Saving our Watershed

Hi, I am Kate Kelly from Lewis Creek Association and LCA’s South Chittenden River Watch volunteer water quality monitoring program. I want to talk to you about how we can take better charge of our lake’s future by using a watershed approach. We have been learning about our water quality over the years, and want to share this information with you, and invite you to network with us as we work to better achieve an ALL IN approach. We invite you to join LCA, where we can best coordinate and decide how to encourage more action and engagement at all levels of our communities.

Lake Champlain is an important and valued resource to Vermonters. The 2017 Clean Water Report by the Vermont State Treasurer says that $300 million is raised in tax revenues and fee revenues from tourism each year. This number (tourism) is only a portion (about 1/5) of what we bring in in revenue because of our clean lake and natural resources.

A polluted Lake Champlain is costly to all taxpayers, rich and poor, and may be costly for generations to come. Recently, we have been losing money from tourism and decreased property values, as well as from lake clean-up expenses by failing to slow down our rate of phosphorus loading to Lake Champlain. “The 20-year total clean water compliance costs are projected to be $2.3 billion” ($115 million per year) according to the VT State Treasurer’s 2017 Clean Water Report.

Lake Champlain is in trouble. We must be "ALL IN."

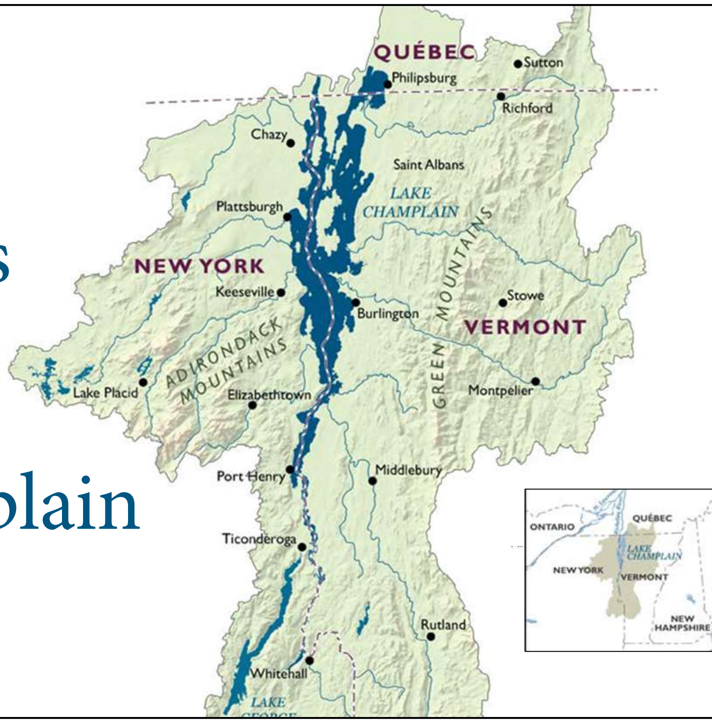
We must work at every level, from property owners to municipalities to the state, to restore the health and functioning of our watershed. We're going to need everyone to pitch in, because what we do on all of our properties and in our towns throughout the watershed, will determine our rate of success in restoring the health and beauty of Lake Champlain. Your help is essential.

How phosphorus gets into the lake

We have phosphorus rich clay soils in the Lake Champlain basin. During rain events, both fertilizer, manure and these tiny clay soil particles that bind to soil phosphorus are carried the farthest and fastest, leading to excessive phosphorus in our stream and lake waters. The smallest amount of bare soils can lead to erosion that transports this soil to Lake Champlain. Phosphorus provides the bulk of food for algae. This then results in excess algae growth including potentially toxic blue-green algae (cyanobacteria), and fish kills.

8,234

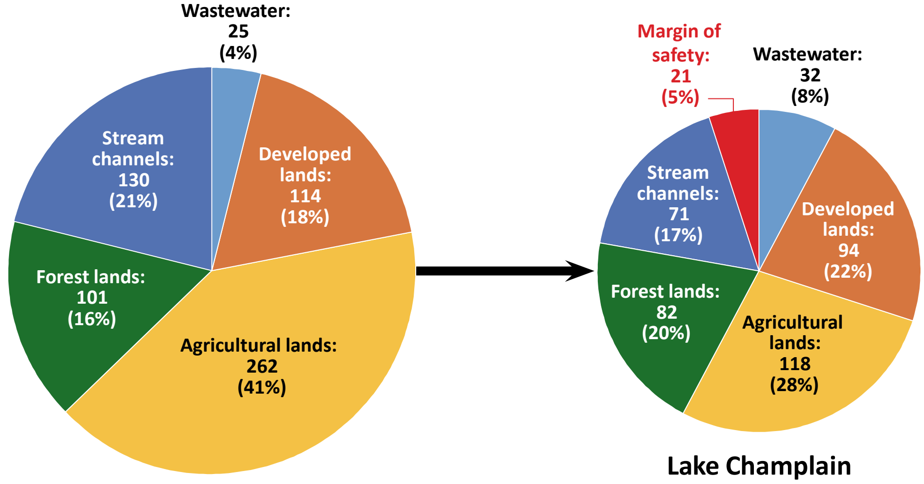
square miles of land drain into Lake Champlain



