Water Quality Remediation, Implementation and Funding Report

Part I: Clean Water Needs, Financial Tools, and Administration
Part II: Lake Shoreland Protection and Restoration Management Options

January 14, 2013

Prepared for the Vermont General Assembly in
Accordance with Act 138 (2012), Section 19

Acknowledgements

Part I of the Act 138 Water Quality Remediation, Implementation, and Funding Report was prepared by staff at the VT Department of Environmental Conservation (VDEC), with the help of municipal staff and officials, members of the public, and members of the Legislature from across the State. Many interested parties participated in consultations and focus group meetings or had offered comments on the draft report. The VDEC staff is grateful for their input.

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Photos: courtesy of VDEC and the Better Back Roads Program:

- Photos on the left depict exposed soils that contribute to water quality degradation:
  - Development that lack adequate erosion and sediment controls (top left);
  - An agricultural field with exposed soils and no buffer (upper middle, left);
  - A poorly maintained roadside ditch (lower middle, left); and,
  - A cleared shoreland, exposing soil and bank to erosion (bottom left).
- Photos on right show management practices that minimize erosion and polluted runoff:
  - A parking lot designed using Low Impact Development (LID) principals to allow precipitation from the lot to drain into a bioretention system (top right);
  - An agricultural field with a cover crop to stabilize soil (upper middle, right);
  - A “Better Back Roads” project that involves installing a rounded, rock-lined ditch along a gravel road (lower middle, right); and,
  - A development that maintains tree cover and is set back from the water’s edge.

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Part II of the Act 138 Report was prepared by VDEC staff of the VT Lakes and Ponds Section: Amy Picotte, Bethany Sargent, Amanda Northrop, and Susan Warren. Thanks to the many people who provided information and review, especially Kellie Merrell.

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Executive Summary

Access to clean water is an integral part of the quality of life in Vermont. Often, however, the public assumes that clean water is readily available and inexpensive. As a result, there is insufficient funding – federal, state, and local – dedicated to addressing water quality problems. The needs for funding are significant, including abatement of agricultural pollution, control of stormwater runoff, and completion of critical maintenance at wastewater treatment facilities. To achieve clean water, Vermonters need to fundamentally shift our collective thinking, set a statewide goal to achieve sustainable, high quality water, prioritize actions, and develop dedicated funding streams for these high priority clean water initiatives.

Abundant water within Vermont's streams, rivers, lakes and ponds is among the State's most precious resources. Vermont has some 7,100 miles or rivers and streams, 300,000 acres of wetlands, and 812 lakes and ponds, totaling over 230 thousand acres. Sustaining and enhancing these water resources is not a short-term proposition to be measured in months or even a handful of years. Rather, it requires a continuous process of planning, developing, implementing, evaluating and adapting management strategies to ensure clean water throughout Vermont.

Vermont's water serves innumerable purposes. Households, schools, day-care facilities, and hospitals use water for drinking, washing, cleaning, and watering of gardens. Fishing, swimming, and boating draw thousands of tourists to our state each year. Commercial uses, ranging from agricultural operations to high-tech industries depend on clean water. The collective activities of more than 600,000 Vermonters are not without impact on our water resources. Stormwater runoff from the roofs of our homes and our driveways contributes small amounts of pollutants, such as dirt, de-icing salts, sand, oil, antifreeze, pesticides, and fertilizer that are washed into streams en masse when it rains or as snow melts. The cumulative impact of this pollution is significant. Similarly in an agricultural setting, rain washes soil and manure off of crop and hay lands and barnyards and ultimately into nearby streams. Unstable streams, partly due to the hydrologic impacts associated with development that yields more runoff[1] and encroachment on floodplains that prevent storage of floodwaters, increase river bank and bed erosion and the associated water pollution from sediments and nutrients. River bank and bed erosion can also be the result of changes in hydrology brought about by traditional surface drainage of land that directs runoff directly to streams without recharging groundwater. Subsurface drainage may also contribute to hydrologic impacts downstream.[2] Inadequately treated wastewater, whether it comes through a septic system or a wastewater treatment facility, contributes to damage to our state waters and can also adversely affect public health.

Since the passage of the Clean Water Act in the 1970s, Vermont and the rest of the nation have made significant gains in controlling water pollution through permit requirements that manage discharges from "point sources."[3] The State and federal government undertook a shared responsibility to provide Vermonters with clean water, investing over $600 million for

[1] http://ga.water.usgs.gov/edu/urbaneffects.html

[2] Seven Mile Creek Improvement Project, Brown-Nicollet Water Quality Board, St. Peter MN.

[3] Point sources are, "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture." 33 U.S.C. § 1362(14).

wastewater treatment. That investment continues to pay substantial dividends to public health and safety, local economies, and the environment.

Over time, however, nonpoint sources[4] of water pollution from our land use activities have grown in significance in Vermont and nationally. Municipalities are confronted with polluted runoff from paved and unpaved roads, parking lots, lawns, and development. Many municipalities do not adequately consider the impacts associated with new subjurisdictional developments. Municipalities are facing unprecedented needs associated with aging sewer pipes and water and wastewater treatment facilities, posing threats to human health and the environment.

Farms are facing similar challenges, as farmers are being asked to make pollution control investments at the same time they are seeing lower milk prices and higher fuel costs. There are increasing federal requirements for action on Lake Champlain, Lake Memphramegog and the Connecticut River, as well as 18 stormwater runoff impaired streams across the state.

We need to once again elevate in the public's consciousness the importance of making clean water a priority for sufficient resources in federal, state and local budgets. Our success in Vermont and elsewhere in restoring and preserving clean water for this and future generations will depend on four outcomes:

1. Controlling nonpoint sources;
2. Avoiding water quality degradation in the first place, which is often more cost-effective than restoring degraded waters;[5]
3. Continuing to provide wastewater treatment;[6] and,
4. Raising the public's conscience that clean water is vital to our public health and economy, worthy of a shared responsibility, and an absolute priority for public investment.

Faced with these challenges, the Vermont Legislature passed Act 138 in 2012 which directs the Vermont Agency of Natural Resources (VANR) to prepare a Water Quality Remediation, Implementation, and Funding Report. Our report, contained herein, investigates options to more effectively meet the State's clean water investment needs. The Act also directs attention to how the State should establish a shoreland program to restore and protect lake health.

The report contains two parts. Part I has three chapters. The first chapter describes the municipal and statewide clean water challenges in 19 categories of need, each including an annual cost (over a ten year planning horizon) and recommended actions.

The 19 categories of need are organized into four groups:

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[4] Nonpoint sources of pollution are sources that do not meet the Clean Water Act's legal definition of point source. Examples include runoff from developed areas, construction sites, and agricultural operations. Nationally, nonpoint source pollution is the leading causes of water quality degradation. U.S. Environmental Protection Agency, Nonpoint Source Pollution: The Nation's Largest Water Quality Problem, EPA841-F-96-004A: http://water.epa.gov/polwaste/nps/outreach/point1.cfm

[5] Kline, M., and B. Cahoon, "Protecting River Corridors in Vermont," Journal of the American Water Resources Association (JAWRA) 1-10, DOI: 10.1111; Bryer, M., Once of Prevention is Worth a Pound of Cure (and millions of dollars in savings) The Nature Conservancy, 9/6/12; VDEC, A Framework for Remediation of VTs Stormwater-impaired waters , January, 2010.

[6] Freedman, P., V. Bierman, J. DePinto., "Hard Lessons, Simple Truths. Water Environment Federation. 2007, http://www.limno.com/pdfs/2007-01_Freedman_Hard_lessons.pdf.

- Group #1: Municipal Operations for Nonpoint Source Pollution Reduction,
- Group #2: Agricultural and Forestry Operations for Nonpoint Source Reduction,
- Group #3: River, Floodplain, and Lake Shoreland Management, and,
- Group #4: Municipal Infrastructure and Regulated Stormwater Programs.

The total annual need in Vermont is estimated to be $156 million. This amount, albeit substantial, should not justify inaction. The need validates the Legislature's concern about the State's current capacity to meet the public's demand for clean water and justifies establishing a process to better meet these needs. The magnitude of need demands a three-step response:

Step 1: Develop a process for establishing funding priorities. That process must focus on the significant sources of nutrient and sediment pollution and rely on a strategic approach that directs resources towards those projects that will yield the greatest long-term benefit to water quality. It must also focus on avoiding water quality degradation, and continue to provide wastewater treatment;

Step 2: Find reliable and long-term sources of funding; and,

Step 3: Use state funds to leverage federal funds.

The second chapter analyzes 16 possible financial tools for generating additional revenue using ten separate criteria. Table 2 focuses on revenue potential, and Table 4 summarizes the evaluation of the financial tools. This chapter also describes options to promote or modify seven current programs to offer greater support for the State's clean water goals.

The third chapter evaluates eight options for administering a statewide water quality trust fund and includes a description of existing statewide and regional organizations and how these organizations could play a greater role in delivering clean water programs throughout the state.

Part II presents management options for lake shoreland protection and restoration and contains four chapters. Chapter One describes the consequences of cleared shorelands. The second chapter covers current shoreland management options. The third chapter discusses the current shoreland regulatory framework, and the final chapter provides options and recommendations for improving shoreland management in Vermont.

It is important to note that the intent of this report is to present to the Vermont General Assembly, as required by Act 138, a comprehensive and analytical evaluation of 16 possible financial tools and seven current programs that could help to achieve the Vermont's clean water and shoreland protection goals. The financial tools were identified through research on other state and regional initiatives and should not be construed as funding proposals by the VANR.

Introduction: Providing Clean Water for Vermont: A Call for Shared Responsibility to Benefit Public Health, the Economy, and the Environment

The Vermont Legislature passed Act 138 in 2012 which directs the Vermont Agency of Natural Resources (VANR) to prepare a Water Quality Remediation, Implementation, and Funding Report (the Water Quality Trust Fund Report or the Report). The Legislature called for the Report partly in response to the devastating impacts of Tropical Storm Irene and the spring 2011 Lake Champlain flooding as a means to improve Vermont's resilience to future flood impacts.

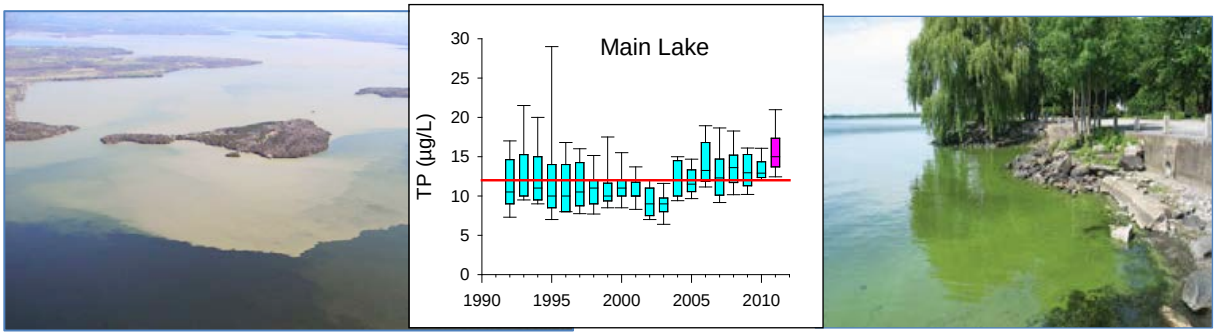

Figure 1: Left: Plume of Sediment in Lake Champlain, 2011; Center: Total Phosphorus concentrations in the Main Lake over time, showing a spike in 2011; Right: Algae bloom in Missisquoi Bay. Courtesy LCBP.

Act 138 also cites the U.S. Environmental Protection Agency's (USEPA) recent disapproval of the Lake Champlain phosphorus TMDL, requiring the state to incorporate additional water quality controls and implement additional measures to achieve Vermont water quality standards. The Act notes that Vermont faces additional pollution control requirements as part of the restoration of Lake Memphremagog, the Vermont portion of the Connecticut River, and the stormwater impaired waters of the state.[7]

In addition to promoting greater flood resiliency, the Legislature also identifies preserving, protecting and restoring the quality of surface waters is necessary for the economic well-being of the State. Restoring and maintaining the quality of the State's surface waters make good economic sense and preserves Vermont's quality of life for this and future generations.

Clean water is a key factor in Vermont's quality of life, economy, and image. All Vermonters ultimately benefit from clean water. Vermonters also ask a lot of our rivers and lakes:

- Cities and towns both draw drinking water and direct stormwater and wastewater into our rivers and lakes;
- Agriculture needs clean water to thrive;
- Businesses, particularly those with ties to recreation and tourism, rely on having clean water in Vermont's rivers and lakes; and,
- Roads and communities are located adjacent to dynamic rivers within river valleys due to historic settlement patterns.

Vermont has 7,100 miles or rivers and streams, [8] 300,000 acres of wetlands, and 812 lakes and ponds that total nearly 231 thousand acres. All waters of the state are at risk of pollution.

[7] Act 138, Sec. 19(a).

[8] Based on 1:100,000 scale maps.

Municipalities are at the front lines of protecting water quality, yet, across the state, they are facing serious revenue shortfalls. Municipalities are contending with aging wastewater, stormwater, and drinking water infrastructure at a time of significant reductions in federal funding. Municipalities also expect to see a reduction in allowable concentrations of phosphorus at wastewater treatment facilities, which will require upgrading the facilities with nutrient removal technologies. Municipalities also need to address a demand for services in areas that: (a) are unsewered; (b) lack services for growth center designation; or, (c) need to upgrade existing treatment facilities to plan for future growth.

One of the most significant challenges facing municipalities is how to effectively mitigate the impacts from unregulated sources of stormwater runoff[9] including rural roads which are thought to be major contributors to water quality degradation. Municipalities with impaired surface waters from stormwater runoff face significant costs to restore those waters. Some communities will see increases in compliance costs with the new"MS4[10]" stormwater permit requirements. Stormwater runoff is a significant source of nutrient loading to Lake Champlain and other watersheds of the State.[11]

Farms face similar challenges. Agricultural runoff is another major source of nutrient loading to Lake Champlain and other watersheds of the State. Agricultural land uses contribute nearly 40 percent of the total phosphorus load to Lake Champlain.[12] A recent study of the Missisquoi Bay Basin reports that agricultural land uses contribute 64 percent of the total phosphorus contribution to that section of the Lake.[13] Like Vermont's municipalities, our farms are also under financial stress due to fluctuating milk prices and the increasing cost of farm inputs such as feed grain and fertilizer, due to higher fuel costs. Improved agricultural land management practices require providing adequate technical and financial assistance to farmers to better control runoff, resources to enforce current regulations, and expanded regulations.

Building greater flood resilience to safeguard public health and safety and reduce flood damages to homes, businesses, and public infrastructure requires a partnership with municipalities. This partnership requires technical assistance, education, and incentives to help communities avoid new infrastructure and buildings in highly vulnerable river corridors and floodplains. Part of that education requires the State to have in place standard operating procedures associated with channel management during large storm events.

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[9] Stormwater runoff is caused by precipitation that runs off of impervious surfaces (such as driveways, sidewalks, streets, and parking lots), rather than infiltrating into the ground. Stormwater runoff often picks up pollutants, waste, and debris, to flow into a sewer system or directly to surface waters. "Slow it down, spread it out, and soak it in" describe common techniques to reduce stormwater runoff: http://water.epa.gov/polwaste/green/video.cfm.

[10] A Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyance systems (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, and storm drains) that transport and discharge untreated stormwater runoff into local water bodies. Combined sewers and publicly owned treatment facilities are not MS4s. http://www.vtwaterquality.org/stormwater/htm/sw_ms4.htm

[11] Troy, Austin, et. al, Updating the Lake Champlain Basin Land Use Data to Improve Prediction of Phosphorus Loading. LCBP Technical Report #54, May 2007, page 45, Table 2-11.

[12] Ibid, page 44.

[13] Stone Environmental, Inc. 2011. Identification of critical source areas of phosphorus within the Vermont sector of the Missisquoi Bay Basin. Prep. for Lake Champlain Basin Program. Grand Isle, VT. http://www.lcbp.org/techreportPDF/63_Missisquoi_CSA.pdf

Vermont is at a critical juncture with respect to shoreland protection. Vermont is the last remaining northeast state without adequate programs in place to restore and protect lake health. There is a need to ensure protection of remaining undeveloped shorelands and to educate current shoreland owners about how to restore already developed lakeshores. (Refer to Part II).

The VANR is also subject to multiple federal requirements to restore and protect water quality as part of the Clean Water Act's Total Maximum Daily Load (TMDL) section.[14] There are federal requirements to develop and implement TMDLs for phosphorus in Lake Champlain and Lake Memphremagog, for nitrogen in the Long Island Sound/Connecticut River watershed, and for 18 stormwater runoff impaired streams across the state.

Facing inadequate funding to respond to the public's demand for clean water, the Legislature called for a report to investigate options to more effectively address the State's challenges to provide clean water. The sources of our water quality problems are everywhere. Human activity -- in how we grow our towns, construct buildings and streets, till and raise crops and manage livestock, silage, and manure, pave for parking lots to service our businesses, and access timber – all contribute to the State's water quality problems.

The restoration and protection of surface waters require a shared responsibility by everyone. Providing clean water for today's and tomorrow's generation to enjoy is everyone's responsibility – municipalities, farmers, homeowners, businesses, developers, the public, and regional, state, and federal agencies alike.

VANR consulted with interested parties in the development of the Water Quality Remediation, Implementation, and Funding Report to obtain comments and advice. VANR staff held more than 30 meetings during the summer and fall of 2012 with staff from other state and federal agencies, legislators, a wide variety of business, environmental, and watershed-based organizations, and selected focus groups. A list of these consultation meetings is provided in Appendix A.

This report builds on the input received, and presents information and options in three chapters:

Chapter One: State Clean Water Needs, Costs, and Actions. This chapter describes the State's priority water quality needs, associated costs and recommended actions to restore and preserve clean water. This chapter evaluates needs by major sector, including the municipal sector's needs associated with stormwater, road, wastewater, and drinking water infrastructure, and agricultural sectors. This chapter also describes needs pertaining to sound river, floodplains, and wetlands protection and management to achieve greater flood resiliency, and needs to secure greater lake shoreland protection.

Chapter Two: Financial Tools for Clean Water. This chapter identifies and evaluates funding sources to meet the State's water quality needs, including an assessment of statewide assessment fees, permit fees, impact fees, or other fees or charges.

Chapter Three: Options to Administer a Statewide Water Quality Trust Fund. This chapter evaluates options for administering a statewide water quality trust fund.

[14] A TMDL is a pollution budget that establishes the maximum amount of a pollutant the waterbody can receive from many different sources of that pollutant while still meeting water quality standards. TMDLs typically include allocations and reduction targets for both point sources and nonpoint sources. Federal Water Pollution Control Act of 1972, 33 U.S.C. Section 1251 et seq., Section 303(d).

Chapter One: State Clean Water Needs, Costs, and Actions

Clean, healthy rivers and lakes provide public health benefits, enhance tourism and recreation, support cultural traditions such as hunting and fishing, provide a water supply that is safe for human consumption, minimize flood damages, support property values, and provide aquatic and riparian habitat.

Vermont's surface waters are threatened by discharges and actions or "stressors" that occur on the landscape and deliver pollutants that threaten public health and safety.[15] The most significant and pervasive water quality problems facing the State are nutrient and sediment loading. The three stressors that comprise most of the nutrient loadings in the State's surface waters are: (a) land erosion from developed lands, agricultural lands, construction, and logging; (b) non-erosion-related nutrient loadings from sources such as over-fertilization of cropland, poorly managed storage and spreading of manure, under-treated domestic waste, and, (c) stream channel erosion from activities that affect the stream channel's hydrology or alter the floodplain and stream channel.

Investing in clean water pays substantial dividends to public health and safety, local economies, and the environment. Since 1955, state and federal governments have invested $656 million[16] in wastewater treatment in Vermont. The state is now focusing on maintaining existing wastewater treatment facilities, correcting untreated or partially treated discharges that pose human health threats, and upgrades to remove nutrient discharges that contribute to unhealthy and potentially toxic conditions downstream.

Although municipal wastewater treatment facilities are one source that contributes to nutrient loading, nonpoint source runoff is by far the largest type of nutrient pollution degrading Vermont's waters. About 97 percent of the phosphorus load to Lake Champlain comes from nonpoint sources, and a similar situation exists for phosphorus loading to Lake Memphremagog and for nitrogen loading to the Connecticut River from Vermont.[17]

Vermont has made progress in reducing nonpoint source nutrient pollution through the installation of conservation practices on farmland, the construction of stormwater treatment systems, the restoration of riparian wetlands, the stabilization of road drainage systems, and the restoration of flood plains and other stabilizing river corridor features. However, progress towards achieving water quality standards has been slow, and further reductions in nonpoint source nutrient pollution will be needed in order to achieve and protect clean water.

Managing nonpoint source nutrient pollution is challenging because most of these sources are not currently subject to State regulation. Municipalities and individual landowners play the most critical role, particularly for those sources of polluted stormwater runoff associated with land use decisions.

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[15] VDEC, Statewide Surface Water Management Strategy, May 2011.

[16] Investment is in total nominal dollars, awarded between 1955 and 2012.

[17] Smeltzer, E., Dunlap, F., and Simoneau, M. 2009. Lake Champlain phosphorus concentrations and loading rates, 1990-2008. Lake Champlain Basin Program Technical Report No. 57. Grand Isle, VT. http://www.lcbp.org/techreportPDF/57_Phosphorus_Loading_1990-2008.pdf

Below is a summary of the State's priority needs to restore and maintain clean water. Each need has an associated cost to address those needs. These are estimates of the additional cost beyond current funding levels. In sum, restoring clean water to the state requires an additional investment $156 million per year for ten years. (Please refer to Appendix B and C for a more detailed discussion of these needs.)

We combined the category of needs in four major groups:

- Group #1: Municipal Operations for Nonpoint Source Pollution Reduction,
- Group #2: Agricultural and Forestry Operations for Nonpoint Source Reduction,
- Group #3: River, Floodplain, and Lake Shoreland Management, and,
- Group #4: Municipal Infrastructure and Regulated Stormwater Programs.

As mentioned above,[18] nonpoint source runoff is the largest contributor of nutrient and sediment pollution to Vermont's waters, requiring close consideration of the actions listed if the state is to be successful in restoring rivers and lakes for this and future generations.

Group #1: Municipal Operations for Nonpoint Source Pollution Reduction

1.1. Unregulated Stormwater

Annual Cost: $70.8 Million

On an acre-for-acre basis, developed land areas generate a disproportionate amount of the nutrient and sediment loading to the state's waters. Developed land involves construction of buildings, roads, and parking areas. These are impervious surfaces that reduce infiltration of precipitation and speed the delivery of runoff into surface waters. The vast majority of existing developed land is not regulated under state/federal stormwater permits, does not manage or treat stormwater, and yet can cause adverse water quality impacts to surface waters. Additionally, an unknown amount of *new* development falls below jurisdictional thresholds, is not subject to stormwater permitting requirements, and do not require treatment.

This cost reflects treating 5 percent of the estimated 140,000 acres of existing impervious surfaces statewide. The actual extent of impervious surfaces requiring treatment is unknown. However, we know that runoff from impervious surfaces contributes to the impairment of Lake Champlain and other waters. The Lake Champlain watershed is currently 3 percent impervious surface.[19] Because settlement patterns cluster impervious surfaces in certain areas, the actual percentage is substantially higher in some smaller watersheds. The "Impervious Cover Model" demonstrates significant degradation of stream biological health at levels of 10 percent impervious cover.[20] As analytical methods improve, more recent national research is showing degradation at levels significantly below 10 percent impervious cover, as confirmed by a recent

[18] See Footnote 4 on page 5.

[19] Knox, R. 2012. NVDI impervious surface layer for the Lake Champlain Basin. Agency of Natural Resources. Information Technology Division. Montpelier, VT.

[20] Schueler, T., 1994 The Importance of Imperviousness. Watershed Protection Techniques 2:100-111.

Vermont study.[21] Given the contribution of impervious surfaces to the impairment of Lake Champlain and other waters, and given that the ongoing development of watersheds will require treatment of existing impervious surfaces to prevent future impairments, planning to treat 5 percent of existing impervious surfaces may reflect the low end of what is ultimately required.

VDEC recognizes that it is unrealistic to simultaneously meet this need and that a strategic approach is necessary to direct resources towards stormwater improvement projects that will yield the greatest long-term benefit to water quality. VDEC is developing a stormwater master planning protocol to help municipalities identify and target where, when, how to pay for, and how to implement effective stormwater controls. Stormwater master planning involves stormwater mapping, evaluation of existing water quality data, and identification and ranking of problem areas. A formal protocol is expected to become available to municipalities to aid in mitigating local stormwater problems.

Actions Needed

- Conduct Stormwater Master Planning[22] at the local level to produce priority-ranked lists of problem sites and proposed corrective measures using Green Infrastructure and Low Impact Development (LID) actions.[23]
- Adopt model municipal erosion control and stormwater management regulations based on model ordinances developed by the Vermont League of Cities and Towns for any site disturbance and development that is not covered by state erosion control and stormwater regulations.
- Provide treatment for existing unregulated impervious surfaces, exclusive of roads.

1.2. Unregulated Stormwater Runoff from Road Networks

Annual Cost: $10.5 Million

There are over 14,000 miles of public roads in Vermont, nearly all of which require ditches and culverts for water drainage. If these structures are not properly constructed and maintained, there is significant potential for erosion of sediment into the drainage network and adjoining streams.[24] Sediment erosion and the associated nutrient loading from roads and their drainage networks can be reduced through implementation of good erosion control and water quality protection practices during road construction and maintenance. About 80 percent of the public road miles in Vermont are maintained by towns. Municipalities need increased technical and financial assistance to help them install water quality protection structures and implement practices for

[21] Fitzgerald, E.P. et al., 2012. Urban Impact on Stream Are Scale-Dependent With Nonlinear Influences On Their Physical and Biotic Recovery In Vermont, United States. Journal of the American Water Resources Association, JAWRA-11-0025-P.

[22] Stormwater master planning guidance under development; pilot projects available at VDEC.

[23] http://www.vtwaterquality.org/stormwater/htm/sw_green_infrastructure.htm.

[24] http://www.clrp.cornell.edu/TechAssistance/Tip_Sheets_by_Others/RoadsideDitches 1-11.pdf; Buchanan,B.P.,K. Falbo,R. L. Schneider,Z. M. Easton, and M. T. Walter. "Hydrological impact of roadside ditches in an agricultural watershed in Central New York: implications for non-point source pollutant transport," Hydrol. Process. (2012), Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/hyp.9305: http://onlinelibrary.wiley.com/doi/10.1002/hyp.9305/abstract

their road drainage networks. This cost estimate needs to be informed by the municipal stormwater infrastructure "Needs Survey," referred to in Section 1.15.

Actions Needed

- Provide outreach and training to towns in road management practices for water quality protection.
- Provide state grant funding to towns to implement road management practices for water quality protection and to comply with the water quality and flood protection practices in the Vermont Agency of Transportation's Town Road and Bridge Standards.

Group #2: Agricultural and Forestry Operations for Nonpoint Source Reduction

1.3. Farm Compliance with the Accepted Agricultural Practice Rules

Annual cost: $635,000[25]

The Vermont Accepted Agricultural Practice Rules (AAPs) establish minimum conservation practices to protect water quality and reduce other impacts of farming[26]. Enforcement of the rule has been primarily a complaint-driven process in which concerns about suspected violations are followed by site inspections to determine compliance with the rule and whether enforcement or other corrective actions are needed. A proactive, inspection-based system with follow-up enforcement is needed for small farms in order to bring these operations into full compliance with the AAPs.

Actions Needed

- Inspect all small farms (less than 200 cows for dairy) for compliance with AAPs.
- Rank by water quality needs on an ongoing basis to determine funding priorities.

1.4. Agricultural Nutrient Management

Annual Cost: $700,000

Reducing nutrient loading to surface and ground water from agricultural lands calls for implementation of a tiered system of nutrient management and conservation practices on all

[25] These actions and costs do not include the implementation of agricultural best management practices (BMPs) that will be needed in many cases to comply with the AAPs, or a nutrient management plan. Potential funding needs for BMP implementation are detailed in Section 1.7.

[26] Accepted Agricultural Practices (AAPs) and Best Management Practices (BMPs) are two different levels of practices to reduce agricultural nonpoint source pollution. AAPs are basic and affordable farming techniques (i.e., do not require governmental financial assistance) that all farms must follow as part of their normal operations. Examples include erosion and sediment control, animal waste management, fertilizer management, and pesticide management BMPs are more restrictive than AAPs, designed to correct a specific water quality problem on a farm, typically require installation of structures or equipment (e.g., manure storage or silage leachate systems), and thus, often require governmental financial assistance. http://www.vermontagriculture.com/ARMES/awq/AAPs.htm;

small farms.[27] Currently, only some small farms engage in nutrient management planning or implement alternative conservation practices to reduce water quality impacts. This tiered approach will provide farmers options for implementing cost-effective and environmentally beneficial on-farm management practices.

Actions Needed

- Develop details of a three tiered system that relies on the current NRCS 590 standard nutrient management planning program for medium and large farms,[28] a small farm nutrient management planning initiative, or the option of implementing site-specific conservation practices.[29]
- Develop resource plans for individual farms based on inspections and water quality priorities. Plans will provide the required tier for each facility, outline resource concerns and recommendations. Technical assistance will be provided to assist with implementation.
- Develop a declining scale cost-share for early adoption with lower cost-share rates for implementation of plans after the first year.

1.5. Agricultural Livestock Exclusion from Streams

Annual cost: $3.3 million

Livestock with unmanaged access to streams cause phosphorus, sediment, and pathogen pollution by depositing manure in the water and by trampling and destabilizing the stream banks. To reduce this source of pollution while meeting animal needs, it is necessary to protect streams from these livestock impacts with fencing, water systems and crossings, or other methods.

Actions Needed

- Quantify the extent of unmanaged in-stream livestock access and determine a priority list for outreach and implementation.
- Develop and implement a declining scale cost-share policy to encourage increased participation with lower assistance for later implementation.
- Use increased inspections and development of resource plans to increase technical assistance and coordination with resources for producers.

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[27] Medium and large farm operations already require wastes to be land applied via a nutrient management plan: See, http://www.vermontagriculture.com/ARMES/awq/MFO.html; http://www.vermontagriculture.com/ARMES/awq/LFO.html.

[28] The 590 Nutrient Management Standard is the US Department of Agriculture Natural Resources Conservation Service (NRCS) document that identifies the minimum requirements of a nutrient management plan. Having a nutrient management plan that meets the standard is a prerequisite for farmer participation in some NRCS cost-share programs. http://efotg.sc.egov.usda.gov/references/public/VT/VT590-051705.pdf

[29] Many smaller farms do not need the costly, extensive 590 standard and would more effectively influence water quality with specific practices such as buffers or reduced tillage.

1.6. Technical Assistance for Agricultural Water Quality Improvement

Annual cost: $653,000[30]

Practices such as cover crops, reduced tillage and aeration are on-farm practices that substantially affect soil erosion and water quality impacts, but these practices work very differently depending on soil types and management systems. New and innovative practices are continually being developed (i.e. aerial seeding of cover crops) as well as ways to achieve water quality improvements cost-effectively (developing resource plans or a certainty program that allows for greater flexibility in achieving water quality improvement).

To better target limited resources and make the most cost-effective decisions in reducing nutrient and sediment loading, farmers need guidance on how to most effectively implement site-specific practices through technical assistance programs and financial assistance. Farmers also need guidance to make major management changes that would have even greater water quality improvements, such as transitioning to grass-based farming where possible and appropriate.

Nutrient management planning is a useful tool being employed in Vermont to help farmers achieve water quality gains. However, nutrient management planning is an agronomic tool, originally designed to optimize nutrient application and utilization as part of a cropping system. It was not explicitly intended to be a water quality tool.[31] Nevertheless, there are ways to enhance nutrient management planning to better protect water quality.

For example, a nutrient management plan includes a soil loss tolerance (T).[32] This means that managing to T, which is not tied to water quality protection, would equate to some accepted annual loss of soil and associated nutrients at the farm. However, soil erosion loss is a major contributor to nutrient loading. The average annual acre of cropland in the US is eroding at a rate of 7 tons per year.[33] It is difficult to estimate the rate of erosion for cropland in Vermont. Erosion rates are a function of site conditions (slope, length of slope, and soil type), management of the property, and rainfall, and thus, are variable.

Reducing losses in soil and nutrients is a fundamental objective for improving water quality. Vermont should investigate water quality-based alternative nutrient management planning approaches that could be tied into the state's agricultural regulations (Medium Farm Operations (MFO), Large Farm Operations (LFO),[27] and AAPs), such as alternatives to management based on soil loss tolerance, T. Further justification for an alternative approach is the U.S. Department

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[30] These actions and costs do not include the implementation of other agricultural best management practices (BMPs) supported by technical assistance efforts. Potential funding needs for BMP implementation are detailed in Section 1.7.

[31] Beegle, D., Agronomy Facts 60: Nutrient Management Planning: http://extension.psu.edu/cmeg/facts/agfact60.pdf, Penn State University.

[32] Tolerable soil loss, T, is the maximum accepted amount of soil loss (tons per acre per year) that can be tolerated without compromising crop productivity. It is a set number for each soil type. Tolerance, T, does not vary and is based on research. AAPs use a soil loss tolerance of 2T. http://www.vermontagriculture.com/ARMES/awq/documents/Medium_Farm_Operations_General_Permit_Response_to_Public_Comment.pdf

[33] Seven tons is equivalent to 1.3 large dump trucks per acre per year. Sullivan, P., Appropriate Technology Transfer for Rural Areas, Sustainable Soil Management, http://www.soilandhealth.org/01aglibrary/010117attrasoilmanual/010117attra.html

of Agriculture Natural Resources Conservation Service (NRCS)'s movement towards new soil loss tolerance factors for the Universal Soil Loss Equation. The anticipated change in these factors may result in changes in landuse practices on highly erodible soils that increase the potential for erosion.

Actions Needed: Technical Assistance and Resources

- Increase funding for the Farm Agronomic Practice Program and the Capital Equipment Assistance Program, both of which expend all funds every year, and allow for implementation of new innovative practices (such as aerial seeding of cover crops), and funding for expensive equipment (such as no-till seeders), for individual farmers or collectively.
- Assist farmers interested in implementing major changes in farm management such as conversion from annual cropland to permanent grass, improved floodplain management (cover crops, larger buffers), conversion from liquid to solid or semi-solid manure.
- Assist with decommissioning and/or relocation of poorly sited manure pits, silage bunkers and barnyards that are in high flood areas. Currently, the BMP cost-share program provides the lowest cost alternative which may not always result in the highest environmental impact.
- Modify the AAPs to reflect new knowledge, technology, and provide better guidance in an effort to achieve a higher level of compliance.[34] One revision is to require either a successful cover crop or a larger buffer in floodplains, where fall nutrients are applied.[35]
- Evaluate current soil loss tolerance (T) system as a regulatory tool. Consider alternative water quality based measures to reduce soil loss and runoff, such as a Phosphorus Index tool, to evaluate and manage the impacts of soil runoff.
- Consider a program that allows an adjustment to gross income for the purchase of equipment that positively impacts water quality on farms.[36]
- Consider development of a "certainty program" or "point system" format that allows for greater flexibility with water quality improvements, especially for farmers who proactively implement critical practices and programs.
- Develop a mandatory continuing education class for farmers (including non-dairy) that would provide annual information about regulations, practices and available resources for implementation.
- Develop a self-certification process for small farms that would document compliance with each requirement of the AAPs and provide information about the farms (acreage, number of animals, soil test results).[37]

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[34] See, "Key Regulatory Strategies to Address Non-Erosion Nutrients" *in* VDEC Surface Water Management Strategy:.http://www.vtwaterquality.org/wqd_mgtplan/stressor_nutrient.htm; Meals, Don. 2006. Lake Champlain Basin Watersheds Section 319 National Monitoring Program Project. Within National Monitoring Program Projects Summary Report. 2011. Department of Biological and Agricultural Engineering. North Carolina State University. Raleigh, NC.

[35] While cover crops are valuable in improving soil health and water quality, especially in riparian and floodplain areas, they can be a challenge to seed down early enough for fall growth in clay soils and where long-season corn is grown. Cover crops may also be a challenge to harvest early during a wet spring season. An alternative to cover crops in riparian fields could be larger riparian buffers.

[36] A similar program currently exists in Virginia.

- Develop a certification program for custom operators who apply fertilizer and manure for agricultural producers.

1.7. Agricultural Best Management Practice Implementation

Annual Cost: $3.3 million

In addition to technical resources and educational programs, implementation of agricultural best management practices (BMPs)[38] is necessary on farms to improve water quality. Examples of BMPs are cover crops, reduced tillage, waste management systems, and silage leachate containment. Increasing inspections of small farms, requiring individual resource plans on farms, and increasing technical assistance will all increase the documentation of needed improvements and the need to provide cost-share assistance for site-specific implementation.

