

Overview/Agenda

- Nutrient pollution in Vermont's major watersheds
- Approach (and funding) for addressing nutrient pollution
- Accomplishments (*Clean Water Investment Report*)



Nutrient Pollution Impairs Rivers, Lakes and Streams

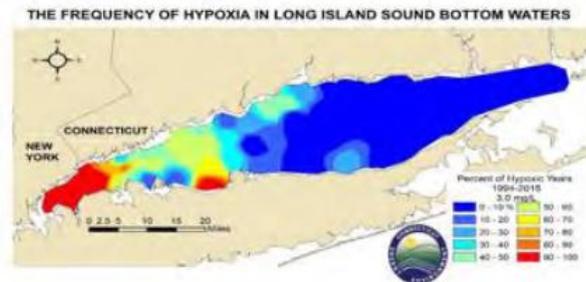
Phosphorus TMDLs for Vermont Segments of Lake Champlain



Lake Memphremagog Phosphorus TMDL

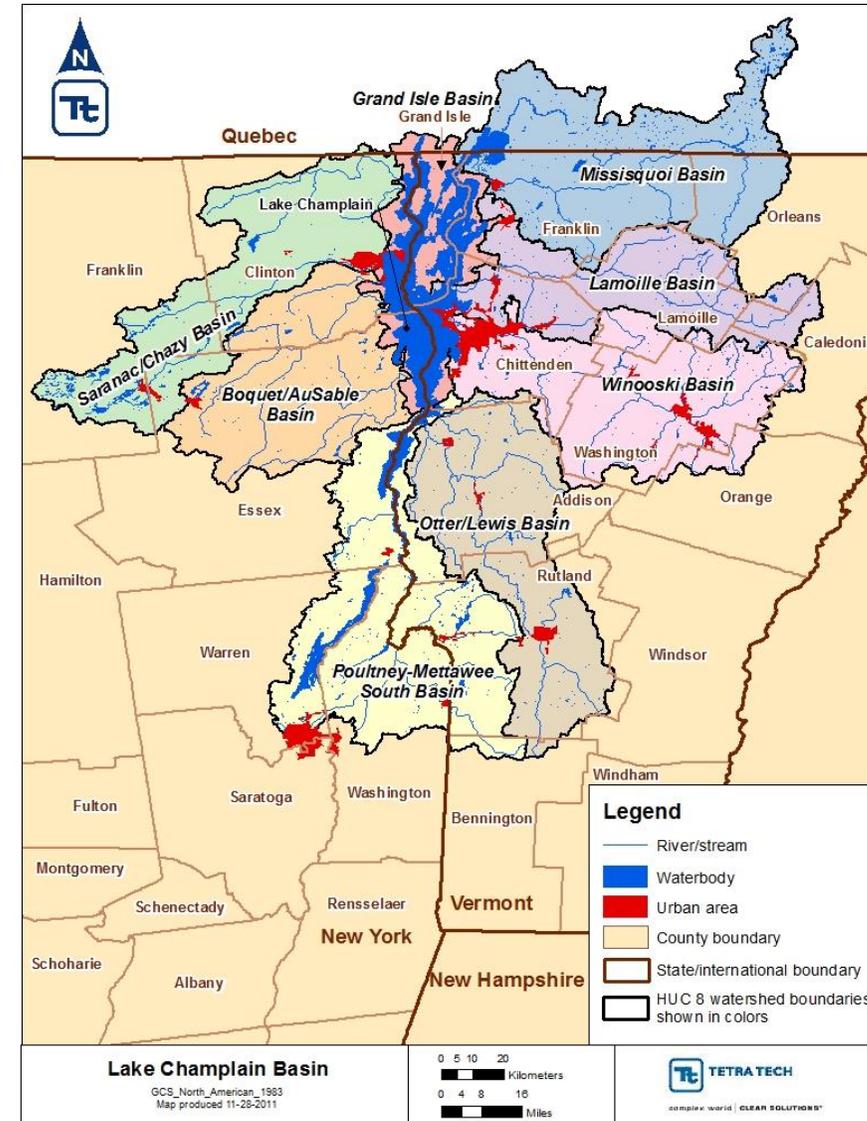


Nitrogen TMDL for Dissolved Oxygen in Long Island Sound

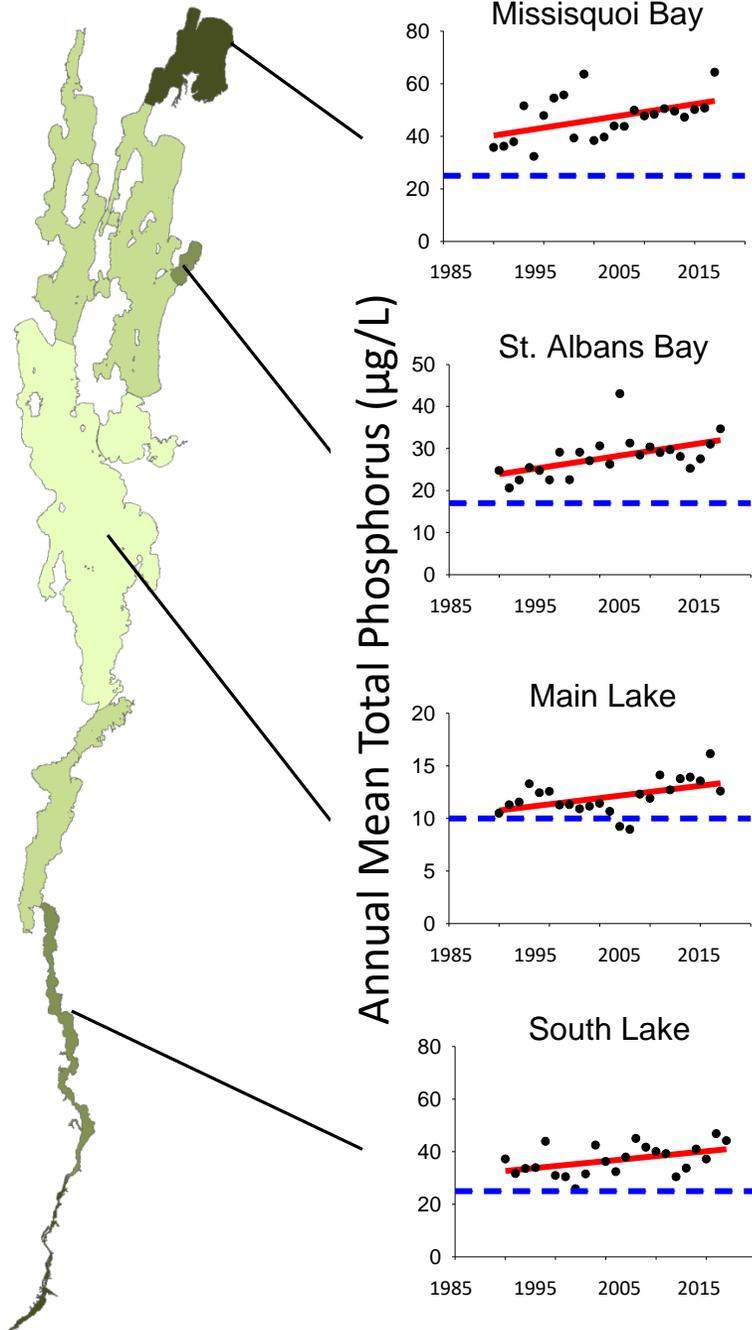


Lake Champlain Statistics

- 8,234 square mile watershed
 - 56% (VT); 37% (NY); 7% (Quebec)
 - Drains nearly half the land area of Vermont
- 120 miles long
- Surface area of 435 square miles
- Maximum depth of 400 feet
- 6th largest (natural) lake in the US
- Drinking water source for 200,000 people
- Residents:
 - 571,000 in total; 390,000 in Vermont
 - More than 100,000 dairy cows