lake champlain basin program

Champlain Valley streams drain a very large land mass to Lake Champlain. The watershed that feeds Champlain is 18 times as large as the lake itself. Rainfall and snowmelt wash over this large land mass and carry sediments, nutrients, and pollutants into our rivers and streams, and on down to Lake Champlain.

Where the phosphorus comes from



Vermont portion of the Lake Champlain Basin: 631 metric tons/year

Lake Champlain TMDL target: 417 metric tons/year

Vermont contributes 631 metric tons of phosphorus to the lake per year. Agriculture and development contribute the most to phosphorus loading. Developed land contributes 18% of the phosphorus load, and agriculture contributes 41% of the phosphorus load. In order to meet our phosphorus reduction targets to improve lake water quality, we need to reduce phosphorus by about 30%, with the largest and most cost effective reductions coming from agriculture.

Past management of streams contributes to erosion and flooding today

Straightening rivers and armoring banks was done mistakenly to “save” farm fields and back yards. It caused water to flow faster, which led to more flooding downstream, more carrying of sediments, and more damage to property because of the force of flood waters. In this slide, on the left you can see a naturally sinuous stretch of the LaPlatte River in Hinesburg, near O’Neil Road and Shelburne Falls Road. On the right, you see a straightened stretch of the LaPlatte, near Silver St. and Charlotte Rd. in Hinesburg. Of the reaches that have been assessed in the LaPlatte watershed (66 miles), 14 miles were mapped as straightened (~21% of assessed sites).

More frequent flooding

Flooding is much more common now because of climate change, more rainfall, more rain in the winter, and larger heavier storms. The vast majority of phosphorus reaches the lake during these major storm water events. With more heavy rainfalls, water soluble phosphorus fertilizer and phosphorus rich clay soils more readily wash off and erode farm fields into surface waters. So, in our very large Lake Champlain drainage area, clay soils, past management practices, more development, and heavier storms are accelerating the rate of phosphorus and other pollution reaching the lake.

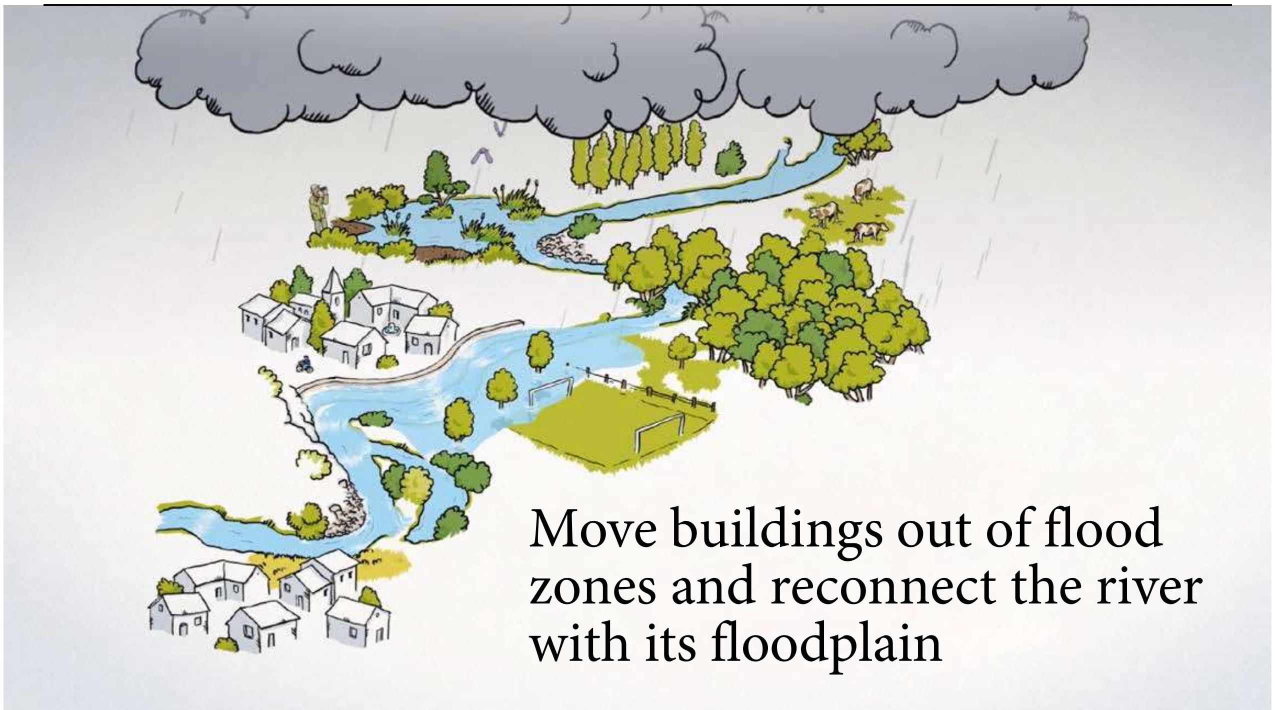
Solutions to lake pollution must occur throughout our watershed.

