SEVEN DAYS
sevendaysvt.com

State, Feds Shake Hands on Lake Champlain Cleanup Agreement

An agreement between the state and the U.S. Environmental Protection Agency, unveiled Friday, specifies that Vermont must reduce the amount of phosphorus going into the lake, called the Total Maximum Daily Load, by 34 percent in the next 20 years. Reductions will be more drastic in certain regions — 64 percent, for example, in Missisquoi Bay in northwestern Vermont.

POSTED BY TERRI HALLENBECK ON FRI, AUG 14, 2015

BurlingtonFreePress.com
A GANNETT COMPANY

Vermont, EPA launch Lake Champlain cleanup

The U.S. Environmental Protection Agency has released a new final draft plan to reduce the amount of phosphorous that drains into Lake Champlain by more than 30 percent in the next two decades.

Paris Achen, Free Press Staff Writer August 21, 2015

VPR
VERMONT PUBLIC RADIO

Are New Pollution Limits Enough to Save Lake Champlain?

"Vermont farmers get it. They really have an interest in clean water. And in fact, when they're doing things right, they're keeping nutrients in the soil. They don't want the nutrients running off the soil because it's this phosphorus is what helped their plants grow and be healthy."

–Vt Agency of Nat. Resources Secretary Deborah Markowitz, Nov. 2, 2015

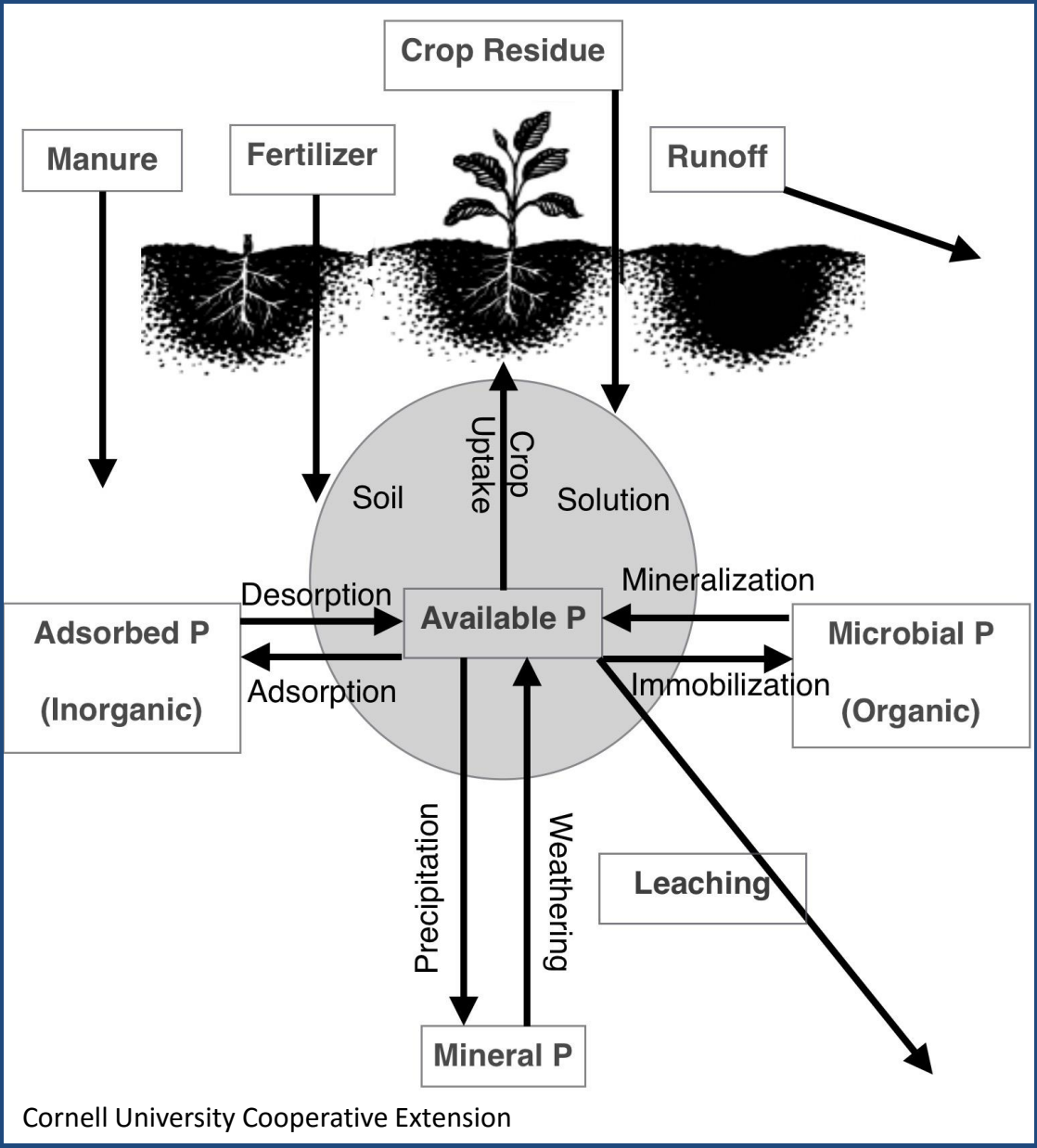

Lake.Champlain 2011
cf.org

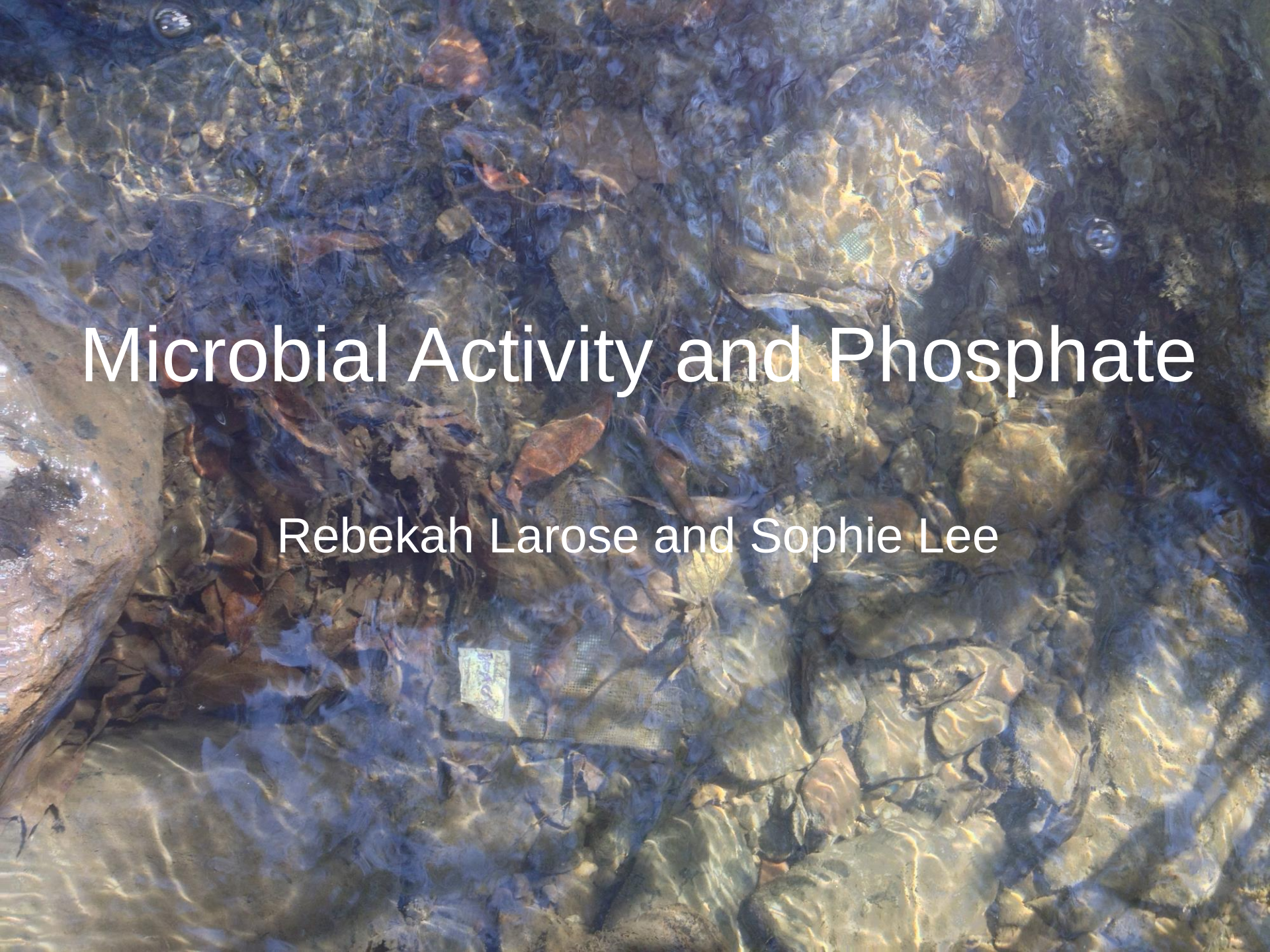

Blue green algae, Lake Champlain
vpr.net


Lake Champlain
