A photograph of three people, two men and one woman, lying on their stomachs in a field of grass and rocks. They are looking towards the camera. The man on the left has a beard and is wearing sunglasses. The woman in the middle is wearing a plaid shirt. The man on the right is wearing a white shirt. The background is a natural outdoor setting with rocks and vegetation.

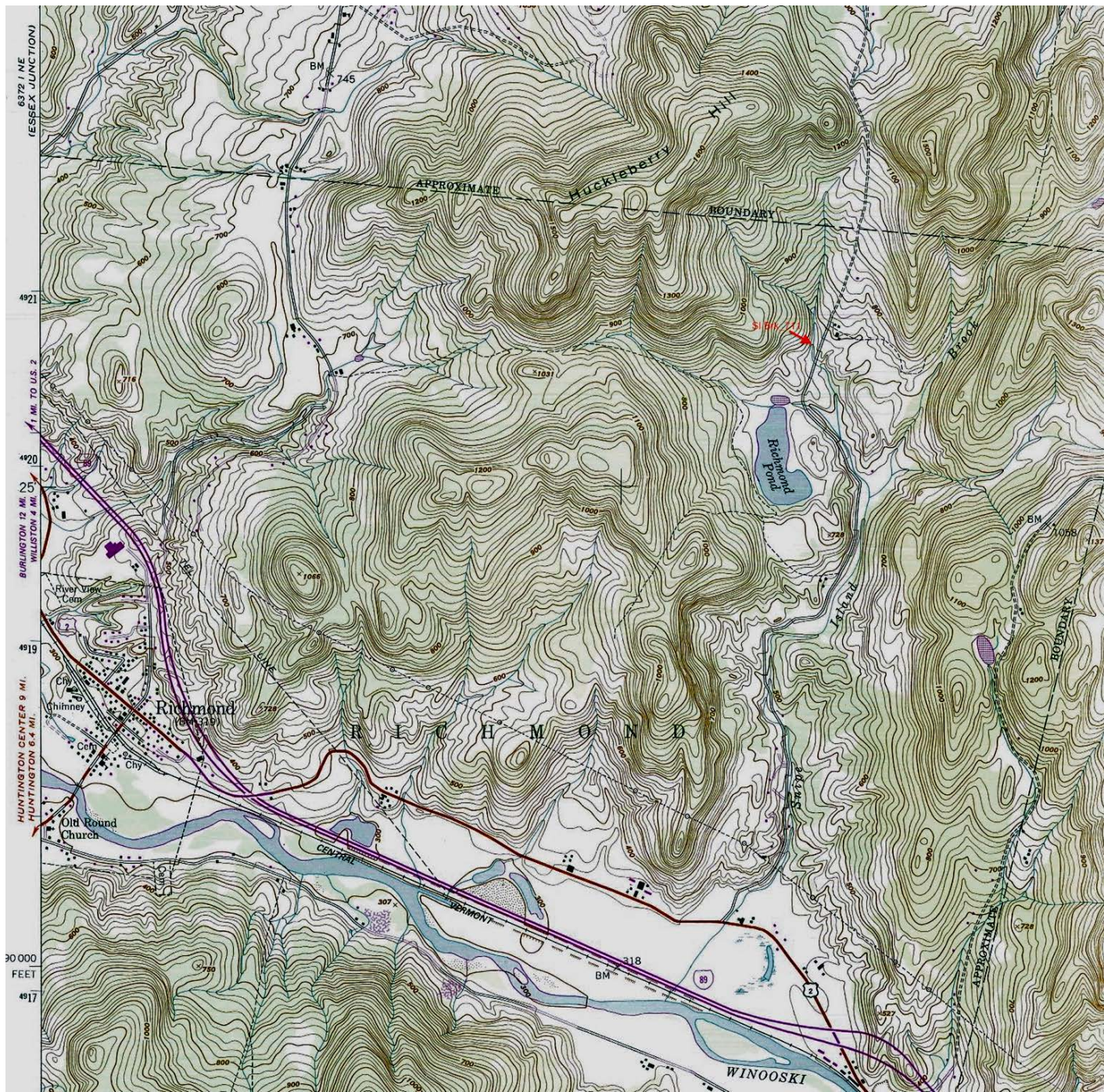
A Look at the Relationships Between E. coli, Total Phosphorus and the Macroinvertebrate Populations in Englesby Brook and Snipe Island Brook

