

Clean Water Projects and Funding

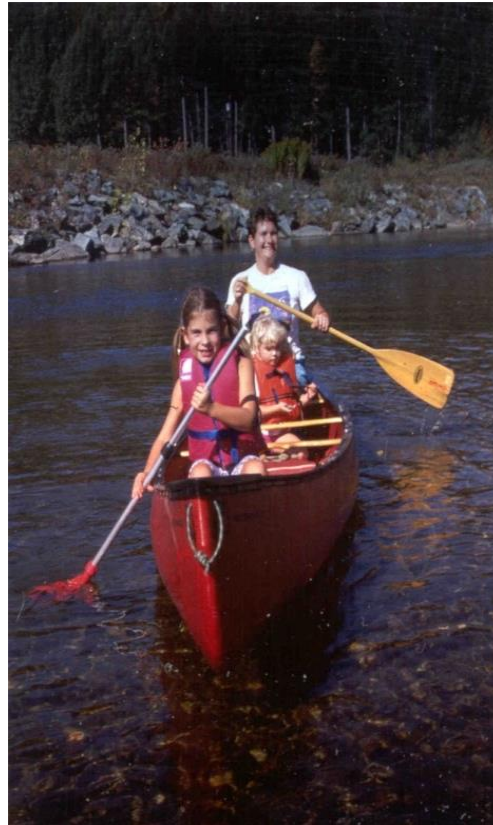
Julie Moore, Secretary Agency of Natural Resources
Neil Kamman, Manager, Monitoring, Assessment and
Planning Program
Kari Dolan, Manager, Clean Water Initiative Program
March 3, 2017



Why We Need Clean Water

- **Use and enjoyment of Vermonters**
 - Drinking water
 - Swimming
 - Fishing
- **Support tourism, at annual spending of \$2.5 billion**
 - Lake Champlain a key attraction for visitors
 - Second home-owners in towns bordering the Lake spend \$150 million annually
 - Overnight visitors in Champlain Valley spend over \$300 million annually
 - Day visitors spend \$30 million annually
- **Maintain property values**
- **Integral to the Vermont brand**
 - Our environmental is our economy

