



# Lake Champlain International

Clean Water. Healthy Fish. Happy People.

Juliana Dixon, Program Director



# The Lake Champlain Basin



- 18:1 Area ratio land:lake
- 347 metric tons above TMDL
- Source of drinking water for 200,000
- 120x12 miles (at widest point)
- 400 ft at deepest point
- Average lake depth 64 ft
- Water retention time:
  - 3 yrs – main lake
  - < 2 months south lake
- \$3.8 billion tourism dollars

## Advocacy

H674  
CSO rule  
211  
Vigils  
Gubernatorial Forum

## Programs

Healthy Waters Healthy Children  
Bring Back the Brookies  
Champlain's Ark  
CSO notification  
BLUE

## Connections

Father's Day Derby  
Little Angler's Derby  
Catch n Cook  
Lake Supper  
Wild About Vermont



# Creating a Culture of Clean Water

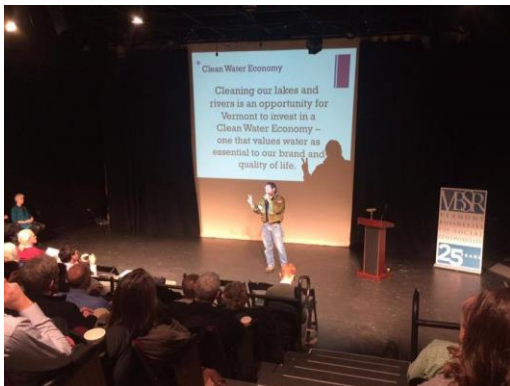
Motivating and encouraging conversation with business, residents, and children



LCI Talks About New Water Quality Issues

There will be new water quality issues for the Vermont Legislature to consider in the new year. James Ehlers with Lake Champlain International explains.

MYCHAMPLAINVALLEY.COM | BY KRISTIN FRECHETTE





**The good life**

# Three interconnected Issues:

Nutrient Pollution

Combined Sewage Overflow

Stormwater



# Issue 1



Nutrient loading





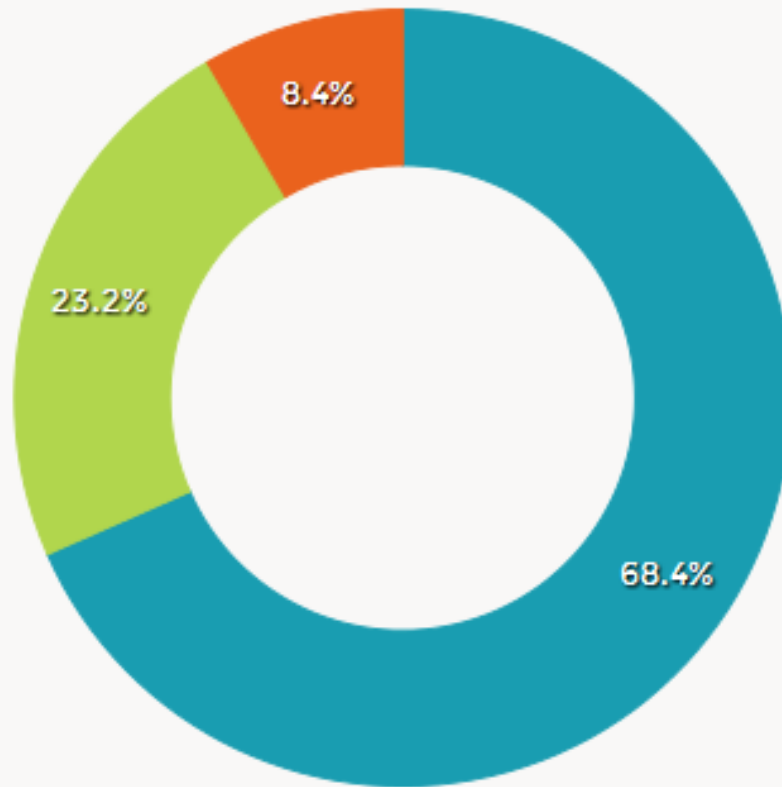
# We like to blame Agriculture



And other practices...



## Who puts phosphorus into Lake Champlain?



### Base Load

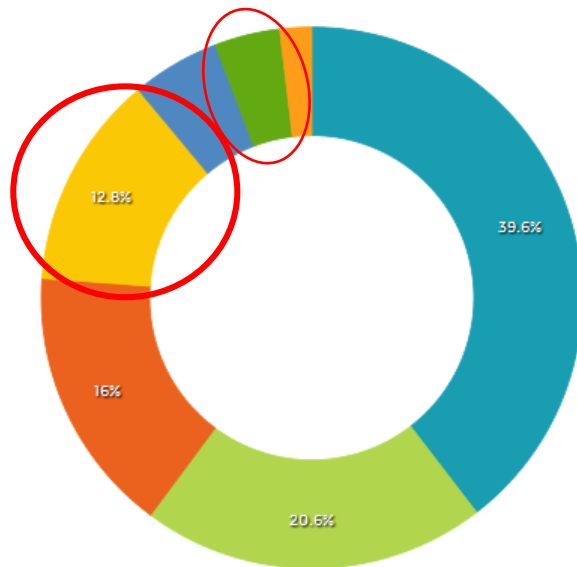
● Vermont    ● New York    ● Quebec

*Base loads are shown in metric tons per year.*

# But we are all to blame, and we are all the solution.

Lake-wide breakdown of Vermont phosphorus sources

SHARE & EMBED EXPLORE



Vermont base totals

- Farms (non-point)
- Streams
- Forests
- Developed + CSO
- Back Roads
- Wastewater Facilities
- Farmsteads