Because our river systems are so connected to lake health, solutions to lake pollution must occur throughout our river systems including their upslope watersheds - it takes an ALL IN watershed approach. This watershed approach is complemented by Vermont's enhanced and science-based river management practices.

We will watch a brief video that shows three river management principles. Each new strategy is shown first, followed by the historic stream alteration that it replaces, and why this replacement is important.

Three River Management Principles

I'll now review those three river management principles.

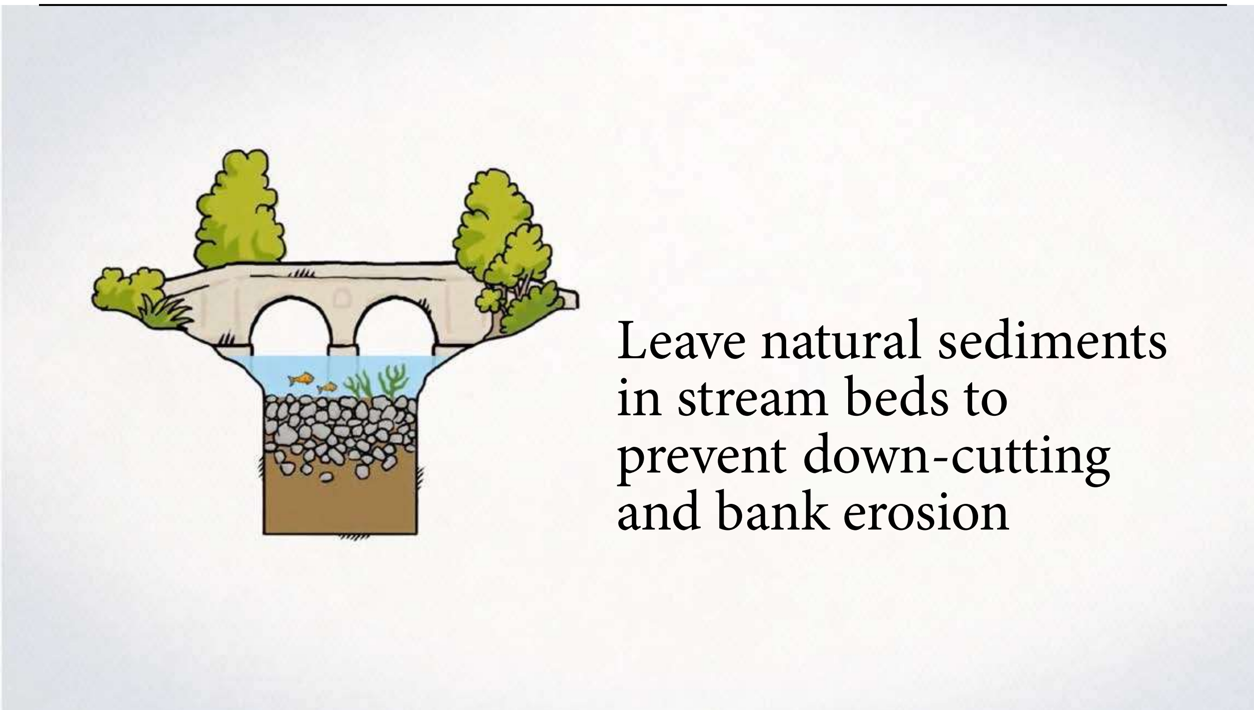


Move buildings out of flood zones and reconnect the river with its floodplain

We must allow natural floodplains to work by slowing flows and attenuating sediments. When this happens, phosphorus-rich clay soil can settle out onto floodplain lands, delivering nutrients to floodplain plants that enrich habitat instead of carrying them to the lake.

