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Judith Van Houten, State EPSCoR Director

Andrew Schroth, Vermont EPSCoR, Dept. of Geology University of Vermont

Steven Scheinert, Vermont EPSCoR

Patrick Clemins, Vermont EPSCoR

Arne Bomblies, Vermont EPSCoR, Dept. of Civil and Environmental Engineering, UVM

Lesley-Ann Dupigny-Giroux, State Climatologist, Dept. of Geography

Beverley Wemple, Vermont EPSCoR, Dept. of Geography, UVM

Outline

A) What is Vermont EPSCoR and what are our comments on H.35?

1) Vermont EPSCoR is a state-wide program funded by two large grants from NSF. Both grants address the health and management of the Lake Champlain Basin as Vermont adapts to Climate Change.

2) H.35 includes many of the same priority interventions that we in Vermont EPSCoR have identified.

3) H.35 is a good first step, but changes in the Lake will take a long time due to high sediment P levels, climate change and increased extreme weather events.

4) H.35 relies heavily on top-down regulation and might benefit from more bottom-up BMP adoption efforts and funding.

5) H.35 should include assessment of the effect of the remedies proposed in the bill so that efforts can be adjusted moving forward.

B) How can Vermont EPSCoR help moving forward?

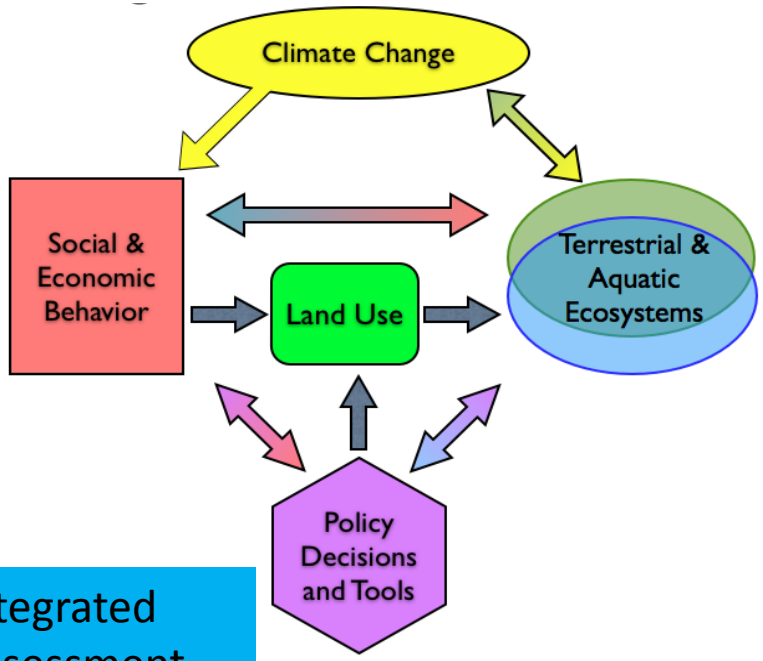
Judith Van Houten, Vermont State EPSCoR Director, Vermont EPSCoR, Feb. 11, 2015

1) Vermont EPSCoR is a state-wide program funded by two large grants from NSF. Both grants address the health and management of the Lake Champlain Basin as Vermont adapts to Climate Change.

Overarching Research Questions for Vermont EPSCoR

How will the interactions of climate change and land use alter nutrients (e.g. phosphorus) moving from the watershed to the Lake, and impact the health of the Lake?

What are the Lake Basin management strategies to adapt to climate change?



2) H.35 includes many of the same priority interventions that we in Vermont EPSCoR have identified.

- 204 participants registered in www.CSS2CC.org

(Coleman et al., 2014)

- 53 participants entered interventions or comments to www.CSS2CC.org

In Our CrowdSourcing Studies, Stakeholders Identified 104 Adaptive Actions to Build Resilience in Lake Champlain in the Face of Climate Change

The Crowdsourcing Survey's Prioritized Adaptive Management Interventions that Overlap with those in H.35