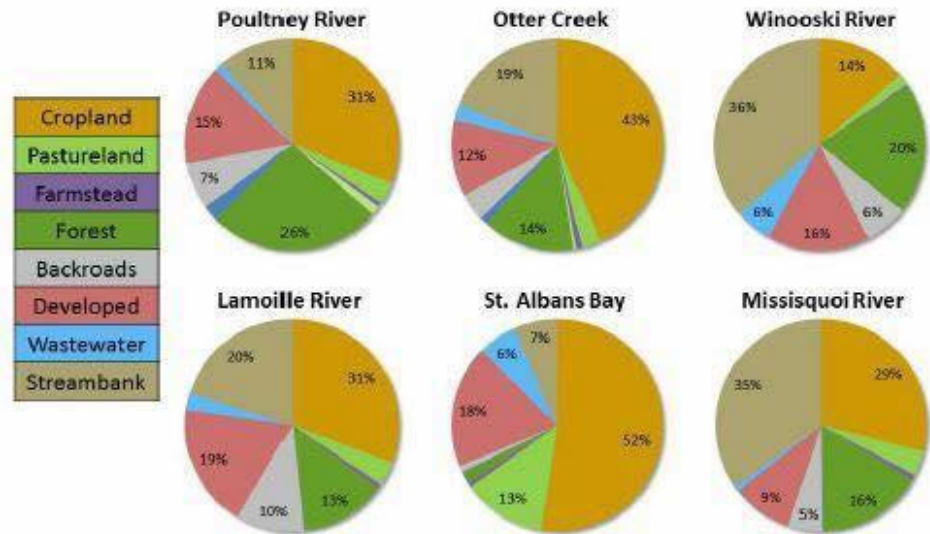
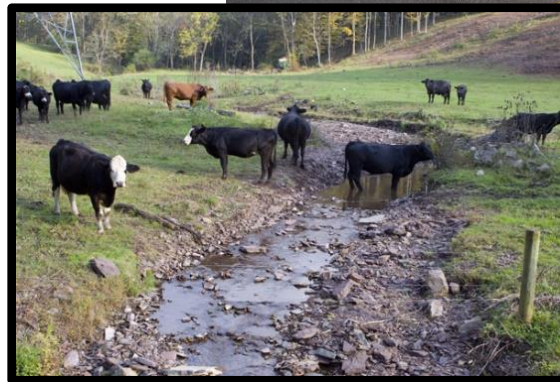


FIGURE 3 - SOURCES OF PHOSPHORUS LOADING TO LAKE CHAMPLAIN FROM VERMONT WATERSHEDS (PRELIMINARY RESULTS FROM EPA/TETRA TECH, 2013)

Credit: Lake Champlain Basin Program

Phosphorus "base loads" from the 2015 TMDL report are shown in metric tons per year. The volume is an average from the years 2001-2010.





# Toxic Algae Warning !

Henley Lake can contain high levels of toxic algae, which may be harmful to people and animals. Please check the indicator for current risk levels.



For more information contact  
Masterton District Council on (06) 370 6300 or visit [www.mstn.govt.nz](http://www.mstn.govt.nz)





# UNH Magazine online

current issue • past issues • send a letter/news • address update • ad

Spring 2009



## Departments

- .....
- Alumni News
- Alumni Profiles
- Book Reviews
- Campus Currents
- Class Notes
- Features
- History Page
- Letters to the Editor

## Features

### Dangerous Waters

Could there be a connection between blue-green algae and clusters of deadly neurological disease near our lakes?

By Virginia Stuart '75 '80G

David Hersey spends more time than he has arms to have one arm that still works. He has a prosthetic arm that he uses as he extends his reach. The doctor, a neurologist, says, in so many words, "The doctor's own research after noticing Lou Gehrig's disease."

Ever since, he's been waiting for the day when he'll be able to feel his hand again. He'll eventually die of respiratory failure, however, like most ALS patients. He, for one, is not a typical ALS patient. He, for one, is not a typical ALS patient. He, for one, is not a typical ALS patient. "I don't have a limp," he says. "I did them a



Environmental Topics    Laws & Regulations    About EPA

Related Topics: [Nutrient Policy and Data](#)

## Health and Ecological Effects

### What health risks do humans face as a result of exposure to cyanotoxins?

Adverse health outcomes from exposure to cyanotoxins may range from a mild skin rash to serious illness or death. Acute illnesses caused by exposure to cyanotoxins have been reported and after short-term exposures, microcystin and cylindrospermopsin could cause liver and kidney damage. The table below summarizes the health effects caused by the most common toxin producing cyanobacteria.

Cyanotoxins	Acute Health Effects in Humans	Most common cyanobacteria producing toxin
Microcystin-LR	Abdominal pain, Headache, Sore throat, Vomiting and nausea, Dry cough, Diarrhea, Blistering around the mouth, and Pneumonia	<i>Microcystis, Anabaena, Nodularia, Planktothrix, Fischerella, Nostoc, Oscillatoria, and Gloeotrichia</i>
Cylindrospermopsin	Fever, Headache, Vomiting, Bloody diarrhea	<i>Cylindrospermopsis raciborskii, Aphanizomenon flos-aquae, Aphanizomenon gracile, Aphanizomenon ovalisporum, Umezakia natans, Anabaena bergii, Anabaena lapponica, Anabaena planctonica, Lyngbya wollei, Raphidiopsis curvata, and Raphidiopsis mediterranea</i>
Anatoxin-a group	Tingling, burning, numbness, drowsiness, incoherent speech, salivation, respiratory paralysis leading to death*	<i>Chrysochloris (Aphanizomenon) ovalisporum, Cuspidothrix, Cylindrospermopsis, Cylindrospermum, Dolichospermum, Microcystis, Oscillatoria, Planktothrix, Phormidium, Anabaena flos-aquae, A. lemmermannii Raphidiopsis mediterranea (strain of Cylindrospermopsis raciborskii), Tychonema and Woronichinia</i>