Investigators: Shona Paladugu and
Michael Martinez, Rock Point School

Teacher: Kathy Rossman

Snipe Island Brook, Richmond, VT



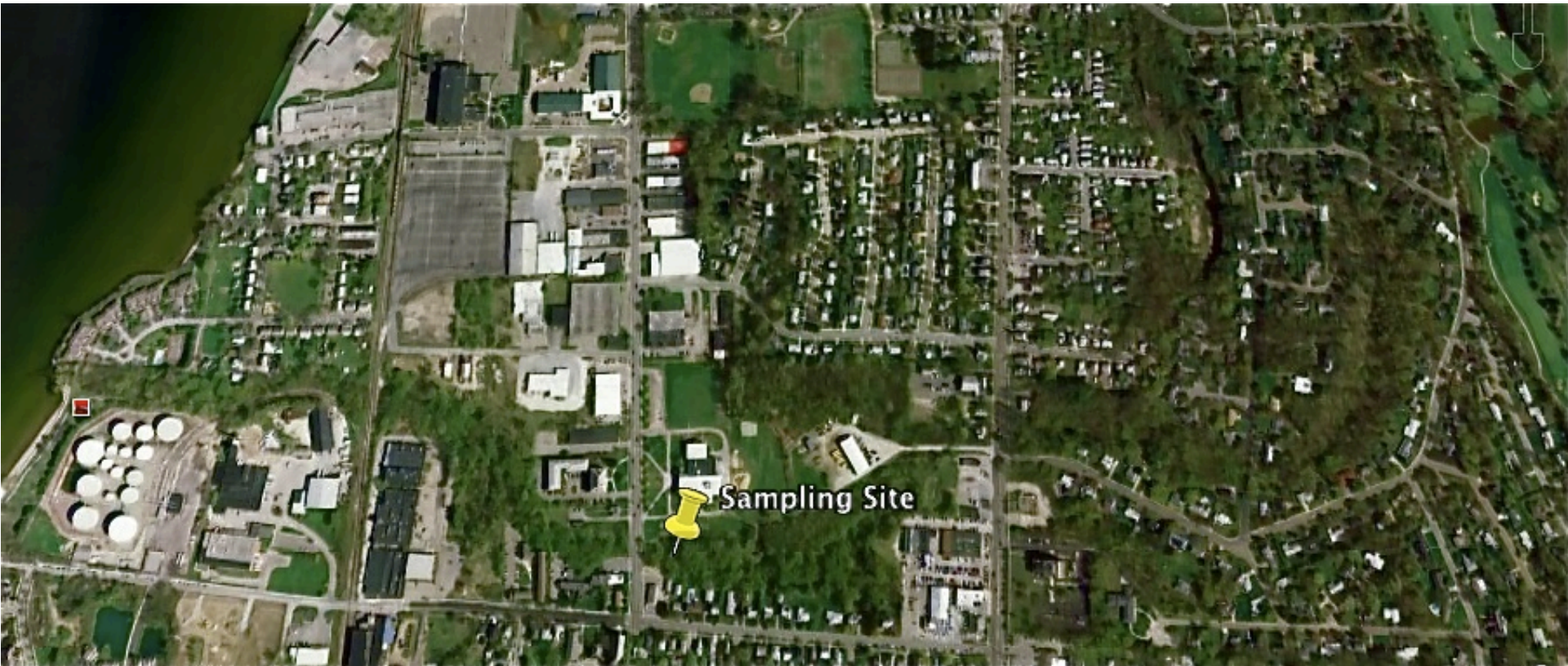


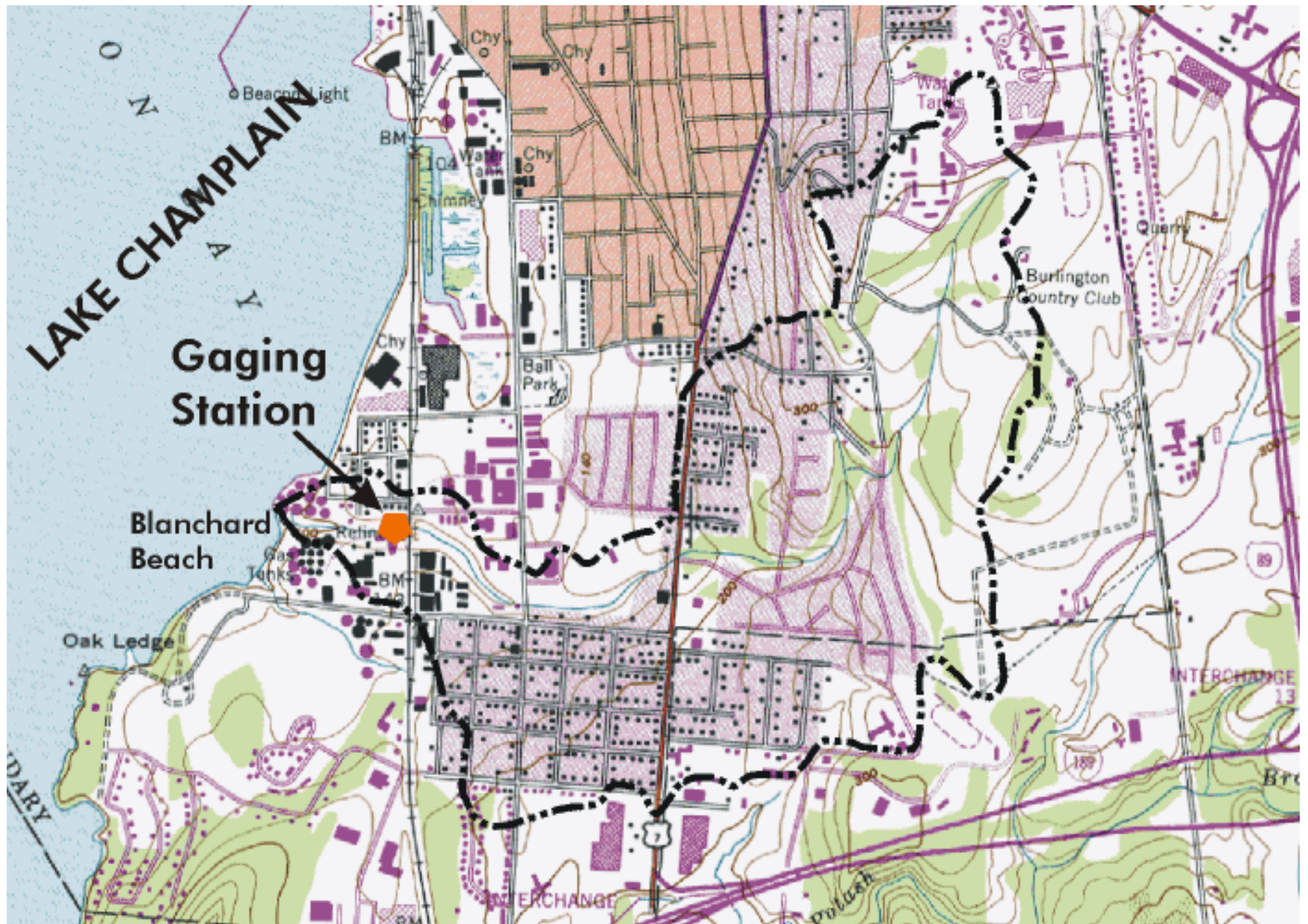
Snipe Island Brook, Richmond, Vermont



- 44.42312, -72.94413
- Low human impact area
- Low density residential area
- Adjacent to forest, a few cut fields, and runs along side a packed dirt road
- Stream bed primarily composed of cobbles and coarse gravel

