

Local Water Quality Matters - Individual Action for the Greater Good

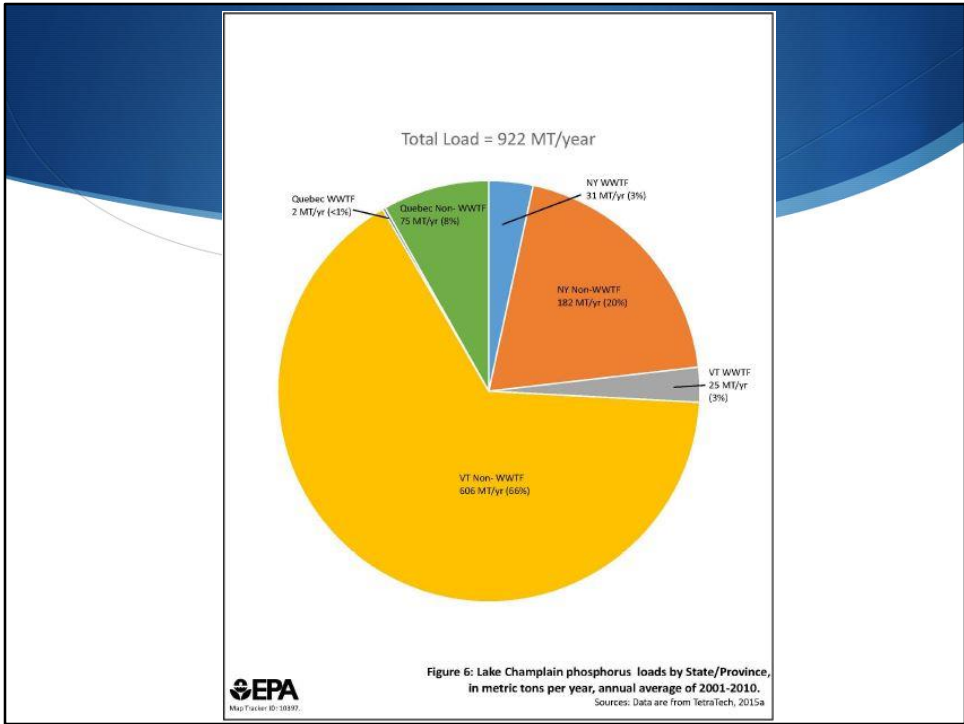
Kate Kelly, Lewis Creek Association



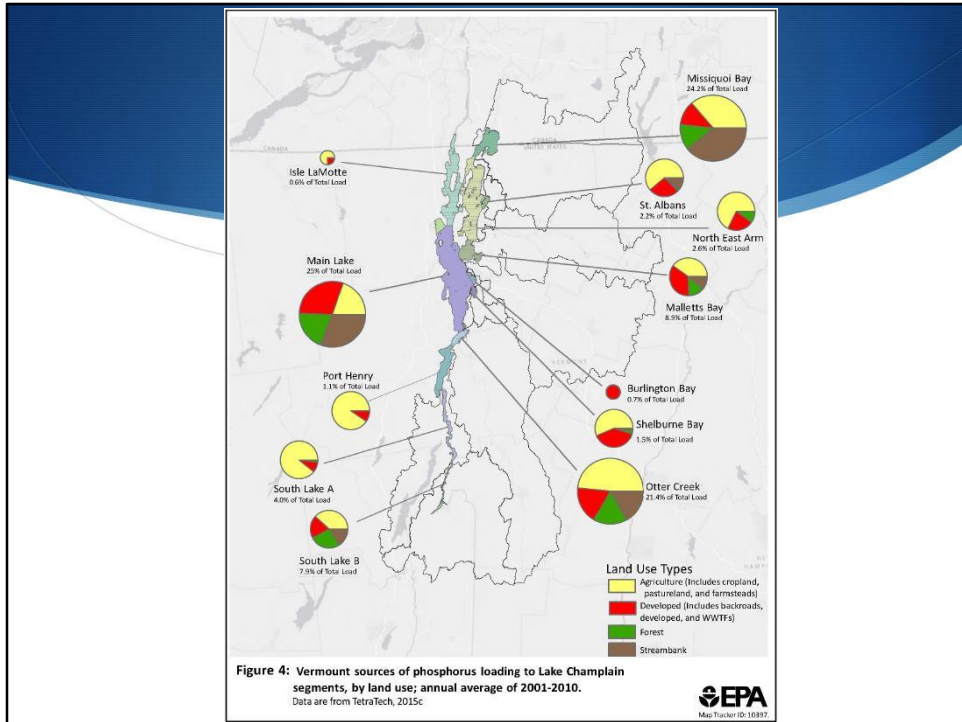
Phosphorus

- ◆ Pollutant of concern
- ◆ Limiting nutrient for algae growth
- ◆ Lake Champlain is impaired by phosphorus

Causes algal blooms, obnoxious odors, low DO, impaired aquatic life, reduced recreational use.