Fully functioning river corridors and floodplains allow more stream flow water to ‘stay local’, soak into the ground and recharge the local groundwater supply.

Stream water and sediment flows slow down when streams meander naturally.
By increasing meanders and the stream length over the slope of its watershed, these flows are less erosive and both habitat and water quality increase naturally.
With increased stream length, meanders and more gentle river flows will ensure ideal habitat features for all river life including invertebrates, fish, and other terrestrial river corridor animals.



Removing gravel from the stream bed causes down-cutting, adds to stream speed and force and therefore erosion and sediment loading to the lake.

The overall message of this video is that what we do in one place in a watershed may have an unintended effect on the stream, so we have to consider the functioning of the whole watershed or catchment area to be effective. This is taking a watershed approach.

What's being done in Vermont

New State Regulations

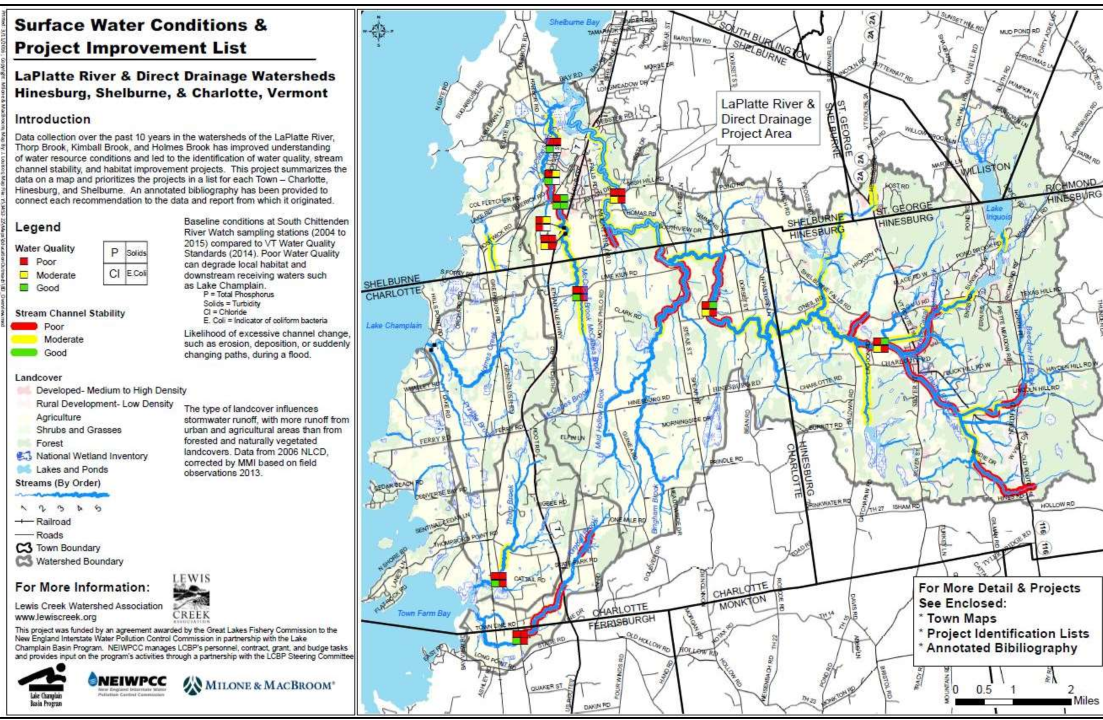
The State of Vermont has put (or will soon put) new regulations into place, including the 3-acre permit, Municipal Roads General Permit, and Required Agricultural Practices (RAPs). Towns and property owners must meet these requirements, often at great expense.