Cost estimates to implement needed BMPs statewide were obtained from the Agency of Agriculture, Food and Markets 2009 Act 78 Report.[39] These estimates include the following:

- Improved manure storage - $5.3million;
- Silage treatment - $11.3 million;
- Barnyard runoff management- $5.6 million;
- Milkhouse waste management - $2.2 million;
- Development of small farm NMPs - $1.5 million;
- Decommissioning or relocating facilities - $5 million; and,
- Upgrades for current waste systems - $2 million.

1.8. Management of Runoff from Timber Harvesting Operations

Annual Cost: $150,000

Reducing impacts to water quality from logging operations is an on-going State priority. Sediment is the most common pollutant associated with timber harvesting. Soil can be carried by rainwater after timber harvesting equipment and trees dragged or carried over the ground loosen and expose the soil. Bare ground exposed during harvesting operations can be eroded by rainwater and enter nearby streams causing sedimentation. A 2007 report for the Lake Champlain Basin Program estimated that 8-15% of the total nonpoint source phosphorus load delivered to Lake Champlain comes from forestland. Work continues to accelerate the implementation of practices to protect water quality during timber harvesting operations. Stream crossings used during harvesting have been a particular area of concern in eliminating discharges of sediment. With forests covering more than 4.6 million acres and representing 78% of

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[37] Currently small farms (including non-dairy) are not required to provide any documentation of compliance with the AAPs. This program would quantify the unknown non-dairy livestock farms, help prioritize inspections of small farms (by evaluating density of animals/acre), and increase awareness of the AAPs. By requiring a signature, it would increase farmer outreach to the non-dairy Agricultural Resource Specialist (ARS) staff who could assist with AAP compliance.

[38] The term, BMPs, describe specific technologies or management actions designed to reduce pollution from runoff.

[39] Vermont Agency of Agriculture, Food, and Markets. 2009 Act 78 Report - An annual report on the status of state animal waste permitting programs. http://vermontagriculture.com/ARMES/awq/documents/Act782009.pdf

Vermont's total land base[40], forestry continues to be an area worthy of efforts to reduce sedimentation and phosphorus loading to state waters.

Since adoption of the Accepted Management Practices (AMPs), the Department of Forests, Parks and Recreation (FP&R) has worked with representatives from the Vermont forest industry to support the Department of Environmental Conservation Compliance and Enforcement Division in an effort to reduce the number and severity of water quality violations resulting from timber harvesting operations. Department foresters have found that there continues to be a high level of cooperation and voluntary compliance among loggers and landowners to keep operations in compliance with Vermont's water quality statutes.

The ***Portable Skidder Bridge Initiative*** promotes better stream crossing practices during logging by using portable skidder bridges to protect water quality. Programs developed under this initiative, provide loggers the opportunity to rent or receive free loans to use bridges and to receive cost-share assistance if they choose to build or purchase their own. This initiative involves multiple partners including the Department of Forests, Parks & Recreation Forest Watershed Program, Northern VT RC&D Council and Natural Resources Conservation Districts.

Actions Needed:

- Technical assistance provider (part time) for Natural Resources Conservation Districts participating in the Portable Skidder Bridge Rental Program.
- Revise the AMPs to reflect new knowledge, technology and provide better guidance in an effort to achieve a higher level of compliance.
- Provide incentive financing to loggers to reduce non-point source pollution risk on timber harvesting operations using State Revolving Fund. Model the program after the Maine Forestry Direct Link Loan Program.

Group #3: River, Floodplain, and Lake Shoreland Management

1.9. River Corridor and Floodplain Management

Annual Cost: $1.4 million

Managing rivers to attain equilibrium conditions provides greater flood resilience and public safety while reducing sediment and nutrient pollution. Avoiding new buildings or public infrastructure in river corridors and floodplains is essential to attaining equilibrium conditions. Municipalities need technical and financial assistance to help them prevent new encroachments on river corridors and floodplains.

Actions Needed

- Increase the regulatory and technical assistance capacity for floodplain protection statewide.
- Establish a Certified Floodplain Technician Program.

[40] 1997 Forest Statistics for Vermont; USDA Forest Service; Northeastern Research Station; Resource Bulletin NE-145.

- Develop the VANR River Corridor Procedures comprised of mapping protocols and best management practices (BMPs).
- Establish a "Flood Resilient Communities Program."
- Increase technical assistance on wetland restoration and protection projects.
- Establish enhanced State floodplain regulations for any development exempt from municipal regulation.
- Conduct outreach to 50 towns per year about floodplain protection.
- Obtain statewide LIDAR and have new and revised maps for 50 percent of Vermont communities.
- Have 75 percent of state with available river corridor maps by 2015 and 100% by 2017.
- Achieve 50 percent of VT towns with enhanced river corridor and floodplain bylaws based on models consistent with the VANR Floodplain Rules and River Corridor Procedures by 2017 and 100 percent by 2022.

1.10. River Channel Management

Annual Cost: $153,000

Stream alteration activities that result in conditions that depart from, further depart from, or impede the attainment of natural equilibrium should be limited. Municipalities require training in standard operating procedures for river management during large storm events in order to minimize and not heighten flood hazards.

Actions Needed

- Adopt rules for in-stream work and emergency protective measures.
- Establish a set of In-stream Procedures and preventative actions for river management, such as standards for properly sized culverts.
- Establish emergency enforcement procedures.
- Establish an In-stream Procedures training program at the Vermont Transportation Agency (VTrans) Training Center.
- Implement Rivers Program Flood Disaster Operations, including communication systems and staff assignments during flood emergencies.
- Draft a webpage for flood information.
- Establish a network of river management personnel to assist VTrans and municipalities on larger disaster recovery sites.
- Execute MOUs and emergency operations plans with other agencies.
- Train flood responders and professional volunteers in the In-stream Procedures.
- Train State/Town roads people through Level I training and disaster recovery specialists through Level II training.

1.11. Lake Shorelands Protection

Annual Cost: $175,000

Vermont lags behind other New England states and New York in terms of lake shoreland regulation; protection; these other states have regulations ensuring good shoreland management including maintenance of natural vegetation along the shore. Consequently, Vermont lakes rank worse than the northeast region and the national average in terms of shoreland disturbance

(clearing of vegetation and impervious surface cover), resulting in greater threats and impacts to lake health. Vermont's shorelands need increased attention to better protect people's use and enjoyment of the lakes, provide flood resilience, protect property values and support the tourism economy of Vermont. Strategies include improvements to education, outreach and technical assistance; however, experience demonstrates that these methods alone do not adequately protect shorelands and lakes. Recommended strategies include adoption of state standards to apply to new shoreland development or re-development of existing properties. Standards will allow the continued use and enjoyment of the lakes and shorelands, provide flood resilience, protect property values, and support the tourism economy, while minimizing impacts on the lake resource.

Actions Needed

- Initiate a new LakeWise Program to recognize and demonstrate good shoreland management techniques.
- Support a grant program of shoreland restoration projects.
- Develop a contractor "green shoreland" certification.
- Continue technical assistance to towns through the Vermont League of Cities and Towns.
- Complete identification of priority conservation needs with respect to undeveloped shorelands.
- Develop regulatory approaches for shoreland development and redevelopment.
- Implement best management practices in Part II of this report, "Lake Shoreland Protection and Restoration Management Options."

Group #4: Municipal Infrastructure and Regulated Stormwater Programs

1.12. Aging Municipal Wastewater Infrastructure

Annual Cost: $18 Million

The 2012 National Clean Watersheds Needs Survey and Assessment identified 122 municipally and privately owned wastewater collection and treatment l facilities in Vermont, serving a population of over 370,000. Many of these wastewater systems must implement improvements to either maintain or attain compliance with state and federal clean water standards to protect public health and the environment.[41] Additionally, implementing state goals that promote compact village and urban centers to help local economies and protect public health, requires adequate water and sewer in these areas.[42] Today, the primary sources of funding for such improvements are State and Federal grants, the State's Clean Water Revolving Loan Fund (CWSRF), and loans from USDA Rural Development.[43]

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[41] Improvements include collection system refurbishment, replacement, separating stormwater from collection systems, pump station upgrades and water pollution control treatment facilities upgrades.

[42] 24 V.S.A. Chapter 117 §4302.

[43] The CWSRF uses federal, state and municipal resources to finance projects that maintain wastewater infrastructure in good working order. Communities then repay the loans into the fund, replenishing the fund to make financial resources available for future projects in other municipalities. Municipalities are ultimately responsible for maintaining the wastewater infrastructure that they own, and for meeting the conditions of their discharge permits.

Based on the most recent draft 2012 National Clean Watersheds Needs Survey and Assessment, the 5-year projection of capital needs for Vermont clean water systems is estimated at $179 million. This translates to an annual need going forward of approximately $36 million. Comparing this figure to the funds received thus far for the Revolving Fund and assuming the same level of funding out into the future,[44] we would experience an annual deficit of at least $18 million.[45]

1.13. Nutrient Pollution Controls at Municipal Wastewater Facilities

Annual Cost: $8.5 to 11.3 Million

Additional nutrient removal treatment at municipal wastewater facilities may be required to meet wasteload allocations in future TMDL plans for Lake Champlain (phosphorus), Lake Memphremagog (phosphorus) and the Long Island Sound/Connecticut River (nitrogen).[46] A 2008 Department evaluation of the cost to meet a 0.2 mg/l effluent phosphorus concentration limit for discharges in the Lake Champlain watershed[47] produced an estimated capital cost of about 73.3 million in 2012 dollars. A 2008 study of costs to meet the reduction in nitrogen loading from point sources in the Connecticut watershed indicated a range of costs depending on discharge levels between 3 to 8 mg/l nitrogen[48]. Here capital cost ranged between 98.2 and 153.7 million dollars. With a 20 year period for financing capital costs, the first year annual cost would range from 8.5 to 11.3 million dollars (in 2012 dollars). Uncertainties exist about future TMDL wasteload allocation requirements, but an estimated order of magnitude state capital cost for

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Most of the CWSRF projects involve replacing or upgrading worn out or technologically obsolete infrastructure. Over the long run, failure to maintain wastewater infrastructure will adversely affect surface water quality. Although there are alternatives to the CWSRF, including the Vermont Municipal Bond Bank, USDA Rural Development grants and loans, and municipal capital funds, the CWSRF is generally considered the most affordable and most flexible loan source for wastewater projects not eligible for USDA grant funding. Since implementation of the CWSRF in Vermont, a large portion of the major municipal wastewater projects in Vermont have used CWSRF funding.

[44] Assuming the same level of funding is a key assumption here.

[45] Additional annual needs likely exist beyond the $11.3 million identified by the Needs survey because this survey only include those needs included in a formal report meeting Needs survey criteria.

[46] Wastewater phosphorus removal has been required for some time in the Lake Champlain and Lake Memphremagog basins. Under current state law, Waterbury Village is the last remaining uncompleted municipal wastewater phosphorus project. About $800,000 in USEPA direct grant funding and $2.5 million in Vermont phosphorus grant funding have already been committed for this project. Waterbury needs an estimated additional $3 million in state phosphorus grant funding to complete the project. With respect to the Connecticut River basin, a statewide wastewater nitrogen load has been developed, but that statewide load has not yet been fully allocated load reductions among the affected municipalities. There is yet a state funding program specifically dedicated to wastewater nitrogen removal. The CWSRF USDA, the Municipal Bond Bank, or municipal capital funding could be used for nitrogen removal.

[47] Vermont Agency of Natural Resources and Vermont Agency of Agriculture, Food, and Markets. 2008. Progress in Establishing and Implementing the Total Maximum Daily Load (TMDL) Plan for Lake Champlain. Submitted to the Vermont General Assembly in accordance with Act 43 (2007), Section 4. http://www.vtwaterquality.org/erp/rep2007/CandC2007RptANRACT43-Final011508.pdf

[48] Evans, B.M. 2008. An Evaluation of Potential Nitrogen Load Reductions to Long Island Sound from the Connecticut River Basin. Submitted to New England Interstate Water Pollution Control Commission, Lowell, MA. http://www.neiwpcc.org/neiwpcc_docs/CT%20River%20Cost-Benefit%20Final%20Report.pdf

nutrient pollution controls at municipal wastewater facilities would be 255 to 338 million dollars over the next 20 years. This estimate assumes a 4 percent inflation rate. Once watershed allocations for wastewater treatments plants are established, further analysis will better refine these costs.

1.14. Financial Planning for Infrastructure Management

Annual Cost: $160,000

Municipality-owned wastewater infrastructure is funded through annual budgets designed to meet their financial needs. Financial needs typically include the cost of annual operation, maintenance, debt service, savings for emergencies and larger projects, and planning for future repair and replacement. Few municipalities have evolved their budget and user rates to reflect both current expenses and the costs of addressing aging infrastructure, while many municipalities have these tasks on their to-do list.[49]

The VDEC is currently providing financial technical assistance to public drinking water systems to set appropriate rate structures and is exploring opportunities to expand these services to wastewater and stormwater utilities in the future. The Department is especially interested in the use of dedicated reserve accounts to pay for replacement of certain assets and will be exploring expanding their use for projects funded by the State Revolving Loan Fund programs.

1.15. Drinking Water Infrastructure

Annual Cost: $21.5 Million

Currently, Vermont has 1,346 municipally and privately owned public water systems, serving a total population of 586,138 people.[50]

Many of these water systems must implement improvements to either maintain or attain compliance with state and federal drinking water standards. Today, the primary source of funding for such improvements is the State's Drinking Water Revolving Loan Fund, which consists of both federal and state dollars. Improvements include transmission and distribution pipe replacement, new sources, storage, pumping facilities and treatment plant upgrades.

Based on the most recent National Drinking Water Needs Survey and Assessment completed in 2007, the 20-year projection of capital needs for Vermont public water systems is estimated at $453 million. Factoring in four percent inflation, that translates to an annual need going forward of approximately $33 million. Comparing this figure to the funds received thus far for the Revolving Fund and assuming the same level of funding out into the future, we would experience an annual deficit of $21.5 million.

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[49] In general, the following topics are typically addressed when improving the financial stewardship of municipally owned utilities: (a) Meetings between Boards and Operators; (b) Preparing Budgets; (c) Setting rates; (d) Asset Management; and, (e) Reserve Accounts.

[50] The total population served includes community (residential), nontransient/noncommunity (schools, office buildings, etc), and transient/noncommunity (restaurants, hotels, etc) systems. Note that one cannot determine the number of people on their own wells by subtracting the total population served from the total state population. Some people who are served by their own wells are also part of the population served by public water systems, such as schools, office buildings, residential camps, and hospitals.

1.16. Municipal Stormwater Infrastructure Needs

Annual Cost: Unknown

The maintenance and planned replacement of stormwater infrastructures systems represents a significant cost for municipalities. The planning, maintenance and financial needs are similar to those for drinking water and wastewater infrastructure, although to a somewhat lesser magnitude. There is currently a lack of information regarding these needs in Vermont, and that represents a substantial planning challenge. A municipal stormwater infrastructure "Needs Survey and Assessment" is needed to provide the required information.

1.17. Replacement or Upgrade of Failing and Substandard Septic Systems

Annual Cost: Unknown

Decentralized wastewater treatment systems (including septic systems and small, shared systems that discharge to a leach field) are typically small scale, gravity based wastewater treatment systems with little or no management oversight after the system is permitted and installed. Failed or failing septic systems are more of a public health concern than a major source of phosphorus loading to Vermont lakes. [51]

A Lake Champlain Basin Program study[52] evaluated septic systems as a source of phosphorus loading to Lake Champlain. Using a range of assumptions about the percentage of failed systems and the phosphorus loads from these systems, the study concluded that phosphorus loading rates from septic systems in Vermont could be in the range of 2.2 – 13.3 metric tons per year, with the upper end representing the extreme worst-case assumptions. Even under worst- case assumptions, the loading from septic systems would be only about two percent of the total phosphorus load to Lake Champlain from all sources in Vermont, which has averaged over 500 mt/yr in recent years.[53] These finding are consistent with direct studies of septic system loadings to Lake Morey,[54] Lake Iroquois,[55] and St. Albans Bay,[56] all of which concluded that septic loads were typically around 1 percent of the total phosphorus budget for these lakes. Two more recent

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[51] Amy Macrellis, Stone Environmental, personal communication, Dec. 6, 2012.

[52] Budd, L. and D.W. Meals. 1994. Lake Champlain nonpoint source assessment. Lake Champlain Basin Program Technical Report No. 6a. Grand Isle, VT.

[53] Smeltzer, E., Dunlap, F., and Simoneau, M. 2009. Lake Champlain phosphorus concentrations and loading rates, 1990-2008. Lake Champlain Basin Program Technical Report No. 57. Grand Isle, VT. http://www.lcbp.org/techreportPDF/57_Phosphorus_Loading_1990-2008.pdf

[54] Morgan, J. T. Moye, E. Smeltzer, and V. Garrison. 1984. Lake Morey Diagnostic-Feasibility Study Final Report. Vermont Department of Water Resources and Environmental Engineering. Montpelier, VT. http://www.anr.state.vt.us/dec/waterq//lakes/docs/lp_moreyfinalreport.pdf

[55] Roesler, C. and A. Regan. 1985. Lake Iroquois Diagnostic-Feasibility Study Final Report. Vermont Department of Water Resources and Environmental Engineering. Montpelier, VT. http://www.anr.state.vt.us/dec/waterq//lakes/docs/lp_iroquoisfinalreport.pdf

[56] TWM Northeast. 1991. St. Albans Bay Pollution Abatement Feasibility Study. Prep. for Towns of Georgia and St. Albans. Williston, VT.

studies evaluated septic system phosphorus loading documented slightly higher percentages: Ticklenaked Pond[57] (3 percent), and Lake Memphremagog[58] (4 percent).

It is possible that over time the ability of septic systems to remove phosphorus could diminish as soils become phosphorus-saturated. However, sub-surface disposal is generally the most effective way to remove phosphorus from wastewater, and septic systems are not likely to become a large or critical source of phosphorus loading to Lake Champlain or other Vermont waters in the foreseeable future. Failing lakeshore septic systems could, however, contribute to localized health hazards from pathogens, and all such systems should be properly constructed and maintained.

The property owner has the responsibility to maintain the system including bearing the costs for upgrades and replacement. There are few funding sources available for property owners if a system needs to be replaced:

- The Vermont Wastewater and Potable Water Revolving Loan Fund was recently established to provide low interest loans to moderate and low income households[59] for the purpose of repairing or replacing a home's failed septic system or water supply. The amount of $275,000 from fees collected from fees from potable water supply and wastewater permits.[60]
- The NeighborWorks® HomeOwnership Centers of Vermont: Offers a low-interest revolving loan program to single-family homeowners below an income threshold. This program is not available for local businesses, condominium residents, or landlords: http://www.vthomeownership.org/home_improvement.html;
- Colchester uses the Clean Water SRF to offer a local low-interest revolving loan program (20-year term, 3% interest) dedicated to septic system repairs and replacements below an income threshold: http://colchestervt.gov/PlanningZ/forms/rlfapplication.pdf;
- Waitsfield is developing a long-term, low-interest loan program to support current and limited future development in the commercial areas of Waitsfield Village and Irasville for both residences and small businesses: http://www.waitsfieldvt.us/wastewater/index.cfm.

Actions Needed

- Develop a septic pump out program, similar to the program being implemented in the State of Wisconsin, to improve drainfield function and expected septic life;[61]
- Provide technical assistance to homeowners on septic maintenance and upgrades;
- Promote available resources for small communities;

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[57] VTDEC 2012. Ticklenaked Pond Total Maximum Daily Load. http://www.vtwaterquality.org/mapp/docs/mp_TMDL.Ticklenaked_Pond_Final_Approved.pdf

[58] SMi Amenatech Inc. 2009. Rapport Finale: Modelisation du Transport du Phosphore sur l'Ensemble du Bassin Versant du Lac Memphremagog. Sherbrooke, QC, Canada. www.groupesm.com

[59] This loan program is reserved for households with an income equal to or less than 200 percent of the state average median household income. 24 V.S.A. §4753(a)(9).

[60] 3 V.S.A. §2822(j)(4).

[61] Wisconsin's program addresses one of the major impediments to getting a septic systems maintained, which is the ease with which an owner could justify delaying maintenance for financial reasons. Often, the delay results in neglecting maintenance until systems are at or near failure.

- Increase compliance and enforcement related to subdivision septic system regulations, particularly near surface waters;
- Pilot the required use of cluster/community systems, where adequate soils exist;
- Provide general education to homeowners on proper maintenance of septic systems to help them avoid failure and the expense of replacing failed systems;
- Consider a 5-year inspection cycle of septic systems that are determined to be at risk or are located within a specified distance to surface waters; (systems that are found to have failed would need to be repaired, which is consistent with state law);[62]
- Evaluate an option to ban the land application of septage where there is runoff potential. The state now requires nutrient management planning/soil testing prior to septage application.

1.18. Stormwater Impaired Waters

Annual Cost: $10 Million

There are 17 stormwater-impaired waters in the State, requiring remediation under the Clean Water Act.[63] The TMDLs and plans will be implemented by a combination of federal and state law authority, including the MS4 Permit and residual designation authority. Implementation will address the primary sources of impairment in these streams, as well as significant sources of phosphorus in the Lake Champlain watershed. Total implementation is estimated to cost $100 million.[64]

1.19. Enhanced Stormwater Regulation

Annual Cost: $1.3 Million

Enhancing the Stormwater Program's ability to inspect and enforce existing permits is a cost-effective approach to reducing urban runoff. It may be a more cost effective approach in comparison to increasing the regulatory scope by lowering the permit threshold to below one acre of impervious surface. Current regulatory thresholds are established under both state and federal law. These thresholds are generally designed to direct efforts to the primary sources of stormwater pollution, where the benefits of regulation clearly outweigh the costs. Lowering regulatory thresholds would result in a reduction in pollution from urban development. The most likely target for such a reduction is the state stormwater permit program, which has a current threshold of one acre of impervious surface. Any significant reduction in the threshold would likely result in a substantial increase in the number of regulated facilities. Potential changes in regulatory standards should be informed by an analysis of likely future development patterns; i.e. how much impervious cover will we have in future decades, and how much of it should be regulated.

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[62] 10 V.S.A. sec 1973(a)(4).

[63] The 17 stormwater-impaired waters include 12 "urban watersheds" – Allen, Bartlett, Centennial, Englesby, Moon, Morehouse, Munroe, Potash, Stevens, Rugg, and Sunderland Brooks – and 5 "mountain watersheds" – North Branch of the Deerfield River, Roaring Brook, East Branch of Roaring Brook, Rice Brook, and Clay Brook. "A Framework for Remediation of Vermont's Stormwater-Impaired Waters," VDEC, January 2010.

[64] The CWSRF could be used for stormwater treatment projects.

1.20. Implementation of the MS4 General Permit Program

Annual Cost: $1.6 Million

The MS4 (Municipal Separate Storm Sewer System) Program regulates stormwater discharges from nine municipal stormwater systems in Chittenden County, along with three "non-traditional" systems. Additionally, the Department may designate additional municipalities as requiring permit coverage based on contributions to stormwater-impaired waters. This is a broad permit program that requires the regulated entity to adopt a stormwater management program covering a wide range of management activities. The MS4 General Permit, released in December 2012, includes a requirement for municipalities to implement stormwater TMDLs in their watersheds, a new and major undertaking for these communities. Costs are roughly estimated at $100,000 per year for each MS4 community, exclusive of TMDL implementation requirements.

1.21. Summary of Costs of Achieving Clean Water in Vermont[65]

Item	Average Annual Cost Over Ten Years
Group #1: Municipal Operations for Nonpoint Source Pollution Reduction[66]	
1.1 Unregulated Stormwater	$70,854,000
1.2 Unregulated Stormwater Runoff from Road Networks	$10,450,000
Subtotal	$81,304,000
Group #2: Agricultural and Forestry Operations for Nonpoint Source Reduction[66]	
1.3 Farm Compliance with the Accepted Agricultural Practice Rules	$635,000
1.4 Agricultural Nutrient Management	$700,000
1.5 Agricultural Livestock Exclusion from Streams	$3,300,000
1.6 Technical Assistance and Education for Agriculture	$652,500
1.7 Agricultural Best Management Practice Implementation	$3,290,000
1.8 Management of Runoff from Timber Harvesting Operations	$150,000
Subtotal	$8,727,500
Group #3: River, Floodplain, and Lake Shoreland Management[66]	
1.9 River Corridor/Floodplain Management	$1,440,000
1.10 River Channel Management	$152,500
1.11 Lake Shorelands Protection	$175,000
Subtotal	$1,767,500
Group #4: Municipal Infrastructure and Regulated Stormwater Programs[67]	
1.12 Aging Municipal Wastewater Infrastructure	$18,000,000
1.13 Nutrient Pollution Controls at Municipal Wastewater Facilities	$11,300,000
1.14 Financial Planning for Municipal Infrastructure Management	$160,000
1.15 Municipal Drinking Water Infrastructure	$21,500,000
1.16 Municipal Stormwater Infrastructure Needs	Unknown
1.17 Replacement or Upgrade of Failing and Substandard Septic Systems	Unknown
1.18 Stormwater Impaired Waters	$10,000,000
1.19 Enhanced Stormwater Regulations	$1,300,000
1.20 Implementation of the MS4 General Permit Programs	$1,600,000
Subtotal	$63,860,000
TOTAL	**$155,659,000**

[65] Additional costs beyond current funding levels.

[66] See Appendix B for budget details for nonpoint sources.

[67] See Appendix C for budget details for Municipal Wastewater, Stormwater, and Water Supply Infrastructure.

1.22. Meeting Vermont's Clean Water Needs

The $156 million of annual statewide need is the result of a broad and inclusive evaluation of Vermont's needs over a ten year planning horizon to restore and protect the state's rivers, streams, lakes, and ponds. This amount, albeit daunting, should not give cause for inaction. It validates the Legislature's concern about the State's current capacity to meet the public's demand for clean water and justifies establishing a process to better meet these needs. That process involves a three step process:

- Step One: Find a reliable and long-term sources of funding;
- Step Two: Develop a process for establishing funding priorities; and,
- Step Three: Use state funds to leverage federal funds.

1.22.1. Step One: Find Reliable and Long-Term Sources of Funding

Act 138 acknowledges that the State, in partnership with municipalities, farmers, and the general public need reliable and long-term sources of substantial funding to help meet water quality needs. Chapter Two evaluates 16 financial tools against a set of criteria, including each tool's ability to help close the gap between current expenditure and identified need.

1.22.2. Step Two: Develop a Process for Establishing Funding Priorities

As we work to close the gap between need and current water quality expenditures, we should also develop a process for establishing funding priorities. That process should consider the relative magnitude of each type of pollution source, the feasibility and effectiveness of treatment, and the cost to address each pollution source listed in Section 1.21 above.

As described earlier in this chapter, the past public investment of $656 million to provide for wastewater treatment was largely for public health and safety, although Vermont has made substantial investments in phosphorus removal treatment at wastewater facilities in the Lake Champlain and Lake Memphremagog watersheds, as well. Those investments have produced substantial reductions in pollution loads, and continue to benefit local economies and the environment. Protecting our investments in water and wastewater treatment by helping municipalities address the aging infrastructure problems and expected future nutrient load reduction requirements is important. However, the potential water quality benefits of additional wastewater treatment for nutrient removal are limited, because wastewater is a relatively small source of nutrient loading to the state's waters. For example, the wastewater component of Vermont's total phosphorus load to Lake Champlain is about 3%[68], and less than 2% for Lake Memphremagog[69]. Municipal wastewater nitrogen sources account for about 9% of Vermont's total nitrogen load to the Connecticut River[70]. Most of the necessary nutrient load reductions will

[68] Smeltzer, E. F. Dunlap, and M. Simoneau. 2009. Lake Champlain phosphorus concentrations and tributary loading rates, 1990-2008. Lake Champlain Basin Program Technical Report No. 57. Grand Isle, VT. http://www.lcbp.org/techreportPDF/57_Phosphorus_Loading_1990-2008.pdf

[69] SMi Aménatech, Inc. 2009. Modélisation du transport du phosphore sur l'ensemble du basin versant du lac Memphremagog. Rapport finale. Présenté à MRC de Memphrémagog. Magog, QC.

[70] Moore, R.B. et al. 2004. Estimation of total nitrogen and phosphorus in New England streams using spatially referenced regression models. U.S. Geological Survey Scientific Investigations Report 2004-5012. http://pubs.usgs.gov/sir/2004/5012/.

have to come from non-wastewater sources such as agricultural runoff, stormwater and road-related runoff, and stream channel erosion processes.

Establishing priorities among the various categories of nonpoint sources should be informed by the relative magnitude of nutrient loading from each source, along with the costs identified above. Table 1 below provides a breakdown of the contributions of each major category of nonpoint source nutrient loading to large and/or high priority Vermont watersheds based on estimates available from several studies.

Table 1. Relative magnitude of categories of nonpoint source nutrient loading from Vermont watersheds (as percent of total nonpoint load). P = phosphorus; N = nitrogen; Not Assessed (NA) indicates that in-channel sources (e.g., streambank erosion) were not assessed directly but were implicitly included within the other land use categories; Not Significant (NS) indicates that forest land was not a significant variable in the model used for these estimates.

Watershed	Nutrient	Agricultural Land	Developed Land	Forest Land	River Channel Processes
Lake Champlain Basin, VT, NY, QC[71]	P	39%	53%	8%	NA
Lake Champlain Basin, VT, NY, QC[72]	P	55%	37%	8%	NA
Missisquoi Bay, VT, QC[73]	P	38%	4%	18%	40%
St. Albans Bay, VT[74]	P	78%	16%	5%	NA
Lake Memphremagog[69]	P	46%	15%	39%	NA
Connecticut River, VT[70]	N[75]	23%	4%	NS	NA

Table 1 shows that agricultural runoff is generally the dominant source of nonpoint nutrient loading to Vermont's waters, although runoff from developed land is important, as well. In the one case (Missisquoi Bay watershed) where in-stream phosphorus sources derived from

[71] Troy, A., et al. 2007. Updating the Lake Champlain Basin land use data to improve prediction of phosphorus loading. Lake Champlain Basin Program Technical Report No. 54. Grand Isle, VT. http://www.lcbp.org/techreportPDF/54_LULC-Phosphorus_2007.pdf

[72] Hegman, W. et al. 1999. Estimation of Lake Champlain basinwide nonpoint source phosphorus export. Lake Champlain Basin Program Technical Report No. 31. Grand Isle, VT. http://www.lcbp.org/techreportPDF/31_NPS_phosphorus.pdf

[73] See Footnote 13 on page 8, above.

[74] Gaddis, E.J.B. and Voinov, A. 2010. Spatially explicit modeling of land use specific phosphorus transport pathways to improve TMDL load estimates and implementation planning. Water Resources Management. 24: 1621-1644.

[75] Note that 65 % of the total nitrogen load to the Connecticut River from Vermont was attributed to atmospheric deposition and not assigned to specific land use categories.

streambank and stream channel erosion were directly estimated, these processes were found to contribute 40% of the phosphorus load to the river. It is likely that a similar magnitude would apply to in-stream nutrient sources in other Vermont rivers. . Factors contributing to stream instability and bank erosion are common to all land use categories and include encroachments on river corridors by roads and buildings, channelization practices (e.g., dredging, ditching, and straightening of the channel or armoring and berming of the banks), surface and subsurface drainage of land, accelerated stormwater runoff from impervious surfaces, and loss of protective features such as floodplains and wetlands.[76]

There are many sources of water quality problems, ranging from point source discharges to runoff of developed areas, construction sites, farms, logging operations, and roadways. The restoration and protection of surface waters must involve a shared responsibility among all sources.

Addressing agricultural sources is a cost-effective priority among other water quality needs, particularly in less developed and more agrarian-based watersheds. Agricultural water quality best management practices typically reduce phosphorus loads by 40-60%, based on a review the available scientific literature[77], although there are large variations from site to site depending on factors such as slope, soil type, and location within the U.S. A study of livestock exclusion in Vermont found that fencing and associated practices could reduce nutrient and sediment loads to streams bordering pasture land by 20-50% at a cost of only $5,000 per metric ton per year of phosphorus reduced,.[78] far less than the cost per ton required for additional wastewater or stormwater treatment.

In addition to the broad cost-effectiveness considerations discussed above, there should also be a process for establishing funding priorities that involves identifying, targeting, and treating specific sites on the landscape determined to be at risk of delivering nutrient and sediment loading to surface waters. These critical source areas should be identified within all land use categories. Below are examples of how Vermont is integrating a more site-specific, targeted approach for determining funding priorities:

- Agricultural Land: The Missisquoi Bay Watershed Critical Source Area Study[73] found that 74 percent of the upland phosphorus loading to the river came from only 20 percent of the land area. Targeting water quality management practices at these "critical source areas" (CSAs) could be close to three times more effective in reducing phosphorus loading than targeting efforts randomly. Vermont is using the high-resolution critical source area maps produced by the project to direct funding to the potentially critical sites, subject to confirmation by field visits. The State is evaluating a simpler "Geographic Information System (GIS)-based" approach for other watersheds, using similar factors such as soil characteristics, slope, proximity to water, and land use. The outcome of this

[76] Vermont Surface Water Management Strategy, http://www.vtwaterquality.org/wqd_mgtplan/stressor_channelerosion.htm

[77] Gitau, M.W., W.J. Gburek, and A.R. Jarrett. 2005. A tool for estimating best management practice effectiveness for phosphorus pollution control. J. Soil Water Conservation. 60(1):1-10.

[78] Meals, D.W. 2004. Water quality improvements following riparian restoration in two Vermont agricultural watersheds. pp 81-95. *In* T.O. Manley et al. (eds.) Lake Champlain: Partnership and Research in the New Millennium. Kluwer Academic/Plenum Publishers. NY.

approach is to produce a relative index of risk to identify and treat potential critical source areas.

- Urban and Developed Lands: The State is developing a Municipal Stormwater Master Planning Process, described in Section 1.1above. This process involves stormwater infrastructure mapping and on-the-ground problem-site identification. This methodology may become the State's protocol for identifying critical source areas on developed land.
- Road Networks: Ditches and other areas along rural roads can pose a high risk of erosion and delivery of sediment-carrying runoff into receiving waters. Greater targeting of road-related problem areas will mean: (a) an increase in funding to support the Vermont Better Back Roads program including support to conduct inventories of road-related erosion problems, and (b) greater awareness and compliance with Road and Bridge Standards.
- River Corridors: Areas of documented stream instability may result in greater than natural contributions of sediment and nutrients to downstream waters. The State's Stream Geomorphic Assessment and Corridor Planning processes identify target reaches for the restoration of stream equilibrium, in support of reduced pollution and increased flood resilience.

VANR uses Tactical Basin Planning (TBP) to identify the highest-priority opportunities for sediment and nutrient remediation. TBP uses monitoring and assessment results to identify and prioritize implementation projects. TBP ensures that limited funds are directed to the most highest-merit opportunities.

1.22.3. Step Three: Use State Funds to Leverage Federal Funds

The final task involves using state funds to leverage federal funds. Below are examples to illustrate how state funds are being used to attract additional federal funding. VDEC will continue to seek these opportunities:

- State dollars serve as the required eligible match funds to leverage millions of federal fund dollars annually through various grant award agreements with federal agencies, such as the U.S. Environmental Protection Agency (EPA);
- State dollars are used as matching funds through cooperative agreements and match certifications with other state agencies and municipalities, such as the VT Agency of Agriculture's NRCS Conservation Innovation Grant to initiate a Lake Champlain Phosphorus Trading Initiative; and,
- State project funding dollars are used to leverage federal funds for multi-state entities such as the New England Interstate Water Pollution Control Commission (NEIWPCC) to further federally funded environmental initiatives in Vermont.

Chapter Two: Financial Tools for Clean Water

This section summarizes the capacity to generate revenues to finance a statewide water quality trust fund. The section also evaluates how existing programs could be modified in order to improve incentives to achieve the State's clean water restoration and protection goals.

This section also introduces a set of ten criteria used to evaluate each of the financial tools, and a Table 4 which presents a summary of an evaluation of those tools using the criteria. Please refer to Appendix D for an in-depth discussion of each of the financial tools.

It is important to note that the intent of this report is to present to the Vermont General Assembly, as required by Act 138, a comprehensive and analytical evaluation of 16 possible financial tools and seven current programs that could help to achieve the Vermont's clean water goals. The financial tools were identified through research on other state and regional initiatives and should not be construed as funding proposals by the VANR.

