

# VT EPSCoR Center for Workforce Development and Diversity

Progress in Year 2 and projections for next year

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Bob Genter  
Declan McCabe



# Center for Workforce Development and Diversity



Education and Outreach  
Workforce Development  
Broadening Participation  
Service to the State

Integrate Participants into RACC research

- Students: high school, undergraduate
- Teachers: middle and high school

Water Analysis Labs for RACC research

Scholarships

Governor's Institutes of Vermont

Private Sector Technology Internships

# Scholarships – Broadening Participation

First generation college students

Native American students

- pursuing a STEM major in Vermont

Awarded in Years 1 and 2 to:

- 3 Native American students
- 6 First generation college students



# Private Sector Technology Internship Program

**PAID SUMMER INTERNSHIPS**



Gain real work experience.  
Get paid.  
*In Vermont.*

To learn more, visit  
[www.vttechcouncil.org](http://www.vttechcouncil.org)



This Internship program is brought to you by the Vermont Technology Council and is funded in part by a Vermont Department of Labor Next Generation Internship Grant.

[vttechcouncil.org/internships\\_search.html](http://vttechcouncil.org/internships_search.html)

vermont technology council

**Employees and students sign up for our internship program newsletter**

We're busy reaching out to companies so we have lots of great postings again this year! Keep checking the site and by late January-february you'll start seeing positions posted.

Please check back frequently for more internship opportunities!

**Vermont Technology Council Internship Postings**

Search:

Openings are still being added regularly, so keep checking!

To see all of the internships that have been filled [CLICK HERE](#).

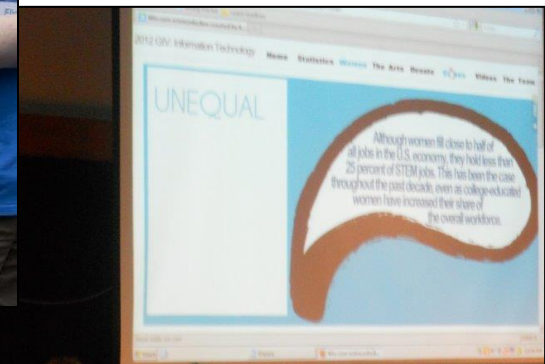
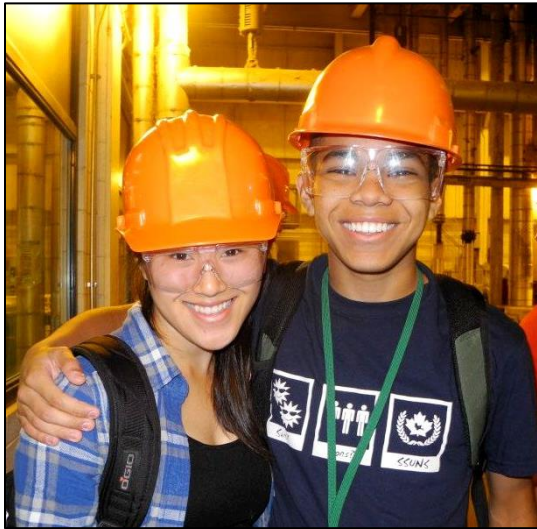
Company	City	State	Job Title	Job Responsibilities
Dealer.com	Burlington	VT	<a href="#">I.T. Intern</a>	The IT Intern assists the IT Helpdesk and IT Infrastructure teams in providing superlative service and assistance to all earthlings. The IT intern needs to possess excellent communication skills. The IT team is dynamic and a highly-valued asset to the company. The interactive, fun DDC culture makes this an extremely rewarding role for the right student.
Green Mountain Coffee Roasters, Inc.	Waterbury	VT	<a href="#">Packaging Development Intern- APPLY DIRECTLY to <a href="http://gmr.com/careers/undergradintern">gmr.com/careers/undergradintern</a></a>	The R&D Packaging Development Co-op will receive exposure to a packaging R&D environment for one of the fastest growing consumer packaged goods companies in the United States. This role will put learning into application in the areas of material science, design, testing, problem solving and specifications. The co-op will have the opportunity to work in cross-functional teams; collaborating with marketing, operations, quality, as well as external vendors. Along with

- VTCEI
- VEC
- VT EPSCoR
- VITC
- VMEC
- VT SBIR
- internship program**
- search opportunities
- employers
- about us**
- history
- vtc plan
- president
- board
- ex officio
- other resources
- contact information



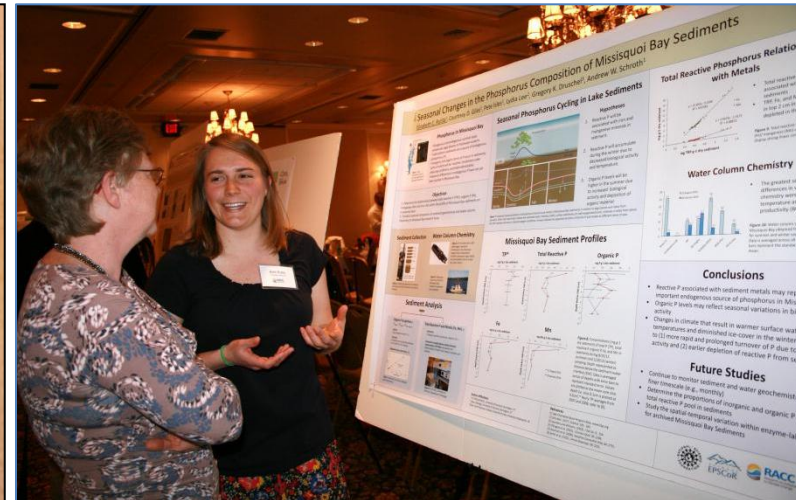
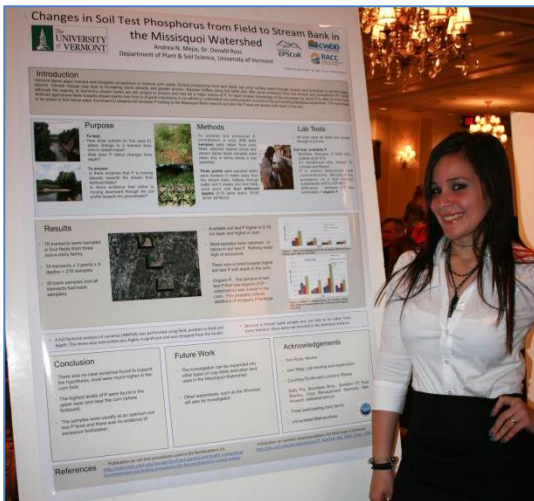
# Funding Support to GIV Institutes

- incentive awards for girls to participate in STEM institutes
- need-based awards for economically disadvantaged students



# Fifth Annual Student Research Symposium

April 4<sup>th</sup>, 2013





# Integrate High Schools into RACC Research

Year 2

## 2012-13 High School Teams:

18 teams: one teacher and two students each

Teachers 50% female; 11% under-represented;

Students: 61% female; 11% under-represented



## 2013-14 High School Teams:

20 teams: 17 from Vermont, 3 teams from Puerto Rico

# Integrate High Schools into RACC Research

## Experience in Active Research

- The Streams Project – Distributed network
  - Monitor stream water quality through biweekly grab sampling for nutrient and TSS analysis
  - Collect and ID macroinvertebrate community samples
  - Collect riparian soil samples
  - Steward stage and temperature sensors
- Other RACC-related research
  - Monitoring local weather data and comparing to regional data
  - Effects of blue green algae on fatty acids in fish
  - Investigating seasonality in Vermont through bird migration study
  - Groundwater and physical geology
  - Small lake temperature profile
  - Water quality comparisons in burned and un-burned sections of forest