Most of Lake Champlain's phosphorus comes from VT non-WWTF



Sources of P loading by land use. Overall = 38% agriculture, 16% developed, 18% streambank. In Shelburne Bay = >50% agriculture, ~1/3 developed. Part of problem is legacy phosphorus (farms).

Phosphorus loads to each lake segment

Table 3. Phosphorus loads to each lake segment during the 2001-2010 base period (Tetra Tech 2015a, 2015b).

Lake Segment	2001-2010 Vermont Base Loads (mt/yr)					Total	Total	Total	Total
	Wastewater	Developed	Forest	Stream	Agriculture	Vermont	New York	Quebec	Basin
South Lake B	0.6	9.0	13.6	8.3	19.6	51.1	39.4	0.0	90.5
South Lake A	0.1	2.3	0.5	0.0	23.6	26.5	24.4	0.0	50.8
Port Henry	0.0	0.7	0.04	0.0	6.3	7.0	8.4	0.0	15.4
Otter Creek	4.5	20.2	24.0	23.0	68.9	140.5	0.4	0.0	140.9
Main Lake	11.7	35.1	32.5	50.2	32.7	162.2	65.0	0.0	227.0
Shelburne Bay	0.6	3.4	0.3	0.2	5.7	10.2	0.0	0.0	10.2
Burlington Bay	2.8	1.7	0.02	0.0	0.0	4.5	0.0	0.0	4.5
Cumberland Bay	0.0	0.0	0.0	0.0	0.0	0.0	42.0	0.0	42.0
Malletts Bay	1.9	17.2	7.6	6.5	23.2	56.4	0.0	0.0	56.4
Northeast Arm	0.0	3.9	1.8	0.0	12.1	17.8	0.0	0.5	18.3
St. Albans Bay	0.9	2.6	0.2	1.5	8.6	13.9	0.0	0.0	13.9
Missisquoi Bay	1.5	17.0	20.1	40.2	57.6	136.3	0.0	72.3	208.6
Isle LaMotte	0.0	0.9	0.1	0.0	3.1	4.1	34.2	4.6	42.9
TOTAL	24.6	113.9	100.7	129.9	261.5	630.6	213.8	77.4	921.6

For Shelburne Bay, most comes from agriculture, followed by developed. Total of 10 metric tons/year (1.6% of Vermont's total loading).

Sources of Phosphorus

- ◆ Agriculture: cropland is by far the largest phosphorus source, followed by pasture and farmsteads.
- ◆ Developed land: back roads are the single largest source category in most lake segment watersheds, due primarily to erosion and sedimentation from poorly managed roadside ditches. Impervious surfaces represent the next largest source.
- ◆ Stream corridors: Highly eroding, unstable stream reaches account for the majority of the phosphorus inputs.
- ◆ Forests: the vast majority of the phosphorus load comes from erosion along forest roads and active harvest areas.

Why do we care?

- ◆ Road Erosion
- ◆ Carries phosphorus (hydrologically connected)
- ◆ Phosphorus = pollution!
- ◆ Lewis Creek Association (South Chittenden River Watch) monitors water quality and pollutants, including phosphorus (dissolved and total)

Background and Goals

- ◆ Began in 2004
- ◆ Random flows until 2014 to establish baseline
- ◆ LaPlatte, McCabe's, Mud Hollow, Bingham, Thorp, Kimball, Holmes, Monroe
- ◆ Data sharing
- ◆ Addison County River Watch Collaborative is our sister sampling group

With state, towns, partner organizations, citizens. EPA also keeps a database. Towns have no requirement to do anything about it until impaired status. Partner orgs include WNRCD, CCRPC, VHCB, land trusts, NRCS, VTrans, schools, WUV, USGS, EPA, LCBP.