Trends in Lake Champlain Phosphorus Concentrations



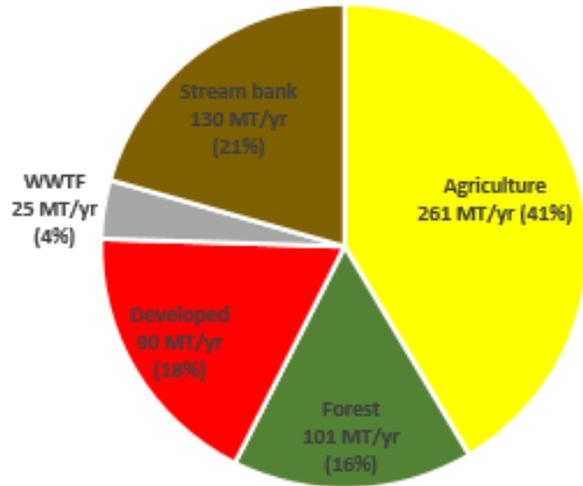
— Trend line
- - - Water quality standard

Phosphorus levels in the lake are above the allowable standards

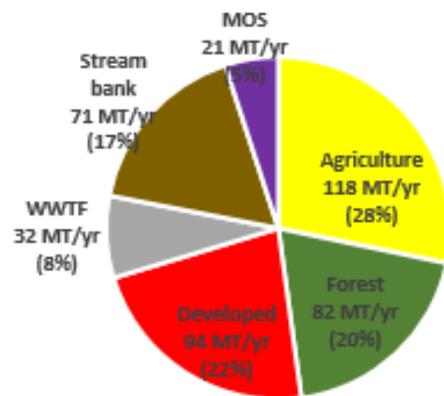
Vermont has taken many important actions, especially in the last 10 years, but much remains to be done

Cleaning up the lake ecosystem is complex and recovery will take time

Base Load
631 Metric Tons/Year



Vermont Reduction
Required = 213 mt/yr (34%)



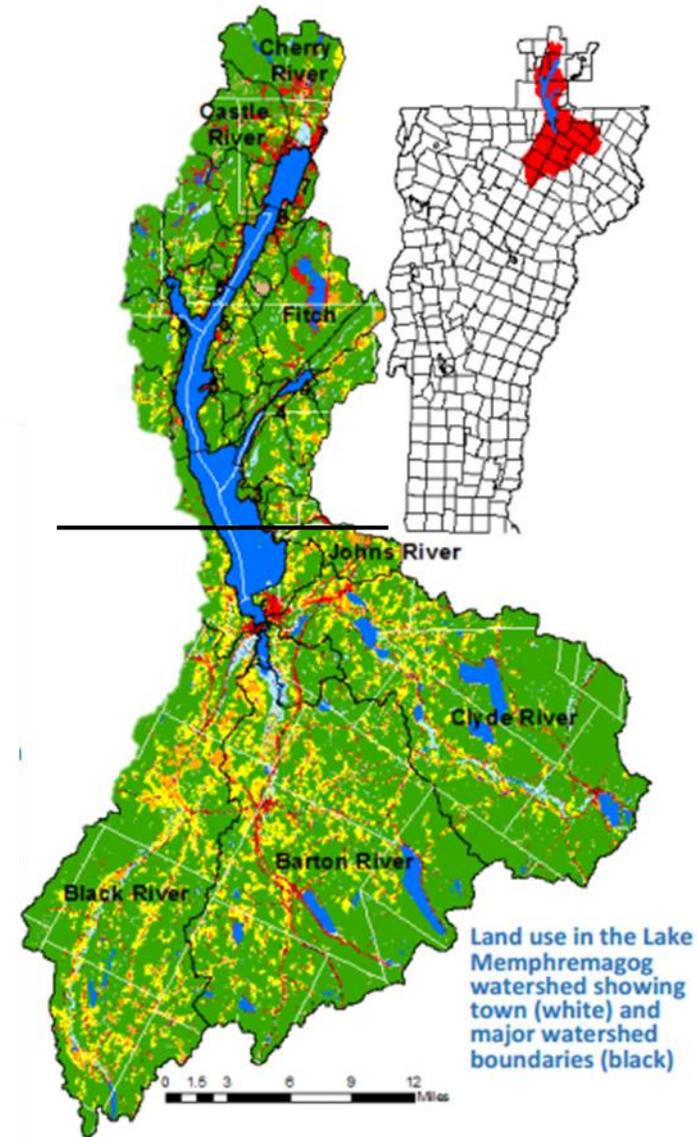
TMDL Loading Capacity and Allocations
418 Metric Tons/yr