Sector	Most critical adaptive management Interventions
Cross-Sector	**Market mechanisms and incentivize eco-technologies to reclaim phosphorus** from farms, runoff, wastewater, on-site septic systems, and solid wastes
Stormwater	**Stormwater management regulations for municipalities and private landowners**;
Development & Land Use	**Smart growth principles and low-impact development practices** in planning and design of development and transportation
River Management	**Vegetated buffers** in riparian zones and along lakeshores
	Moratorium on **wetland impacts** and enhance functions of existing wetlands
Transportation	**Better backroads** construction and maintenance practices
Agriculture	**Financial and technical assistance and outreach** to promote soil health and associated best practices on farms
	Cover cropping to reduce soil and nutrient loss from agriculture
	Nutrient balancing on farms in nutrient management planning and improve management of manure spreading practices.
	Subsidize water storage capacity increases on farmland for flood mitigation
	Inspection and enforcement of water quality regulation on large and medium farms, and require runoff reduction practices for small farms.

3) H.35 is a good first step to reduce phosphorus transport from the watershed to the Lake, but changes in the Lake will take a long time due to high sediment P levels, climate change and increased extreme weather events.

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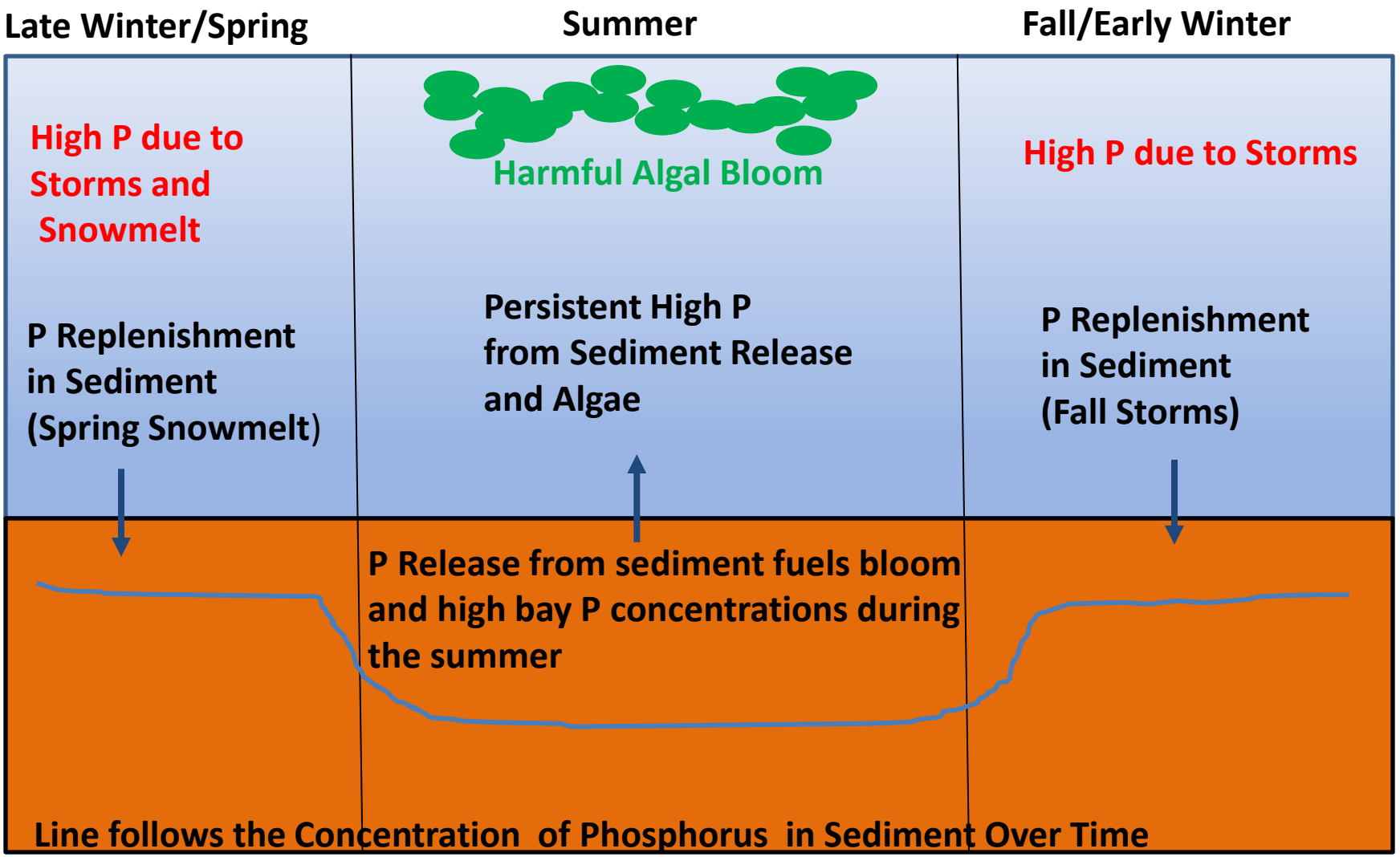
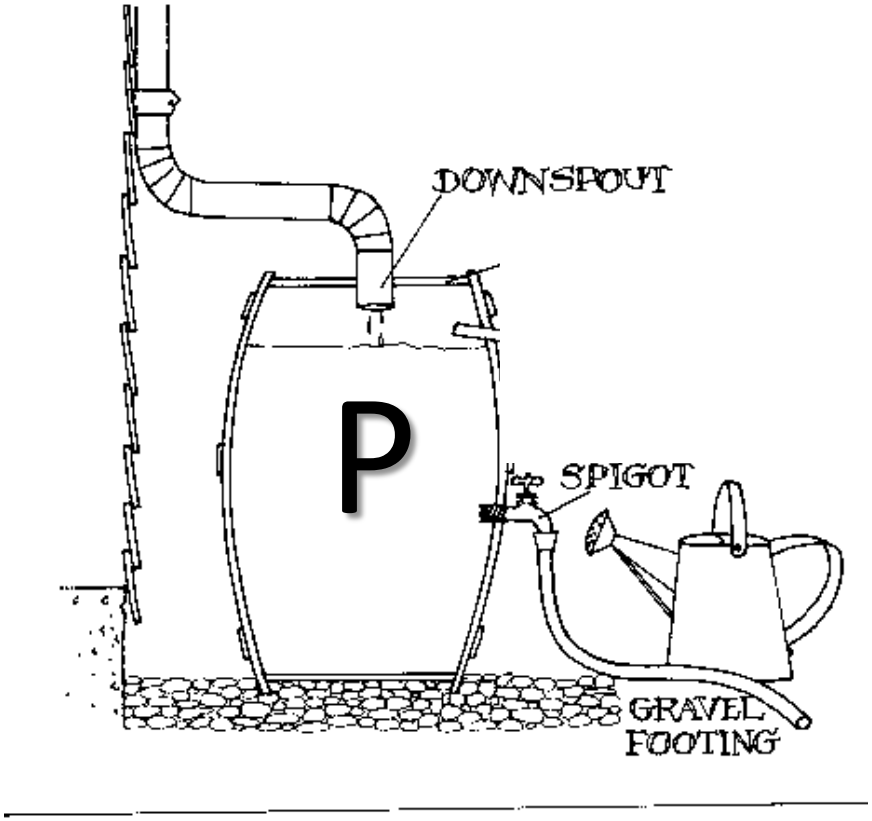
In Missisquoi Bay, sediment phosphorus is replenished every spring resulting in persistent high water P levels and harmful algal blooms in summer.