Vermont Health Department


Middlebury College Environmental Senior Seminar 2011

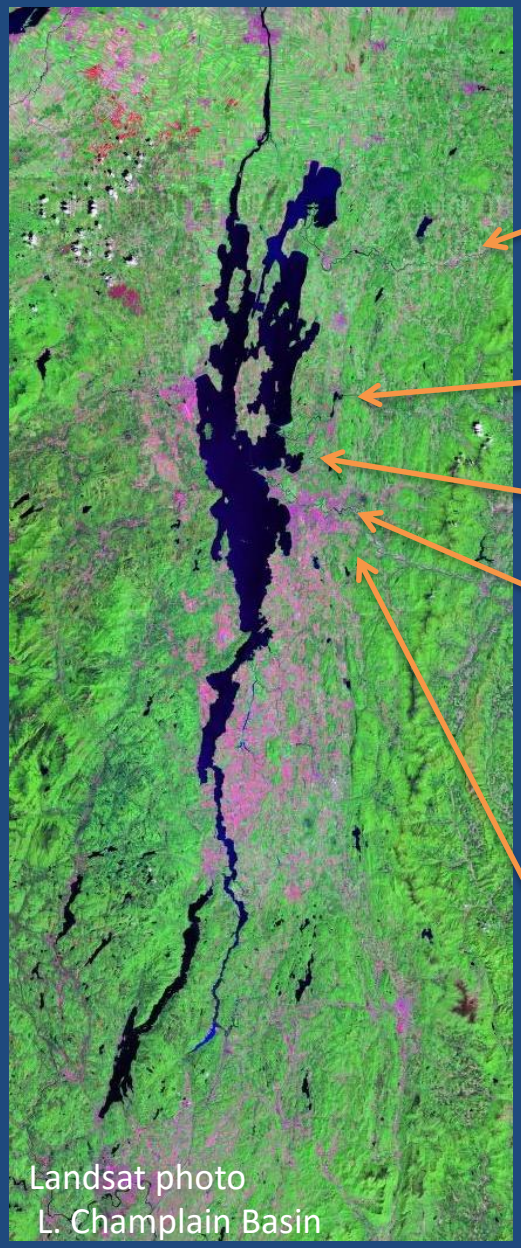
Phosphate Cycle

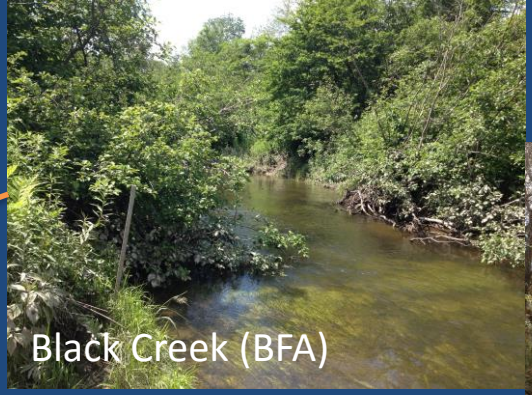




Microbial Activity and Phosphate

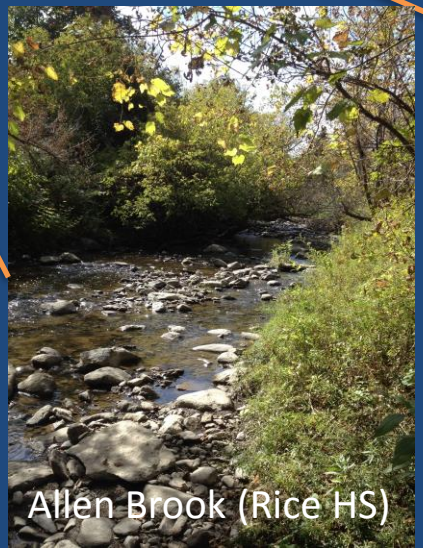
Rebekah Larose and Sophie Lee

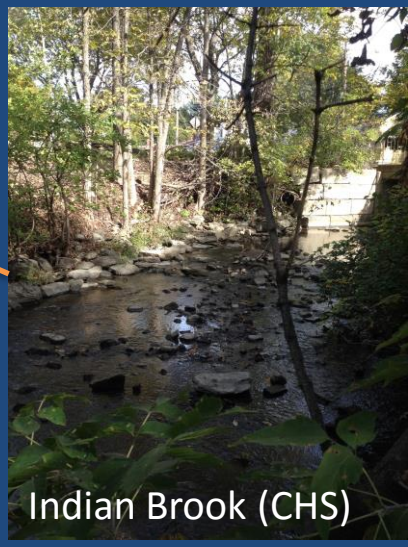

Landsat photo
L. Champlain Basin


Black Creek (BFA)


Mill Brook (BFA)

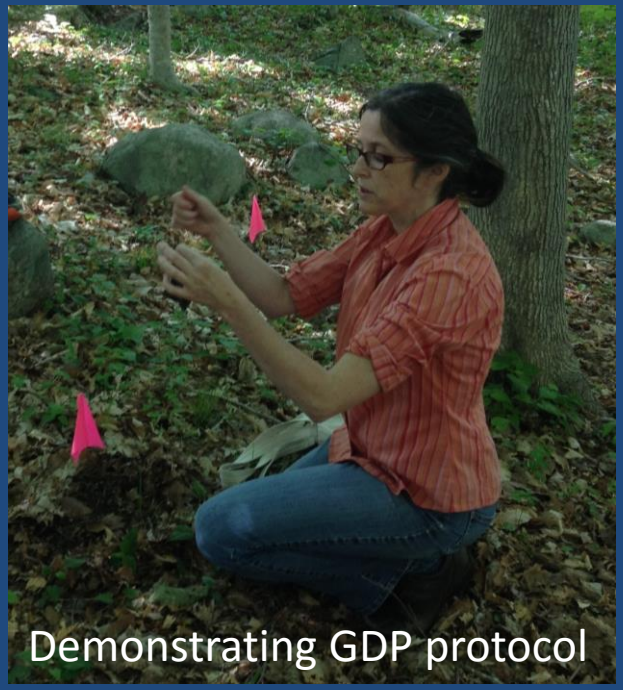

Pond Brook (CHS)


Allen Brook (Rice HS)