Surface Water Conditions & Project Improvement List

LaPlatte River & Direct Drainage Watersheds Hinesburg, Shelburne, & Charlotte, Vermont

Introduction

Data collection over the past 10 years in the watersheds of the LaPlatte River, Thorp Brook, Kimball Brook, and Holmes Brook has improved understanding of water resource conditions and led to the identification of water quality, stream channel stability, and habitat improvement projects. This project summarizes the data on a map and prioritizes the projects in a list for each Town - Charlotte, Hinesburg, and Shelburne. An annotated bibliography has been provided to connect each recommendation to the data and report from which it originated.

Legend

Water Quality	P	W
■ Poor	■ E	■ O
■ Moderate	■ C	■ H
■ Good	■ I	■ S

Stream Channel Stability

■ Poor
■ Moderate
■ Good

Landcover

■ Developed - Medium to High Density
■ Rural Development - Low Density
■ Agriculture
■ Shrubs and Grasses
■ Forest
■ National Wetland Inventory
■ Lakes and Ponds

Baseline conditions at South Chittenden River Watch sampling stations (2004 to 2015) compared to VT Water Quality Standards (2014). Poor Water Quality can degrade local habitat and downstream receiving waters such as Lake Champlain.

P = Total Phosphorus
S = Solids + Turbidity
E = Col - indicator of coliform bacteria
C = Chloride
H = Hardness
I = Inorganic Nitrogen
S = Sulfate

The type of landcover influences streamwater runoff, with more runoff from urban and agricultural areas than from forested and naturally vegetated landscapes. Data from 2006 NLCD, corrected by MMI based on field observations 2013.

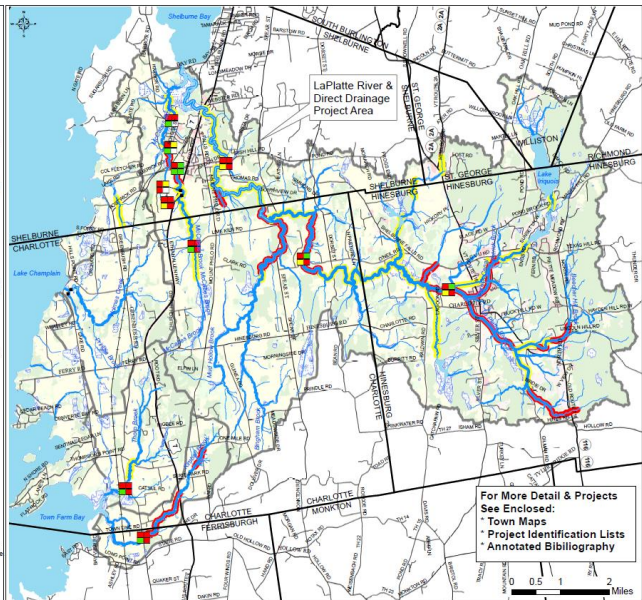
Streams (By Order)

—	1st Order
—	2nd Order
—	3rd Order
—	4th Order
—	5th Order
—	6th Order
—	7th Order
—	8th Order
—	9th Order
—	10th Order

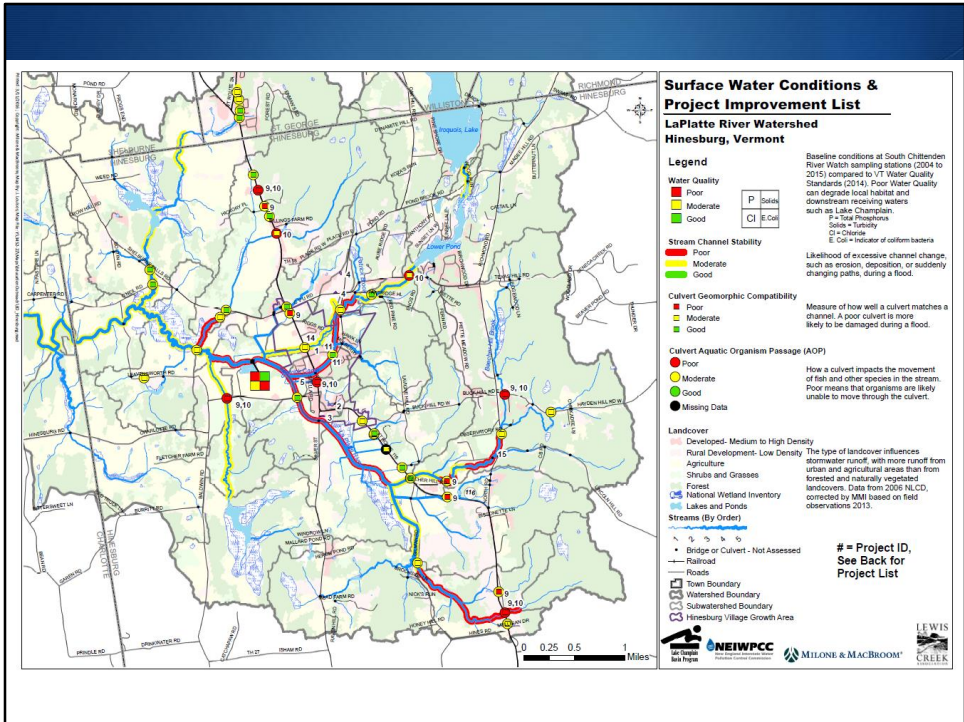
For More Information:

Lewis Creek Watershed Association
www.lewiscreek.org

This project was funded by an agreement awarded by the Great Lakes Fishery Commission to the New England Interstate Water Pollution Control Commission in partnership with the Lake Champlain Basin Program. NEIWPCC manages LEISF's personnel, contract, grant, and budget tasks and provides input on the program's activities through a partnership with the LEISF Steering Committee.



For More Detail & Projects
See Enclosed:
• Town Maps
• Project Identification Lists
• Annotated Bibliography



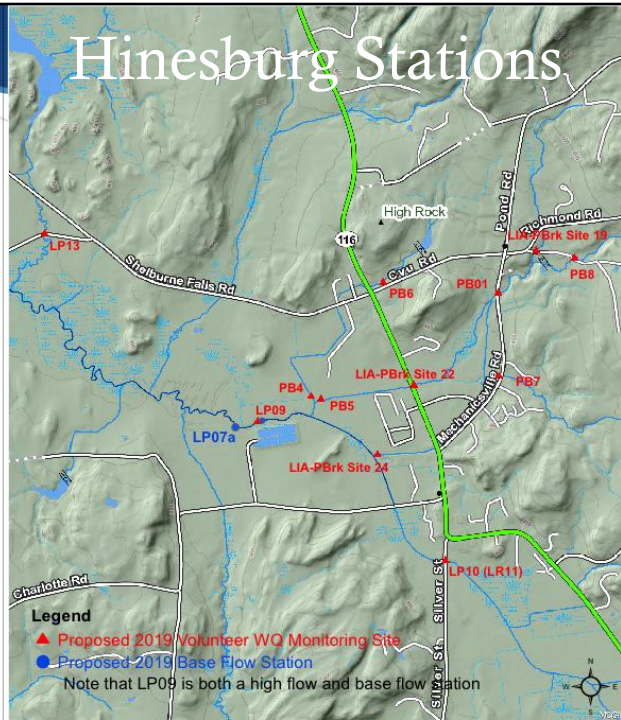
Sampling Stations 2019

- ◆ Partnered with Lake Iroquois Association to take over nine Patrick Brook stations
- ◆ 29 sampling stations (an addition of 13 stations from 2018): three high-flow and three low-flow samples collected
- ◆ Added four LaPlatte River stations
- ◆ Continued Kimball and Thorp Brook focus studies (to track before and after water quality enhancement projects)
- ◆ Low flow sampling around wastewater treatment facilities (Shelburne and Hinesburg): four samples this year