Rain Barrel Analogy for the Missisquoi Bay

- Barrel starts out with high Phosphorus (P).
- Water enters from the watershed through the downspout and leaves through spigot.
- P is replenished through Storms and Snow melt from the Watershed (downspout)
- Unless the Phosphorus level in the transport from the watershed is greatly reduced, the barrel will maintain its high P level.



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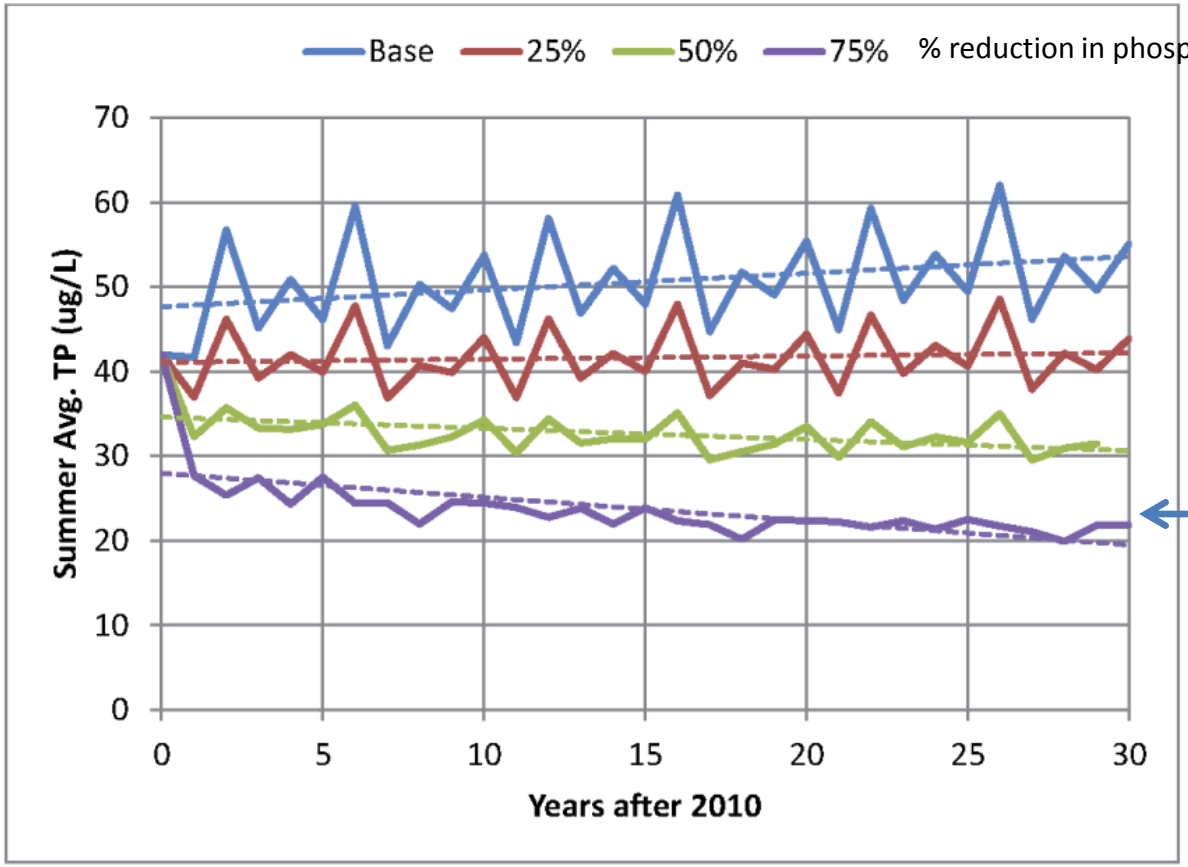
The previous slide showed that Missisquoi Bay is a system dominated by P coming from sediment. Such systems require aggressive reductions in P transport from the watershed and take a long time to reach EPA criteria.