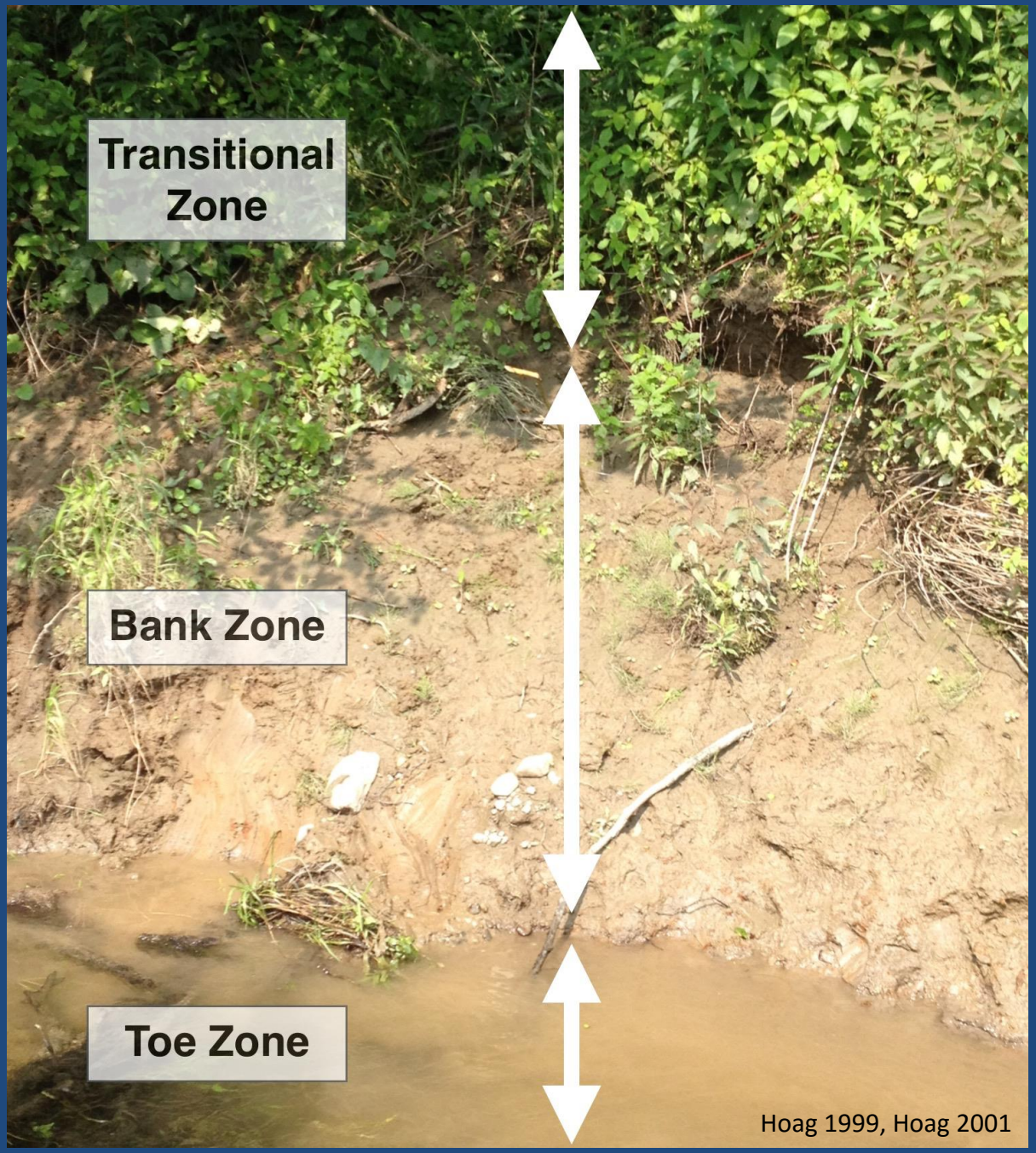

Indian Brook (CHS)