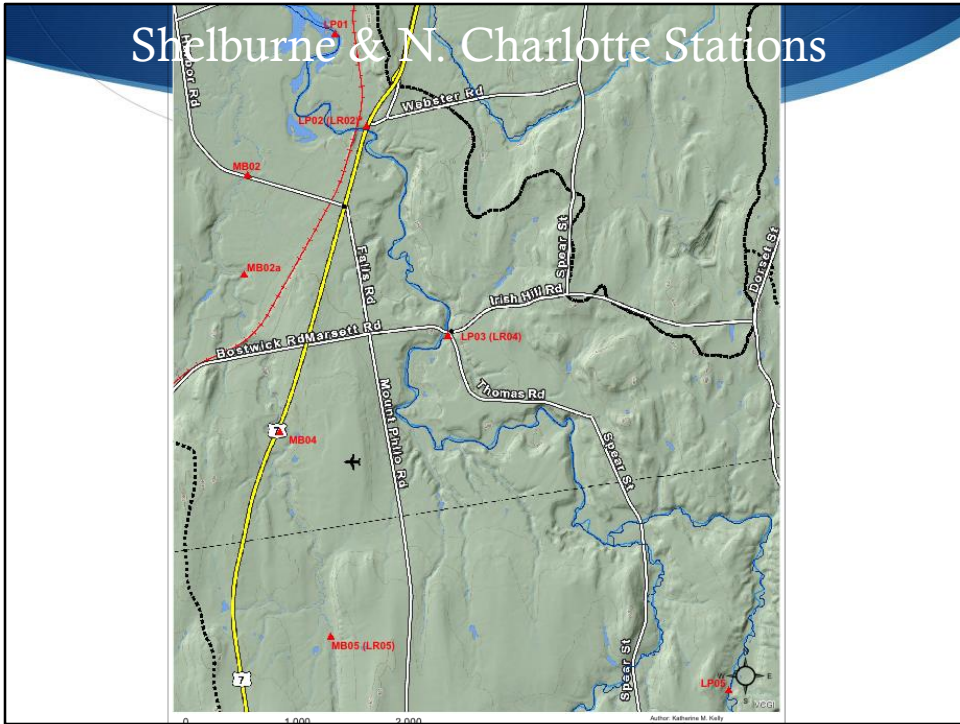
PB stations to track before and after water quality enhancement projects (one at CVU will happen this fall)

Others target hot spots (road runoff and ag areas), track before and after projects, compare to baseline data and DEC biomonitoring sites, stream morphology, etc.