Vermont's Rivers, Lakes and Wetlands are Critical Community Assets



Human Activity Can Harm Our Waters



Phosphorus Pollution Impairs some VT Lakes and Streams



Lake Champlain

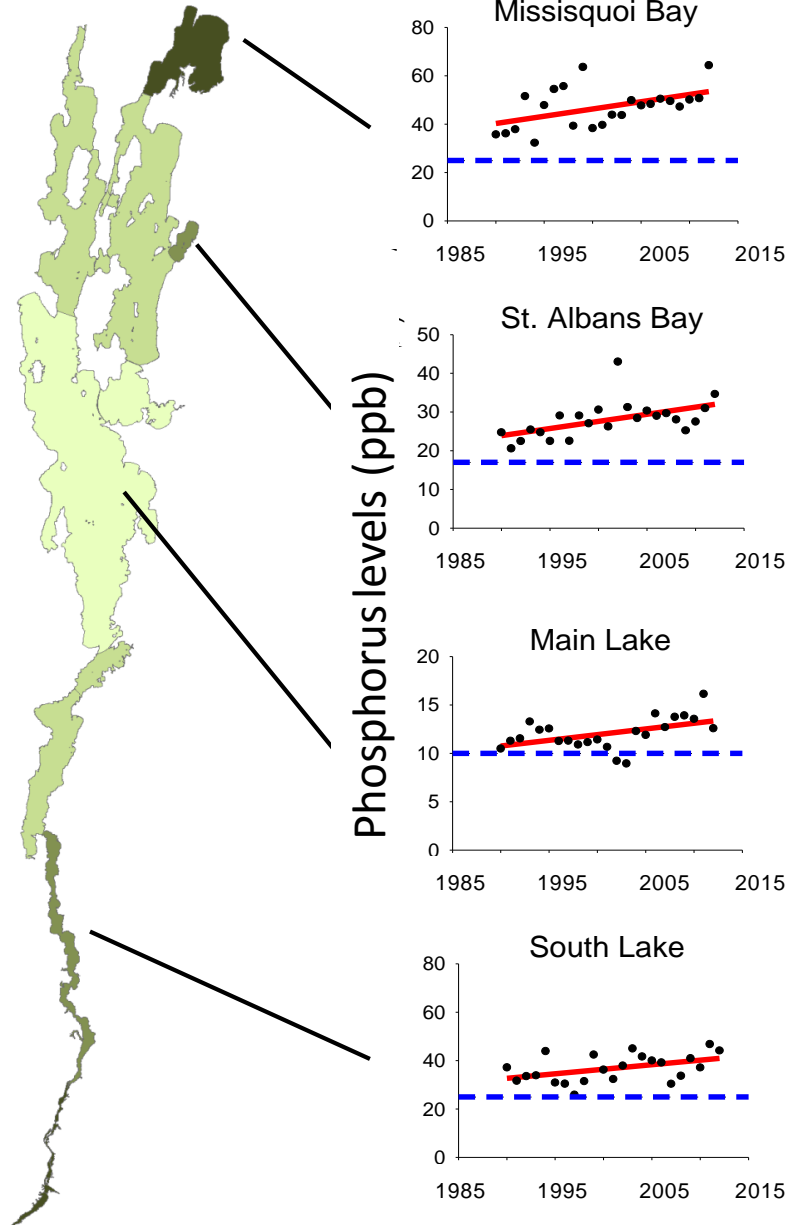


Lake Memphremagog

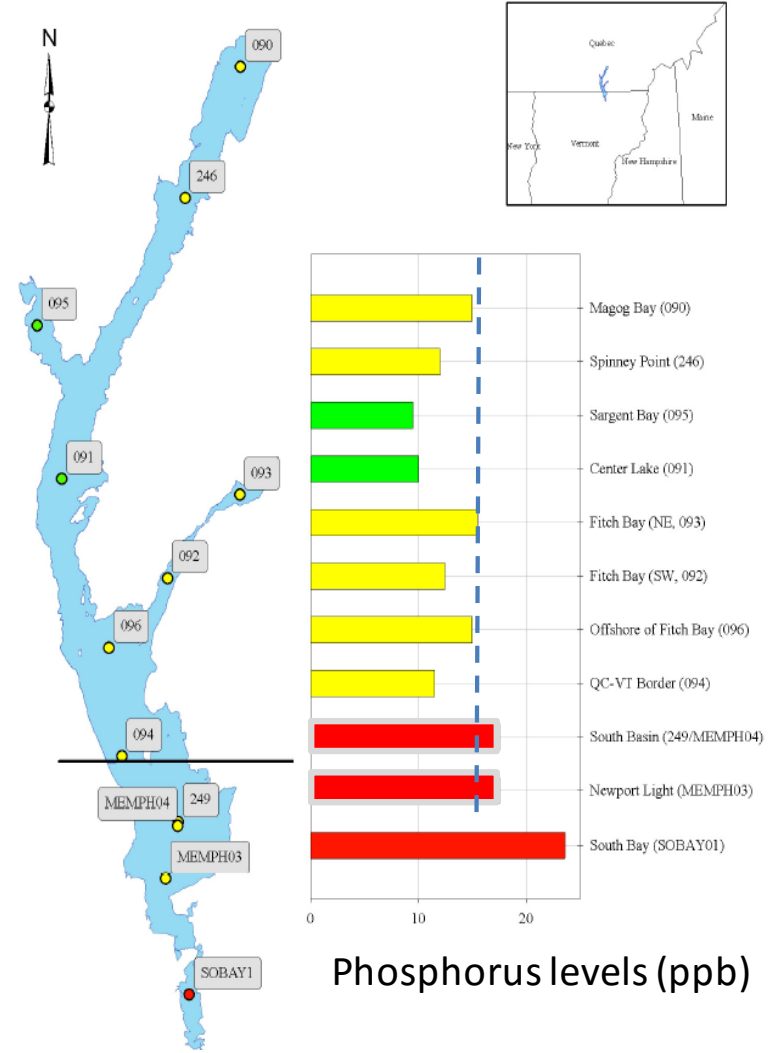


Blue-green algae bloom in Missisquoi Bay
Photo by Robert Galbraith

Lake Champlain



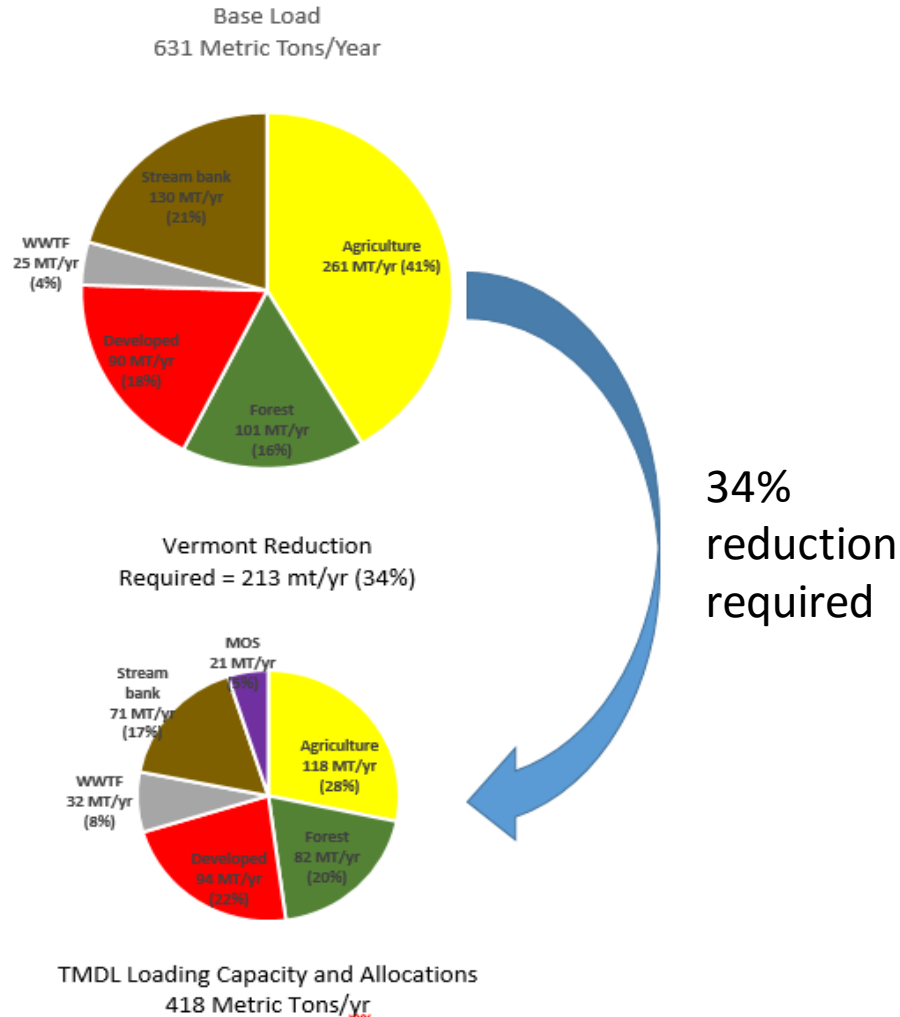
Lake Memphremagog



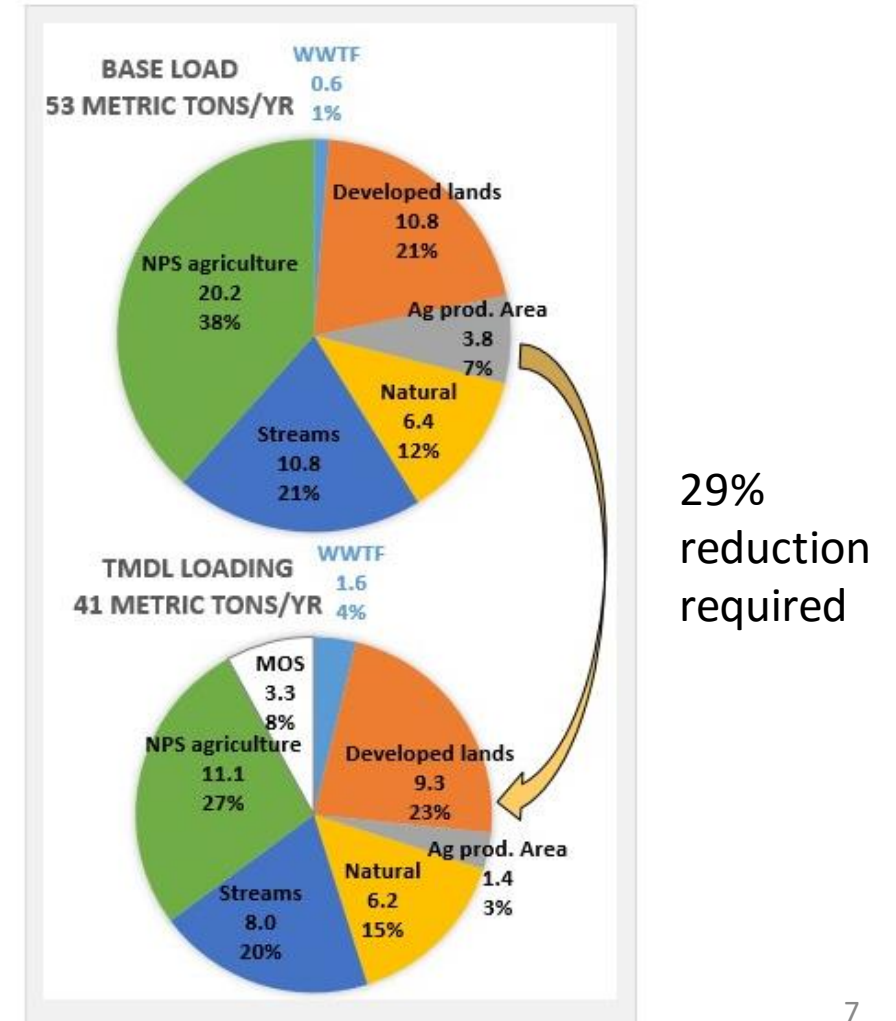
Also impaired: Lake Carmi (Franklin) and Shelburne Pond (Shelburne)

