, Batten Kill Watershed Alliance, and Bennington NRCD. These partners assist in basin planning and project prioritization and development, conducting municipal outreach, and managing project implementation.
- Participation in the Aquatic Organism Passage Working Group with Trout Unlimited, Batten Kill Watershed Alliance, Bennington County Regional Commission, Bennington County Conservation District (BCCD), VT Fish and Wildlife Department, Vermont Land Trust, Trout Unlimited, Green Mountain NF, and the Batten Kill Watershed Alliance NY/VT.
- Participation in culvert and bridge prioritization and selection meeting with Trout Unlimited, Batten Kill Watershed Alliance, Bennington County Regional Commission, Bennington NRCD, VTrans, and local road foreman/crew members. The most costly and vulnerable culverts in each town were identified, so Trout Unlimited can conduct topographic/engineering surveys to assist with 30% design plans that towns can leverage for funding opportunities and/or as a starting point for replacement.

Project Development and Implementation – Coordination with

- Bennington County Regional Commission on an Ecosystem Restoration Program (ERP) project proposal for Stormwater Master Plan in Manchester
- BCCD on the Japanese knotweed management program along two watercourses in West Arlington. They are the major source of knotweed in the Vermont portion of the Batten Kill main stem from the Green River downstream.
- Batten Kill Watershed Alliance AOP working group on habitat improvements for the Green River in Sandgate, especially AOP culvert projects and a possible bank stabilization project.
- local partners to improve stream habitat and dynamics based on an initial habitat analysis of Camden Creek in Sandgate by Trout Unlimited and Batten Kill Watershed Alliance.
- Bennington County Regional Commission on the Lye Brook Berm Removal Alternatives Analysis in Manchester.
- BCCD to implement the ERP funded Arlington schools and library stormwater project, which will produce 100% designs for four stormwater retrofit projects on the grounds of the Arlington schools and public library on East Arlington Road.

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

The 2017 South Lake Champlain Tactical Basin Plan provides an overall assessment of the health of the "South Lake" Champlain Basin, which covers approximately 500 square miles through 24 towns from Rupert to Charlotte. The plan's implementation table specifies **67 actions** to address the key stressors in the basin including: nutrients, encroachment, channel erosion, land erosion, invasive species, and flow modification. An additional goal of the plan is to set priorities for meeting targets for phosphorus loading from the South Lake and all of the waters in its drainage basin that contribute to the South Lake "A" and "B" and Port Henry segments of Lake Champlain.

The basin is now in its monitoring phase and biomonitoring was conducted in Summer 2019. Sample processing will be completed in 2020 and assessment will begin in 2020-21. The next Tactical Basin Plan will be finalized in 2022.

Project Status: The basin planning process supports on-going identification, funding, and implementation of projects in Basin 2&4. Of the 347 projects identified in the Watershed Projects Database (WPD), 68 were completed in SFY18.

By land use sector, most were road improvement projects (21), followed by agriculture projects (15), then natural resource projects focused on forests and floodplain/stream restoration (10), wastewater (1), and stormwater projects (1). The remainder of the projects provided education and outreach (i.e., workshops, trainings, and public/stakeholder meetings) and technical support (i.e., targeted, one-on-one interactions) to Vermont's landowners, stakeholders, business owners and other members of the public.

In SFY 2019, 53 clean water projects received $1,840,776 in funds from state agencies in Basins 2&4 (Appendix A, 2019 Clean Water Performance Report). Of those, 28 road improvement projects were funded through the Grants in Aid program and salt sheds in Vergennes and Fair Haven received $409,126. As a result, a total of 35 municipal road drainage and stream culverts were replaced in SFY 2019. Nineteen agriculture best management practices such as cover cropping and waste storage facilities received funding. As a result, 735 acres of agricultural land were treated by conservation practices in SFY 2019.

Watershed Partner Coordination:

- Regional coordination meetings with watershed partners including representatives of the Poultney Mettowee NRCD (PMNRCD) and the Rutland RPC along with lake associations and watershed groups to identify and begin to scope and implement projects identified in the plan.
- Coordination with PMNRCD to increase understanding of water quality conditions through water quality monitoring

Project Development Coordination and Implementation:

- PMNRCD to plant riparian buffers along stream and rivers in the basin. In 2019, 4,085 new stems covering 15.42 acres were planted.
- PMNRCD on the recently funded ERP grant for the Poultney River Watershed Stormwater Master Plan (SWMP) covering 88,000 acres in the South Lake Champlain Basin
- PMNRCD to implement projects identified in the Lake Saint Catherine and Little Lake watershed SWMP
- Lake Saint Catherine Implementation Team
- PMNRCD, VDEC Lake Program staff, and lake associations on improving lakeshore zone habitat by evaluation, protection, and implementing projects identified in Lake Wise assessments and through basin specific lake watershed management plans (e.g., Bomoseen and Lake Saint Catherine);
- PMNRCD to continue implementing projects identified in the Castleton SWMP.

Figure 7. Riparian planting along the Mettowee River.

Figures 8 and 9. Stormwater treatment practices installed at Castleton Transfer Station

Subwatershed Monitoring in the McKenzie Brook Watershed in Vermont (supplemental monitoring project funded through the Lake Champlain Basin Program)

The Vermont portion of the HUC-12 "McKenzie Brook Watershed" is a composite of several subwatersheds in western Addison County that drain directly into Lake Champlain's "South Lake". This is one of the most intensive agricultural areas in the State of Vermont. It is part of what is known as the South Lake (segment) "A," which requires a 60% reduction in phosphorus loading from agricultural sources to meet State and Federal water quality targets. Recently, the McKenzie Brook Watershed has been targeted by the Natural Resource Conservation Service (NRCS) and its partners for accelerated implementation of agricultural best management practices (BMPs) over the next five years. During this timeframe, NRCS technical and financial assistance as well as resources provided by partners will be directed to this watershed.

At the behest of the Lake Champlain Basin Program and NRCS, the Vermont (DEC) Monitoring, Assessment, and Planning Program initiated the McKenzie Brook hydrologic and water quality monitoring study to complement on-going efforts to implement targeted BMP installations on farms located within the watershed. These data were used to document existing conditions in calendar years 2017 and 2018 with respect to streamflows and loading of nutrients. This study provided useful insights into the hydrologic and geochemical dynamics of this region, and results serve as a point of reference for reducing phosphorus concentrations and loads through implementation of agricultural BMPs going forward. The final report is available through the Lake Champlain Basin Program.

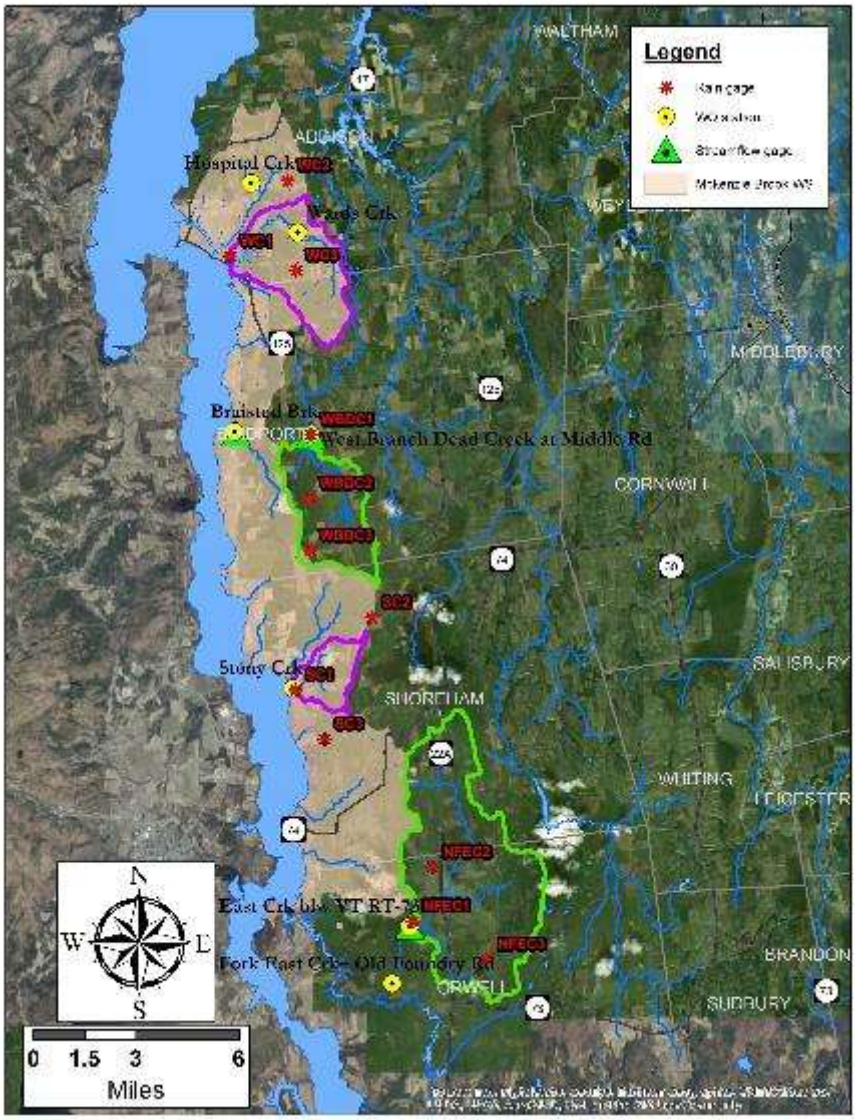


Figure 10. Map of the McKenzie Brook study area with 7 water quality sampling sites, 12 rainfall gaging stations, and 2 streamflow gaging stations in adjacent watersheds.

