

Lake Champlain Phosphorus TMDL



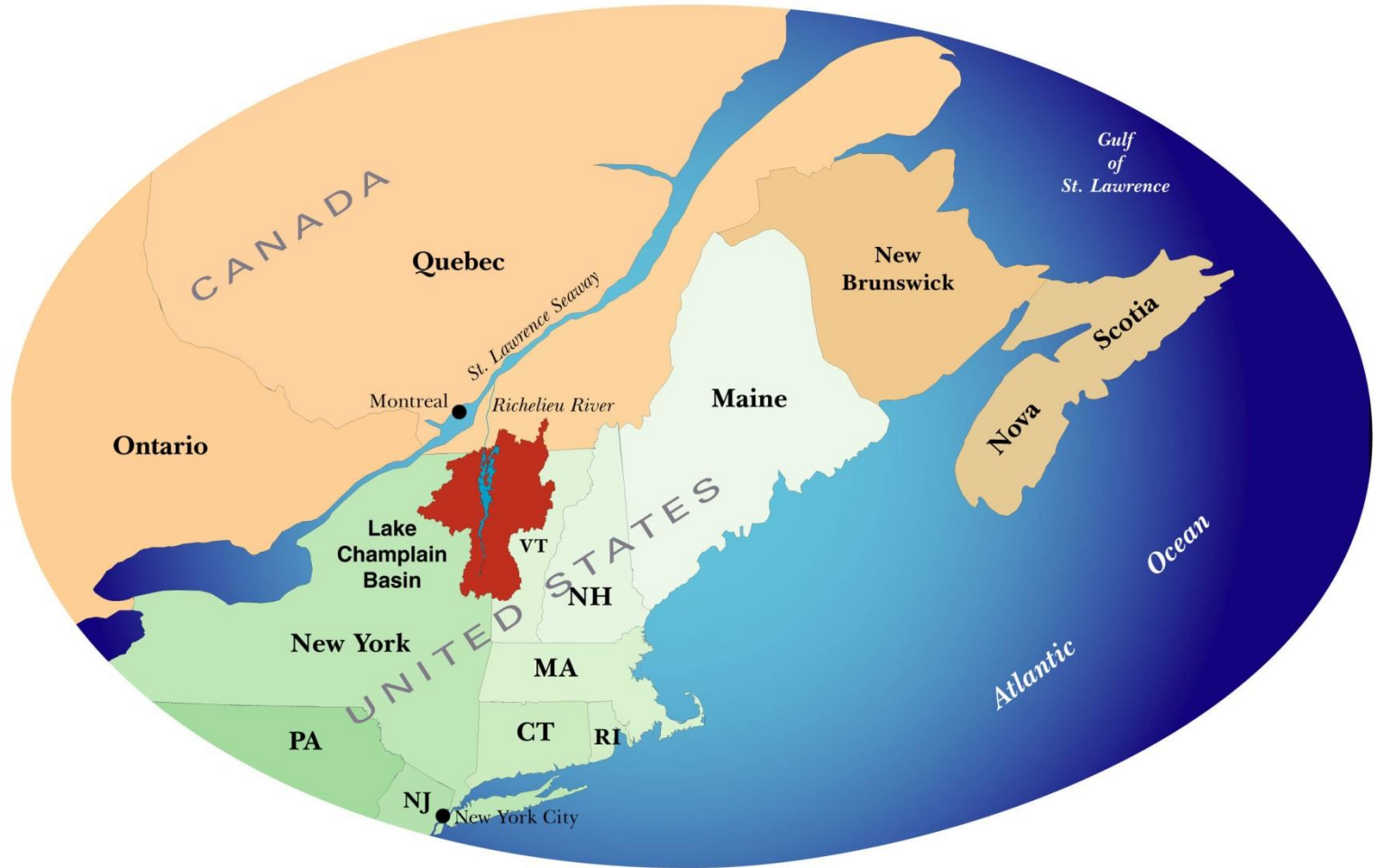
Kari Dolan, Ecosystem Restoration Program Manager
October 10, 2014

Outline

- Lake Champlain's Phosphorus Pollution Problem and Clean Water Challenges statewide
- Vermont Lake Champlain Phosphorus TMDL Implementation Phase I Implementation Plan
- Road standards as an element in the Phase I Plan