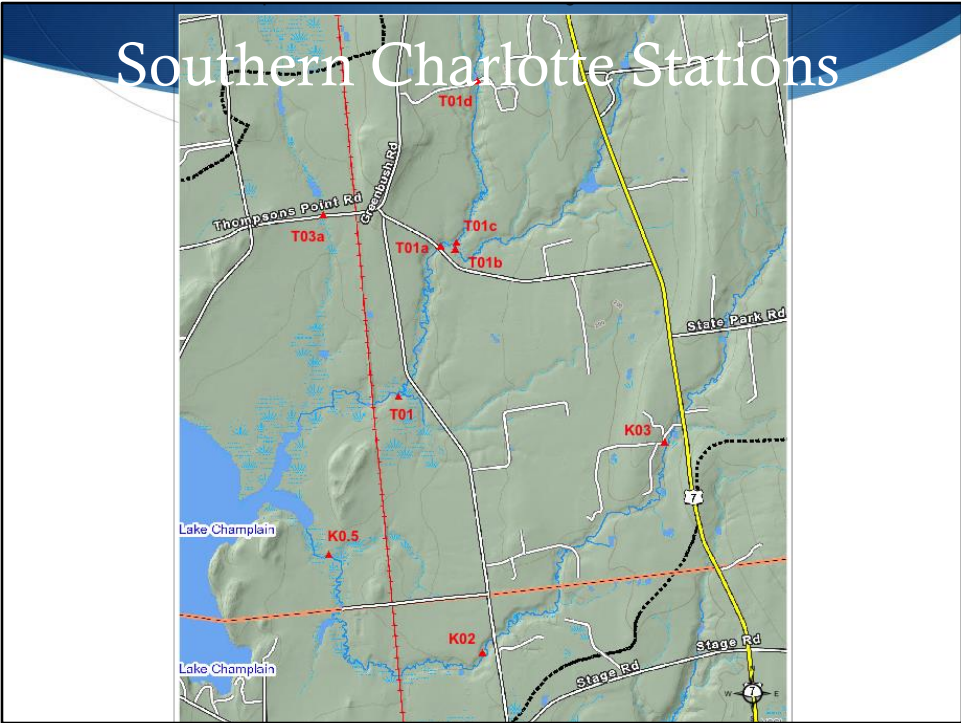
Hinesburg Stations



Shelburne & N. Charlotte Stations



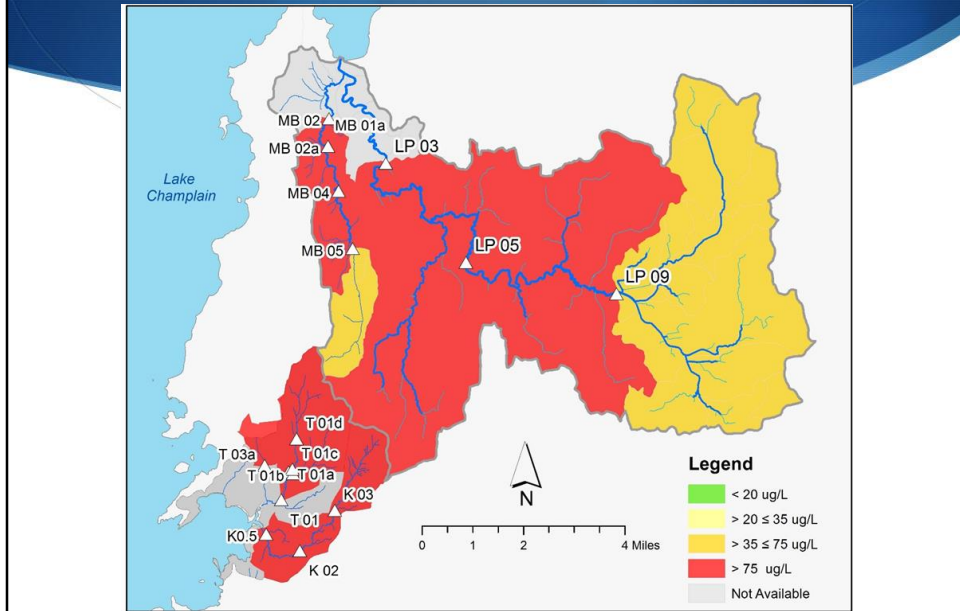
Southern Charlotte Stations



Sampling Protocol: Parameters

- ◆ Phosphorus (total and dissolved)
- ◆ Nitrogen (Total and NO_x)
- ◆ Chloride
- ◆ TSS/turbidity

2018 Results



Distribution of Mean Total Phosphorus in Watersheds Monitored by the SCRW. Subwatersheds draining to each water quality station are color coded based on mean TP recorded during three sampling events occurring during high flows in April, November, and December, 2018.

Preliminary 2019 Results

LaPlatte River, total phosphorus

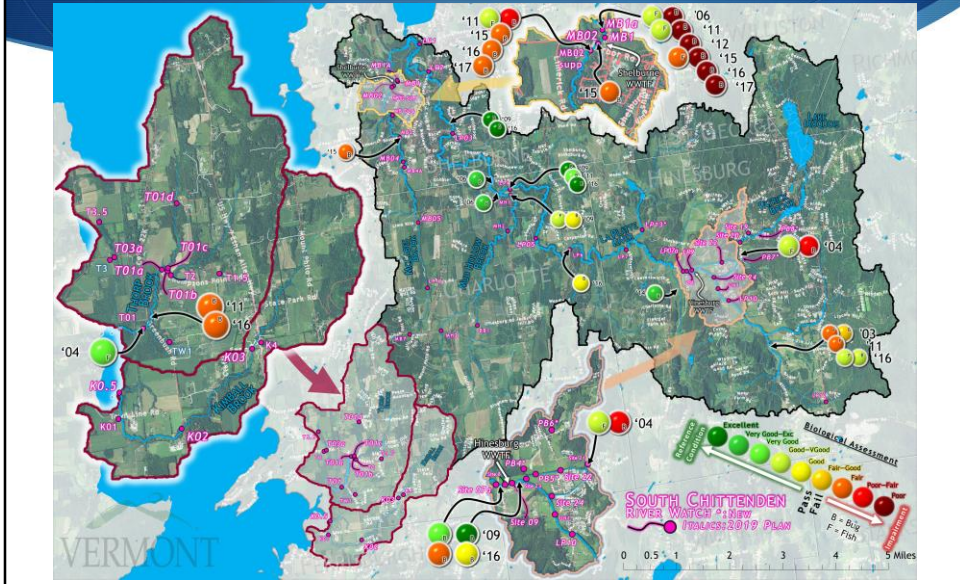
- ◆ 94% of total phosphorus samples exceed state standards
- ◆ Highest single TP measurement: 187 $\mu\text{g}/\text{L}$ at LP03 - LaPlatte River at Falls Rd (High flow on 5/10/19)
- ◆ Highest average TP measurement: Tributary to LaPlatte under O'Neil Rd. (LP13): multiple farms + golf course.
- ◆ Generally increases from headwaters to mouth with a slight drop in average TP at the mouth
- ◆ Average TP generally higher during high flow events