34% phosphorus
reduction over
20 years in Lake
Champlain

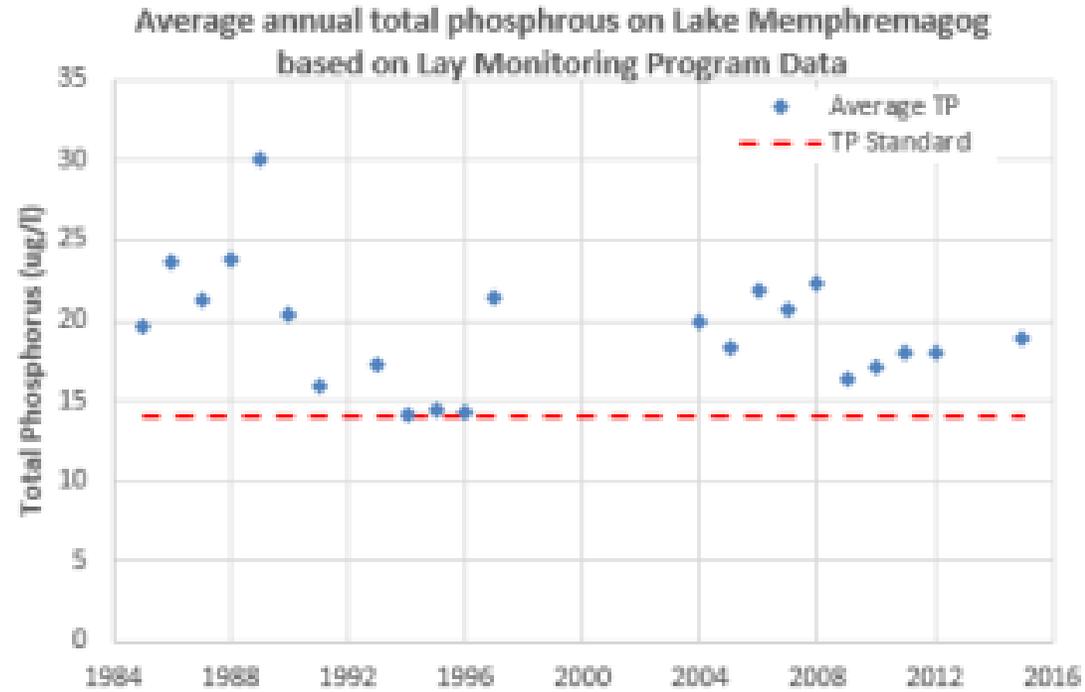


Lake Memphremagog Statistics

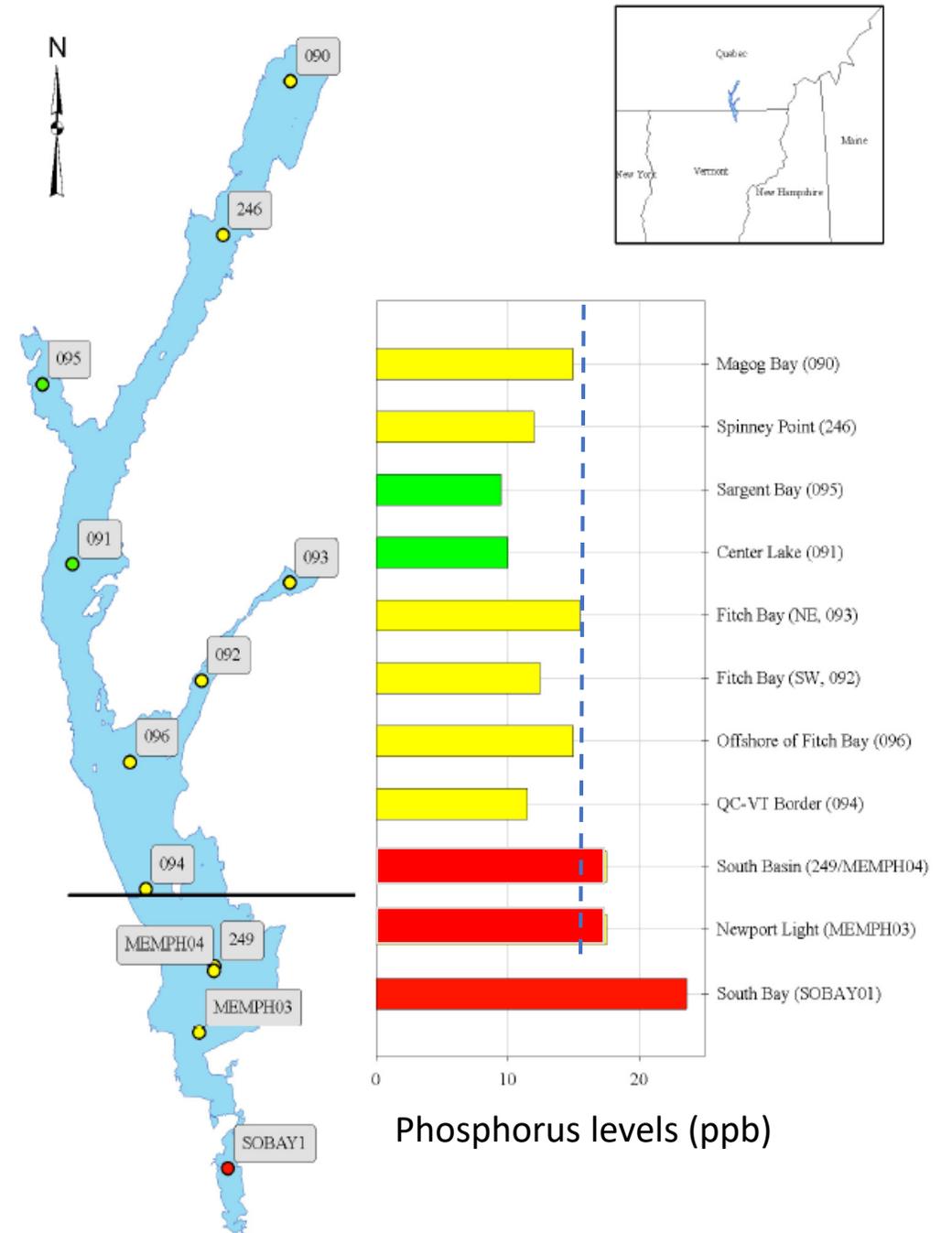
- 687 square mile watershed
 - 71% (VT); 29% (Quebec)
 - Nearly $\frac{3}{4}$ of the surface area of the Lake is in Quebec
- 31 miles long
- Maximum depth of 350 feet
 - 3rd deepest lake in Vermont
- Drinking water source for 200,000 people, mostly in Quebec