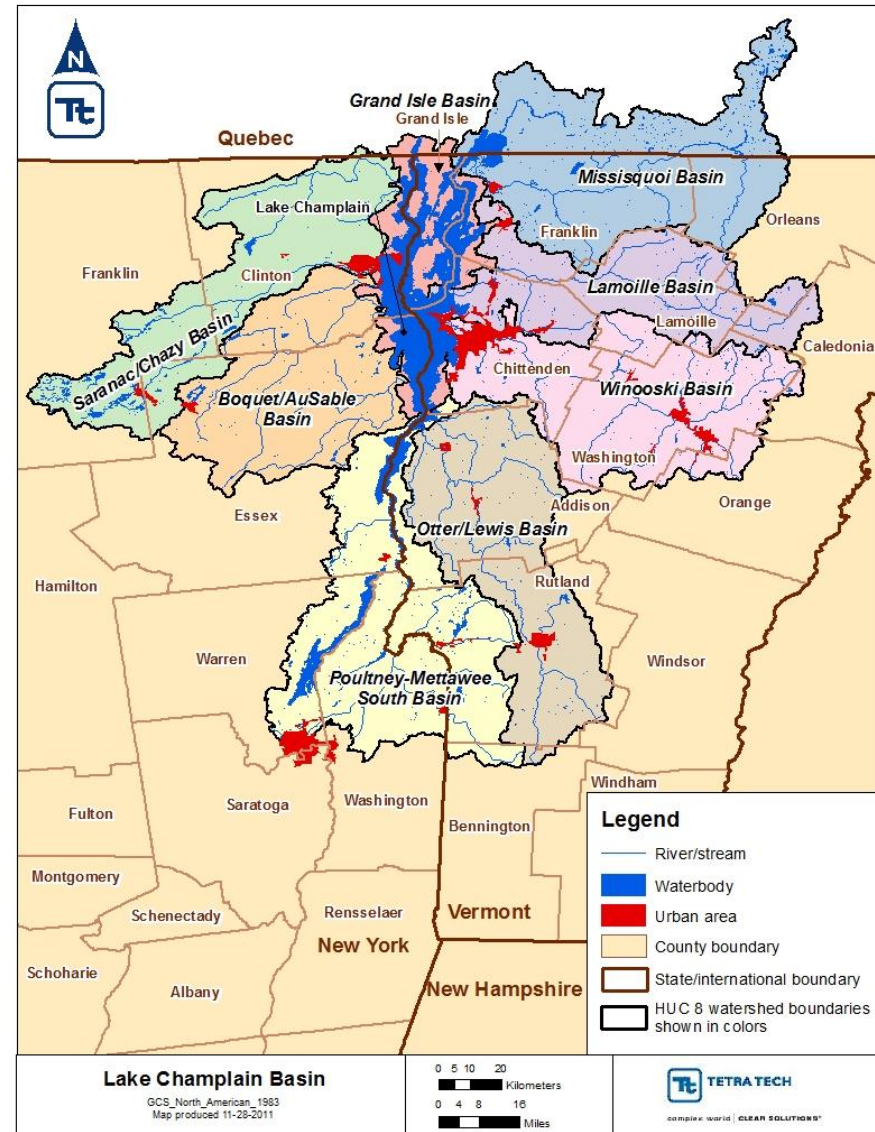


Lake Champlain Basin



Lake Champlain Basin

- 8,234 square mile watershed
 - 56% (VT); 37% (NY); 7% (Quebec)
 - Drains nearly half the land area of Vermont
- 6th Largest Natural Lake in the US
- Drinking Water Source for 200,000 people
- Home to:
 - 390,000 people
 - More than 100,000 dairy cows



Fundamental Pollutant of Concern: Phosphorus

Impacts:

- Algae blooms
- Toxic blue-green algae blooms
- Fish kills
- Loss in tourism and recreation
- Reductions in property values
- Increased costs in drinking water treatment
- Increased costs in wastewater treatment
- Impacts to natural ecosystem



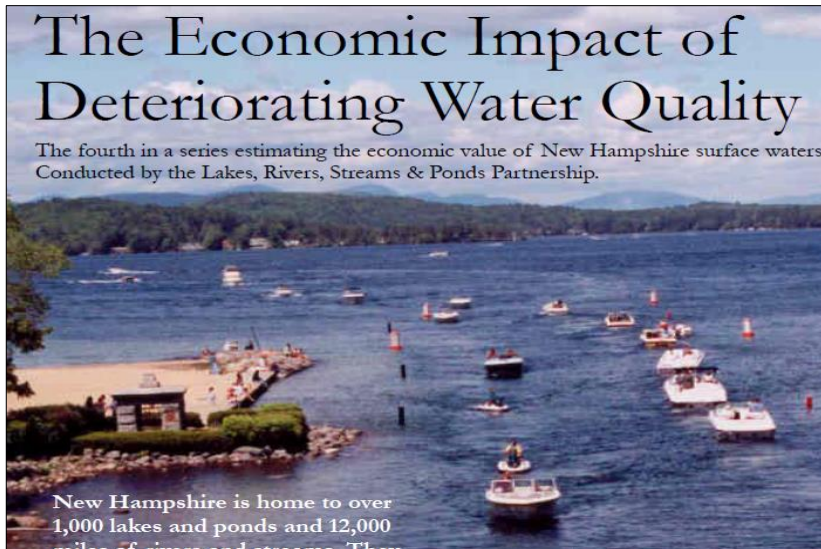
Blue-green algae blooms, 2012, Lake Champlain