Phosphorus Reductions Required by EPA Pollution Control Plans

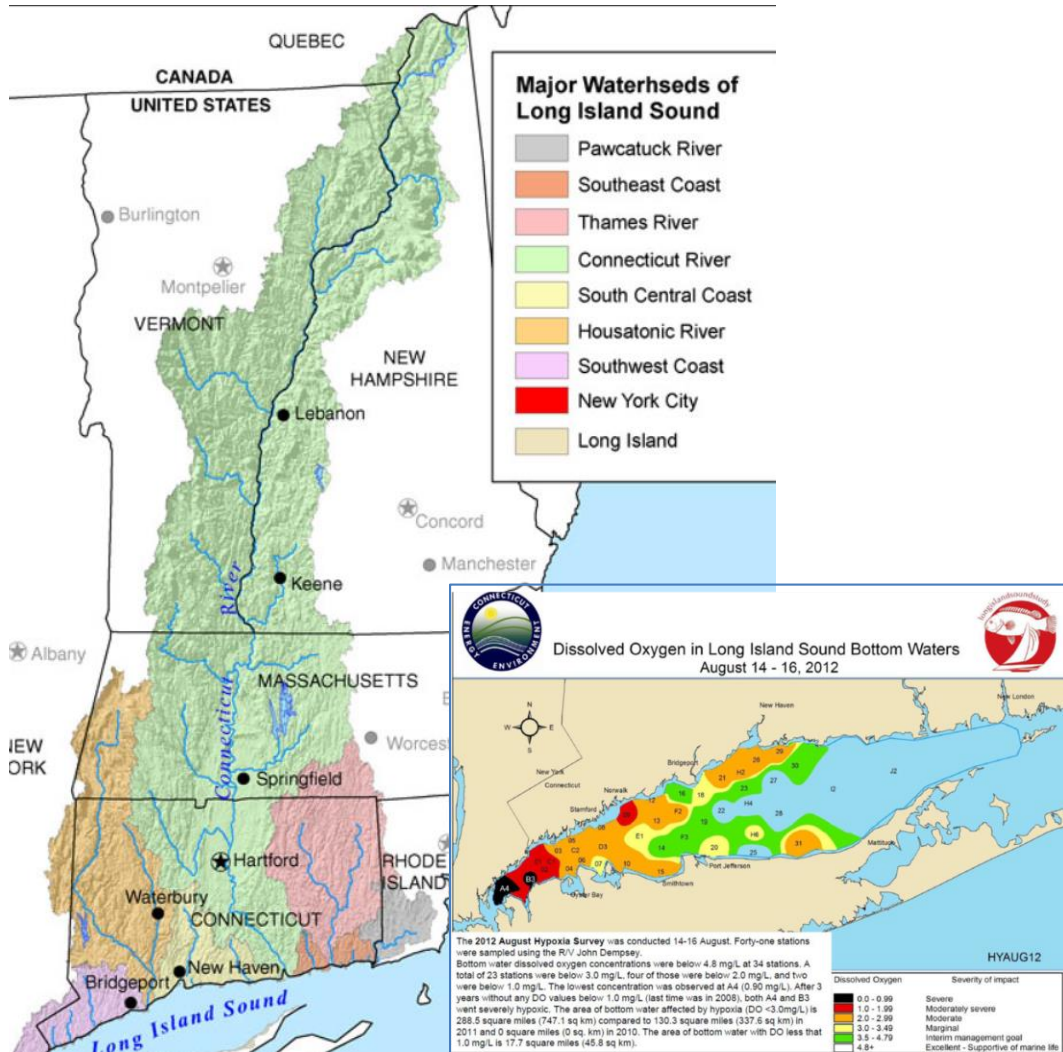
Champlain



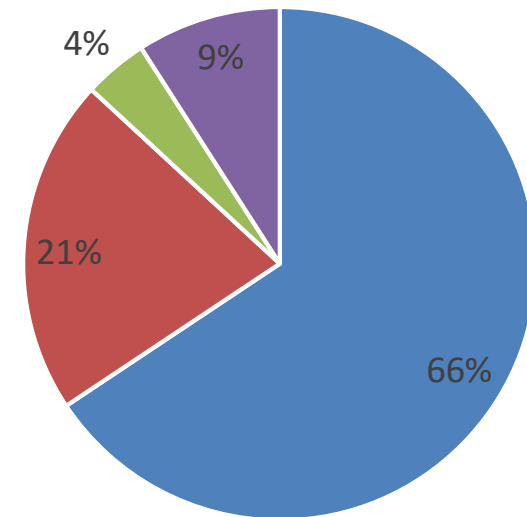
Memphremagog



Connecticut River/Long Island Sound Nitrogen TMDL



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



- Atmospheric Deposition
- Agricultural Lands
- Developed Lands/Roads
- Municipal Wastewater