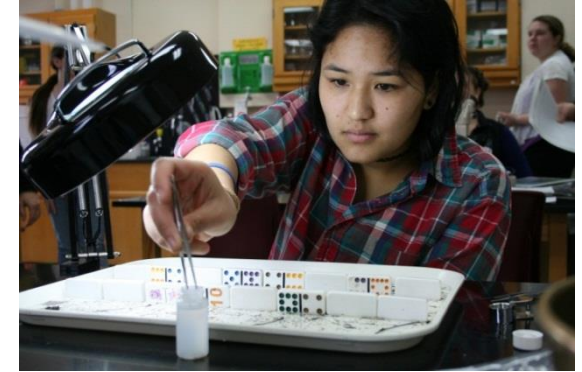
# Stage Sensor Sites

School	Town	Stream	Watershed
Harwood Union High School	Moretown	Dowsville Brook	Winooski
Colchester High School	Colchester	Pond Brook	Lake Champlain Direct
Vermont Commons School	S. Burlington	Huntington River	Winooski
Rice Memorial High School	S. Burlington	Potash Brook	Lake Champlain Direct
Stowe High School	Stowe	Gold Brook	Winooski
People's Academy	Morrisville	Little River	Winooski
Bellows Free Academy	East Fairfield	Black Creek	Missisquoi
Lake Region Union High School	Orleans	Burgess Branch	Missisquoi
Missisquoi Valley Union High School	St. Albans	Hungerford Brook	Missisquoi
Milton High School	Milton	Stone Bridge Brook	Lake Champlain Direct



# Macroinvertebrate Communities

School	Town	Stream	Watershed
Rock Point School	Richmond	Snipe Island Brook	Winooski
	Burlington	Englesby Brook	
Burr and Burton Academy	Dorset	Mettawee River	Poultney / Mettawee
	Dorset	Mettawee River	
Oxbow Union High School	Newbury	Hills Brook	Connecticut River
	Washington	East Orange Branch	
Oxbow Union High School	W. Topsham	Waits River	Connecticut River
	Bradford	South Branch Waits River	
University Gardens High School	Carolina	Rivera Stream	Puerto Nuevo, PR
	Carolina	Senorial Stream	
Jose E. Aponte De La Torre School	San Juan	Maracuto Creek	Rio Grande de Loiza, PR
	Bayamon	Trib A	Rio Bayamon, PR
Poughkeepsie High School	Stratsburg	Fall Kill River	Hudson, NY
	Pougheepsie	Fall Kill River	




# Cyber – Video Conferencing

## 1. Research Progress






### Webinar

November

Research on Adaptation to Climate Change in the Lake Champlain Basin  
High School Webinar Series, Part I



12 November 2012  
Courtney D Giles, PhD  
University of Vermont



## 2. Data Analysis Webinar

January

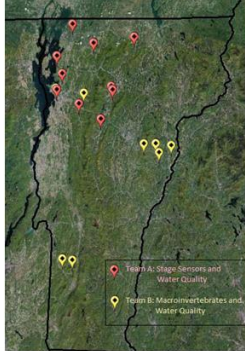
EPSCoR Data Webinar  
Declan McCabe, Saint Michael's College Biology  
[www.uvm.edu/epscor/redir/streamsprojectdata](http://www.uvm.edu/epscor/redir/streamsprojectdata)

**What we will cover:**

- Data sources
- Data grooming
- Data presentation

**What we may get to:**

- Powerpoint tips
- Poster templates



Big Blue Button software



# Data Generated from Streams Project Network

- 226 grab samples to water quality labs:
  - TSS analysis
  - TP and TN analysis
- 60 riparian soil samples from 7 stream sites
- Macoinvertebrate community characterization from 12 stream sites, 2-4 sampling dates
- Continuous stream stage and temperature





# Integrate Middle School Teachers into RACC Research



# Integrate Undergraduates into RACC Research

Year 2

## Undergraduates:

43 students from 13 institutions

62% female; 26% under-represented;

4 CCV students



## 9 VT institutions:

Castleton State College

Community College of VT

Johnson State College

Middlebury College

Norwich University

St. Michael's College

Sterling College

University of Vermont

Vermont Technical College

## 4 outside VT institutions:

Texas A&M University

Univ. of Maryland Eastern Shore

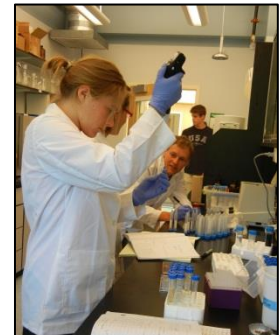
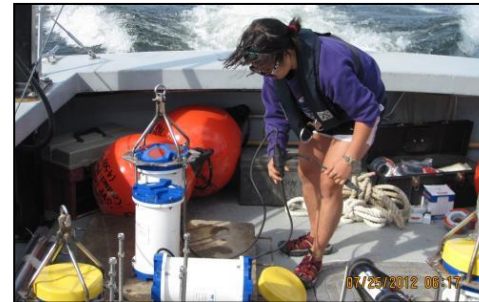
Universidad Metropolitana

University of Puerto Rico

# Integrate Undergraduates into RACC Research

**Research:** Working with 17 different faculty mentors

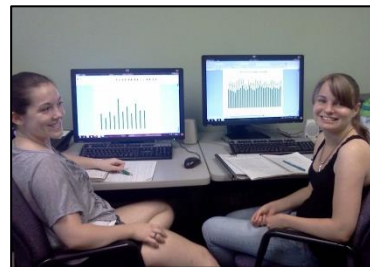
In Lake Processes: 7 interns  
(at UVM, SMC and Middlebury)



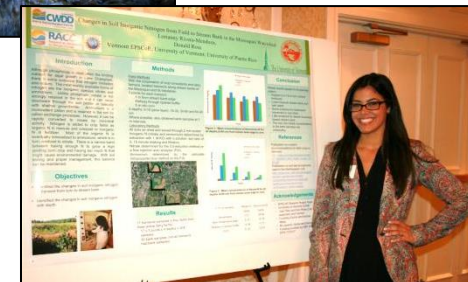
To Lake Processes: 26 interns  
(at UVM, SMC, JSC, Middlebury)



Climatology: 2 interns  
(at UVM)



Policy and Management: 7 interns  
(at UVM, SMC)





# Water Analysis Labs

- St. Michael's College – TSS analysis
- Johnson State College – Nutrient analysis