EPA target

Source: Limnotech/LCBP 2012

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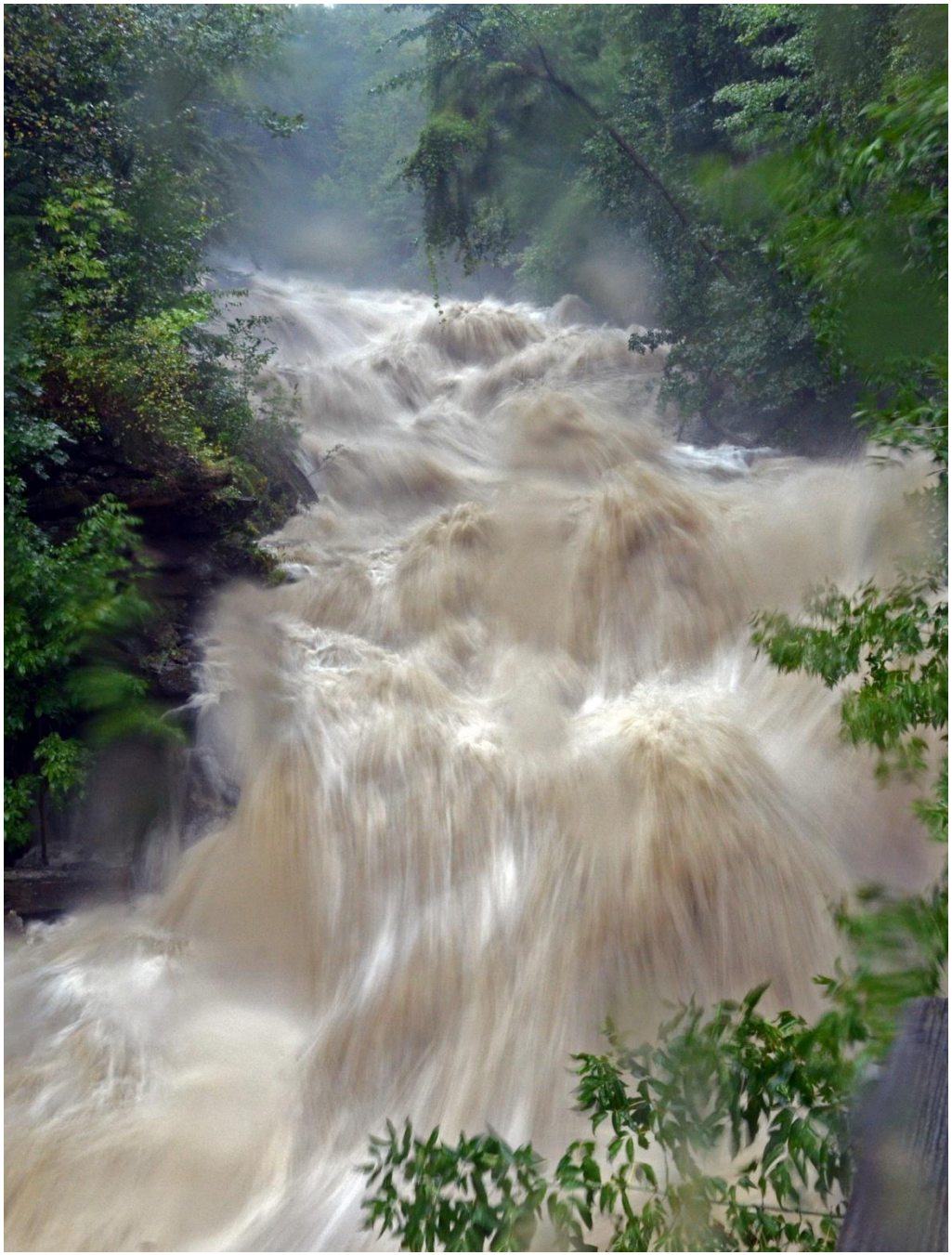

Tropical Storm Irene,
Aug. 27, 2011
(Gordon Miller)

Climate Change and Extreme Weather Events will prolong the time to lower P levels

4) H.35 relies heavily on top-down regulation and might benefit from more bottom-up BMP adoption efforts and funding.

Survey of Farmers in the Missisquoi and Lamoille Watersheds

FINDINGS:

•Very low (0 to 1%) prevalence of adoption of most of BMPs by large farms.

•Somewhat higher adoption rates by small and medium scale farms (13-32%).

•Perceived behavioral control (farmer sense of control over the decision) has the largest effect on nutrient BMP adoption behaviors.

• Perceived social norms and the past practice of adoption matter marginally, while farmer attitudes towards these BMPs don't appear to play a significant role

•Technical Assistance is as important as financial assistance to increase the adoption of BMPs

IMPLICATIONS:

To effectively implement BMPs, watershed managers and policy makers should prioritize strategies to increase the perceived control by the farmers and increase outreach through farm extension programs and technical service providers.

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It is apparent from our public opinion polling, that Vermont residents are willing to pay for water quality through modest tax and fee increases.

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Spring 2013 Public Opinion Poll of Vermonters
General Acceptance of Fundraising Mechanisms

- 58.9% of respondents find stormwater fees acceptable.
- 58.7% of respondents find one-time development fees acceptable.
- 46.1% of respondents find excise taxes acceptable.
- 41.3% of respondents find annual development fees acceptable.
- 34.2% of respondents find broad-based taxes acceptable.

