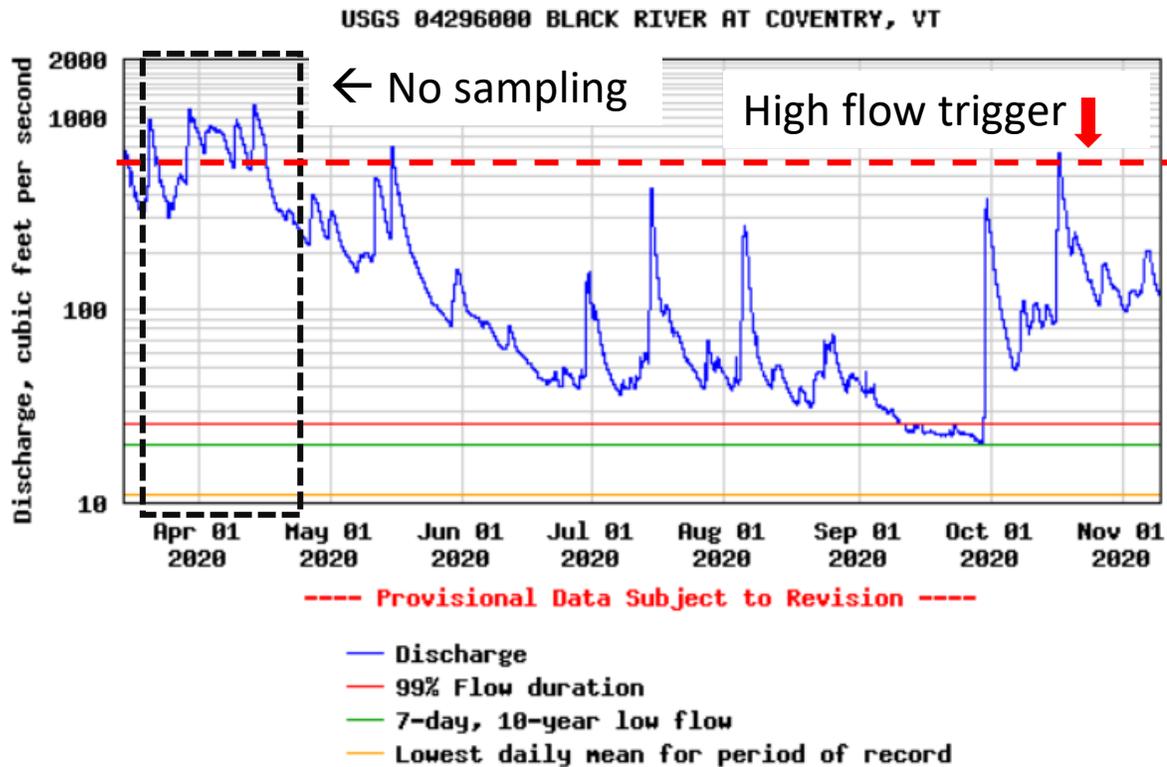


# The major tributary sampling program (Black Barton Clyde and Johns Rivers) to estimate phosphorus loading

- Led by Sarah Damsell with the Orleans County Natural Resources Conservation District in 2020
- Stay a home order limited sampling during spring runoff and there were no significant runoff events this summer so we will not capture close to the target of 10 runoff events even with continued fall sampling.