Voluntary conservation measures

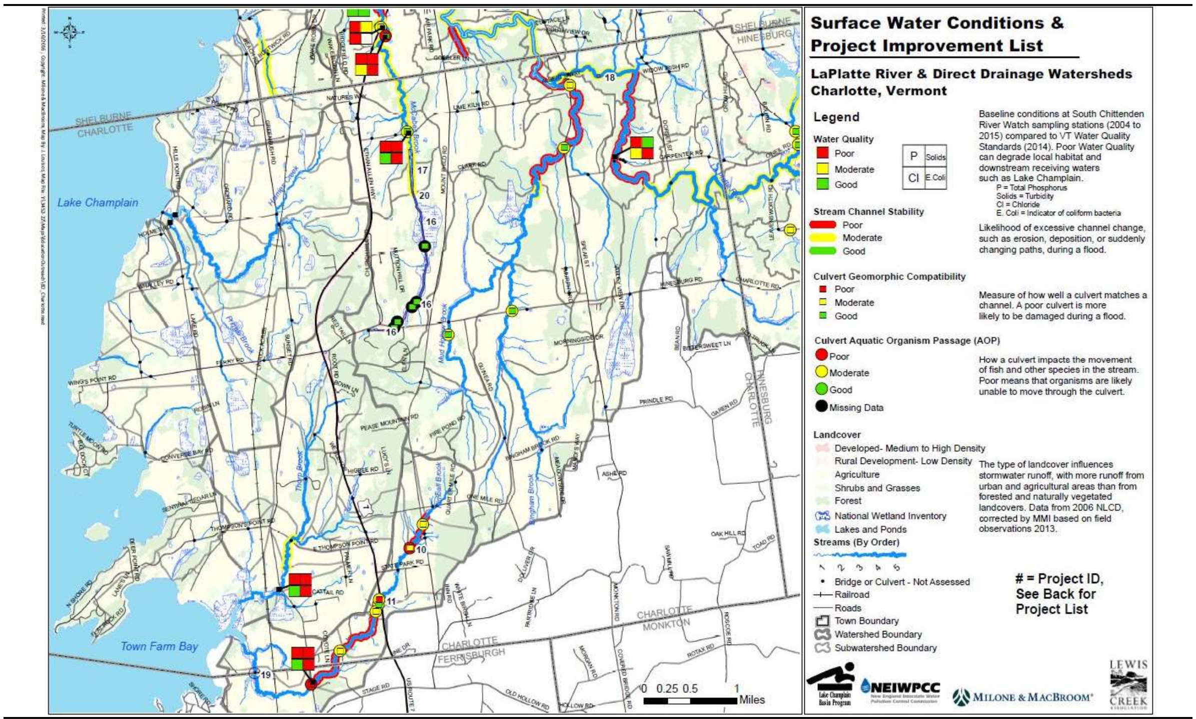
LCA and land trusts work to promote voluntary measures, often going above and beyond regulations to take into account climate change. For example, the Vermont Land Trust conserved the river corridor on the Clifford and Briggs farms in the Starksboro valley. This project will allow the stream to meander and access its natural floodplain as in the video.

Monitoring water quality

Monitoring water quality helps to detect hot spots while understanding trends. LCA's water quality monitoring program, South Chittenden River Watch, informs our project locations and designs, as well as the work of state agencies. Our current data results confirm that all of the LaPlatte region streams have excessive phosphorus concentrations. Towns and others can better utilize this information (for example, by including this information about high phosphorus in your town plan, to allow the DRB authority to make conditions for water quality such as respecting a wider buffer).



LCA's scorecard map for the LaPlatte River and direct drainage watersheds shows 10 years of water quality data results, and includes information on culverts and stream channel stability. On this map, each icon with four small squares is one of our sampling locations. Each small square reflects a different parameter for water quality. Phosphorus is in the upper left corner of each, and it also shows solids (sediment), chloride, and E. coli (bacteria). The colors reflect a water quality score of poor (red), moderate (yellow), or good (green). You'll note that every station in this area has poor (high) levels of phosphorus (upper left corner).