# Ribotyping and Water Analysis Lab

## Johnson State College

Bob Genter and Saul Blocher

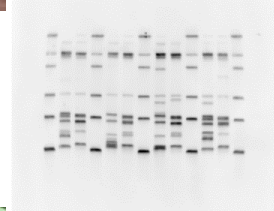
Johnson State College, VT

16 May 2013

# Sample Sources

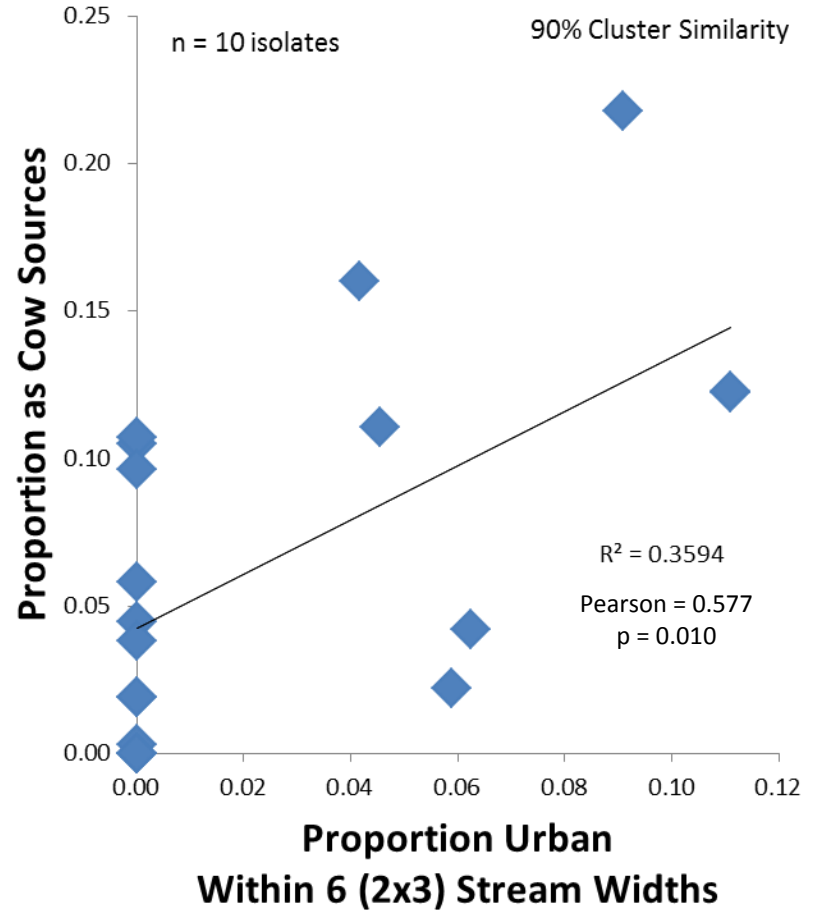
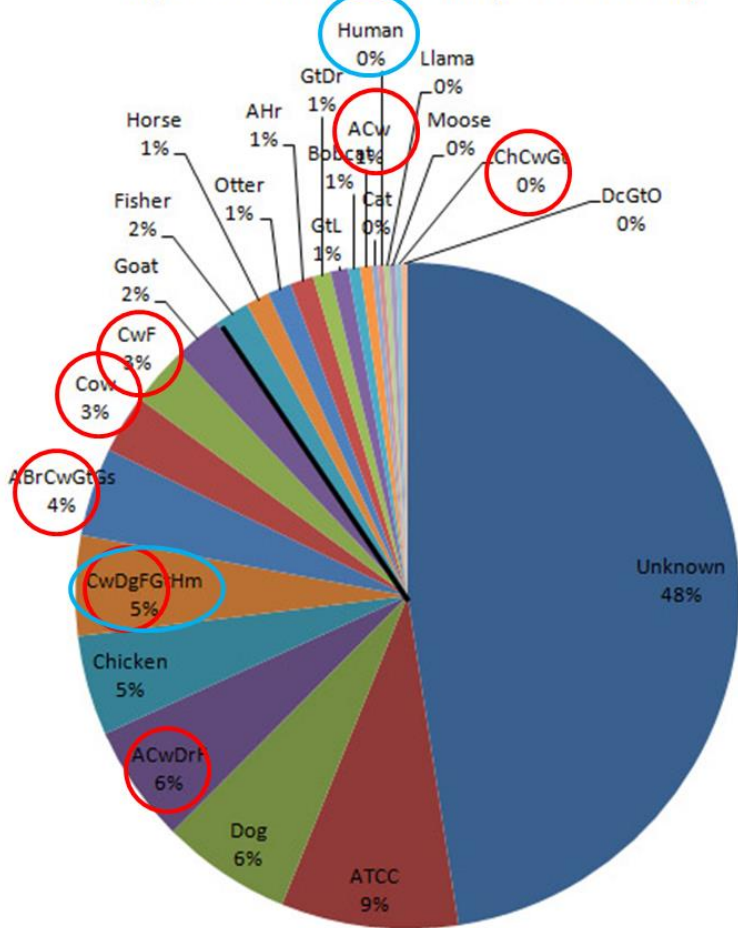
- Microbial source tracking for *E. coli*
  - Lamoille River – 19 sites (summer)
- Chemical analysis of river and lake water
  - Lake Champlain – 1 ISCO site (May – Oct.)
  - Mississquoi River – 3 ISCO sites (May – Oct.)
  - Winooski River – 5 ISCO sites (May – Oct.)
  - Lamoille River – 19 sites (summer)

# Microbial Source Tracking for *E. coli*



# Ribotyping

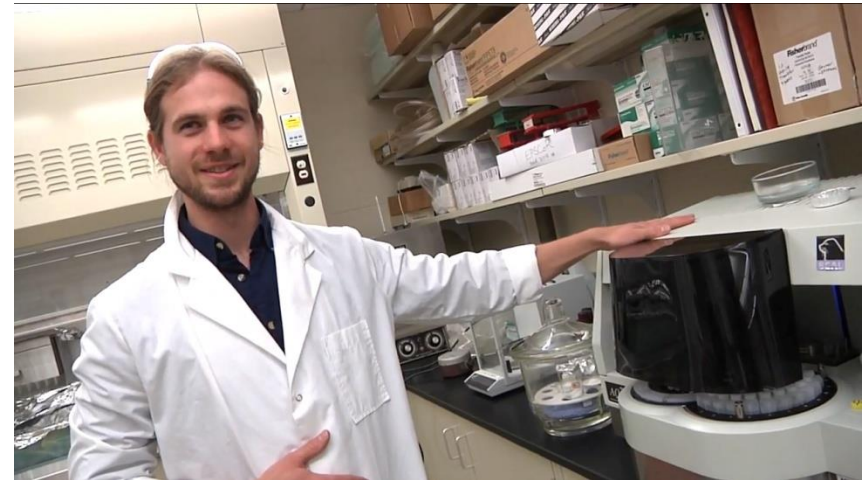
Top 10 Sources of *E. coli* (>2% of total)





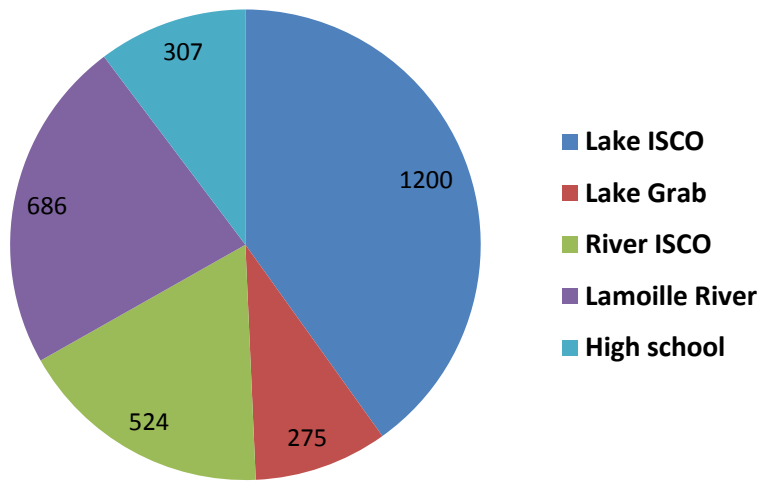
# Chemical Analyses

- Saul Blocher
  - Coordinating with Katie Chang, St. Michael's College
- Analytes
  - Phosphorus
    - Total P
    - Total dissolved P
    - Soluble reactive P
  - Nitrogen
    - Total N
    - Total dissolved N
    - Ammonia
    - Nitrate

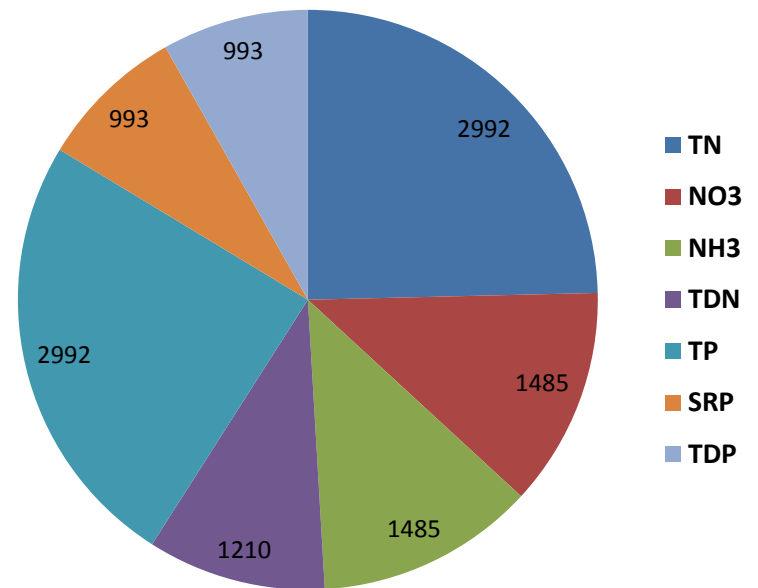


Seal AQ2

### Number of Samples Analyzed (2992 total)



### Number of Each Analyte Analyzed (12,150 total)



An additional ~30% of the samples are QC for a total of about 16,000 analyte-equivalents.