## 2020 phosphorus results (ug/l)

Date	Barton	Black	Clyde	Johns
27-Apr	53.4	18.4	11.5	14.8
16-May	99.8	107	18	31.6
22-Jun	30	30.6	128	21.9
21-Jul	25	30.1	14.2	21.3
17-Aug	15.1	27	13.8	16.5
21-Sep	27.4	18.7	31.1	14
13-Oct	NA	NA	NA	NA
9-Nov	NA	NA	NA	NA



Prepared for the  
The LaRosa Volunteer Water Quality Monitoring Program  
Vermont Department of Environmental Conservation

by

## Lake Memphremagog LaRosa Sampling

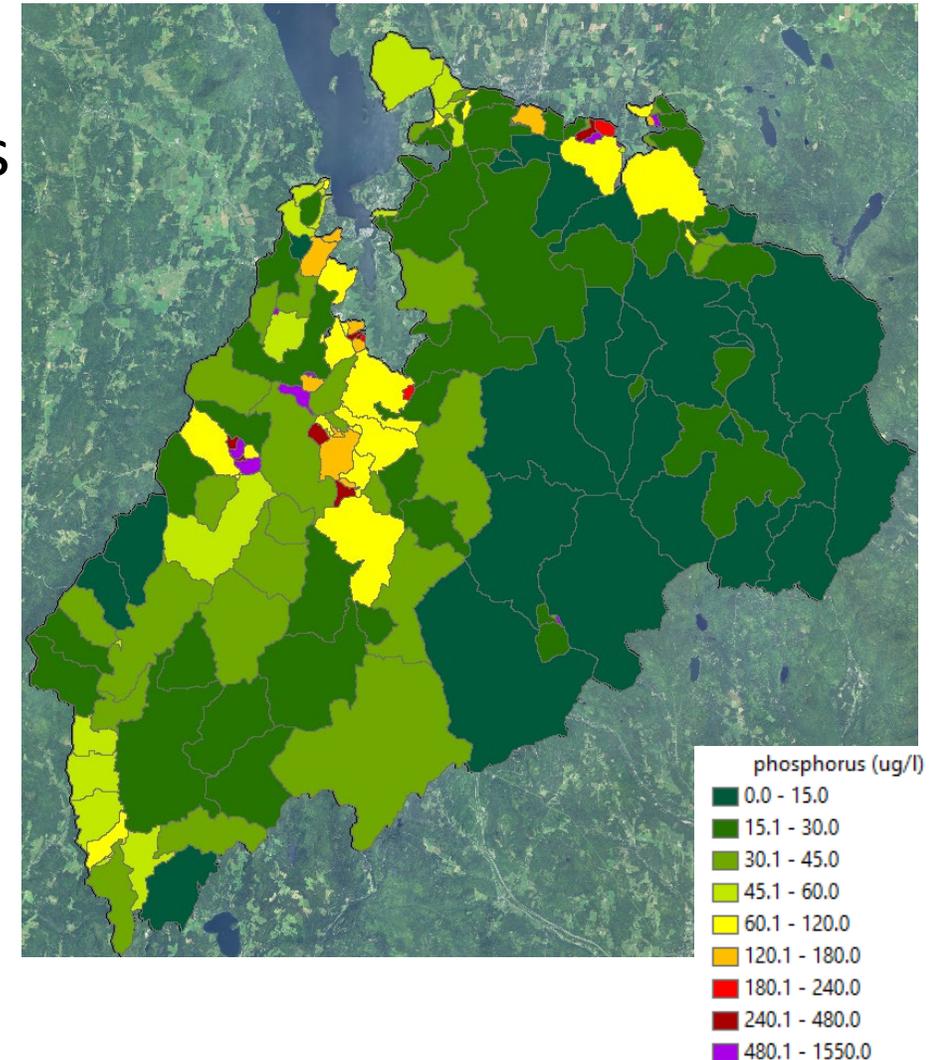
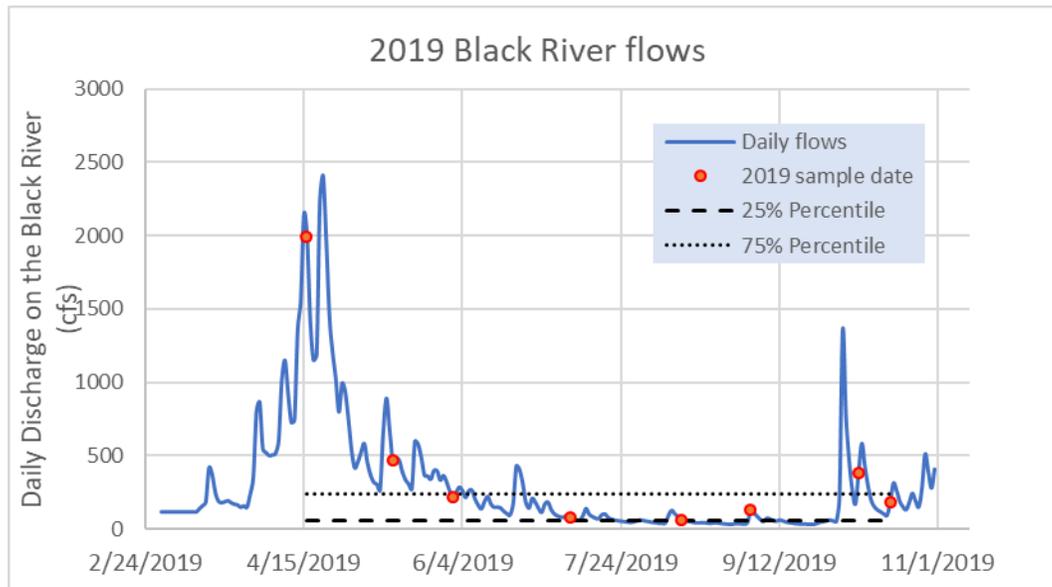
2019 - Annual report  
2021 - Sampling plans