Table 2: Tools for Financing a Statewide Water Quality Trust Fund

Financial Tool	Annual Revenue Potential	Reference in Appendix D
Statewide Stormwater Fees	An average stormwater fee of $10 per parcel of real property will generate approximately $3.4 million annually.	D.1.
Municipal Property Tax	An additional 1-cent tax rate applied to the fair market value of taxable real property will generate $8.0 million annually.	D.2.1.
Surtax on Personal Income Tax Liability	A 1% surtax applied to personal income tax liability will generate approximately $6.0 million annually.	D.2.2.
Excise Tax on Motor Fuels	An additional 1-cent per gallon excise tax increase will generate approximately $3.9 million annually.	D.3.1.
Excise Tax on Fertilizers & Pesticides	A 1% excise tax on the sale of fertilizers and pesticides will generate approximately $250,000 annually.	D.3.2.
Excise Tax on Flushable Consumer Products	A 1% excise tax on the sale of flushable products will generate approximately $1.3 million annually.	D.3.3.
Excise Tax on Bottled Water Containers	A 1-cent per container excise tax on bottled water would raise roughly $1 million annually.	D.3.4.
Special License Plate Fee	A special license plate fee would generate a very small amount of revenue annually.	D.4.1.
Non-Motorized Boat Fee	A non-motorized boat fee would generate a small amount of revenue annually.	D.4.2.
Non-Resident Boat Docking Fee	A non-resident boat docking fee would generate a small amount of revenue annually.	D.4.3.
Impact Fees	Impact fees would generate an uncertain amount of revenue annually since they are tied to new development.	D.4.4.
Drinking Water Fee	Drinking water fees may generate moderate revenue depending on the scope of the program.	D.4.5.
Special Assessments	Assessing the beneficiaries of certain public water quality projects would generate an uncertain amount of revenue annually.	D.5.1.
Escheating Unclaimed Beverage Container Deposits	Escheating unclaimed beverage container deposits would generate approximately $2 million annually.	D.5.2.
Lottery Game	Expanding the player base of the state lottery would generate a small amount of revenue annually.	D.5.3.
Increased Civil Penalties	Revenue potential is considered low, since civil penalties are intended to deter violations rather than raise revenue.	D.5.4.

Table 3: Tools to Enhance Effectiveness of Current Programs to Support Clean Water

Existing Program	Possible Modification	Reference in Appendix D
Supplemental Environmental Projects (SEP)	Enhance the Use and Effectiveness of SEPs	D.6.1.
State Revolving Funds	Encourage the Development of Stormwater Projects Using SRF[79]	D.6.2.
Vermont State Municipal Bond Bank	Provide Municipalities with Low Interest Loans.	D.6.3.
US Department of Agriculture Rural Development Loans & Grants	Provide Loans and Grants for Municipal Wastewater and Drinking Water Projects	D.6.5.
Use Value Property Taxation	Improve Environmental Stewardship of the Program	D.6.6.
Conservation Easements and Other Conservation Tools	Achieve Greater Water Quality Protection Through Conservation	D.6.7.
Targeting Incentives to Support Compact Sustainable Growth	Integrate Water Quality Objectives with Sustainable Land Use Policies	D.6.8.

Evaluation Criteria:

Revenue Potential: The revenue source has a base large enough to generate significant revenue with a reasonable tax rate or fee.

Stability: Revenues are relatively constant over time and not subject to unpredictable fluctuations.

Sufficiency: The revenue source provides the revenue growth necessary to finance the desired rate of spending growth.

Administration and Compliance: The degree to which the administrative apparatus necessary to collect revenue, enforce the law, and audit to ensure compliance and the burden of tax compliance on taxpayers is minimized.

Accountability: The degree to which the amount of the tax or fee is explicit and known to those who pay. This criterion provides for transparency in evaluating the set of financial tools.

Political Viability: The presumed level of public support or opposition to the tax or fee as a mechanism to improve water quality (which is necessarily subjective).

Promotes Mitigation: The degree to which a tax or fee encourages individuals and businesses to perform on-site mitigation to improve water quality.

Geographic Distribution: The degree to which the tax or fee applies uniformly across the entire state.

Sensitivity Based on Income: The degree to which the tax or fee is based on ability to pay.

Relation to Water Resources: The degree to which the tax or fee bears a relationship to water quality.

[79] Nonpoint source control and the SRF: http://water.epa.gov/polwaste/nps/outreach/upload/93issue.pdf

Table 4: Evaluation of Financial Tools to Support a Clean Water Trust Fund

Revenue Option	Revenue Stream Considerations			Administration & Implementation			Equity and Other Considerations			
	Revenue Potential	Stability	Sufficiency	Administration& Compliance	Accountability	Political Viability	Promotes Mitigation	Geographic Distribution	Income Equity	Relation to Water Quality
Statewide Stormwater Fees	High	High	Low	High	High	High	Yes	High	Low	High
Municipal Property Tax	High	High	High	Low	Low	Low	No	High	Moderate	Low
Surtax on Personal Income Tax Liability	High	High	High	Low	High	Moderate	No	High	High	Low
Excise Tax on Motor Fuels	Moderate	Moderate	Low	Low	Moderate	Moderate	No	High	Low	High
Excise Tax on Fertilizer & Pesticides	Low	High	Low	High	Low	Low	Yes	Moderate	Low	High
Excise Tax on Flushable Consumer Products	Moderate	High	Moderate	High	Low	Moderate	No	High	Low	Moderate
Excise Tax on Bottled Water Containers	Moderate	High	Moderate	Moderate	Low	Moderate	No	High	Low	Low
Special License Plate Fee	Low	High	Low	Low	High	High	No	High	Moderate	Low
Non-Motorized Boat Fee	Low	High	Low	Low	High	Moderate	No	High	Moderate	High
Non-Resident Boat Docking Fee	Low	High	Low	Moderate	High	High	No	NA	Moderate	High
Impact Fees	Low	Low	Low	Moderate	High	Moderate	Yes	High	Moderate	High
Drinking Water Fee	Moderate	Moderate	Moderate	High	High	Moderate	No	High	Moderate	Moderate
Special Assessments	Low	Low	Low	High	High	Moderate	Yes	Low	Moderate	High
Escheating Unclaimed Beverage Container Deposits	Moderate	High	Low	Low	High	High	No	High	NA	High
Lottery Game	Low	High	Low	Low	High	High	No	High	Low	Low
Increased Penalties	Low	Low	Low	Moderate	High	High	Yes	High	NA	High

Chapter Three: Options to Administer a Statewide Water Quality Trust Fund

This chapter evaluates seven options for administering the statewide water quality trust fund. Table 5 presents options to reflect ideas that came out of the consultations. This chapter evaluates each option based on their advantages and disadvantages, using a common set of criteria.

Table 5: Options for Administering the Statewide Water Quality Trust Fund

Option Category	Possible Entity to Administer Program
State Government Agency	State Government Option #1: Vermont Department of Environmental Conservation
	State Government Option #2: State or Regional Stormwater Utility
Quasi-Judicial Public Agency	Vermont Natural Resources Board
Quasi-Governmental Funding Agency	Funding Agency Option #1: Vermont Housing and Conservation Board;
	Funding Agency Option #2: Vermont Economic Development Authority
Non-Governmental, Publicly supported, Organization	Vermont Community Foundation
Private, Non-Profit Organization	The Efficiency Vermont Model
New Institution	New Institution for Managing Runoff

The following suggestions raised during the Act 138 consultations should be incorporated into any one of these options listed in Table 5:

- Take advantage of local and regional relationships of existing regional and statewide organizations such as the Natural Resources Conservation Districts (NRCDs), Regional Planning Commissions (RPCs), and the Vermont League of Cities and Towns (VLCT);
- Manage the program regionally. This options manages the program as four regions, based on the State's four major water basins-- the Lake Champlain Basin, the Connecticut River Basin, the Memphremagog Basin, and the Hudson River Basin. A regional program would raise funds and implement projects within each basin; and,
- Take a watershed approach to problem solving. This approach is based on the acknowledgement that activities causing or contributing to water quality degradation of a river causes downstream impacts. Working upstream to treat problems at the source address should help minimize costs of water quality remediation downstream.

Below is an evaluation of each option to administer the program, using nine key principles of a successful water quality program:

1. Keep trust fund revenues and expenditures as "local" as possible, implementing projects within the same basin or the same watershed where the revenue is collected;

2. Coordinate water quality projects on a watershed scale, considering the upstream and downstream impacts across the entire watershed;
3. Strive for equity, ensuring that revenue collection and expenditures are distributed fairly both geographically and across all four sectors;
4. Minimize administrative costs and duplication of technical expertise;
5. Emphasize cost-effectiveness and coordination with other water quality programs to target critical areas;
6. Work with municipalities, community groups, and other organizations to implement water quality projects;
7. Promote incentive based approaches that encourage voluntary participation;
8. Reward early adopters; and,
9. Minimize disparity between developed and rural areas.

3.1. State-based Government Agency

Below are two options for a State-Based Government Agency. Option #1 administers the water quality trust fund via the VDEC Ecosystem Restoration Program. Option #2 is to create a new statewide stormwater utility within VDEC to administer the water quality trust fund. The primary advantage of housing the program within VDEC is that the Department is already structured to administer clean water funding, it has a full range of programs with technical expertise, and has the administrative capacity to manage the tasks. VDEC is already organizing its work based on targeting, can conduct monitoring of water quality projects, and offers the Tactical Basin Planning approach to identify and prioritize clean water restoration and protection projects for implementation. (See a discussion of Tactical Basin Planning in Appendix E).

3.1.1. Vermont Department of Environmental Conservation

The VDEC Watershed Management Division houses the Ecosystem Restoration Programs (ERP), formerly the Clean and Clear Program. The mission of the program is closely related to the goals of this report: to accelerate the reduction of sediment and nutrient pollution from uncontrolled runoff into the surface waters of the state. The ERP is currently funded through state appropriations and federal grants, and provides leadership, technical and educational expertise, and financial support to water quality projects across the state. Due primarily to budgetary constraints, historically the ERP has only funded small scale demonstration or site-specific remediation projects, which endeavor to demonstrate the feasibility and cost effectiveness of various pollution prevention and mitigation techniques or reduce small quantities of sediment and nutrient at source generation sites.

VDEC has a strategic plan for comprehensive water protection and remediation, called the *Vermont Surface Water Management Strategy* (Strategy). This plan describes the protection and management of the sources of pollutants that degrade Vermont's surface waters (rivers and streams, lakes, ponds and reservoirs, and wetlands), and helps to guide the Agency's decision-making to ensure efficient, predictable, consistent and coordinated management actions.[80]

The foundation of the Strategy is the Vermont's Tactical Basin Planning (TBP) process. TBP identifies and prioritizes restoration or protection projects, surface water reclassifications, and

[80] The Surface Water Management Strategy addresses the problems associated a full suite of stressors: http://www.vtwaterquality.org/swms.html.

certain permitting schedules. It coordinates existing programs and builds partnerships to result in efficient and environmentally sound management of Vermont's surface water resources. Moreover, TBPs are an effective tool for prioritizing funds, technical assistance, and educational assistance. TBPs contain objectives, prioritized strategies, benchmarks and tasks for implementation of the plans. The plans prioritize basins and sub-basins for project development and restoration actions based on the level of degradation. The plans also prioritize waters that are of very high quality with important aquatic features deserve greater protection. Tactical Basin Plans are developed for each major basin and updated on a five-year cycle as specified by the Water Quality Standards. The TBP identify priority sub-boxing for enhanced monitoring, assessment, and protection development within the lifecycle of each plan. TBPs also have implementation tables that summarize highest priority projects for implementation.[81] Each plan describes attainable goals and targeted strategies to achieve those goals. The plans should contain an implementation table by which progress and commitments can be tracked using measurable indicators.

Advantages

The ERP works closely with the Department and with sister agencies, facilitating access to technical expertise to address water quality problems. To keep administrative costs low and avoid duplication of existing resources, ongoing cooperation and coordination with these programs is essential for any statewide water quality trust fund administrator. While the ERP is currently a small program, it has experience applying for and receiving federal grants, as well as administering water quality grants and projects across the state, including the Better Back Roads program. The ERP continues to works closely with the VDEC staff to refine its prioritization methodology which enhances the cost effectiveness of the program.

The ERP works closely with the VDEC's Monitoring, Assessment, and Planning Program (MAP) in the implementation of the Vermont Surface Water Management Strategy, by execution of the Tactical Basin Planning approach, and in the evaluation and prioritization of ERP-funded remediation projects. . To accomplish this, ERP partners with VDEC's tactical basin planners and many local, regional, and statewide communities and organizations, leveraging its resources to generate public awareness and participation. The basin planners are responsible for pre-screening and integration of ideas that are proposed for ERP funding, and for identifying groups that would be suitable project sponsors. This approach ensures predictability and transparency in project support, while continually building and improving capacity among partner groups.

Disadvantages

The ERP is a small program, and lacks the staff necessary to implement a full scale, statewide water quality program. It has expertise in targeting money efficiently. It also has constructed business processes to ensure funds are well spent on target surface waters. However, it is not currently organized to manage the program equitably across the state. Although VANR has an extensive fee system and collects and administers many types of fees, the ERP has no experience with collecting revenue other than appropriations and federal grants.

[81] The general idea is to focus resources and attention on a more concentrated area, in coordination with stakeholders, in order to be efficient with limited resources.

3.1.2. State Stormwater Utility

A stormwater utility is an organization that uses available revenue sources to better address and maintain stormwater runoff from existing development, and plan for mitigation of stormwater runoff from future development. There are some 1,100 stormwater utilities in 38 states, servicing communities ranging from 33 residents to well over 3 million residents. The average community size is approximately 82,000 residents.[82]

A utility is advantageous for developed municipalities as well as more rural communities. The impacts from stormwater runoff are a regional and not a local problem. Landuse decisions that increase impervious surfaces, developments the occur on floodplains and river corridors, requiring greater channelization of the streams, and shunt more water quickly into surface waters via the road and land ditching of upland areas all contribute to the increased risk of flooding and degradation of water quality.These problems illustrate that stormwater is a regional problem, requiring a comprehensive and regional solution.

Virtually every community in Vermont is interested in preserving or restoring clean water, ensuring public safety by managing drainage, and minimizing infrastructure and property damages during flood events. Most municipalities have aging infrastructure or existing development that lacks any stormwater treatment, but they typically lack adequate funds to effectively address these needs. A stormwater utility can provide these kinds of services. A state stormwater utility could be housed within VDEC to take advantage of the existing technical and administrative expertise and offer efficiencies in addressing priority stormwater problems in a cost-effective manner.

Advantages

A major advantage of a state stormwater utility is that it can be designed to meet specific water quality priority needs. The utility targets high priority stormwater problems on large scales, often using proven technology but sometimes demonstrating new approaches. Because of the increasing prevalence of stormwater utilities nationwide, they are becoming increasingly accepted and understood by the general population as the preferred mechanism for stormwater projects. A statewide stormwater utility could service needs on a statewide or regional basis, and could offer municipalities assistance in developing a municipal-owned local stormwater utility (which ensures that revenues stay within the region). Another benefit of a statewide utility is the economies of scale; a central system to collect fees, administer the program, provide technical assistance, and coordinate an equipment sharing program would help minimize administration costs. VDEC's Facilities Engineering Division has experience administering the Clean Water SRF, a large loan program, the model of which could serve potentially as a stormwater utility at a statewide scale.

Disadvantages

There will be some administrative costs associated with establishing a new stormwater utility. Traditional stormwater utilities are primarily focused on reducing impacts from municipal runoff. Designing a utility that address the major sources of water quality degradation in Vermont will require an institutional structure that can focus on other water quality impacts, such as runoff from farms and roads.

[82] Western Kentucky University Stormwater Utility Survey, 2010.

3.2. State-Based Quasi-Judicial Public Agency: Vermont Natural Resources Board

The Natural Resources Board (NRB) is a quasi-judicial entity established by statute in 2005 to provide independent, meaningful public participation in both Act 250 and water resource decisions. The NRB is an independent board of citizen members appointed by the governor in staggered four-year terms.[83] In 2012, Act 138 transferred rulemaking authority from the Water Resources Panel of the NRB to VANR.[84] Although the Water Resources Panel may still participate as a party in water-related environmental appeals, the VANR now makes all future rulemaking and policy decisions related to water quality.

The NRB's Land Use Panel administers Act 250, the Vermont's land use law, which includes review of water quality-related issues and incorporates VANR permits. The Land Use Panel promulgates the Act 250 rules, oversees nine district commissions and staff who issue Act 250 land use decisions, and participates in appeals of those decisions at the Vermont Environmental Court. Act 250 decisions are directly appealable to the Vermont Environmental Court.

The NRB's expertise, independent and transparent decision-making structure, and a strong public participation component make the board an attractive option for administering a trust fund or utility. A quasi-judicial NRB process could be tasked with setting the stormwater utility rates. The quasi-judicial structure with appeals to the Vermont Environmental Court or directly to the Supreme Court, provides an efficient structure for handling formal complaints or appeals over rates. NRB will need additional staff to take on the additional responsibilities of managing a trust fund or utility option.

3.3. State-Based Quasi-Governmental Funding Agency: Vermont Housing and Conservation Board

The Vermont Housing and Conservation Board ("VHCB") is a quasi-governmental entity established by statute in 1988 to administer the Vermont Housing and Conservation Trust Fund. The primary purpose of the fund is to provide grants and loans to assist in creating affordable housing and to maintain the working agricultural and forested landscape, historic properties, important natural areas, and recreational lands. VHCB is funded primarily through annual legislative appropriations (state capital funds and property transfer tax) and federal grants, and also receives Act 250 mitigation fees. VHCB and its partners' work have been recognized for its excellence including recent awards from EPA for Smart Growth, and HUD for its capacity building work. VHCB works with communities, state agencies, non-profit organizations and landowners in accomplishing that mission. VHCB is directed by an eleven member independent board: three governor appointed citizen members; the secretaries of the agencies of Agriculture, Human Services, and Natural Resources; the Executive Director of the Vermont Housing Finance Agency and four citizen members appointed by the legislature. This board directs a staff of 28 employees who administer between $23-$26 million annually. VHCB has a diverse portfolio of activity that has required the development of new expertise on staff or through partners and constituents to meet new challenges and opportunities, including the organization's Healthy Homes, AmeriCorps and Farm Viability programs,

[83] 10 V.S.A. § 6021(a).

[84] The NRB retains the authority to participate in water-related court cases and otherwise participate in policy discussions.

Advantages

VHCB has a strong track record of efficiently administering a diverse grant portfolio, building capacity in organizations and communities and working with multiple partners to distribute financial resources throughout the state. The organization, leverages state and federal dollars with significant amounts of additional private equity and foundation funds, with state dollars matched 5 to 1 in 2011.

Due to the nature of the VHCB mission, the board has strong local support; many constituents advocate for annual funding, as well as organize volunteer community efforts and raise local funds. As a quasi-governmental board, there is a level of separation between the political process and the decisions of the VHCB.

VHCB has an existing relationship with VDEC, assimilating river corridor protection into new conservation projects and adding vegetative buffers to existing conservation easements. Voluntary participation by farmers and other landowners in these permanent restrictions is helping to address sedimentation and nutrient runoff in the state. The organization also funds natural area projects that maintain water quality by protecting forests. With the signing of Act 138 last year, VHCB's statute was expanded to specifically include "the protection of surface waters and associated resources" and the organization has also integrated an enhanced water quality role into its programs as a partner/funder in the FEMA flood hazard mitigation initiative.

The existing administrative infrastructure for VHCB grants keeps administration costs to a minimum, and VHCB has worked effectively across the entire state both in rural and urban communities with targeted grant making that results in perpetual stewardship of resources.

Disadvantages

Even though VHCB is a large organization that already administers more than $20 million annually, similar to other management options, additional personnel would be needed to administer a water quality trust fund.

Although VHCB works with ANR and VDEC to take advantage of the technical expertise of those state entities, it does not have in-house expertise in water quality issues, particularly with targeting efficient use of money on critical source areas generating nutrient and sediment loading. (This is a similar issue with other management options.) VHCB does, however, have a track record of attracting staff and partners who can provide expertise in new areas of activity.

3.4. State-Based Quasi-Governmental Funding Agency: Vermont Economic Development Authority

The Vermont Economic Development Authority ("VEDA") is a statewide lender created by the legislature in 1974.[85] VEDA could provide low interest loans for projects including capital improvements and soil and water conservation and protection. VEDA has provided more than $1.9 billion in low interest loans and other financial assistance to eligible Vermont entrepreneurs, manufacturers, small businesses, and agricultural operations to foster growth, job creation, and

[85] VACC, http://www.veda.org/financing-options/vermont-agricultural-financing/
2012 VEDA Annual Report, http://www.veda.org/wp-content/uploads/optimized-for-web-VEDA-Final-2012-Annual-Report.pdf

economic stability throughout the state. One component of VEDA is the Vermont Agricultural Credit Corporation ("VACC"), which provides low-interest loans (variable rate, currently 3.50 percent) for a wide range of projects including making capital improvements and promoting soil and water conservation and protection.[86] VEDA was particularly active following Tropical Storm Irene, providing 299 "flood loans" totaling $16.7 million, including $1.8 million in loans to family farms. VACC loans could be an option for financing agricultural BMPs.

Advantages

VEDA is a statewide lender with significant experience administering technical and financial assistance.

Disadvantages

Some of the limitations of other options apply the VEDA. It would likely need additional personnel to administer a water quality trust fund. It would also need to formalize an collaborative agreement with the VANR to take advantage of the technical expertise.

3.5. Non-Governmental Third Party Organization: Vermont Community Foundation

The Vermont Community Foundation ("VCF") is a tax-exempt public charity dedicated to serving the interests of Vermonters. Founded in 1986, it is the largest foundation in Vermont in terms of assets, and administers more than $10 million in grants and distributions annually from more than 600 charitable funds. The grants support a range of issues: hunger, housing, arts, cultural heritage, social justice, animal welfare, and environmental sustainability. More than 60 percent of the grants are donor advised or donor directed, meaning the VCF acts as the grant administrator; it does not choose where or how the money is spent. That said, it has a program and grants staff that administer several competitive grant rounds annually, both staff and external committee reviewed, and have developed grant-making criteria that promote equitable distribution of funding, both geographically and across issues, and that could be applied to grant-making for the Trust using local experts from the field. Grants from the VCF *Community Fund* may support both public institutions and 501(c)(3) organizations.

While VCF lacks integration with VDEC technical expertise and has limited experience managing water quality projects, it is an option for project administration that can decrease administrative overhead and encourage community involvement. Because the VCF is familiar with donor advised and donor directed grants, if water quality projects are evaluated and chosen based on the technical expertise of VDEC or some other entity, the VCF could then administer the projects as donor directed grants. Water quality trust fund revenues can also be managed directly by the VCF, which currently manages more than $154 million in assets across its 600 funds. In addition, 5 percent of VCF's assets, or roughly $7 million, are invested directly in Vermont, in vehicles such as the Vermont Community Loan Fund and Housing Finance Authority.

If keeping funds in perpetuity and leveraging additional funding are important objectives, then joining the Trust's funds with VCF's investments would maximize investment opportunities and potential returns. They use Colonial Consulting (based in New York City) and have an external

[86] http://www.veda.org/financing-options/vermont-agricultural-financing/

team of community members with investment experience advising their investment strategy which has consistently beaten benchmarks for the last several years. The ownership of the assets must be turned over to the Foundation in order for it to be able to manage the fund. This provides a process for extracting the funds in case of an emergency.

VCF has a history of convening and a reputation for partnership and neutrality that could prove useful in helping to have municipalities, community groups and other entities work together on implementation projects.

3.6. Private Nonprofit Organization: The Efficiency Vermont Model

In addition to charitable grant administration organizations like the VCF, there are other non-governmental organizations that could serve as a model for administering the fund. Efficiency Vermont,[87] may offer a suitable model for creating an independent, transparent, and publicly accepted third party administration to manage the program.

A clean water option that uses Efficiency Vermont as its model could include:

- The Legislature declaring a clean water utility similar to its declaration of an energy efficiency utility;
- A third party governmental entity would select an organization to administer the clean water utility via a competitive bidding process and use a performance-based contract to support the utility, similar to how the PSB selected and contracted with Efficiency Vermont;
- A separation of rate-setting, which determines the level of revenue, and expenditures associated with project implementation. This approach ensures that rates are based on actual need for water quality projects, and not based on funds needed to simply finance the utility's own existence;
- The same governmental entity would set rates for the utility, similar to the role of the Public Service Board (PSB) in setting Efficiency Vermont's rate structure;
- The governmental entity would establish accountability in program administration. The entity would establish a process of collecting the fees, selecting projects based on a set of criteria, and regularly auditing projects;
- A role of the technical institution, such as VANR, to serve in an advisory capacity, similar to the role of the Department of Public Service; and,
- A role of a public advisory council, made up of interested parties, to offer the local perspective and recommendations, similar to a public advisory group that existed while Efficiency Vermont was getting underway.

An important feature of Efficiency Vermont is financial and project accountability. Efficiency Vermont experiences on a regular basis financial audits by VEIC and the PSB and performance based audits, which ensures that projects achieve the desired goals and are cost effective. Another feature is that the PSB manages the rate setting process, which is a transparent, quasi-

[87] Efficiency Vermont is administered by the Vermont Energy Investment corporation (VEIC) and is dedicated to providing technical assistance, financial rebates, and other incentives to improve energy efficiency in households and businesses across the state. Efficiency Vermont was established by the PSB pursuant to 30 V.S.A. § 209 (d) & (e), and is administered by VEIC under an order of appointment by the PSB.

judicial public process. The fees are based on demonstrated needs, and the PSB sets the rates somewhat free of any political sway.

3.7. A New Stormwater Utility

A new statewide stormwater utility that combines the strengths of existing programs is another option. A statewide utility could incorporate the technical expertise of VANR, quasi-judicial rate setting and decision-making of the NRB, and the efficiency and accountability of the Efficiency Vermont model.

3.7.1. Use the Technical Expertise of VANR

ANR already employs dozens of scientific and financial experts with years of experience monitoring water quality, assessing performance, and implementing projects. To avoid any duplication of services, VANR should be fully integrated into the utility as an advisor to ensure a strategic targeting of funds to address the highest priority water quality needs.

3.7.2. Use the Quasi-Judicial Expertise of the NRB

Rate-setting should be separate from expenditures. In the Efficiency Vermont model, the PSB objectively evaluates the needs of the utility and sets rates accordingly. This public process provides transparency, public participation, and is designed to serve the public interest.

Second, the NRB can provide a quasi-judicial forum for members of the public affected by a rate or other action to seek a fair decision. Using the NRB to address grievances created through water quality projects supports the intent of promoting a process that is efficient, fair, and transparent.

3.7.3. Adopt the Efficiency Vermont Model

If the utility is not housed within VANR, it should be managed on a performance based contract similar to the PSB contract with Efficiency Vermont. Using guidelines and technical assistance from VANR, the utility should be subject to periodic financial audits by the NRB or VANR, and should also be subject to performance based audits measuring the effect of projects and their impact on water quality. These audits would ensure that projects are targeted at high priority areas, that projects are implemented in a timely manner and on-budget, and that ongoing monitoring is sufficient to achieve the milestones necessary for TMDL compliance, if applicable.

Existing state and regional partners could also play an important and enhanced role in implementing clean water programs, and providing technical assistance to municipalities and farms. Please see Appendix F for a discussion of these partners.

Appendix A: Consultation Meetings

Act 138 directed the VANR to consult with interested parties in the development of recommendations for the Vermont Statewide Water Quality Report. Tables 6a and 6b summarize the series of meetings held over the course of the summer and fall, 2012 and January, 2013.

Table 6a: Consultation Meetings for the Preparation of the Vermont Statewide Water Quality Trust Fund Report, 2012

Meetings	Date	Venue
Legislators Meetings	Monthly	VANR
VT Agency of Agriculture, Food & Markets	July 3, 2012	VT Agency of Agriculture, Food & Markets, Montpelier
VT Agency of Agriculture, Food & Markets, VT Transportation Agency	July 18, 2012	VT Agency of Transportation, Montpelier
Lake Champlain Regional Chamber of Commerce/Greater Burlington Industrial Corporation	July 18, 2012	Lake Champlain Chamber of Commerce, Burlington
Chittenden County Regional Planning Commission/Regional Stormwater Education Program Meeting	July 19, 2012	Chittenden County Regional Planning Commission, Burlington
State & Federal Partners General Meeting	August 22, 2012	Vermont Transportation Agency, Montpelier
Non-Governmental Organizations-General Meeting	September 10, 2012	Shelburne Town Office, hosted by the Lake Champlain Basin Program Citizens Advisory Committee
Municipal Interests-General Meeting	September 11, 2012	Chittenden County Regional Planning Commission
Business Interests	September 18, 2012	Pavilion Building, Montpelier
State & Federal Agencies-General Meeting	September 27, 2012	Agency of Commerce & Community Development, Montpelier
Agricultural Interests-General Meetings and Focus Group Discussions	October-December	Various statewide locations, conducted in partnership with the VT Agency of Agriculture, Food, and Markets
Vermont Natural Resources Board	October 2, 2012	Vermont Natural Resources Board, Montpelier
Vermont Housing & Conservation Board	October 4, 2012	Vermont Housing and Conservation Board, Montpelier

Meetings	Date	Venue
General Meeting-St. Johnsbury	October 9, 2012	State Office Building, St. Johnsbury
General Meeting-Ascutney	October 10, 2012	South Windsor Regional Planning Commission, Ascutney
Friends of the Northern Lake Champlain Annual Meeting	October 10, 2012	Swanton Municipal Office, Swanton
General Meeting-Brattleboro	October 11, 2012	Marlboro College Graduate School, Brattleboro
General Meeting-Rutland	October 12, 2012	Rutland Regional Planning Commission, Rutland
General Meeting-Arlington	October 12, 2012	Arlington Town Hall, Arlington
Champlain Islands Chamber of Commerce	October 23, 2012	Grand Isle Lake House, Grand Isle
Green Mountain Water Environment Association Fall Conference	November 2, 2012	Sheraton Hotel & Conference Center, Burlington
Municipal Stormwater Runoff Focus Group #1	October 25, 2012	Lake Champlain Committee, Burlington
Municipal Stormwater Runoff Focus Group #2	October 31, 2012	VANR Regional Office, Essex Junction
Municipal Stormwater Runoff Focus Group #3	November 1, 2012	Rutland Regional Planning Commission, Rutland
Municipal Stormwater Runoff Focus Group #4	November 6, 2012	Northwest Regional Planning Commission, St. Albans
Municipal Stormwater Runoff Focus Group #5: Rural Roads	November 7, 2012	VANR, Montpelier
Municipal Stormwater Focus Group #6: Rural Roads	November 8, 2012	VANR, Montpelier

Table 6b: Meetings with the Agricultural Community

Meetings	Date	Venue
Agricultural focus group	October 5, 2012	Middlebury
Agriculture focus group	October 25, 2012	Middlebury
Agri-business focus group	October 25, 2012	Middlebury
Farmers Watershed Alliance	October 25, 2012	St. Albans
Rutland Conservation Districts farmer meeting	October 25, 2012	Rutland
Poultney Mettowee Conservation District farmer meeting	October 25, 2012	Pawlet
Environmental, watershed and conservation NGO meeting	October 30, 2012	Montpelier
Vermont Farm Bureau annual meeting	November 2, 2012	Killington
Essex Conservation District farmer meeting	November 7, 2012	Concord
Vermont Association of Conservation Districts annual meeting	November 15, 2012	Rutland
Green Mountain Dairy Producers meeting	December 4, 2012	Montpelier
Environmental, watershed and conservation NGO meeting	December 5, 2012	Montpelier
Agriculture public meeting	December 7, 2012	Middlebury
VACD/Ag partners meeting	December 11, 2012	Berlin
Natural Resources Conservation Council meeting	December 11, 2012	Berlin
Orleans Conservation District farmer meeting	December 11, 2012	Newport
Agriculture public meeting	December 19, 2012	St. Albans
Windham Conservation District farmer meeting	January 15, 2013	Saxtons River
Ottaquechee Conservation District farmer meeting	January 15, 2013	White River Junction
Vermont Grazing Conference	January 19, 2013	Lake Morey

Appendix B: Costs to Reduce Nonpoint Source Pollution

Nonpoint Source Item	Annual Operating	Annual Capital	One-Time Operating	One-Time Capital	Average Annual Cost over 10 Years
Unregulated Stormwater					
Watershed teams			$3,690,000		$369,000
VTDEC Green Infrastructure Coordinator	$75,000				$75,000
Technical assistance for zoning	$412,500				$330,000
VLCT Water Quality Municipal Assistance Program	$100,000				$80,000
Treatment of 5% of impervious surfaces		$70,000,000			$70,000,000
Sub-Total					$70,854,000
Unregulated Stormwater Runoff from Road Networks					
ANR inspection and training coordinator	$75,000				$75,000
VTrans district technicians	$300,000				$300,000
VTrans Better Back Roads coordinator	$75,000				$75,000
Grants to towns		$10,000,000			$10,000,000
Sub-Total					$10,450,000
Accepted Agricultural Practices Compliance					
Engineers	$225,000				$225,000
Inspectors	$300,000				$300,000
Enforcement case management	$75,000				$75,000
Attorney services	$35,000				$35,000
Sub-Total					$635,000
Agricultural Nutrient Management					
Farmer training in NMP development	$50,000				$50,000
Manure and soil tests	$400,000				$400,000
Increased Farm Agronomic Practices	$250,000				$250,000
Sub-Total					$700,000
Agricultural Livestock Exclusion from Streams					
Fencing and watering systems				$33,000,000	$3,300,000
Sub-Total					$3,300,000
Technical Assistance and Education for Agriculture					
Agronomists	$300,000				$300,000
Self-Certification Program	$35,000				$35,000
Continuing Education Program	$300,000				$300,000
Custom Operator Training			$175,000		$17,500
Sub-Total					$652,500
Agricultural and Forestry Best Management Practices					
Improved manure storage				$5,300,000	$530,000
Silage treatment				$11,300,000	$1,130,000
Barnyard runoff management				$5,600,000	$560,000
Milkhouse waste management				$2,200,000	$220,000
Development of small farm NMPs				$1,500,000	$150,000
Decommissioning or relocating facilities				$5,000,000	$500,000
Upgrades for current waste systems				$2,000,000	$200,000
Management of runoff from timber harvesting	$150,000				$150,000
Sub-Total					$3,440,000
River Corridor/Floodplain Management					
Travel and course materials	$20,000				$20,000
Webpage and outreach material	$40,000				$40,000
Mapping contractors	$200,000				$200,000
LiDAR data acquisition (for five years)	$500,000				$250,000
Phase 2 river corridor mapping	$250,000				$250,000
Sensitive river mitigation plans	$75,000				$75,000
Easements		$500,000			$500,000
ANR GIS web application			$100,000		$10,000
Contract for River Corridor Planning update			$50,000		$5,000
Contract for statewide conservation strategy			$75,000		$7,500
Contract for Flood Resilient Communities Program			$75,000		$7,500
Wetland Restoration and Protection	$75,000				$75,000
Sub-Total					$1,440,000
River Channel Management					
Rivers Program Trainer	$75,000				$75,000
River Management Engineer	$75,000				$75,000
IT services and hardware			$25,000		$2,500
Sub-Total					$152,500
Lake Shorelands Protection					
Education, technical assistance, and grants	$175,000				$175,000
Sub-Total					$175,000
TOTAL	**$4,317,500**	**$80,500,000**	**$4,190,000**	**$65,900,000**	**$91,799,000**

Appendix C: Aging Wastewater and Drinking Water Supply Infrastructure

C.1. Summary of Wastewater and Drinking Water Supply Infrastructure Needs

Table 7 summarizes the current wastewater and drinking water supply infrastructure needs in Vermont. Discussion of each system follows.

Table 7: Summary of Vermont Wastewater and Water Supply Infrastructure Needs, 2012

	Number of Infrastructure Systems	Annual Capital Needs	Deficit (Annual Need minus Funding)
Wastewater Infrastructure	122	$36 M	> $18 M
Drinking Water Supply Infrastructure	1,367	$33 M	$21.5 M

The 2012 National Clean Watersheds Needs Survey and Assessment identified 122 municipally and privately owned water pollution control facilities in Vermont. Many of these wastewater systems must implement improvements to either maintain or attain compliance with state and federal clean water standards, with projects ranging in size from a few thousand to several million dollars.[88] Today, the primary sources of funding for such improvements are:

- State grants; and,
- The State's Clean Water Revolving Loan Fund, which consists of both federal and state dollars.

The primary source of project funding beyond the state grant program consisted of local bond authorizations and USDA grants and loans.

Based on the most recent draft 2012 National Clean Watersheds Needs Survey and Assessment, the 5-year projection of capital needs for Vermont clean water systems is estimated at $179 million. This translates to an annual need going forward of approximately $36 million. Comparing this figure to the funds received thus far for the Revolving Fund and assuming the same level of funding out into the future, we would experience an annual deficit of at least $18 million.[89]

C.2. Improving Municipal Financial Stewardship

Municipality-owned wastewater infrastructure is funded through annual budgets designed to meet their financial needs. Financial needs typically include the cost of annual operation, maintenance, debt service, savings for emergencies and larger projects, and planning for future repair and replacement. Few municipalities have evolved their budget and user rates to reflect

[88] Improvements include collection system replacement, separating stormwater from collection systems, pump station upgrades and water pollution control treatment facilities upgrades.