# Expectations for 2013

- More animal sources of *E. coli* identified as more wildlife *E. coli* are added to the library
- Increased number of water samples processed as ISCO sampling begins earlier in the year



# Thank you Students

- Greg Perry
- Tim Thurston
- Benjamin Kirchner
- Jake Van Gorder
- Danielle Mendes
- Ryan Joy
- Saul Blocher
- Ben Massey
- Abbie Murphy
- Helen Birk
- Laura Salazar
- Gabriel Pérèz-Beyer
- Allie Compagna
- Corynne Dedeo
- Rebecca Richert
- John Dawkins

# Thank you all.

- Vermont EPSCoR
  - Judy Van Houten, Kelvin Chu
  - Miranda Lescaze, Kathyjo Jankowski, Liza Ray
  - Lexi Hazelton, Dawn Shackelton, Lydia Pitkin
- Jim Ryan, VTDEC
- Kim Komer & Christina Goodwin, Lamoille Valley Natural Resources Conservation District
- Catherine Donnelly, DJ D'Amico, Errol Groves
- Saul Blocher, Keith Kirchner, Barbara Murphy, Sharron Scott, Sandy Duffy, Nancy Hutchins, Nita Lanphear, Sue Mann, Karen Jones & EHS Department, JSC

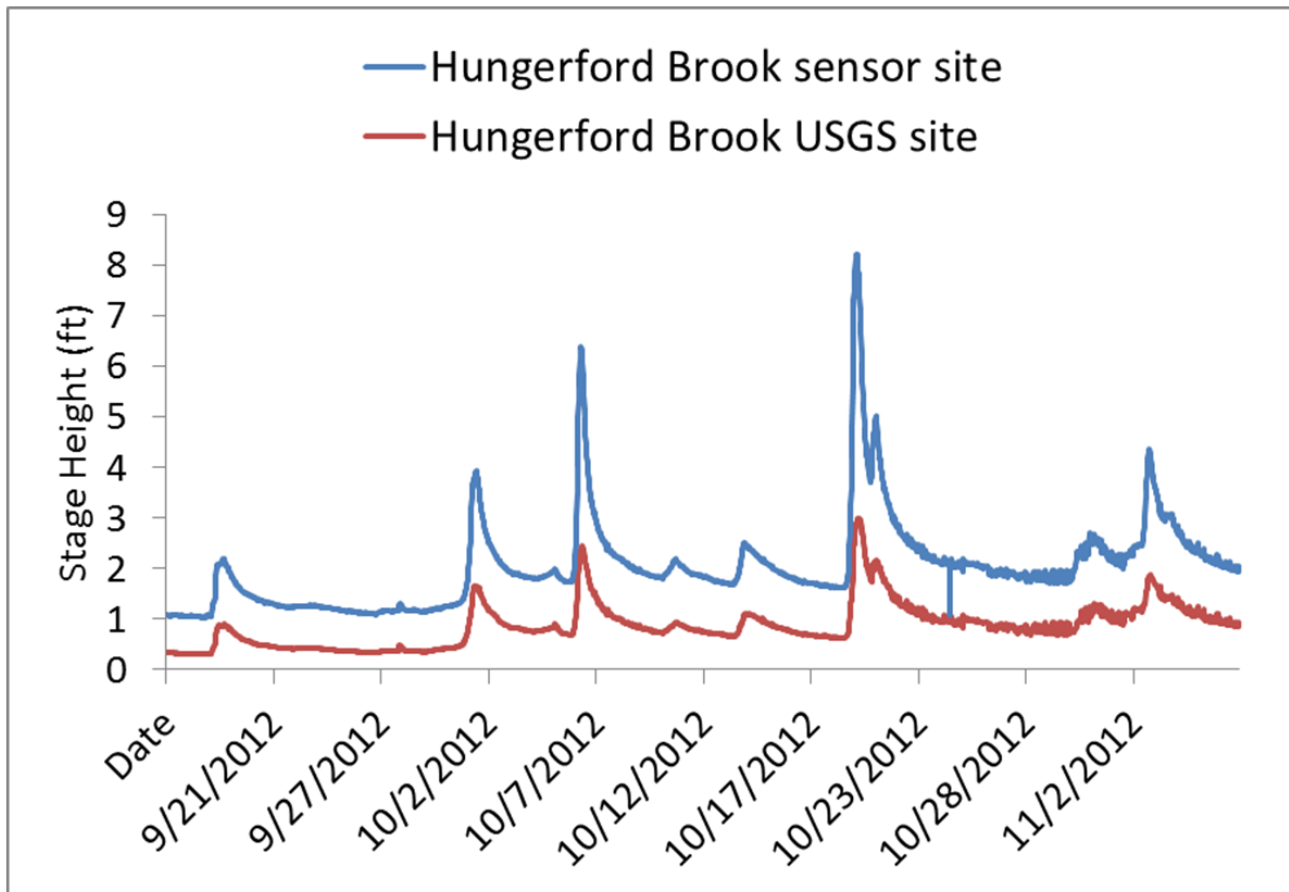
# Updates from the SMC Water Quality Lab

- 1097 TSS samples:
  - from the lake (295)
  - Watershed ISCOs (576)
  - High school teams (226)