Ben Copans  
and  
Sarah Damsell

<https://www.vacd.org/conservation-districts/orleans-county/programs-and-services/memphremagog-reports/>

# LaRosa volunteer monitoring program Memphremagog water quality sampling partnership - background

- 8 sample dates per year over
- At least two targeted runoff events each year
- Sample for total nitrogen and total phosphorus
- In 2019 we sampled 37 sites at 9 farms
- Continuation of sampling efforts that began in 2005 – where we have sampled over 190 sites



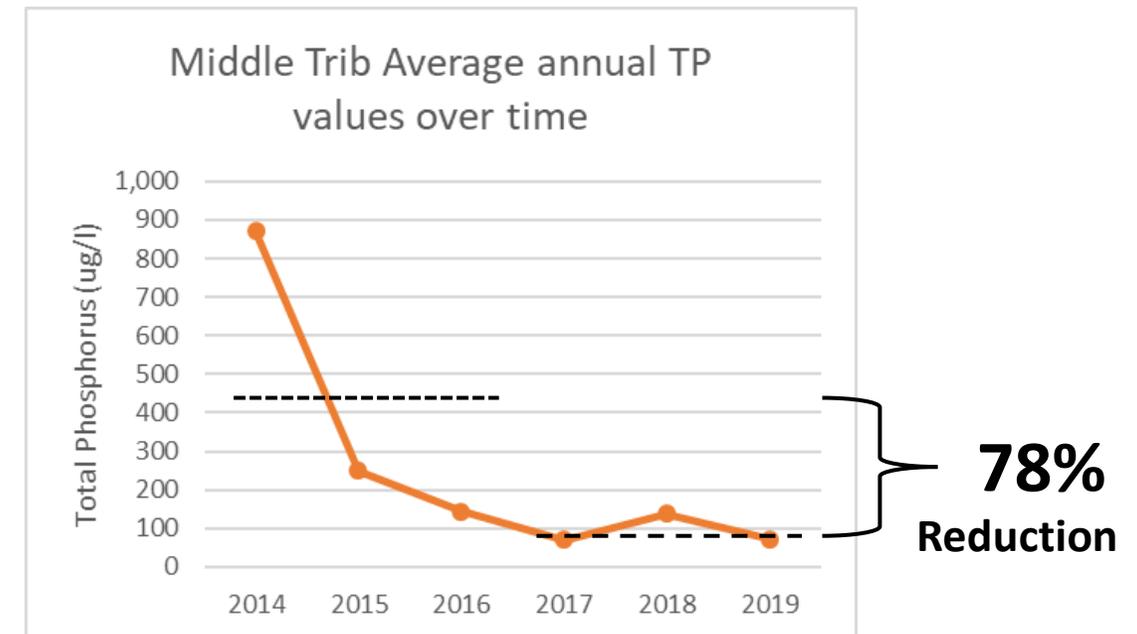
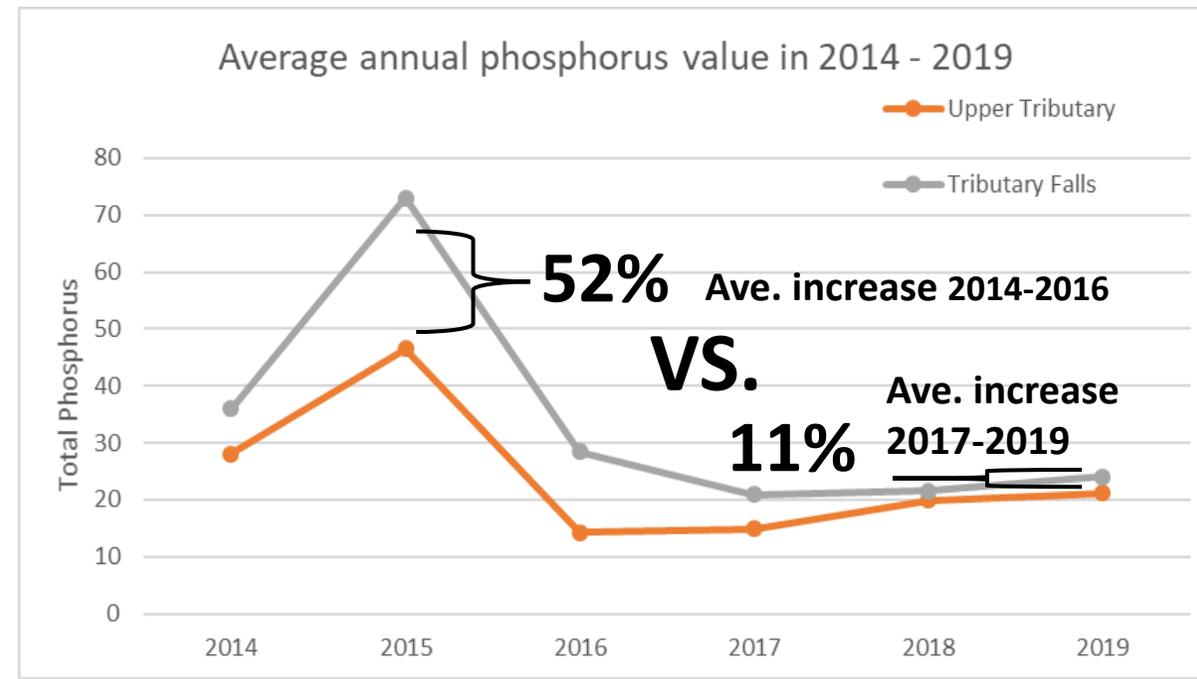


In 2019 we made progress in showing water quality improvements even with limited data.