Similar Challenges in Providing Clean Water Statewide

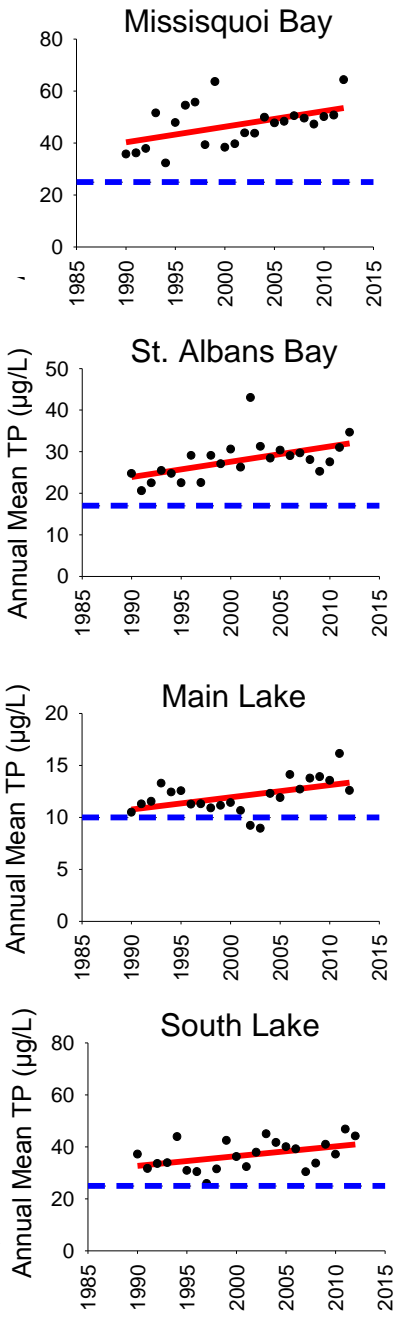
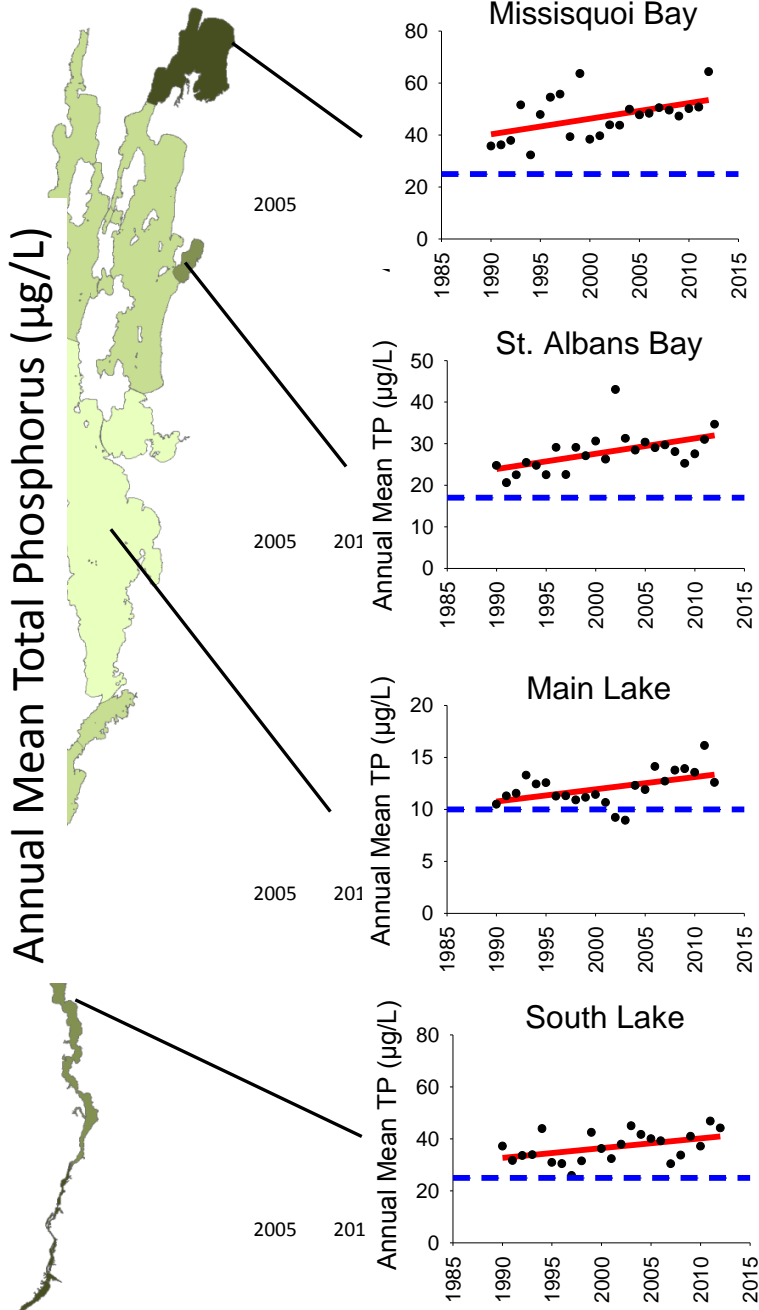


Fundamental Problem: Economic Harm

- The decline in the health of our waters has economic impacts:
 - Loss of uses such as boating, swimming, fishing
 - Decline in natural resource-based tourism
 - Decline in property values
 - Cost of water treatment
 - Cost of reducing the pollution