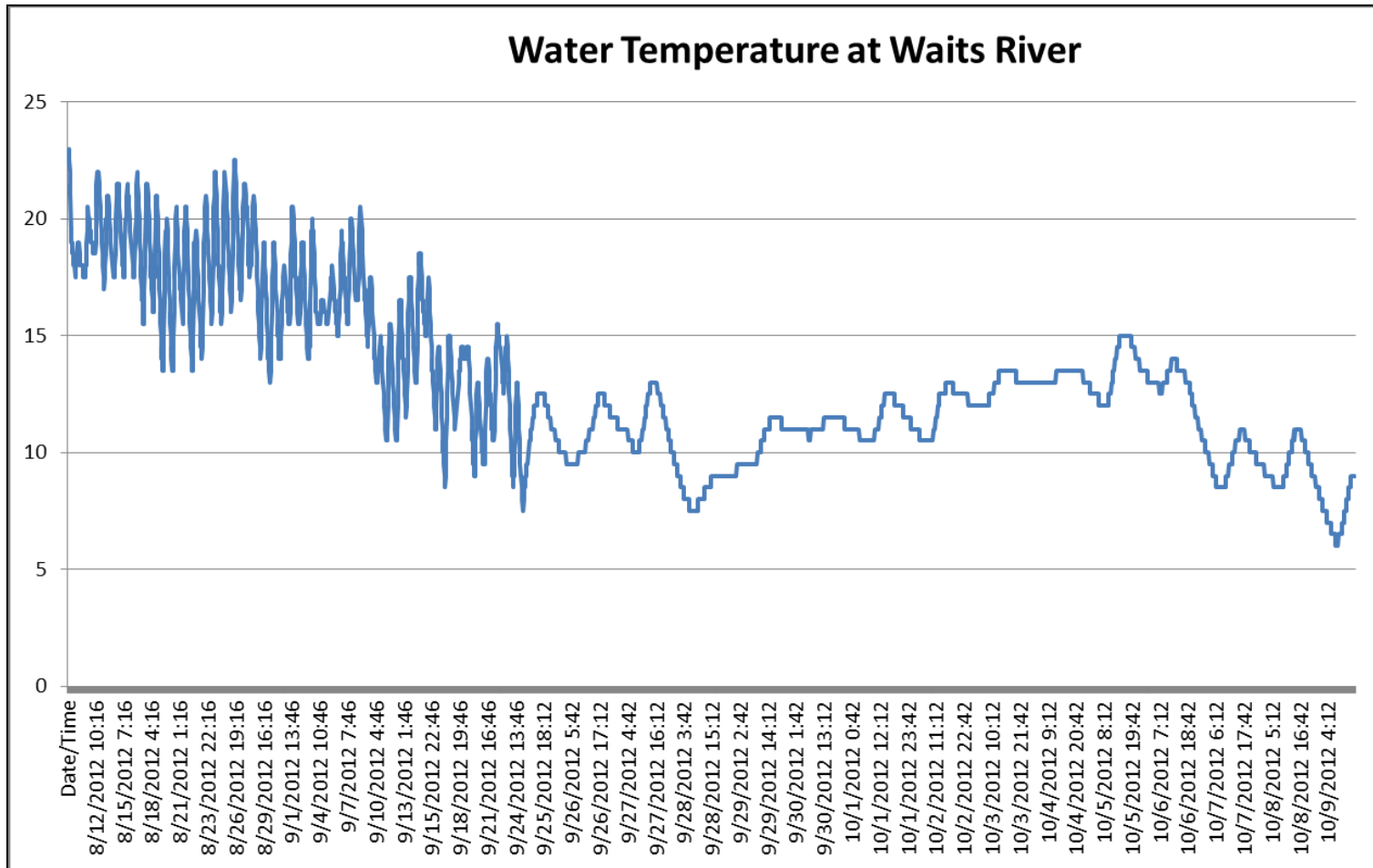




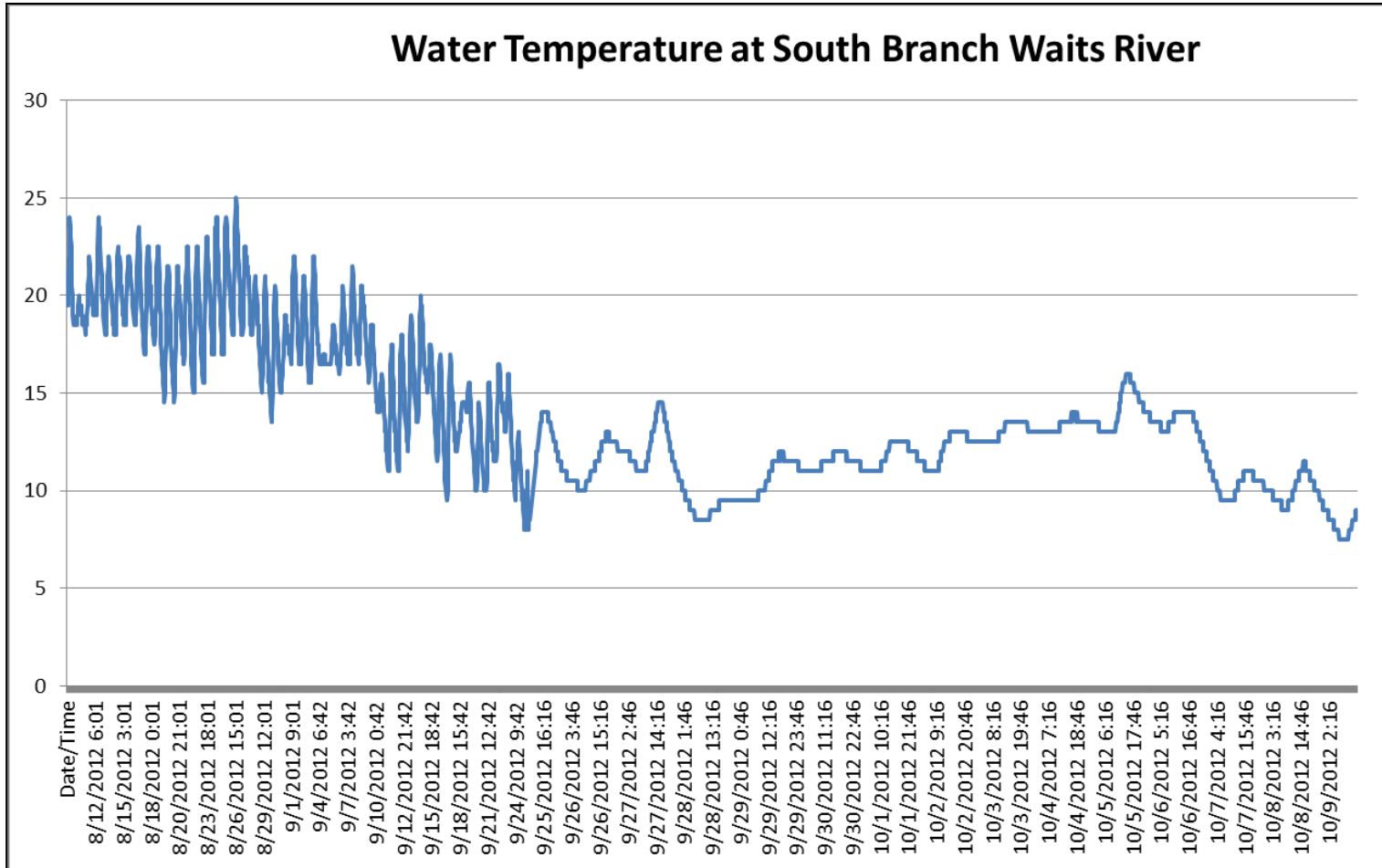
# Comparing Stage Sensor site to USGS



# Temperature Sensor Data

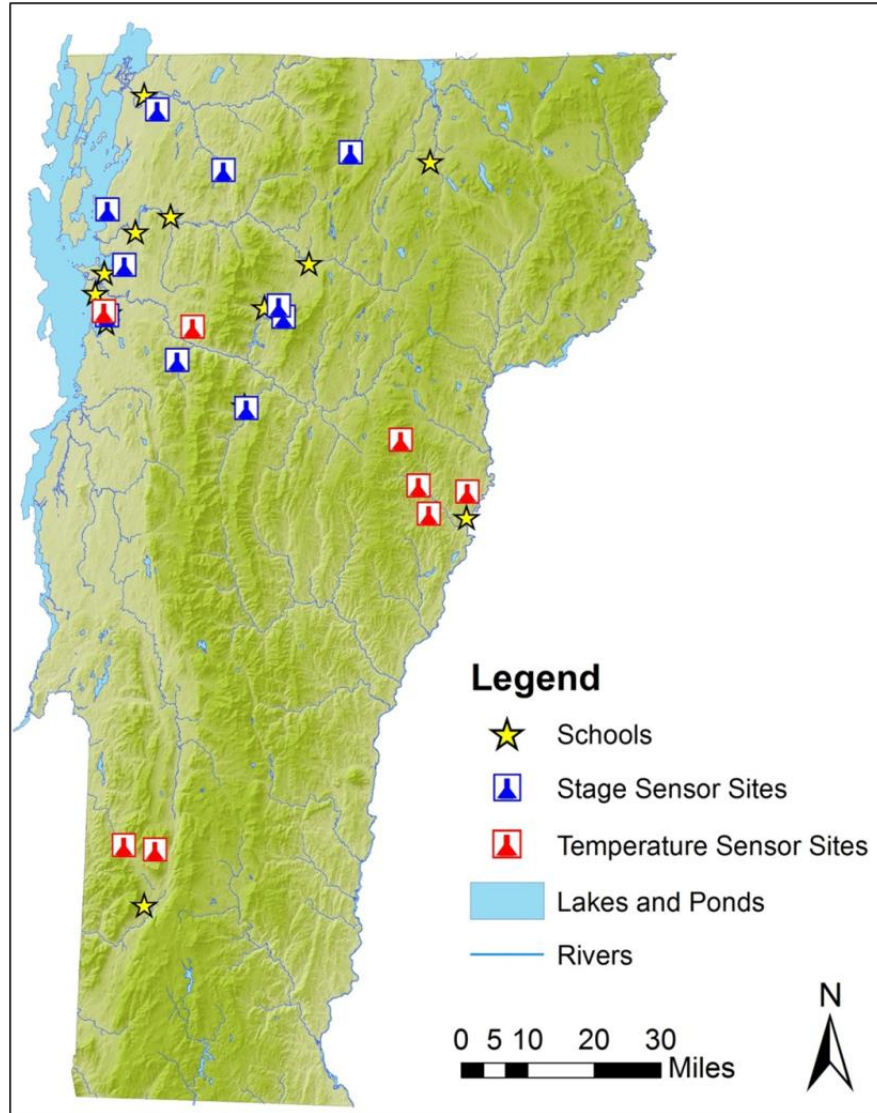


# Temperature Sensor Data

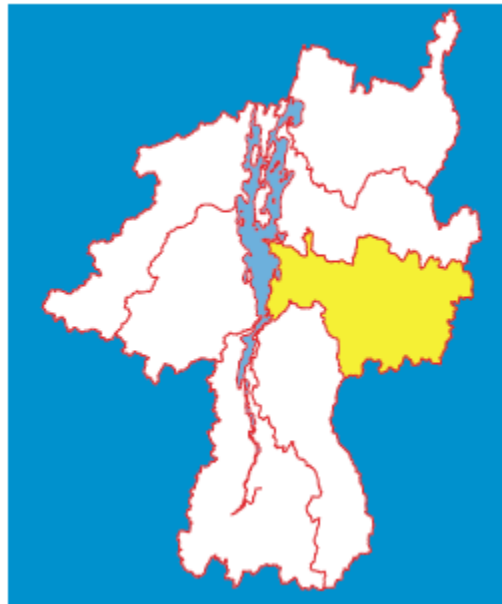
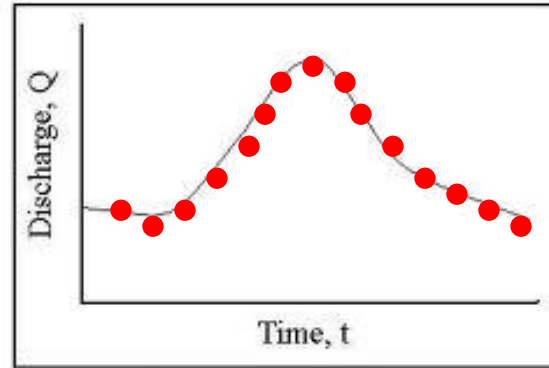
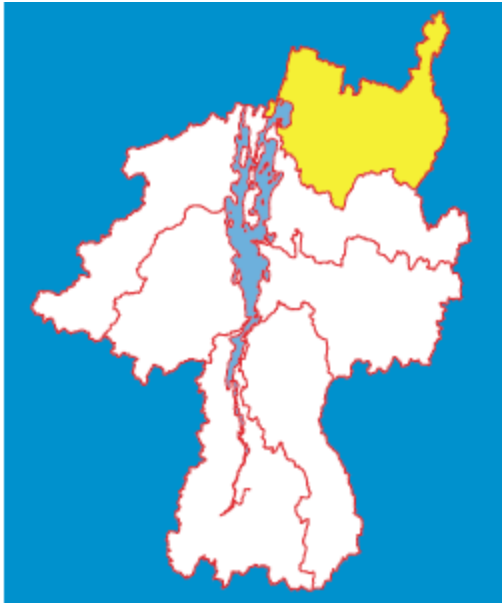




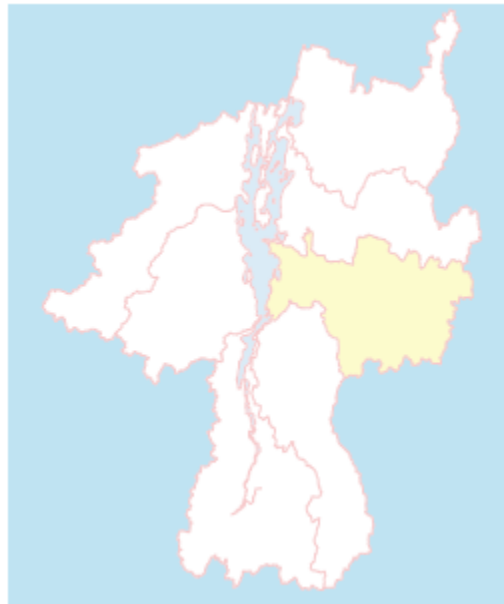
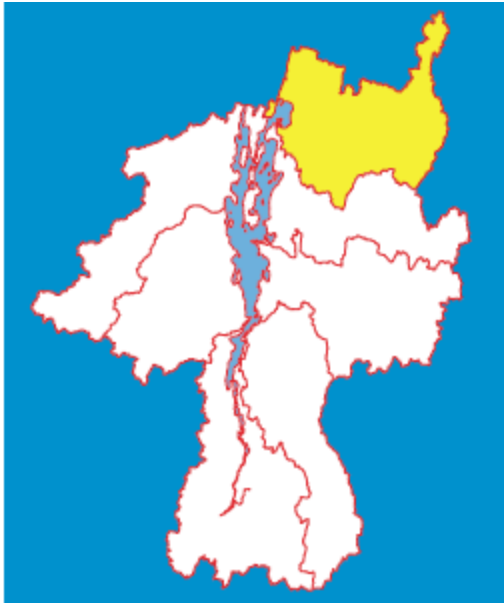