# Farm 6

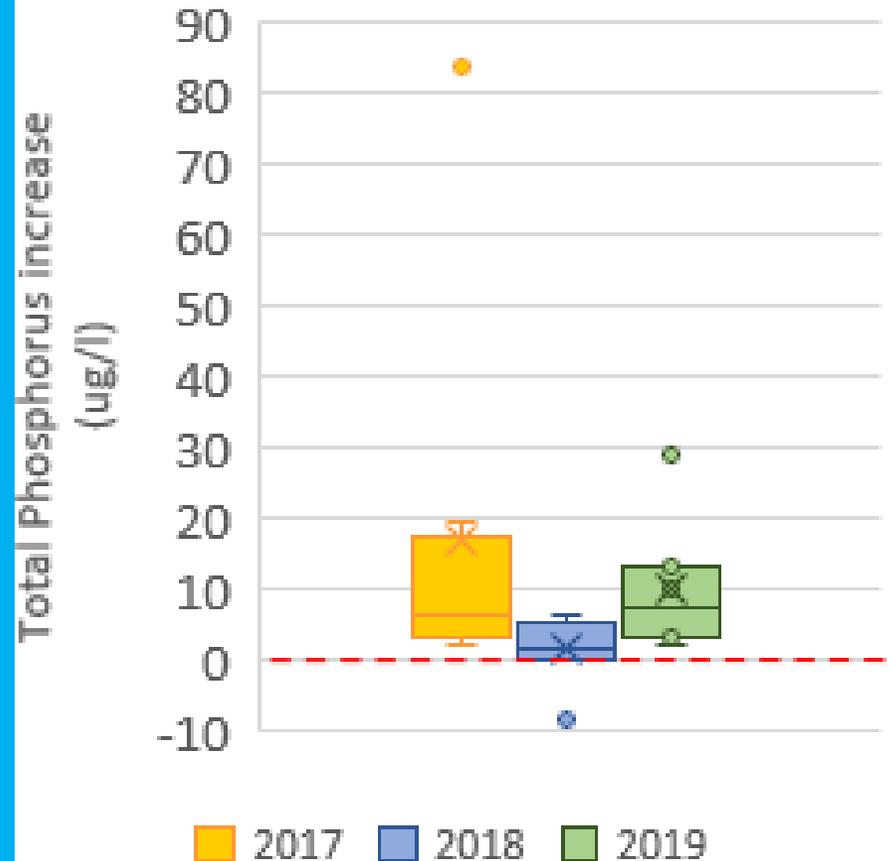
- Statistical analysis suggests that cover cropping and no/reduced till practices have reduced loading from corn fields.
- 99.8% chance that the reduction in the increase from above to below the corn fields in 2017-2019 (11%) vs 2014 – 2016 (52%) is real.
- The magnitude of the drop at the middle site that is below this corn fields and barnyard runoff was much higher with a reduction of 78%. This is just barley statistically significant with just over 95% chance this is a real change. This is due to the high variability in the phosphorus concentrations at this site.