SUBSCRIBE

SCIENTIFIC AMERICAN

English    Cart    Sign In    Register

## Are Algae Blooms Linked to Lou Gehrig's Disease?

Medical researchers are now uncovering clues that appear to link some cases of ALS to people's proximity to lakes and coastal waters



By Lindsey Konkel, Environmental Health News on December 11, 2014    3



# Issue 2



Combined Sewer Overflow





# Wastewater Constituents

## Microorganisms

Pathogenic bacteria, virus and worms eggs.  
Risk when bathing and eating shellfish.

## Biodegradable organic materials

Oxygen depletion in rivers, lakes and fjords.  
fish death, odors.

## Nutrients

Nitrogen, phosphorus, ammonium  
eutrophication, oxygen depletion, toxic effect

## Metals

Hg, Pb, Cd, Cr, Cu, Ni  
Toxic effect, bioaccumulation.

## Odour (and taste)

Hydrogen sulphide.  
Aesthetic inconveniences, toxic effect.

## Radioactivity

Toxic effect, accumulation.

## Other organic materials

Detergents, pesticides, fat, oil and grease,  
coloring, solvents, phenols, cyanide.  
Toxic effect, aesthetic inconveniences,  
bio accumulation in the food chain.

## Other inorganic materials

Acids, for example hydrogen sulphide,  
bases, corrosion, toxic effect.

## Thermal effects

Hot water.  
Changing living conditions for flora  
and fauna.

Constituents present in domestic wastewater (based on Henze et al., 2001)

# Sewage Spills in the Lake Champlain Basin, 2016

## Total CSO Spills

# spills	Max Gallons
<b>120</b>	<b>16,954,701</b>

## All Reported Spills

#Spills	Max Gallons
<b>150</b>	<b>18,498,714</b>

### CSO Score Card

Rutland	82
Montpelier	15
Vergennes	7
Burlington	7
St. Albans City	4
Northfield	3
Middlebury	2

CSO stands for combined sewage overflow - the discharge of untreated or partially treated sewage and gutter water into our waterways that occurs when rain or snowmelt overwhelms treatment plant capacity

### Total Spill Score Card

Rutland	84
Montpelier	16
Burlington	8
Vergennes	7
St. Albans City	5
Barre	5
Fairhaven	5
Shelburne	4
Northfield	3
Hardwick	2
Middlebury	2
Winooski	2
Brandon	2
Poultney	1
Pawlet	1
Proctor	1
East Montpelier	1
Private	1



**Lake Champlain**  
International  
Clean Water. Healthy Fish. Happy People.

[www.champlain.ngo](http://www.champlain.ngo)  
[info@mychamplain.net](mailto:info@mychamplain.net)





# sewage free 2016 seas

Join Surfers Against Sewage in  
calling for an end to sewage  
pollution at our beaches.

[SIGN THE CONSULTATION](#)



Issue 3

Stormwater

# Components of stormwater

- Chemical pollutants: Fuels, lubricants, particles from brakes or tires, exhaust emissions, corrosion products, pesticides
- Nutrients in the form of grass clippings, fertilizers, pet waste
- Physical pollutants: litter, road surface degradation, silt, gravel

## Consequences of stormwater

- Decreased property values
- Economic and tourism declines
- Loss of recreational activities
- Public health symptoms
  - Gastrointestinal disease
  - Neurological disease
  - Carcinogens
- Increased fees to clean up polluted waters





Permeable Pavement allows rain to infiltrate back into the ground.



Green Roofs capture rain and save energy by cooling buildings.



Rain Gardens utilize natural vegetation to absorb runoff.

[citizenscampaign.org](http://citizenscampaign.org)

What actions could you do to manage phosphorous, and stormwater on your land? How can you do your part to reduce CSO?

What if you have no idea what steps to take?

# BLUE<sup>®</sup>

Effective stormwater management:  
Preventing pollution of our drinking water, beaches, and fish