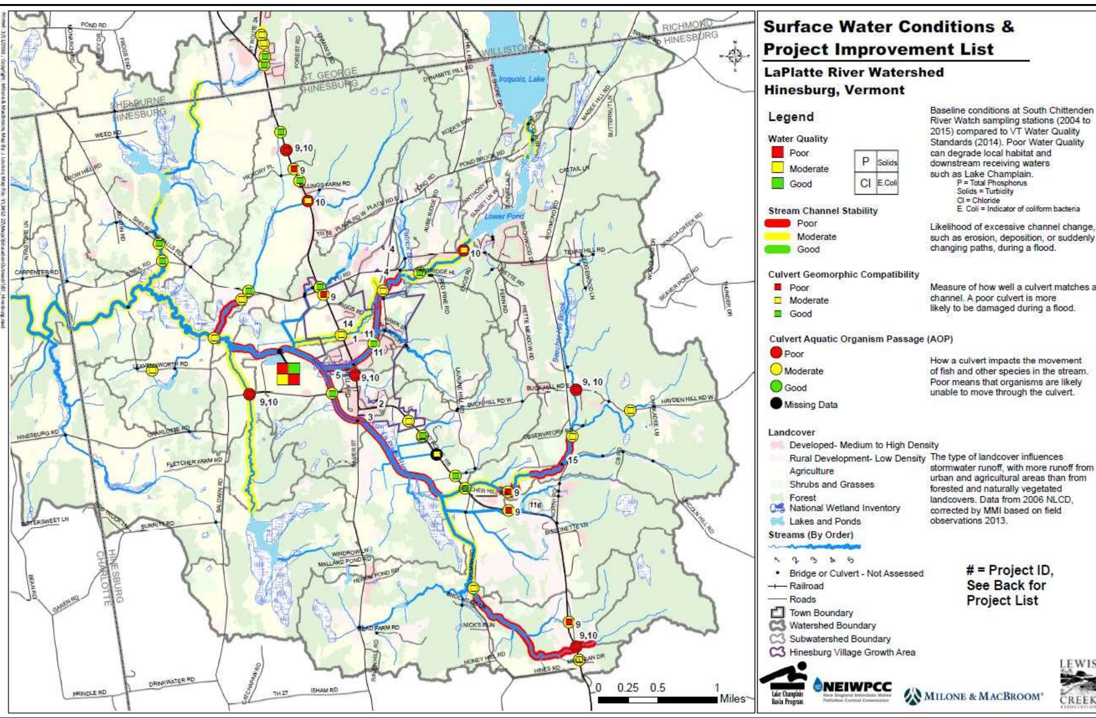


On subsequent pages, the map shows results for each town, and includes data on stream channel stability, and culverts (how well they match the channel, and how they impact the movement of fish and other animals in the stream).

Surface Water Project Improvement List
Charlotte, Vermont

Priority	Watershed	Stream Segment	Stressor	Project Description	Source
1	Shelburne Bay	All Waters	land erosion, nutrients, channel erosion	Identify and implement needed agricultural BMPs for areas identified as significant pollutant sources based on risk for erosion, water quality data and agriculture inspections.	VTANR, 2015; SCRW, 2016b; SCRW, 2016c; MMI, 2010d
2	McCabes Brook	All Waters	land erosion	Develop and implement stormwater management plan for private and public roads. Use Road erosion Risk layer (Fig. 4-8) and map points of stormwater inputs to ditches to assist in project prioritization	VTANR, 2015; MMI, 2010c
3	LaPlatte River and Direct Drainages	All Waters	nutrients, land erosion, channel erosion, pathogens	Monitor and assess surface waters to gain better understanding of condition and potential sources	VTANR, 2015
4	LaPlatte River and Direct Drainages	All Waters	channel erosion, encroachment	Protect river corridors to increase flood resilience and to allow rivers to reach equilibrium by assisting towns to adopt appropriate ordinances	VTANR, 2015
5	LaPlatte River	All Waters	land erosion, channel erosion	Support geomorphic assessments Phase 2 light to identify opportunities for regaining floodplain connection and potential gully remediation.	VTANR, 2015; LCA, 2008; LWP, 2007a; MMI, 2012b
6	LaPlatte River and Direct Drainages	All Waters	pathogens, nutrients, land erosion	Limit amount of impervious surface and preserve open space	MMI, 2010c
	LaPlatte River		nutrients, land erosion	Identify potential wetland restoration sites based on Lake	

The document also gives a list of projects suggested for each town by various reports and studies. These projects inform our work in your town to improve water quality.



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Surface Water Project Improvement List
Hinesburg, Vermont