Initial GDP Bag

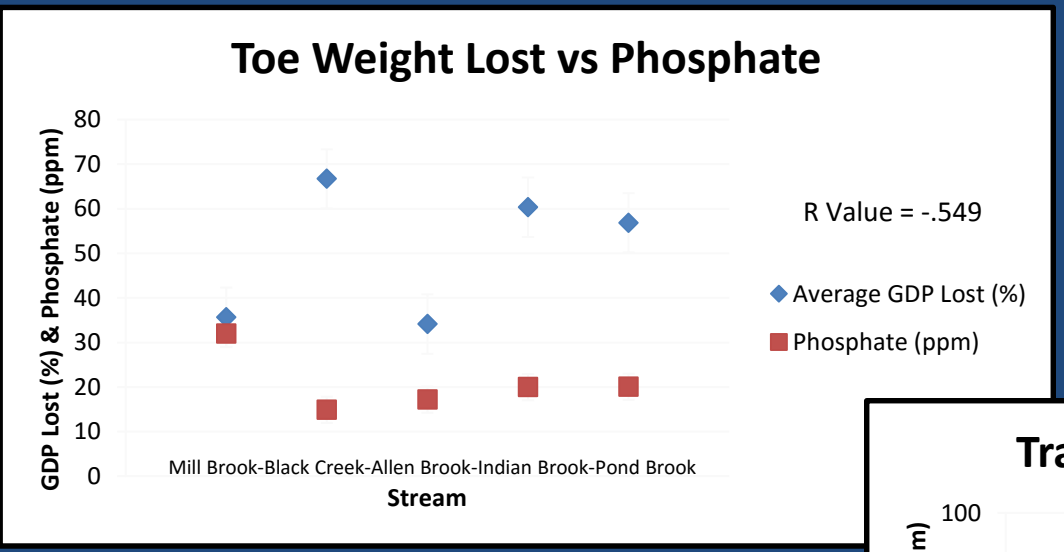
Final GDP Bag

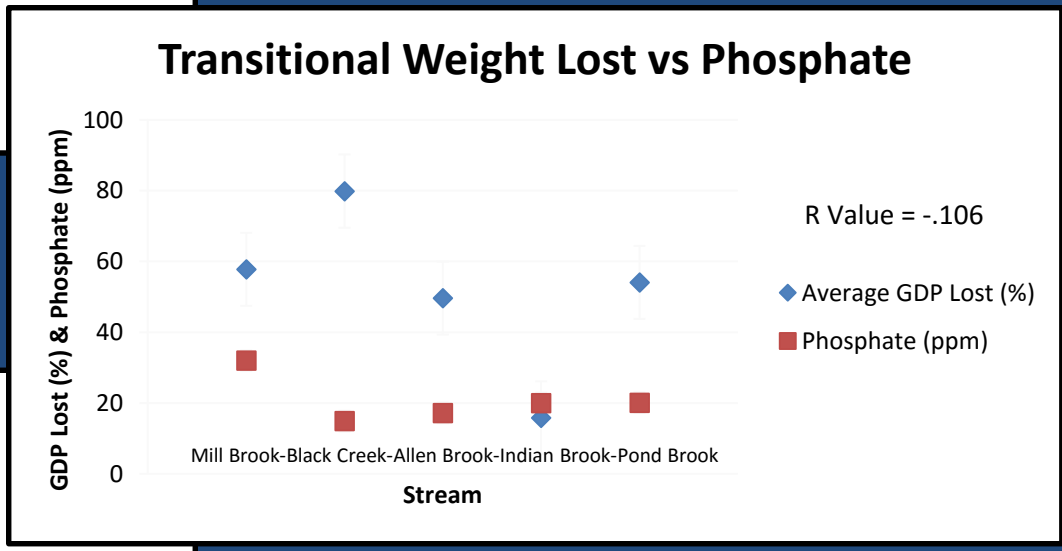

Demonstrating GDP protocol

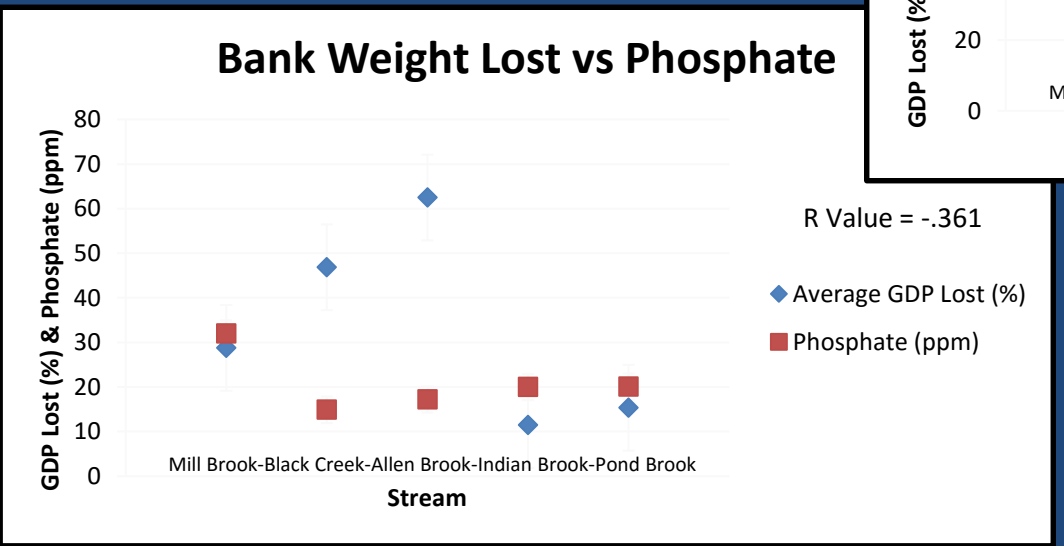

Deploying GDP bags in toe zone


Transitional Zone
Bank Zone
Toe Zone
Hoag 1999, Hoag 2001

Results


Toe Weight Lost vs Phosphate
GDP Lost (%) & Phosphate (ppm)
80
70
60
50
40
30
20
10
0
Mill Brook-Black Creek-Allen Brook-Indian Brook-Pond Brook
Stream
R Value = -.549
Average GDP Lost (%)
Phosphate (ppm)


Transitional Weight Lost vs Phosphate
GDP Lost (%) & Phosphate (ppm)
100
80
60
40
20
0
Mill Brook-Black Creek-Allen Brook-Indian Brook-Pond Brook
Stream
R Value = -.106
Average GDP Lost (%)
Phosphate (ppm)


Bank Weight Lost vs Phosphate
GDP Lost (%) & Phosphate (ppm)
80
70
60
50
40
30
20
10
0
Mill Brook-Black Creek-Allen Brook-Indian Brook-Pond Brook
Stream
R Value = -.361
Average GDP Lost (%)
Phosphate (ppm)

Discussion

- Decomposition bag mass loss (%) averages for toe, bank, and transitional areas compared to phosphate averages (ppm) at all sites showed negative correlations these were respectively, -0.549, -0.361, and -0.106.
- More microbes in the soil may mean less phosphate in the streams.
- Increased microbial activity may reduce P available for leaching and runoff in soils where P is not in excess (Reddy, 1999). Sufficient plant uptake of inorganic phosphate coupled with microbial scavenging of phosphate may lead to less phosphate in runoff.