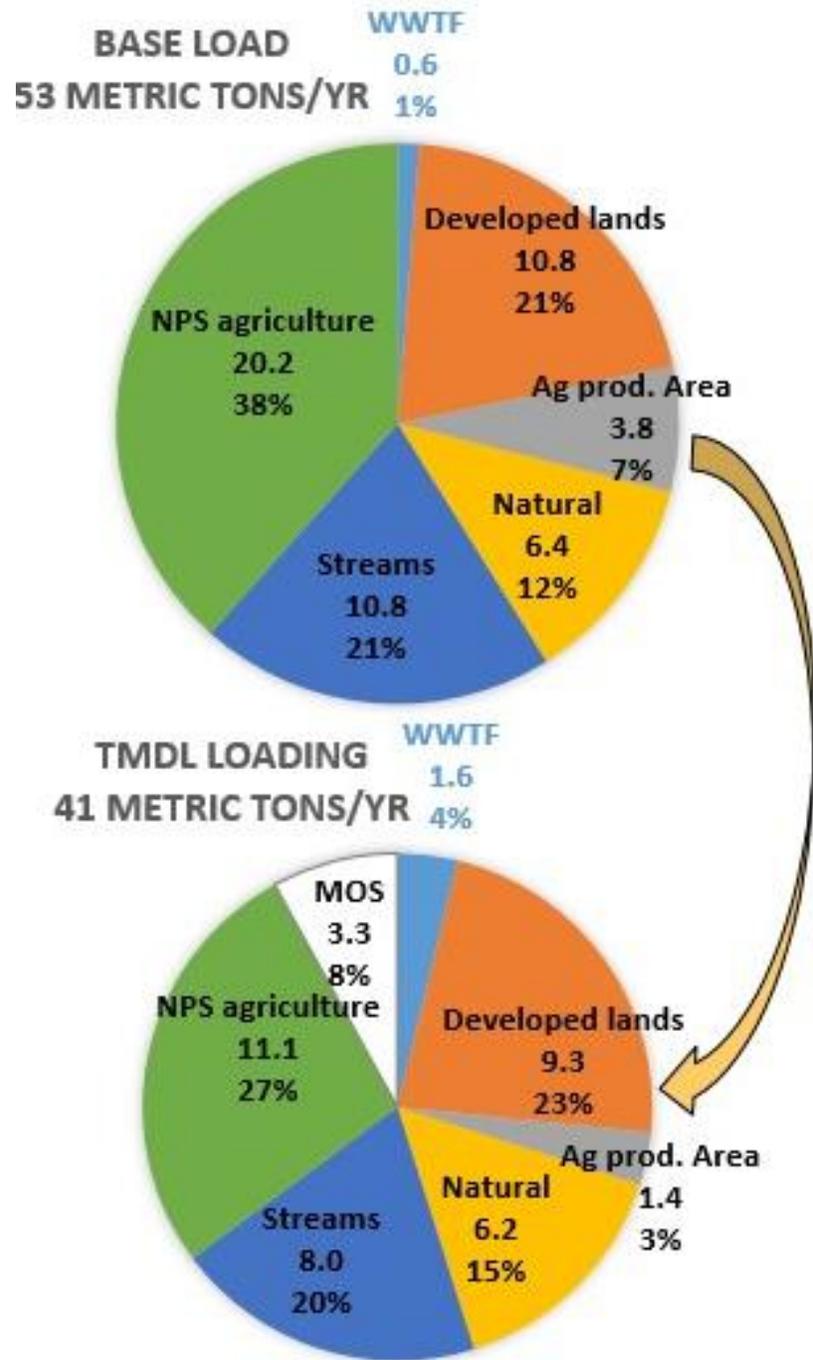


Phosphorus Loading to Lake Memphremagog



Land use	Percent of VT watershed
Developed	6%
Agricultural	17%
Forest/Wetland	77%



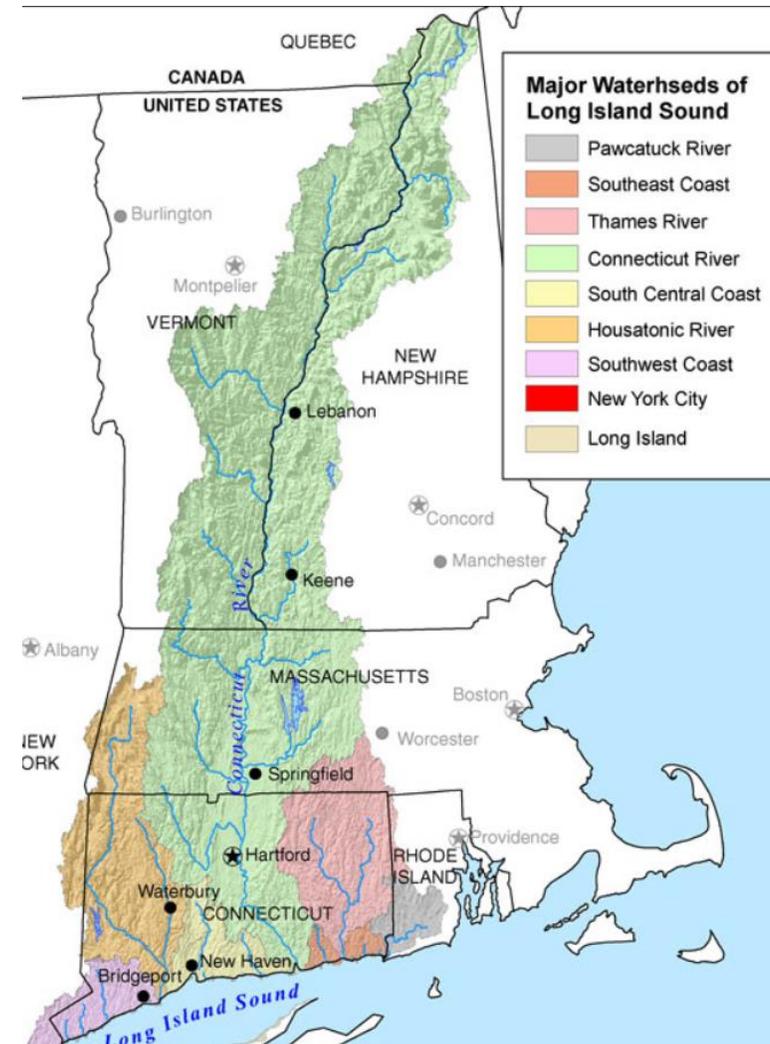


29% phosphorus reduction needed in Lake Memphremagog

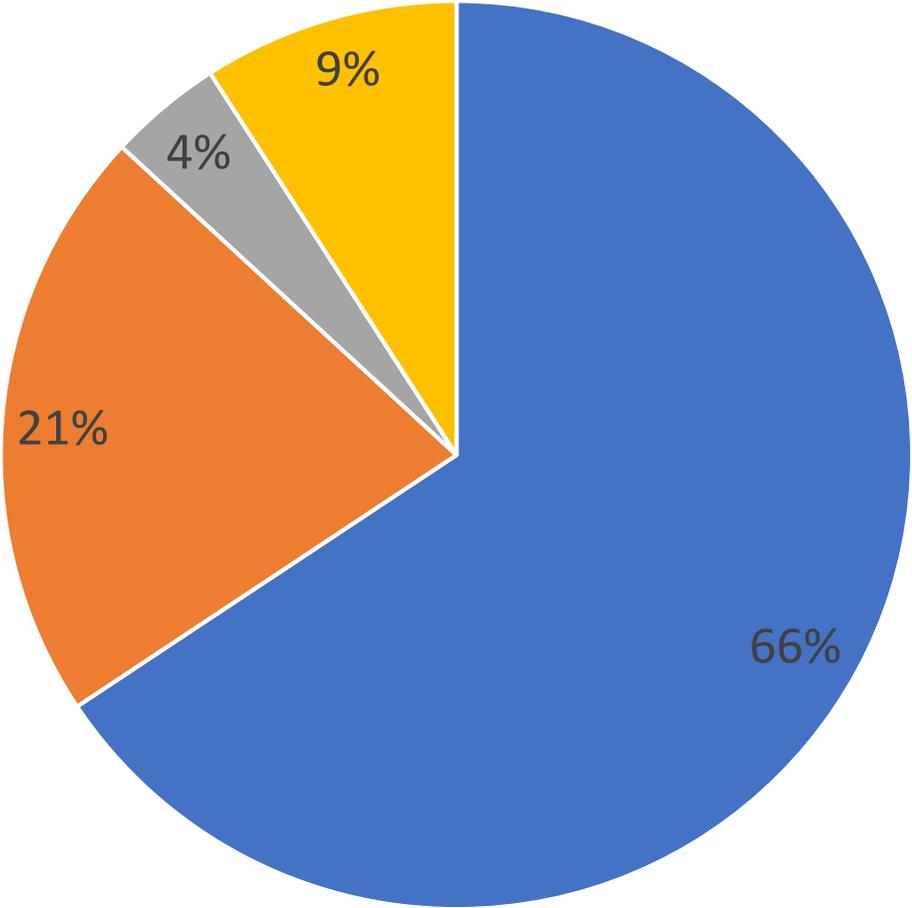


Connecticut River/Long Island Sound Statistics

- 42% of Vermont is in the Connecticut River watershed
- Connecticut River is 410 miles long with over 250 miles along Vermont
- Connecticut River drains to Long Island Sound
- Nitrogen pollution from Vermont contributes to dissolved oxygen (DO) impairment in the Long Island Sound