Englesby Brook, Burlington, VT



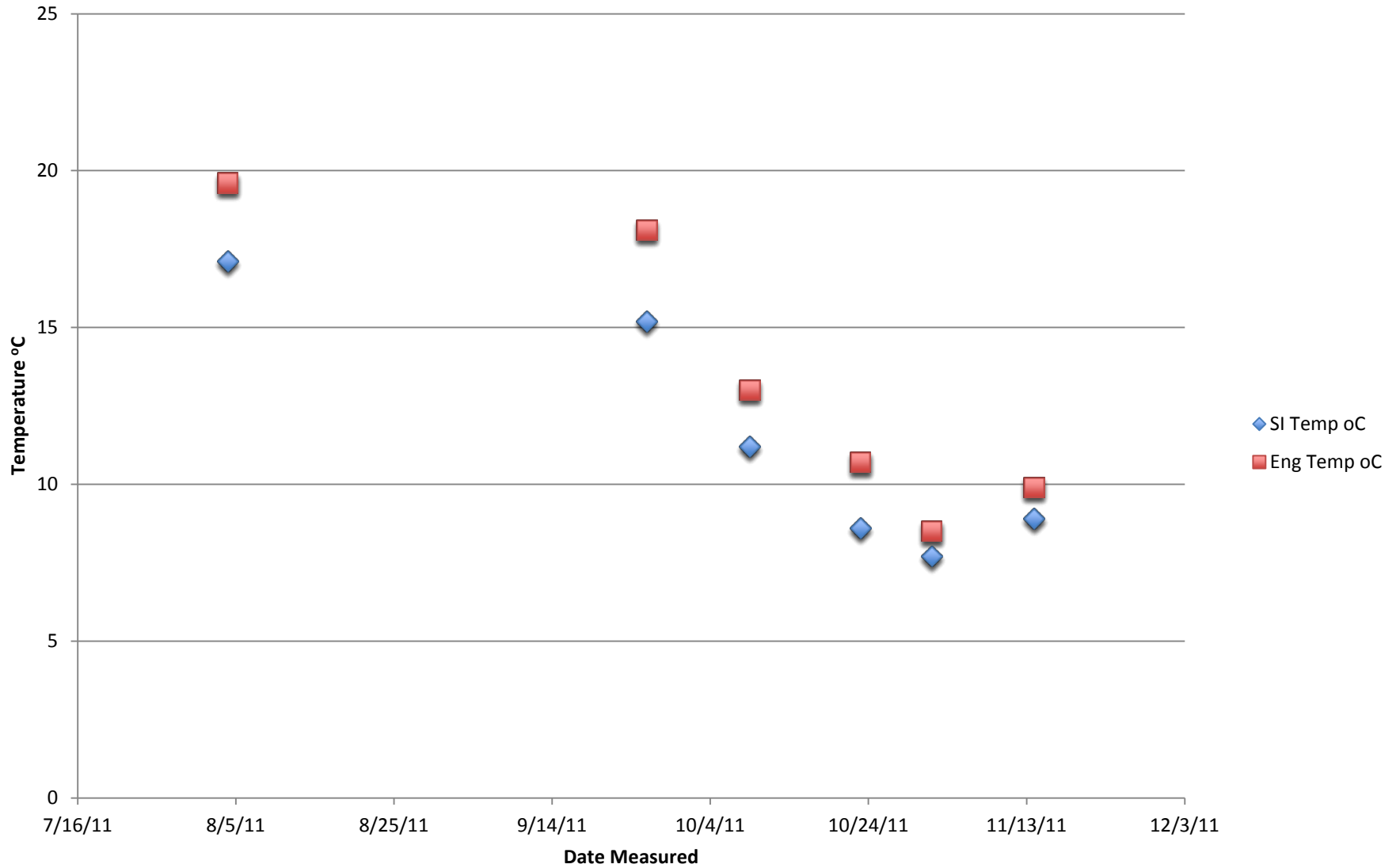


Englesby Brook, Burlington, Vermont

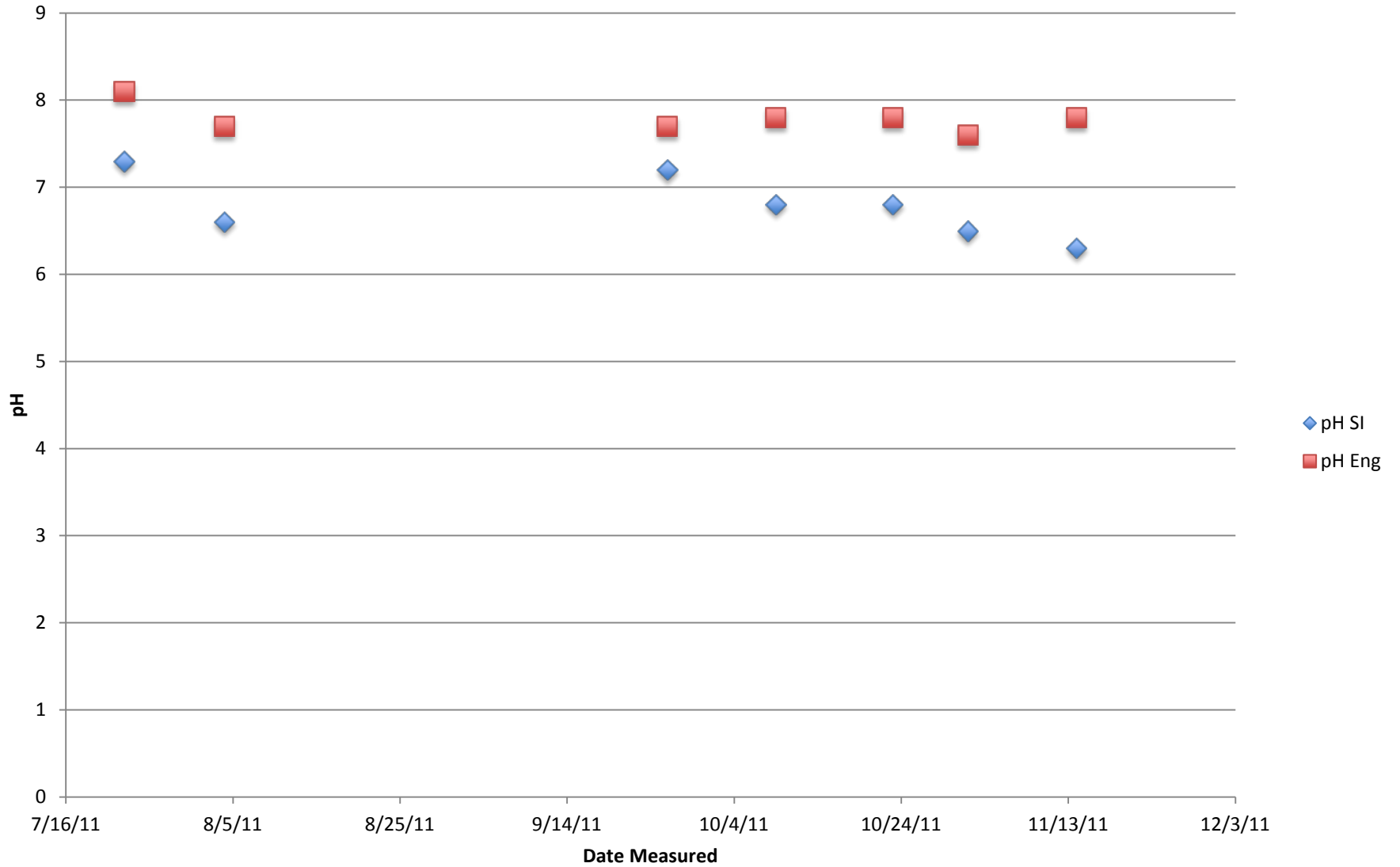


- 44.456134, -73.213635
- High human impact area
- Located near school, bridge for major road, high density residential area, and community garden site
- Stream originates from Burlington Country Club
- Stream bed primarily composed of gravel and coarse gravel