# Program Overview:

## Actions:

Door hangers: 5029

Evaluations: 549

Certifications: 132

## Active in:

Burlington

Charlotte

Colchester

Shelburne

Waterbury

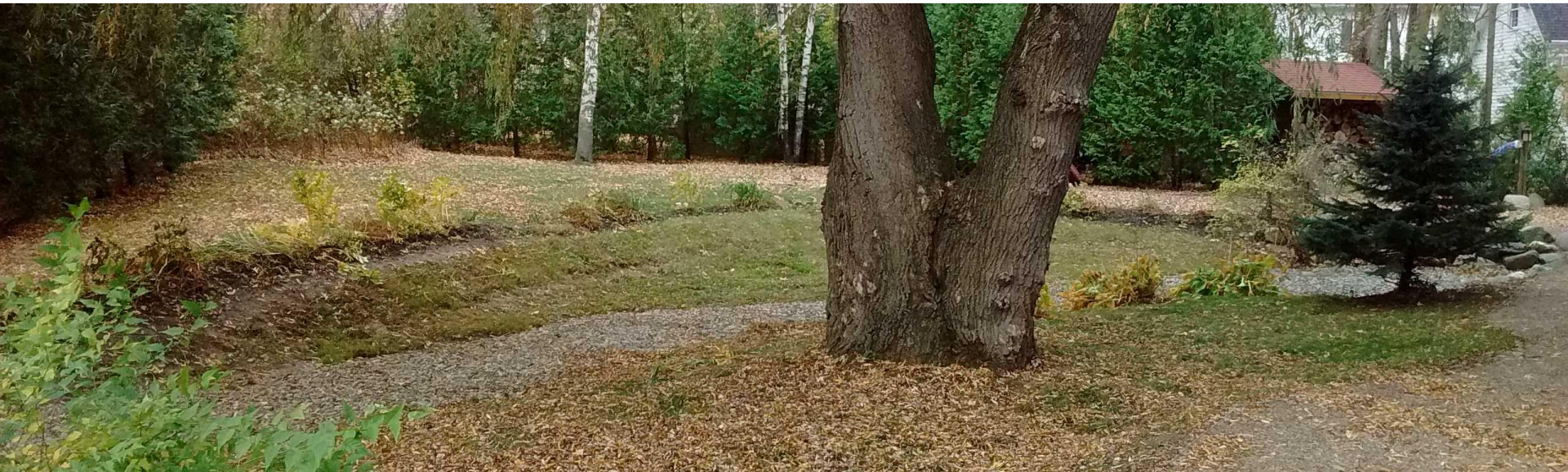
Winooski

## Program arrangements:

Municipal partnership

In-house program management

City specific grants



Property Address:  
Owner Name:  
Phone Number/Email:  
Mailing Address:

Certifier's Checklist

BLUE® Level:  None at this time  Basic  Advanced  Leader



BASIC

Wastewater Management

- |                          |                          |                          |                          |   |                          |    |
|--------------------------|--------------------------|--------------------------|--------------------------|---|--------------------------|----|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (1a) Septic system legally compliant with current law and maintained every 3-5 years (or more frequently if required by law)  |                          |    |
|                          |                          |                          | <input type="checkbox"/> | Yes   | <input type="checkbox"/> | No |
|                          |                          |                          | <input type="checkbox"/> | INSPECTION (View septic system maintenance receipt- pumped within the past 5 years, or new system in past 5 years)  |                          |    |
|                          |                          |                          | <input type="checkbox"/> | CONDUCT   |                          |    |
|                          |                          |                          |                          | Note:   |                          |    |
| <hr/>                    |                          |                          |                          |   |                          |    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | (1b) Utilize Phosphorous-free detergents  |                          |    |
|                          |                          |                          |                          | CONDUCT   |                          |    |
|                          |                          |                          |                          | Note:   |                          |    |
| <hr/>                    |                          |                          |                          |   |                          |    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | (1c) Personal Care Products, Pharmaceuticals, and all toxic substances, including automotive vehicle fluids, are recycled or disposed of in accordance with EPA-recommended practices |                          |    |
|                          |                          |                          |                          | CONDUCT   |                          |    |
|                          |                          |                          |                          | Note:   |                          |    |

Landscape

- |                          |                          |                          |                          |  |                          |    |
|--------------------------|--------------------------|--------------------------|--------------------------|--|--------------------------|----|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | (1d) Utilize only fertilizers that soil tests indicate are needed  |                          |    |
|                          |                          |                          |                          | CONDUCT  |                          |    |
|                          |                          |                          |                          | Note:  |                          |    |
| <hr/>                    |                          |                          |                          |  |                          |    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | (1e) Commit to a pesticide-free lawn while using no other pesticides within 100 feet of receiving water                |                          |    |
|                          |                          |                          |                          | CONDUCT  |                          |    |
|                          |                          |                          |                          | Note:  |                          |    |
| <hr/>                    |                          |                          |                          |  |                          |    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (1f) Grass clippings left in place or properly disposed of and lawn mowed no shorter than 3 inches                     |                          |    |
|                          |                          |                          | <input type="checkbox"/> | Yes  | <input type="checkbox"/> | No |
|                          |                          |                          | <input type="checkbox"/> | INSPECTION (measure height of grass and look for piles of grass clippings)   |                          |    |
|                          |                          |                          | <input type="checkbox"/> | CONDUCT  |                          |    |
|                          |                          |                          |                          | Note:  |                          |    |
| <hr/>                    |                          |                          |                          |  |                          |    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | (1g) No trash or other manmade refuse stored or disposed of within 50 feet of bank or shore                            |                          |    |
|                          |                          |                          |                          | INSPECTION (look for manmade refuse loose on lawn)   |                          |    |
|                          |                          |                          |                          | CONDUCT  |                          |    |
|                          |                          |                          |                          | Note:  |                          |    |
| <hr/>                    |                          |                          |                          |  |                          |    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (1h) All animal waste is collected and disposed of in the trash or composted or buried a minimum of 50 feet from shore |                          |    |
|                          |                          |                          | <input type="checkbox"/> | Yes  | <input type="checkbox"/> | No |
|                          |                          |                          | <input type="checkbox"/> | INSPECTION (look for animal feces and location of any livestock and poultry)   |                          |    |
|                          |                          |                          | <input type="checkbox"/> | CONDUCT  |                          |    |
|                          |                          |                          |                          | Note:  |                          |    |

Infrastructure

- |                          |                          |                          |  |   |
|--------------------------|--------------------------|--------------------------|--|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |  | (1) Stormwater remediation maintained on site via retention ponds, swales, rain gardens, dripline trenches, and barrels, as appropriate |
|                          |                          |                          |  | INSPECTION (building permits, if applicable)  |
|                          |                          |                          |  | Note:   |