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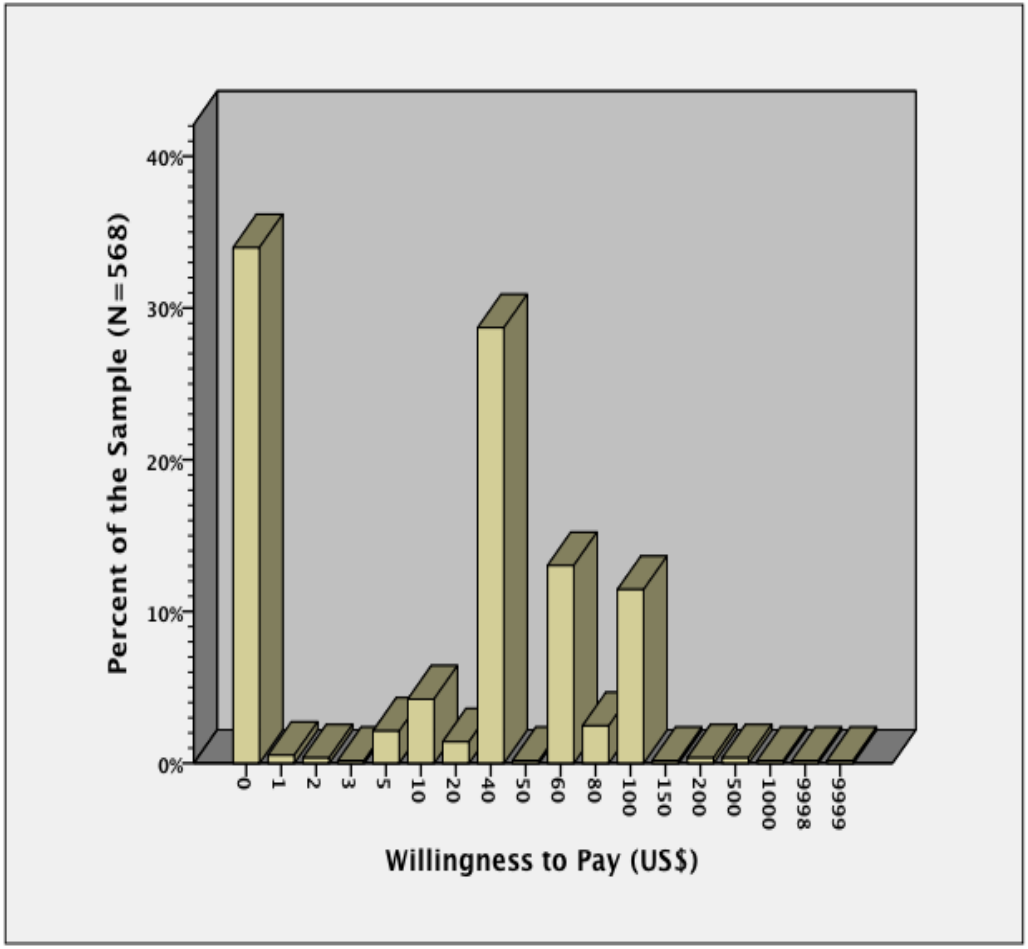
Spring 2014 Vermonter Poll
Vermonter's Annual Willingness to Pay for Improved Water Quality



Raising $20 per year per vehicle registration fees & $20 per household for a water utility fee will potentially raise $15 million per year that can be used to enhance the Lake Champlain trust fund identified in H.35.

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Predictors of Vermonters' Willingness to Pay

- Education/Outreach
  - Those with greater education are more likely to support water quality programs
  - Increase education and outreach to grow support

- Proximity to Lake not a factor

5) H.35 should include assessment of the effect of the remedies proposed in the bill so that efforts can be adjusted moving forward.

Is the quality of state waters being improved over time?
What measures will be used?

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How can Vermont EPSCoR help moving forward?

- Scenario testing for managers about algal blooms and phosphorus mitigation using our Integrated Assessment Model (IAM)

- High resolution Modeling of the bays of Lake Champlain and its watersheds

- Data Management and Data Sharing - priority for NSF and Vermont EPSCoR

- Other collaborations through our sensor network and more

- Focus on longer term climate change and extreme events

- Building resilience through institutional interventions, inter-agency partnerships and adaptive management

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Thank you for your attention!