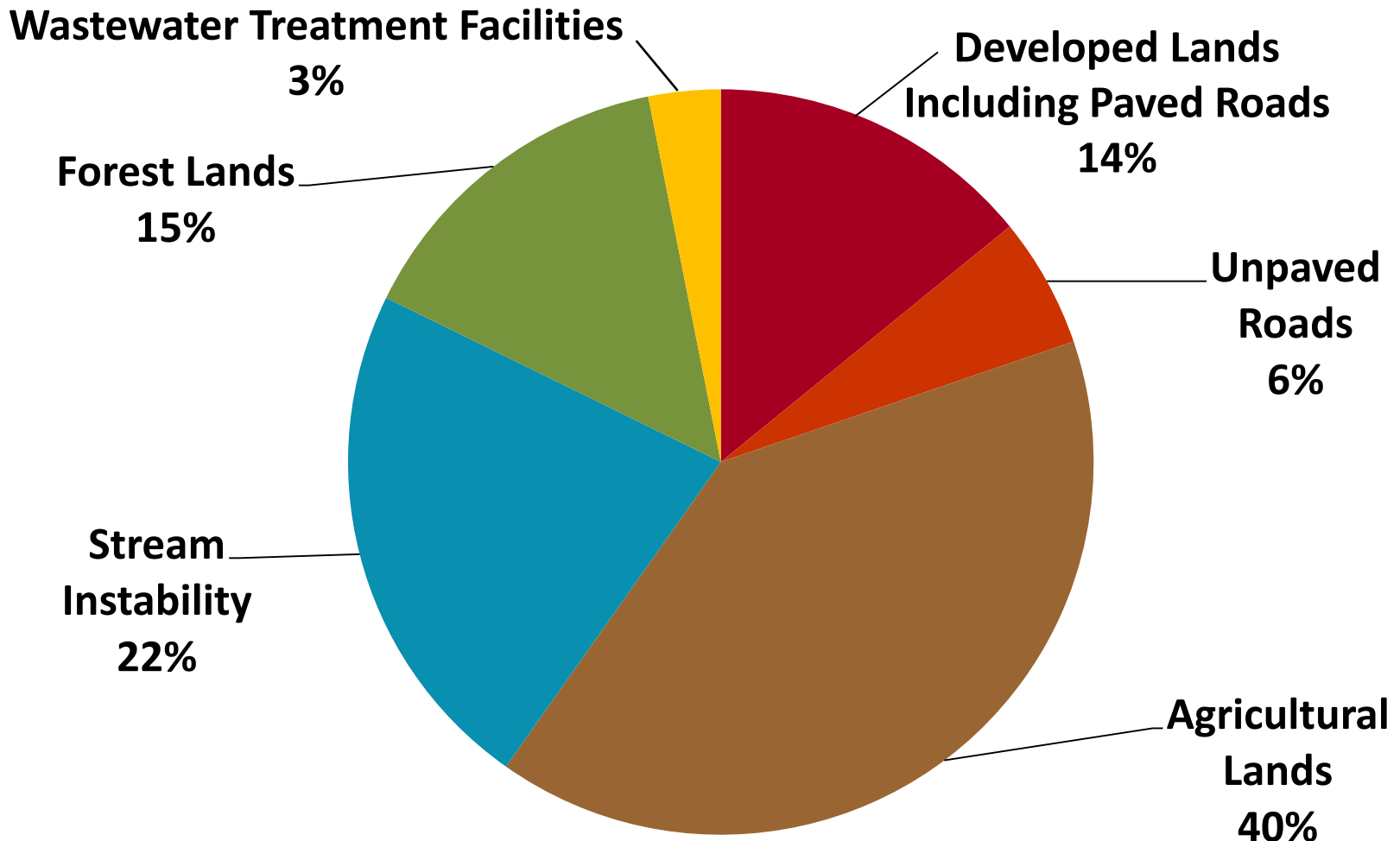


Trends in Lake Champlain Phosphorus Concentrations



— Trend line
- - - Water quality standard

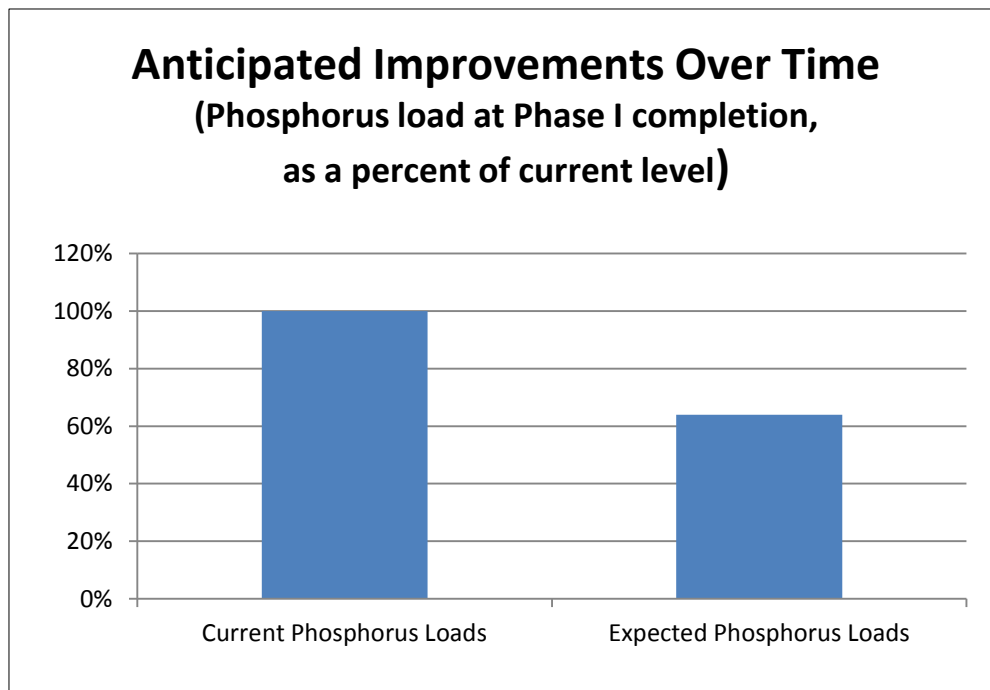
Phosphorus Sources in the Vermont Portion of the Lake Champlain Basin



Expected Outcomes from the Lake Champlain Phosphorus TMDL Phase I Plan

Summary of Phase I Plan


- Expected to reduce phosphorus loading by 36% over 20 years to meet State Water Quality Standards
- Targets major source areas using cost-effective actions