Priority	Watershed	Stream Segment	Stressor	Project Description	Source
1	Patrick Brook	M15.S2.01	land erosion, channel erosion	Detain stormwater on southeast side of Route 116	VTANR, 2015; MMI, 2010a; MMI, 2010c; VHB and MMI, 2015
2	LaPlatte River	M16	land erosion, channel erosion	Swale improvement at gas station/Lyman Meadows	VTANR 2015; MMI, 2010a; MMI, 2010c; VHB and MMI, 2015
3	LaPlatte River	M16	land erosion, channel erosion	Install stormwater treatment at Hinesburg Community School.	MMI, 2010a; VHB and MMI, 2015
4	LaPlatte River	M15S2.02 and upstream	channel erosion, nutrients	Assess adequacy of CVU field drainage practices to protect stream	VTANR, 2015; LWP, 2007a; MMI, 2010c; VHB and MMI, 2015
5	LaPlatte River	M16	land erosion, channel erosion	Install stormwater treatment at or near former cheese factory site.	MMI, 2010a; VHB and MMI, 2015
6	LaPlatte River and Patrick Brook	All Waters	nutrients, land erosion, channel erosion, pathogens	Monitor and assess surface waters to gain better understanding of condition and potential sources	VTANR, 2015
7	LaPlatte River	All Waters	channel erosion, land erosion, encroachment	During scheduled improvements to roads or following damage or washouts, upgrade culverts to meet aquatic organism passage, geomorphic compatibility, and flood resilience standards.	MMI 2010b; MMI 2012c
8	LaPlatte River	All Waters	channel erosion, encroachment	Protect river corridors to increase flood resilience and to allow rivers to reach equilibrium by assisting towns to adopt appropriate ordinances	VTANR, 2015
				Replace ten geomorphologically incompatible culvert and	

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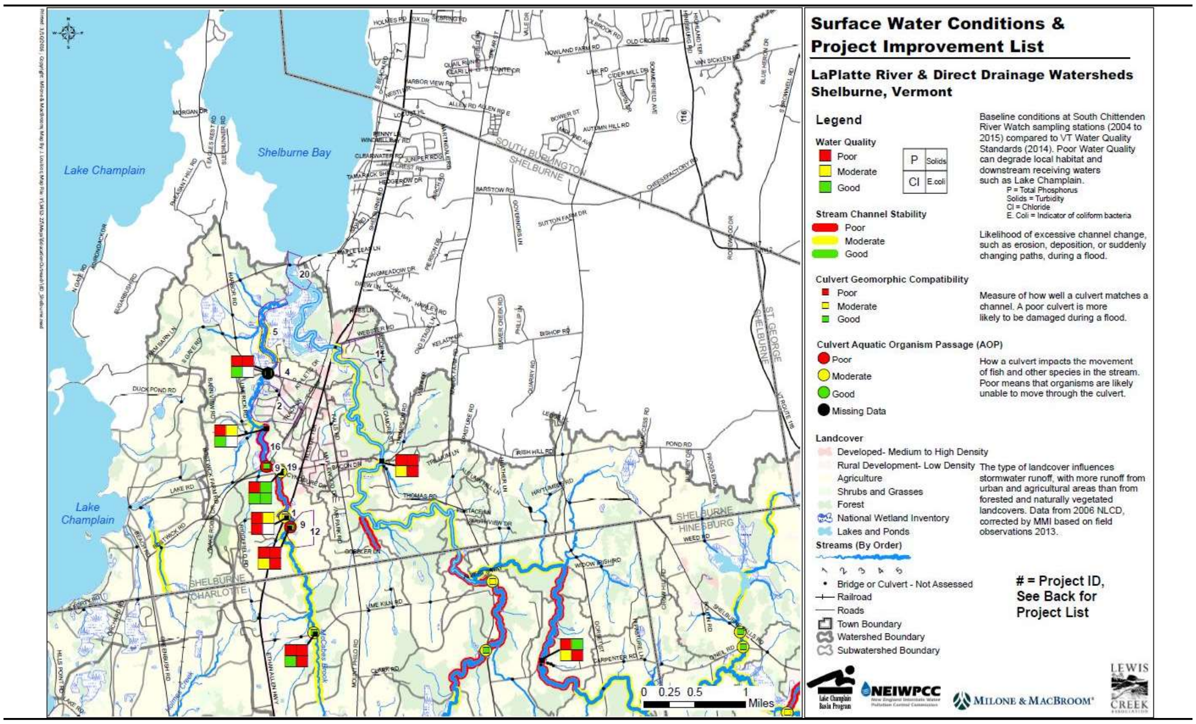

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Surface Water Project Improvement List
Shelburne, Vermont