# Map of Sensor Locations:



# Watershed Sampling

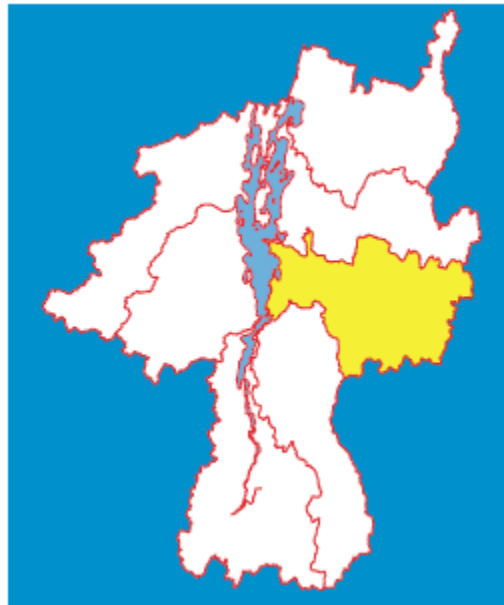


# Missisquoi



Slide credit: C Giles





# Winooski

Urban/ Mixed Land-use



Slide credit: C Giles

# Field Season Summary

- Installations:
  - 7 by late June/early July
  - Hungerford Brk by early Sept
- Total ~580 samples
- 10 Storms captured



# Field Season Summary

- Receive USGS Water Alert email
- Next morning site visits, sample collections, and resetting samplers
- Delivery of samples to Johnson and SMC