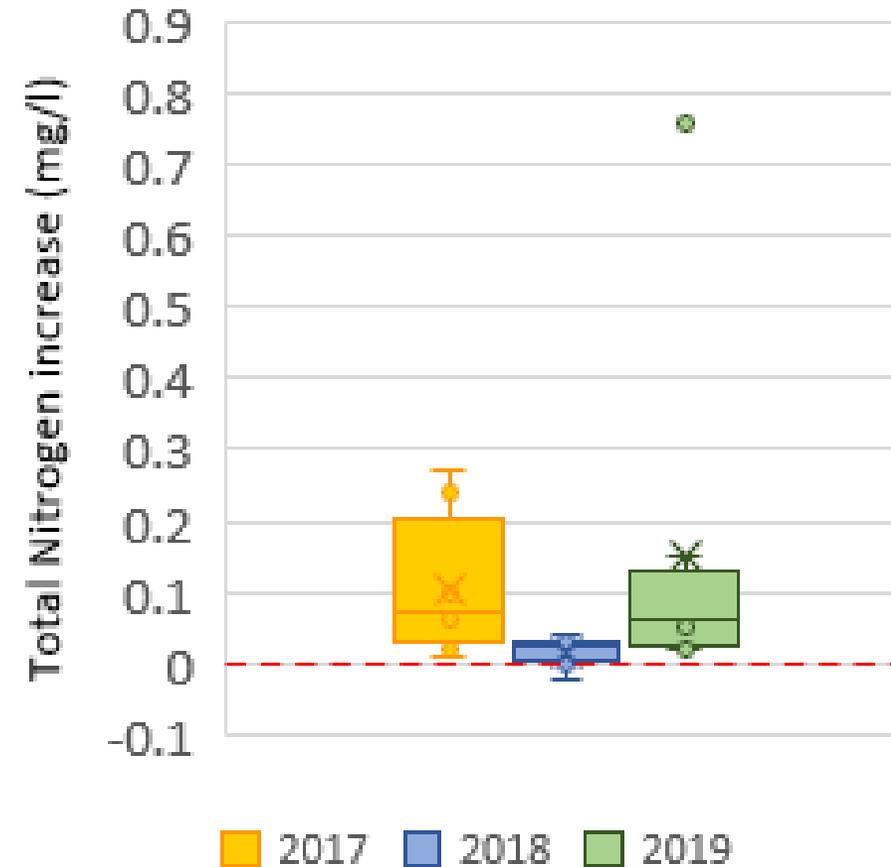
# Farm 9

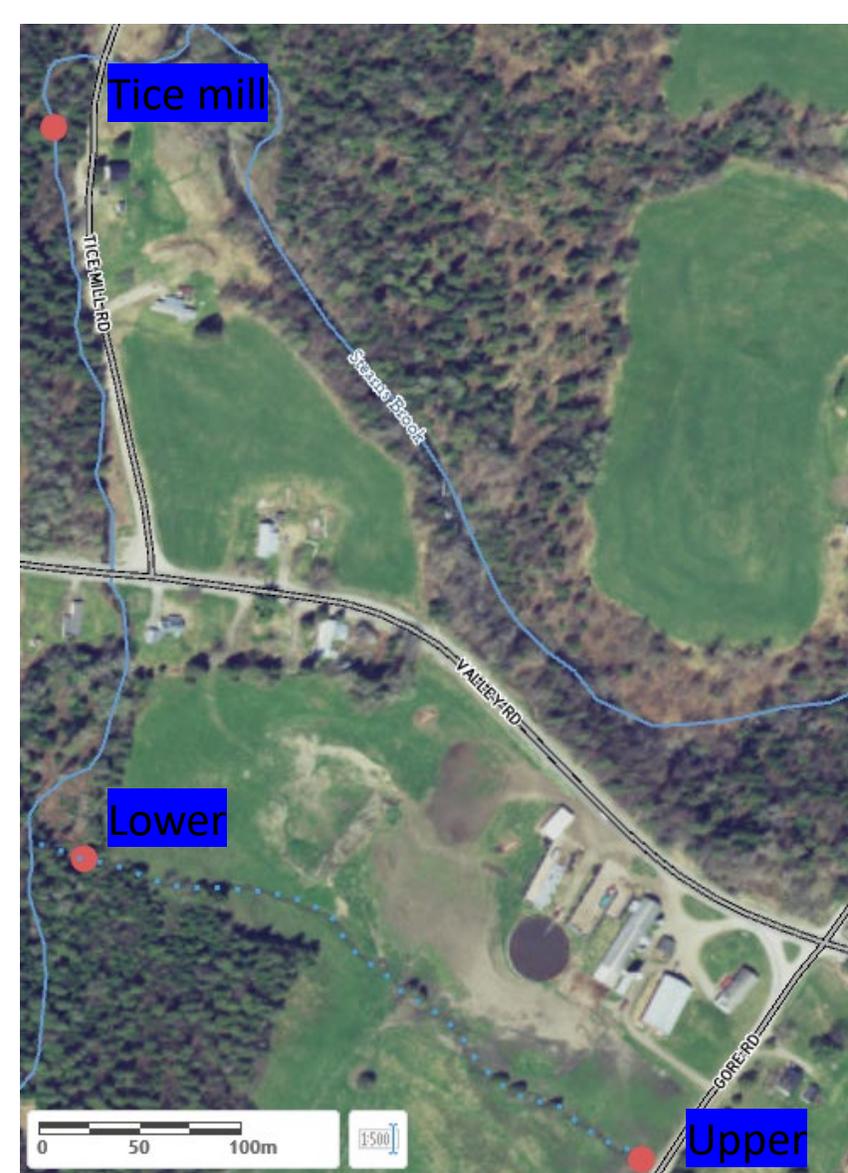
- 2017 – milking Herd
- 2018 – no cows
- 2019- Heifers
- Statically significant difference in TP and TN between 2017 and 2018.
- Small barnyard project in 2018 and buffer discussed.
- Farm was conserved in 2020 and restoration projects are being planned.