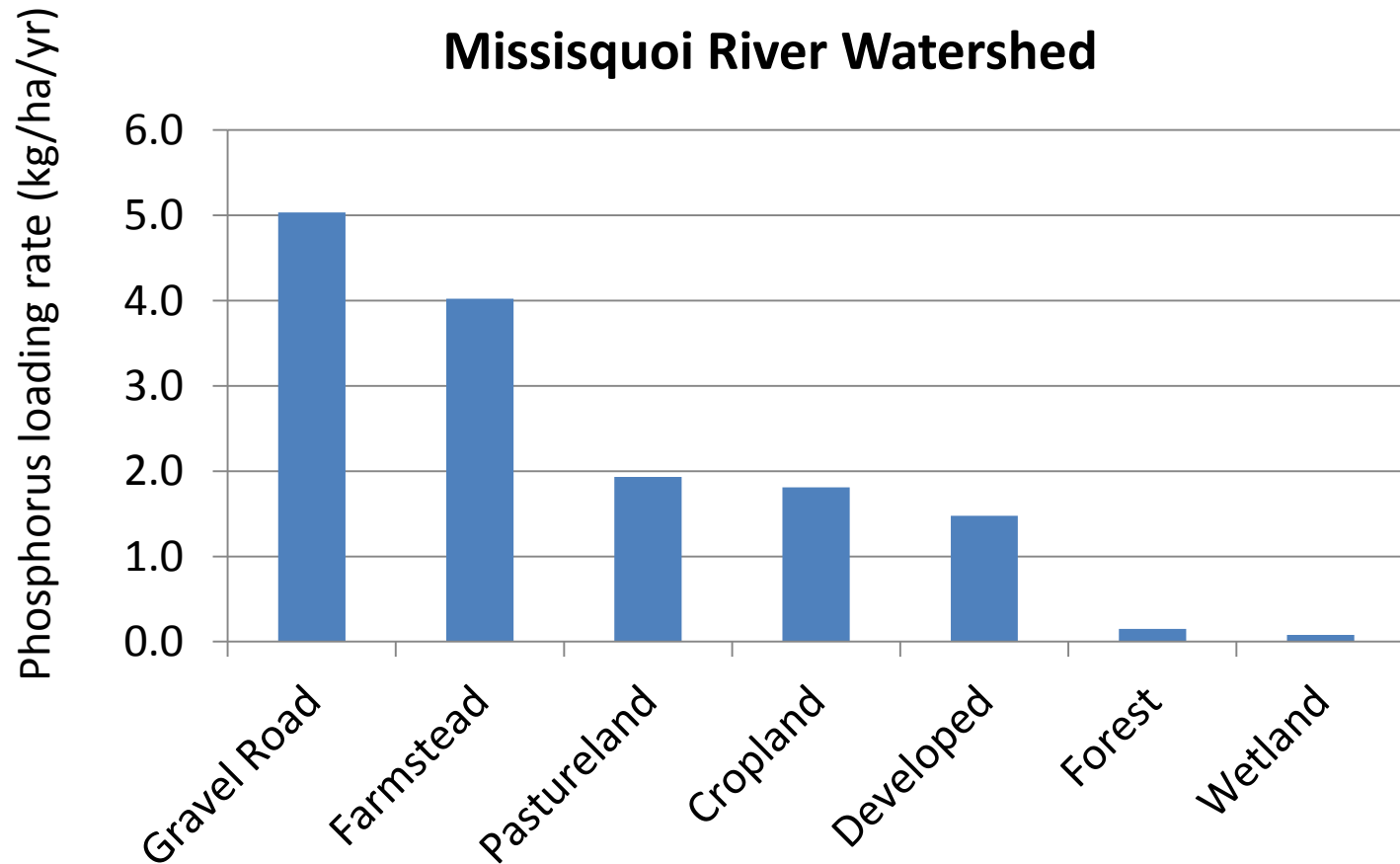
VERMONT LAKE CHAMPLAIN
PHOSPHORUS TMDL PHASE 1
IMPLEMENTATION PLAN

PREPARED BY THE STATE OF VERMONT
FOR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY

MAY 29, 2014

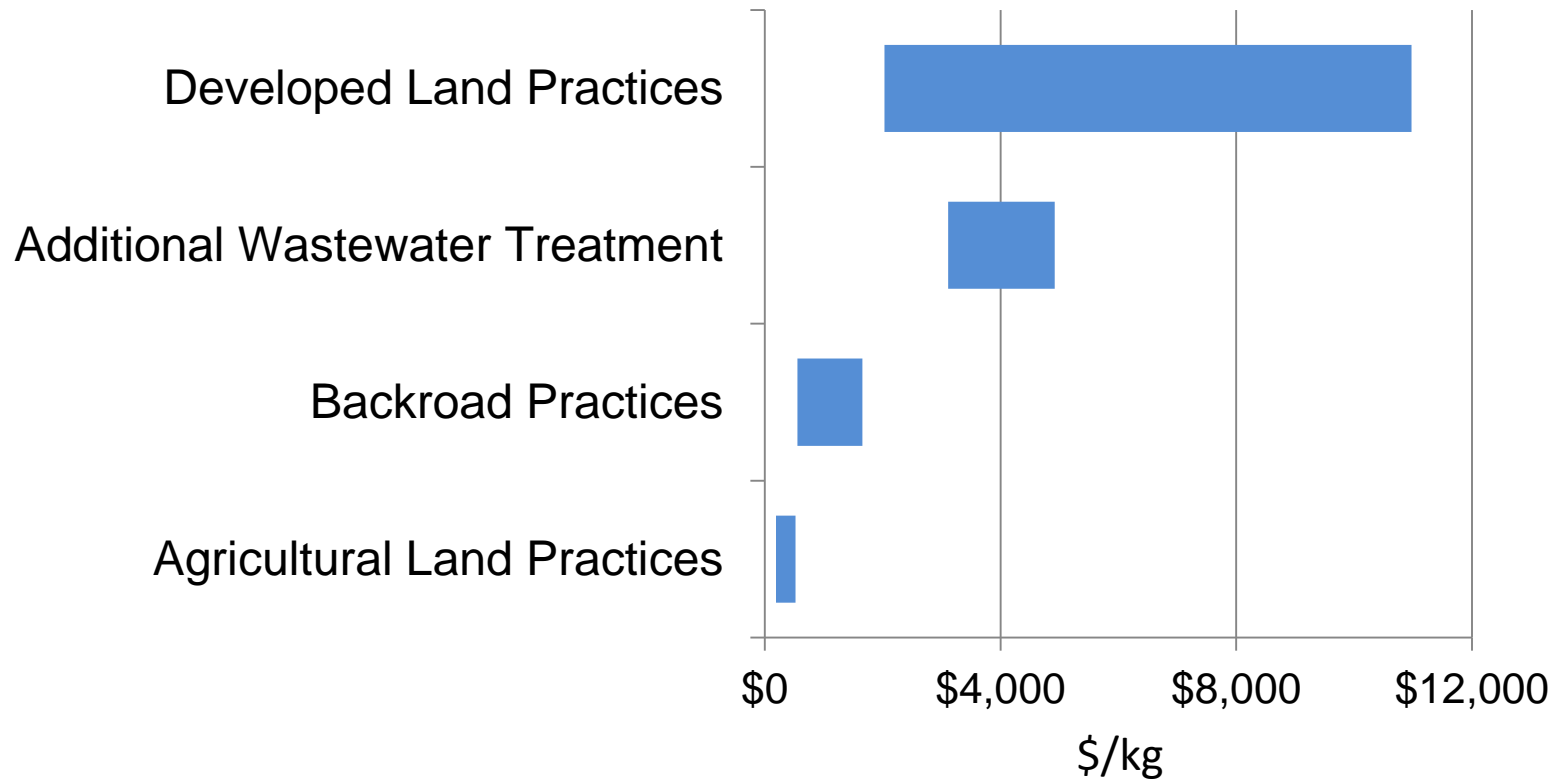
 VERMONT

TMDL Plan's Strategic Focus is based on Relative Ranking of Critical Sources of Phosphorus (per unit of land area)