Nitrogen Loading from Vermont to Long Island Sound via the Connecticut River



■ Atmospheric Deposition
■ Developed Lands/Roads

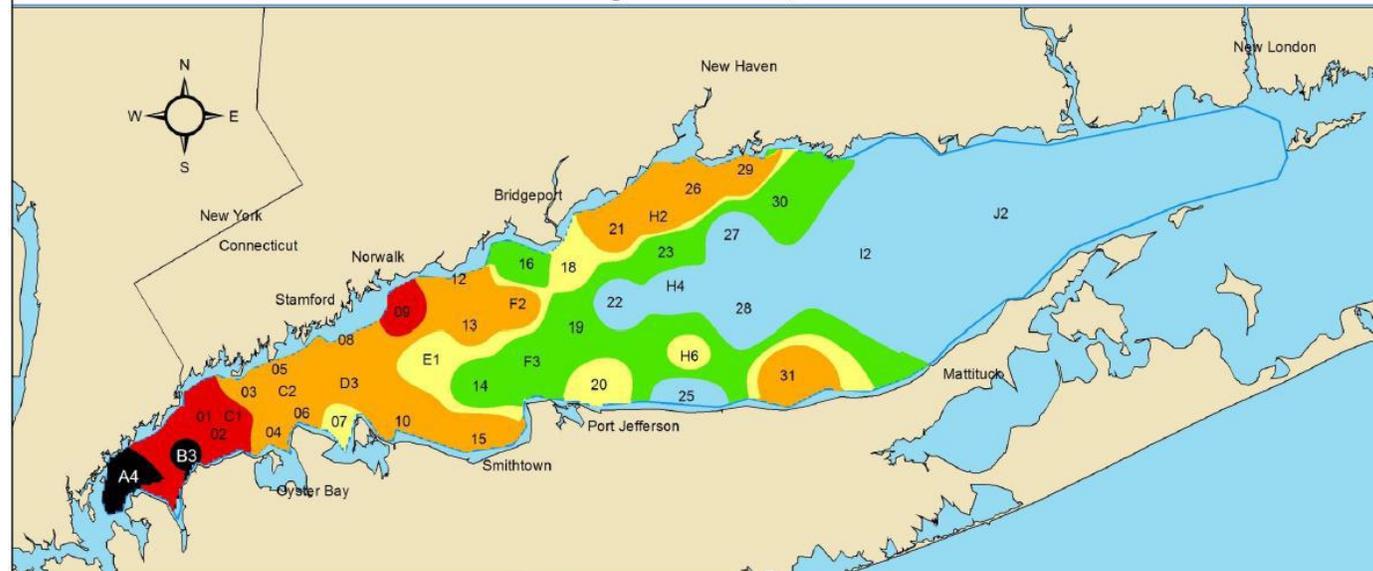
■ Agricultural Lands
■ Municipal Wastewater

Long Island Sound Nitrogen TMDL

- Basin-wide load reduction target is 58.5%
- TMDL study underway to refine required reductions regionally



Dissolved Oxygen in Long Island Sound Bottom Waters
August 14 - 16, 2012



The 2012 August Hypoxia Survey was conducted 14-16 August. Forty-one stations were sampled using the R/V John Dempsey. Bottom water dissolved oxygen concentrations were below 4.8 mg/L at 34 stations. A total of 23 stations were below 3.0 mg/L, four of those were below 2.0 mg/L, and two were below 1.0 mg/L. The lowest concentration was observed at A4 (0.90 mg/L). After 3 years without any DO values below 1.0 mg/L (last time was in 2008), both A4 and B3 went severely hypoxic. The area of bottom water affected by hypoxia (DO <3.0mg/L) is 288.5 square miles (747.1 sq km) compared to 130.3 square miles (337.6 sq km) in 2011 and 0 square miles (0 sq. km) in 2010. The area of bottom water with DO less than 1.0 mg/L is 17.7 square miles (45.8 sq km).

Dissolved Oxygen	Severity of impact
0.0 - 0.99	Severe
1.0 - 1.99	Moderately severe
2.0 - 2.99	Moderate
3.0 - 3.49	Marginal
3.5 - 4.79	Interim management goal
4.8+	Excellent - Supportive of marine life

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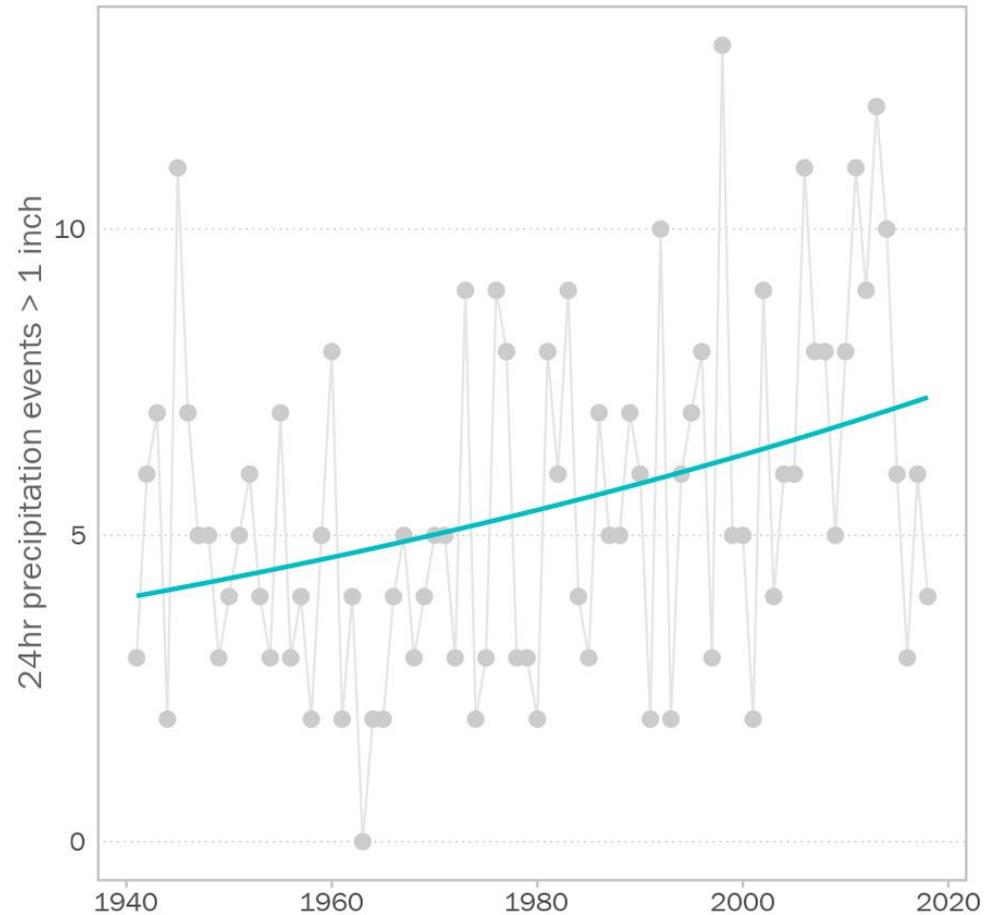
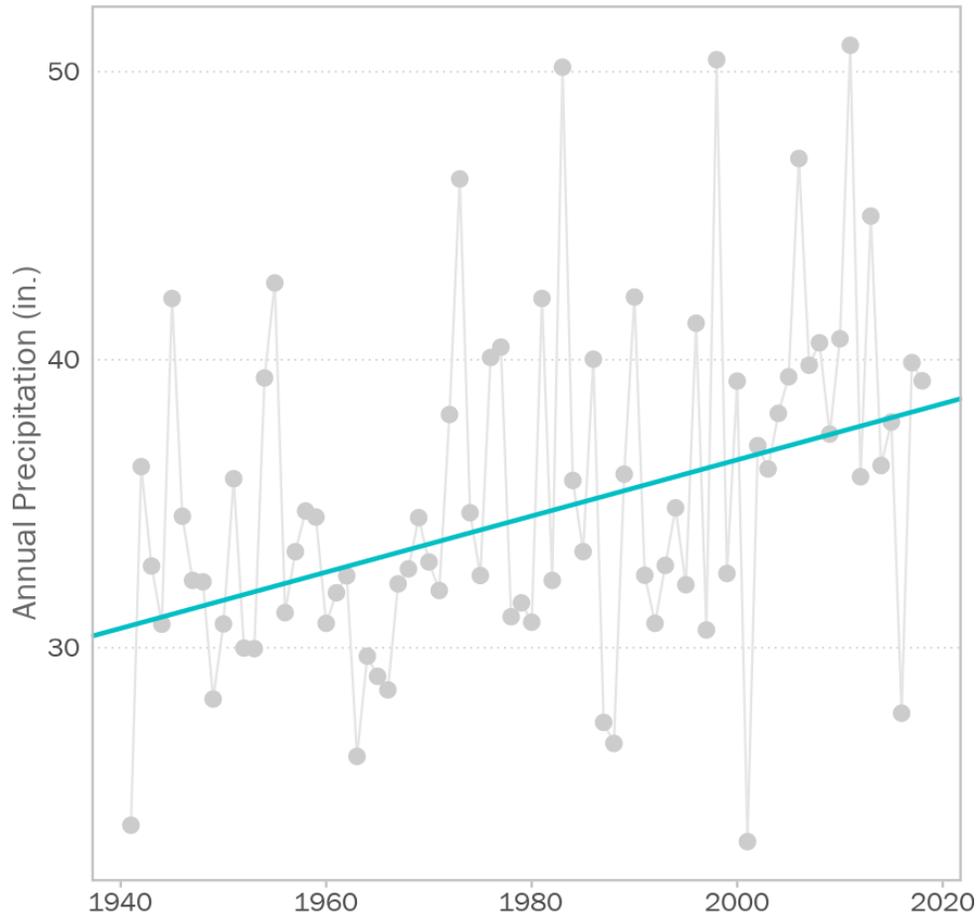
What is Driving Nutrient Pollution in Vermont?