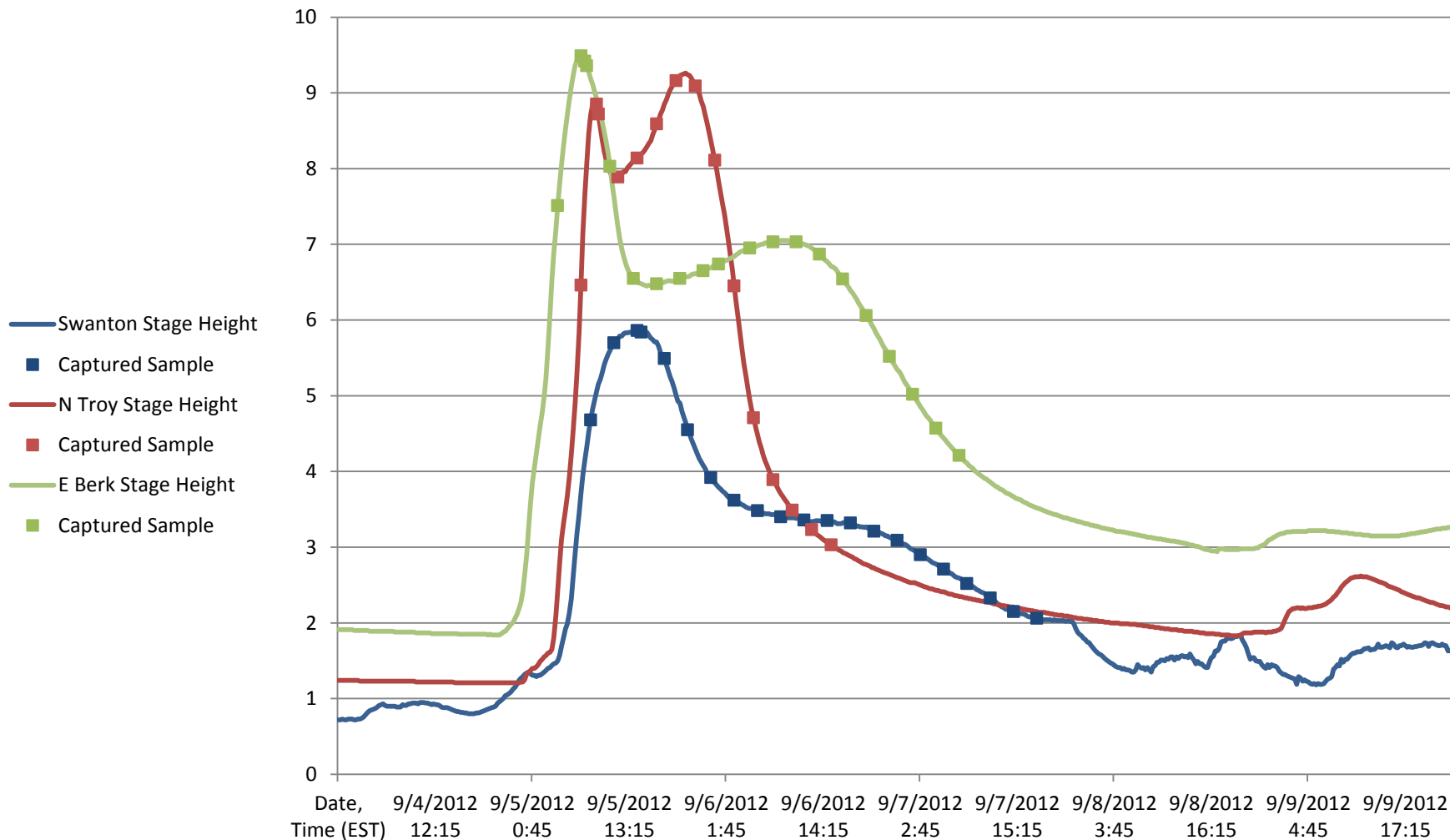


# Watershed Sampling 2012 Program

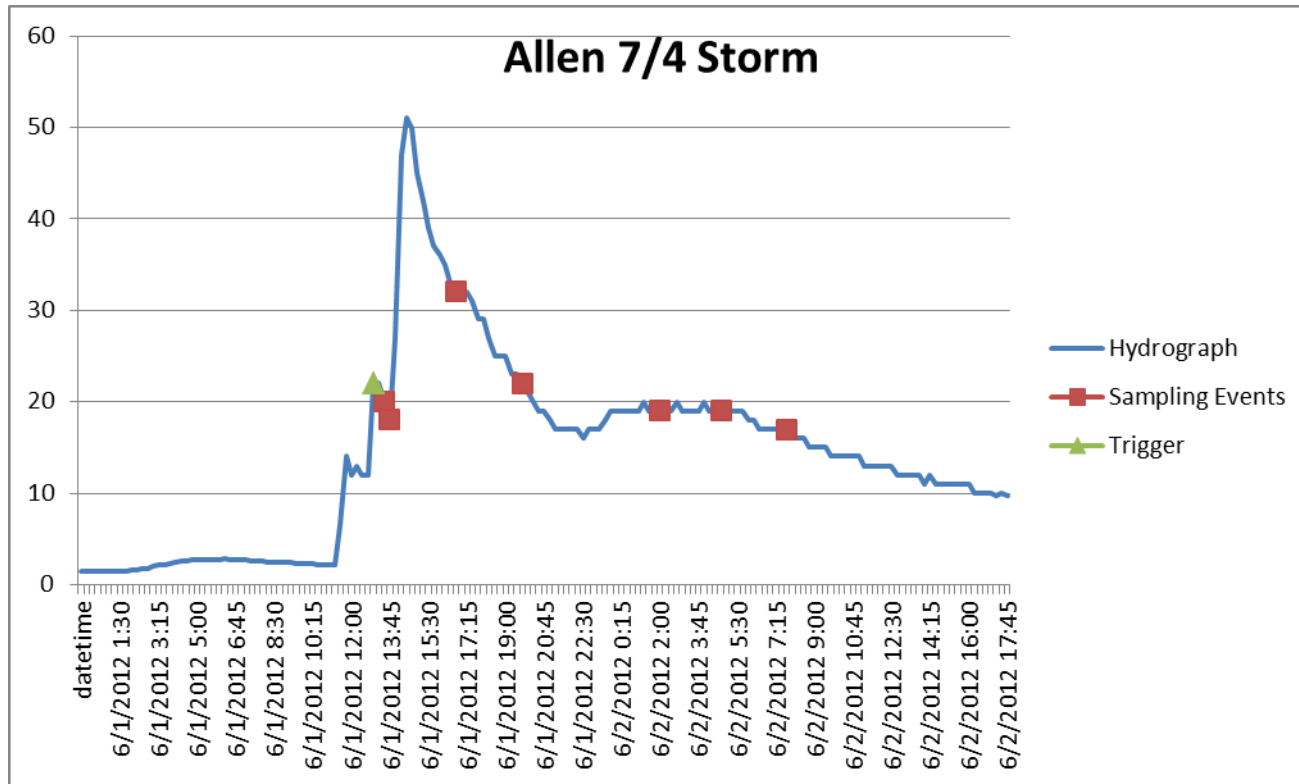
Station	Name	Stage Threshold (ft)	Sample Interval (hrs)	Deadband at Peak
04286000	Winooski at Montpelier	5.00	4	-0.03
04288230	Ranch Bk nr Stowe	1.50	2	-0.02
04288225	WB Little nr Stowe	2.00	2	-0.02
04290335	Allen Bk nr Essex Jct	2.30	3	-0.02
04290500	Winooski at Essex Jct	4.50	4	-0.03
04293000	Missisquoi R at N Troy	3.00	2.5	-0.03
04293500	Missisquoi R at E Berkshire	4.00	3	-0.03
04294000	Missisquoi R at Swanton	2.00	3	-0.02
04288000	Mad River	3.80	3	
04293900	Hungerford Brk			



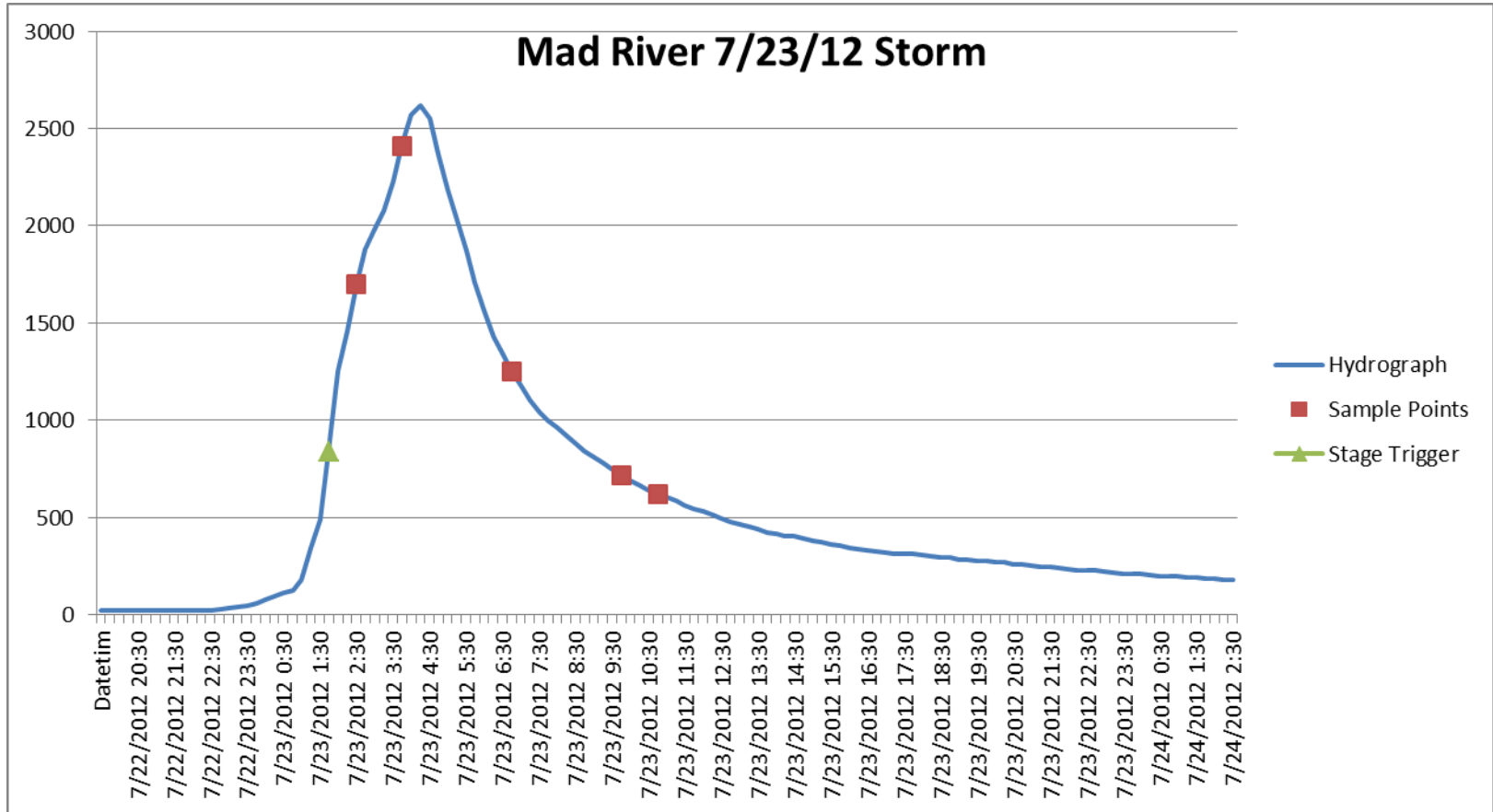
# Watershed Sampling - Missisquoi Sites 9/5/12