Relative Cost-Effectiveness of Actions by Source

Range of Annualized Cost (per kilogram of Phosphorus Reduced)



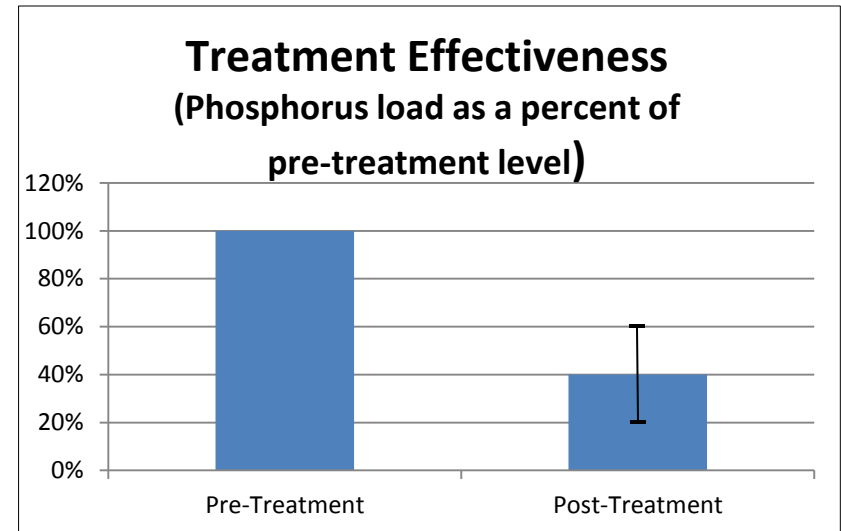
Lake Champlain Phosphorus TMDL Draft Phase I Implementation Plan

Program Area
Agricultural Programs
Stormwater Management
Rivers Management
Wetlands Management
Lakes Management
Forest Management

Agricultural Programs

Proposed Rule Update: State Accepted Agricultural Practices (AAPs) and Technical Assistance Example: Increase buffer size and crop rotation

- Achieves 40%-80% reduction in Total Phosphorus
- Estimated project cost = \$6,000 (100 acres treated)



Corn crop showing bare soil & no buffer, increasing erosion and phosphorus loading

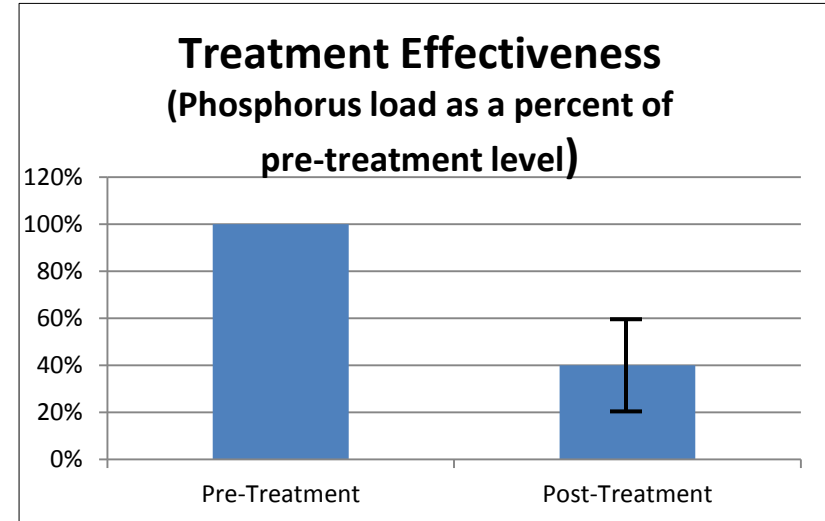


Hay crop & buffer reduce erosion and phosphorus delivery to streams

Agricultural Programs

Proposed Rule Update: State Accepted Agricultural Practices Example: Vegetated buffer on Field and Roadside Ditches

- Achieves 40%-80% reduction in Total Phosphorus
- Estimated project cost = \$1,350 (3 acres treated)



Runoff draining into ditch



Vegetated buffer along ditch

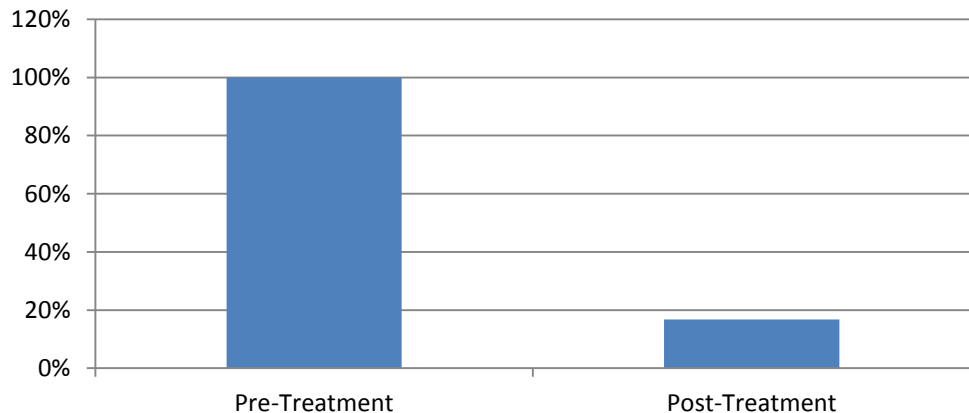
Stormwater Management

Stormwater Runoff from Existing Developed Lands

Englesby Brook, Blanchard Beach Burlington & South Burlington

- Stormwater treatment achieved over 80% reduction in Phosphorus
- Estimated cost for stormwater treatment for land already developed = \$30,000 per acre of impervious surface