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

The 2019 Otter Creek Tactical Basin Plan (TBP) was finalized on Dec. 17, 2019, and contains substantive changes including: standardized content and layout, a climate change implications section, updates to the Lake Champlain P TMDL including the Phase II content, and strategies to address pollution from land use sectors contributing to water quality issues, and more.

The plan's implementation table specifies **57 actions** to address the key stressors in the basin including: nutrients, encroachment, channel erosion, land erosion, and pathogens. An additional goal of the plan is to set priorities for meeting targets for phosphorus loading from the Otter Creek segment of Lake Champlain.

The 2019 Otter Creek Tactical Basin Plan and an accompanying Story Map presented during the Plan's public comment period are available at: https://dec.vermont.gov/watershed/map/basin-planning/basin3.

The basin was in the plan finalization phase during 2019. Implementation will continue in 2020 and biomonitoring will be conducted in Summer 2021. The next Tactical Basin Plan will be finalized in 2024.

Project Status: The basin planning process supports on-going identification, funding, and implementation of projects in Basin 1. Of the 404 projects identified in the Watershed Projects Database (WPD), 108 were completed in SFY18.

By land use sector, most were road improvement projects (42), followed by agriculture projects (35), then natural resource projects focused on forests and floodplain/stream restoration (7), and stormwater projects (1). The remainder of the projects provided education and outreach (i.e., workshops, trainings, and public/stakeholder meetings) and technical support (i.e., targeted, one-on-one interactions) to Vermont's landowners, stakeholders, business owners and other members of the public.

In SFY 2019, 104 clean water projects received $5,725,987 in funds from state agencies in Basin 3 (Appendix A, 2019 Clean Water Performance Report). Of those, 34 road improvement projects were funded through the Grants in Aid program and salt sheds in Vergennes and Fair Haven received. As a result, a total of 36 municipal road drainage and stream culverts were replaced in SFY 2019. Forty agriculture best management practices such as cover cropping and waste storage facilities received funding totaling $2,478,301. As a result, 1,777 acres of agricultural land were treated by conservation practices in SFY 2019.

Watershed Partner Coordination:

- Regional coordination meetings with watershed partners including representatives of the Addison County NRCD, the Rutland NRCD, the Rutland RPC, along with lake associations and watershed groups to identify and begin to finalize the 2019 Otter Creek TBP and to scope and implement projects identified in the plan.
- Coordination with Addison County River Watch Collabrative (ACRWC) to increase understanding of water quality conditions through water quality monitoring funded by the LaRosa Partner Program and Organizational Support Grants.
- Assisting the ACRWC to build organizational capacity and better communicate their water quality data to local landowners and farmers through securing of ACWIP funds in 2019.

Project Development Coordination and Implementation

- Town of Middlebury on the Downtown Master Plan funded through the Better Connections Program (Vtrans and the Agency of Commerce and Community Development) to identify stormwater mitigation projects and complete one 30% design. The "Middlebury Planapalooza" was held in November 2019 to gather public input into master planning.
- Implementation of projects identified in the Moon Brook SWMP in Rutland City (with RNRCD)
- Lake Dunmore Fern Lake Association coordination with WSMD Lake Program staff on improving lakeshore zone habitat by evaluation, protection, and implementing projects identified in Lake Wise assessments and monitoring for aquatic invasive species;
- Working with ACRPC to implement projects identified in the Bristol SWMP
- Working with RNRCD to implement projects identified in the Wallingford SWMP
- Coordinating with VDEC Rivers program staff and RNRCD on finalizing the Cold River Berm Removal (2018-ERP-M-2_02): This project restores over 10 acres of floodplain along the Cold River

in the Town of Clarendon, which is currently cut off by a large berm. The site is located between Rt 7, where it was destroyed during TS Irene, and the Middle Road on the right bank. This project was identified as a top priority through the river corridor planning process.

- Working with RRPC to apply for Block Grant funding for a stormwater project in Pittsford. The project was identified in the 2012 Stormwater Infrastructure mapping Project – Action List 1/Subwatershed 15 and is a bioretention area to treat runoff in the vicinity of Pleasant and Arch Streets.
- Working with VDEC River program staff and MAP program staff to monitor water quality after emergency breach of the Dunklee Pond Dam on 10/30/2019.

Figures 11. Partial breach of the Dunklee Pond Dam in Rutland City on 10/30/2019. Left: Before breach, Right: during breach.

Basin 5 - Northern Lake Champlain Basin, including LaPlatte, Malletts Bay, St. Albans Bay

The Northern Lake Champlain Tactical Basin Plan was approved in August 2015 and updated in December 2017. The update included addition of the Lake Champlain Phosphorus TMDL Phase II content. The Phase II content includes high-resolution phosphorus-load modeling and projected phosphorus reductions for smaller sub-watersheds as well as by types of sources (wastewater treatment plants, developed lands stormwater, roads, forestry and agriculture). The 2017 plan also describes strategies relating to the development of new regulations associated with the Vermont Clean Water Act. The planning process drew heavily from assessment information including water quality results obtained 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.

The planning process for the 2021 Tactical Basin Plan rewrite commenced with a Partners kick-off meeting in December 2018. Additional meeting to fine tune water-quality monitoring plans and identify natural resource restoration or protection projects have occurred over the year. The fall included meetings to introduce the community to the planning process and invite comments or questions. The meeting included two hosted by the Clean Water Advisory Committees in Chittenden and in Franklin County. In addition, meetings were held in Georgia, North and South Hero with the assistance of the Northwest Regional Planning Commission. Meetings in the southern section of the basin were held in collaboration with the Lewis Creek Assn, the Lake Iroquois Assn and the St. Albans Area Watershed Assn. The Chittenden County Regional Planning Commission assisted in presenting planning concepts at Lewis Creek Assn's *Watermatters* meeting in November. The Winooski Natural Resource Conservation District assisted with a meeting in Essex Junction. Meetings have also occurred throughout the year with partners to provide updates on the planning process and review sections of the plan. Partners have included the Northwest and Chittenden County regional planning commissions, the Winooski and Franklin natural resources conservation districts, the Southern Chittenden County River Watch, the Friends of Northern Lake Champlain and Lake Iroquois Assn. Meetings with agricultural partners also occurred to inform the plan development. The plan is expected to be signed in the fall of 2020.

Examples of projects in 2019 that support plan strategies through collaborative effort of partners are described:

Figure 12. Mill Pond Dam before and after dam removal and restoration project

Mill Pond Dam Removal

The Vermont Natural Resources Council, with assistance from The Nature Conservancy and the US Fish and Wildlife Service, removed a dam on Indian Brook in Colchester to restore that section of the brook to a free-flowing stream. The project also included removing 30,000 cubic yards of phosphorus-containing sediment, regrading and planting the new floodplain.

Flow Restoration Plan projects

Burlington, South Burlington, Colchester, Essex Junction, Shelburne, and St. Albans City and Town continue to work on project design and implementation for seven Flow Restoration Plans to remediate the seven urban stormwater impaired streams in the basin, including Bartlett Brook, Englesby Brook, Indian Brook, Munroe Brook, Potash Brook, Stevens Brook and Rugg Brook. Some of the projects as depicted below, include Green Stormwater Infrastructure practices to more effectively remove pollutants from stormwater (Figure 13).

Figure 13. Example of a Green Stormwater Infrastructure Practice, a gravel wetland on St. Paul Street, Burlington completed in 2019.

Floodplain Restoration Design for Beecher Hill Brook

The Lewis Creek Association and Town of Hinesburg completed the floodplain restoration on Beecher Hill Brook. The goal of this project is to enhance river functions through floodplain reconnection and reduce sediment inputs and improve water quality. This was accomplished by developing and implementing a floodplain restoration design to return the river corridor to a dynamic channel and allow the river to access its historic floodplain.

Figure 14. Beecher Hill Brook floodplain restoration project post construction (*photo credit: Jessica Louisos*).

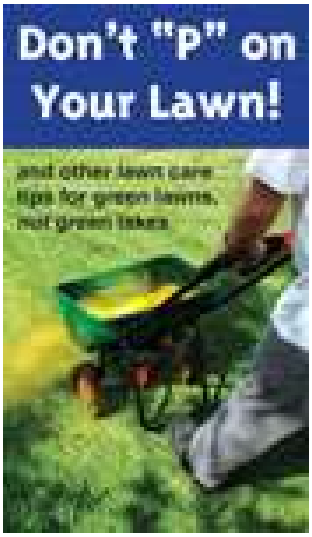
WNRCD Equine Workshop

In response to a need identified in the 2019 tactical basin planning process to improve management of horse manure, the Winooski Natural Resource Conservation District developed and held a workshop in Jericho. The workshop included instruction to help area horse stables with opportunities to learn about the new agricultural RAPs and BMPs for managing horse manure. The event also offered two water quality training credits from the Vermont Agency of Agriculture for horse facilities

WNRCD works with horse owners to identify suitable locations to store manure and to compost manure that are both environmentally friendly and convenient for the landowner.