Phosphorus increase from above to below the farm on sample dates in 2017, 2018, and 2019

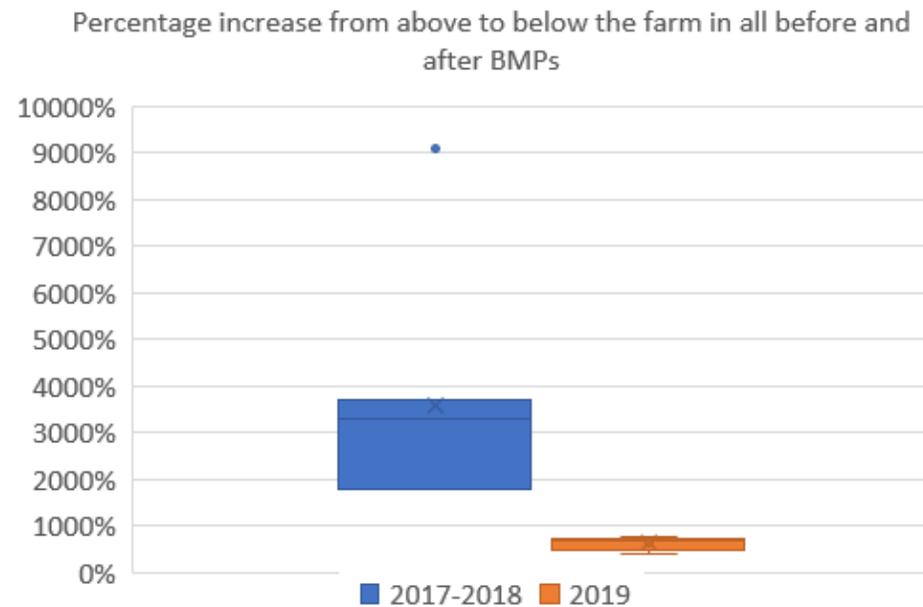


Nitrogen increase from above to below the farm on sample dates in 2017, 2018, and 2019





# Morin Farm



- The difference between the upper and lower sites in fall pre vs post BMP shows a 99.97% chance that there is a reduction over time by nearly 85%.
- This reinforces that the closer sites are to BMPs the better but above and below provides the best chances of showing improvements with limited data.

# Success Story



NONPOINT SOURCE  
POLLUTION SUCCESS STORY

## Installing Livestock Exclusion Best Management Practices Reduces Phosphorus

### PROBLEM:

The Morin farm is in the town of Holland within the Stearns Brook watershed. Stearns Brook flows northeasterly and is listed on the VT Dept of Environmental Conservation 2016 stressed waters list for agricultural and gravel road runoff and morphological instability. Stearns Brook drains to Quebec's Lake Massawippi which has elevated levels of phosphorus.

The coordination efforts of Orleans County Natural Resources Conservation District (NRCDC) and other partners focused efforts have improved water quality conditions by implementing best management practices throughout the watershed.

Elevated levels of phosphorus in the unnamed waterway that runs through the Morin farm were discovered by the Orleans County Conservation District through the LaRosa Volunteer Water Quality Monitoring program. Samples were collected 8 times per year including 2 rain events in 2017, 2018 and 2019 at two locations, above and below the farm.