“All-In” Approach

Wastewater Treatment



Forestry



Runoff from Developed Land



River Channels



Roads

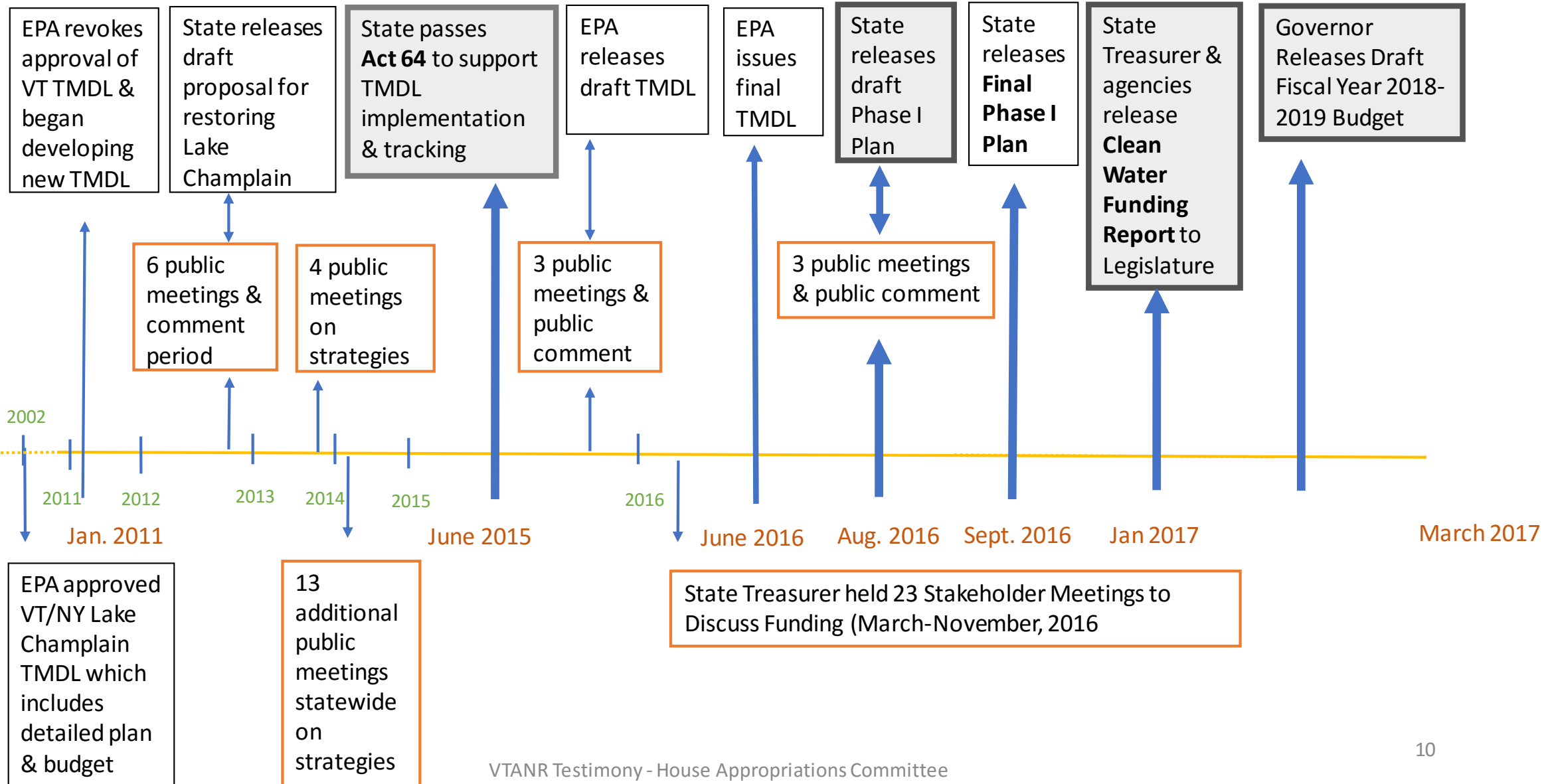


Agriculture



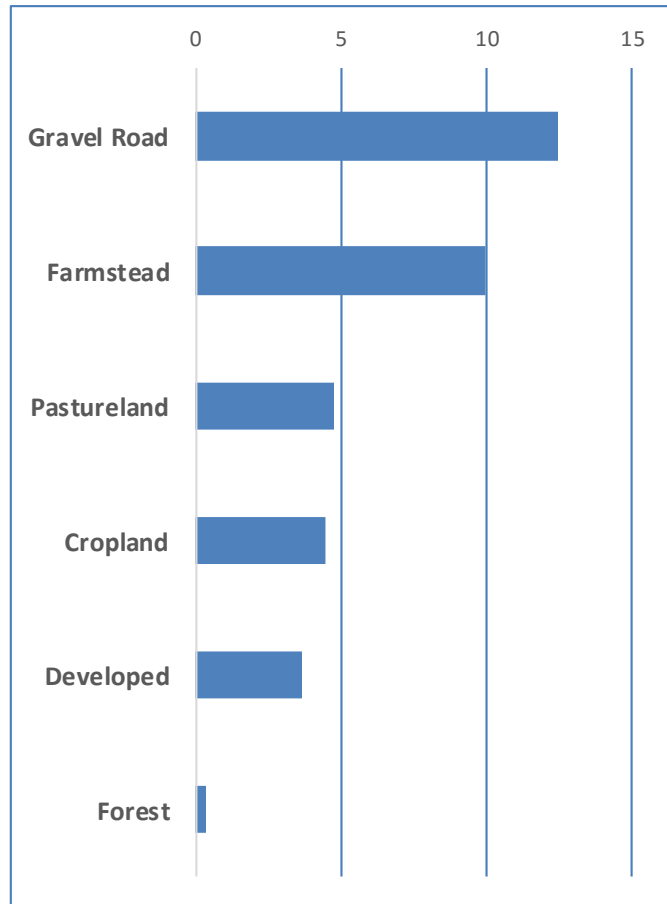
Lake Champlain TMDL and Phase I Implementation Plan