- Sewer overflows?
- Agricultural runoff?
- New construction?

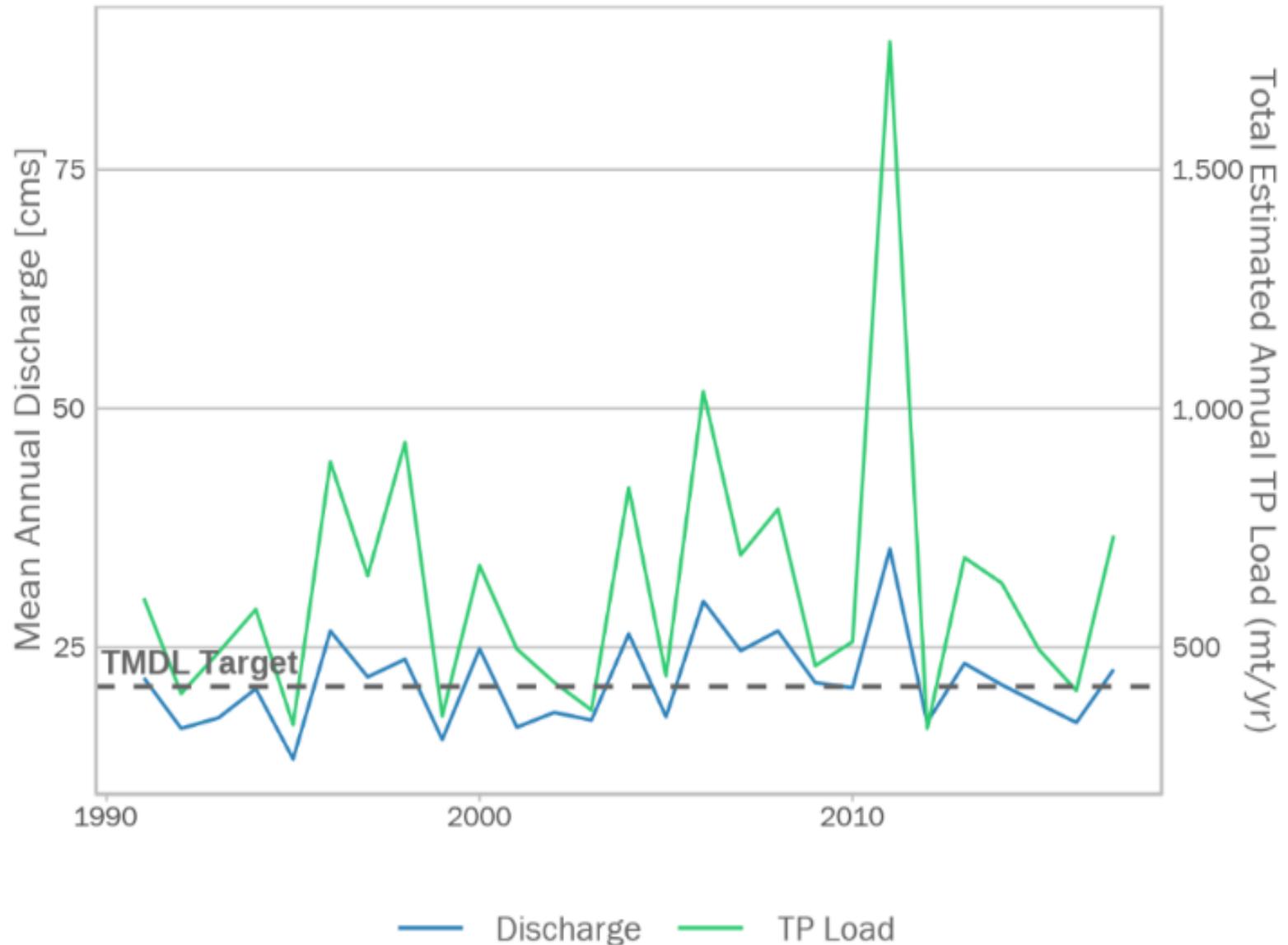
- WEATHER!
 - More rain = more nutrients reaching our waterbodies
 - Weather is noisy, so can be hard to detect trends

What is Driving Nutrient Pollution in Vermont?

Significant increases in frequency of intense storms and total annual precipitation.



What is Driving Nutrient Pollution in Vermont?



What Needs to Happen?

- Significant reduction in nutrient loading
 - Lake Champlain = 34%
 - Lake Memphremagog = 29%
 - Connecticut River/Long Island Sound = 50%+
- For perspective...
 - Chesapeake Bay = 24%
 - Gulf of Mexico = 20%
 - Lake Erie = 40%

How Are We Going to Get There?