[89] It is noteworthy that additional annual needs likely exist beyond the $36 M identified by the Needs survey because this survey only include those needs included in a formal report meeting Needs survey criteria.

both current expenses and the costs of addressing aging infrastructure, while many municipalities have these tasks on their to-do list.[90]

The VDEC is currently providing financial technical assistance to public drinking water systems will be exploring opportunities to expand these services to wastewater and stormwater utilities in the future. The Department is especially interested in the use of dedicated reserve accounts to pay for replacement of certain assets and will be exploring expanding their use for projects funded by the State Revolving Loan Fund programs.

C.3. History of Public Investment in Wastewater Infrastructure

The State Clean Water grant program began in 1957 with funding from the U.S. Public Health Service. The Clean Water Act took effect in 1972 which continued funding of waste water systems. Over the prior 55 year period, the state and federal governments have appropriated approximately $ 696 M, for municipal clean water system improvements.

Table 8: Summary of State and Federal Contributions to Clean Water Act Grant and Loan Funds

State Fiscal Year	Federal CWA Grant & EPA STAG	Federal CWSRF Grants	Total State Funds[91]
1957	$1,131,975.00		$1,000,000.00
1958			$0.00
1959	$545,600.00		$1,000,000.00
1960	$548,650.00		$0.00
1961	$545,025.00		$1,000,000.00
1962	$867,280.00		$0.00
1963	$963,990.00		$1,000,000.00
1964	$1,063,900.00		$0.00
1965	$1,055,350.00		$2,000,000.00
1966	$1,154,050.00		$1,500,000.00
1967	$1,178,700.00		$0.00
1968	$1,301,700.00		$5,000,000.00
1969	$1,343,600.00		$0.00

[90] In general, the following topics are typically addressed when improving the financial stewardship of municipally owned utilities: (a) Meetings between Boards and Operators; (b) Preparing Budgets; (c) Setting rates; (d) Asset Management; and, (e) Reserve Accounts.

[91] Total State Funds includes State contributions through the capital bill for grants directly to municipalities and as a match to Federal funds in the State Revolving Loan program, and funds paid back from loan repayments.

State Fiscal Year	Federal CWA Grant & EPA STAG	Federal CWSRF Grants	Total State Funds
1970	$2,542,800.00		$3,500,000.00
1971	$2,528,700.00		$2,500,000.00
1972	$5,137,200.00		$5,000,000.00
1973	$4,436,000.00		$5,000,000.00
1974	$6,654,000.00		$460,000.00
1975	$11,800,800.00		$0.00
1976	$22,506,600.00		$0.00
1977	$3,272,000.00		$3,500,000.00
1978	$17,422,890.00		$0.00
1979	$20,851,100.00		$4,500,000.00
1980	$12,531,753.00		$2,500,000.00
1981	$12,616,128.00		$1,500,000.00
1982	$11,395,715.00		$4,000,000.00
1983	$11,856,420.00		$4,000,000.00
1984	$11,977,100.00		$2,900,000.00
1985	$11,977,800.00		$3,600,000.00
1986	$8,809,000.00		$4,850,000.00
1987	$11,634,141.00		$3,400,000.00
1988	$11,275,000.00		$3,000,000.00
1989	$9,258,400.00	$4,754,174.00	$17,782,601.00
1990	$4,507,400.00	$5,865,937.00	$4,350,000.00
1991		$10,098,544.00	$6,600,000.00
1992		$9,543,900.00	$7,513,445.00
1993		$9,431,000.00	$6,763,445.00
1994		$5,813,800.00	$3,566,685.00
1995		$6,007,800.00	$1,984,829.00
1996	$333,000.00	$9,904,800.00	$2,475,139.06
1997	$5,000,000.00	$2,991,051.00	$1,508,050.36
1998	$3,000,000.00	$6,577,300.00	$8,092,085.43
1999	$5,000,000.00	$6,577,300.00	$6,923,228.90

State Fiscal Year	Federal CWA Grant & EPA STAG	Federal CWSRF Grants	Total State Funds
2000	$3,935,300.00	$6,555,200.00	$7,411,443.06
2001	$3,387,600.00	$6,496,100.00	$8,800,075.23
2002	$3,500,000.00	$6,510,800.00	$9,783,559.12
2003	$3,903,000.00	$6,467,800.00	$7,707,825.63
2004	$1,446,400.00	$6,471,800.00	$8,816,180.73
2005	$1,202,800.00	$5,243,500.00	$10,531,980.07
2006	$1,911,200.00	$4,242,300.00	$9,344,029.77
2007	$0.00	$5,207,300.00	$9,579,715.73
2008	$716,000.00	$3,274,300.00	$8,885,447.92
2009	$898,000.00	$22,513,400.00	$11,088,712.20
2010	$800,000.00	$10,002,000.00	$8,306,044.46
2011	$0.00	$7,222,000.00	$14,068,852.49
2012	$0.00	$6,908,000.00	$10,529,253.27
TOTAL	$261,724,067.00	$174,680,106.00	$259,122,628.43
PROGRAM TOTAL		$695,526,801.43	

C.4. Aging Drinking Water Systems

Currently, there are 1,367 municipally and privately owned public water systems in Vermont serving a total population of 582,693 people. Table 9 is a profile of these public water systems:

Table 9: Vermont Public Water Systems

Population Range	Community Systems[92]	Non-Community Systems[93]	Total
25 - 100	142	542	684
101 - 500	171	347	518
501 – 1,000	42	32	74
> 1,000	79	12	91
Total	434	933	1,367

[92] Community System: A water system serving a year-round residential population of 25 or more people.

[93] Non-Community System: A water system serving a non-residential population of 25 or more people, such as schools, commercial and industrial buildings.

Many of these water systems must implement improvements to either maintain or attain compliance with state and federal drinking water standards, with projects ranging in size from a few thousand to several million dollars. Today, the primary source of funding for such improvements is the State's Drinking Water Revolving Loan Fund, which consists of both federal and state dollars. Improvements include transmission and distribution pipe replacement, new sources, storage, pumping facilities and treatment plant upgrades.

Based on the most recent National Drinking Water Needs Survey and Assessment completed in 2007, the 20-year projection of capital needs for Vermont public water systems is estimated at $453 million. Factoring in four percent inflation, that translates to an annual need going forward of approximately $33 million. Comparing this figure to the funds received thus far for the Revolving Fund and assuming the same level of funding out into the future, we would experience an annual deficit of $21.5 million.

It is worth noting the economic benefit of water and sewer infrastructure investment. The 2008 U.S. Conference of Mayors report[94] cited a study that estimated each dollar of water and sewer infrastructure investment increases private output (Gross Domestic Product, GDP) in the long-term by $6.35. Additionally, with respect to annual general revenue and spending on operating and maintaining water and sewer systems, the U.S. Department of Commerce's Bureau of Economic Analysis estimates that for each additional dollar of revenue (or the economic value of the output) of the water and sewer industry, the increase in revenue (economic output) that occurs in all industries is $2.62 in that year. The same analysis estimates that adding 1 job in water and sewer creates 3.68 jobs in the national economy to support that job.

C.5. History of Investment in Public Drinking Water Supply Systems

Table 10 below summarizes funds allocated to system improvement projects since the inception of the loan program in 1997. Prior to that time, Vermont provided up to 35 percent state grant assistance to municipalities for the highest priority projects. Over the prior 20-year period (1976 – 1996), the state appropriated approximately $64 million, or an average of just over $3M annually for municipal drinking water system improvements. The primary source of project funding beyond the state grant program consisted of local bond authorizations and USDA grants and loans:

Table 10: Total Loan Program Funds Received Plus Projected Through SFY14

	Federal	State	Total
FFY 97 CAP Grant	$10,399,392	$2,511,760	$12,911,152
FFY 98 CAP Grant	$5,505,827	$1,424,260	$6,930,087
FFY 99 CAP Grant	$6,045,972	$1,492,760	$7,538,732
FFY 00 CAP Grant	$6,241,580	$1,551,400	$7,792,980
FFY 01 CAP Grant	$5,856,754	$1,557,820	$7,414,574

[94] The U.S. Conference of Mayors. *Local Government Investment in Municipal Water And Sewer Infrastructure: Adding Value To The National Economy.* Richard A. Krop, Ph.D., Charles Hernick, and Christopher Frantz. The Cadmus Group, Inc., August 14, 2008.

	Federal	State	Total
FFY 02 CAP Grant	$6,264,100	$1,610,500	$7,874,600
FFY 03 CAP Grant	$6,593,314	$1,600,820	$8,194,134
FFY 04 CAP Grant	$6,391,744	$1,660,620	$8,052,364
FFY 05 CAP Grant	$6,394,868	$1,657,100	$8,051,968
FFY 06 CAP Grant	$6,129,679	$1,645,860	$7,775,539.00
FFY 07 CAP Grant	$6,031,592	$1,645,800	$7,677,392
FFY 08 Cap Grant	$5,925,927	$1,629,200	$7,555,127
FFY 09 Cap Grant	$5,747,505	$1,629,200	$7,376,705
FFY 09 ARRA Grant	$18,410,000	- 0 -	$18,410,000
FFY 10 Cap Grant	$9,976,155	$2,714,600	$12,690,755
FFY 11 Cap Grant	$6,922,230	$1,884,160	$8,806,390
FFY 12 Cap Grant	$6,842,540	$1,795,000	$8,637,540
Subtotals	$125,679,179	$6,393,760	$153,690,039
Cumulative Interest Earnings Projected at 7/1/13			$4,805,720
Cumulative Net Loan Repayments Projected at 7/1/13			$25,721,980
Total Project Funds			!D20 Is Not In Table

Appendix D: Tools for Financing a Statewide Water Quality Trust Fund

Evaluation Criteria

Each potential revenue source for financing a statewide water quality trust fund is evaluated against the following criteria:

Revenue Potential: The revenue source has a base large enough to generate significant revenue with a reasonable tax rate or fee.

Stability: Revenues are relatively constant over time and not subject to unpredictable fluctuations.

Sufficiency: The revenue source provides the revenue growth necessary to finance the desired rate of spending growth.

Administration and Compliance: The degree to which the administrative apparatus necessary to collect revenue, enforce the law, and audit to ensure compliance and the burden of tax compliance on taxpayers is minimized.

Accountability: The degree to which the amount of the tax or fee is explicit and known to those who pay.

Political Viability: The presumed level of public support or opposition to the tax or fee as a mechanism to improve water quality (which is necessarily subjective).

Promotes Mitigation: The degree to which a tax or fee encourages individuals and businesses to perform on-site mitigation to improve water quality.

Geographic Distribution: The degree to which the tax or fee applies uniformly across the entire state.

Sensitivity Based on Income: The degree to which the tax or fee is based on ability to pay.

Relation to Water Resources: The degree to which the tax or fee bears a relationship to water quality.

This section evaluates a number of tools that may be used to finance a statewide water quality trust fund using ten criteria. The potential revenue sources examined include stormwater user fees, broad-based taxes, excise taxes, fees, and other potential revenue sources. In addition, this section evaluates how existing programs could be modified to improve incentives to achieve the state's clean water restoration and protection goals. The programs evaluated include supplemental environmental projects, the clean water state revolving fund, the use value appraisal program, conservation easements, and designation programs (such as the downtown designation program).

It is important to note that the intent of this report is to present to the Vermont General Assembly, as required by Act 138, a comprehensive and analytical evaluation of 16 possible financial tools and seven current programs that could help to achieve the Vermont's clean water goals. The financial tools were identified through research on other state and regional initiatives and should not be construed as funding proposals by the VANR.

D.1. Stormwater User Fees

This section examines the potential use of a statewide stormwater user fee[95] to finance a statewide water quality trust fund. Stormwater user fees have several advantages over taxes as financing source including increased stability and predictability, greater equity, and the opportunity to incorporate incentives for on-site stormwater management. Stormwater user fees are generally based on factors that influence stormwater runoff, such as the impervious area (roof area, patios, driveways, etc.) of each land parcel. Stormwater user fee structure, fee basis and data collection, fee collection, geographic coverage, and exemptions and credits are discussed below.

In Vermont, there are some enhanced municipal stormwater programs – the stormwater utility in South Burlington and a dedicated stormwater program in Burlington, which are financed with stormwater user fees. South Burlington's stormwater user fees may serve as a model for a statewide stormwater user fee and is discussed below where appropriate.

D.1.1. User Fee Structure

User fee structure has implications for a number of issues including cost, ease of administration and understanding, and equity. For residential properties, the most common types of fee structure are flat, tiered, and variable. For non-residential properties, the most common types of fee structure are tiered and variable. Vermont currently assigns parcels to one of fifteen categories; these categories could be combined to make them more manageable for this purpose.

Flat fees are uniform for all properties in a use category. Pure flat fee approaches are rare except as an interim measure while developing a more refined system. Flat fees reduce data collection needs, are easy to explain and for the public to understand, and easy to administer. However, the nexus between the fee and the volume of stormwater generated may be weak so this approach may be subject to legal challenge.

Tiered fees increase in steps, depending on whether the property falls within a particular size range, based on the amount of impervious surface or some other factor. Most jurisdictions avoid creating residential tiers because of the data collection involved. Tiered fee structures provide more equity than flat fee structures, but may not be worth developing in light of relatively small differences in runoff impact for residential properties. Since specific data collection on non-residential properties is necessary to classify into tiers, it may make sense to use a variable approach that provides more equity.

Variable fees increase incrementally based on the amount of impervious surface or some other factor on all or most classes of uses. Variable user fees are intended to be as equitable as possible, with an effort to accurately assess properties according to stormwater impact. Some approaches can become complex and require extensive data collection. However, a variable fee structures may be deemed the fairest approach and it creates an incentive for users to reduce impervious areas.

In South Burlington, single-family residences are charged a flat fee of approximately $71 and non-residential properties are charged a variable fee.

[95] Stormwater user fees are usually associated with stormwater utilities. A stormwater utility may imply a funding and accounting method, an organizational approach, a management concept, or a combination of these. The focus in this section is on stormwater user fees as a mechanism for financing a statewide water quality trust fund.

D.1.2. Basis of Stormwater User Fees and Data Collection

Another consideration is what information is to be used as the basis for the stormwater user fee structures. Most jurisdictions use impervious surface area as the basis for their fees. Other possibilities are parcel size and parcel size adjusted by land use type. The Division of Property Valuation and Review (PVR) maintains a property database that includes information on every parcel in the state. It includes, among other variables, the property category and acres. The database is updated annually.

Fees may be apportioned according to the size of the parcel with larger parcels paying a higher fee. This approach is simple to administer and the information needed is easy to collect and maintain. However, there is a poor nexus with actual stormwater impact; consequently, this approach may be subject to legal challenge. Data on total acres is available for every property in Vermont in the PVR database.

Another common approach is to use parcel size in conjunction with a pre-determined estimate of the runoff impact for different land use types. This allows for the creation of a fee structure without needed to collect parcel specific information other than gross size and land use and is less expensive than an analysis of impervious area parcel by parcel. However, the approach can be quite inaccurate – especially for non-residential parcels and is complicated to explain. All parcels in Vermont are classified in one of fifteen categories. This information is also available in the PVR database.

Actual measurement of impervious surfaces is labor intensive; however, a majority of jurisdictions now adopting stormwater user fees use this approach – at least for non-residential properties. Most use Geographic Information Systems (GIS) and aerial photography with some ground verification. GIS integrate hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. Cost can vary tremendously depending on what resources and capabilities are already available. The Vermont Center for Geographic Information may be a source of GIS data that could be used for this purpose.

An alternative is to estimate impervious surface area based on other existing or easily obtainable parcel-specific information. Assessment records that indicate the size of building footprints and other data may be an option. This may offer a cost effective alternative to actual measurement of impervious area.

In South Burlington, the stormwater user fee on all single-family residences is based on the average impervious area per lot, which is estimated to be 2,700 square feet. The stormwater fee on non-residential property is based on actual impervious area, which is calculated using satellite imagery.

D.1.3. Collection of Stormwater User Fees

Collection of stormwater user fees is a significant issue. The consensus is that it is best to piggy-back onto an existing system rather than trying to establish a new billing system. This approach minimizes administrative burdens and costs and results in lower delinquency rates. However, for reasons discussed below this approach may not be practical in Vermont.

In most jurisdictions that impose stormwater user fees, the fee is added to the existing water/sewer bill. Because many parcels may have impervious area without having municipal water or sewer, stormwater bills would need to be sent to parcel owners with impervious area but

no water or sewer service. In Vermont, this may be problematic since most parcels are not served by municipal sewer and water. If used, the water and sewer bills would have to be able to accommodate an additional line item and parcel owners not on public water or sewer would need to be identified and billed separately.

An alternative is to add stormwater user fees as a line item to the existing property tax bill. Tax-exempt properties with impervious area would also require stand-alone stormwater bills. Although this approach is used in two bills filed this session (S.185/H.529), in Vermont this approach would be problematic since most towns use a property tax billing system that was developed and is maintained by the New England Municipal Resource Center. This billing system is not flexible enough to add additional line items on property tax bills.

A small number of jurisdictions elect to send a standalone stormwater bill. This approach reaches all parcels with impervious area; however, this approach also has drawbacks including higher cost, lower customer acceptance, and higher rates of delinquency since enforcement measures such as a lien on the property or shutting off utility service is not feasible. But it may also provide an opportunity to send targeted educational materials on stormwater and the need for the fee. To reduce costs, billing could take place annually. It may be possible to use the PVR database to facilitate standalone billing; it includes, among other variables the name of the owner(s), mailing address, property classification, total acres, and tax status.

In South Burlington, stormwater user fees are added to the municipality's monthly sewer and water bill. As noted above, this approach may not be feasible for a statewide stormwater user fee because less than one-half of the state's population is served by a municipal sewer or water utility.

D.1.4. Geographic Coverage of Stormwater User Fees

All properties within the state contribute to stormwater runoff, including those in rural areas. However, some jurisdictions with stormwater user fees apply them only to areas served by municipal water or sewer utilities. Applying the fee to all parcels may be perceived as more fair since all residents share the burden. However, rural landowners may have difficulty seeing how the fee has any relationship to them and the natural features of some rural lands may provide stormwater detention and filtering. In South Burlington, the stormwater user fee applies to developed properties, including tax-exempt parcels. The only exclusions are for railroad tracks and undeveloped pervious land.

D.1.5. Stormwater User Fee Exemptions and Credits

Since all properties contribute to stormwater runoff, it can be argued that all properties should be charged under a stormwater user fee system. However, certain improvements such as roads constitute essential infrastructure that benefits the public and it can be argued that undeveloped lands have far less significant impact that developed ones and should be exempt from the fee. One survey indicates that 70 percent of stormwater utilities exempt public roads and just over half of all jurisdictions with stormwater user fees exempt undeveloped lands, including agricultural lands.

Allowing no exemptions is simple and maximizes revenue. However, it may be argued that some uses or types of land do not create significant runoff or it may be politically expedient to exempt them.

Exempting private roads may avoid administrative and political issues, but private roads do contribute to stormwater runoff and fees on private roads generate more revenues and may create a disincentive for excessive road building. Vermont has roughly 2,500 miles of private roads; however, this total likely excludes some private roads, long driveways, access roads, and farm roads that not in the Agency of Transportation database.

Undeveloped land, particularly large blocks, can help mitigate stormwater impacts as they function to divert, store and filter stormwater. If the focus of the fee is impervious area, it is difficult to charge owners of land with little or no impervious surfaces. However, undeveloped property may contribute to stormwater runoff in some cases and it may be argued that as user of public roads and other services, owners of land with little stormwater impact should still contribute. Vermont has 8,339 parcels classified as woodland.

Agricultural land managed according to best management practices has far few negative stormwater impacts than developed properties. However, agricultural land can create significant negative stormwater impacts, particularly regarding water quality. In Vermont, there are 2,739 parcels classified as agricultural.

Stormwater fee structures may also provide an incentive to change behavior, if they incorporate credits. The most common credits are for the installation of on-site measures that detain or filter stormwater. On-site projects for developed properties include rain barrels, rain gardens, pervious surfaces, vegetated rooftops, curb cuts to direct stormwater toward permeable ground, and other low-impact designs. For agricultural and logging operations, incorporation of best management practices or low-cost accepted agricultural practices may be appropriate for credits. In South Burlington, credits against the stormwater user fee are provided for qualifying on-site stormwater mitigation, MS4 compliance, and more.

D.1.6. Revenue Potential of Stormwater User Fees

The revenue potential of a stormwater user fee depends on each of the factors discussed above including fee structure, fee basis, fee collection, geographic coverage, and exemptions and credits. Vermont has 339,636 parcels of real property. An average stormwater user fee of $10 per parcel would generate approximately $3.4 million annually.

D.1.6.1. Evaluation of Stormwater User Fees

Revenue Considerations	
Revenue Potential	High.
Stability	High.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	High – initial costs include mapping, calculation of appropriate fees, billing, creating and evaluating potential credits.
Accountability	High.
Political Viability	High – stormwater user fees are becoming a common and accepted mechanism to finance water quality programs.
Promotes Mitigation	Yes – credits may be used to promote on-site mitigation of stormwater runoff, LID, & retrofitting.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Low.
Relation to Water Quality	High – impervious area that creates stormwater runoff is closely related to water quality.

D.1.6.2. References & Additional Information

- Stormwater Management Financing: http://stormwaterfinance.urbancenter.iupui.edu/PDFs/Cyre821.pdf
- Stormwater Utility Fees: http://efc.muskie.usm.maine.edu/docs/StormwaterUtilityFeeReport.pdf
- Stormwater Utility Survey: http://204.118.135.81/Downloads/Resources/Brochures/rsrc_EMS_2010StormwaterUtilitySurvey.pdf
- N.H. Stormwater Commission Final Report: http://www.nh.gov/water-sustainability/publications/documents/hb1295-stormwater-factsheet.pdf
- South Burlington Stormwater User Fees: http://www.sburlstormwater.com/about_us/about_us.shtml

D.2. Broad-Based Taxes

This section examines the potential use of broad-based taxes to finance a statewide water quality trust fund. Broad-based taxes such as property and income taxes are established, well understood, relatively stable, and generally accepted by taxpayers. Each is capable of generating millions of dollars annually. Unlike user fees, no technical analysis is required to implement a broad-based tax; however, there is at best a tenuous relationship between water quality and the burden borne by taxpayers.

D.2.1. Municipal Property Tax

In Vermont, municipal property taxes are based on listed value, which is determined by local assessing officials. Annually, the legislative body of each municipality sets a property tax rate to raise funds for highways and other necessary expenses.[96] Property taxes are also levied in villages and fire districts. In tax year 2011, the average effective municipal tax rate was $0.46 per $100 of fair market value; however, municipal tax rates vary widely. The municipal property tax raised $372.2 million in FY2012.

Additional revenue to finance a water quality trust fund could be raised by assessing each municipality a share of the total revenues to be raised based on its share of statewide fair market property values.[97] This assessment would become part of each municipality's annual budget to be raised through the property tax like other municipal expenses. A 1-cent tax rate applied to the fair market value of taxable real property would raise an additional $8.0 million annually. A typical residential property with a fair market value of $200,000 would be assessed $20.

[96] In Vermont, elementary and secondary public education is financed through a statewide property tax.

[97] The tax department publishes an equalization study annually that provides an estimate of the fair market value of taxable real property in each municipality.

D.2.1.1. Evaluation of a Municipal Property Tax

Revenue Considerations	
Revenue Potential	High.
Stability	High – property taxes are among the most stable revenue streams since they are unaffected by changes in taxpayers' income or consumption patterns; however, dramatic fluctuations in real property values do occur.
Sufficiency	High – revenue increases with new construction and as property values appreciate.
Implementation & Administration	
Administration and Compliance	Low – collection, enforcement, and auditing mechanisms already exist; however, municipalities may need to be compensated for collecting and remitting the tax to the state. Municipalities retain 0.225% of the statewide education property taxes they collect and remit to the state.
Accountability	Low – the total assessment would appear as a line item in municipal budgets, but a taxpayer's individual assessment would not be apparent on the municipal property tax bill.
Political Viability	Low – the state and municipal property tax burden in Vermont is among the highest nationally.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High – all taxable real property would pay the additional tax; some of the tax would be exported to non-residents.
Income Equity	Moderate – the property tax is based on property values, which are generally correlated to income; the total property tax burden of lower-income taxpayers is capped at a fixed percentage of household income.
Relation to Water Quality	Low – there is minimal connection between fair market value and water quality and some property is exempt from the tax.

D.2.1.2. References & Additional Information

- Vermont Property Tax Information: http://www.state.vt.us/tax/pvr.shtml

D.2.2. Surtax on Personal Income Tax Liability

In Vermont, the personal income tax is based on the federal definition of taxable income with several state-specific exclusions, exemptions, deductions, and credits that modify the federal tax base. The state's taxable income base was over $28 billion in 2010. There are five taxable income brackets with tax rates ranging from 3.55 percent to 9.40 percent. The personal income tax raised $597 million in FY2012.

Additional revenue to finance a water quality trust fund could be raised by applying a surtax to each filer's personal income tax liability and dedicating or earmarking the revenue for this purpose. A one percent surtax on personal income tax liability would raise an additional $6.0 million annually. On average, personal income tax liability would increase by about $17 annually per tax return.

D.2.2.1. Evaluation of a Personal Income Surtax

Revenue Considerations	
Revenue Potential	High.
Stability	High – but revenues do fluctuate with the health of the overall economy and federal tax policy.
Sufficiency	High – revenue grows with taxable income and when taxpayers move into higher tax rate brackets as taxable income grows; however, revenue growth declines during economic downturns, especially in states such as Vermont that rely heavily on high-income earners.
Implementation & Administration	
Administration and Compliance	Low – collection, enforcement, and auditing mechanisms already exist; however, the tax department would need to revise the tax form and instructions and tax software would need to be rewritten.
Accountability	High – the surtax would appear on personal income tax returns.
Political Viability	Moderate – the state's top marginal personal income tax rates rank high nationally.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	High – Vermont's personal income tax is progressive with a graduated rate structure and an earned income credit.
Relation to Water Quality	Low.

D.2.2.2. References & Additional Information

- Vermont Personal Income Tax Information: http://www.state.vt.us/tax/individual.shtml

D.3. Excise Taxes

This section examines the potential use of excise taxes on products that may contribute to the wastewater stream to finance a statewide water quality trust fund. An excise tax is an indirect tax, meaning that the producer or retailer who pays the tax generally shifts the tax by raising the price paid by the buyer. An excise tax may be applied as a percentage of value of a product or a per-unit excise tax may be levied. The excise taxes examined below include a fertilizer and pesticide tax, a flushable products tax, motor fuels taxes, and a bottled water tax. Although excise taxes typically generate less revenue than broad-based taxes, the relationship between the product taxed and water quality is more apparent.

Vermont adopted the Streamlined Sales Tax Agreement (SSTA) in 2007. The SSTA is intended to simplify administration and reduce the burden of compliance so that sales taxes may be collected from businesses that sell to residents through internet or mail order sales only. One requirement of the agreement is that member states share a uniform definition of taxable items. States are strongly urged not to create new excise taxes in order to tax a particular category of property because of the additional burden it places on sellers. With exception of the motor fuels excise, which is not subject to the requirement of the SSTA, Vermont would need to exclude the excise taxes discussed below.

D.3.1. Excise Taxes on Motor Fuels

Vermont's gasoline tax is $0.19 per gallon and the diesel fuel tax is fixed at $0.25 per gallon. In addition, there is a 1-cent per gallon tax that is dedicated to the petroleum cleanup fund and a 2 percent assessment on the retail price of gasoline and a $0.03 per gallon assessment on diesel fuel that is dedicated to transportation capital projects. The gasoline tax applies to all sales (except between licensed distributors). There are several exemptions from the diesel fuel tax including agricultural, government, and off-road uses. In FY2012, the motor fuels excise tax raised $76.6 million on about 389 million gallons of motor fuel sold in Vermont.

Additional revenue could be raised for a water quality trust fund by increasing the tax rates on motor fuels and earmarking the additional revenue for this purpose. A 1-cent per gallon excise tax applied to the sale of motor fuels would raise an additional $3.9 million annually. For diesel fuels, it may be necessary to classify the additional charge as a "surcharge" to comply with the International Fuel Tax Agreement.

D.3.1.1. Evaluation of a Excise Tax on Motor Fuels

Revenue Considerations	
Revenue Potential	Moderate.[98]
Stability	Moderate – consumption may decrease due to fuel prices, motor vehicle fuel efficiency, alternative fuel sources, and consumer driving patterns.
Sufficiency	Low – motor fuel taxes are inelastic; revenues fail to keep pace with inflation and economic growth at a given tax rate.
Implementation & Administration	
Administration and Compliance	Low – collection, enforcement, and auditing mechanisms already exist. VTrans would need to account for and remit the fees to the water quality trust fund.
Accountability	Moderate – while consumers are aware of fuel taxes, the exact amounts are generally not well known.
Political Viability	Moderate – likely to raise opposition when gasoline and diesel fuel taxes increase.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High – however, drivers in more rural parts of the state may consume more fuel.
Income Equity	Low – especially in areas such as Vermont where residents often commute longer distances to work, to shop, and for other necessary activities.
Relation to Water Quality	High – vehicle use and the associated road network are highly correlated to surface water pollution.

D.3.1.2. References & Additional Information

- Vermont Department of Motor Vehicles Fuel Taxes: http://dmv.vermont.gov/fees/tax_title#FuelTax

D.3.2. Excise Tax on Fertilizer and Pesticide

In Vermont, there is currently no excise tax on fertilizers or pesticides.[99] The sale of these products for use by commercial farming and animal operations is also exempted from the state's general sales & use tax. The state does require fertilizer manufacturers and distributors to register each type of fertilizer sold for a modest fee and to pay a $0.25 per ton fee to pay for the

[98] This is based on the Tax Policy Center 2009 estimate of VT state and local motor fuel revenue of $84 million, with a tax of approximately $0.27cpg – 311 million gallons of taxable fuel. 3.85cpg x 311 million = $12 million.

[99] There are registration fees for commercial fertilizers: http://www.vermontagriculture.com/documents/fertapplication.PDF.

inspection and testing of fertilizers to ensure that each product contains the specified minimum amount of nutrients. Total commercial fertilizer usage in Vermont has remained consistent at around 40,000 tons annually. Pesticide manufacturers and dealers are subject to a similar dealer application fee and product registration fees, but not to a tonnage fee.

An excise tax based on the sales value of fertilizers and pesticides, particularly targeted at phosphorus and nitrogen-based fertilizers could generate modest revenue for a water quality trust fund. According to the 2007 Census of Agriculture, the total sales value of these products in Vermont in 2007 was estimated to be $25.4 million. A 1 percent excise tax applied to sales value would raise roughly $250,000 annually. Alternatively, an excise tax based on the weight of fertilizers sold in the state could be implemented. A $1 per ton excise tax on fertilizer would raise about $40,000 annually.

D.3.2.1. Evaluation of a Fertilizer & Pesticide Excise Tax

Revenue Considerations	
Revenue Potential	Low.
Stability	High.
Sufficiency	Low – sales of these products is relatively stable; however, revenues would grow with prices.
Implementation & Administration	
Administration and Compliance	High – defining the product to be taxed could be difficult; tax compliance burden on distributors or retailers would be high.
Accountability	Low – the fee would be passed through to users in the price of fertilizers and pesticides.
Political Viability	Low – the fee would likely to generate opposition from farmers.
Promotes Mitigation	Yes – fee may discourage excessive use of fertilizers and pesticides by commercial applicators.
Equity & Other Considerations	
Geographic Distribution	Moderate – applies to all commercial sales
Income Equity	Low – the fee is not related to ability to pay.
Relation to Water Quality	High – there is a direct relationship between use and nutrient loading pollution.

D.3.2.2. References & Additional Information

- Analysis of Vermont's Food System, Farm Inputs: http://www.vsjf.org/assets/files/Agriculture/Strat_Plan/3.2_Farm%20Inputs_0_Intro_V3.pdf
- Vermont Agency of Agriculture, Food & Markets, Fertilizer Program:http://www.vermontagriculture.com/ARMES/pidfeedseedfert.htm
- Vermont Agency of Agriculture, Food & Markets, Pesticide Management:http://www.vermontagriculture.com/ARMES/pest.htm
- State Laws Banning Phosphorus Fertilizer Use: http://www.cga.ct.gov/2012/rpt/2012-R-0076.htm.

D.3.3. Excise Tax on Flushable Consumer Products

Vermont currently has no excise tax on flushables – consumer products, including soaps, detergents, toiletries, and other items, that are classified as "safe" for flushing down a toilet. These consumer products are currently taxed under the state's general sales & use tax. Although phosphates[100] are already illegal in laundry and dishwasher detergents, phosphates are still present in many other products including shampoos, soaps, toothpastes, etc. Other chemicals in these products also contribute to water quality problems.

An excise tax on flushable consumer products in Vermont could raise revenue for a water quality trust fund. According to a Government Accounting Office analysis of Census data, total sales of flushable products nationally amounted to more than $63 billion in 2009. If consumption of these products in Vermont is proportional to its population, in-state sales are roughly $126 million annually. A 1 percent excise tax on the sales price of flushable consumer products in Vermont could raise roughly $1.3 million annually.

D.3.3.1. Evaluation of an Excise Tax on Flushable Consumer Products

Revenue Considerations	
Revenue Potential	Moderate.
Stability	High.
Sufficiency	Moderate – revenue would grow with consumption and price.
Implementation & Administration	
Administration and Compliance	High – defining the product to be taxed would be difficult; the burden of tax compliance on distributors or retailers would be high.
Accountability	Low – the tax would be passed through to consumers in the price of the products subject to the excise tax.
Political Viability	Moderate.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Low – fees on consumer products are generally regressive.
Relation to Water Quality	Moderate – these products may contribute to the wastewater stream.

D.3.3.2. References & Additional Information

- U.S. Governmental Accounting Office, Clean Water Infrastructure: http://www.gao.gov/new.items/d09657.pdf

[100] Phosphate is the inorganic form of phosphorus.

D.3.4. Excise Tax on Bottled Water Containers

Vermont currently does not have a bottled water excise tax. In addition, bottled water is exempt from the state's general sales & use tax and the bottle redemption fee. Data for bottled water consumption specific to Vermont is not readily available; however, according a statistics from the International Bottled Water Association, on average 167 plastic bottles of water are consumed per person in the United States annually.[101] If per-person consumption in Vermont is near the national average, 100 million bottles are consumed within the state annually. A 1-cent excise tax per bottled water container would raise roughly $1 million annually.

D.3.4.1. Evaluation of an Excised Tax on Bottled Water Containers

Revenue Considerations	
Revenue Potential	Moderate.
Stability	High.
Sufficiency	Moderate – revenue increases with units sold and consumption of bottled water has been growing.
Implementation & Administration	
Administration and Compliance	Moderate – the burden of tax compliance on distributors and/or retailers would be high.
Accountability	Low – the excise tax would be included in retail price.
Political Viability	Moderate – may depend on perceived connection between beverage containers and water quality. Likely to generate opposition from bottlers, retailers, and distributors.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Low.
Relation to Water Quality	High. Water bottled in Vermont benefits directly from clean groundwater and from the public perception that Vermont has clean water; Bottles are often a major component of aquatic litter.

[101] International Bottle Water Association Bottled Water Statistics: http://www.bottledwater.org/economics/industry-statistics; "A Fountain on Every Corner," New York Times. May 23, 2008.

D.3.4.2. References & Additional Information

- US Consumption of Bottled Water Shows Significant Growth, Increasing 4.1 percent in 2011, International Bottled Water Association: http://www.bottledwater.org/content/us-consumption-bottled-water-shows-significant-growth-increasing-41-percent-2011
- Florida SB 118: Environmental Surcharge on Bottled Water:http://flsenate.gov/Session/Bill/2012/118
- City of Chicago Bottled Water Tax: http://www.cityofchicago.org/city/en/depts/fin/supp_info/revenue/tax_list/bottled_water_tax.html

D.4. Fees

In addition to the broad-based taxes and excise taxes discussed above, there are number of fees that may supplement the primary revenue streams used to finance a statewide water quality trust fund. Nearly every fee presented below bears a strong relationship to surface water quality; however, they independently lack the reliability and revenue capacity to finance a water quality trust fund. These fees are designed to spread the burden of funding a water quality trust fund across those who contribute to water quality problems, as well as those who benefit the most from clean water.