Key Milestones, 2002-2017

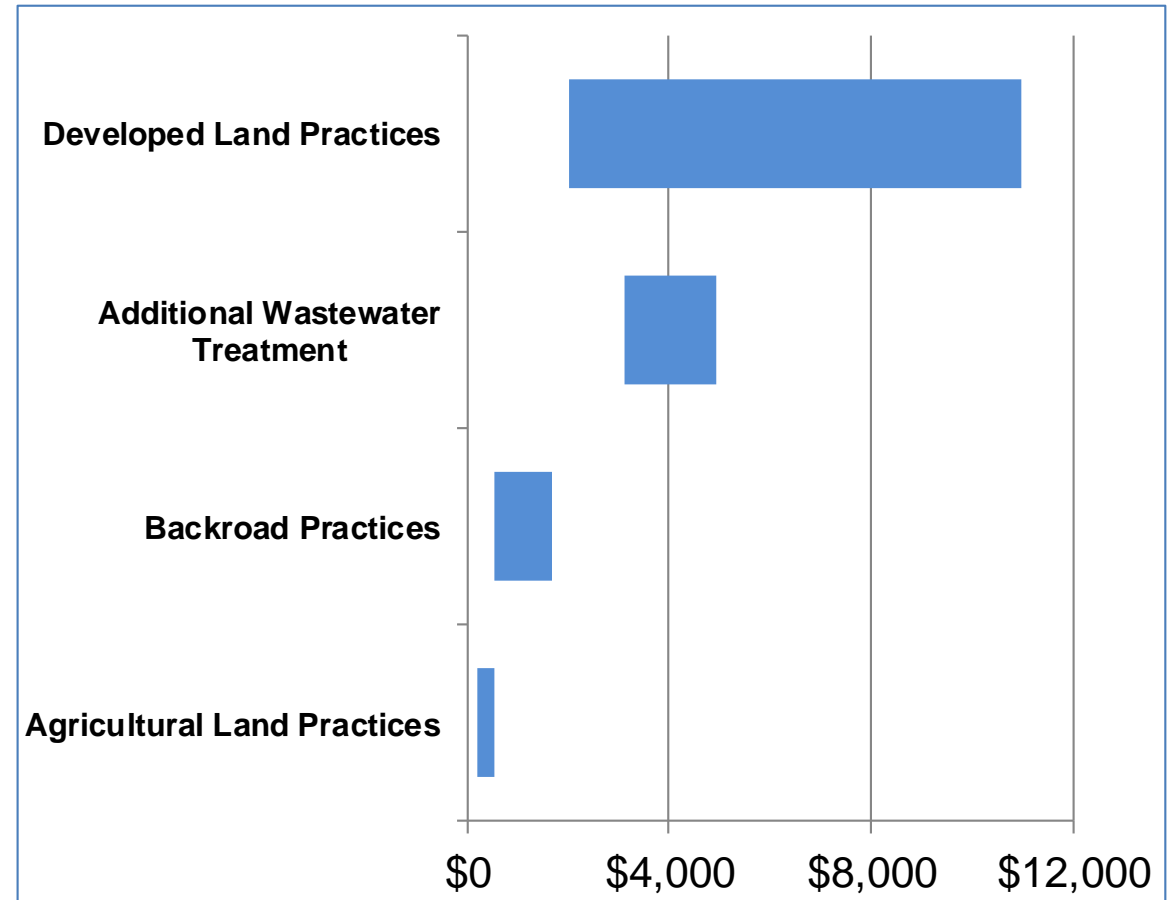


Relative Cost-Effectiveness of Actions by Source

Phosphorus loads
(kg/ac/yr)



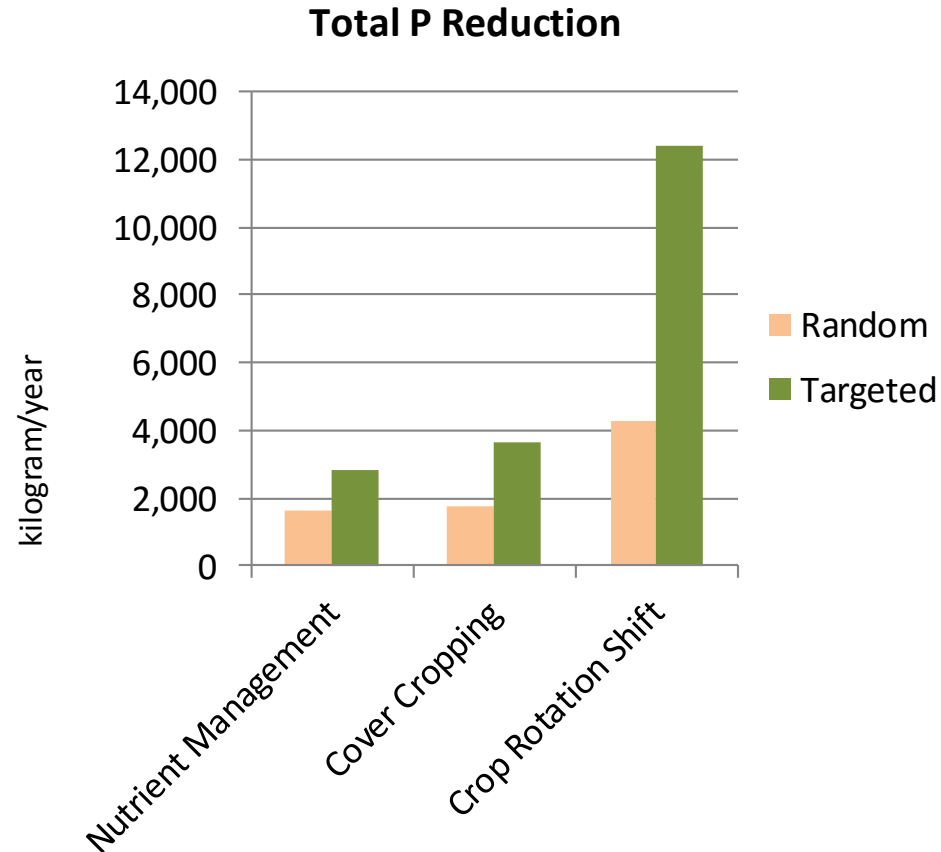
Range of Annualized Cost
(per kilogram of Phosphorus Reduced)



Strategic Investment

Critical Source Area Targeting

Critical Source Area Study in Missisquoi Bay Basin found that program effectiveness increases 1.5 to 3 times with targeting



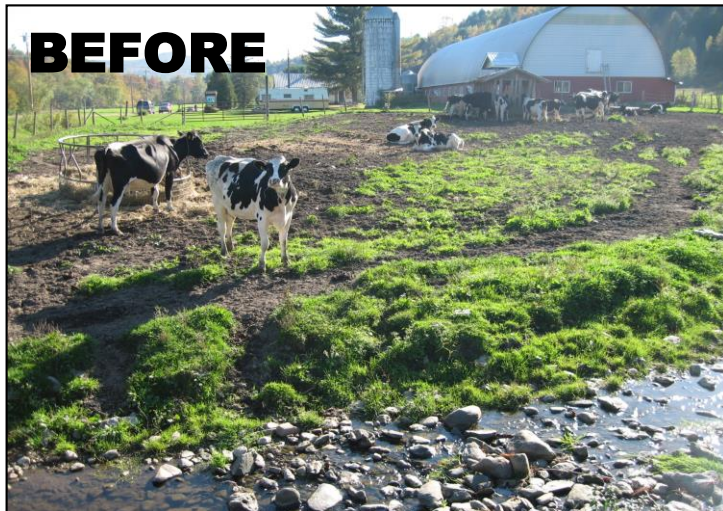
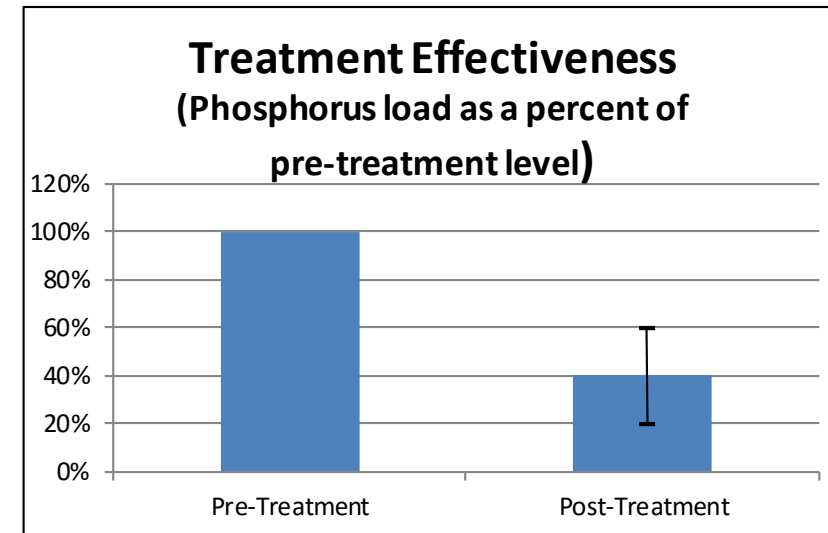
Agricultural Programs