### PROJECT HIGHLIGHTS:

Andre Morin bought his 116-acre home farm from his parents in 1992, who had purchased it in 1984. In 2016, he started working with the Vermont Land Trust and the Vermont Housing & Conservation Board to place a permanent conservation easement on his farm.

As part of the easement agreements Andre agreed to address all Required Agricultural Practices (RAPs) including addressing the herd management practices of a heavy use production area adjacent the waterway. With assistance from Orleans County NRCDC staff he has discontinued the practice of feeding in paddocks adjacent to the waterway and allowing livestock access along the waterway.

In 2019 Andre completed a new heavy use area barn yard project with funding from the VT Agency of Agriculture, Food and Markets' Best Management Practices program. He also installed exclusion fencing, alternative watering, stream crossings and laneway projects with funding from the Orleans County NRCDC USDA Regional Conservation Partnership Program to bring the farm into compliance with the RAPs.

Andre said, "The project improved the farm because the cows are out of the mud, there is more room to feed in one place, it is easier to maintain, it helps my manure management, it looks a lot nicer and the work benefits the local waters because the cows are not going in the stream whenever they want." He sold his cows in the winter of 2020 because of his personal health limitations but his brother John will continue to use the facilities, pastures and crop fields.



Before

After

For additional information contact:  
VTDEC Watershed Coordinator, Ben Copans 802 751 2610  
Orleans County NRCDC Manager, Sarah Damsell 802 334 6090 x 7008

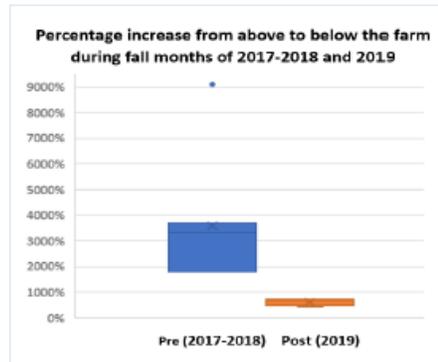
### WATER QUALITY RESULTS:

Total phosphorus concentrations were considerably higher on average at the lower than the upper site in 2017 and 2018. This tended to increase in August through October where on average the lower site was 36 times as high as the above site in 2017 and 2018.

The installation of BMPs in 2019 appears to have dramatically reduced the phosphorus loading from the farmstead and pasture areas. After this work was completed the increase in total phosphorus from the upper to the lower sites dropped to 6 times higher.

Analysis suggests that this was a real improvement in phosphorus levels in the fall, with over a 99% chance of significant improvement. It is unusual to be able to document such a dramatic improvement with only one season of data. The box plot graph below shows the percent increase in phosphorus concentration during the fall season from above to below the farm in 2017-2018 and 2019 showing dramatic improvement after BMP's were installed in July of 2019.

### Water Quality Sampling Results



### Map of Watershed



### REQUEST FOR ACTION:

Andre believes that farm conservation work that helps water quality "is good because everybody uses rivers and lakes and if we don't keep them clean then we will all pay the price. When one farm here and another farm there does a project like this it adds up to have a bigger effect and I am proud to be a part of that work". Andre said he would suggest to other farmers doing this work because "Working with the staff was real good, everyone listened to my suggestion and their openness was a big help. If you have time to work on the project, they will help you do it!"



Before



After

The creation and distribution of this publication is supported by a grant from the VT Agency of Agriculture Clean Water Funding Initiative.

# 2021 LaRosa water sampling plans



The 2020 season was canceled, however the Orleans County Natural Resources Conservation continued to work with many farms where we sample to implement agricultural best management practices.



The LaRosa Partnership Program will be happening in 2021 but there may be some changes in how this program is structured



The Memphremagog RCPP has been renewed for 5 years with \$850,00 in funding and we are considering how to recruit new farmers into the water sampling program to allow for data collection before practices are implemented to evaluate BMP effectiveness.