Use of fees to raise additional revenue for a water quality trust fund is limited because the primary purpose of a fee is to cover the expense of providing a service or regulating a program. Courts do not require that monies generated from fees exactly equal the expense of regulation; however, the fee must be shown to be reasonably related to the probable cost of providing the service or regulating the program. If the primary purpose of a fee is deemed to be generating revenue, it is a tax.

D.4.1. Special License Plate Fee

Vermont currently offers special vehicle license plates covering a variety of themes. For example, there is a conservation license plate that is available for $23 annually. In FY2012, the fee for conservation plates raised about $191,000 on the issuance and renewal.

A special license plate dedicated to a recognizable public trust such as Lake Champlain might generate modest revenues. Such a plate might also have the ancillary benefit of raising awareness about water pollution across the state.

D.4.1.1. Evaluation of a License Plate Fee

Revenue Considerations	
Revenue Potential	Low.
Stability	High.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	Low – collection, enforcement, and auditing mechanisms already exist; however, may require marketing to residents. Costs for the design and distribution of the plates can be significant.
Accountability	High.
Political Viability	High – the fee is voluntary.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Moderate – a special plate would likely be purchased by higher-income residents.
Relation to Water Quality	Low – but a special license plate may raise awareness of water quality problems.

D.4.1.2. References & Additional Information

- Vermont Department of Motor Vehicles, Special License Plates: http://dmv.vermont.gov/registrations/drivers/plates/special#conservation

D.4.2. Non-Motorized Boat Use Fee

Vermont currently requires the registration of all motorized boats regardless of size or engine displacement if the boat is owned by a resident and operated on the state's waters. Boats owned by non-residents and operated outside of the waters of the state are exempt from registration. Non-motorized boats operated on the state's waters, including canoes, kayaks, and some sailboats are specifically exempt from registration.

To raise revenue to finance a water quality trust fund, a registration fee could be imposed on residents who use non-motorized watercraft on the state's waters. These registration fees could be processed through the Department of Motor Vehicles, which currently issues registrations to all motorized vehicles including watercraft.

D.4.2.1. Evaluation of a Non-Motorized Boat Use Fee

Revenue Considerations	
Revenue Potential	Low.
Stability	High.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	Low – collection, enforcement, and auditing mechanisms already exist; however, enforcement may be difficult.
Accountability	High.
Political Viability	Moderate – similar fees for motorized watercraft accepted. Although the public perception is likely that these crafts are non-polluting alternatives, users may support the clean water goals.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Moderate – fee unrelated to income.
Relation to Water Quality	High – relationship between recreational use and water quality.

D.4.2.2. References & Additional Information

- Vermont Motorboat Registration: http://dmv.vermont.gov/sites/dmv/files/pdf/DMV-VD037-Motorboat_Reg_Title_App.pdf

D.4.3. Non-Resident Boat Docking Fee

Boats that are registered in Vermont pay registration fees ranging from $27 to $136 annually depending on length. However, out-of-state boats pay only a modest $26 vessel validation sticker fee when operating in the state for more than 30 consecutive days. Furthermore, enforcement of the vessel validation sticker is infrequent and sporadic, allowing many out-of-state boats to operate and dock year round in Vermont without ever paying a fee.

Additional revenue could be raised by a water quality trust fund by imposing a boat docking fee for all recreational boats administered by Vermont marinas. The fee would capture revenue from out-of-state boaters who currently benefit from the use of the state's waters.

D.4.3.1. Evaluation of a Non-Resident Boat Docking Fee

Revenue Considerations	
Revenue Potential	Low.
Stability	High – unless avoided by non-resident boaters.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	Moderate – collection by marinas with state oversight.
Accountability	High.
Political Viability	High – fee would be exported to non-residents.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	NA – would be paid only by non-residents.
Income Equity	Moderate – fees are generally regressive, but non-resident boaters likely have higher incomes.
Relation to Water Quality	High – boat users benefit from water quality.

D.4.4. Impact Fees[102]

Impact fees are one-time payments from property developers for off-site infrastructure improvements necessitated by new development. Unlike traditional user fees, which generally fund current services, impact fees are used exclusively for capital improvements. Impact fees are typically limited to situations in which the impact of new development on the existing stormwater management system is (1) measureable and certain; (2) of definable geographic or systemic extent; and (3) quantifiable in terms of the incremental capital investment that will be required to maintain an adequate level of service.[103]

Although other statewide impact fees could possibly be designed to raise revenue to offset the environmental impact of new development, impact fees are limited as a mechanism for financing a statewide water quality trust fund because they are tied to new development and generally limited to capital projects.

D.4.4.1. Evaluation of Statewide Impact Fees

Revenue Considerations	
Revenue Potential	Low.
Stability	Low – fee is dependent on new development.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	Moderate – depending on complexity and accounting.
Accountability	High.
Political Viability	Moderate – likely to generate opposition from developers.
Promotes Mitigation	Yes – if credits for on-site mitigation are provided.
Equity & Other Considerations	
Geographic Distribution	High – although fees will be concentrated in parts of the state with development.
Income Equity	Moderate – may be slightly regressive if fees pass through to purchasers.
Relation to Water Quality	High – strong relationship between new development and water quality.

D.4.4.2. References & Additional Information

- Information on Impact Fees: http://www.impactfees.com/

[102] Vermont has a statute that authorizes municipalities to implement impact fees (24 VSA §5200), but they are not used in many Vermont communities because the law requires a strict accounting of the fees and fee management can be complicated.

[103] In Vermont, impact fees for municipal and county government is authorized under 24 VSA §§ 5200-5206.

D.4.5. Drinking Water Fee

Vermont regulates the withdrawal of groundwater when used for potable purposes and large withdrawals when used for commercial or industrial purposes.[104] Additional revenue for a water quality trust fund could be raised two ways. First, the permit requirement could be applied to high-volume withdrawals regardless of use. Second, lower-volume users of groundwater could be assessed a fixed annual fee. In 2000, the USGS estimated that Vermonters withdrew 43 million gallons of groundwater per day. About half of this was for residences and half was for municipal drinking water supply.

D.4.5.1. Evaluation of a Drinking Water Fee

Revenue Considerations	
Revenue Potential	Moderate.
Stability	Moderate – water withdrawals are relatively stable and increasing with population.
Sufficiency	Moderate – number of gallons of groundwater withdrawn is increasing.
Implementation & Administration	
Administration and Compliance	High – initial setup costs, new administrative system required. Potentially high enforcement costs.
Accountability	High.
Political Viability	Moderate – public may accept fee on high-volume withdrawals; probably less acceptance for low-volume withdrawals.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Moderate.
Relation to Water Quality	Moderate – there is some relationship between surface water quality, amount, and drinking water percolation and recharge.

D.5. Other Potential Revenue Sources

In addition to taxes and fees, there are several other potential sources that may be used to supplement the primary revenue streams used to finance a statewide water quality trust fund. Like most fees, they lack the reliability and revenue capacity to stand alone. The potential revenue sources examined below include special assessments, unclaimed bottle deposits, the state lottery, and increased penalties for environmental violations that are related to water quality.

[104] See generally 10 V.S.A. Chapter 48 (large groundwater withdrawals) and Chapter 56 (public water supplies). Fees for these facilities: 3 VSA 2822(j)(7).

D.5.1. Special Assessments

A special assessment is a unique charge assessed against real property for certain public projects. This charge is levied in a specific geographic area known as a special assessment district. A special assessment may only be levied against parcels of real estate which have been identified as having received a direct and unique "benefit" from the public project. The benefit must be definable, measurable in some economic manner, and available to the assessed property within a practical timeframe. Special assessments are more restrictive and costly than service fees.[105]

Additional revenue to finance a water quality trust fund could be raised by creating new special assessments. For example, a special assessment on lakefront property in Vermont may be appropriate to help offset the cost of improving water quality since these property owners would receive a disproportional benefit of improved water quality through increased property values. However, special assessments are limited as mechanism for financing a statewide water quality trust fund.

D.5.1.1. Evaluation of Special Assessments

Revenue Considerations	
Revenue Potential	Low.
Stability	Low.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	High – initial mapping and classification costs.
Accountability	High.
Political Viability	Moderate – tied to a public benefit.
Promotes Mitigation	Yes – if credits for on-site mitigation exist.
Equity & Other Considerations	
Geographic Distribution	Low – assessed on lakefront property only.
Income Equity	Moderate – if assessment is based on property value which are generally correlated with income.
Relation to Water Quality	High – relationship between lakefront development and water quality.

D.5.1.2. References & Additional Information

- Lake Lansing Special Assessment District: http://www.lakelansing.org/SAD/SAD.php
- City of Fargo, Special Assessments: http://www.cityoffargo.com/Residential/SpecialAssessments/

[105] In Vermont, impact fees for municipal and county government are authorized under 24 VSA §§ 3251-3271.

D.5.2. Escheating Unclaimed Beverage Container Deposits

In Vermont, beverage distributors and retailers are required by law to collect small deposits on certain packaged beverages. When the consumer returns these beverage containers to a retailer or redemption center, the deposits are returned to the consumer. When a consumer chooses not to return a beverage container for a deposit return, the deposit money is considered "unredeemed." Vermont currently imposes a $0.15 deposit on liquor containers and a $0.05 deposit on beer, malt beverage, mineral water, carbonated soft drink, and mixed wine drink containers. The state's overall redemption rate has decreased over time and is currently about 85 percent. The deposits on unredeemed containers are retained by the manufacturers and distributors.

Escheating the unclaimed deposits to a water quality trust fund would under the existing redemption program would raise almost $2 million annually. Other states, such as Maine, apply the bottle deposit to virtually all containers including water, juice, and milk. Expanding the redemption program to include more containers or increasing the deposit from $0.05 to $0.10 could generate additional revenue unless the redemption rate also increases. A higher redemption rate would have a positive environmental impact, but would reduce escheated revenue.

D.5.2.1. Evaluation of Escheating Unclaimed Beverage Container Deposits

Revenue Considerations	
Revenue Potential	Moderate.
Stability	High – unless the deposit is increased and redemption rate increase as a result.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	Low.
Accountability	High.
Political Viability	High – the redemption system is well established and accepted in Vermont; would be opposed by industry.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Not applicable.
Relation to Water Quality	Low.

D.5.2.2. References & Additional Information

- Vermont Legislative Research Service, Jeffords Center, University of Vermont, Bottle Bills: http://www.uvm.edu/~vlrs/Environment/Bottle%20Bills.pdfThe Costs of Beverage Container
- Beverage Container Redemption in Vermont: http://www.anr.state.vt.us/dec/wastediv/solid/Bottle_Bill/DSMReportJune2007.pdf
- The Fate of Unclaimed or "Abandoned Deposits:" http://www.bottlebill.org/about/unclaimed.htm

D.5.3. Lottery Game

Vermont has had a state lottery since 1978. In FY2012, the lottery generated about $22 million. Under current law, all profits from the lottery are transferred to the state's education fund. Only one state, Nebraska, earmarks lottery revenue for environmental programs.

The state lottery is probably not a good vehicle for raising revenues for a water quality trust fund. Although a new game could be created with revenues earmarked for this purpose, without increasing lottery sales, any revenue dedicated to a water quality water quality trust fund would likely come at the expense of education funding. However, the State Lottery Commission is currently studying the feasibility of online lottery sales, which has the potential to grow revenues by expanding the player base.

D.5.3.1. Evaluation of a Lottery Game

Revenue Considerations	
Revenue Potential	Low.
Stability	High.
Sufficiency	Low – lottery sales in Vermont are flat.
Implementation & Administration	
Administration and Compliance	Low – collection, enforcement, and auditing mechanisms already exist.
Accountability	High.
Political Viability	High – participation is voluntary.
Promotes Mitigation	No.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	Low –there is evidence that per-capita play is higher among lower-income players.
Relation to Water Quality	Low.

D.5.3.2. References & Additional Information

- National Conference of State Legislatures, Use of Net Revenue: http://www.ncsl.org/issues-research/econ/lotteries-in-the-u.s.aspx

D.5.4. Increased Civil Penalties

Additional revenue to finance a water quality trust fund could be raised by increasing civil penalties for water quality violations. However, higher civil penalties may place an unreasonable burden on municipalities for violations due to structural limitations or other causes that are financially impracticable to solve in the short term. In addition, penalties are generally intended to reduce water quality violations rather than raise revenue.

D.5.4.1. Evaluation of Increased Civil Penalties

Revenue Considerations	
Revenue Potential	Low.
Stability	Low.
Sufficiency	Low.
Implementation & Administration	
Administration and Compliance	Moderate – enforcement mechanisms already exist, but may require additional staff and other resources.
Accountability	High.
Political Viability	High.
Promotes Mitigation	Yes – may encourage compliance; however, may discourage self-reporting.
Equity & Other Considerations	
Geographic Distribution	High.
Income Equity	NA.
Relation to Stormwater Runoff	High – there is a direct relationship between violations and water quality.

D.6. Enhance Existing Funding Programs and Improve Targeting

Water quality projects currently receive funding from a variety of sources including the Supplemental Environmental Projects program, the Clean Water State Revolving Fund, and general fund appropriations associated with the Use Value Appraisal Program, conservation easements, and designation programs. This section evaluates how these existing programs could be modified to improve incentives to achieve the state's clean water restoration and protections objectives.

D.6.1. Supplemental Environmental Projects (SEP)

The VANR Compliance & Enforcement Division ("CED") brings enforcement actions for violations of environmental laws, permits, and regulations. Examples of violations include: municipal sewage treatment facilities exceeding discharge limits into surface waters; excessive sediment runoff on construction sites; illegal dumping of solid waste; violating air quality standards; and many more. Complying with environmental laws and regulations generally requires the expenditure of additional resources, creating an incentive to ignore these laws and regulations in order to save money. Financial penalties are often a component of any enforcement action, and are designed to deter future violations and to recoup any economic advantage gained through noncompliance. A Supplemental Environmental Project ("SEP") is an environmentally beneficial project that must be approved by ANR and the violator as part of a settlement agreement resolving an enforcement action. When an SEP is included as part of a settlement, a portion of the fine is designated to do some environmental good in the geographic area affected by the violation.

The SEP must involve an activity which the violator is not otherwise legally required to perform, and which does not directly benefit the violator. For instance, if the violation is sediment erosion from a construction site, the SEP cannot be erosion prevention on that site, because the violator is already required by permit to prevent erosion from the site. The project must have some relationship or nexus to the violation and must be a discreet project with a beginning and an end. SEP funds may be used in conjunction with other funding sources, such as grants. SEPs include the following types of projects: environmental enhancement; education and awareness; research, monitoring and data collection; emergency planning and preparedness; pollution prevention; and pollution reduction projects; land conservation and access. SEPs can be proposed by either the violator, VANR, or by a third party such as a community organization or a non-governmental organization (NGO). The actual SEP project is most often done by a third party with expertise in environmental issues, with the violator providing the funding in whole or part.

SEPs range in cost from a thousand to tens of thousands of dollars, and typically each dollar spent on a SEP is credited 1:1 against the monetary penalty, up to 75 percent of the total penalty. A second category of SEP is referred to as "pollution prevention." A pollution prevention SEP is one where a violator asks to expend what would be penalty funds to improve internal operation at a production facility so as to reduce the amount of pollution generated by production. The pollution reduction must reduce pollution above and beyond any permit or other legal requirement. Pollution prevention SEPs have a penalty offset ration of 1.5:1, meaning that the penalty is only reduced by $1 for every $1.50 spent on the SEP. This reduced offset ratio exists because financing improvements through a SEP has the effect of providing a benefit to the polluter. The present SEP policy makes clear that pollution prevention SEPs are generally disfavored and as a result are very seldom approved.

Several options to encourage and improve the use and effectiveness of SEPs are described below:

D.6.1.1. Relax the 1.5:1 Pollution prevention offset ratio for non-point projects

The 1.5:1 offset ratio for pollution prevention SEPs is a sensible policy for most violations. For certain types of violations, such as agricultural runoff, relaxing this standard to allow a 1:1 offset may be particularly beneficial to surface waters. While all agricultural operations are required by law to comply with Accepted Agricultural Practices ("AAPs"), few farms and dairy operations voluntarily adopt the comparatively expensive Best Management Practices ("BMPs"). Relaxing the offset ratio to encourage adoption of BMPs may be a sensible alternative to requiring compliance with AAPs, which are far less effective at controlling runoff.

D.6.1.2. Use VANR technical expertise to assist SEP project development

While ANR can encourage violators to submit SEP proposals, the ultimate burden lies on the violator or a third party to envision and propose a SEP. Every SEP proposal requires a brief narrative description of the project, including expected benefits, tasks, and a project budget of projected costs. For a small violation, a thousand dollar fine may often seem like an easier and better option than proposing a SEP. For these small projects, as well as technically complex and large projects, the SEP process can result in more work for the violator. Using ANR expertise to assist violators in the creation of the proposal may encourage additional SEPs.

D.6.1.3. Develop a SEP Project Idea Bank

ANR currently provides a listing of selected SEP projects on its website; however, it is arranged alphabetically and provides only a very brief description of the violation and the SEP project. A more detailed listing, organized by type and severity of the violation would provide violators with convenient access to possible SEP ideas. This database should include detailed information about past projects that may inspire new SEP proposals rather than simply paying a penalty.

D.6.1.4. Encourage SEPs that are aligned with CSA[106] targeting

To achieve maximum efficiency, appropriate SEP projects related to water quality violations should be aligned with the goals of targeting using Tactical Basin Plans, Stormwater Master Plans, Critical Source Area assessments, or river corridor plans. If the SEP development process incorporates ANR staff and technical expertise, it may be possible to coordinate SEP projects to supplement other targeted water quality projects.

D.6.1.5. References & Additional Information

- ANR SEP website, http://www.anr.state.vt.us/dec/co/enf/enf-sep.htm
- Vermont SEP Policy: http://www.anr.state.vt.us/dec/co/enf/pdf/2011DECSupplementalEnvironmentalProjectPolicy2011.pdf
- Summary of SEP projects in Vermont, 1996-2010: http://www.anr.state.vt.us/dec/co/enf/pdf/SEP_Summaries_2010.pdf
- 50 State SEP Survey with Model Practices: http://www.uchastings.edu/public-law/docs/plri/ABAHastingsSEPreport.pdf

[106] Critical Source Area (CSA). See Footnote 13 on page 8, above.

D.6.2. State Revolving Funds

Vermont has two "pollution control" state revolving funds ("SRF") that are used for municipal wastewater and stormwater projects. These funds are capitalized by several sources: a large portion of annual funding comes from the federal Clean Water Act State Revolving Fund appropriation ($6.9 million in FY 2012); a 1:5 state match ($1.15 million in 2012); principal and interest repayment from existing loans, which varies but can generate more than $5 million annually; and the unspent balance carried forward from previous years. The funds are available to municipalities, state agencies, and the Vermont Housing Finance Agency as very low interest loans. The definition of "municipality" was amended in 2012 to include any "statewide or regional water quality utility or mechanism."

Projects funded by the SRF are currently capped at $4 million annually, and the majority of the funding is used for upgrades and maintenance of municipal sewage treatment plants. The approval process is reactive; ANR does not propose any particular project, it only evaluates submitted proposals to annual request for funding using a priority list. While up to 30 percent of new federal and state appropriations may be spent on stormwater projects, historically, the actual spending has been minimal due to a lack of proposals. Since 2009, a condition for receiving federal appropriations is funding projects that meet the "Green Project Reserve," which targets water conservation/energy efficiency, use of "Green" infrastructure, or innovative and sustainable projects not typically funded by SRF money. In FY 2012, 10 percent of the federal allocation was dedicated to these green projects ($690,800), and it is likely that FY 2013 will have a similar requirement. However, the requirement is an aggregate, so a single, million dollar project can satisfy the entire Green Project Reserve requirement.

Recently the Department has placed stormwater projects at the top of the priority list. Because the entire SRF budget is allocated in any given year, stormwater projects will decrease the funding available for wastewater projects. In recent years few stormwater projects have applied for CWSRF loans. There are a number of ways to encourage additional stormwater projects described below.

Table 11: Vermont Green Project Reserve Projects to Date

Year	Municipality	Project	Green Project Reserve Type	Allocation
2009	South Burlington	Municipal wastewater treatment plant advanced digester and gas recovery system	Energy Efficiency	$2,000,000
2009	Troy and Jay	Solar sludge treatment	Innovative	$1,688,571
2009	Burlington City	Manhattan CSO Reduction Project	Green Infrastructure	$800,000
2009	Burlington City	Gazo CSO Reduction project	Green Infrastructure	$400,000
2009	Essex Town	Perkins Bend stormwater upgrade of pond	Green Infrastructure	$135,000
2010	South Burlington	Municipal wastewater treatment plant advanced digester and gas recovery system	Energy Efficiency	$2,000,000
2011	Brattleboro	Municipal wastewater treatment plant advanced digester and gas recovery system	Energy Efficiency	$1,500,000
2012	Brattleboro	Municipal wastewater treatment plant advanced digester and gas recovery system	Energy Efficiency	$2,100,000
Total				$10,623,571

D.6.2.1. Award Additional Priority Points for Nutrient and Sediment Pollution Control Projects

The current priority schedule for ranking SRF project efficiency was promulgated by rule in 2002 and is based on EPA guidance. A rule revision is being contemplated; however, it is expected that EPA will release updated priority guidance shortly, so a rule revision may be slightly premature. Awarding additional priority points to proposals that specifically target nutrient and sediment pollution may improve the likelihood of funding stormwater projects, and will certainly direct more SRF money towards projects that focus on those specific pollutants instead of other water quality issues.

D.6.2.2. Award Priority Points for Coordination with Targeted CSA Areas to Maximize Effect

A second option is to award additional priority points for proposals that coordinate and overlap with unrelated nutrient and sediment pollution projects in targeted areas. Instead of awarding points for simply focusing on nutrients and sediment, this option has a geographic approach, and prioritizes SRF proposals within identified CSAs, where maximum cost efficiency is possible. This option requires some additional coordination between the Financial Management Section of the ANR Facilities Engineering Division, which manages SRF money, and whatever entity ultimately administers the water quality trust fund.

D.6.2.3. Award Priority Points for Non-Point SRF Projects

Overall, non-point projects comprise only about 4 percent of total SRF spending nationwide, but in Vermont, only $450,000 out of more than $210 million in SRF money was spent on non-point

projects since 1988, and all on decentralized sewage treatment systems. Other states use SRF to provide low interest loans for a variety of non-point pollution projects, including:

- Decentralized sewage treatment systems – including repair and replacement of septic systems;
- Stormwater BMPs – including purchasing street sweepers, gravel compaction machines for dirt roads to reduce sediment runoff, vegetative plantings, catch basins, and wetland construction;[107]
- Agricultural and Forestry BMPs – including manure management, erosion control, and efficient fertilizer application; and,
- Land acquisition and conservation easements – particularly along riparian buffers.[108]

Pass-through lending is often used to reduce the burden on the SRF administrator while making small amounts of SRF money available to individuals. With pass through lending, the SRF lends money directly to another government agency or municipality, which then makes smaller loans to individuals. This approach has been used with excellent results for septic system repairs and replacements in Massachusetts, where towns may pass-through up to $200,000 to low and medium income households who may otherwise be unable to secure financing. See Section 1.17. on page 26 above, which describes Vermont's new Wastewater and Potable Water Revolving Loan Fund. This fund was established to provide $275,000 per year in low interest loans to moderate and low income households for the purpose of repairing or replacing a home's failed septic system or water supply. Similar pass-through lending may work well for agricultural BMPs and other non-point projects that concern individuals instead of municipalities.

D.6.2.4. References & Additional Information

- Vermont Special Environmental Revolving Fund, 24 V.S.A. § 4751–78.
- ANR SRF website, http://www.anr.state.vt.us/dec/fed/fms.htm
- SRF Program Information for the state of Vermont, 1988-2011: http://water.epa.gov/grants_funding/cwsrf/upload/vt.pdf
- Funding Nonpoint Source Activities with the Clean Water State Revolving Fund: http://water.epa.gov/grants_funding/cwsrf/upload/2003_12_11_cwfinance_cwsrf_final.pdf
- New Hampshire Nonpoint and Stormwater SRF Projects, http://xml2.des.state.nh.us/blogs/watershed/?p=746

[107] The Champlain Water District (CWD) has administered a USEPA STAG grant for multiple stormwater treatment projects in the watershed of Shelburne Bay and in other nearby watersheds. That stormwater STAG was also used to purchase municipal street sweepers.

[108] http://www.spnhf.org/pdf/watersupply.pdf;
Trust for Public Land, Financing Land Conservation with the State Revolving Loan Fund.

D.6.3. The Vermont State Municipal Bond Bank

The Vermont State Municipal Bond Bank (VMBB) is one of a dozen or so bond banks nationally and was the first created in 1970 with a mandate to provide municipalities with access to capital markets at the lowest possible cost. Municipalities can borrow funds from the VMBB at very competitive rates due to a strong bond rating, currently AA, and lower administrative cost resulting from pooled or combined municipal borrowing. VMBB loan rates are tied to the national bond market and have recently ranged between 3 and 4 percent. Loan durations reflect the useful life of the facilities funded and may be up to 30 years.

D.6.4. U.S. Department of Agriculture, Rural Development Loans and Grants

Municipalities with populations of 10,000 or less could also seek funding for wastewater and drinking water infrastructure projects through the U.S. Department of Agriculture Rural Development. Both loans and grants are available. Grant eligibility is based on the system service area median household income and the estimated ratepayer cost for the project. RD funding may be provided in conjunction with ANR/DEC funding. The loan interest rate is also based on the service area median household income. Current lending rates (January 1, 2013) range from 1.875 percent to 3.125 percent for 30 (wastewater) or 40 (water) years. Interested municipalities should contact the office directly for current information.

D.6.4.1. References & Additional Information

- USDA Rural Development Office: http://www.rurdev.usda.gov/NH-VTHome.html

D.6.5. Use Value Property Taxation

Established in 1980, the Use Value Appraisal Program (also known as the Current Use) creates equitable taxation of agricultural and forest lands. Eligible landowners are taxed based on the "use value" of their enrolled parcels, or their value for production of crops and timber, rather than on their fair market value, which reflects their potential for development. The program's goal is to achieve greater equity in property taxation between developed and undeveloped land, and in so doing, to alleviate financial pressures from taxation that might cause farmers and forest landowners to sell their acres for development.

D.6.5.1. Program Participation

The financial incentive provided by the Use Value Appraisal (UVA) program is significant, and as a result, participation has steadily grown. As of tax year 2012, approximately 45 to 50 percent of Vermont's eligible forest land is enrolled in the program, and almost 60 percent of eligible agricultural land. The Use Value Appraisal program has provided substantial support for maintaining Vermont's working landscape and conserving open space.

D.6.5.2. Level of State Investment

The State General Fund is used to reimburse Vermont towns for the full amount of the reduction in municipal property tax revenue collected as a result of the program. As the amount of enrolled acres has steadily grown, so too has the level of reimbursement that the state annually provides to towns. In 1980, the program's first year, that investment was a modest $4000. It now totals $12 million annually for both agricultural and forest parcels. The total "cost" of the Current Use Program annually is about $50 million, but 80% of that figure is foregone property tax revenue (i.e., what towns and the State would have collected, had the enrolled land and farm buildings been assessed at full fair market value.) This kind of cost is also known as a tax expenditure.

The annual expenditure creates more equitable taxation for agricultural and forest landowners, helping to ensure that they do not have to take their lands out of production to meet tax obligations.

D.6.5.3. An Opportunity to Enhance Water Quality Protection on Enrolled Agricultural Lands

The primary purpose of the Use Value appraisal program has always been to prevent the conversion of Vermont's working lands to residential and commercial development. But the statute authorizing its creation also points to an environment purpose: "to assist in their conservation and preservation for future productive use *and for the protection of natural ecological systems*."(italics added).[109]

The UVA Program has produced enormous environmental benefits for Vermont. By protecting its working lands from being developed, the program helps to protect the many ecosystem services contributed by forests and fields. The options below consider three ways that the program could increase the program's protection of "natural ecological systems," especially by increasing the protection of water quality on enrolled agricultural lands by ensuring compliance with existing water quality regulations. These options could further leverage the considerable investment Vermont state government makes every year to provide equitable taxation for working lands.

D.6.5.4. Three Options for Improving Environmental Stewardship on Enrolled Acres

<u>Option #1: Link Eligibility and Demonstrated Compliance</u>

Currently, the use value taxation that agricultural landowners receive through the Current Use Program is not conditioned in any way on their compliance with the state's Accepted Agricultural Practices or other state farming regulations. A landowner may have an ongoing, documented violation(s) of water quality regulations, and still receive a significant property tax reduction each year. The average estimated reduction in property tax liability on enrolled agricultural lands ranges between 80 and 90 percent.

In contrast, the UVA Program is already administered for enrolled forest landowners with a requirement that they commit to certain land management practices through the development of a forest management plan submitted to and approved by a Vermont Department of Forests, Parks, and Recreation (FPR) County Forester. This planning process familiarizes the landowner not only with required silviculture practices, but also with the Vermont Accepted Management Practices (AMPs), which help to minimize the impacts of forestry operations on water quality. It should be noted that this requirement has never been legally challenged, as it is not in the statute, but in the administrative policy of FPR. It is hard to imagine any higher requirement under either current state regulations for water quality protection or within the tax program itself for forest lands.

If a forest landowner is found to be out of compliance with his or her forest management plan, the state offers the landowner technical assistance, delivered by a County Forester, to help address the problem. If over time the issue is not resolved, the landowner may lose eligibility to receive use value taxation and be subject to a Land Use Change Tax.

There may be an opportunity to revise UVA program requirements and procedures for agricultural landowners enrolled in the UVA Program to create a stronger linkage between

[109]. 32 V.S.A § 3751

enrollment and compliance with the state's Accepted Agricultural Practices (AAPs) for agricultural lands.

The significant incentive that agricultural landowners receive through use value taxation is a ready-made source of leverage for bringing a greater percentage of Vermont's farms, especially small farms that do not receive periodic inspections, into compliance with the AAPs. New and/or continued enrollment in the Current Use Program could be made contingent on a very simple process through which agricultural landowners could self-report their compliance. For example, participating landowners could be required to submit a simple one page form that certifies that they are in compliance, or serves to formally transmit a request for technical assistance to achieve that goal.

Landowners who do not certify their compliance (by failing to submit the form, or by submitting a form that acknowledges a compliance gap) could be offered technical assistance, as described elsewhere in this report.[110] For instance, visits by Agricultural Resource Specialists employed by Conservation Districts, or by Inspectors employed by the Vermont Agency of Agriculture, Food and Markets could assist the farmer in understanding regulatory requirements and identifying funding assistance to meet them.

After some defined period of time aimed at giving enrolled landowners ample assistance to achieve compliance, those who remain in violation of state regulations could be subject to de-enrollment and a Land Use Change Tax. This action would acknowledge the state's interest in meeting basic environmental goals on Current Use lands, goals that are codified through the state's AAPs and that are important to Vermonters, in exchange for the state's investment of tax revenues to lower property taxes on agricultural lands.

The implementation of this option could be structured in multiple ways. It could apply just to landowners enrolling after the effective date of a new statutory provision outlining the requirement. Or it could be made to apply as well to agricultural landowners currently enrolled in Current Use.

[110] See discussion under the "Actions Needed" in Section 1.6. (page 15) and Section 1.7. (page 17), above.

Evaluation of Linking Eligibility and Demonstrated Compliance	
Implementation & Administration	
Tax Expenditures	None, or perhaps a small decrease (resulting from de-enrollment of farms that continue to be in violation of AAPs after provision of technical assistance and cost share.)
Administrative Cost	Cost of technical assistance to help landowners who do not self-report compliance with AAPs
Accountability	Transparent
Political Viability	Likely to raise opposition among agricultural landowners
Equity & Other Considerations	
Geographic Distribution	Participating landowners across the state would be equally affected.
Equitable	Equitable; voluntary incentive
Relation to Stormwater Runoff	High

Option #2: Create an Incentive for Excellent Stewardship

The Use Value Appraisal program could offer a new incentive – in the form of an even greater reduction in property taxes – to agricultural landowners who agree to exceed the regulatory requirements in the Accepted Agricultural Practices, the regulations for Large and Medium Farm Operations, and others. Agricultural landowners could gain eligibility for this incentive by implementing defined Best Management Practices to reduce the nutrient pollution in agricultural runoff. For the owners of farms located adjacent to streams, eligibility could also be secured by implementing BMPs that help to increase stream channel stability, so that erosion of phosphorus-laden sediment from river banks is reduced during storm events.

The mechanism for providing this incentive would be the creation of a lower use value rate for lands managed with these BMPs. In 2012, the use value of agricultural land was set at $254 per acre. This rate is already significantly lower that the fair market value of these lands, so any further reductions would provide a marginal increase in the financial benefit for landowners. Still, such a reduction in use value might create an incentive that would be attractive to some agricultural landowners.

This option would require the development of a list of Best Management Practices that exceed current regulations and that are known to deliver a high benefit for reducing water quality impacts from farming practices and from the erosion of agricultural lands in river valleys.

The lower use value rate could be made available to landowners that agree to implement all, or a certain minimum number, of the practices on the approved BMP list. Alternatively, the decision to award a lower use value could be made after a negotiation between agricultural BMP specialists and interested landowners that results in agreements to implement certain practices that make sense for each farm based on its unique configuration, water quality issues and financial constraints.

If the anticipated tax expenditure required to offer this financial incentive to all enrolled landowners is too great, this option could be implemented in a more limited manner. The incentive could be made available, for example, to landowners within critical source areas known to have high rates of phosphorus loading to nearby surface waters.

While the description of this option is focused on agricultural land, a similar benefit could be created for the forestland owners enrolled in the UVA Program. In 2012, the use value of forest land was set at $123 per acre. Forest landowners could become eligible for property taxation based on an even lower use value if they agreed to meet a standard of stewardship that exceeds the requirements of Vermont's Accepted Management Practices. Currently, up to 20% of productive forestland can be enrolled as Ecologically Significant Treatment Areas (ESTAs) that do not have to meet the timber harvesting obligation required under UVA (see below).

Evaluation of Creating an Incentive for Excellent Stewardship	
Implementation & Administration	
Tax Expenditures	Some increase. Will vary depending on where the use value rate for this new incentive is set.
Administrative Cost	Depends on approach to establishing BMP agreements (standard or customized). Would require some monitoring of lands receiving incentive by agricultural resource specialists.
Accountability	Transparent
Political Viability	Not likely to raise opposition since its voluntary
Equity & Other Considerations	
Geographic Distribution	Participating landowners across the state could take advantage of the incentive.
Equitable	Equitable; voluntary incentive
Relation to Stormwater Runoff	High

<u>Option #3: Incentivize the Development of Larger Vegetated Buffers and River Corridor Protection for Flood Resiliency</u>

A final option for improving the water quality protection on Current Use lands would be to create a new category of enrollment for vegetated buffers on farms that abut streams. Currently, enrolled property owners are subject to the requirement, codified in Vermont's Accepted Agricultural Practices, to maintain a small ten-foot vegetated buffer. However, maintaining a wider buffer could jeopardize their tax benefit, since the program's requirements are carefully structured to ensure that lands receiving use value taxation are, with very limited exceptions, managed for agricultural purposes.

In 2008, UVA requirements were changed to allow forest landowners to enroll riparian lands not being actively managed for silviculture. This occurred when a new category called "Ecologically Significant Treatment Areas" (or ESTAs) was created to incentivize good stewardship of forest lands with special ecological attributes or functions. Forested riparian areas with certain ecological attributes were included in the definition of ESTAs. These include natural communities and wildlife habitats of statewide significance; rare, threatened, and endangered

species; some riparian areas; vernal pools with amphibian breeding habitat; forested wetlands; and old forests. Program requirements specify how much ESTA land a landowner can enroll, so as to maintain the program's focus on conserving working lands. (Eighty (80) percent of the site class I, II, and III acres must be managed for repeated forest crops).

A similar enrollment category for riparian ESTAs could be created for agricultural landowners. Land management practices for riparian ESTAS would need to be specified, and might include requirements related to the maintenance of vegetation and avoidance of active channel management. Landowners could be permitted to cultivate certain crops, such as hay, that cause less soil loss and fewer water quality impacts during flooding events. In exchange for meeting these practices on an enrolled ESTA, eligible landowners could be offered a use value rate lower than the standard rate for agricultural lands.

It is important to note that under current program rules, when forest landowners enroll ESTAs, they do not receive a lower use value rate. They simply enjoy the enrollment benefit without having to manage ESTA acres for forest crops. However agricultural landowners might not have a sufficient incentive to create large vegetated buffers if the use value rate was not lowered, since they would be required to take these areas out of production, an action that could significantly reduce farm income.

New program provisions establishing this enrollment category could be structured to allow participating landowners to enter into conservation easements, river corridor easements or Conservation Reserve Enhancement Program (CREP)[111] contracts for these riparian lands while still receiving use value taxation. This would enable participating landowners to package together multiple financial incentives for managing riparian lands to protect water quality. Packaged together, these incentives could help compensate the landowner for lost revenue resulting from the reduction of row crop cultivation.