Effectiveness of Stormwater Treatment
(Phosphorus load as a percent of pre-treatment level)



Expanded stormwater treatment pond

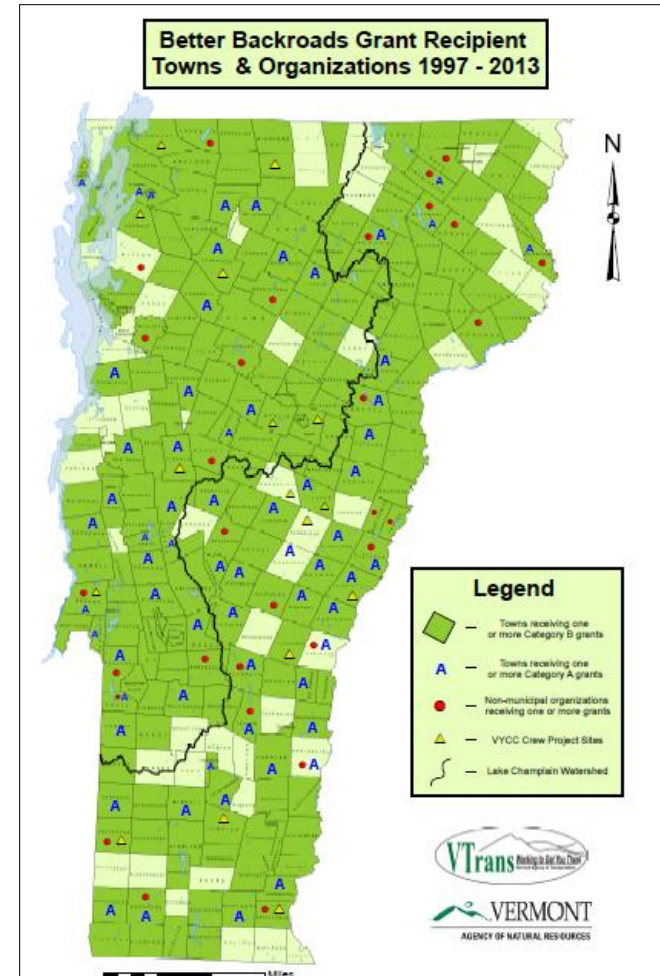
Gravel Roads in VT

- There are over 14,000 miles of public roads in Vermont; over 11,000 of these road-miles are maintained by municipalities
- Vermont has approximately 8,000 miles of gravel roads
- According to VTrans, 75% of town roads need erosion control improvements
- Gravel roads in the Winooski River watershed alone exceeds 40,000 metric tons of sediment per year, and an estimated 15,000 kg of phosphorus (Wemple 2013)



Vermont Better Back Roads Program

- Provides municipalities with technical and financial assistance



Fletcher, VT

Before



Fletcher, VT

After



Fairfield, VT



Before

Fairfield, VT

After



Vermont Transportation Agency's Voluntary Road and Bridge Standards

- Flood Resiliency
- FEMA Public Assistance – more money
- Water Quality Improvements
- Town Highway Grants State Match – 10% extra
- Emergency Relief and Assistance Fund (ERAF) – increased State match for FEMA Public Assistance projects



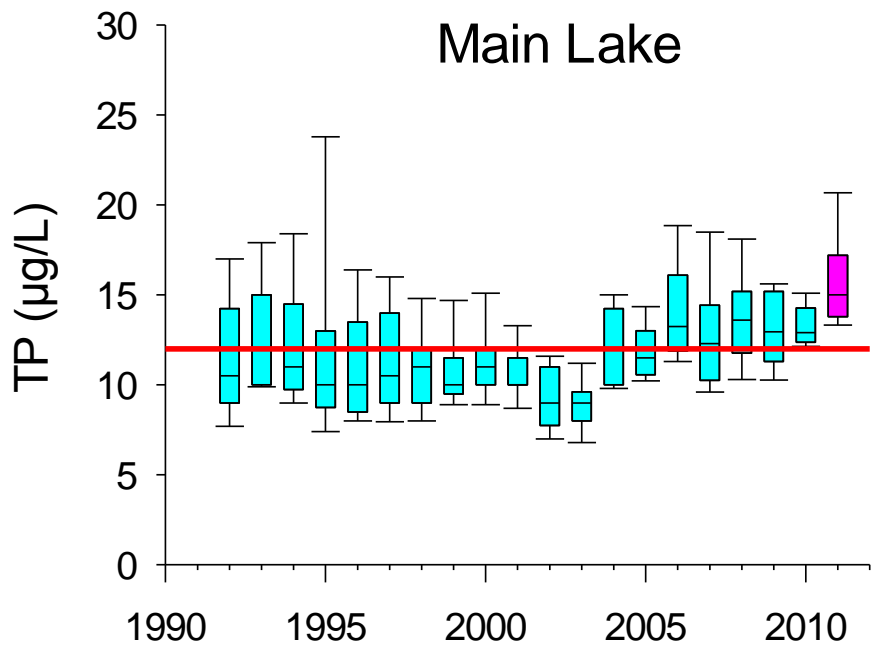
Photo: Brattleboro, VT, 2011, Courtesy of Caleb Clark, CNN