An “All-In” Approach

Wastewater Treatment



Forestry



Runoff from Developed Land



Floodplains and River Corridors



Roads



Agriculture



Combination of Mandatory and Voluntary Programs and Projects

- Mandatory - Act 64 (2015)
 - Agricultural practices
 - Stormwater runoff
 - Developed lands (3-acre permit)
 - Roads (Municipal Roads General Permit)
 - Wastewater
 - Forestry
 - Revisions to the Accepted Management Practices (AMPs)
- Voluntary (non-regulatory) – Act 76 (2019)
 - Natural resources restoration
 - Wetlands
 - Floodplains and river corridors
 - Projects that go “above and beyond” regulatory requirements

Are Some Sectors Asked To Do More than Others?

- Multiple objectives drove the mix of programs selected, including:
 - Cost-effectiveness
 - \$ per pound of pollution controlled
 - Capacity
 - Equity
 - Sustainability
 - Programs that EPA has direct control over
 - Wastewater treatment

How is Clean Water Work Funded?



Average Annual State Appropriations = \$50-60 M/year

How is Clean Water Work Funded?

Total FY21 Clean Water Gov Rec.	\$56,127,808
• Clean Water Fund:	\$20,568,808
• <i>Property Transfer Tax Surcharge:</i>	<i>\$5,790,000</i>
• <i>Escheats (unclaimed bottles):</i>	<i>\$1,940,000</i>
• <i>Meals and Rooms Tax:</i>	<i>\$11,982,000</i>
• <i>Prior Years Surplus Revenue:</i>	<i>\$956,808</i>
• Capital Bill:	\$13,900,000
• Transportation Bill:	\$7,078,000 (20% state/80% federal)
• Appropriations Bill	\$7,947,000
• <i>DEC Clean Water SRF Match</i>	<i>\$7,779,000 (100% federal)</i>
• <i>AAFM Farm Agronomic Practices</i>	<i>\$412,000</i>
• LCBP/Leahy Appropriation	\$6,390,000 (100% federal)

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Discretionary vs. Directed

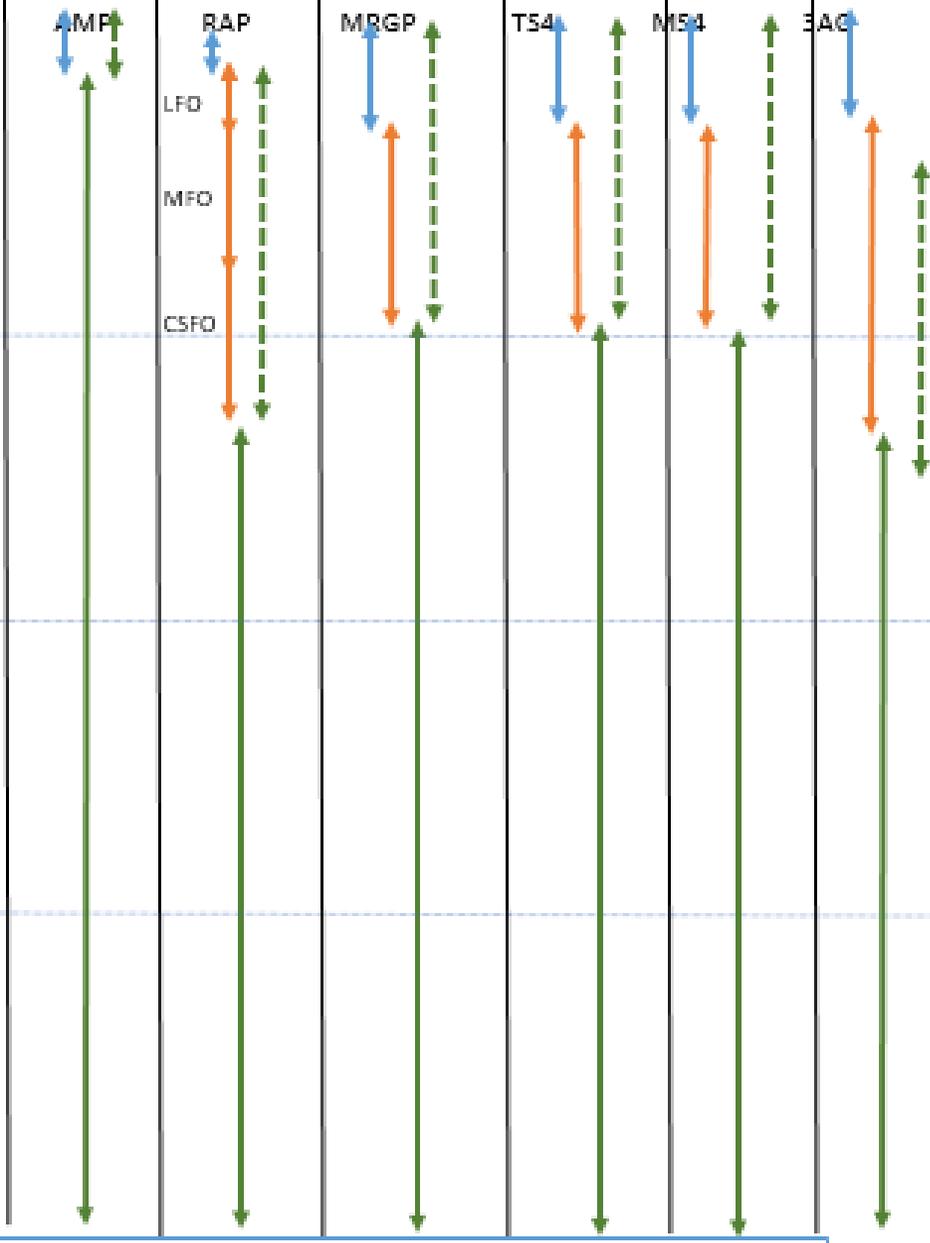
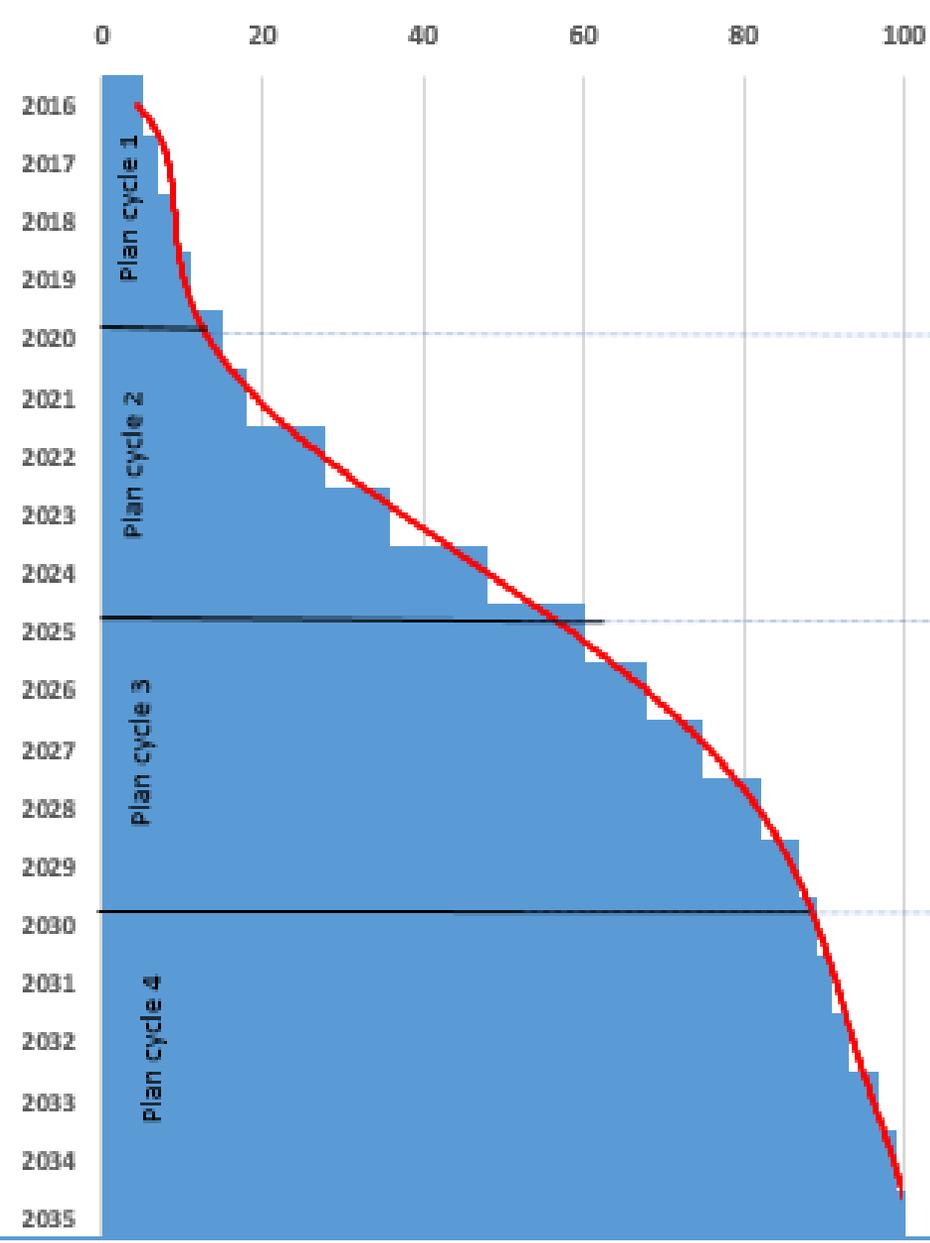
- Investments are real, but not all are discretionary
- Directed = \$26.2m
 - \$12.7m for municipal wastewater, stormwater and CSOs
 - \$7.1m for transportation-related stormwater
 - \$6.4m for projects approved by LCBP
- “Discretionary” ~ \$30m
 - Existing cost share commitments; combination of statute and agency practice