Enrollment of riparian ESTAs on agricultural lands could decrease the volume of nutrient-laden runoff that flows off agricultural lands during rain events. These ESTAs could also help slow down and store flood waters when rivers spill over their banks. Attenuating river flooding provides a dual benefit – it reduces the erosion in stream channels that produces high levels of phosphorus loading to Lake Champlain and other Vermont lakes, and it reduces the public safety and property damage risks in communities downstream. Wide vegetated buffers on agricultural lands would deliver a very high environmental benefit, similar to the benefits accruing from Vermont's forest cover.

111 http://www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20110214_consv_en_crepvt01.html

Evaluation of Incentivizing the Development of Larger Vegetated Buffers	
Implementation & Administration	
Tax Expenditures	Some increase. Will vary depending on where the use value rate for this new incentive is set.
Administrative Cost	Would require some monitoring of land management practices in enrolled riparian areas
Accountability	Transparent
Political Viability	Not likely to raise opposition among agricultural landowners since its voluntary. Forest landowners could object if not also offered a lower rate for ESTA enrollment.
Equity & Other Considerations	
Geographic Distribution	Participating landowners across the state could take advantage of the incentive.
Equitable	Equitable; voluntary incentive
Relation to Stormwater Runoff	High

D.6.5.8. Resources & Additional Information

- Vermont statutes, Title 32, Chapter 124. Taxation and Finance, Agricultural and Forest Lands, http://www.leg.state.vt.us/statutes/sections.cfm?Title=32&Chapter=124
- 2012 Annual Report. Division of Property Valuation and Review, Vermont Department of Taxes, http://www.state.vt.us/tax/pvrannualreports.shtml
- Use Value Appraisal Program Manual (March 2010). Vermont Department of Forests Parks and Recreation, http://www.vtfpr.org/resource/documents/UVAManual.pdf
- Other resources on the Use Value Appraisal Program are available at the Department of Taxation, http://www.state.vt.us/tax/pvrcurrentuse.shtml

D.6.6. Conservation Easements and Other Conservation Tools

Vermont's many conservation organizations have been working for decades to prevent Vermont's working agricultural and forest lands from being converted to residential or commercial development. Vermont leads states across the nation in the success of these efforts; of the over 700,000 acres of land that are in active agricultural production, 20 percent are already conserved. In addition, many acres of agricultural lands that are not in active production have also been conserved.[112] While these organizations sometimes purchase land on a fee simple basis, their most common strategy is the negotiation of conservation easements with private landowners. Conservation easements are agreements that protect the special attributes of land – such as important natural features, recreational uses, or scenic vistas – in a manner that meets the goals of the landowner and the mission and goals of the organization holding the easement. Easements are most often donated to conservation organizations, or purchased in exchange for a one-time payment to landowners.

[112] DFPR, Vermont Land Trust.

In Vermont, a significant investment has been made in protecting land through these conservation agreements. Existing easements are in place for thousands of acres of agricultural land already, and new easements are always being negotiated. Vermont state government invests in these agreements through its annual appropriation to the Vermont Housing and Conservation Board, and through other programs that provide funding for conservation agreements with landowners, such as the Department of Environmental Conservation's Ecosystem Restoration Program and many other ANR-based land acquisition and protection programs and strategies.

The reach of this conservation method makes it well-suited for achieving greater water quality protection on Vermont's working agricultural lands. There are two specific and related options that could be considered. First, Vermont state government could collaborate with conservation organizations to ensure that new easements help to reduce the sediment and phosphorus pollution carried by farm runoff into Vermont's rivers and lakes.

Second, state agencies could work with conservation organizations to improve the practices on land already conserved, by addressing policy obstacles that prevent the overlay of new agreements on existing ones that may allow land management practices which do not minimize water quality impacts. Both of these options leverage investments that already protect the unique rural character of Vermont and its special historic, cultural and ecological assets. In other words, both options are fiscally efficient.

Both options are briefly described below, along with their possible benefits and the obstacles to their implementation.

D.6.6.1. Option #1: Target New Conservation Agreements Based on Clean Water Needs

Future land conservation easements or other conservation agreements could be targeted to critical source areas. As analytic work makes clear which agricultural areas contribute most to phosphorus loading and the loading of other key pollutants of concern to surface waters, Vermont state agencies could work with conservation organizations to target outreach and resources toward securing agreements in those areas.

In addition, the specific provisions in new conservation easements could be tailored to ensure greater water quality protection on protected lands. Existing conservation easements in Vermont may sometimes include provisions designed to address water quality impacts, but historically, their main goal has been to prevent development of working lands; the goal of minimizing water quality impacts from agricultural operations and practices had been secondary.

This option would require identification of a set of Best Management Practices for reducing agricultural pollution which could be incorporated into landowner agreements. For example, landowners selling easements could be asked to maintain a vegetated riparian buffer not subject to cultivation, and/or to grow hay in riparian areas instead of corn or other row crops that aggravate phosphorus pollution. For agricultural lands situated in areas of river corridors that experience significant river bank and field erosion during high river flows, easements could be structured to give those unstable rivers more room to adjust towards a more naturally stable slope. This approach is already being used in River Corridor Easements funded by VANR's Rivers Program on a limited scale; greater funding would allow for their broader use.

Easements negotiated through forest conservation programs administered by Vermont's Departments of Fish and Wildlife and Forest Parks and Recreation already incorporate standard language and procedure. For example, lands and easements acquired through the Forest Legacy Program are required to implement Vermont's Accepted Management Practices for forestland.

Land conservation staff from ANR's three departments could collaborate with the experienced staff of land trusts, towns and other partners to implement standard water quality protection language on all easement lands. ANR and other state agencies could also advocate for, and help to support development of, third party certification for some types of forests and perhaps for some types of farms.

The price that the landowner is offered for selling an easement that includes water quality BMPs would need to account for the effect that implementation of these practices would have on the farm's income. A price that did not account for these revenue impacts would be unlikely to garner the interest of the landowners.

In practice this need to offer a fair price for BMP implementation on conserved land might necessitate the development of a broader and more creative set of conservation tools. Currently easements are valued using the policies and principles that govern the appraisal of land and land improvements (buildings). This valuation approach is not well-suited to compensating agricultural landowners for lost income as a result of their agreement to cultivate land in certain ways, because it doesn't allow for compensation based on the ecosystem service that the farmer is providing. However, it may be possible to negotiate time-limited contracts with landowners that are valued based on these ecosystem benefits rather than the more traditional fair market value of the land.

State programs that fund conservation work on agricultural lands just recently identified water quality protection as an explicit goal.[113] A necessary first step for leveraging future conservation easements for greater water quality protection would be to make reducing water quality impacts an explicit goal attached to these funding sources. The complementary goal of achieving greater flood resilience, which is supported by many of the same farm practices, could also be added. One step could be to reexamine the goals for state funding appropriated to the Vermont Housing and Conservation Program to ensure a greater focus on environmental stewardship. Likewise, additional funding for the Ecosystem Restoration Program could be directed at outreach and environmental stewardship. Vermont state agencies could also work with Vermont's leading conservation organizations to make environmental stewardship a stronger focus of their work.

D.6.6.2. Option #2: Improve Clean Water Practices on Land Already Conserved

Over 20 percent of Vermont's agricultural land is already conserved through conservation easements. This raises the question of whether any steps could be taken to strengthen water quality protection on these already conserved areas.

One way to increase water quality protection would be to overlay new agreements on existing ones, in exchange for an additional payment to the landowner. These new agreements could include the kind of Best Management Practices outlined above, such as management of riparian buffers, implementation of certain cultivation methods and avoidance of others, or avoidance of channel armoring or relocation practices that accelerate downstream river flows and contribute to erosion of phosphorus-laden sediment from river banks.

Unfortunately restrictions on federal conservation funding restrict this promising avenue for reducing water quality impacts from conserved farms. Many existing conservation easements

[113] As mentioned above, Act 138 expanded VHCB's statute to specifically include "the protection of surface waters and associated resources." and the organization has also integrated an enhanced water quality role into its programs as a partner/funder in the FEMA flood hazard mitigation program.

were funded through the Natural Resource Conservation Services' Farm and Rangeland Protection Program. Program requirements prohibit the overlay of new agreements on lands protected through FRPP-funded easements. A modification of those requirements could lay the groundwork for this option, by making it possible to approach landowners who have sold FRPP easements with a request to consider new agreements with terms that compensate them for the implementation of water quality and flood resilience BMPs.

D.6.7. Targeting Incentives to Support Compact Sustainable Growth

A Clean Water Trust Fund has significant potential for improving stormwater management, reducing agricultural runoff, improving drainage along road networks, and protecting water quality in Vermont's rivers, lakes and ponds. Enhanced water quality protection is the ultimate measure of its success, but how the distribution of its resources affects progress toward more sustainable land use across Vermont's landscape should also be considered.

The reality is that the allocation of funding to support the attainment of compliance with stormwater regulations and other water quality standards *will* have an impact on land use patterns, and those changing patterns themselves affect the environment. For example, when federal or state funding makes extending stormwater or wastewater infrastructure into undeveloped "green field" areas less costly than retrofitting infrastructure in areas where development already exists, that funding can have the unintended effect of facilitating growth that results in sprawl. When federal or state funds for infrastructure are instead allocated to help reduce the costs of infill development in communities with a compact form, the result is a dampening effect on sprawl, and extra support for the kind of redevelopment that reduces vehicle miles travelled in cars, reduces carbon emissions and air pollution, promotes public health, and enhances quality of life by creating walkable, livable neighborhoods.

In short, Vermont's new initiative to promote clean water in its rivers, lakes and ponds should be designed to promote the kind of land use patterns we wish to leave for future generations of Vermonters. The state must also learn from experiences in regions where development is outpacing progress in restoring degraded waters. A report from the Chesapeake Bay found that, "new development is increasing nutrient and sediment loads at rates faster than restoration efforts are reducing them…a 16 percent increase over the past two decades."[114] This can be accomplished through the design of the new Clean Water Trust Fund, and by making strategic adjustments to existing state programs that provide permits and technical and financial assistance for development. Below are four ways to ensure that clean water is not secured at the expense of smart growth.

D.6.7.1. Action #1: Design Funding Criteria that Channel Infrastructure Funds to Already Developed Areas

As the State develops a new Clean Water Trust Fund, there should be careful consideration on designing funding criteria that promote redevelopment. For example, state funds to support planning for or construction of green infrastructure or more traditional storm water storage and treatment infrastructure could be allocated so as to reward those municipalities that are seeking to channel growth into already developed areas and avoid sprawl. The designation programs managed by the Agency of Commerce and Community Development would provide a

[114] U.S. EPA, Office of Inspector General Evaluation Report: Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay. Report No. 2007-P-00031, Sept. 10, 2007.

mechanism for creating these financial incentives; municipalities that have secured growth center designations – and as a result are known to have made a robust commitment to smart growth planning and implementation – could be given preferential status in the process of awarding fund resources.

Other avenues for amplifying the incentives available for growth and redevelopment in already developed areas might include the State's Revolving Loan Funds for drinking water and wastewater systems. The existing funding criteria that govern the allocation of grants and low interest loans from these funds are already adjusted to create a higher priority for projects that support compact land use development. Evaluating the effectiveness of this approach may be useful. Various requirements governing the percentage of local match necessary to receive state funding could also be adjusted to give more state financial assistance when development occurs in designated growth centers.

With respect to wastewater treatment plant expansion, the Vermont Environmental Protection Rules already require a state growth review process for wastewater treatment plant hydraulic capacity expansions and sewer extensions using clean water revolving loans for design or construction.[115] In addition, USEPA Region 1 has its own growth review process for clean water projects receiving STAG funding.[116]

D.6.7.2. Action #2: Incentivize Redevelopment Through Existing State Permitting Programs

Currently, Act 250 is the main regulatory tool that the state uses to promote compact land use development.[117] Criterion 9(H) directs applicants to ensure that the costs of public services that a proposed development may require does not outweigh the public benefits it offers.[118] However, it may be possible to make this landmark permitting program more effective at controlling sprawl and incentivizing development proposals in concentrated areas of development. Currently, the thresholds for requiring Act 250 permits relate to the size of proposed developments, rather than their location. Projects to infill dense downtown areas are subject to the same requirements for Act 250 permitting as are projects in suburban or rural areas, where the environmental impacts of new construction are likely to be much higher. One way to ensure that our work to improve the environmental health of our rivers and lakes does not inadvertently drive development into "green field" areas is to accompany the launch of the new Clean Water Trust Fund with new incentives that ease the requirements for Act 250 permits in downtown areas. If development projects are proposed in designated downtowns or growth centers and incorporate green infrastructure practices were subject to a modified Act 250 permitting process, the costs of development in these areas would be reduced. This incentive could promote more redevelopment activity in these areas. It may be appropriate to adjust other permitting programs `to achieve the same goal – providing some permit relief when projects are located in areas of dense development. Various permitting incentives, through Act 250 or through other state environmental permitting programs, could be organized and publicized through state designation programs which are currently being restructured to increase municipal participation.

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[115] Chapter 2, Subchapter 300: http://www.anr.state.vt.us/dec/FED/financial/docs/finalprioritysystem.pdf.

[116] State and Tribal Assistance Grant (STAG) program; See Committee Report:http://thomas.loc.gov/EPA STAG grants.

[117] http://www.nrb.state.vt.us/lup/publications/statutes/statute 07-01-12.pdf

[118] http://www.nrb.state.vt.us/lup/publications/act250brochure.pdf

D.6.7.3. Action #3: Provide Planning Assistance to Promote Green Infrastructure and Maintain Compact Downtowns

The state of Vermont could channel non-monetary benefits, such as planning assistance for low impact development and green infrastructure, to municipalities or regional organizations that embrace the goal of encouraging keeping their downtowns compact and avoiding green field development. For example, the state could provide grants to municipalities to explore and implement strategies for developing green infrastructure – parks, greenways, or greenbelts – that serves multiple purposes including keeping downtown areas beautiful and appealing as living areas, providing ecosystem services such as flood attenuation and water quality protection in riparian zones, and creating growth management barriers at the edge of existing neighborhoods and commercial districts.

The state could also look at strategies to increase the planning assistance and financial incentives that communities can access to "keep forests in forest," protect watersheds, require green infrastructure investments as a requirement for permits for all development, and help with on-going maintenance of street and community trees, including stream buffers, rain gardens and wetland and shore areas. This should include support of existing programs such as the Vermont Urban and Community Forestry Program, projects through VTrans and federal programs such as the Conservation Reserve Program.

As the state's designation programs are restructured to include new requirements and new benefits for designated municipalities and villages, there are important opportunities to assist communities in planning for compact growth. The designation for growth centers, for example, could be updated to more fully address stormwater management. All designated areas should be targeted for municipal stormwater master planning assistance.

D.6.8. Federal Funds and Programs that Support Vermont's Clean Water Goals

Current local, state, and federal public investments in clean water are critical to collective efforts to try to maintain today's current water quality conditions. Those investments pay for actions to restore and safeguard water quality that are undertaken by state agencies and partners, including municipalities, landowners, farmers, businesses, regional and local civic organizations, federal agencies, and the public.

Federal agencies and programs continue to serve a crucial role in helping to leverage local and state funds to support Vermont's clean water goals. Table 12 presents the last few years of federal funding that have come to Vermont to support programs that help with the State's nutrient and sediment pollution reduction efforts. VDEC appreciates the important role of the federal resource agencies, and will continue to seek their involvement in future years.

Federal Clean Water Funding - Vermont	Approved FFY 2009	Approved FFY 2010	Approved FFY 2011	Approved FFY 2012	Anticipated FFY 2013
US Environmental Protection Agency					
Clean Water Act §319 Grant Program (Nonpoint Source) - Total Pass Through	$460,634	$460,634	$460,634	$196,240	--
- Agriculture	$207,285	$207,285	$207,285	$196,240	--
-NPS Pollution Control-Non Agriculture	$253,349	$253,349	$253,349	--	--
Clean Water Act §604(b) Water Quality Planning Grants	$40,000	$40,000	$40,000	$40,000	--
Lake Champlain Basin Program					
To VDEC (USEPA funds)	$487,950	$793,200	$399,116	$240,750	--
To VDEC (Great Lakes Fishery Commission)		$1,840,000	$595,000	$1,429,100	--
LCBP Implementation - P reduction projects		$443,172	$1,032,172	$980,962	--
IJC Missisquoi Bay phosphorus reduction	$300,000	--	--	--	--
Monitoring, Phoshorus loading from roads	$100,000	--	--	$41,000	--
Monitoring, Missisquoi Bay internal P model	$125,000	--	--	--	--
Ecosystem indicators database	--	--	$275,000	--	--
Monitoring, To UVM, Monitoring, Blue-Green Algal Toxin	$85,000	$120,000	$120,000	$70,000	--
Project Rock	--	$250,000	--	--	--
Otter Creek IDDE	--	$100,000	--	--	--
USDA Agriculture Research Service, BSTEM Model Phase II	--	$100,000	--	--	--
U.S. Geological Survey					
LiDAR (USGS/VTDEC agreement; Missisquoi Phase II, Otter Creek, Phase I)	--	$270,000	--	$150,000	--
BMP effectiveness studies (USGS-LCBP)	$145,000	$117,536	$52,000		--
Phosphorus trends analysis (USGS-LCBP)	$40,000	$50,000	$93,000		--
Federal Highway Administration					
Better Back Roads, Federal Transportation Enhancement Funds	$275,000	$275,000	$275,000	$275,000	$0
US Department of Agriculture, US Fish and Wildlife Service					--
NRCS, Riparian Corridor and Wetland Protection and Restoration	$1,600,000	$1,750,639	$482,000	$1,181,858	--
Pittman-Robertson 3:1 match	$90,000	--	--	--	--
NRCS Best Management Practices-EQIP	--	$7,000,000	$7,984,404	$5,353,325	$5,250,000
Nutrient Management Planning, EQIP LTPs (Land Treatment Plans)	--	$140,000	$49,000	$85,000	$85,000
Conservation Reserve Enhancement Program (CREP)	--	$700,000	$800,000	$800,000	--
Conservation District Agricultural Resource Specialists	--	$42,000	$42,000	$42,000	--
US Fish and Widllife Service, Riparian, Wetland Protection and Restoration	$60,000	$320,000	--	--	--
FEMA, Map Modernization, Pre-Disaster Mitigation	$540,000	$200,000	--	--	--
TOTAL (FY2013: funding is not yet available)	$4,809,218	$15,472,815	$13,159,960	$11,081,475	$5,335,000

Appendix E. Vermont Surface Water Management Strategy & Tactical Basin Planning

The Vermont Surface Water Management Strategy (Strategy) is the VANR Watershed Management Division's strategic plan. It describes the protection and management of the sources of pollutants that degrade Vermont's surface waters (rivers and streams, lakes, ponds and reservoirs, and wetlands), and helps to guide the Agency's decision-making to ensure efficient, predictable, consistent and coordinated management actions.[119]

The foundation of the Strategy is the Vermont's Tactical Basin Planning (TBP) process. TBP identifies and prioritizes restoration or protection projects, surface water reclassifications, and certain permitting schedules. It coordinates existing programs and builds partnerships to result in efficient and environmentally sound management of Vermont's surface water resources.

TBPs are an effective tool for prioritizing funds, technical assistance, and educational assistance. TBPs contain objectives, prioritized strategies, benchmarks and tasks for implementation of the plans. The plans prioritize basins and sub-basins for project development and restoration actions based on the level of degradation, and also prioritize waters that are of very high quality with important aquatic features that deserve greater protection. Each plan describes attainable goals and targeted strategies to achieve those goals. The plans contain an implementation table by which progress and commitments can be tracked using measurable indicators. Implicit in the Tactical Planning Process is the process by which ecosystem restoration program funding is tied directly to those priorities identified in tactical plans.

The plans also have implementation tables that summarize the highest priority projects for implementation. Implicit in the Tactical Planning Process is the intent to tie ecosystem restoration program funding directly to those priorities identified in tactical plans.

TBPs are developed for each major basin and updated on a five-year cycle as specified by the Water Quality Standards. The TBPs identify *priority sub-basins* for enhanced monitoring, assessment, and project development within the lifecycle of each plan. The general idea is to focus resources and attention on a more concentrated area in a more coordinated fashion with the various stakeholder input in order to be efficient with limited resources.

Projects identified and prioritized within the implementation tables are described in the following five general land use areas.

Agricultural Lands

WSMD annually works with VAAFM to establish workplans for the Agricultural Resource Specialists, establish monitoring and assessment projects with partner groups, and identifies sub-watersheds for agricultural-based technical assistance programs, such as Agricultural Environmental Management (AEM) based on monitoring results.

Watershed coordinators also engage in collaborative agriculture working groups under a memorandum of understanding developed between NRCS, AAFM,VANR, VACD, Extension, and other groups, to promote information sharing, strategic outreach, and intervention planning. The MOU enable the sharing of individual farm information in a manner that increases our

[119] The Surface Water Management Strategy addresses the problems that arise from a full suite of stressors: http://www.vtwaterquality.org/swms.html.

ability to focus limited resources, prioritize remediation and coordinate people and funding sources to the greatest gain.

Urban Lands

WSMD works partners to: (a) identify and evaluate stormwater infrastructure for system upgrades, ideally using green infrastructure/low impact development techniques; and, (b) conduct Illicit Detection and Elimination mapping of storm and wastewater infrastructure and water quality testing to identify infrastructural deficiencies. The TBP also identifies areas where targeted education and outreach is necessary to promote landowner-scale activities such as small-scale green infrastructure projects, or modifications to property management practices.

Transportation

WSMD works with municipal officials to develop erosion/sediment control projects through the Better Back Roads Program, the Local Roads Program, or, for smaller projects, through the Vermont Youth Conservation Corps in targeted municipalities. Tactical Basin Plan implementation tables identify specific municipalities for these programs, and also identify targeted larger road networks for remediation.

River Corridors and Floodplains

Tactical Basin Plans identify priority rivers for Stream Geomorphic Assessments (SGA) and include the highest priority projects identified by those SGA and river corridor plans as part of the TBP's implementation table.

Forestlands

Watershed coordinators work closely with the FPR Watershed Forester to maintain healthy headwater streams, assist in the development of surface water components of State Forest long-range management plans, and include within the TBP's implementation table priority erosion and sediment control projects identified through monitoring and assessment.

Appendix F. Statewide Partners

Existing state and regional organizations could play an important role in delivering programs to implement clean water actions funded by the Water Quality Trust Fund. Below is a discussion of options for three organizations: the Natural Resources Conservation Districts, the Regional Planning Commissions, the Vermont League of Cities and Towns and educational partners.

F.1. Natural Resources Conservation Districts

In 1939, the Vermont Legislature passed the Soil Conservation Act (Title 10, Part 2, Chapter 31) as part of the national movement following the Dust Bowl to create locally governed boards to coordinate assistance from all available sources—public and private, local, state and federal—to support landowners and communities in developing solutions to their natural resource concerns.

The purpose of Vermont's Soil Conservation Act was to "provide for the conservation, development, and use of the natural resources of the state." The Act formed the Natural Resources Conservation Council (NRCC) and set the framework for the establishment of Vermont's fourteen Natural Resources Conservation Districts, whose boundaries coincide with counties or watersheds and who collectively cover the entirety of the state. Conservation Districts are local units of government, with elected boards of supervisors, given the authority to assess natural resource needs, carry out measures for the prevention and control of soil erosion and the protection and conservation of water resources, implement demonstration projects, and advise state and federal partners on natural resources conservation policies and programs.

Working closely with the VT Agency of Agriculture Food and Markets (VAAF&M) and the Natural Resources Conservation Service (NRCS), Conservation Districts assist farmers in identifying problem areas, adopting new and innovative conservation practices, and incorporating elements of sustainable agriculture into their farm planning in order to address soil and water quality concerns while enhancing farm viability and resiliency.

Conservation Districts work on a wide array of natural resource issues, with a primary emphasis on water quality. Conservation Districts work with local, regional, state, and federal partners to identify, develop, and implement programs in the areas of agriculture, forestry, urban conservation, watershed stewardship, habitat restoration, and education. Here are examples of the projects and programs undertaken by Vermont's Conservation Districts in the past few years:

- Conservation Tillage & Cover Cropping Incentives Program
- Agricultural Nutrient Management Plans
- Flood Resiliency Outreach
- River Restoration
- Trees for Streams Buffer Program
- Stream Geomorphic Assessments
- Water Quality Monitoring
- Culvert Retrofits for Aquatic Organism Passage
- Installation of Stormwater BMPs
- Rain Barrel and Rain Garden Programs
- Municipal Stormwater Retrofits
- Hydroseeder Cost Share Program
- Portable Skidder Bridge Program
- Class 3 and 4 Erosion Control
- Gully Stabilization
- Education Programming for Children and Adults
- Native Shrub and Tree Sales
- Wildlife Habitat Assessments
- Invasive Species Management
- Working Landscape Initiatives
- Forested Floodplain Restoration

Accomplishing this work requires a significant amount of staff time and resources on behalf of each Conservation District. Conservation Districts have historically received between $7,000 and $8,000 annually through the VAAF&M budget to NRCC. Districts accomplish their natural resource conservation goals by multiplying this core funding ten-fold through grant writing, tree sales, and annual campaigns. While successful at securing project grants, this income-generating model does not offer the opportunity for continuity of services between Conservation Districts and the municipalities and landowners they serve. Grant-funded programs are restricted to project area boundaries, timelines, and/or a project focus area that limits the ability of Conservation Districts to maintain a consistent role in their service areas. For example, particularly since Tropical Storm Irene, the need for flood resiliency assistance to communities has increased. While qualified to provide this assistance, Conservation Districts are only able to provide it once a grant is initiated and will be limited to the timeline of the grant and service area stipulated in the agreement.

The need to raise money on a continual basis also puts a significant strain on each Conservation District and limits the amount of on-the-ground work they can accomplish. On average, districts receive 70 percent of funds through Federal and State grants. In some cases, neighboring Districts have forged successful partnerships on similar programs. This can be a challenge as many projects are driven by local concerns and solutions may be executed on a different time frame.

Working to develop locally driven solutions, Conservation Districts are an important link that connects state and federal agencies with municipalities and private landowners on environmental initiatives through sustainable and forward thinking projects.

Additional support for Conservation Districts would help to fortify their role as Regional Water Resource Specialists in the public sector and taking on a greater responsibility for the water quality challenges facing Vermont in the coming years. Districts are intimately knowledgeable of the natural resource concerns within each of their boundaries and thus are uniquely positioned to expand the success of their ongoing efforts. The Conservation Districts could provide the following assistance:

- Serve as Regional Water Resource Specialists by working closely with Watershed Basin Planners and River Scientists, to direct and/or contract with Watershed Groups, Planning Commissions, and/or Youth Conservation Corps on water quality projects.
- Coordinate federal and state initiatives at a local level, offering a non-regulatory local face to landowners and communities in an effort make resources more understandable and available
- Provide flood resiliency efforts with municipalities and landowners through partnerships with RPCs, VT Rivers Program, and Flood Hazard Mapping Coordinators. Conservation Districts could coordinate additional data collection on rivers and streams as necessary.
- Provide an overall leadership role in collaborating efforts within communities addressing TMDLs, and initiative programming as necessary to reach goals.
- Leverage funds to integrate and coordinate various federal and state resources, partner groups, and contractors to increase their effectiveness.
- Provide technical assistance and leadership for strategic incorporation of innovative environmental strategies for better statewide and regional alignment to solve local challenges.

- Collaborate with educational institutions (college level when possible), local community groups, and nonprofit organizations to actively engage and mobilize youth and local citizens to learn new skills and increase their environmental literacy.
- Pursue projects that preserve the physical and community landscape while also generating tangible opportunities for natural resources protection.
- Continue to be a critical link between public and private, local, state and federal organizations to disseminate information on critical source areas, policies, and regulations on emerging issues.
- Provide training and other opportunities to raise awareness and advance new technologies for municipalities, educational institutions, and non-governmental institutions.

Supporting water quality specialists in each of the 14 Conservation Districts would require an annual investment of $65,000 per district.

F.2. Regional Planning Commissions

Vermont's eleven regional planning commissions (RPC) operate under the Vermont Municipal and Regional Planning and Development Act of 1967.[120] By law, all municipalities within each planning commission are members of the commission, and most participate in the regional planning process. Each RPC is governed by a board with members appointed by the municipalities, and the RPCs implement a variety of projects and programs tailored to local needs.

All RPCs provide a number of important services to their municipalities, including: assistance with updating municipal plans and bylaws; providing geographic mapping data to support state and local projects; transportation planning through regional VTrans Transportation Planners; watershed planning; emergency response planning; assistance applying for state, federal, and private grants; and more. RPCs are also required by statute to create a Regional Plan,[121] designed to coordinate economic development within the region. The plan incorporates a number of elements[122], including: land use, transportation, utilities, a statement of policies on the preservation of rare and irreplaceable natural areas and resources, housing, economic development, and an implementation program.

A crucial element missing from this statutory list is water quality. Amending 24 V.S.A. 4348a to include a water quality element will bring water quality issues to the forefront of regional plans, which will then influence municipal planning and projects. This element should require a statement of policies and implementation measures that further the State's goals of preserving, protecting, and restoring the quality of surface waters that are necessary for the environmental and economic well-being of Vermont.

There are several ways that RPCs can assist in meeting water quality goals:

[120] Vermont Municipal and Regional Planning and Development Act, 24 V.S.A. § 4301–4498.

[121] Duties of Regional Planning Commissions, 24 V.S.A. § 4345a(5).

[122] Elements of a Regional Plan, 24 V.S.A. § 4348a.

- **Review municipal plans for compliance with Statute.** In their work with towns to ensure that municipal plans are compliant with state statute, ensure that there is adequate consideration for clean water, including management of stormwater runoff;
- **Provide technical assistance in the development of water quality language in municipal bylaws.** RPCs could provide technical assistance in the development and promotion of model bylaws that focus on stormwater management;[123]
- **Assist in Trainings and Workshops.** RPCs could work with DEC staff, ACCD and VLCT in providing trainings on regulatory and non-regulatory water quality topics, including greater participation in the development of VDEC's tactical basin plans;
- **Assist in Road Inventories and Mapping**. The RPCs' transportation planners could assist in the development of road inventories for Better Back Road projects.

F.3. Vermont League of Cities and Towns

Through the Ecosystem Restoration Program, funds have been provided to the Vermont League of Cities and Towns (VLCT) to support a part-time Water Resources Coordinator to engage and work with towns primarily but not exclusively, in the Lake Champlain Basin. This position provides technical assistance as outlined in the grant agreement to planning commissions, conservation commissions, select boards, development review boards, zoning administrators, planners and other professional municipal staff to support water quality and water resource protection enhancements to their zoning regulations and other municipal ordinances. Education, outreach and technical assistance are provided through several avenues including technical papers, model ordinances and bylaws, presentations and newsletter articles. The Water Resources Coordinator is focusing on the new Emergency Relief and Assistance rule, continuing zoning regulation review and reporting, and offering technical assistance in water quality management to towns.

F4. Educational Partners

Participants in nearly every consultation meeting held this fall called for greater public education and technical assistance. Having resolve to taking on the actions described in the Accountability Framework requires an informed and engaged citizenry to help build the political resolve to affect change.

VDEC has does not have a grant program that could enable municipalities and local, regional, and statewide partners to engage the public in clean water initiatives. VDEC would like to propose a State Water Education and Public Engagement Program. This Program could offer youth and young adults four jobs corps/service learning options and a mini-grant program that will support the next generation of leaders in conservation and promote lifelong stewardship of our natural resources. Educating the youth is a responsible way to ensure that we are not simply passing the responsibility and costs to minimize water quality impacts down to future generations to address. The proposed competitive small grant program would help local and regional partners implement their own water quality education programs. The following are some ideas that could be part of a clean water education program:

[123] Vermont League of Cities and Towns have a model stormwater bylaw: http://www.vlct.org/municipal-assistance-center/water-resources-assistance/

- Enhance summer work crew: One option is support for a combined summer youth crew to perform conservation service work in teams under the guidance of trained crew leaders. Crew members learn valuable leadership and teamwork skills while engaged in critical hands-on environmental maintenance and restoration work. A likely partnership could involve organizations such as VYCC, SCA, the North Woods Stewardship Center, and others.[124]
- Enhance Youth and Young Adult Leader Teams: This option could support leader teams -- highly-skilled leaders of partner organizations who work on hands-on conservation service projects that require advanced work skills in the shoulder seasons (spring and fall). Leaders also receive targeted leadership training;
- Support for a Young Adult Stormwater Outreach Team: This option is to support a 10-month team of interns. The interns could participate in a training prior to deployment to form as a cohort, learn about the initiative and the supporting organizations. These teams provide community education through the implementation of hands-on water quality protection projects. Interns develop a variety of outreach materials, trainings, resources, and educational opportunities. Projects may include engaging communities in the installation of rain gardens and other Low Impact Development/Green Infrastructure practices, vegetation restoration along lake and river riparian areas, and training of town road crews in the reasons for and installation of Better Back Road (BBR) practices. A likely partnership could involve organizations such as VYCC, SCA and others;
- Offer a Small Grants Program: This option could offer a small grant program to support local and regional water quality education and public engagement initiatives. That could include: environmental education in schools, riparian buffer planting, hands-on service learning in watershed and river corridor protection, residential educational programs that involve retrofitting using Low Impact Development stormwater practices, and wetlands restoration.
- A Stormwater Public Engagement Program: An interesting model for engaging the public in stormwater management is the Chittenden County Regional Stormwater Education Program (RSEP). This organization was formed in 2003 to encourage area residents to get personally involved in reducing storm water pollution in Lake Champlain. The effort is conducted as part of public education measures required by federal Environmental Protection Agency storm water system permits. Chittenden County RSEP uses television, radio, print, and this website to distribute messages linked to specific stormwater problems, such as proper pet waste disposal, minimizing debris from home projects, proper disposal of toxic chemicals, safer car washing, and reducing erosion and over fertilization of lawns and gardens. In addition to the multi-channel media campaign, educational events hosted throughout Chittenden County also raise awareness and encourage positive behavior change in residents. The VANR should explore opportunities to work with RSEP in the delivery of stormwater educational programs;
- Proposed Watershed Academy: A consortium of organizations and agencies that include Lake Champlain Sea Grant, the Department of Forests, Parks and Recreation, VDEC, and UVM Extension are developing a program that focuses on stormwater education and ways to use Low Impact Development (LID)/Green Infrastructure practices to reduce polluted runoff. The target audiences are local municipal officials, local and regional watershed groups and civic organizations, and landscape professionals: http://www.uvm.edu/seagrant/water-quality

[124] Vermont Youth Conservation Corps (VYCC), North Woods Stewardship Center (NWSC), and the Student Conservation Association (SCA).

Part II: Lake Shoreland Protection and Restoration Management Options

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In Partial Fulfillment of the Requirements of Act 138

January 11, 2013

Vermont Agency of Natural Resources
Department of Environmental Conservation
Lakes and Ponds Section

This report was prepared by staff of the Vermont Lakes and Ponds Section: Amy Picotte, Bethany Sargent, Amanda Northrop and Susan Warren. Thanks to the many people who provided information and review, especially Kellie Merrell.

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Cover photo, Lake Eden, Eden, Vermont.
Photo shows several decades of natural re-growth of native species on a shore that had previously been cleared of all its woodlands; it now serves as a family picnic grove for the shoreland owners.