Lawn to Lake

In 2006, the WID's basin planner, LCBP and several other groups in Vermont and the Champlain watershed in New York began pooling resources and ideas to create a coordinated lawn care outreach message. The group has developed and supported both the "Don't 'P' on Your Lawn" phosphorus-free fertilizer and the Raise the Blade campaign. Their Lawn to Lake web site includes healthy lawn tips and information about legislation in New York and Vermont that restricts the application of phosphorus fertilizers. In 2019, the group developed an additional website information promoting their "Raise the Blade" campaign to encourage the practice of mowing lawns to 3 inches to increase soil health, reducing stormwater runoff heading to lake.



Basin 6 Missisquoi Bay, including Pike and Rock Watersheds

The Missisquoi Bay Tactical Basin Plan (TBP) was approved on December 2nd, 2016. One of the goals of the plan is to set priorities for meeting targets for phosphorus loading from the Missisquoi River and all the waters adjacent to its drainage basin that contribute to Missisquoi Bay in Lake Champlain. As such the plan contains a comprehensive chapter addressing the Lake Champlain TMDL requirements, including high-resolution phosphorus load modeling.

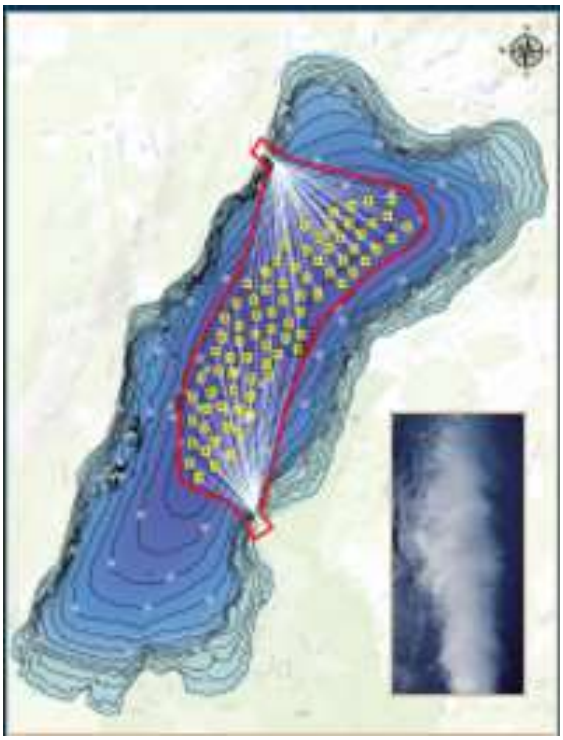
Project implementation is currently the focus for the basin. The towns, local stakeholders, including the Friends of Northern Lake Champlain, The Franklin Watershed Committee, the Missisquoi River Watershed Association, the Upper Missisquoi Wild and Scenic committee, the Franklin Natural Resource Conservation District and the Regional Planning Commissions have participated in project development and implementation.

The division is also continuing to support water quality monitoring by the Franklin Natural Resource Conservation District, Missisquoi River Basin Association and the Franklin Watershed Committee (Lake Carmi watershed). The WSMD LaRosa Program volunteer water quality monitoring program provides community groups with financial and technical assistance.

The WSMD has continued to support a local implementation action team for the Lake Carmi watershed that works to coordinate project identification and development among partners. The meetings have become a central hub for communication with community members deeply frustrated with the length and intensity of cyanobacteria blooms last fall. The meetings have brought in experts from all sectors to provide background information as well as helping to facilitate discussion. A Lake Carmi Action Plan was also developed by WSMD staff with input from the implementation action team.

Examples of projects in 2019 that support plan strategies through collaborative effort of partners are described:

Figures 15. Lake Carmi aeration project in operation



Figures 16. Lake Carmi aeration project map.

Aeration installation at Lake Carmi

An aeration system on Lake Carmi was installed and began operating on June 23rd, 2019. It was success in allowing the water column to mix so that dissolved oxygen was able to reach the lake bottom. The presence of dissolved oxygen at the lake bottom is important to reduce internal phosphorus loading. The aeration system, the first of its kind in Vermont, is part of a broader effort to reduce phosphorus loading to Lake Carmi and also includes numerous interventions in the watershed to reduce phosphorus inputs to the lake from surface water runoff, as defined in the ANR Lake Carmi Lake in Crisis Response Plan. While the aeration system is not expected to eliminate algal blooms, it is intended to reduce their occurrence and duration.

2019 Preliminary Results: The Lake Carmi aeration system is working as intended and was responsible for limiting phosphorus loading from the lake's bottom sediments this summer. Operational challenges and construction timelines did reduce the days the system was expected to operate and therefore, more phosphorus from internal loading reached the water column than is expected when the system is fully Figures 13. Lake Carmi aeration project in operation operational next year.

Outreach to agricultural producers in Pike River watershed

UVM extension has continued to work directly with farmers and landowners to increase the development and implementation of best management practices (BMP) that address nutrient and sediment runoff from

agricultural facilities and practices and identification and development of other innovative opportunities to improve water quality. With the help of AAFM and DEC, staff were able to buy and equip the area's first hay land manure injector, which will be available to farmers in the Pike River Watershed next spring. The DEC Rivers Program and the WID basin planner also helped staff provide information about the new two-tiered ditch practice to farmers in the area, see below.

Two-Tiered Agricultural Ditch

The successful installation of a two-tiered ditch in 2018 has led to a second installation in the same Rock River watershed this year. The second tier is the enlargement of a farm ditch to include a floodplain shelf. The Franklin Natural Resource Conservation District and the DEC Rivers Program worked with a farmer to help him understand the benefits of the ditch, which led to the installation.

Basin 7 Lamoille

Monitoring, implementation and project support have been underway in Basin 7 for a third year since the plan was published in 2016. The towns, local stakeholders, Regional Planning Commissions (RPCs), and Natural Resource Conservation Districts (NRCDs) are continuing to engage on priority projects throughout the basin writing grant applications, reaching out to the public, and implementing priority projects identified in the Plan. The Interim TMDL Implementation Status for the Lamoille River Planning Basin was developed this year for the USEPA as part of the Accountability Framework for the 2016 Phosphorus TMDLs for Vermont Segments of Lake Champlain. This report provides specifics on the status of the implementation table. The projects reported on below were identified as priorities in the 2016 Lamoille Tactical Basin Plan Implementation Table.

Water Quality Monitoring Collaboration Highlights

Deer Brook Water Quality Monitoring Project

In 2019, the Deer Brook Gully Stormwater Project that was funded by the Clean Water Fund through an ERP Grant was completed. This project, that primarily took place in 2018, was implemented by the Friends of Northern Lake Champlain (FNLC) and Northwest RPC with support from the basin planner and identified several stormwater treatment best management practices (BMPs) along Route 7 and 104A in Georgia to slow the flow of water entering the gully that has caused the gully to erode and deposit sediment into Deer Brook.

Deer Brook is impaired by excess sedimentation and these projects will reduce the overall sediment loading to the river. The FNLC received funding in 2019 for project development to move forward on conceptual designs for one of the stormwater runoff abatement projects and will continue to work on others identified in the report.

Figure 17. Fine silts depositing into Deer Brook from Deer Brook Gully caused by excessive stormwater runoff (left). Liza Lemiux, ECO Americorps Member for the Franklin County NRCD collects water quality samples out of Deer Brook (right). Photo credit: Jeannie Bartlett.

In order to track implementation efforts and ensure focused project implementation, water quality monitoring was started along Deer Brook targeting land use in sub-watersheds in collaboration with VDEC and the Franklin County NRCD. This data will provide a baseline to compare water quality before and after remediation in the Deer Brook Gully watershed and help us to understand how land use may be affecting water quality.

Caspian Lake Tributaries Water Quality Monitoring Project

Based on data collected by Lay Monitors on Lake Caspian, the Lake Caspian Lake Scorecard indicates significantly increasing summer and spring Total phosphorus trends. In early spring 2019 the basin planner received a phone call expressing concern about high phosphorus levels recorded from a tributary to Caspian Lake. The basin planner coordinated with the Lakes & Ponds Program monitoring staff and the Caspian Lake Lay Monitor to set up a season of tributary monitoring. In addition to the initial high phosphorus readings, Caspian Lake is one of a small group of oligotrophic (deep, clear, nutrient poor) lakes in Vermont experiencing significant increases in phosphorus levels. One season of sampling has been completed and the basin planner will work with the Lakes & Ponds Program to develop a 2-page report to provide to the town on the results and recommendations for next year's sampling plan. As part of this effort, the Lakes & Ponds Program is looking into establishing a long-term lay monitoring program on lake tributaries in need. A Story Map Tour displaying the sampling sites was created by the basin planner.

CLEAN WATER PROJECT COLLABORATION HIGHLIGHTS

Jericho Center Circle Infiltration Basin

During the month of August, the basin planner provided technical assistance to Chittenden County RPC (CCRPC) and the town of Jericho by reviewing two stormwater projects from the Jericho SWMP – completed in 2018 – for project development under the CCRPC Federal Highway Administration Funding. The Jericho Center Circle Stormwater Project would be part of a larger plan to address runoff and flooding issues on Bolger Hill in Jericho Center while also reducing runoff to the Browns River watershed. The Basin Planner, CCRPC, and the Town Administrator met on site to explore options referencing the conceptual designs provided through the Jericho SWMP funded by the VT Clean Water Fund. This project is an example where federal and state funds can be leveraged to bring a project to fruition, while achieving multiple benefits related to water quality.