Buildings

- |                          |                          |                          |  |  |
|--------------------------|--------------------------|--------------------------|--|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |  | (1) Redirect downspouts, sump-pump drainage, perimeter drains to maintain water onsite |
|                          |                          |                          |  | INSPECTION (location of drainages)   |
|                          |                          |                          |  | Note:  |

Paved surfaces

- |                          |                          |                          |  |  |
|--------------------------|--------------------------|--------------------------|--|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |  | (1k) Use of approved environmentally friendly sealers (no coal-tar, cannot be petroleum based) |
|                          |                          |                          |  | CONDUCT  |
|                          |                          |                          |  | Note:  |

ADVANCED

Wastewater Management

- |                          |                          |                          |  |   |
|--------------------------|--------------------------|--------------------------|--|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |  | (2a) Employ low-flow fixtures throughout dwellings and structures |
|                          |                          |                          |  | CONDUCT   |
|                          |                          |                          |  | Note:   |





# BLUE® BTV Stormwater Audit

Date of audit: \_\_\_\_\_

Name of Auditor: \_\_\_\_\_

### Landowner Contact Information

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Property Location: \_\_\_\_\_

### Desktop Assessment (to be done prior to visit)

Total lot area (sq. feet): \_\_\_\_\_

Predominant soil Hydrological Class?      A      B      C      D

Mapped depth to seasonal high water? \_\_\_\_\_

Stormwater permitted site?    Yes    No

Proximity to receiving waters?   <500'    100-500'    500-2,000'    2,000-5,280'    >1 mile

After desktop site assessment, indicate any areas of concern or questions. <http://anrmaps.vermont.gov/websites/anra/>

### Field Assessment (photographs should be included with report)

(Necessary materials: tape measure, string, string level, 2 wooden stakes, hand trowel, glass jar, camera/iPad)

Measure impervious areas (square feet)

Roofs \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

Walkways \_\_\_\_\_ Driveway surfaces \_\_\_\_\_ Other \_\_\_\_\_

Indicate material of each impervious surface (example asphalt, metal, slate, brick, etc.)

Roofs \_\_\_\_\_ Flashing Material \_\_\_\_\_ Walkways \_\_\_\_\_ Driveway surfaces \_\_\_\_\_ Other \_\_\_\_\_

What is the driveway condition? (rutted, eroded, cracking etc.): \_\_\_\_\_

PHOTO OF DRIVEWAY

What is the driveway slope? (use attached instructions to measure slope) \_\_\_\_\_

Is the driveway crowned to allow water to shed laterally? \_\_\_\_\_

Is the driveway sealed?    Yes    No    Don't Know

Was a tar-based sealant used?    Yes    No    Don't Know

Are there ditches or conveyance structures adjacent to the driveway?    Yes    No

If yes, describe material and condition: \_\_\_\_\_

Are there seasonally saturated areas on the property?    Yes    No

If yes, describe. \_\_\_\_\_

Does water enter the home or outbuildings?    Yes    No

If so, when and how much? \_\_\_\_\_

Are there any natural water features on site? (stream, river, spring, wetland)

If yes, are the appropriately buffered with vegetation?    Yes    No

PHOTO (and take note of location on map)

Does the home/building have gutters?      Fully Guttered      Partially Guttered      Not Guttered

NOTES \_\_\_\_\_

Does the home/building have downspouts?    Yes    No

If yes, how many and where are they directed? \_\_\_\_\_

Where does the water ultimately flow? Are they connected to foundation drains? \_\_\_\_\_

Based on visual inspection, how is water shed from walkways, driveways, and other impervious surfaces?

Sheet Flow    Channelized

Where does it ultimately flow? (grassy area, stormwater catchment basin, street, sidewalk, etc.)/ Other Notes. \_\_\_\_\_

Are there swales or other conveyance structures on site?    Yes    No

If yes, describe condition and surface (vegetated, paved, perforated PVC pipe, etc.). Other notes. \_\_\_\_\_

Sample of projects  
implemented through BLUE:



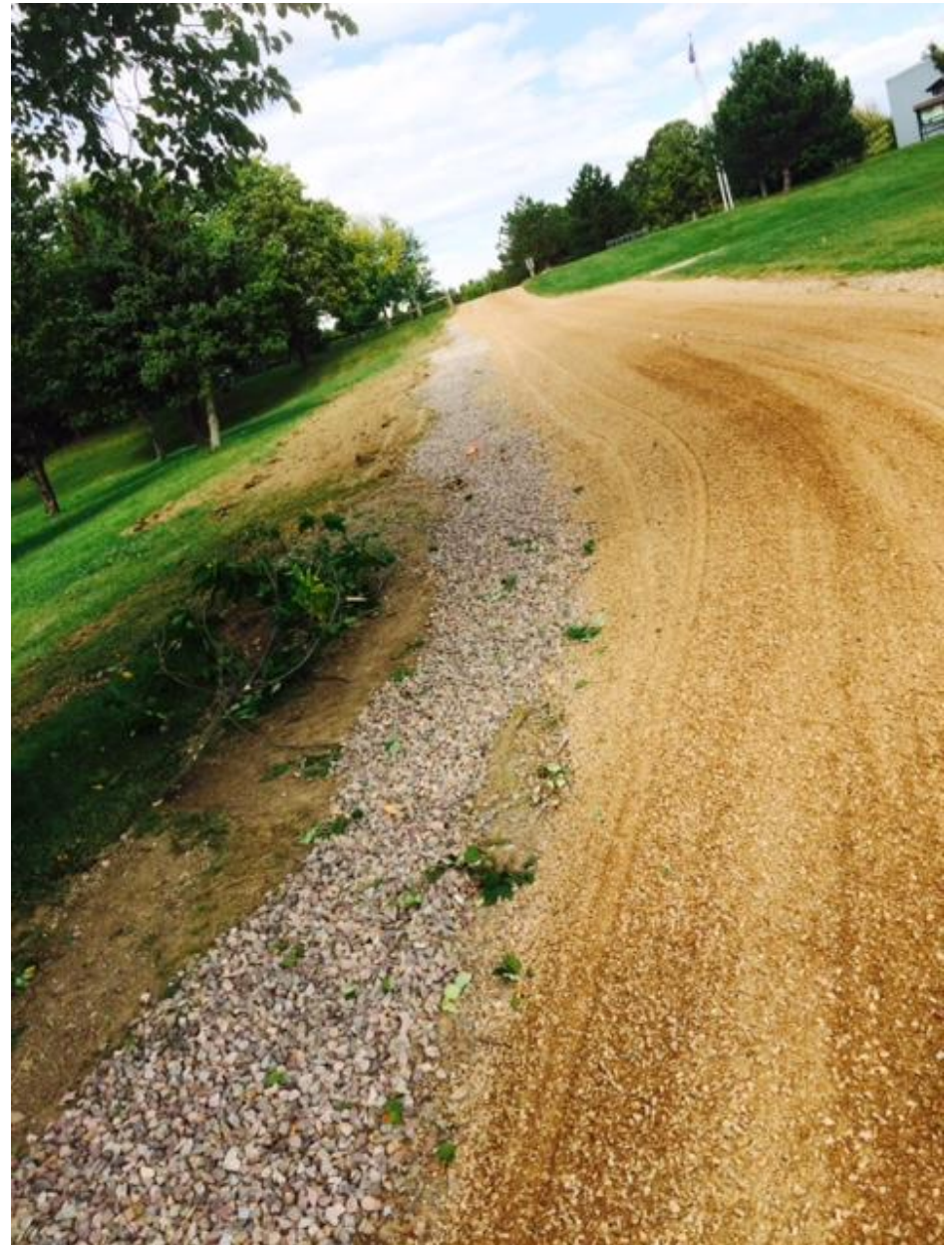
Rain gardens



# Driveway stormwater redirection and infiltration



Water bar



Infiltration trench



Retention pond

# Stormwater slowing through retention