Brattleboro, 2011, photo: M. Reston



Wilmington, 2011, photo: J. Cantore



Pollution Source – Road Runoff



Eroding roadside ditch

Storm-damaged gravel road

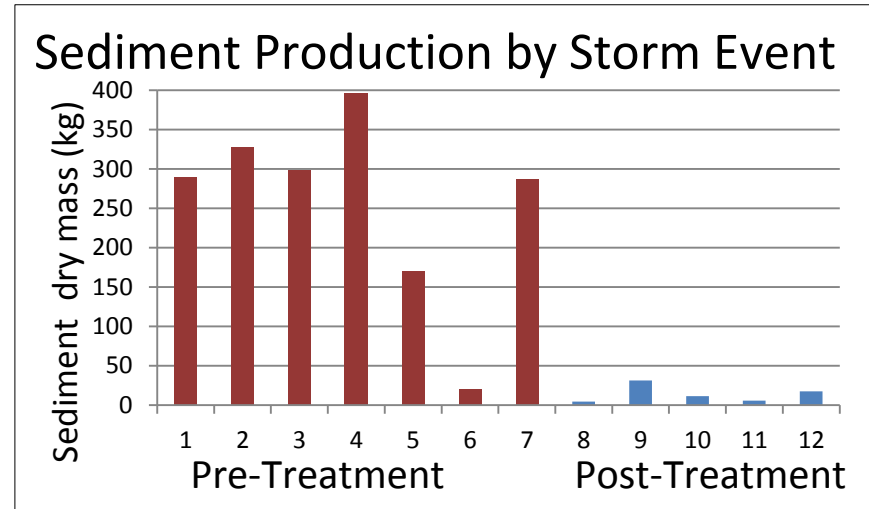
Stormwater Management

Stormwater Runoff - Municipal Roads

Sediment and Erosion Control

Washington County

- UVM Controlled Study found a dramatic reduction in polluted runoff from Best Practices such as rock-lining ditches on steep roads
- Estimated project cost = \$3,000 (1,000 linear feet treated)



Wempe, 2013



Eroding roadside ditch



Ditch stabilization saves road and reduces erosion 27

Restoring Lake Champlain Basin

Proposed Commitments

Enhance water quality rules for agriculture (Accepted Agricultural Practices, AAPs).

Develop a stormwater permit for state highways.

Develop a stormwater permit for town roads.

Require additional stormwater treatment for more densely developed areas.

Revise Vermont Stormwater Management Manual for new development.

Improve rules for managing rivers and floodplains.

Enhance water quality rules for logging (Accepted Management Practices, AMPs).

Mapping Road-Related Potential Critical Sources Areas

- Gravel Roads and driveways
- Erodible soils
- Frequently flooded soils
- Rivers and streams
- Wetlands
- Lakes and Ponds
- Digital Elevation Model to calculate road gradient
- Slope
- “Problem” culverts



LEGEND

Road Erosion Risk Ranking

- Low Risk, 0.5 - 4
- Moderate Risk, 4.5 - 6
- High Risk, >= 6.5

Town Boundary

NOTES

Map depicting low, moderate and high risk for gravel road erosion

1: 55,575
October 7, 2014

2,823.0 0 1,412.00 2,823.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 4631 Ft. 1cm = 556 Meters

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THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.



ROAD EROSION METHODOLOGY

FIELD INVENTORY AND COLLECTION OPTIONS

OCTOBER 2014

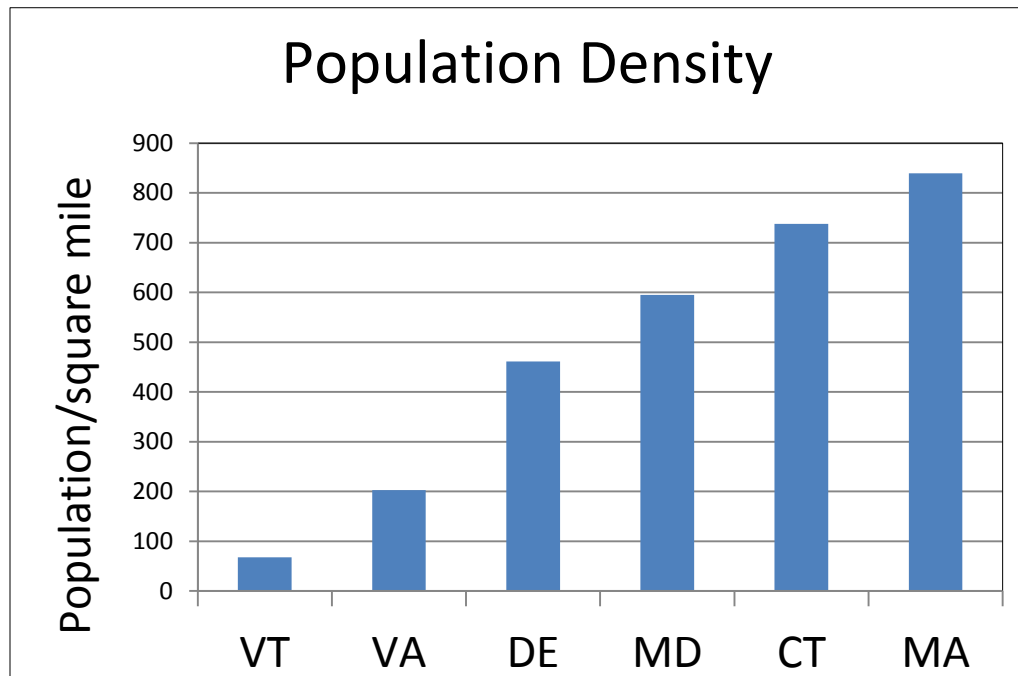
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DRAFT work in progress - example only for
presentation

Vermont: A Small State Facing Big Challenges to Implement Plan

- Vermont's small population makes paying for clean water particularly challenging due to its small revenue base, compared with southern New England and Chesapeake states
- However, Vermont's rural landscape means that the State has more cost-effective opportunities to reduce phosphorus loads than urbanized regions



Vermont: A Small State Facing Big Challenges to Implement Plan

State will need to tap into existing & new sources to implement plan



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“Restoring Lake Champlain Website:

<http://www.watershedmanagement.vt.gov/erp/champlain/>