Temperature: Snipe Island Brook v Englesby Brook



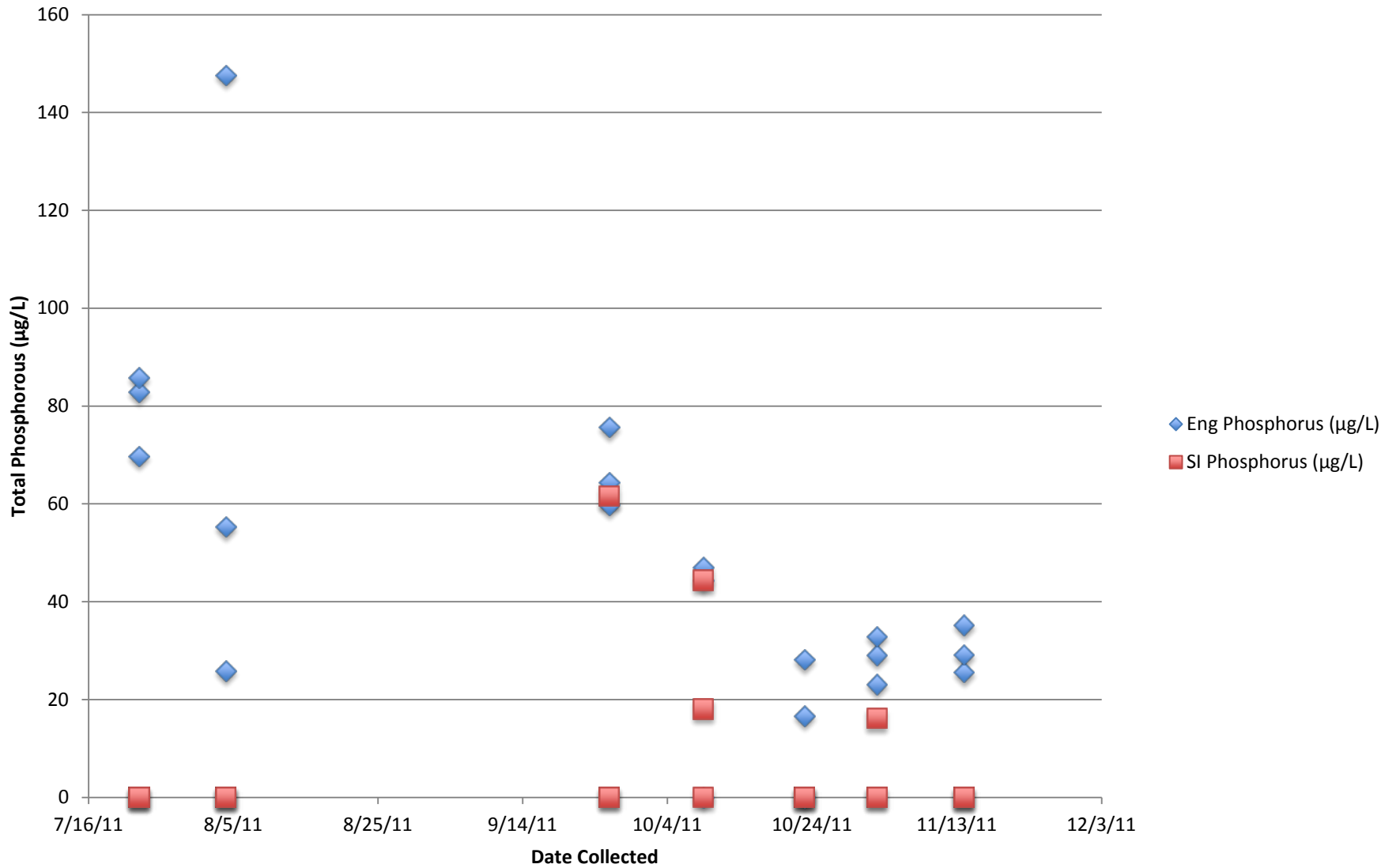
pH: Snipe Island Brook v Englesby Brook