# Watershed Sampling

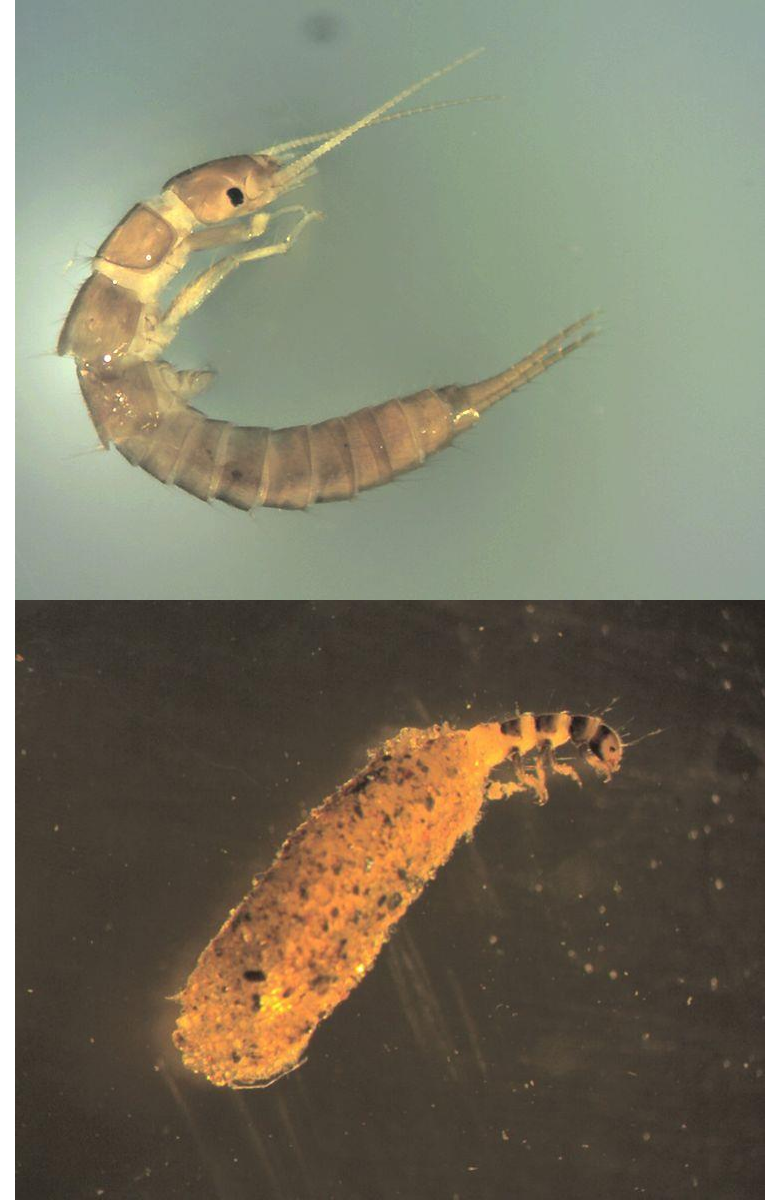


# Watershed Sampling



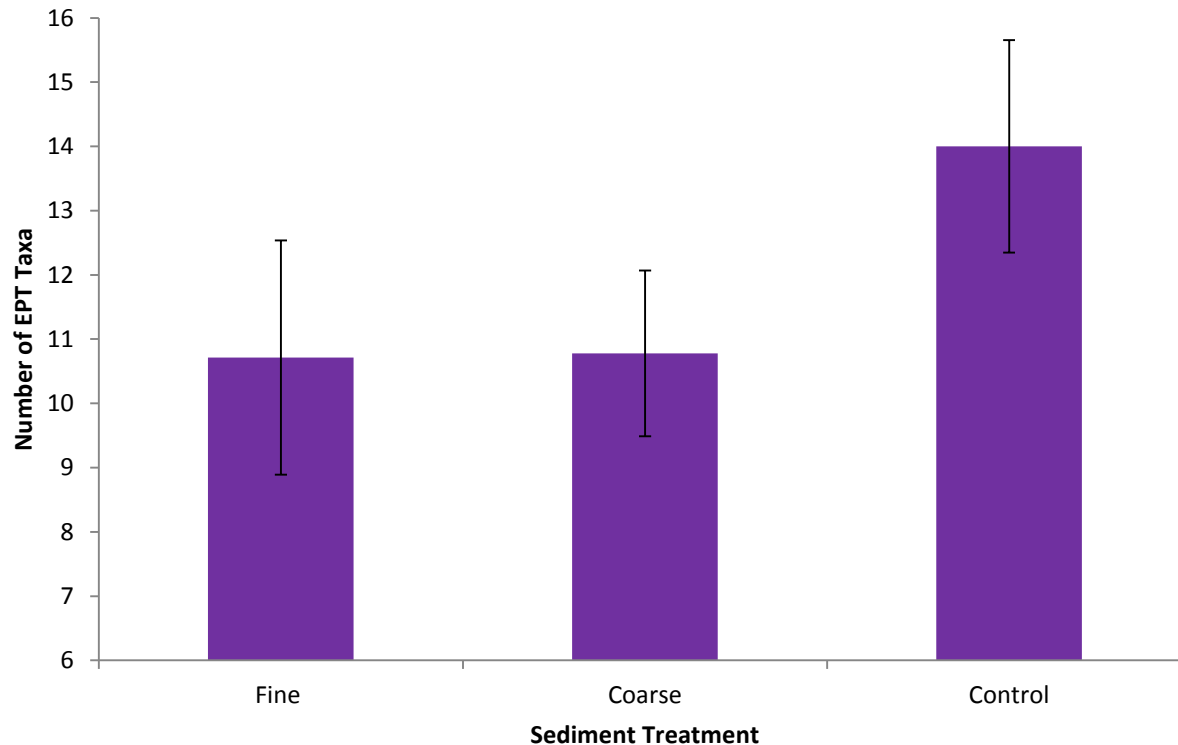
# Macroinvertebrates

- 195 macroinvertebrate samples from 12 sites
- *In situ* sediment addition experiment
- Sediment/macroinvertebrate observational study in an urban and a forested watershed





# Sedimentation reduces diversity



**Figure VI. Average number of EPT taxa (Ephemeroptera, Plecoptera, Trichoptera) in different sediment treatments.** Number of EPT taxa were counted and averaged for each treatment. Each treatment was set into Brown's River with different proportions of sediment sizes: fine have smaller sediment, coarse having larger sediment, and the control sediment taken from Brown's River. Fine treatments= 7 replicates; Coarse= 9 replicates; Control= 6 replicates. Treatments left in river for 12 days. No significant difference using ANOVA;  $p=0.2997$ . T-test: Control vs. Coarse,  $p=0.0722$ ; Control vs. Fine,  $p=0.1074$ ).