- Could microbial manipulation and careful application of phosphate help lessen phosphate leaching and runoff in our streams and rivers and reduce phosphate levels in Lake Champlain?
- Broadening the sample base to include more tributaries to Lake Champlain as well as measuring the P levels in the toe, bank, and transition areas at different times of the year for comparison to P averages in the stream would assist in narrowing additional factors involved in our results.

References

Gyles Randall, Dave Mulla, George Rehm, Lowell Busman, John Lamb, and Michael Schmitt. 2002. Phosphorus: Transport to and Availability in Surface Waters. University of Minnesota Extension, Nutrient Management.

A. Adkins, D. Leduc. 2006. Microorganisms: Role of Microorganisms in Phosphorus Cycling. Dept. of Bio. U. Of Winnipeg.

K.R. Reddy, J.R. White, A. Wright. T. Chua. 1999. Influence of Phosphorus Loading on Microbial Processes in the Soil and Water Column of Wetlands. Phosphorus Biogeochemistry in Subtropical Ecosystems. Ed. K.R. Reddy, G.A. O'Connor, C.L. Schelske. CRC Press. LLC

Acknowledgments

Thank you :

- Lindsay Wieland, Janel Roberge, Laura Yayac and Declan McCabe, VT EPSCoR CWDD at St. Michael's College.
- Dr. Sue Natali, Associate Scientist, Woods Hole Research Center for introduction to and instruction regarding the Global Decompostion Program.
- Saul Blocher for water analysis at Johnson State College, VT.

Funding provided by NSF Grant EPS-1101317