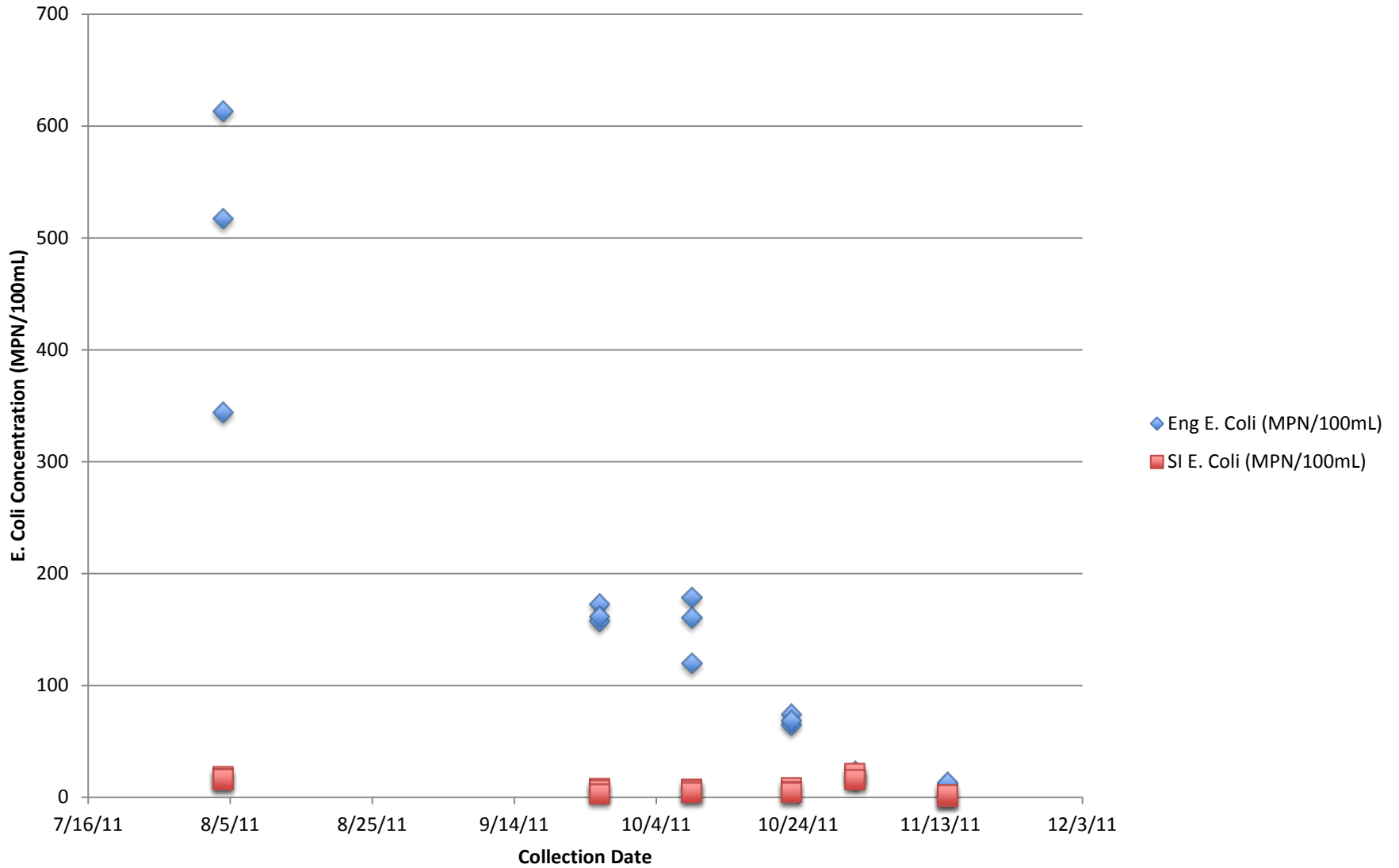
The Relationship between E. coli, Phosphorus, and Macroinvertebrates