North Wolcott Floodplain Restoration Project

During a late winter flooding event in 2018 on the Wild Branch in North Wolcott, a large flood chute was created along North Wolcott Road in Wolcott. This flooding event partially destroyed the roadway and electric poles and gouged out a 5 to 6-foot-deep channel in a small vegetated swale. The town of Wolcott was being provided emergency funding through the Vermont Agency of Transportation (AOT) which opened up the opportunity for a match to restore the flood chute to a more stable vegetated channel and add vegetation to the proposed rip-rap on the road side of the flood chute. The basin planner coordinated with the Lamoille County Conservation District (LCCD), the VDEC Rivers Program, Vermont River Conservancy, and the engineer contracted by AOT to repair the roadside of the flood chute. The group developed a plan to restore the flood chute to a more stable channel to prevent further erosion. The project was implemented in spring 2019 and trees were planted in fall 2019. A storm in late October swept away some of the plantings but overall the site remained stable, preventing excessive sediment from being delivered to the Wild Branch. The banks have stabilized, and vegetation is growing in vigorously on both sides of the river. This site will be monitored and may require additional stabilization measures depending on continued flooding events.

Lamoille County Aquatic Organism Passage Assessment for Brook Trout

Funds for aquatic organism passage (AOP) projects for Brook Trout are being pursued by US Fish & Wildlife Service (USFWS). LCCD is coordinating a workgroup to prioritize and assess culverts in Lamoille County. The basin planner has provided technical assistance to the workgroup by helping develop mapping technologies to identify priority sites for field verification by combining information gleaned from previous inventories and

monitoring data. The workgroup, consisting of VDEC, USFWS, VFWD, LCCD, and Lamoille County Planning Commission (LCPC), has completed the development of a priority list, on-the-ground verification in Cambridge, Eden, Elmore and Johnson, and the development of a first-tier list for removal.

A more complete accounting of funding spent, and performance measures achieved to improve water quality in this basin is available in Appendix A of the 2019 Clean Water Performance Report. This report does not include projects that were funded using non-state funds.

Basin 8 Winooski River

The Winooski River Tactical Basin Plan was approved in December 2018. The Winooski River Tactical Basin Plan (TBP) outlines a series of actions the State, towns, and local organizations will take to improve the Winooski River Basin. It also provides information about how landowners, organizations, and communities can access clean water funding and technical assistance.

Partners in the implementation of the plan included the Chittenden, Lamoille, Central Vermont Regional Planning Commissions and the Northeastern Vermont Development Association as well as the Winooski and Lamoille Natural Resources Conservation District. Implementation of the plan continues with support of assessments and projects (see below). The Friends of the Winooski River, Huntington River group, Winooski Natural Resources Conservation District 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

The TBP's top objectives and strategies support actions that enhance flood resilience and stream equilibrium by protecting river corridors; reduce nutrient and sediment loading and bacteria impairment by increasing Best Management Practices across all land sectors; restore shorelines, wetlands and floodplains, and assist communities in understanding how they can best participate in protecting and restoring water resources.

Based on monitoring results, 40 streams are proposed for reclassification under the Vermont Water Quality Standards to preserve current high-quality waters. The Central Vermont Regional Planning Commission has already spoken with three towns, Northfield, Middlesex and Marshfield to ask for their support in any reclassification for streams to B1 for fishing. The plan also identifies the Huntington Gorge and The North Branch as potential Outstanding Resource Waters. The Derway Island wetland is identified as a prospective

Figure 18. Deeply incised flood chute with riprap on roadside bank (left). Restored flood chute stabilized and vegetated (right). Vegetation on riprap will decrease pollution from road stormwater runoff and eventually provide shade and habitat for aquatic organisms.

Class I wetland candidate

The Plan also includes the Phase II content (Chapter 3) for the Lake Champlain Phosphorus Total Maximum Daily Load (TMDL), including setting targets for phosphorus loading from the Winooski River to Lake Champlain. The Phase II content includes high-resolution phosphorus load modeling and projected phosphorus reductions for smaller sub-watershed as well as by types of sources (wastewater treatment plant, developed lands stormwater, roads, forestry and agricultural). The TMDL as well as the associated Phase I Implementation Plan both point to issuance of this plan as a component of the accountability framework.

Examples of projects that support plan strategies through collaborative effort of partners are described:

Texas Hill Road Culvert

Due to participation in the Basin Planning steering committee discussions organized by DEC Basin Planners, the CCRPC and WNRCD are communicating more frequently. Not only does this avoid duplication of efforts and potential confusion among target audiences, it also occasionally leads to joint endeavors where their respective capacities and skills can come to the fore. For example, the WNRCD had long been concerned about erosion problems at a large culvert on Texas Hill Road in Huntington but had been unable to make significant progress in scoping potential solutions due to a lack of funding. In 2019, however, WNRCD made CCRPC aware of the concerns and CCRPC was able to hire one of its engineering firms on retainer to conduct a preliminary scoping and identify some possible approaches for both culvert replacement and riparian erosion mitigation which WNRCD is now exploring further.

Stormwater Master Plan Projects

Northfield and Barre each completed a project included in a Basin Plan supported stormwater master plan with the assistance of the Central Vermont Regional Planning Commission: Northfield's Water Street stormwater chambers and Barre's Pouilot Street stabilization projects, see pictures below.

Figure 19. Stormwater from Water St in Northfield diverted from Dog River into Stormwater treatment chambers

Figure 20. Gully created by stormwater runoff from Pouliot St. in Barre stabilized in project coordinated by the Central Vermont Planning Commission

Figure 21. Volunteers collected water quality samples for rethinkrunoff.org/the-stream-team/

Sampling Urban Streams for Chloride, Nutrients and Sediment

Since 2017, Regional Stormwater Education Program and the Chittenden County Stream Team manage Rethink Runoff, www.rethinkrunoff.org, as a collaborative program that both educates the public and gets them involved in hands-on activities through the Stream Team http://rethinkrunoff.org/getinvolved/get-involved-stream-team/. The Stream Team is made up of volunteer citizens who sample urban streams for chlorides, nutrients and sediment, helping the community better understand condition of neighborhood waterbodies, including Centennial Brook in Basin 8 (Figure 18).

Basin 9 White River

Basin 9 is in its first year of implementation since the approval of the White River Tactical Basin Plan (TBP) in December 2018. The plan was completed with input from our major partners including the White River Partnership (WRP), Two Rivers Ottauquechee Regional Commission (TRORC), and the White River Natural Resources Conservation District (WRNRCD). Other partners, stakeholders, municipalities and landowners were also crucial in the development of the plan. These groups are now working on the actions identified in the Basin 9 TBP. The projects reported on below were identified as priorities in the 2018 White River Tactical Basin Implementation Table. To learn more about the White River Basin, visit the Story Map.

WATER QUALITY MONITORING COLLABORATION HIGHLIGHTS

White River Partnership Water Quality Monitoring

The White River Partnership continued to monitor *E. coli* levels along the mainstem and branches of the White River. This information is distributed annually to the local community and watershed partners to inform the public of safety issues with swimming and other primary contact recreation in the White and its tributaries. The WRP supplements this sampling through the LaRosa Partnership Program. The basin planner works with WRP to determine supplemental monitoring efforts to identify areas of phosphorus or nitrogen pollution and also to compare high *E. coli* levels with nutrient levels. In 2019, the WRP continued their supplemental sampling and will use this data to inform restoration efforts and future monitoring. The basin planner meets with the WRP on an annual basis to review the year's results, recommend sampling sites, and review the next year's grant proposals to the LaRosa Partnership Program.

CLEAN WATER PROJECT COLLABORATION HIGHLIGHTS

Bridge Street Bridge Creosote Remediation Planning in Royalton

During the summer of 2018, spurred by a summer heat wave, creosote, from the treated wooden base of the Bridge Street Bridge in Royalton, dripped onto to people tubing on the White River. Many bridges throughout the state have wooden supports treated with creosote, but do not pose a safety risk. Reports of chemical burns were fielded by the Department of Health, Agency of Transportation and DEC. The three agencies, with coordination provided by the basin planner, offered technical support for identifying and evaluating health risks to both humans and aquatic organisms. In collaboration with WRP, the basin planner coordinated with the Town of Royalton to develop a plan to protect recreationists and address the dripping creosote. Signs were created and posted at access points and along the river and bridge. A long-term plan to address the creosote dripping was identified as a priority in the 2018 White River TBP and the WRP received funding this year from the Project Development Block Grant to work with the town and a local consulting firm to identify possible solutions for 2020.

White River Mainstem Outstanding Resource Water Designation Efforts

The 2018 White River Basin Plan recommends the White River Mainstem be designated as an Outstanding

Resource Water (ORW) for recreation. The basin planner coordinated with the Two Rivers Ottauquechee Regional Commission (TRORC) to support a Mitigation Enhancement Fund grant application and provided TRORC with documentation from previous ORW designations and supporting information for the ORW recreational use. TRORC received funding to work on the ORW designation in 2019 and the basin planner has continued to provide support. The basin planner drafted a response letter to TRORC on their questions regarding the ORW petition process and will meet with them to continue collaboration around the effort to further protect the White River mainstem.

White River Partnership Tree Planting, Snorkeling, Stream Geomorphic Assessment, and Dam Removal

The basin planner provided technical assistance and support for tree planting in Bethel along the White River with school groups for the WRP and Green Mountain National Forest Service (GMNF) at a floodplain restoration site and along the Third Branch at an agricultural restoration site with a new River Corridor Easement.

The Green Mountain National Forest partners with the WRP and provides a freshwater snorkeling program during the fall season that lasts over 2 weeks (9 days of snorkeling) and teaches 350 students (plus teachers and parents) about clean water, habitat, the role wood plays in our rivers, through exploration and snorkeling. This year the basin planner provided support for this program and helped students to identify macroinvertebrates and fishes in the White River Watershed.