Required Agricultural Practices

Example: Livestock Exclusion

And Vegetated Buffer

- Achieves 40%-80% reduction in Total Phosphorus
- Estimated project cost = \$20,000 (fencing, stream crossing, 1 acre of buffer)



Uncontrolled livestock access to stream



Installation of livestock fencing & buffer

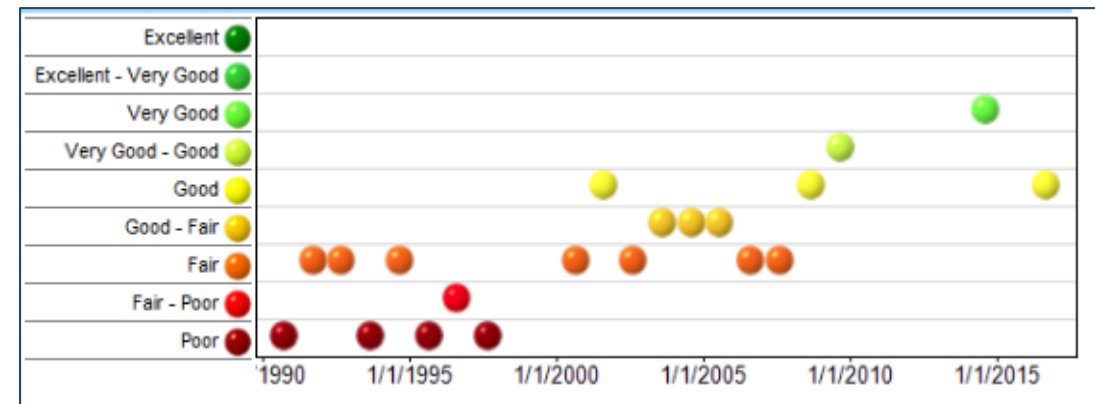
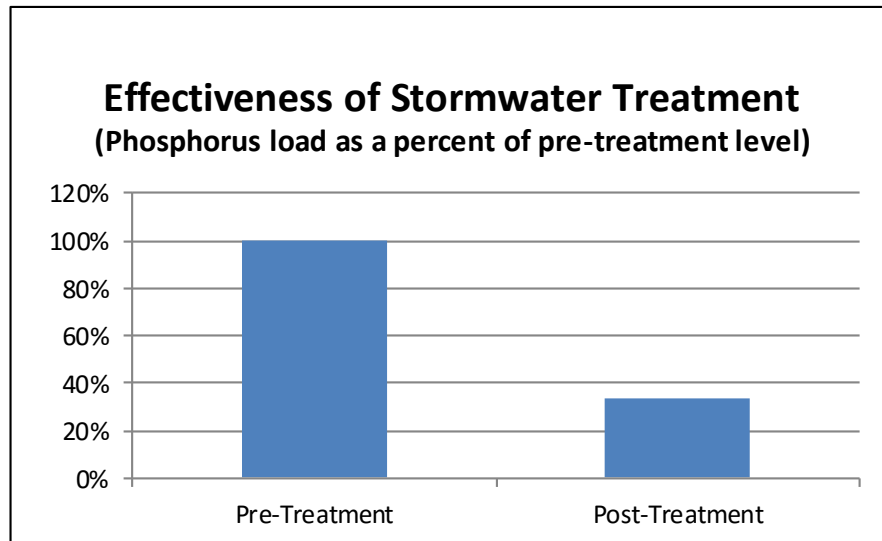
Stormwater Management

Stormwater Runoff from Existing Developed Lands Rice Brook, Sugarbush Ski Resort

- Reduced annual phosphorus and sediment concentrations by nearly 30%
- Restored Water Quality Standards



Stormwater Treatment Pond

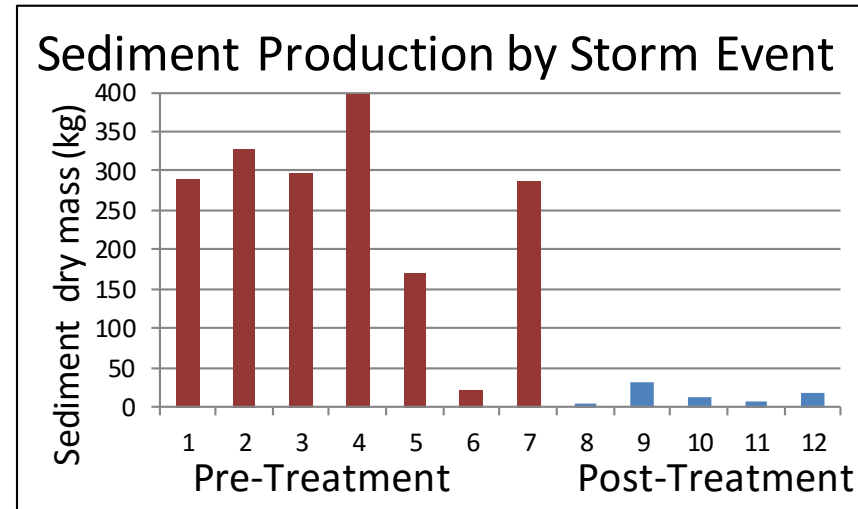


Stream Health

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)