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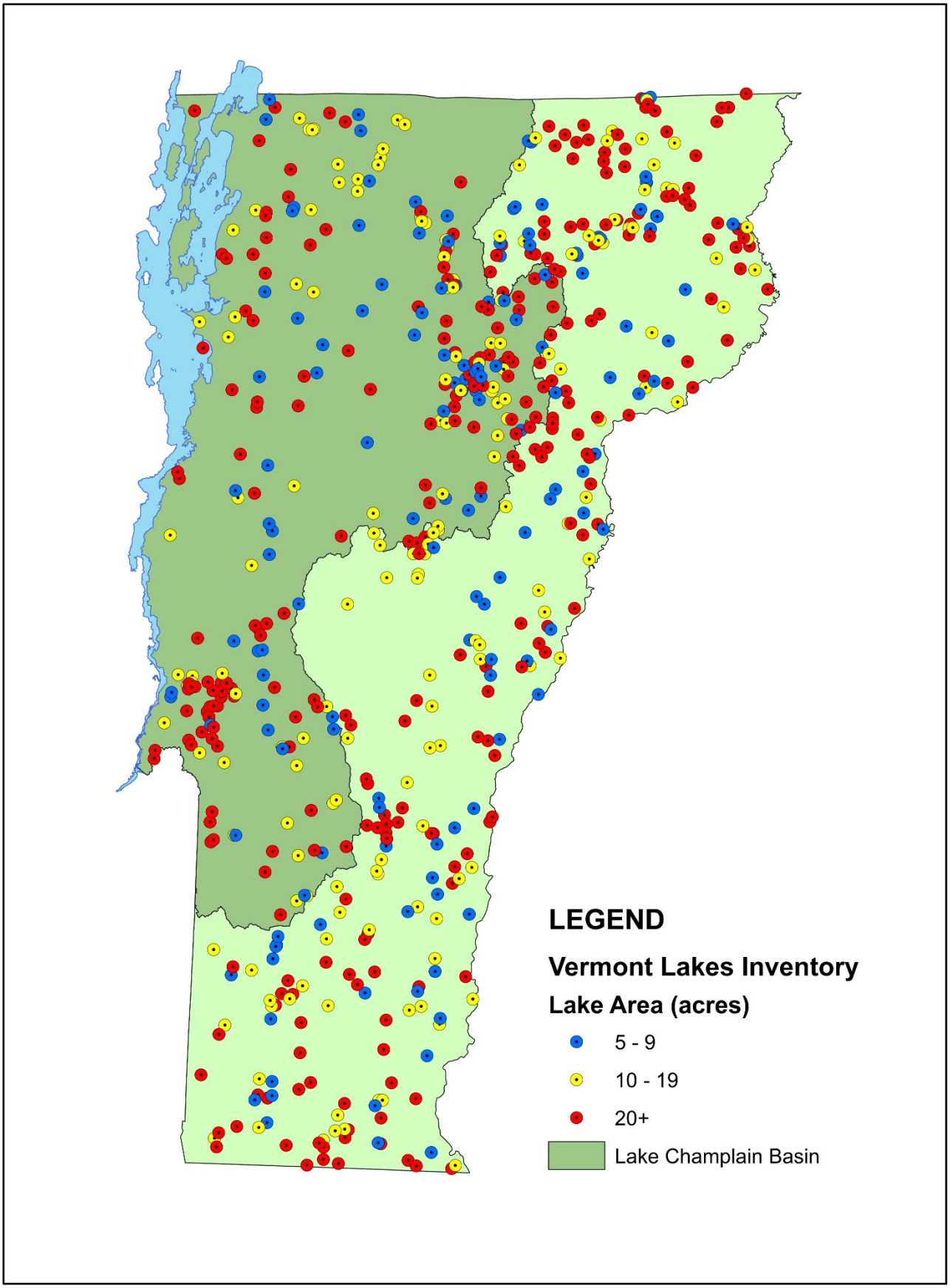


Figure 1. Distribution of Lakes in Vermont. Lake Champlain is Vermont's largest lake with a complex ecosystem and watershed covering half the state. Vermont also has over 800 other lakes, 292 of them 20 acres or larger in size, which provide a variety of outstanding recreational opportunities and natural values.

Executive Summary

According to a U.S. Environmental Protection Agency (USEPA) study of lakes across the country, the health of Vermont's lakes is less than both the northeast region and the national average in terms of percent of shoreland that is either in fair or poor condition, as measured by the extent of clearing, lawns and development near the shoreline. When a lake's natural vegetation (woodland) is removed and replaced by lawns and impervious surfaces, fish and wildlife habitat degrades, shores erode, and the lake is more vulnerable to water quality problems such as algae blooms. Cleared shores are also more susceptible to erosion during flood events.

Naturally vegetated lakeshores reduce pollution, protect property and fisheries, improve recreation, and greatly contribute to the economy. Some of the many benefits and values naturally vegetated lakeshores offer include:

Revenue and property values. Healthy lakes generate millions of dollars annually for the Vermont economy and private property maintains highest value when water quality is good.

Flood resilience. Well-vegetated shorelands provide flood resilience and play an essential part in buttressing Vermont's water resources against the effect of climate change.

Recreation and tourism. Treed shorelands are scenic, enhancing the recreational experience and contributing to Vermont's tourism economy.

In addition, a wooded shore provides ecosystem services that are essential for protecting lake ecological health:

Pollution filtration. Shoreland vegetation naturally filters phosphorus and sediment from uphill runoff.

Shoreline stability. Wooded shores provide shoreline stability with a diversity of dense root structures.

Figure 2. Common lakeshore development consists of clearing native vegetation and planting a lawn. Suburbanized shorelands diminish lake health.

Habitat for fish and aquatic species. Fallen trees and branches provide critical physical habitat for fish, amphibians, turtles and insects such as dragonflies .

Prevention of problem plant growth. Overhanging branches keep the water shaded and cool, thus helping to prevent algae and problem plant growth that thrive in warm and sunny waters.

Habitat for wildlife species. A natural shoreline enables use of the lake environment for species such as loons, kingfishers and otters.

At present, most shoreland development in Vermont involves clearing native vegetation along shorelines to establish lawns down to the water's edge, and as a result, 82 percent of Vermont's shorelands are currently in poor or fair condition. Accordingly, Vermont lakes are more threatened by phosphorus and sediment runoff from shoreland areas, habitat degradation, and flood damage than lakes in other New England states and the nation.

The Vermont Legislature passed Act 138 during the 2012 legislative session, which requires the Vermont Agency of Natural Resources (VTANR) to submit a report with options for restoring and protecting lakeshores. In particular, Act 138 calls on VTANR to address whether the state should enact statewide shoreland regulations.

Vermont's Shoreland Management Programs

Vermont's current shoreland management programs focus on education, outreach and technical assistance. At present, there is no statewide standard for shoreland management and the responsibility for developing standards falls to municipalities. Less than 20 percent of towns have implemented ordinances to protect lakeshores. Municipal adoption of effective local shoreland zoning has progressed very slowly over the last 40 years and efforts have varied in effectiveness.

Figure 3. Lake-friendly shoreland development includes: setting a lawn back from the lake; allowing native trees to stabilize the bank, while pruning lower branches for a view; leaving woodlands (duff layer, shrubs, and mature trees) in place to filter runoff and provide healthy habitat for fish and other wildlife.

Act 250 and the Stormwater Management Rules have limited applicability to lakeshore management. Most shoreland development occurs one lot at a time and is thus sub-jurisdictional with respect to Act 250. The vast majority of shoreland development is also sub-jurisdictional to the Stormwater Management Rules as the developed area is usually less than one acre. Finally, 80 percent of towns lack shoreland development standards. The majority of shoreland development occurs without any guidance or requirements addressing lake protection.

The VTANR concludes that the current shoreland management approach in Vermont – education, outreach, technical assistance and voluntary municipal participation – is not providing adequate protection of Vermont's lakes. Comparing Vermont's current shoreland management practices to other northeastern states' programs reveals a major gap in Vermont's management program: Vermont is the only northeastern state without state standards for shoreland development. New approaches are needed to ensure the long term health of Vermont lakes and shorelands.

Regulatory Options

As required in Act 138, VTANR provides the following regulatory options for consideration to supplement Vermont's current shoreland management program:

State administered option: The Agency would adopt standards via rule making and administer a statewide permit program.

Enhanced local option: Set minimum standards that the municipalities can choose to administer themselves. This option may be attractive to the 20 percent of towns that already have protective shoreland zoning, or towns that want to add to the state minimum standards to reflect local priorities. The Agency would administer the standards through a permit program in municipalities that choose not to do so themselves.

Municipality administered option: The state sets minimum standards that municipalities must incorporate into their zoning ordinances. The state would provide technical assistance to towns. The state would administer the minimum standards in the 94 towns which have no zoning.

Non-Regulatory Options

Although VTANR concludes that Vermont's shoreland management program relying solely on education, outreach and technical assistance is not adequately protecting Vermont's lakes, such non-regulatory programs are a necessary component of any protection and restoration program. The following elements are therefore recommended for continuation, expansion or establishment:

- Encourage and enable shoreland conservation projects that preserve undeveloped lakeshores.
- Evaluate a use value appraisal-type tax credit for establishing or protecting a wooded lakeshore and to reward landowners for maintaining a naturally vegetated shore.
- Support education and outreach efforts, such as the Agency's Lake Wise Program and literature and website materials. Continue Agency individual site visits, as requested, to provide recommendations regarding shoreland management or restoration.
- Continue to support the Vermont League of City and Towns lake protection technical assistance to towns.
- Establish a "green" certification program for contractors to provide training on water resource protection measures such as vegetated shorelands and erosion control during construction.
- Continue to fund lake events and technical assistance projects that promote and demonstrate shoreland restoration and protection. Partner with external organizations, such as the Vermont Federation of Lakes and Ponds, the Natural Resources Conservation Districts, and the Regional Planning Commissions.

There has never been a better time, or a greater need, to rethink how Vermont manages its lake shorelands. Recent flooding events caused by extreme weather, such as the 2011 spring flooding and Tropical Storm Irene, demonstrated that wooded shorelands are substantially more resilient to high water and wave action than cleared shores or those with retaining walls. Increasing public scrutiny on the effort to stem phosphorus pollution in Lake Champlain provides a reminder to all lakefront landowners that collective action is needed to prevent degradation of water quality for all Vermont lakes.

This is an opportunity for the Vermont Legislature to implement a fair and effective program for lakeshore management and protection to ensure that the state's economic, social, and ecological values are protected for current and future generations.

Introduction

This report presents options and recommendations for strengthening Vermont shoreland management. Scientific studies in Vermont and the nation link degraded lake conditions to poorly planned and increasing lakeshore development. Most Vermont lakeshore owners manage their property with little or no knowledge or standards for lake protection. This report evaluates options for lakeshore management by reviewing Vermont's current programs as well as those of other states.

This report examines the values of a well-managed shoreland, and the current status of Vermont's lakeshores. The report then evaluates Vermont's non-regulatory shoreland management programs, and the regulatory program of three other states. Finally, regulatory options for Vermont at presented, as well as enhancements of the existing non-regulatory approaches.

A lake's first line of defense against pollution and habitat degradation is its shoreland—the surrounding land that drains directly into the lake. Naturally vegetated shorelands protect lake health and recreational values, provides flood resilience and fortify Vermont's economy.

Chapter One - The Consequences of Cleared Shorelands

The Status of Vermont Lakes

Vermont's 800+ lakes and ponds are natural jewels left by glacial activity more than 10,000 years ago. Over time, they have provided waterways for human settlement, exploration, battles, and trade and commerce. Today, people use Vermont lakes primarily for recreation. Vermont residents and visitors may spend a day fishing or boating, go camping, or rent a lake house, and many own homes or camps on the lakeshore.

For lakes to be resilient to human activity on the land and to climate change, their first line of defense is a well vegetated shore. However, data show that in Vermont, developed sites have 96 percent fewer trees along the shores than undeveloped sites and that cleared shores pose the greatest threat to Vermont lakes.[1,2] **Naturally vegetated shores protect lake water quality, ecology, and bank stability. Healthy lakes benefit people, property values, and the tourism economy**.[3,4,5]

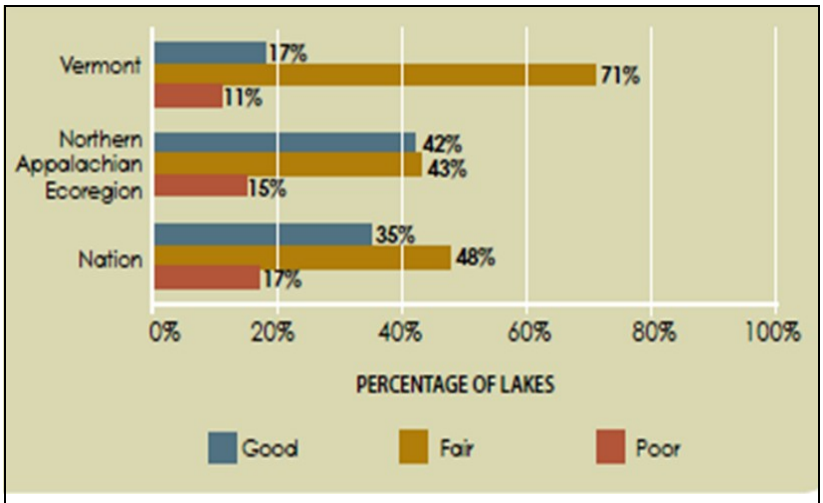


Figure 4. Extent of Lakeshore Disturbance. 83% of Vermont's shorelands are in either fair or poor condition, compared to 58% in the northeast region, and 65% nationally.

Figure 5. Shallow water habitat structure. Fallen trees, branches and leaves, rocks, aquatic plants and the adjacent woodlands provide shelter, feeding, and breeding sites for a large variety of aquatic and terrestrial life.

- **Lake Habitat For Fish and Wildlife**

Recent studies in Vermont indicate that clearing shorelands of natural vegetation results in degradation of aquatic habitat.[6] VTANR's participation in the 2007 EPA National Lake Assessment shows that in Vermont 82% of lake shorelands are in poor or fair condition because of excessive disturbance (clearing or impervious surfaces).[7] In addition, VANR's Littoral Habitat Study shows a strong correlation between cleared shoreland and loss of shallow water habitat for fish and other organisms.[7]

Vermont lakes rank worse than the northeast region and the national average in terms of shoreland disturbance. Only 17% of Vermont lakeshores are in good condition as measured by the extent of disturbance and lawns along the shore, compared to 42% regionally and 35% nationally (Figure 4). [6]

Vermont lakes with good shoreland condition (e.g. the natural woodlands have been maintained)

have corresponding healthy shallow water habitat including a variety of sediment, woody snags, diverse aquatic plants, and boulders and cobble. These complex environments provide habitat for a wide diversity of terrestrial and aquatic organisms—from fish, to aquatic insects, to birds and mammals.

- **Bank Stability**

Clearing lakeshores of vegetation causes bank instability and erosion.[8] As witnessed on Lake Champlain during spring 2011 flooding, well vegetated banks resisted the winds, waves, high waters, and storm water runoff better than cleared or walled shores. In addition, walled shores do not provide good habitat. Property owners who have cleared shores, often later pay for a wall to stabilize the bank. The clearing of shores is costly for owners and the lake.

Figure 6. Eroding and Non-Eroding Shorelines. The shore above is experiencing erosion because a lawn provides little soil stability. In contrast, the mix of trees, shrubs and groundcover at left offers excellent stability due to the variety and density of root structures and mass.

Figure 7. Lake-friendly shoreland development:

- Provides bank stability with trees and shrubs
- Provides shade and overhanging vegetation for aquatic habitat
- Allows woodlands to naturally filter runoff
- Establishes lawns back from lake
- Preserves the natural lakeshore beauty

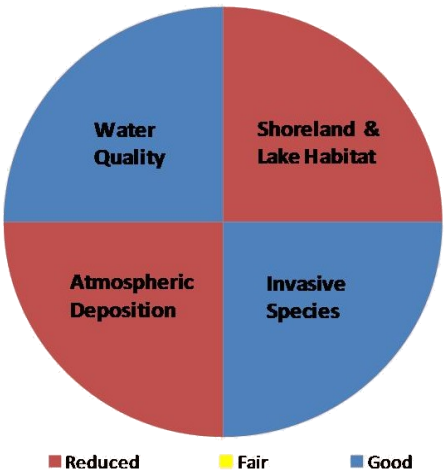


Figure 8: Score Card for Salem Lake , Derby, VT. The Vermont Lake Score Card is accessible on the Lakes and Ponds Section website and shows how each lake or Lake Champlain station is doing with respect to water quality, shoreland condition, invasive species, and atmospheric deposition (acidification and mercury contamination).

In general, water quality trends are good across the state, but the shoreland and lake habitat conditions are not. The score card for Lake Salem in Derby represents a typical lake report card with a "good" rating for water quality, but with reduced conditions for shoreland and lake habitat. Lake Salem's lakeshore condition threatens its good water quality because more than 50% of the natural woodland shore has been converted to lawn down to the lake. (Salem Lake, like the majority of Vermont lakes, is rated "reduced" for atmospheric deposition because of a fish consumption advisory for mercury.)

- **Water Quality**

Cleared shoreland results in increased phosphorus and sediment pollution of lakes which decreases water clarity and increases algae growth. Eventually phosphorus pollution can lead to blue-green algae blooms, which can pose a serious health concern.[9] Cleared shores contribute 18 times the sediment, five times the runoff and seven times the phosphorus to the lake than those where the shoreland is wooded.[10] Shores with lawns and impervious surfaces, with little or no natural vegetation and underlying duff layer, turn the lake into a stormwater catch basin with no natural way to filter and clean run-off.

Development on Vermont Shorelands

- **Increasing Loss of Natural Shorelands**

The pattern of clearing all trees and shrubs in preparation for shoreland development is a concern for Vermonters. In 2002, The University of Vermont Center for Rural Studies conducted a survey asking Vermonters to identify recreation-related issues. Of the 510 survey respondents, 84% identified lakeshore development as a problem.[11] And yet, despite the fact that shoreland clearing leads to loss of wildlife habitat, excessive loading of sediment and nutrients, and a decline in water quality, the dominant development trend on Vermont lakes continues to be lawn to the lake's edge.[12,13,14]

- **Redevelopment**

The enlargement and/or winterization of lakeshore homes is often associated with house additions, and the enlargement of lawns and driveways, all of which can degrade water quality.[15] Many Vermont seasonal camps are being replaced by large year-round homes. It is not the redevelopment itself that causes concern, but rather the resulting increased loss of shoreland vegetation. However, there are few standards that have guided either development or redevelopment of lakeshores in Vermont and so there has been a significant loss of natural shoreland.

- **Gaps in Standards**

The cumulative impact from individual property development is the greatest stressor to Vermont lakes and those in other states.[16,17] Construction erosion control and post-construction site design under the Stormwater Management Rules apply only to one acre or greater of disturbed or impervious area.[18] Given the typically small lot size, almost no lakeshore owners are covered under the Stormwater Rules. Likewise, both agricultural and forestry uses have some restrictions within the shoreland area. In addition, only 20 percent of Vermont towns have shoreland regulations that provide a minimum of protection and 80 percent of towns do not have effective shoreland regulations or zoning at all.

Economic Value of Shorelands

Vermont lakes are critical to local and state economies. They provide valuable services, such as drinking water for thousands of Vermonters; provide critical wildlife habitat; and scenic and recreational amenities that attract tourists, hunters and anglers, and recreation enthusiasts. Visitors and lake users are drawn to lakes with good water quality, scenic shores and quality fishing and wildlife observation opportunities, all supported by naturally vegetated shores.

Lakes and ponds provide services for which people are willing to pay a premium. The loss of these services due to pollution or habitat degradation can result in considerable expense to taxpayers.[19,20] Whether it is their impact on property values, or the revenue they generate through increased tourism and recreation or through the sales of fishing licenses, Vermont lakes help to generate hundreds of millions of dollars annually and play an integral role in Vermont's economy (Table 1, page 6). When, however, conditions in a lake degrade, these economic benefits are threatened and local, state and federal agencies may be obligated to pay substantial sums for restoration.

- **Recreation and Tourism**

A study completed by Gilbert and Manning in 2002 details the amount of money Vermont State Park visitors spend and what they are spending it on including food, souvenirs, park fees, and gas/transportation. When comparing the average annual total visitor expenditures for a state park located on a lake or pond to the average for those not so located, the difference is stark. *The average annual total visitor expenditures for lake-based state parks ($976,870) is nearly three times the amount of that of non-lake based state parks ($367,122).*[21]

- **Fish and Wildlife**

In 2009, 83,017 Vermont residents bought fishing licenses. Nearly 57% of the residents surveyed fished for trout or salmon in ponds or lakes (excluding Lake Champlain) between 2007 and 2009, and approximately half fished Lake Champlain during the same time period.[22]

Total fishing license sales amount to approximately $3,000,000 annually.[23]

According to the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation – State Overview Preliminary Report, 207,000 Vermont residents and non-residents spent a total of $131,223,000 on trip- and equipment-related purchases for 2,215,000 fishing days.[24] In the same 2011 report, wildlife-watching by 370,000 people brought in an estimated $288,507,000 through trip, equipment, and other expenditures. At 53%, Vermont has the highest participation rate of wildlife watching of any state.

Activity	Annual Visitor Expenditures/ Revenue Generated in VT
Visiting Lake-Based State Parks	$976,870 average per park[21]
Fishing	$131,223,000[23,24]
Wildlife Watching	$288,507,000[26]
Lakeshore Property Values	Up to $200 per foot frontage for each 1-meter increase in water clarity[30]

Table 1. Economic inputs provided by a few ecosystem services of Vermont lakes and ponds.

- **Property Values**

A study on the impact of water quality on lakefront property values in Maine, New Hampshire, and Vermont show a significant loss in property value as water quality degrades.[27] Cleared shores increase nutrient loading to the lake, degrading water quality. The study found that a decline in water clarity lowered lakefront property values – a potential loss of millions of dollars for a single lake.[27] Property value decline is not only a loss for the owner, but for a town's tax revenue.

In Vermont, realtors have reported that degraded water quality hurts lakeshore property values.

> *When we list a lakefront property, that's one of the main questions [water quality] because it does have a significant impact on the value. When people are looking, buyers want water they can swim in and use. You don't want to pay for something you can't use, because it's not cheap.*[29] **Evan Potvin, VT Real Estate Agent, quoted on VPR on August 18, 2009.**

- **Intrinsic Ecological Value**

The lakeshore is the interface between water and land, and critical to the health and future of the lake. Eighty to ninety percent of all lake life is born, raised and fed in the area where land and water meet.[33] Natural vegetation on the shore means the lake can function as an ecological whole and provide the full suite of natural values. It is much less costly to protect a lake's water quality in the first instance, through shoreland protection, than to have to pay to restore it after it is already degraded.

- **Flood Resiliency**

Vermont lakes are under increasing pressure from stressors – from climate change and the forecasted large rain events and subsequent flooding to the introduction of new aquatic invasive species. The resilience to ecosystem stressors that woodland shores provide is an economically valuable ecosystem service.

> *The number one way to build resilience to climate change for lakes is to expand and improve riparian vegetation. It is a win-win management strategy."*[34]
> **Dr. Steve Carpenter, Director of the Center for Limnology, University of Wisconsin**
> *2011 Laureate of the Stockholm Water Prize*

- **The Cost of Nutrient Loading and Habitat Degradation**

While the monetary value of some ecosystem services provided by Vermont lakes is described above, it is more difficult to quantify the true cost of their loss.[31] The following reiterates how nutrient loading and habitat degradation affects people and the lakes.[32]

Lower Property Values: There is a documented decrease in property values as water clarity decreases, as a result of sedimentation and nutrient loading.
Poor Fishing: Excess sediment and nutrients degrade fish habitat by decreasing water clarity and oxygen availability, and covering spawning grounds. Cleared shores reduce physical habitat diversity that fish rely on for cover and feeding.
Poor Aquatic and Shore Habitat: Naturally vegetated shores and the adjacent shallows are necessary for many native bird, reptile, amphibian and insect life cycles.
Nuisance Growth of Aquatic Plants and Algae: Nutrient laden sediments feed nuisance plant and algae growth.
Loss of Tourism: Highly eutrophic lakes are unattractive aesthetically and recreationally to residents and visitors.
Local Tax Impacts: Declines in property value decrease tax revenues, as costs increase to clean up sediment and restore degraded ecosystems.
Loss of Resilience: Intact, well vegetated shorelands are more resilient to flooding impacts and climate change. The value of resilience is difficult to quantify, but record flooding in 2011 caused millions of dollars in damage in Lake Champlain alone.

Current Shoreland Management Options

Many water resources management programs in the country use a balance of education and regulation.[35] In Vermont, preserving lakeshores depends entirely on voluntary landowner participation in lake-friendly development, with the exception of the small number of towns that have shoreland zoning. Education and outreach are key to gaining voluntary participation in lake-friendly development, Table 2 shows a range of education and outreach efforts used in Vermont to promote effective shoreland stewardship practices.

Education Outreach	Audience	Results
Financial Incentives *(to date primarily grants) to provide replanting or restoration of shorelands*	Lakeshore property owners Towns Regional planning commissions.	Piecemeal approach, ineffective way to protect longer or priority stretches of shoreland No guarantee for long term maintenance of any project
Conservation Initiatives (VT Land Trust or "Current Use" Program)	Landowners Lake Associations	An underused approach, perhaps hindered by the high value of developed shoreland property.
Partnership Approach	Volunteer lake monitors Lake associations Fed. of VT Lakes & Ponds Lake Champ Basin Program Lake Champlain Committee Regional planning commissions Natural Resource Conservation Districts Towns	All shoreland re-vegetation or runoff control projects are done and maintained on a voluntary basis. If lakeshore property changes hands, there is no guarantee how the property will continue to be managed. Lake Associations have asked for stronger state grant support.
Educational Curriculum	K-12 Grade Audience	Project WET, Water Education for Teachers, has trained 100s of teachers in lake science and issues.
Awards - Lake Wise Certification	Shoreland property owners	In 2013, Lake Wise Awards will recognize excellent lake stewards on properties using lake-friendly practices. Model lakeshore properties will be show cased with beautiful stewardship signs as a way to inspire other landowners to adopt better practices.
Other Efforts - Lake Seminar Tech. Assistance Newsletter	Lakeshore property owners Towns	Good communications statewide with a strong network of lake users.

Table 2. Several Vermont lakeshore protection education and outreach initiatives.

Current Non-Regulatory Programs – Education and Outreach

Below are three examples of current non-regulatory, education and outreach lake protection efforts.

- **FOVLAP - Buffers for Blue Lakes**

Formed in 1972, the Federation of Vermont Lakes and Ponds is a non-profit group of more than 80 lake associations. FOVLAP communicates with about 350 lake residents through their semi-annual newsletter, email notices, meetings, and annual events.

FOVLAP has made shoreland protection a priority. Their social marketing campaign encouraging lakeshore owners to protect their shores with native species plantings has received Watershed License Plate, Green Mountain Coffee Roasters, and Vermont Community Foundation grants, totaling about $10,000. They conducted a statewide survey of their members to learn how to best launch a campaign to protect lakeshores. In 2012, FOVLAP's "Buffers for Blue Lakes" campaign partnered with local lake and watershed associations, the Orleans County Natural Resources Conservation District, and the Northwoods Stewardship Center to offer the Northeast Kingdom Healthy Waters Workshops, including a workshop on lakeshore best management practices. A similar southern workshop was held at Lake St. Catherine in Poultney. At most of the FOVLAP Annual Lake Meetings (60-85 attendees with 25-40 lakes represented statewide), FOVLAP addresses the importance of mixed woody shoreland vegetation. For example in 2012, horticulturalist Charlie Nardozzi provided suggestions of native, edible species suitable for lakeshores.

Pros: FOVLAP members are well connected, informed and involved in lake issues and have helped spread the word about the value of protecting shorelands. They collaborate closely and productively with ANR's Lakes and Ponds Section and provide input and insight into statewide lake issues.

Cons: FOVLAP's outreach for lakeshore protection depends on busy volunteers; membership in lake associations is down; seasonal lake residents are changing from once being on the lake all summer to spending less time and being less involved in lake initiatives. Lake residents living year round on their lake do not participate as much as seasonal residents do in FOVLAP initiatives.[36] Education and outreach is a piece-meal incremental approach when relied on solely for shoreland protection.

- **Northeast Kingdom Lake Buffering Program-**
Orleans County Natural Resources Conservation District

With about $9,500 in Ecosystem Restoration Grant funds provided annually for four years, the Orleans NRCD has offered landowners native trees and shrubs for stabilizing and re-vegetating lakeshores. Dayna Cole, Program Director, says it has not been an easy sell, and over the last four years has planted trees on only eight sites.[37]

Pros: Landowners pay twenty percent of tree planting costs, which helps ensure that the trees will not get cut down right away; local technical assistance available to landowners; program has gained local recognition; and by enabling planting by a few shoreland owners, they can then influence their neighbors.

Cons: Slow going; spotty lakeshore protection approach; difficult to measure success.

- **Vermont League of Cities and Towns -**
Water Resources Coordinator

The Ecosystem Restoration Program has provided $50,000 in annual funding to the Vermont League of Cities and Towns (VLCT) to support a part-time Water Resources Coordinator. The Coordinator works with planning and conservation commissions and municipal staff to enhance their water quality protection zoning regulations. In 2011, the Coordinator developed a Model Lake Shoreland District Protection Bylaw. A technical paper accompanies the ordinance, explaining how towns can adopt the bylaw. The Coordinator's shoreland protection outreach efforts also have included offering a Municipal Shoreland Zoning Workshop at the 2011 Annual Vermont Lake Seminar.

Pros: The Water Resources Coordinator is an important voice for shoreland protection at the VLCT. The Model Lakeshore Ordinance has been written and promoted to towns interested in lakeshore protection.

Cons: The new model shoreland has been available since spring of 2011, but no towns have made use of it to date to complete adoption of a lakeshore ordinance. Currently only 14 percent of municipalities have adopted shoreland zoning that meets minimum standards for lake protection (see Figure 8 and Appendix 2). Twenty-five percent of towns in Vermont have no zoning at all. The coordinator's time for working on shoreland issues is limited as the coordinator also addresses river corridor and low impact development town ordinances.

Municipal Regulatory Programs

Current Status

Vermont law enables municipalities to conduct a wide range of regulatory and non-regulatory activities related to local land use planning.[38] Regulating at the municipal level grants towns flexibility to determine what, if any, ordinances best meet their land use needs.

As of 2009, according to the Vermont League of Cities and Towns, only 29 of the 136 towns within the Lake Champlain basin had adopted ordinances that protect water quality, but not all these ordinances cover lakeshore protection.[39] Statewide, about 15 percent of towns have a shoreland ordinance that includes an at least 50 foot naturally vegetated zone along the shore. Thirty-seven percent of towns have no zoning at all. Below are three case studies that show the diversity of shoreland zoning in Vermont.

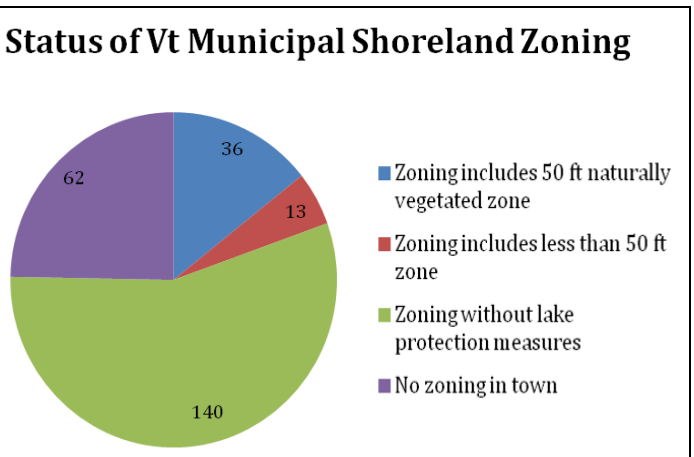


Figure 9. Number of Vermont Towns with Selected Municipal Shoreland Zoning Coverage. Less than 20 percent of towns in Vermont include requirements for natural vegetation along the shore. See Appendix 2 for further details.

Case Studies of Three Towns in the Lamoille Watershed

- **Greensboro - *Strong Zoning to Protect Water Quality***

The Town of Greensboro has established a Lakeshore District for Caspian and Elligo Lakes, with specifications for minimum lot size (1 acre), minimum lot width (100 feet), and minimum building setback (150 feet). In addition, there is also a vegetated buffer requirement of 75 feet (Table 4). The bylaws also specify a maximum house size of 2,500 square feet for newly constructed homes, rebuilt homes, or homes for which an addition is being built. In addition, there are setback and buffer requirements for Long Pond (300 foot setback, 100 foot buffer) and for Mud and Horse Ponds (50 foot setback, 50 foot buffer).

Within the buffer area (with the exception of Long Pond), existing healthy trees, shrubs, and ground cover need to be maintained and enhanced by selective cutting and pruning. No trees may be cut or brush cleared within 100 feet of Long Pond without the permission of the Planning Commission. For existing development within the vegetative buffer (e.g. a field, lawn, powerline, or access), such use may be maintained but not expanded, including lawns. The footprint of a nonconforming structure within the buffer may not be expanded.

The Zoning Board of Adjustment has the capacity to grant variances and as recently as July 2012, a variance was granted for the construction of a 26 by 28 foot garage within the established buffer area of Elligo Lake.[40] In addition, Greensboro residents have described violations to the buffer requirement that the town simply did not have the resources to enforce.[41]

- **Elmore - *Moderate zoning to protect water quality***

Elmore designates a shoreland district that includes all lands located within 500 feet of the shorelines of Lake Elmore, Little Elmore Pond, and Hardwood Pond. The shoreland district allows for compatible forms of development within the shoreland areas, "which will protect water quality and shoreland vegetation, minimize adverse impacts to the lakeshore environment, limit encroachments into public waters, and preserve both visual and physical access to and from the lake."

The Town of Elmore requires a one acre minimum lot size for Lake Elmore (five acres for Little Elmore and Hardwood Ponds), 150 feet minimum lot depth, a building setback of 40 feet (100 feet for Little Elmore and Hardwood Ponds), a maximum developed lot coverage of 10%, a minimum lake frontage of 125 feet (400 feet for Little Elmore and Hardwood Ponds), and a 40 foot vegetated buffer for Lake Elmore (100 feet for Little Elmore and Hardwood Ponds). Within the vegetated buffer, a minimum amount of clearing to accommodate permitted accessory structures is allowed, as is the removal of existing vegetation with approval from the Development Review Board. Clearing to create or enhance views, or to improve lake or pond access, may be permitted in accordance with a landscaping plan if the plan is designed to maintain water quality, prevent erosion, and enhance the visual character of the shoreline as viewed from the lake or pond. None of the provisions outlined specifically address nonconforming uses.

- **Eden** - ***No Zoning***

The Town of Eden includes shorelands on four lakes and ponds over 20 acres – Long Pond, Lake Eden, South Pond, and the northern-most tip of the Green River Reservoir. No zoning bylaws currently exist.

Town	Min. Lot Size	Min. Lot Width/ Frontage	Min. Bldg. Setback	Max. Lot Coverage	Min. Lake Frontage	Vegetated Buffer
Greensboro Lakeshore District (Lakes Caspian & Elligo only)	1 acre	100 feet	150 feet (Caspian & Elligo) 300 feet (Long Pond) 50 feet (Mud & Horse Ponds)	N/A	N/A	75 feet (Caspian & Elligo) 100 feet (Long Pond) 50 feet (Horse & Mud Ponds)
Elmore Shoreland District (Elmore Lake, Little Elmore & Hardwood Ponds)	1 acre (Elmore) 5 acres (Little Elmore & Hardwood Ponds)	150 feet	40 feet (Elmore) 100 feet (Little Elmore & Hardwood Ponds)	10%	125 feet (Elmore) 400 feet (Little Elmore & Hardwood Ponds)	40 feet (Elmore) 100 feet (Little Elmore & Hardwood Ponds); exceptions given per DRB approval
Eden	N/A	N/A	N/A	N/A	N/A	N/A

Table 3. Comparison of shoreland ordinances in three Vermont towns. Municipal shoreland ordinances vary greatly from town to town; some towns have no protective ordinances, and some provide

Conclusions

As demonstrated by the three case studies above, municipal level zoning can vary widely from town to town, and may or may not include provisions that protect lakes. Additionally, variances not in accordance with zoning bylaws may be allowed with the approval of the zoning board of adjustment. Local regulation poses the following challenges to achieving the goal of protecting the health of our lakes, which are public resources of statewide significance:

- ***There are a diversity of zoning ordinances.*** Although a town may designate a shoreland district, it might not include measures that protect lakes, such maintenance of shoreland vegetation.

- ***A single lake may fall under the jurisdiction of multiple towns***. There can be more than one municipality on a particular lake and those municipalities may have different shoreland zoning restrictions – or in some cases, no zoning at all.
- ***Zoning ordinances are likely to be ineffective for lakes with highly developed shorelands***. Addressing changes in existing uses is complex and ensuring the degree of non-conformance does not increase can become a contentious local issue.

- ***Zoning enforcement varies widely from town to town, and may change as the composition of the zoning board of adjustment changes.*** Even if a town has good standards to protect water quality in their zoning, waivers or variances can be granted, as illustrated by Greensboro.
- ***Towns may lack the resources required to properly enforce zoning bylaws.*** In some cases, towns may not have the funds or expertise available to enforce zoning regulations.
- ***Standards need not be applied, only considered during a review process.*** Even if a town has good standards for review of site plans or through a conditional use review process, the reviewing body could apply, somewhat apply, or not apply the standards as long as they were considered during the review process.
- ***Zoning is not static.*** Shoreland protection in town ordinances can be weakened at any time.

Federal, State, and Local Responsibility

● Federal Clean Water Act

Growing public awareness and concern for controlling water pollution led to the enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. The law prohibits the discharge of any pollutant from a point source into navigable waters, unless a permit is obtained. The Clean Water Act requires that state water quality standards be set for all contaminants in surface waters, and many of Vermont's water quality permit and enforcement programs address discharges. The Act also recognizes the need for planning to address the problems posed by nonpoint source pollution, including lakeshore erosion and property runoff to lakes.[42]

● Vermont Water Quality Standards

All surface waters in the state are public resources and are protected by the Vermont Agency of Natural Resources (VTANR). Vermont has established water quality standards for all surface waters—rivers, streams, lakes and ponds—to ensure that the waters continue to support uses like swimming, fishing, and aquatic habitat.