The planner also provided technical support for a field day collecting data for the Second Branch Stream Geomorphic Assessment (SGA) in Royalton with the VT Rivers Program staff and the WRP. The Second Branch SGA was identified as a priority in the 2018 White River TBP.

After receiving funding for a final design and implementation, the White River Partnership convened on the removal of the Upper and Lower Eaton Dams on the First Branch of the White River. Another priority project in the 2018 White River TBP completed with funding from the state and the hard work of our watershed partners.

Figure 22. In clockwise order: Paddling with the WRP to assess the Second Branch. The Lower Eaton Dam removal before and after photos. A young girl snorkeling in the Third Branch. A Clean Water Project sign at the Eaton Dam site. The White River Partnership after a half day of planting a total of 415 stems in the rain. All photos credited to WRP.

A more complete accounting of funding spent and performance measures achieved to improve water quality in this basin is available in Appendix A of the 2019 Clean Water Performance Report. The report does not include projects that were funded using non-state funds.

Basin 10 Black & Ottauquechee Rivers Basins

The Basin 10 Tactical Plan was adopted in 2018 covers the Black and Ottauquechee river watersheds and the tributaries that drain directly to the Connecticut River including Mill Brook, Lulls Brook and Spencer Brook.

The Plan is now in its implementation phase and working with regional partners projects are underway. In the past year six projects were completed funding through Basin Planning work investing $158,901 in Clean Water funding. An additional $105,732 has been granted for seven additional projects to be implemented in 2020.

Of the 461 projects identified for the Basin in the Watershed Projects Database(WPD). To date 20 have been completed, 20 have received finding to proceed, with 421 remaining.

Additional Clean Water funding for wastewater, agriculture, roads and stormwater cumulatively lead to investments of $7,290,432 in the Basin between 2016 – 2018.

Projects completed include:

- On-going volunteer water quality monitoring programs by three local organizations on the Black and Ottauquechee rivers and Mill Brook. The Black River Action Team, the Ottauquechee River Group and the Ottauquechee Natural Resources Conservation District coordinate with the Basin Planner to select site locations, analyze results and minimize project costs by coordinating sampling days and transportation of samples.
- Development of a Stormwater Master Plan for the Town of Springfield and preliminary development of a stormwater treatment and abatement system to address extensive gully erosion.
- A riparian buffer installed on six individual properties along Lulls Brook in Hartland.
- Stabilization of significant erosion along Cady Brook on a legal trail in Hartland.
- Stabilization and restoration of forest roads in Coolidge and Proctor-Piper State Forests by the Dept. of Forest, Parks and Recreation.
- A completed design for the removal of a private dam and replacement of an eroding culvert in Weathersfield in partnership with funding from the US Fish & Wildlife Service through a partner NGO.

Priority project areas continue to include Kedron Brook in Woodstock to work on addressing nutrient and pathogen issues; addressing impaired waters and stormwater inputs in Hartford, Killington, Woodstock, Ludlow and Springfield; promoting lakeshore BMPs on the lake system in Plymouth and Ludlow; and reducing road erosion and sedimentation basin-wide.

Regional partners Ottauquechee Natural Resources Conservation District, Southern Windsor County Regional Planning Commission, and Two-Rivers-Ottauquechee Regional Commission are hosting or participating in Clean Water Advisory Committees, assisting in basin planning and project prioritization and development, conducting municipal outreach and managing project implementation and participating in regional basin planning coordination meetings.

Readers can access the Black, Ottauquechee Rivers Watershed Summary of projects implemented and related investment through the 2019 Vermont Clean Water Performance Report.

Basin 11 Williams, West, Saxtons, Lower CT River Direct

The Basin 11 Tactical Basin Plan was approved in January 2016 and covers the Williams, West, Saxtons river watersheds and Connecticut River tributaries including Salmon, Canoe, Sacketts, East Putney, Chase, Fullam, Mill, and Morse Brooks.

The Plan is in its implementation phase. 237 projects have been identified in the WPD, sixteen of which are completed and eleven are funded for future implementation with 210 remaining. In the past year five projects have been completed through the Basin Planning process investing $195,922 in Clean Water funding. An additional $6,941 has been granted for even additional projects through Block Grants for work in the coming year.

Additional Clean Water funding for wastewater, agriculture, roads and stormwater cumulatively lead to investments of $4,267,393 in the Basin between 2016 – 2018.

Over the past year several important projects have been completed in the Basin.

- On-going volunteer water quality monitoring programs by on the West, Williams and Saxtons rivers and numerous tributaries throughout the Basin by the Southeastern Vermont Watershed Alliance (SeVWA) and coordinated with the Basin Planner.
- Riparian buffer plantings have been installed along the Saxtons River.
- Three dams have been removed and the stream channels and riparian areas restored, one each in Dummerston, Grafton and Weston (shown below).

Figure 23. Weston Dam breached in Tropical Storm Irene (before and after removal)

- A large debris pile left by TS Irene containing construction and home materials has been removed and the site restored to floodplain. This project was initiated by landowners along the river concerned about pollution and the future hazards posed by the large amount of debris. Working with the Basin Planner the project developed into a partnership between the Town of Grafton, the Windham County NRCD, the Grafton Improvement Society and the Vermont Youth Conservation Corps to clean up the debris and have it hauled and disposed of by the Town, address invasive knotweed on the site and revegetate the floodplain areas with native plantings..
- Stabilization and restoration of forest roads and trails in Turner Hill Wildlife Management Area by the Dept. of Forest, Parks and Recreation.

Regional partners Windham County Natural Resources Conservation District and Windham Regional Commission are hosting or participating in Clean Water Advisory Committees, assisting in basin planning and

project prioritization and development, conducting municipal outreach and managing project implementation and participating in regional basin planning coordination meetings.

Basin 12 Deerfield, Green & East Branch North Rivers Basins

The Deerfield River Tactical Basin Plan is undergoing public review. Basin 12 covers the Deerfield, Green and the East Branch of the North river watersheds. All of these are bi-state rivers with headwaters in Vermont and ending in Massachusetts. Connecticut River tributary streams included Whetstone Brook, Broad Brook and Newton Brook.

Public hearings are in progress with municipalities, boards and commissions seeking comments on the Plan for final adoption. Meetings to gather public comment are being held on December 10th (Brattleboro) and 19th (Wilmington). The comment period runs through January 9, 2020. The draft plan may be obtained on-line at https://dec.vermont.gov/water-investment/watershed-planning/tactical-basin-planning/basin12.

There are 108 projects entered in the WPD, sixteen are completed or funded for implementation with 92 remaining. Five projects were completed this year investing $21,444 in Clean Water funding. No projects have yet received funding for 2020 work.

Additional Clean Water funding for wastewater, agriculture, roads and stormwater cumulatively lead to investments of $6,169,628 in the Basin between 2016 – 2018.

Projects completed in the past year include:

- On-going volunteer water quality monitoring programs by on the Deerfield River and numerous tributaries throughout the Basin by the Deerfield River Watershed Alliance (DRWA) and coordinated with the Basin Planner.
- Floodplain, in-stream and riparian restoration of a storm-damaged parcel in Guilford on the Green River. This long-term restoration project has involved State, federal and local partners and funders (Figure 21).

Figure 24. Damaged abandoned buildings and subsequent floodplain restoration

Originally identified in the Basin Planning initiated River Corridor Assessment, this parcel was destroyed during TS Irene. Damaged structures included a house, shed, and out-buildings. Abandoned, reclaimed and ultimately purchased and place under a River Corridor Easement through DEC, all the structures were removed, the site was cleaned of debris and trash, the banks stabilized and planted, the river channel stabilized and enhanced for aquatic habitat and a floodplain forest

planted over the entire site. Tactical Basin Planner partnered with the Connecticut River Conservancy (CRC), the Vermont River Conservancy, USDA NRCS, USFWS, and local and municipal partners to complete this restoration over five years.

- Lake Raponda:
  - 200 feet of shoreland stabilization and restoration
  - Lake Watershed Assessment conducted with Lake Raponda Association & Windham County NRCD
- Green River Watershed Alliance – Watershed Identify outreach project with VT & MA partners

Regional partners Windham County and Bennington County Natural Resources Conservation Districts and Windham and Bennington Regional Commissions are hosting and participating in Clean Water Advisory Committees, assisting in basin plan development and outreach, assisting with project prioritization and development, organizing agriculture workgroups, conducting municipal outreach and managing watershed organizations and water quality monitoring and doing project implementation.

Working along the mainstem of the Connecticut River the multi-state effort continues on the Long Island Sound (LIS) Dissolved oxygen/nitrogen TMDL through the LIS Regional Conservation Partnership Program.

In a partnership between the Basin Planner, CRC and NHDES, the fourth Samplepalooza event was held in September. This effort coordinates volunteer water sample collection from 57 sites on the Connecticut River mainstem and tributaries in four states (VT, NH, MA, CT) on the same morning. This data is used to track nitrogen and phosphorus levels in support of the LIS-TMDL.

The Basin Planner represents DEC on the Connecticut River Joint Commissions and is active in the Connecticut River Watershed Farmers Alliance and the bi-state Creating Resilient Communities partnership in the Deerfield River watershed.