Will it Really Take 20 Years?

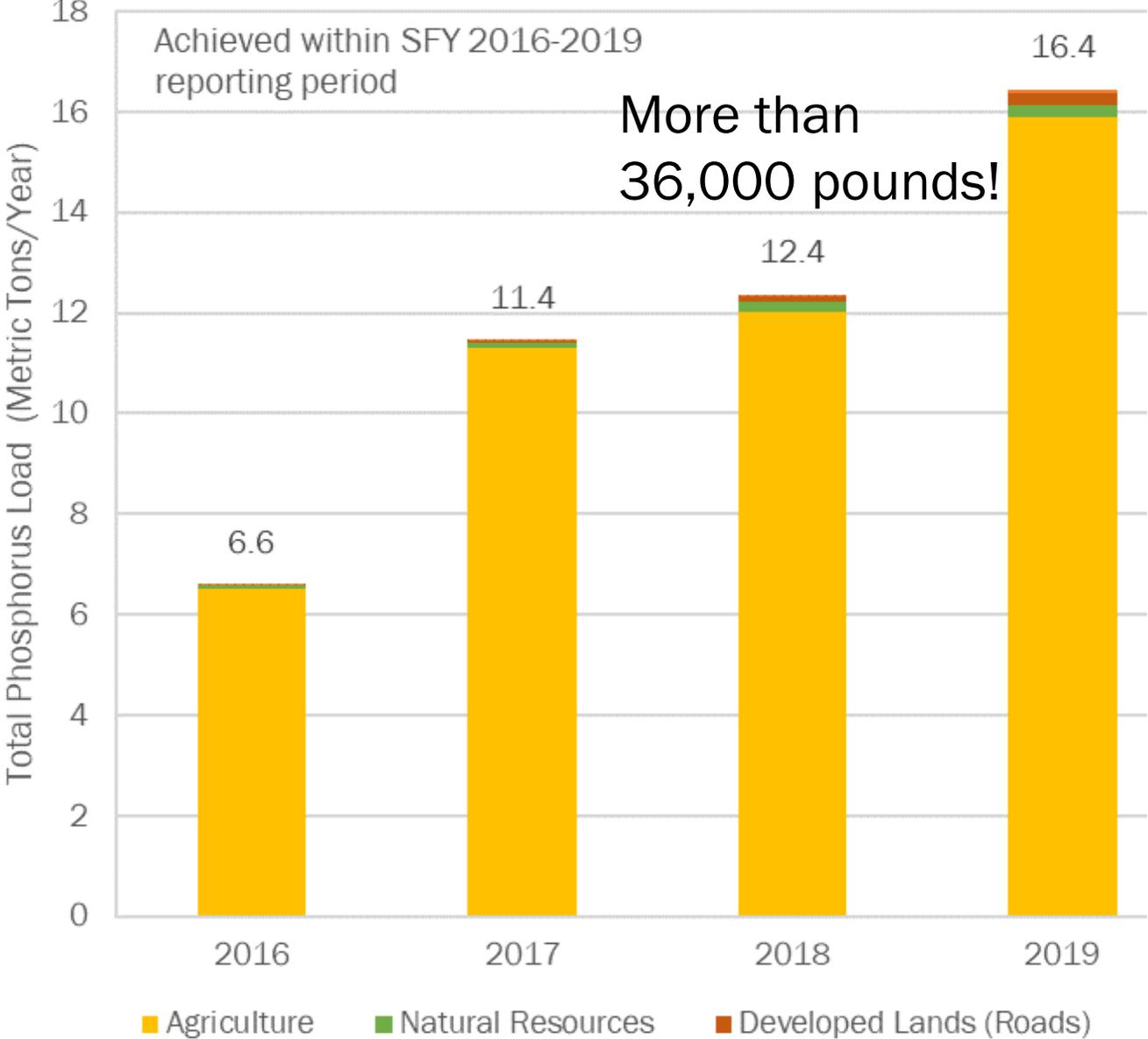
- YES!!
- Federal (TMDL) target is established and provides clear direction
 - Significant reductions are need
- Early years have been characterized by planning and putting systems in place
 - Implementation is accelerating
- Important for the State of Vermont to lead by example
- Progress will:
 - Not come in neat increments of pollution reduced per dollar spent
 - Be complicated by climate change as total rainfall and rain intensity increase

Regulatory Program Timeline

Hypothetical Phosphorus Reduction Curve (%)



Phosphorus Load Reductions, FY16-FY19



Phosphorus Load Reduction Required by TMDL