Classes of Vermont surface waters

All surface waters in Vermont are classified as either Class A or Class B. Class A waters (3% of state waters) are managed to maintain the highest quality standards of drinking water or ecologically significant wildlife and aquatic habitat. Most lakes are Class B waters, and water quality is managed to support swimming, fishing, boating, aquatic habitat and biota.

Numeric water quality standards

A numeric water quality standard is a maximum allowed concentration of a pollutant in water. Numeric standards are associated with each water classification. Specific standards for parameters such as pH, phosphorus, temperature, and turbidity can be found in the Vermont Water Quality Standards.[43] Lakes Champlain and Memphremagog are considered impaired due to phosphorus levels that exceed the standard.

Narrative water quality standards

A narrative water quality standard describes the acceptable conditions in or on the water, such as for swimming or aquatic habitat. These standards protect surface water uses such as swimming and aquatic biota from accelerated eutrophication, more than minor changes in condition, impairment of the biological community, and toxicity levels in fish for human consumption.

● Municipal Shoreland Management

In Vermont, municipalities may adopt shoreland regulations that set standards for lakeshore development. Currently, less than 20 percent of towns have shoreland zoning that provides some lake protection. The Vermont League of City and Towns (VLCT) has created a "Model Lake Shoreland Protection District Bylaw" for towns to use in establishing shoreland zoning.[44] The VT Department of Environmental Conservation, Regional Planning Commissions, and the VLCT provide technical assistance to towns interested in enacting such an ordinance.

● Agency of Natural Resources

The Agency is required to monitor, study, and assess lake conditions and to provide information and technical assistance to Vermonters. Within the Agency, the Shoreland Management Program supports policy decisions with science-based recommendations.[45] The *Vermont Lakes Shoreland Handbook* is in development and a new lakeshore stewardship awards program, Lake Wise, will start in 2013.[46] The Departments of Fish and Wildlife, and Forests, Parks and Recreation both promote vegetated shorelands for their value in supporting habitat and recreation.

Vermont Regulations with Limited Shoreland Jurisdiction

Several Vermont regulations provide minor coverage over shoreland development, but none offer adequate or comprehensive shoreland protection.

The Vermont Shoreland Encroachment Program has jurisdiction on projects (docks, walls, fill, and dredging) that fall below a lake's mean summer water level. The adjacent shoreland is covered only to the extent that it ties directly into the proposed project.

Act 250 rarely applies to shoreland projects as most shoreland development occurs one lot at a time and is thus sub-jurisdictional with respect to Act 250.

Stormwater Management Rules apply to construction projects that disturb more than one acre of soil, create more than an acre of impervious surface, or involve industrial facilities. These rules are designed to prevent and control erosion and reduce polluted water run-off from impervious surfaces. These rules rarely apply to smaller size lakeshore development or redevelopment projects and are not written for lakeshore management as they do not require set backs from surface waters or protect shoreland vegetation.

State Regulatory Programs - Three State Models of Lakeshore Regulations

Currently, Vermont has no statewide lakeshore protection rule (such a law was passed in 1969, but it was repealed in 1973).[47] In the following section, three states with lakeshore protection laws are described. These state models include varied approaches to administration, but all offer good examples for Vermont to consider. (For a listing of selected state shoreland protection standards, see Appendix 1.)

♦ **New Hampshire—Administered by State Agency** New Hampshire Department of Environmental Services (NHDES)

History of Shoreland Water Quality Protection Act

The SWQPA, originally named the Comprehensive Shoreland Protection Act, was enacted into law in 1991. The Act established minimum standards for the subdivision, use, and development of the shorelands along the state's lakes ten acres or greater. In 2008, the Act was amended to include limitations on impervious surfaces, new vegetation maintenance requirements, and the establishment of a permit requirement for many construction, excavation, and filling activities within the Protected Shoreland. In 2011 changes were made to the vegetation requirements within the natural woodland and waterfront buffers, the impervious surface limitations, and a new shoreland permit by notification process was adopted.[48] The Act is designed to meet many goals, including maintaining safe and healthy lake conditions; protecting fish spawning grounds, aquatic life, bird, and wildlife habitats; anticipating and responding to the impacts of development in shoreland areas; providing for economic development in proximity to waters; and preventing and controlling water pollution.[49]

New Hampshire Shoreland Regulations	
Number of Lakes	959 (>10 acres)
Regulation	Shoreland Water Quality Protection Act (SWQPA)
Setbacks and Vegetated Requirements	On all lakes > 10 acres, primary structures must be set back 50 feet from the lake and natural vegetation must be left growing within 250 feet of the lake. All shoreland protection rules apply within 250 feet of the shore.
Year Enacted	1991 (amended in 2008 & 2011, adding impervious surface rules)
Administered	Statewide by the NHDES
Other Restrictions	All fertilizers, except for limestone, are banned within 25 feet of shore

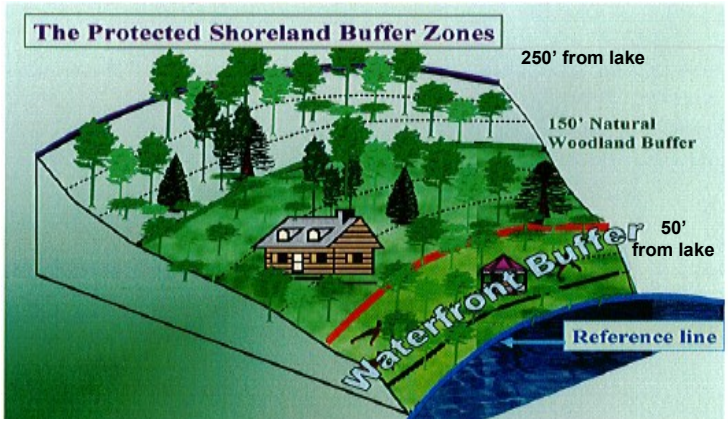


Figure 10. New Hampshire's Protected Shoreland Buffer Zone

How New Hampshire's Shoreland Act Works

New Hampshire has jurisdiction over land uses within 250 feet of the lake's edge and calls this area the Protected Shoreland Zone. Within this 250 feet of shoreland, there are two subzones, the Waterfront Buffer Zone, which extends 50 feet from the lake and the Natural Woodland Buffer Zone, which covers 50-150 feet from the lake; the remaining 50 feet and the two subzones make up the Protected Shoreland Buffer Zone.[49]

Waterfront Buffer Subzone Restrictions:

A grid system of 50'x50' is used to determine the appropriate density and type of vegetation within the Waterfront Buffer Zone. There must be a minimum of fifty points within a 50'x50' parcel. Points are determined by a tree's or a sapling's diameter at breast height (4 ½ feet) and the mix of groundcover and thickness of shrubs (ground cover and shrubs can not exceed 25% of the points). The number of required points is proportional to the grid size if less than 50'x50', and tree branches can be trimmed for views. A permanent pathway up to six feet wide leading to the lake is allowed as long as it does not contribute stormwater runoff, so paths that meander are more permissible than straight paths.

Natural Woodland Buffer Subzone :

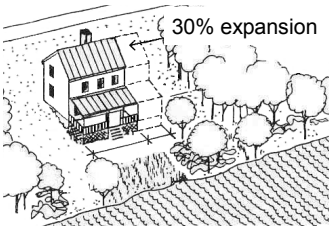
This area 50 to 150 feet from the water edge must be maintained with at least twenty five percent vegetation in an "unaltered state," meaning no trimming, pruning, limbing or mowing. Vegetation clearing for building construction is limited to 25 feet outward from the building, septic, and driveway.

The Protected Shoreland Zone:

Property owners who exceed 30 percent impervious surface coverage must have a Stormwater Management System designed by a certified engineer. Property owners who exceed twenty percent of impervious surface coverage (20 to 30 percent impervious) are required to

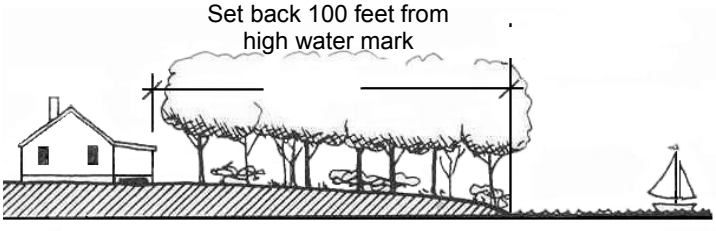
Maine Shoreland Regulations	
Number of Lakes	2,600 (>10 acres in size)
Regulation	Mandatory Shoreland Zoning Act
Setbacks and Vegetated Requirements	This Act establishes a statewide shoreland protection zone within 250 feet of Maine's rivers, wetlands, lakes and ocean. All structures must be set back 100 feet from the lake and cannot exceed 35 feet in height. There is a vegetative requirement and only 20 percent of the lot can be impervious. Minimum lot sizes for lakeshore are 200 feet by 200 feet.
Year Enacted	1971
Administered	Municipalities have Local Code Enforcement officers who administer and enforce the Shoreland Zoning Act. MDEP assists municipalities with shoreland zoning by providing technical assistance and training on shoreland zoning rules. The MDEP Shoreland Zoning Program offers an "on-call" toll free system to provide shoreland zoning assistance.
Other Restrictions	All site workers and construction contractors must be state certified to work within 250 feet of any surface water shore.

have a Stormwater Management Plan, which they must submit to NHDES, but do not necessarily have to have a certified engineer approve this plan. Within all zones, a permit from the NHDES is required for any construction, excavation or filling activities (with a few exceptions). The construction permits fees help pay for the enforcement by NHDES inspectors.



MDEP Shoreland Handbook

Pros: A lakeshore culture has developed around this law; people associate healthy lakes with wooded shores and a protected shoreland. The public supports the law to protect recreational opportunities and property values.[50] Recent amendments to the law strengthened lake protection by increasing the vegetative requirement and adding new impervious surface rules. The law is administered by the NHDES, ensuring its uniformity across the state. Good "Fact Sheets" are available.



Cons: Although the 2011 amendments clarify the 250 shoreland zone and what projects are and are not permitted, the law does not apply to existing landscaping. Owners of lots legally developed or landscaped before the amendments are not required to increase the area of natural vegetation. Some towns have adopted their own, slightly more lenient version of shoreland zoning with approval by NHDES.[47]

Diameter	Points
Under 2"	0
2" to < 4"	1
4" to < 8"	2
8" to < 12"	4
12" or >	8

Measure tree diameter at 4.5 feet from ground

♦ Maine—Administered by Municipalities

Maine Department of Environmental Protection (MDEP)

History of the Mandatory Shoreland Zoning Act

Originally passed in 1972, during the last 40 years changes to Maine's Shoreland Act have increased the set back building distance from 75 to 100 feet, and fortified the vegetative requirements. Their Act is designed to prevent and control water pollution, protect fisheries, and conserve natural beauty and shore cover.[51]

How Maine's Shoreland Zoning Act Works

Shoreland zoning regulations are based on standards developed by MDEP and administered and enforced by each municipality through locally adopted ordinances. The local "Code Enforcement Officer" is the contact for shoreland zoning questions. Three Shoreland Zoning Staff at MDEP assist municipalities with shoreland zoning questions and issues, and provide technical assistance and training to the Code Enforcement Officers. MDEP staff are available to the public through a toll free number and they list all the Municipal Shoreland Ordinances on their web site.

The *Maine Shoreland Zoning Handbook for Shoreland Owners*[51] explains the Shoreland Act with graphics illustrating for landowners and local Code Enforcement Officers the development allowed within the 250 foot shoreland zone. As shown above, shoreland owners can expand their home, but not more than 30 percent; the addition must not encroach towards the lake, but be built on the side or back of the existing structure.

The vegetation requirement follows a "Diameter at Breast Height" point system for determining the amount of vegetation within a 25 foot by 50 foot section. Within this plot there has to be a minimum five saplings and

vegetation under three feet can not be cut. Also, openings in the tree canopy can not be greater than 250 square feet and meandering paths can not be wider than six feet. According to Rich Baker of MDEP, this grid system is very easy for a landowner to understand which allows landowners to manage their own property.[53] New Hampshire based their grid system after Maine's in 2011.

Pros: Maine's law is easy to follow and reflects the state's 40 year history of fine-tuning, making it simple and more effective at protecting water quality and shoreland habitat.

Cons: MDEP staff have had some issues with the local administration and enforcement, and staff have commented that if it were state administered it might be more efficiently run.

- **Wisconsin - Administered by Counties**

Wisconsin Department of Natural Resources (WDNR)

Wisconsin Shoreland Regulations	
Number of Lakes	15,000 (>10 acres ?)
Regulation	The Shoreland Zoning Ordinance
Setbacks and Vegetated Requirements	The Shoreland Zoning Ordinance (NR 115) establishes statewide shoreland zoning standards on lands 1,000 feet from the ordinary high water mark, which mandate a 75 foot set-back for all structures and prohibit clear-cutting of trees and shrubs 35 feet from the lake (with the exception for a 30 foot wide path, for every 100 feet of shoreline, down to the water.) Every county in the state must adopt at least these minimal statewide shoreland regulations.
Year Enacted	1968
Administered	By counties
Other Restrictions	A 2009 ban on phosphorus in lawn fertilizer.

History of the Wisconsin Shoreland Zoning Ordinance

Since 1968, Wisconsin has required counties to adopt ordinances on shoreland zoning that include setbacks of structures from the water's edge, minimum lot sizes on new subdivisions, and restrictions on clear-cutting of trees in the nearshore area. Additional zoning guidelines have been added on a county-by-county basis to address the kinds of developments, improvements and modifications those communities were experiencing.

How Wisconsin's Shoreland Ordinance Works

All counties in the state must adopt shoreland zoning ordinances to protect the navigable waters of the state. The "shoreland zone" is defined as the area within 1,000 feet of a navigable lake or pond. These ordinances require owners to maintain safe and healthful conditions; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control placement of structures and land uses; and reserve shore cover and natural beauty.[54] County ordinances may be more restrictive than the state standards, but not less.

Lot size standards depend on the sewage system. Lots served by a public sewer system must have a minimum average width of 65 feet and a minimum area of 10,000 square feet. Unsewered lots (lots using on-site systems) must have a minimum average width of 100 feet and a minimum area of 20,000 square feet. Buffer strip rules vary according to the zone. The clear-cutting of trees and shrubs is not allowed in the strip of land from the ordinary high water mark to 35 feet inland. One exception exists for a 30 foot wide path down to the water, allowed for every 100 feet of shoreline.

All buildings and structures must be set back at least 75 feet from the high water mark. Structures can not be more than 35 feet in height. There is a provision for the grandfathering of homes (legal non-conformities), which allows for the continued use of those homes that were built before the Ordinance took effect. This only allows for the grandfathering of homes in violation of the setback requirements, not the buffer strip rules. Each county must address nonconformities through limiting or prohibiting additions, structural alterations, and/or repairs. The intent is that all nonconformities shall eventually be brought into conformity with the ordinance.[55]

Pros: Wisconsin is a large state with many lakes, and county-administration of state shoreland standards is most effective. The vegetative requirements apply to all shoreland homes, regardless of the year built.

Cons: Although updates to the shoreland law have been written, they have been put on hold for the last few years. Amendments to better protect lakes from large rain events, increased impervious surfaces, and habitat degradation are being considered. The exception for a 30 foot wide cleared path to the water's edge for every 100 feet of shore lessens the vegetative protection of the lake.

Conclusions from the review of other state regulations

Municipal or county administration of a shoreland regulation keeps the cost to the state down, but transfers that cost to the local entity and may result in inconsistencies in effectiveness and enforcement.

States with shoreland protection standards have nurtured a lake culture where lake users accept and support vegetated lakeshores because they associate them with healthy lakes. Washington, Minnesota, Wisconsin, Michigan, New York, Quebec Province, and all the New England states besides Vermont have shoreland regulations.

Good education and outreach is a critical to maximizing compliance. Maine and New Hampshire offer internet resources and fact sheets that explain how their shoreland law works. The Maine Shoreland Owner Handbook makes it easy for a shoreland owner to understand how to manage their property.[56]

Best Management Practice	Comments
Vegetated protective zone – an area of mixed native vegetation along the shore, made up of trees, shrubs, groundcover, and duff (decomposing material)	***The single most important shoreland management tool.*** The multiple layers of vegetation, the absorbent duff layer and the natural uneven ground all contribute to filtering and infiltrating sediments and phosphorus from runoff and ensuring that only clean water reaches the lake. The variety of root structure, depth and mass hold the soil together and prevent erosion. Fallen trees, branches and leaves all provide essential habitat structure in the shallow water.
Erosion control standards during construction	The construction period can be a time of significant sediment runoff into the lake unless simple erosion control measures are followed.
Placement of buildings 25 ft uphill of the vegetated protective zone	Ensures that construction equipment does not encroach on the protective zone.
Standards that address existing, non-conforming uses	Typically, a regulation does not require any action to reduce the degree of non-conformance unless a change in use is proposed for the property. When a change or increase in use is proposed, it is usual to require the degree of non-conformance not be increased. In addition, mitigation measures can reduce the impact of a change (for instance a home can be enlarged in exchange for planting along the shore).
Minimum lot sizes and lake frontage when new lots are being cre-	To ensure adequate space for a vegetated protective zone and setbacks and well-functioning on-site septic systems.
Low-impact development standards for the developed portion of the property	To reduce runoff into the protective zone, increasing its effectiveness. Measures could include a limit on impervious area, driveway standards, infiltration requirements.

Table 4. Best management practices for shorelands. Regulations in other states, the Vermont League of Cities and Towns model shoreland ordinance,[57,58] and VTANR management recommendations contain these recommendations for shoreland to protect water quality and habitat, provide bank stability and scenic values.

Chapter Four - Shoreland Protection and Restoration Recommendations

This report highlights the role naturally vegetated and well-managed lakeshores play in the long-term prosperity of lakes and ponds. Vermont's lakes are a valued resource for recreation, the economy, and the natural landscape. However, Vermont's shorelands are in substantially poorer condition than lakes in the northeast eco-region and in the nation. Comparing Vermont's current shoreland management practices to other northeastern states' programs reveals a major gap in Vermont's management program, that of uniform and required standards for shoreland development. The VANR concludes that the current shoreland management approach in Vermont, education, outreach, technical assistance and voluntary municipal participation, is not providing adequate management and protection of our lakes. Ensuring the long term health of Vermont lakes and continued enjoyment of them requires new approaches and standards to protect and restore woodland shores.

This report finds that:

1. 82% of Vermont's shorelands are in poor or fair condition due to clearing of native woodlands.
2. A shoreland cleared of natural vegetation results in:
   - Increased phosphorus and sediment runoff (the primary pollutants to Vermont lakes) both during and after development.
   - Degraded shallow water habitat.
   - Erosion caused by lawns down to the water's edge.
   - Bank instability during floods, as illustrated on Lake Champlain and other lakes in the spring of 2011.
   - Increased likeliness of algae growth, mucky bottoms, and nuisance plant growth.
3. Healthy lakes generate millions of dollars annually for the Vermont economy and private property maintains highest value when water quality is good.
4. Well-vegetated shorelands provide flood resilience and play an essential part in buttressing Vermont's water resources against the effect of climate change.
5. Education, outreach and technical assistance, while essential, cannot alone provide adequate protection of the shorelands and lakes.
6. Less than 20 percent of towns have ordinances to protect lakeshores, which vary in effectiveness. Adoption of good local shoreland zoning has progressed very slowly over the past 40 years.
7. Act 250 has jurisdiction over only a very small percentage of shoreland development; most shoreland development takes place one lot at a time. Likewise, the vast majority of shoreland development is subjurisdictional to the Stormwater Management Rules as the developed area is usually less than an acre.
8. Vermont lags behind other New England states and the nation in terms of shoreland condition. Accordingly our lakes are more threatened by phosphorus and sediment runoff from shoreland areas, habitat degradation, and flood damage.
9. It is far more effective both in cost and in functionality to prevent a problem rather than trying to restore water quality or habitat after damage is done.

The VTANR concludes that a new approach is necessary if Vermont is to adequately protect lake water quality, habitat, recreational use, the tourism economy, and property values. Vermont legislators have an opportunity to not only protect Vermont lakes from further degradation, but to strengthen the uses and values they hold for all Vermonters. VTANR provides these three options for protection and restoration of shorelands and lakes.

Three Regulatory Management Options:

***State administered option*:** The Agency would adopt standards via rule making and administer a statewide permit program. Similar to Act 250, the extent of state jurisdiction in a town could vary depending on the existing ordinances in town.

***Enhanced local option*:** Set minimum standards that the municipalities can choose to administer themselves. This option may be attractive to the twenty percent of towns that already have protective shoreland zoning, or that want to add to the state minimum standards to reflect local priorities. The Agency would administer the standards through a permit program for municipalities that choose not to do so themselves.

Municipality administered option: The state sets minimum standards that municipalities must incorporate into their zoning ordinances. The state could provide technical assistance to towns administering the ordinance. The state would administer the minimum standards in the 94 towns which have no zoning and are therefore not set up to administer an ordinance.

Paying for a statewide shoreland permit program

The VTANR estimates there would be annually 75 proposals for development on undeveloped shores, and 675 proposals for redevelopment of existing developed shores in Vermont. Under the permit administration options outlined above, the following program costs and revenues are identified.

***State administered option*:** A permit fee as low as $250 per application review would cover the state's costs.

***Enhanced local option*:** Under this option the state would administer shoreland development applications in towns that choose not to adopt that state standards and provide technical assistance to those towns that are administering ordinances. Assuming that twenty percent of towns would manage an ordinance locally, fee revenue from the remaining towns would support administration of the program including technical assistance.

Municipality administered option: The state sets minimum standards that municipalities must incorporate into their zoning ordinances. The state would administer the minimum standards in towns which have no zoning. The state would administer the standards and collect fees only in towns without zoning.

Non-Regulatory Options

While VTANR concludes that a shoreland program relying solely on education, outreach and technical assistance is not adequately protecting Vermont lakes, such programs are a necessary component of any program, regulatory or not. The following elements are therefore recommended.

- Encourage and enable shoreland conservation projects that preserve undeveloped lakeshores.
- Evaluate a use value appraisal-type tax credit for establishing or protecting a wooded lakeshore and to reward landowners for maintaining a naturally vegetated shore.
- Support education and outreach efforts, such as the Agency's Lake Wise Program and the Lakes and Ponds Section literature and website materials.
- Continue to support the Vermont League of City and Towns lake protection technical assistance to towns.
- Establish a "green" certification program for contractors to provide training on water resource protection measures such as vegetated shorelands and erosion control during construction.
- Continue Agency individual site visits, as requested, to provide recommendations regarding shoreland management or restoration.
- Continue to fund lake events and technical assistance projects that promote and demonstrate shoreland restoration and protection. Partner with external organizations, such as the Vermont Federation of Lakes and Ponds, the Natural Resources Conservation Districts, and the Regional Planning Commissions.

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Appendix 1. Comparisons of Selected State Shoreland Regulations

State *(Width of State Shoreland Zone)* **# of lakes** Date of Enactment	**Protective Vegetation Requirement**	**Setback for Structures**	**Minimum Lot Size**	**Can Towns Adopt Less Strict Requirements?**	**Enforcement of Shoreland Zoning**
Vermont **292 > 20 acres**	0	0	0	–	There are no statewide shoreland regulations, but towns are authorized to adopt them if they choose. Towns with municipal shoreland zoning rules (~20%) often have a difficult time enforcing them
Maine *(250 feet)* **2,600 > 10 acres** 1971	Yes	125' (100 foot setback for soil disturbance)	200'x200' for new construction	No	75-80% of towns adopt the state's model ordinance verbatim, other towns make minor changes that MDEP must approve. Local Code Enforcement Officers administer and enforce zoning. MDEP has five regional Shoreland Specialists to technically assist the public and Code Enforcement Officers.
New Hampshire *(250 feet)* **959 > 10 acres** 1991 (revised in 2011)	Yes (vegetation requirements for all of shoreland zone -250 of shore)	50'		No	Statewide by the NHDES
Massachusetts *(100 feet)* **600 > 10 acres** 1983	Determined by required review.	Determined by required review	Determined by required review	Yes. Local Conservation Commissions can approve all work projects within the 100' shoreland zone if they decide there will be no adverse affect to the lake bank.	The State Wetlands Protection Act designates a 100 foot buffer zone, providing a regulatory mechanism to require review of all projects within this zone. Less review is done for projects 50-100 feet from the protected water resource area if the slope within the buffer zone is not steeper than 15% and no more than 40% of the buffer zone is impervious surface. All review and enforcement is done by Municipal-volunteer Conservation Commissions. Mass DEP Circuit Riders assist Conservation Commissions.
Rhode Island *n/a* 1971	Yes, within 50' of lakeshore, must avoid and minimize alterations in canopy. Can clear 15' width without permit.	50'	Determined by required review	Must demonstrate in permit request to RIDEM that any changes minimize possible impacts.	Approval of RI Dept. of Environmental Mgt. is required for projects on ponds greater than three acres. Must get permit to build within 50' and must avoid and minimize alterations within 50'. RIDEP Freshwater Wetlands Program is responsible for enforcement.
Connecticut *n/a* **2,267 > 1 acre** 1972	Determined by required review	Determined by required review	Determined by required review	No	The state requires all municipalities to establish a wetlands agency and all permits are done through that local agency. Municipal regulations must be in conformity with the Commissioner's Regulations, including the Wetlands and Watercourses Act.

Appendix 1. Comparisons of Selected State Shoreland Regulations, continued

New York – Adirondack Park **7,849 (statewide)** **1973 (APA)**	Not state-wide, but APA has vegetative requirement in park.	50 -100' within Adirondack Park Agency (No statewide setback)	50-200' minimum lot width Adirondack Park, with options for "clustering" development.	Yes, but must appeal to local government or to APA for any changes.	Adirondack Park Agency (APA) (State Attorney General's Office)
Wisconsin *(1000 feet)* **15,000** 1968 (revised in 2010)	Yes 35' vegetative requirement back from lake's ordinary high water mark [OHWM].	75'	Yes Sewered lots minimum width size of 65' and minimum area of 10,000 sq ft; unsewered lots minimum width 100' and min area of 20,000 sq ft.	No	The statewide shoreland zoning standards under Chapter NR 115 are implemented by counties and generally apply only to unincorporated land that is within 1,000 feet of the ordinary high water mark of a lake, pond, or flowage. These minimum state standards establish setbacks and vegetative rules for each county.
Minnesota *(1000 feet)* **11,842 > 10 acres** 1969	Yes For some Lake Classifications and Shoreland Zones	200'	Yes Lot size depends on the lake class (Natural, Recreational, or General); municipal or private septic; and Land Use District Rules.	Yes Local zoning ordinances regulate vegetation removal depending on the shoreland zone.	Towns administer and enforce shoreland zoning with assistance from Minnesota Dept of Natural Resources
Washington *(200 feet)* 1972	Determined by required review.	Determined by required review.	Determined by required review.	Yes Towns can determine their own requirements, but they must have state approval for determining setbacks or vegetation removal. Based on land use and local ecology there can not be any net loss of shoreline ecological functions for development to occur.	State regulates the adoption of regulations by local governments and local governments enforce their regulations.
Quebec Province **>500,000** 2002	Yes Minimum buffer of five meters seems to be the mandate in the Environment Quality Act.	No Local municipalities must get Minister approval for any project on lakeshore, including redevelopment	No Local municipalities must have Minister approval for all lakeshore development projects.	Yes Local municipalities can ask Minister of Development for changes to lakeshore vegetation requirements.	Local municipalities determine setbacks and lot size with approval from Minister of Development. Municipalities issue permits for small-scale projects under the Act Respecting Land Use Planning and Development. The Minister of Development of the Environment and the Parks issues permits for public/ commercial/industrial projects under the Environment Quality Act.

Appendix 2 - Vermont Municipal Shoreland Ordinances

This information is a compilation from records at VT Department of Environmental Conservation and the Vermont League of Cities and Towns. We apologize for any mistakes it may contain.

Town	Lake(s) 20 acres or larger	Lakeshore buffer width	Building setback from water's edge
Addison	Yes	-	100 ft
Albany	Y	-	-
Alburgh	Y	-	-
Andover		-	-
Arlington		-	-
Athens	Y	-	-
Averill	Y	50 ft	100 ft
Averys Gore		50 ft	100 ft
Bakersfield		-	100 ft
Baltimore		-	-
Barnard	Y	50 ft	50-100 ft
Barnet	Y	-	100 ft
Barre City		n/a	-
Barre Town		-	50 ft
Barton	Y	-	25 ft
Belvidere		-	-
Bennington	Y	-	50 ft
Benson	Y	-	75 ft
Berkshire		-	yes
Berlin	Y	-	75 ft
Bethel		-	-
Bloomfield		n/a	-
Bolton		50-100 ft	50-200 ft
Bradford		-	35-50 ft
Braintree		-	100 ft
Brandon		-	yes
Brattleboro	Y	n.a	50-100 ft
Bridgewater		n/a	-
Bridport	Y	-	-
Brighton	Y	30 ft	-
Bristol	Y	-	50 ft
Brookfield	Y	-	75 ft
Brookline		n/a	-
Brownington	Y	-	-
Brunswick	Y	-	-
Burlington	Y	-	50-250 ft
Cabot	Y	50 ft	75 ft
Calais	Y	50 ft	150 ft
Cambridge		-	-
Canaan	Y	-	50 ft
Castleton	Y	-	-
Cavendish	Y	-	-
Charleston	Y	-	-
Charlotte	Y	-	100 ft
Chelsea		-	35 ft
Chester		-	-

Town	Lake(s) 20 acres or larger	Lakeshore buffer width	Building setback from water's edge
Chittenden	Y	-	-
Clarendon		-	-
Colchester	Y	100 ft	100 ft
Concord	Y	-	35 ft
Corinth		n/a	-
Cornwall		n/a	-
Coventry		-	-
Craftsbury	Y	-	-
Danby	Y	-	-
Danville	Y	-	-
Derby	Y	-	25 ft
Dorset	Y	50 ft	50 ft
Dover		n/a	?
Dummerston		n/a	50 ft
Duxbury		n/a	-
East Haven		-	-
East Montpelier	Y	?	?
Eden	Y	-	-
Elmore	Y	40-100 ft	40-100 ft
Enosburg		-	-
Essex	Y	150 ft	150ft
Essex Junction		n/a	?
Fair Haven	Y	n/a	50 ft
Fairfax	Y	-	-
Fairfield	Y	-	75 ft
Fairlee	Y	-	50 ft
Fayston		n/a	?
Ferdinand	Y	50 ft	100 ft
Ferrisburg	Y	-	80 ft
Fletcher	Y	40 ft	40 ft
Franklin	Y	-	25-50 ft
Georgia	Y	50 ft	50 ft
Glastenbury		-	-
Glover	Y	-	-
Goshen	Y	-	-
Grafton		-	-
Granby	Y	-	-
Grand Isle	Y	75 ft	75 ft
Greensboro	Y	50-300 ft	150 ft
Groton	Y	-	40 ft
Guildhall		n/a	75 ft
Guilford	Y	-	-
Halifax	Y	-	75 ft
Hancock		-	-
Hardwick	Y	25 ft	75 ft
Hartford	Y	30 ft	-
Hartland	Y	-	-
Highgate	Y	-	10 ft
Hinesburg	Y	-	75 ft
Holland	Y	-	-
Hubbardton	Y	25 ft	25 ft

Town	Lake(s) 20 acres or larger	Lakeshore buffer width	Building setback from water's edge
Huntington		n/a	-
Hyde Park	Y	-	100 ft
Ira		n/a	-
Irasburg		-	-
Isle la Motte	Y	-	-
Jamaica	Y	-	-
Jay		n/a	-
Jericho		-	-
Johnson		-	-
Killington	Y	150 ft	200 ft
Kirby		-	-
Landgrove		n/a	-
Leicester	Y	-	75 ft
Lemington		n/a	50 ft
Lewis	Y	50 ft	100 ft
Lincoln		n/a	25 ft
Londonderry	Y		
Lowell	Y	-	-
Ludlow	Y	-	50 ft
Lunenburg	Y	-	-
Lyndon	Y	-	-
Maidstone	Y	25 ft	25 ft
Manchester			50 ft
Marlboro	Y	50 ft	75 ft
Marshfield	Y	25 ft	75 ft
Mendon		n/a	150
Middlebury		-	25-100 ft
Middlesex	Y	25 ft	75 ft
Milton	Y	25 ft	50 ft
Monkton	Y	-	-
Montgomery		n/a	-
Montpelier	Y	n/a	-
Moretown		-	25 ft
Morgan	Y	-	20 ft
Morristown	Y	-	50 ft
Mount Holly		-	-
Mount Tabor		-	-
Newark	Y	-	-
Newbury	Y	10 ft	100 ft
Newfane	Y	-	75 ft
Newport City	Y	-	-
Newport Town	Y	-	-
North Hero	Y	25 ft	75 ft
Northfield		-	-
Norton	Y	-	-
Orange	Y	-	-
Orwell	Y	50 ft	50 ft
Panton	Y	-	-
Pawlet		n/a	-
Peacham	Y	50 ft	-
Peru		-	-

Town	Lake(s) 20 acres or larger	Lakeshore buffer width	Building setback from water's edge
Pittsfield		n/a	-
Pittsford	Y	-	-
Plainfield		-	-
Plymouth	Y	50 ft	75 ft
Poultney	Y	-	50 ft
Pownal	Y	-	50 ft
Proctor		-	-
Putney		-	50-100 ft
Randolph		-	50-200 ft
Reading	Y	50 ft	50 ft
Readsboro	Y	-	-
Richford		-	-
Richmond	Y	-	50 ft
Ripton		-	-
Rochester		-	-
Rockingham	Y	-	-
Roxbury		-	-
Royalton	Y	-	-
Rutland City		-	-
Rutland Town	Y	-	-
Rupert		n/a	-
Ryegate	Y	50 ft	100 ft
Salisbury	Y	-	25-100 ft
Sandgate	Y	-	100 ft
Searsburg	Y	-	-
Shaftbury	Y	~50 ft	50 ft
Sharon	Y	-	-
Sheffield	Y	-	-
Shelburne	Y	100 ft	100 ft
Shoreham	Y	-	20 ft
Shrewsbury	Y	-	100 ft
Somerset	Y	-	-
South Burlington	Y	-	-
South Hero	Y	-	75 ft
Springfield	Y	-	25 ft
St Albans City		-	-
St Albans Town	Y	50 ft	75 ft
St George		n/a	-
St Johnsbury		-	-
Stamford	Y	-	-
Stannard	Y	-	-
Starksboro		100ft	-
Stockbridge		n/a	10 ft
Stowe	Y	200 ft	50-200 ft
Strafford	Y	-	200-400 ft
Stratton	Y	-	-
Sudbury	Y	25-50 ft	-
Sunderland	Y	-	-
Sutton	Y	-	-
Swanton	Y	50 ft	50 ft
Thetford	Y	-	-

Town	Lake(s) 20 acres or larger	Lakeshore buffer width	Building setback from water's edge
Tinmouth	Y	-	50 ft
Topsham		-	-
Townshend	Y	-	-
Troy		n/a	-
Tunbridge		-	-
Underhill		-	100 ft
Vergennes		n/a	-
Vernon	Y	-	-
Vershire		-	10 ft
Victory		-	-
Waitsfield		n/a	-
Walden	Y	-	-
Wallingford	Y	-	-
Waltham		-	-
Wardsboro		-	-
Warners Grant		n/a	100 ft
Warren	Y	50-100 ft	100 ft
Warrens Gore	Y	50 ft	100 ft
Washington	Y	50 ft	?
Waterbury	Y	-	-
Waterford	Y	-	-
Waterville		-	-
Weathersfield	Y	50-100 ft	50-100 ft
Wells	Y	-	-
West Fairlee	Y	-	-
West Haven	Y	-	200 ft
West Rutland		n/a	-
West Windsor		-	50 ft
Westfield		n/a	50 ft
Westford		100 ft	100 ft
Westminster		-	50 ft
Westmore	Y	15 ft	50-100 ft
Weston	Y	-	-
Weybridge		-	-
Wheelock	Y	-	-
Whiting		n/a	-
Whitingham	Y	-	125 ft
Williamstown	Y	-	-
Williston	Y	150 ft	150 ft
Wilmington	Y	-	-
Windham	Y	-	-
Windsor	Y	50 ft	50 ft
Winhall	Y	-	200 ft
Winooski	Y	-	-
Wolcott	Y	100 ft	25-150 ft
Woodbury	Y	50 ft	100 ft
Woodford	Y	-	50 ft
Woodstock		-	50 ft
Worcester	Y	-	-