Basin 14 Stevens, Wells, Waits, Ompompanoosuc, CT River Direct

Planning for the Basin 14 TBP is well underway. The public kick off meeting for Basin 14 was held in Bradford at the confluence of the Waits and Connecticut River in November 2018. Members from local watershed groups, conservation commissions, and the general public attended and provided feedback. The Basin 14 Story Map was presented at the meeting and distributed widely in the Basin 14 region. As part of the planning process a report card presenting the status of actions identified in the 2015 Basin 14 TBP is under development.

Our main partners in this basin are the Caledonia County and White River Natural Resource Conservation Districts (CCNRCD, WRNRCD), the Connecticut River Conservancy, Two Rivers Ottauquechee Planning Commission (TROPC), Northeastern Vermont Development Association (NVDA), and Central Vermont Regional Planning Commission (CVRPC). All partners plus local conservation commissions, lake associations, and regional water quality groups have been working in each sector to meet the goals laid out in the 2015 Basin 14 TBP. The projects reported on below were identified as priorities in the 2015 Basin 14 Tactical Basin Implementation Table.

WATER QUALITY MONITORING COLLABORATION HIGHLIGHTS

Lake Morey Tributary Water Quality Monitoring

Water quality trends have indicated a slight increase in internal phosphorus loading in Lake Morey. As a result, the basin planner collaborated with the VT Lakes and Ponds Program and a small group of Lake Morey stakeholders to develop a sampling plan to be implemented both internally by DEC staff and externally by volunteers of the Lake Morey Group. The Lake Morey Group received funding through the LaRosa Partnership

Program for tributary sampling during the summer of 2019.

DEC has been coordinating with the group on in-lake vertical profile sampling efforts and the development of a volunteer monitoring plan. Results of this study will be used to determine if internal loading is leading to increased water quality problems in the lake. Following the sampling season, the basin planner coordinated and hosted a meeting with the Lay Monitoring Coordinator, LaRosa Monitoring Partnership Coordinator, LaRosa Monitoring Partnership Eco Americorp Member, and Lake Morey Volunteer Monitor to review 2019 tributary

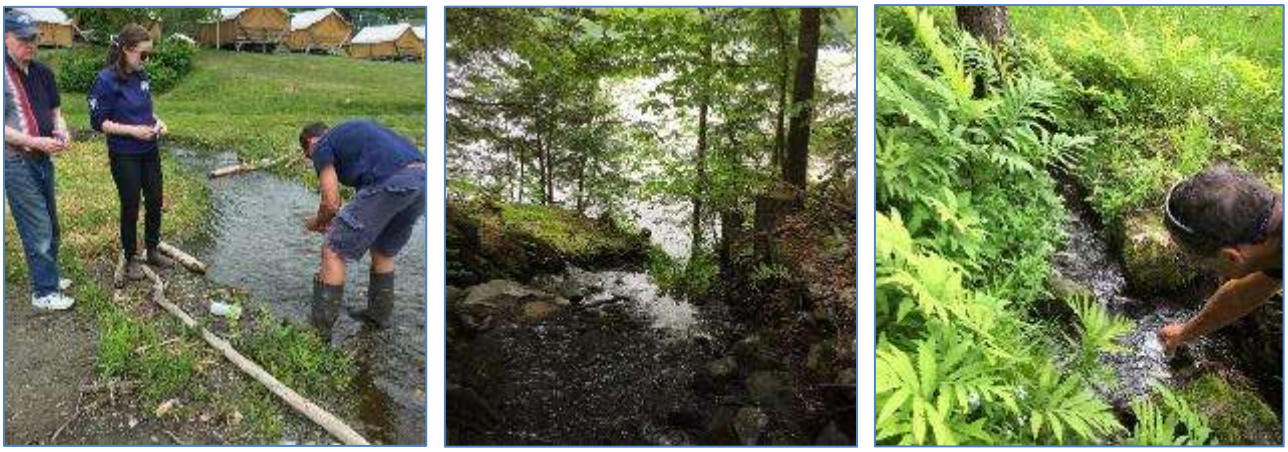


Figure 25. Lake Morey Water Quality Committee and LaRosa Partnership Program Coordinator on a Quality Control visit at the Lake Morey (left). Tributary monitoring site on Lake Morey (middle). Lake Morey volunteer collecting water quality samples (right).

sampling data. The tributaries met water quality standards and overall total and dissolved phosphorus numbers were low. The group will continue supplemental monitoring into the next sampling season.

CLEAN WATER PROJECT COLLABORATION HIGHLIGHTS

South Peacham Brook Watershed Assessment

The basin planner spent a day in the field with Connecticut River Conservancy staff to assess South Peacham Brook for excessive sedimentation sources and other water quality project opportunities to benefit Harveys Lake and decrease lake sedimentation. The basin planner developed a Story Map Tour of the sites and shared with Caledonia NRCD and the Northeastern Vermont Development Association to follow-up on potential projects. The planner coordinated follow-up visits in the Harveys Lake watershed with CNRCD to identify projects for project development.

Lake Fairlee Lake Action Committee

The basin planner provided technical assistance to a Thetford Planning Commission member and new head of a Lake Fairlee Protection Committee who is coordinating among the three towns bordering the lake and is interested in mitigating the increasing levels of phosphorus in Lake Fairlee.

A list of recommendations and current information on the status of Lake Fairlee was provided to the committee chair. The planner coordinated with the VT Lakes & Ponds Program and the White River Conservation District to aid the committee with their scope to develop a plan to address the rising phosphorus levels. The groups met and discussed opportunities during a boat tour of Lake Fairlee hosted by the committee and the Lay Water Quality Monitor. The group continues to stay connected and are discussing next steps that may include tributary

monitoring and a Lake Watershed Assessment.


Figure 26. Members of the Lake Fairlee Committee and the White River NRCD discussing the history of land use around the lake (left). Opportunities for shoreline protection and restoration are numerous on Lake Fairlee (right).

A more complete accounting of funding spent and performance measures achieved to improve water quality in this basin is available in Appendix A of the 2019 Clean Water Performance Report. This report does not include projects that were funded using non-state funds.

Basin 15 Passumpsic River Basin

The Passumpsic River Tactical Basin Plan was signed in October of 2019 with a focus on protecting many of the high quality waters in this basin. This included seven waters that are flagged for reclassification as A(1) or B(1) waters for aquatic biota and 12 waters flagged for reclassification as B(1) for fishing use in addition to highlighting the Victory Basin wetlands complex as candidate for reclassification as a Class 1 wetland. The plan also addresses E. *coli* impairments of the Passumpsic and Sleepers Rivers, increasing nutrients trends and shoreland development on several lakes in the basin, and keeping the stressed Water Andric and Dish Mill Brooks from becoming impaired.

Several projects were completed or initiated in 2019 that focused in these areas and which are largely a result of strong partnerships between DEC, the Connecticut River Conservancy, the Essex and Caledonia County NRCD's, Northeast Vermont Development Association and NorthWoods Stewardship Center as well as private landowners in the basin. These efforts have included:

- The initiation of a Joes pond Association lake watershed assessment effort in coordination with several members of the Lake Association, the Lakes and Ponds program and the Caledonia County Natural Resources Conservation District. A meeting of these partners discussed a tributary water quality monitoring program, Lake Wise assessment and BMP implementation efforts and outreach around septic system maintenance.
- Four stormwater designs that were identified as priorities though the Lyndon, St Johnsbury and Concord stormwater master plans were completed or initiated with ERP funding and support from the Caledonia and Essex Natural Resource Conservation districts and local municipalities.
- A rapidly expanding gully draining to the Sleepers River caused by a stormwater outfall was addressed by a private school after this issue was identified and then site visits and technical assistance was coordinated by the basin planning and Caledonia County NRCD staff.

Figure 27. Before and after pictures of gully restoration and stormwater redirection project

- Basin planning staff coordinated with the Caledonia County NRCD, town of St Johnsbury and the St Johnsbury Academy to provide guidance on a buffer planting project that was completed as a student led project. The buffer planting was between a stormwater practice at the St Johnsbury town garage that was installed in 2018 and the Moose River and in combination these practices address a significant source of sediment to the Moose River and will improve riparian habitat.

Figure 28. St Johnsbury Academy students planting a riparian buffer as part of a student led project at the town garage.

- The Vermont Department of Forests Parks and Recreation completed a fire road erosion control and culvert removal project in the portion of Darling State Park which drains to the stressed Dish Mill Brook addressing both erosion and aquatic organism passage.

A more complete accounting of funding spent, and performance measures achieved to improve water quality in this basin is available in Appendix A of the 2019 Clean Water Performance Report.

Basin 16 Northern Connecticut River Watersheds

The tactical basin planning process for the Northern Connecticut River Watersheds kicked off in the spring of 2019 with a meeting of key partners across the watershed including the Essex Natural Resources Conservation District, Vermont Fish and Wildlife Department, The Nature Conservancy, US Fish and Wildlife Service and the Vermont River Conservancy. The Northern Connecticut River Basin includes tributaries to the Connecticut River north of the Passumpsic River including Paul Stream, Leach Creek and the Nulhegan River along with several smaller streams.