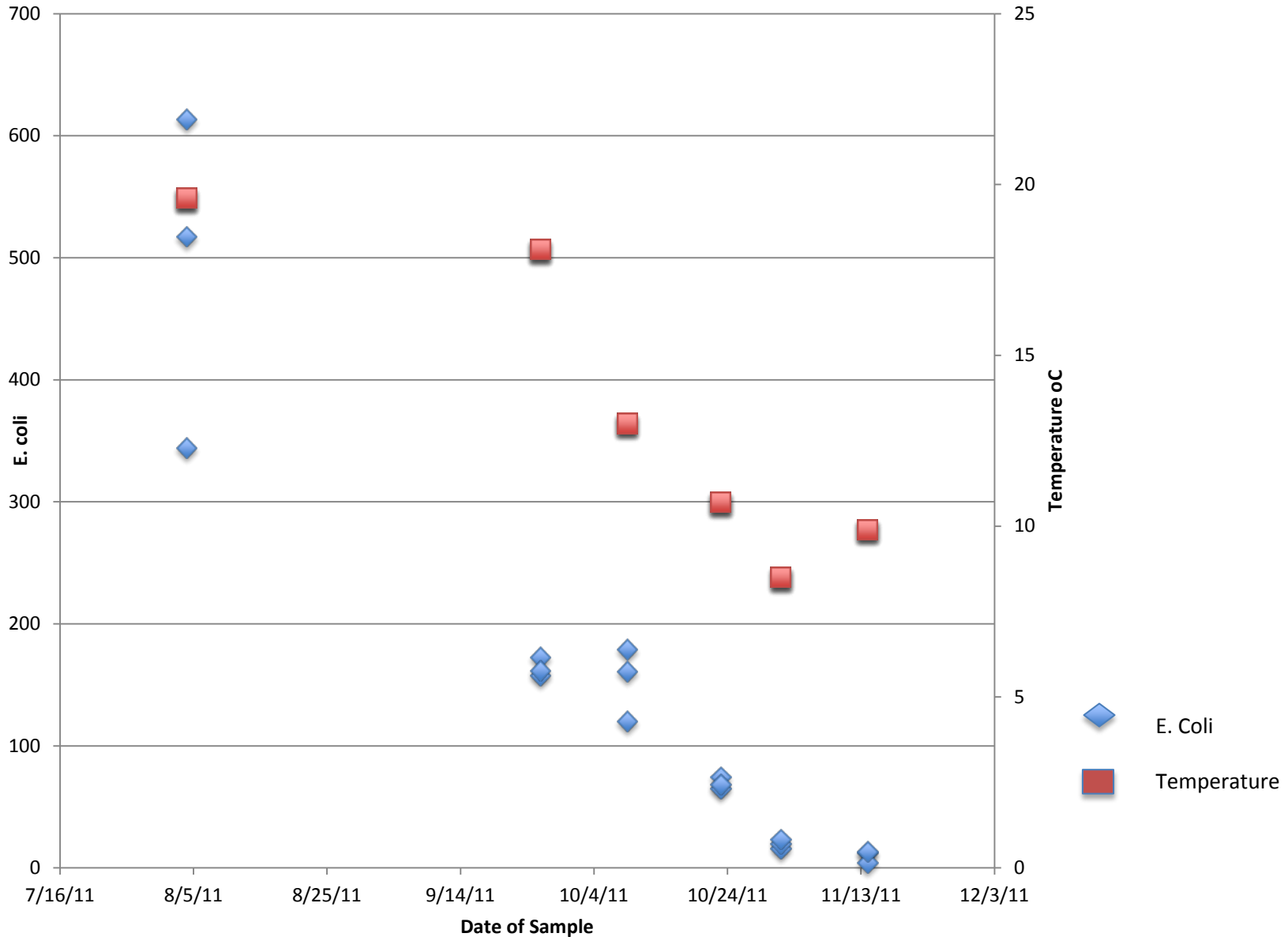
Total Phosphorus: Snipe Island Brook v Englesby Brook