Preliminary 2019 Results

Patrick Brook, Hinesburg

- ◆ 71% of total phosphorus samples exceeded state standards
- ◆ Highest average TP: tributary to Patrick Brook at Mechanicsville Rd., followed by Patrick Canal below Cheeseplant
- ◆ Highest single TP measurement: 106 $\mu\text{g}/\text{L}$ at PB05 – Patrick Brook at ballfields, followed by CVU tributary

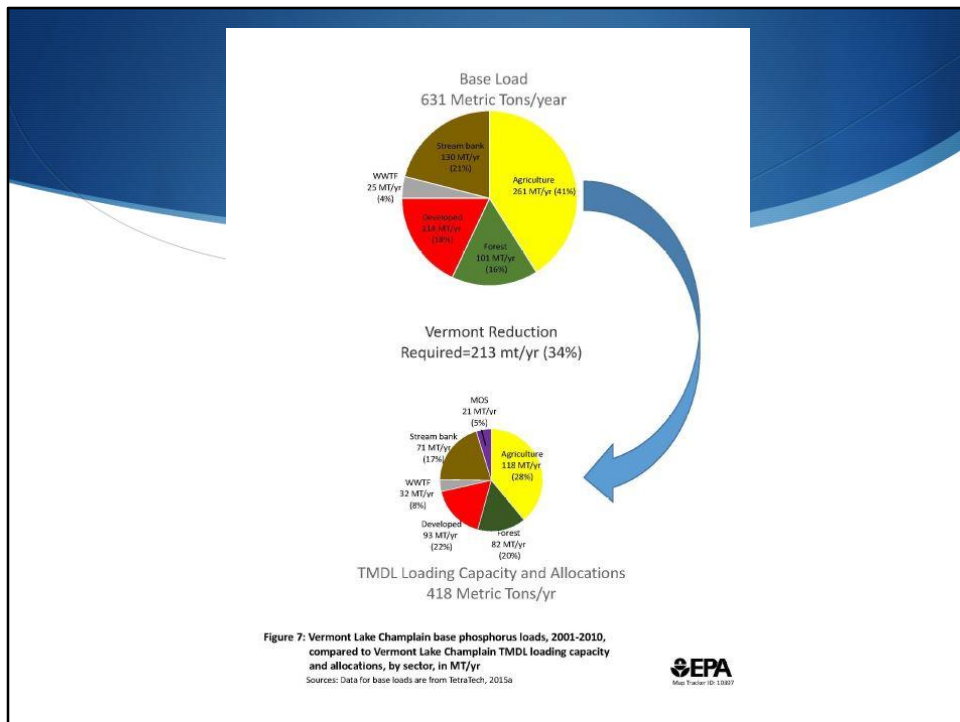
Results of VT DEC's biological sampling



Roads

- ◆ [Map](#) of roads and sub-watersheds
- ◆ Managing my sub-shed
- ◆ Improving roads to help minimize pollutants (phosphorus) running to lake

Display maps of catchments – describe our catchments and their catchments. Our subsheds are based on what we can access/afford (we lump some of their subsheds). Their data our modeled, our data validate/invalidate their pictures.



The Federal Clean Water Act requires states to develop Total Maximum Daily Loads (TMDLs) for lakes and rivers that are not meeting water quality goals. A TMDL is an estimate of the amount of a pollutant that a body of water can receive without impairing vital uses, such as drinking water supply or support of aquatic life. Because excess phosphorus from a variety of sources has impaired water quality in many parts of Lake Champlain, the states of Vermont and New York developed a phosphorus TMDL in 2002. Vermont needs to reduce our base load by 34% of what it is currently to reach TMDL loading capacity and allocations of 418 metric tons/year. Recent LCBP report (State of the Lake) shows that overall Lake Champlain gets 921 metric tons/year, and must reduce by 50%. Given the TMDL, there is a plan for making these changes = TBP
Introduce Dan/Karen

Questions?