There are only a few water quality issues across this basin including increasing phosphorus trends on Maidstone Lake and elevated levels of E. *coli* on some portions of the Connecticut River so the tactical basin plan will focus on protecting the high quality of waters that already exist. This focus includes floodplain restoration along the Connecticut River, strategic wood addition, aquatic organism passage and the identification of reclassification opportunities. Efforts are ongoing to implement strategies identified in the 2014 Upper Connecticut River and Passumpsic River Tactical Basin Plan which include:

- The Essex County Natural Resources Conservation District worked with the Maidstone Lake Association and NorthWoods Stewardship Center to design and implement lake wise restoration practices at Maidstone Lake – funded through an ERP grant and supported though the NorthWoods Stewardship Center work crew
- The Vermont Fish and Wildlife Department completed strategic wood additions in the watershed which is part of an ongoing effort to restore habitat impacted from log drives many years ago. Studies of this project show that these efforts have doubled brook trout biomass, but observations have also shown that these wood additions can act to trap sediment and nutrients. The trapping of sediment has allowed funding though an ERP grant to support a continuation of this work and this has included an assessment to evaluate how these practices can increase the storage of sediment in bars and on the floodplain and reduce sediment and phosphorus loading downstream which will be reported in 2019.
- The Essex County Natural Resources Conservation District has participated in the Northeast Kingdom Rivers and Roads workgroup meetings and has led efforts with the Northeast Vermont Development Association to support towns in completing road erosion inventories for most of the small communities in this basin with support from tactical basin planning funds. These efforts provide essential support for these small communities for the implementation of Better Roads projects and Grant in Aid projects targeting priority road water quality issues.

A more complete accounting of funding spent and performance measures achieved to improve water quality in this basin is available in Appendix A of the 2019 Clean Water Performance Report.

Basin 17 Lake Memphremagog, Coaticook, Tomifobia Basin

Significant progress was made in 2019 toward implementing practices identified in the Lake Memphremagog, Coaticook, and Tomifobia Tactical Basin Plan and the phosphorus Total Maximum Daily Load for the Lake Memphremagog watershed that were both approved in 2017. This progress is a result of the work of several partners in the basin which are supported by the basin planning staff. These coordination efforts include the Memphremagog Regional Conservation Partnership Program focused on agricultural practices, a stormwater collaborative in association with the Northeast Kingdom Roads and Rivers Workgroup, and the Quebec Vermont Steering Committee.

A major focus in 2019 was guiding an International Joint Commission (IJC) study on addressing nutrient enrichment and harmful algal blooms on Lake Memphremagog that has produced a draft report for public comment and will be presented to this IJC for review in early 2020. The Memphremagog Watershed Association coordinated the drafting of the study report alongside the Memphremagog Conservation Inc. but the tactical basin planning staff co-chaired the Memphremagog Study Advisory Committee and assisted in facilitating a science and policy workshop. Recommendations in the report include updating the watershed export model used in the development of the TMDL to better estimate phosphorus loading from Quebec portions of the watershed to support the creation of concentration targets for the lake system. These targets will better support joint efforts to reduce phosphorus loading across the international watershed. The report also has specific recommendations to better address nutrient loading across agricultural, developed, and natural lands and the strengthening of the Quebec Vermont Steering Committee on Lake Memphremagog to support the work needed to reduce phosphorus loading across the watershed. Details on the study are available at: https://www.ijc.org/en/lclm/project-two.

Tactical basin planning staff worked closely with the Orleans County NRCD on the Memphremagog Regional Conservation Partnership Program targeting agricultural implementation efforts using water quality sampling data and uses this data to demonstrate the effectiveness of installing best management practices (BMPs). Through this program over 20 farm BMPs have been strategically implemented or planned on farms based on the targeted water quality sampling and sampling will continue in these areas to evaluate water quality improvements.

A list of some of the larger projects completed or in process for the watershed include:

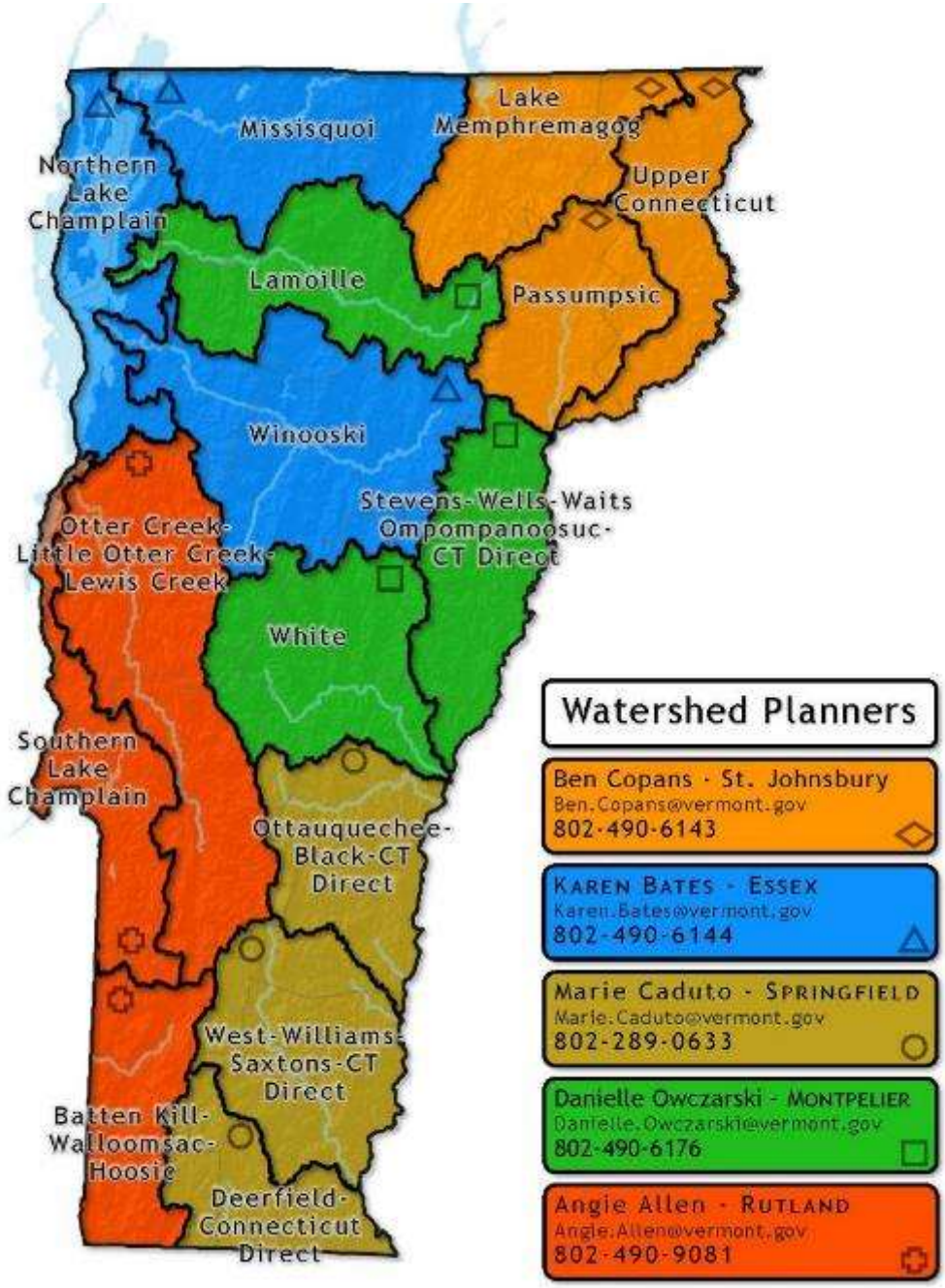
- The Vermont Fish and Wildlife Department has received an ERP grant to assess their riparian ownership which covers significant lengths of the Barton, Willoughby and Black Rivers. This project will identify riparian restoration opportunities which may be targets for Great Lakes Fisheries appropriations for this basin which has been $250,000 annually in recent years and has been proposed to increase to $500,000 in next year's federal budget.
- The NorthWoods Stewardship center installed a number of lakeshore restoration projects in the basin including several with the support of ERP work crew grant and support from the Vermont Forests Parks and Recreation and VTrans with regards to erosion on social trails on Lake Willoughby and the Vermont Fish and Wildlife Department which supported stormwater and lakeshore practices a four boat launches in the watershed.

Figure 29. Picture of the restoration of an unused boat ramp and one of 4 rain gardens installed at Seymore Lake by the NorthWoods Stewardship Center Work crew in 2019.

- A design for a major stormwater treatment practice in the City of Newport continues to move along and another stormwater design grant was received by the Memphremagog Watershed Association to develop a treatment design for another large stormwater drainage in the City.

A more complete accounting of funding spent and performance measures achieved to improve water quality in this basin is available in Appendix A of the 2019 Clean Water Performance Report.

Tactical Basin Planner Contacts



Acronyms Used in this Report

AAFM – Agency of Agriculture, Food, and Markets

AMPs – Acceptable Management Practice for Silviculture

AOP – Aquatic Organism, Passage

AOT – Agency of Transportation

BMPs – Best Management Practice

CCRPC – Chittenden County Regional Planning Commission

CRC – Connecticut River Conservancy

CVRPC – Central Vermont Regional Planning Commission

CWIP – Clean water Initiative Program

CWR – Clean Water Roadmap

DEC – Vermont Department of Environmental Conservation

ERP – Ecosystem Restoration Program

ESTAs - Ecologically Significant Treatment Areas (ESTA)—areas with special ecological values, such as endangered species or habitat. ESTAs may be enrolled on their own, as well as part of a larger parcel. If enrolled as part of a larger parcel, under the recent UVA revisions there is no maximum limit on the proportion of a property that may be classified as an ESTA provided it meets the criteria for the latter. Management may occur within ESTAs as long as it is consistent with the values (e.g., habitat or rare plant communities) target for conservation.