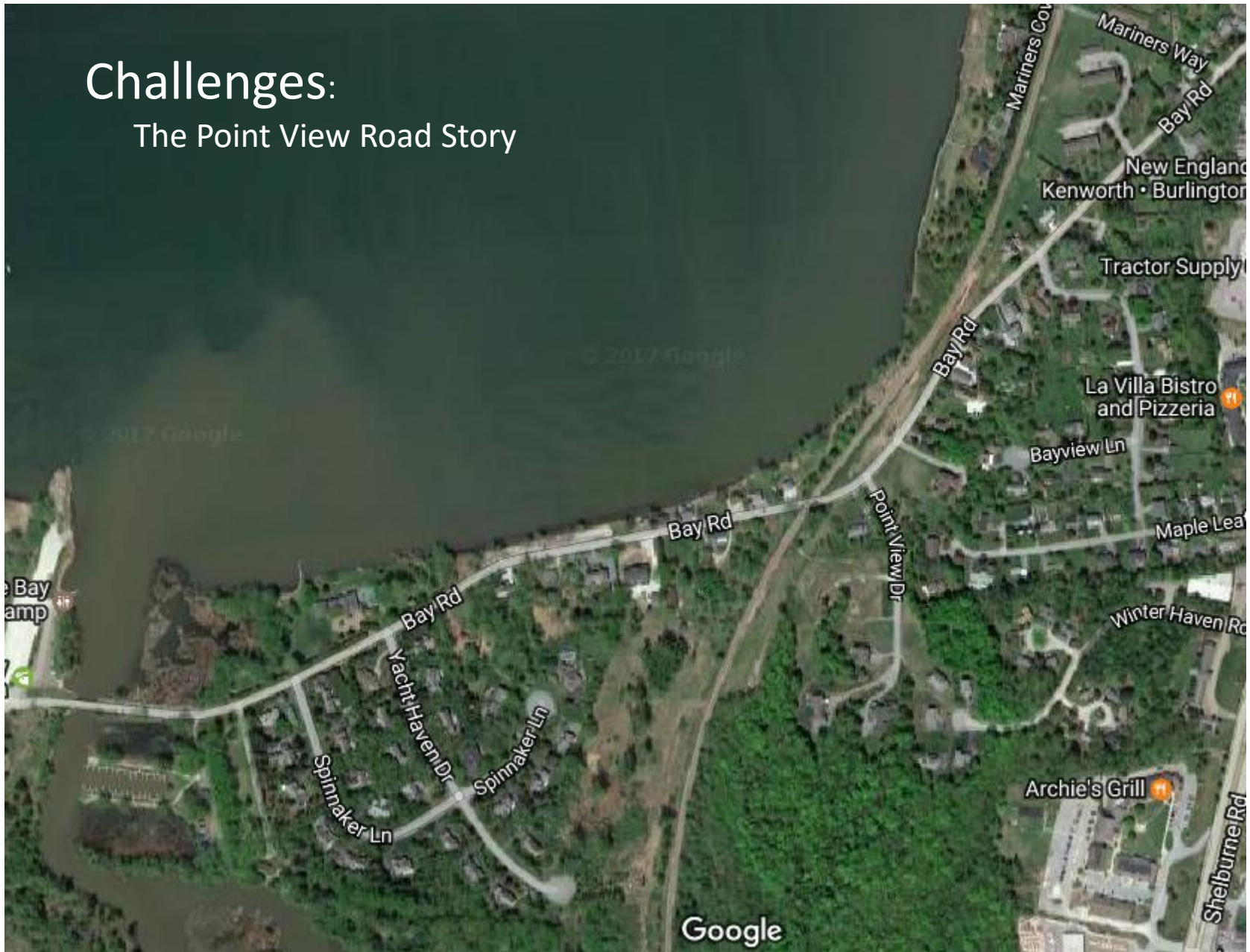
Rain barrel



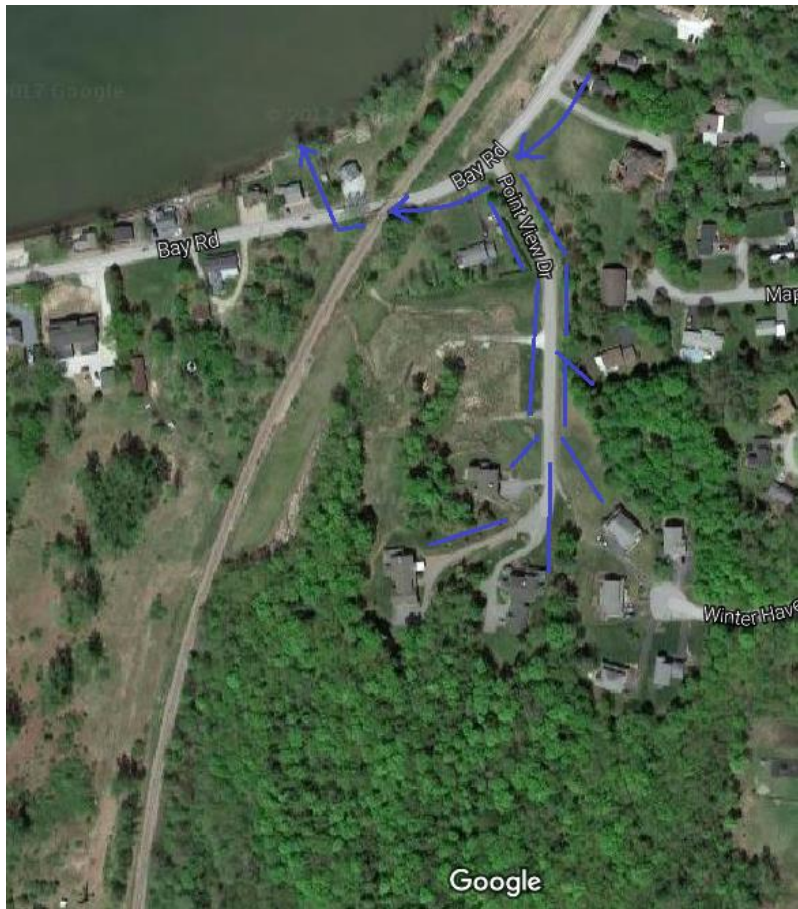
Rainwater cistern (representation only)

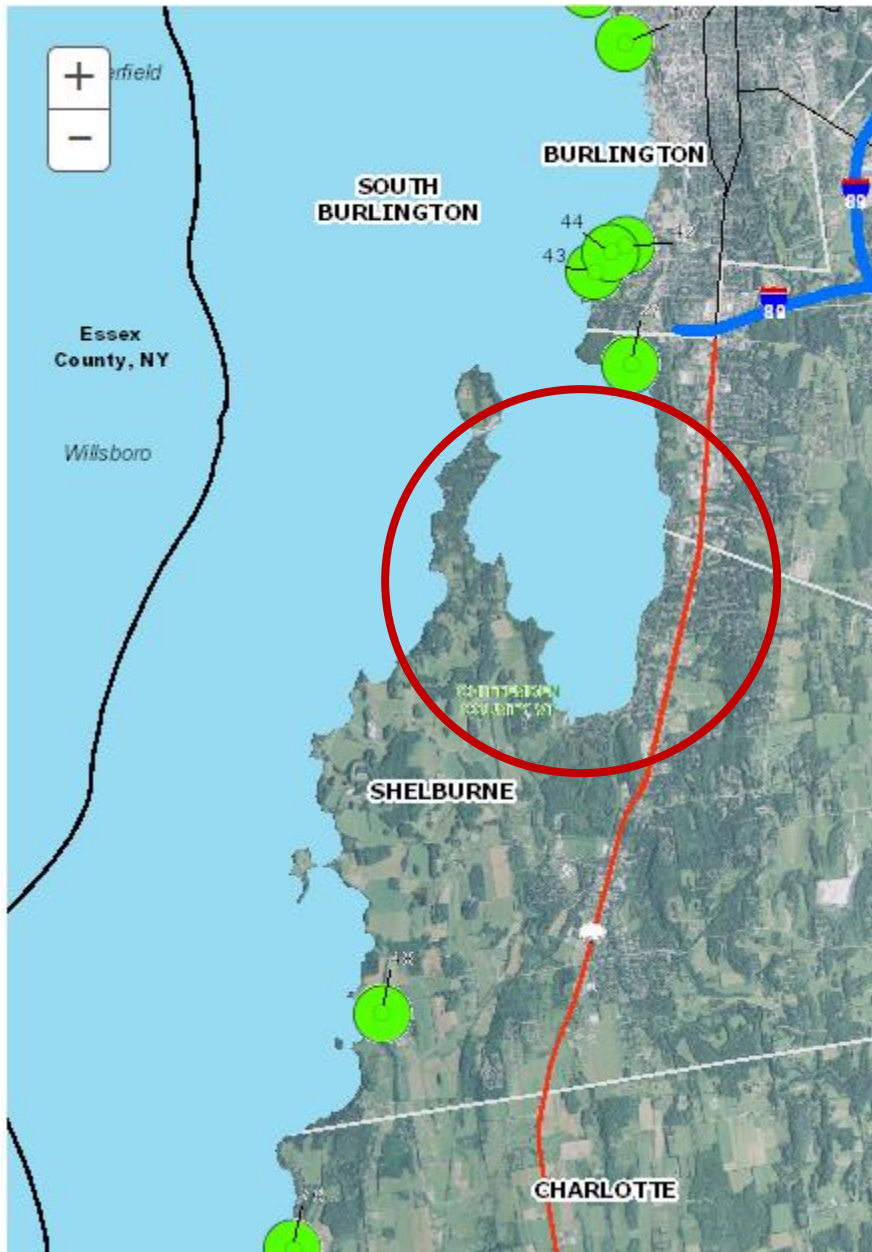
# Challenges:

## The Point View Road Story

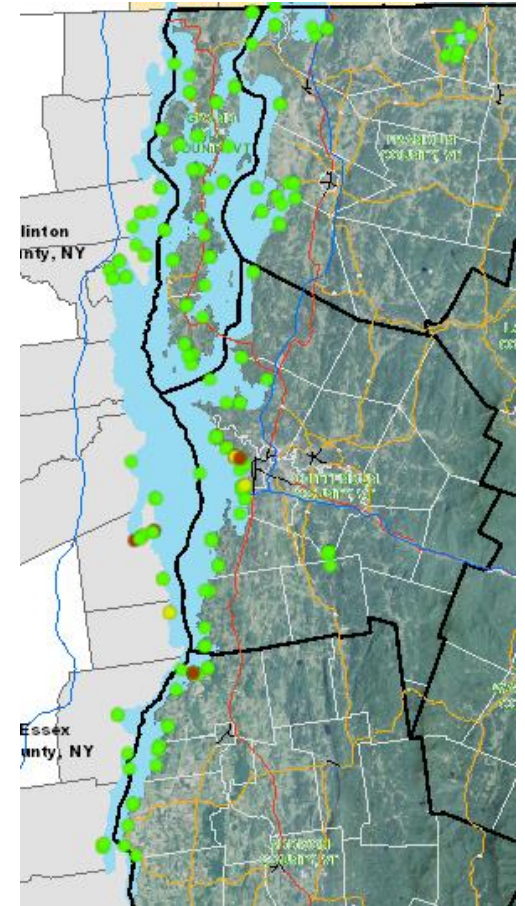








Inconsistent reporting adds to the communication challenge



# Challenges:

## The McCabe Circle Story



# Challenges:

Misty Bay Rd



Condo associations



Campus wide evaluations

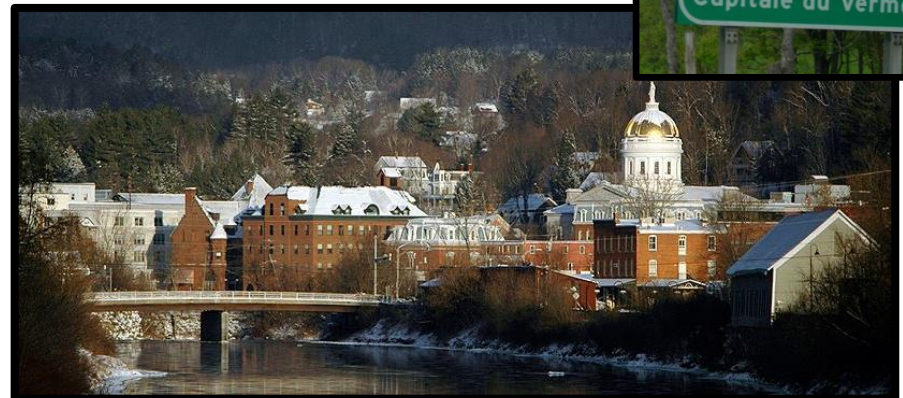
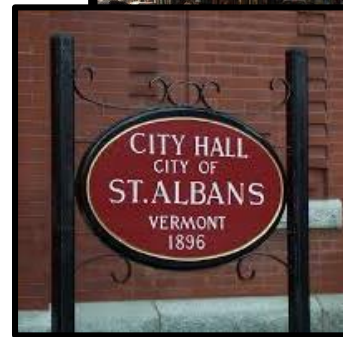
# BLUE<sup>®</sup> wins for swimmable, drinkable, fishable waters:

- Certified the Ed Weed Fish Hatchery as watershed friendly, the first of its kind in the country
- Engaged hundreds of students with stormwater management techniques, and public education
- Has dispersed \$20,000 in stormwater mitigation improvements
- Have spoken with over 1,000 homeowners instigating the culture of clean water
- Have 2 universities and 3 elementary schools engaged with integrating BLUE certification with education



# Next Steps for BLUE<sup>®</sup>

- Secure funding to expand operations
- Train more evaluators
- Solidify GIS evaluation techniques
- Engage a younger audience with local actions for local futures





**AFTER ALL...**

PHOTO: MICHAEL TESSIER OF BRADFORD, VT



**IF WE HAVE THE ABILITY TO PREVENT  
POLLUTION, WHY AREN'T WE?**





**The good life**



**Juliana Dixon**  
**Program Director**  
**Lake Champlain International**

**802.879.2016**

**[juliana@champlain.ngo](mailto:juliana@champlain.ngo)**  
**[facebook.com/LakeChamplain](https://www.facebook.com/LakeChamplain)**  
**[www.mychamplain.net](http://www.mychamplain.net)**