E. coli Concentrations: Snipe Island Brook v Englesby Brook






LCD_Englesby Brook _117 E. coli vs Temperature






Macroinvertebrate Comparisons

Snipe Island Macroinvertebrate Populations

Image	Population	%
	ORDER: Ephemeroptera FAMILY: Baetidae COMMON NAME: Small Minnow Mayflies	33
	ORDER: Odonata FAMILY: Gomphidae COMMON NAME: Clubtail damselflies	13
	ORDER: Trichoptera FAMILY: Philipotamidae COMMON NAME: Finger Net Caddisflies	12.5

Englesby Brook Macroinvertebrate Populations

Image	Population	%
	ORDER: Diptera FAMILY: Chironomidae COMMON NAME: Blood Worms	44.2
	ORDER: Trichoptera FAMILY: Hydropsychidae COMMON NAME: Net – Spinning Caddisfly	34.8
	ORDER: Diptera FAMILY: Ephydriidae COMMON NAME: Shore flies	8.0

Other Macroinvertebrate Populations

Snipe Island Brook Other Populations (9 most populated of 16 identified types)	%
ORDER: Plecoptera FAMILY: Pteronarcyidae COMMON NAME: Giant Stonefly	8.2
ORDER: Trichoptera FAMILY: Hydropsychidae Common Name: Netspinning Caddisfly	6.28
ORDER: Diptera FAMILY: Chironomidae COMMON NAME: Bloodworm	6.28
ORDER: Diptera FAMILY: Simuliidae COMMON NAME: Black Fly	2.8
ORDER: Coleoptera FAMILY: Elmidae COMMON NAME: Riffle Beetle	2.8
ORDER: Plecoptera FAMILY: Chloroperlidae COMMON NAME: Green Stonefly	2.5
ORDER: Tricoptera FAMILY: Psychomyiidae COMMON NAME: Tube Making Caddisfly	2.2
ORDER : Lepidoptera FAMILY : Psephenidae COMMON NAME : Water Penny Beetle	1.3
ORDER : Annelida FAMILY : Oligochaeta COMMON NAME : Earth Worm	.94

Englesby Brook Other Populations	%
ORDER: Trichoptera FAMILY: Helicopsychidae COMMON NAME: Snail Case Caddisfly	7.4
ORDER: Odonata FAMILY: Cordulegastridae COMMON NAME: Spike Tail Dragonfly	0.88
ORDER: Annelida FAMILY: Oligochaeta COMMON NAME: Earthworm	0.88
ORDER: Diptera FAMILY: Psychodidae COMMON NAME: Moth Fly	0.88
ORDER: Ephemeroptera FAMILY: Tricorythidae COMMON NAME: Little Stout Crawler Mayfly	0.59
ORDER: Coleoptera FAMILY: Elmidae COMMON NAME: Riffle Beetle	0.59
ORDER: Diptera FAMILY: Simuliidae COMMON NAME: Black Fly	0.29
ORDER: Diptera FAMILY: Ceratopogonidae COMMON NAME: Biting Midge	0.29

Conclusions

E. coli population was greater in stream with greatest human impact

E. coli population showed positive correlation with temperature

Total phosphorus concentration was higher in human impacted streams

Species richness of macroinvertebrates was less in human impacted stream

Based on our research there is a negative correlation between macroinvertebrate species richness and E. coli and phosphorus concentrations

However, other factors such as stream bed sediment, pH, TSS, and temperature could significantly influence macroinvertebrate populations

Acknowledgements

A great thank you to the ESPCoR team and Saint Michael's College for providing us this incredible learning opportunity!

- <http://www.epa.gov/bioiweb1/html/benthosclean.html>
 - http://academics.smcvt.edu/Vermont_rivers/
- <http://wupcenter.mtu.edu/education/stream/Macroinvertebrate.pdf>
 - <http://bcn.boulder.co.us/basin/data/NEW/info/TSS.html>
- http://water.me.vccs.edu/courses/env211/lesson20_2.htm
- <http://www.epa.gov/owow/NPS/tribal/pdf/r8sedimentcriteria.pdf>
 - www.water-research.net/phosphate.htm