FWD – Vermont Fish and Wildlife Department

HUC12 – Refers to a 12-digit Hydrologic Unit Code based on a relative watershed scale, approximately the size of the average Vermont town (developed by the USGS)

LC PTMDL – Lake Champlain (phosphorus) Total Maximum Daily Load

LFO – Large Farm Operation

WPP – Watershed Planning Program

MFO – Medium Farm Operation

MRGP – Municipal Roads General Permit

MS4 – Municipal Separate Storm Sewer System

NRCS – USDA Natural Resource Conservation Service

NRCD – Natural Resource Conservation District

NVDA - Northeastern Vermont Development Association (NVDA).

PMNRCD – Poultney Mettowee Natural Resource Conservation District

RAPs – Required Agricultural Practices

RCPP – Regional Conservation Partnership Program

RPC – Regional Planning Commission

SFOs – Small Farm Operations

SWMP – Stormwater Master Plan

TA – Technical Assistance

TBP – Tactical Basin Plan

TMDL – Total Maximum Daily Load

TNC – The Nature Conservancy

TRORC - Two Rivers Ottauquechee Planning Commission

TP – Total Phosphorus

TS4 – Transportation Separate Storm Sewer System

USEPA – US Environmental Protection Agency

VAEL - Vermont Agricultural and Environmental Laboratory

VAPDA – Vermont Association of Planning and Development Agencies

WSMD- Watershed Management Division

Vtrans – Vermont Agency of Transportation

VYCC – Vermont Youth Conservation Corps

Appendix A) Statutory Partner Progress Reports

Per 10 VSA § 1253, and in consultation with Regional Planning Commissions and the Natural Resources Conservation Council, DEC provides the following annual progress reports submitted by VAPDA and the NRCC summarizing the progress made and difficulties encountered in revising basin plans, as well as the opportunities and success stories associated with partner coordination in the basin planning process in 2019.

VAPDA Final Report and Activities

On behalf of the Vermont Association of Planning & Development Agencies, the Chittenden County RPC is pleased to present this brief summary of activities carried out by Vermont's eleven regional planning commissions to support DEC's tactical basin planning process. From October 1, 2018 through September 30, 2019, RPC's carried out the following tasks:

Task 1: Tactical Basin Planning

- where applicable, RPC's assisted in the planning process for the following Basins: *Otter Creek (3), Northern Lake Champlain (5), Winooski (8), White (9), Deerfield (12-13), Stevens, Wells, Waits, Ompompanoosac (14), Passumpsic (15), and Upper Connecticut Direct (16).* RPCs educated municipalities about the TBP process and facilitated incorporation of municipal water quality related data [scientific assessments, plans & bylaws and municipal efforts with regards to hazard mitigation] and RPC input into the plan,
- assisted DEC with broadening municipal & regional input into the final draft of the applicable TBPs by hosting local basin plan forums as well as RPC Clean Water Advisory Committee and Board meetings to collect input from the public, municipalities and RPC Board members.
- provided an analysis and formal recommendation on conformance of the draft Tactical Basin Plan(s)with the goals and objectives of applicable regional plans to each relevant Basin Planner per *10 VSA Sec. 1253(d)(2)(g).*

Task 2: Tactical Basin Plan Implementation

Coordination with DEC and Partner Organizations & Outreach and Education to Municipalities:

- communicated regularly with each of DEC's five Watershed Coordinators and applicable partner organizations to assure coordination on development of TBPs and on outreach to municipalities concerning the Vermont Clean Water Act, relevant TMDLs (including Champlain, Memphremagog, Lake Carmi and Long Island Sound), and related regulatory requirements;
- hosted and coordinated 67 (sixty-seven) meetings of an RPC Clean Water Advisory Committee or similar committee to assure consistent outreach to municipalities and the incorporation of municipal input into TBP's and on related key water quality policy issues, and
- documented the frequency, duration, attendance and topics presented at these monthly meetings as well as dedicated outreach meetings via the Agency of Natural Resources Online portal

Municipal Plan & Bylaws Assistance

- provided technical support to 58 (fifty-eight) municipalities to update their municipal plans and bylaws to promote water quality protection, hazard mitigation and flood resiliency;

Stormwater Master Planning & Follow-up

• assisted 32 (thirty-two) municipalities by either securing funding for the development of stormwater master plans or assisting them with complying with their municipal separate storm
sewer system (MS4) permit or the pending developed lands general ("3-acre") permit.
• assisted 37 (thirty-seven) municipalities with advancing stormwater master plan projects toward implementation.

Task 3: Program Oversight & Reporting

• For the 4th year in a row, the Chittenden County Regional Planning Commission (CCRPC) acted as the Grantee for this regional TBP support and water quality outreach effort funded by
the DEC. The CCRPC negotiated ten sub-awards to its partnering RPCs, communicated regularly
with DEC staff, Watershed Coordinators and local watershed organizations and worked to assure consistency of effort and progress reporting by all 11 Vermont RPCs.
• Each of the 11 RPCs submitted monthly progress reports directly to applicable DEC Watershed Coordinators on implementation of the various Tasks and Sub-tasks of the Agreement.

Challenges encountered

While numerous achievements were secured by RPCs to assist the DEC with supporting the Tactical Basin Planning process, one major challenge remains, as follows:

• Project Prioritization: RPCs developed a matrix to determine the regional "co-benefits" [hazard mitigation, transportation, socio-economic, capital/asset planning, community support, etc.] of projects entered into DEC Watershed Projects Database. The hope has long been that these "co-benefit" scores could be easily entered into the WPD so that DEC could use these scores to identify which projects should be supported (via grant funds, prioritized within TBPs,
etc.) for BOTH their water quality and regional benefits. Unfortunately, this aspiration has not yet been met.

NRCC Final Report and Activities

Report and Success Stories, October 2018 - September 2019

Between the fall of 2018 and this past September, Vermont's 14 Natural Resources Conservation Districts (NRCDs) partnered with Vermont's Department of Environmental Conservation (DEC) to support tactical basin planning activities throughout the state. This work involved the coordination and input by a wide array of partners, including Conservation Districts, DEC staff, landowners, watershed groups, municipalities, and Regional Planning Commissions. This ongoing work is made possible through an annual $80,000 grant provided by DEC.

Tactical Basin Planning is a large-scale, ongoing effort across the state. This effort is critical to give landowners, natural resource project implementors, and other local partners an avenue for providing input and local priorities into Tactical Basin Plans.

DEC's Basin Planners work throughout the state on a five-year rotating schedule to develop, draft, and receive input on basin plans and ultimately identify and remediate water quality issues in each of the state's 15 basin planning watersheds. Basin Plans have continued to be a foundational tool leading to the assessment and long-term planning around current water quality needs and future opportunities for action.

This year, Conservation Districts partnered with DEC's team of Basin Planners to carry out a variety of projects. These included supporting opportunities for local input and prioritization on draft basin plans, organizing and supporting water quality monitoring efforts in key watersheds, and using existing basin plans to implement projects that restore or improve water quality throughout the state

A frequent activity enabled through this funding is coordination meetings and site visits. Site visits and structured coordination allows partners to meet and discuss potential solutions to known natural resources concerns, avoid duplicating efforts between implementors, and allow implementation partners to pool resources. For instance, Winooski NRCD had long been concerned about erosion problems at a culvert in Huntington but was unable to make progress in scoping potential solutions due to lack of funding. Through coordination activities, Winooski NRCD partnered with Chittenden County Regional Planning Commission, who hired an engineering firm to conduct a preliminary scoping and identify some possible approaches for both a culvert replacement and riparian erosion mitigation which WNRCD is now exploring further.

Frequently basin planning efforts and coordination activities are used to identify gaps in water quality data. Tactical Basin Planning efforts are often used to enable NRCD staff to coordinate with DEC and collect water quality data to further enhance the identification and prioritization of clean water issues. One example is Franklin County NRCD's extensive water quality monitoring program.

Through the field season of 2019, ECO AmeriCorps member Liza Lemieux collected 288 water samples from the Deer Brook in Georgia, 125 water samples from agricultural tile drain outlets, and in partnership with local volunteers, 310 water samples from Hungerford Brook and Black Creek watersheds. Last year's sampling data was used to create a water quality data report for DEC this year, in addition to preliminary analysis of 2019 data.

Ultimately, monitoring and coordination efforts lead to the prioritization and identification of clean water implementation projects. Each year, Conservation District staff reference established Tactical Basin Plans and work with DEC's Basin Planners to implement projects that improve and protect waters throughout Vermont. Over the past year, Caledonia County NRCD partnered with the Town of St. Johnsbury, Stone Environmental, and Dufresne Group to implement the first neighborhood-scale Green Stormwater Infrastructure (GSI) project in Vermont to further mitigate combined sewer overflows.

The Oak Street neighborhood project included the installation of 22 roadside swales sited in the green space along roadways, with road grading directing flow towards the swales. The swales now treat runoff from 7.5 acres, including over two acres of impervious rooftops, driveways, and roads. These swales are helping to collect and treat stormwater and are helping protect water quality in the Passumpsic River. In June, the project and involved companies won an Engineering Excellence

Merit Award from the American Council of Engineering Companies of Vermont (ACEC-VT) for the innovative green stormwater infrastructure design and implementation project.

Tactical Basin Planning funding continue to be an effective way to allow implementors to coordinate with partners, monitor our waters, provide local input into Tactical Basin Plans, and ultimately identify projects for future implementation. This vital funding allows clean water projects to progress through the development and design phases to implementation and combines valuable local insights and priorities with state resources and technical expertise.