Priority	Watershed	Stream Segment	Stressor	Project Description	Source
1	McCabes Brook	T1.05B/A	channel erosion, land erosion	Determine benefit of increasing floodplain and stabilizing mass failure for benefit of protecting Route 7 and replacement of Route 7 culvert	VTANR, 2015; MMI, 2012b
2	McCabes Brook	T1	land erosion, channel erosion	Address stormwater related issues at School Street neighborhood, include work with residential home owners to implement GSI	VTANR, 2015; MMI, 2010c
3	Entire Basin	All Waters	land erosion, channel erosion	Identify stormwater conveyance swales with problems and improve using stormwater treatment BMPs and swale screen results.	MMI, 2013
4	McCabes Brook	T1.03	land erosion, channel erosion	Plant stream buffer/restore flood plain at the Shelburne Town Garage and Wastewater Treatment Facility on Turtle Lane	VTANR, 2015; MMI, 2012b
5	McCabes Brook	T1.02	land erosion	Work with landowners to secure specific protections for the forested river corridor and manage for compatibility with the lake.	MMI, 2012b
6	LaPlatte River and Direct Drainages	All Waters	pathogens, nutrients, land erosion	Revise planning and zoning to improve stormwater including required use of LID and conservation of prime areas for infiltration	MMI, 2010c
7	LaPlatte River and McCabes Brook	M04-M06; T1.03	land erosion, channel erosion	Restore incised reach and address stormwater inputs with GSI practices. Review LWP stormwater study projects and identify treatment options. Expand village stormwater management plan/hydrologic study.	VTANR, 2015; LWP, 2008; SCRW, 2016a; MMI, 2010c
8	LaPlatte River	All Waters	nutrients, land erosion,	Monitor and assess surface waters to gain better	VTANR, 2015

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Applying
“slow it, spread it, sink it” principles

Lewis Creek Association’s Ahead of the Storm program showcases “Slow it, spread it, sink it” principles to its demonstration sites and in all land management practices. By installing practices like these throughout the watershed, we will be able to help improve water quality in our streams and lake.

Slow it

This site, E. Thompson's Point Road in Charlotte, is a roadside swale designed with these rock check dams to slow water down before it drains into Thorp Brook.

Spread it

At this site, the Hinesburg Town Garage, buildings and a berm next to Beecher Brook were removed, to make space for the stream to spread out onto what was originally its natural floodplain, but had been filled in over time. In addition, rocks and logs were added to the brook to raise its level, to allow it to spread out onto its new floodplain, thereby dropping sediment held in the water before it gets washed down the brook to the LaPlatte River and Lake Champlain.

Sink it

At Shelburne Community School, this project transformed the area in the middle of the school bus circle from a grassy lawn with storm grates (where water went directly from the parking lot into McCabe's Brook) into a rain garden, which allows the water to sink into the ground, getting cleaned up by the plants in the rain garden before being sent on to the brook and lake.

What we can do on our own properties

Manage landscaping to prevent soil and storm water from leaving your property. Apply the AOTS principles of the three S's ("slow, spread, sink") to your property's backyard, driveway and private road. Manage to prevent sediment and pollution from reaching waterways. Here are some examples of what you can do:

Keep soil from eroding

We want to keep soil on our own properties. Redirect downspouts so the water sheets over the lawn instead of making a gully. Use a rain barrel to collect rainfall so you can use it for watering. Fix gullies when they have just begun.

Fix driveways

Grade and use water bars or broad-based dips. The Municipal Roads General Permit applies only to public roads, but we have many private roads in our towns (average 35% of our roads are private). We need to apply the Municipal Roads General Permit design principles to driveways and private roads, and enhance them to prepare for larger storms. We should crown the road to prevent gully erosion (as in this photo), use grass-lined ditches on the sides, install waterbars or broad-based dips on steeper roads, and install check dams and rock lining on steeper road ditches to slow the flow. Do not allow soil to leave your property.

Allow water to soak into the soil

This is a raingarden installed at a private home in Charlotte, that allows water from the roadside ditch (that used to flood across their driveway) to be collected in this area and soak into the soil instead of flooding their property.

Plant natives as a no-mow area

Minimizing lawn, and cutting grass no shorter than 3”, slows the flow of water because taller grass and plants have deeper root systems, and catch more water.

Maintain wooded buffer along waterways on our properties

Trees and shrubs along streams and swales help minimize pollutants and sediments that reach our waterways.

What else we can do:

- Refrain from or minimize use of fertilizer
- Pick up domestic animal waste
- Maintain septic systems
- Reduce salt use in the winter

Support the work of LCA and South Chittenden River Watch

Your towns provide funding support each year to LCA, and we have a devoted group of volunteers who help collect water quality samples. Consider joining our team!

Investing now in preventive measures and fixing past mistakes will cost us less in the end.

Please reach out to me with any questions, or to get involved.
Funding provided by Lake Champlain Basin Program and NEIWPCC.

We must be “ALL IN” — NOW

What we do on our properties and in our towns will determine our success in restoring both the health and beauty of Lake Champlain and our community health.