Eroding roadside ditch



Wemple,
2013

Ditch stabilization saves road and reduces erosion

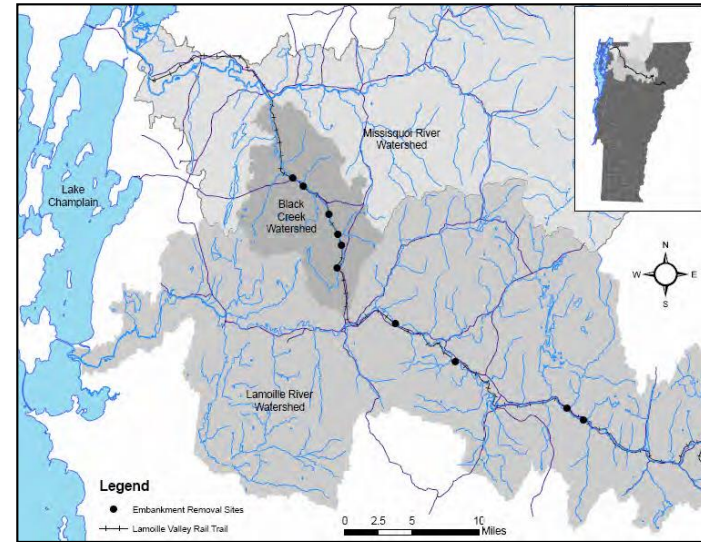
Rivers Channel Stability

Floodplain Restoration Lamoille River, Black Creek Franklin County

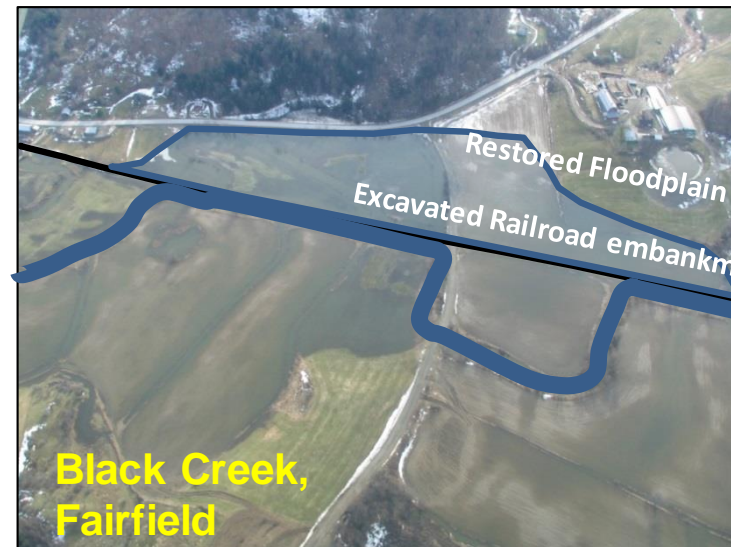
- Reconnected 200 acres of floodplain
- Monitored 3 of the 11 sites (21 acres)
- 3 sites captured 1.3 metric tons of total phosphorus
- Estimated cost for levee removal = \$50,000/mile



3/3/2017 Removal of elevated railroad embankment



11 Floodplain Restoration Sites



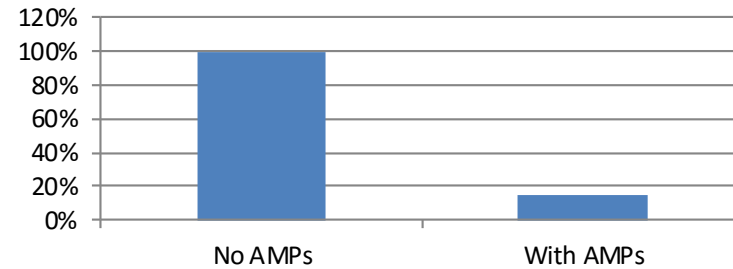
Restored floodplain

Forest Management

Acceptable Management Practices (AMPs)

- Can reduce phosphorus loading by 85%
- 60% of VT forests are subject to AMP compliance or equivalent, as required under Current Use Program and public land management practices
- Estimated project cost = \$3,000 (per crossing)

Effectiveness of Forestry Practices
(Phosphorus load as a percent of load from watersheds logged without AMPs applied)



Edwards, Williard, 2010



IMPACT

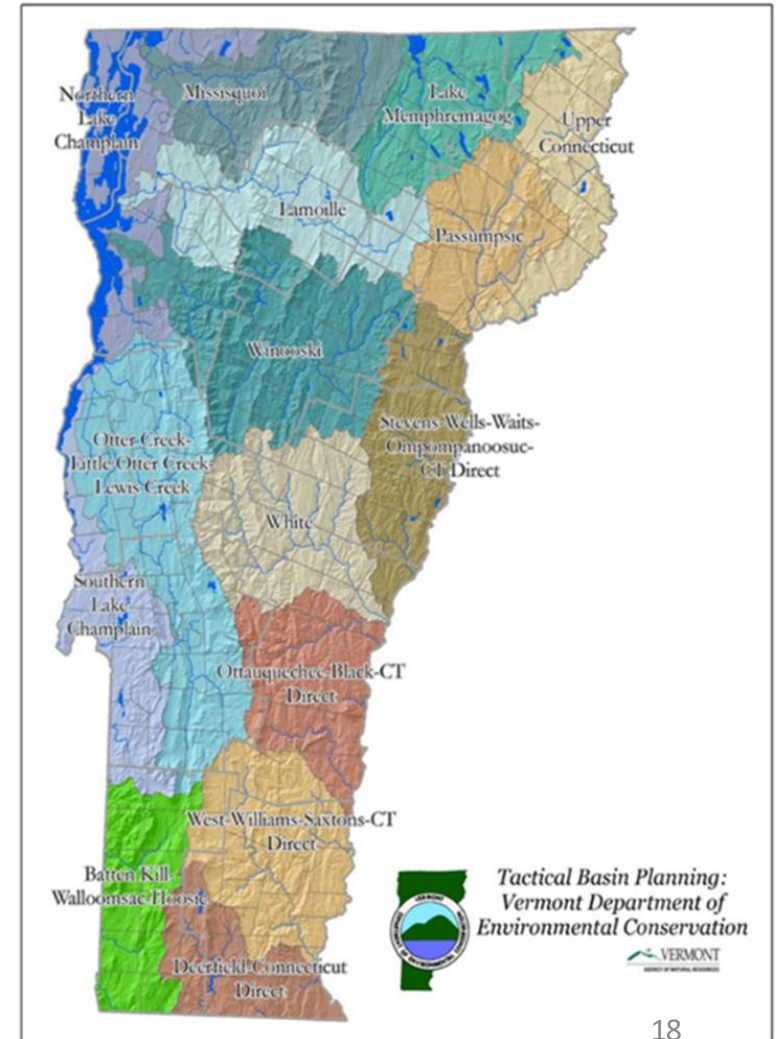


TREATMENT

Temporary skidder bridge

Developing the projects necessary to implement Act 64

- Tactical Basin Planning is Vermont's approach to targeting funding to highest priority projects, across sectors.
- Basin Planning is a prescribed process involving many stakeholders, and different types of information gathering.
- Outcomes of basin plans are twofold
 - Protect the best
 - Restore the rest



Tactical Basin Planning- Sector-specific assessments:

Water Quality Monitoring

Year	Location	Parameter	Value	Standard	Notes
2014	Green River	Temperature	15.5	16.0	Good
2014	Green River	Dissolved Oxygen	8.5	8.0	Good
2014	Green River	pH	7.5	7.0-8.5	Good
2014	Green River	Turbidity	1.5	2.0	Good
2014	Green River	Total Suspended Solids	15	20	Good
2014	Green River	Total Phosphorus	0.05	0.10	Good
2014	Green River	Total Nitrogen	0.5	1.0	Good
2014	Green River	Ammonia Nitrogen	0.1	0.2	Good
2014	Green River	Nitrate Nitrogen	1.0	1.0	Good
2014	Green River	Chlorophyll a	1.0	2.0	Good
2014	Green River	Secchi Disk	1.0	1.0	Good
2014	Green River	Water Temperature	15.5	16.0	Good
2014	Green River	Dissolved Oxygen	8.5	8.0	Good
2014	Green River	pH	7.5	7.0-8.5	Good
2014	Green River	Turbidity	1.5	2.0	Good
2014	Green River	Total Suspended Solids	15	20	Good
2014	Green River	Total Phosphorus	0.05	0.10	Good
2014	Green River	Total Nitrogen	0.5	1.0	Good
2014	Green River	Ammonia Nitrogen	0.1	0.2	Good
2014	Green River	Nitrate Nitrogen	1.0	1.0	Good
2014	Green River	Chlorophyll a	1.0	2.0	Good
2014	Green River	Secchi Disk	1.0	1.0	Good

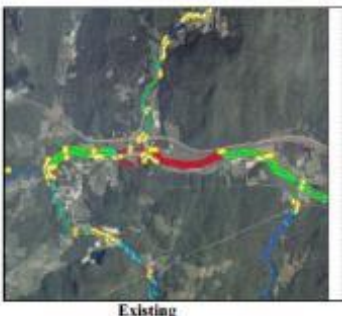
Road Inventory for Road Projects



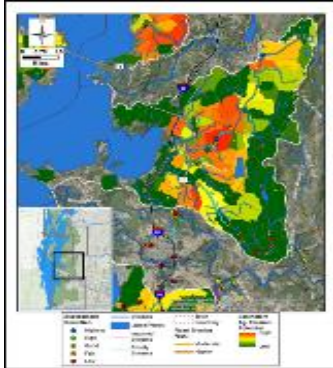
Stormwater Inventory for Projects



Stream Geomorphic Condition



Agricultural Project Assessments



Town Zoning and Corridor Protection

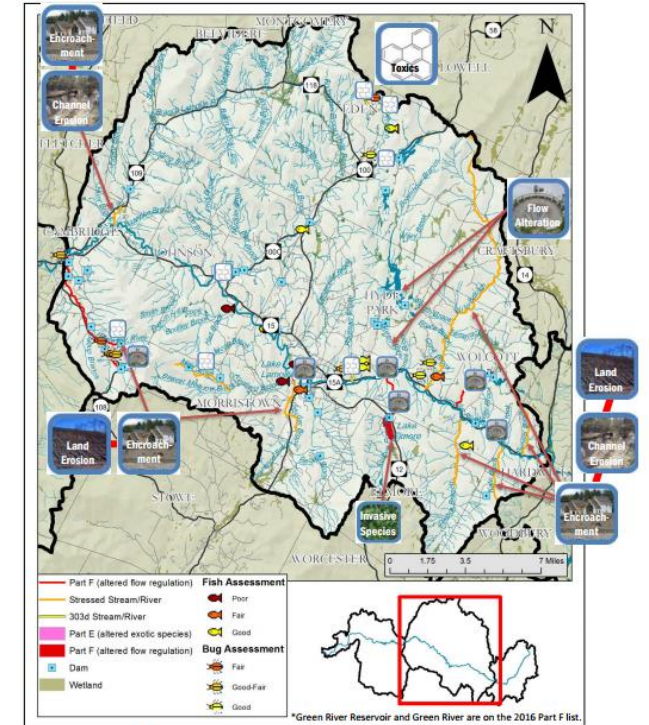


Figure 5. Middle Lamoille basin priority surface waters and related water quality stressors.

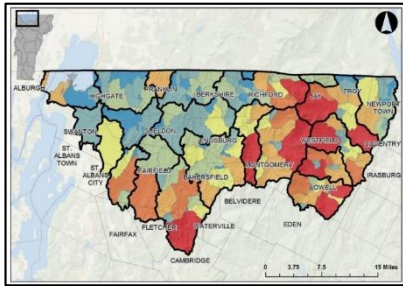
In-water testing

Sector-specific field surveys

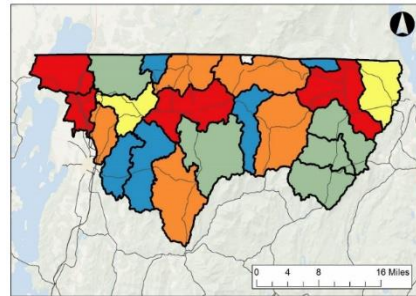
Pinpointed problems
Project opportunities

Tactical Basin Planning - Modeling sector-specific reductions.

Forests



State roads/facilities



“MS4” communities

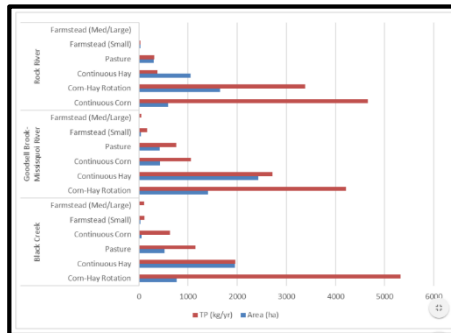
represents portions of the municipality that drain to the Lamolite basin.

MS4 Municipality	Paved road (excluding Vtrans managed roads) (kg/yr)	Unpaved roads (kg/yr)	Other developed lands (kg/yr)
Essex	30	37	260
Milton	181	18	373

Three-acre parcels

Town	Parcels (#)	Impervious (acres)
Eden	1	0.1
Highgate	8	75.5
Jay	4	74.0
Lowell	2	22.0
Montgomery	2	15.8
Richford	4	25.6
Swanton	8	38.1
Troy	1	3.6
Total	30	254.7

Agriculture



Local roads

Town	Paved Roads (kg/yr)	Unpaved Roads (kg/yr)	Town	Paved Roads (kg/yr)	Unpaved Roads (kg/yr)
Bakersfield	332.5	263.4	Jay	249.5	70.1
Belvidere	---	---	Lowell	316.6	67.4
Berkshire	291.5	144.4	Montgomery	302.7	119.3
Cambridge	108.4	53.3	Newport	256.2	104.4
Eden	4.7	---	Richford	280.3	81.0
Enosburgh	357.8	177.4	Sheldon	240.9	56.7
Fairfax	0.1	---	St. Albans	87.1	43.5
Fairfield	398.4	232.5	Swanton	398.6	27.0
Fletcher	11.0	10.6	Troy	210.2	58.1
Franklin	247.8	59.4	Westfield	196.7	43.9
Highgate	402.9	66.4			
Total loading from all roads (kg/yr)	6374				
Total reduction based on overall		2180			

Wastewater treatment facilities

Facility (permit ID)	Permit expiration date	Planned permit re-issuance year	Design flow MGD	WQC 7Q10 /LMM	Current permitted load (mt P/yr)	TMDL WLA (mt P/yr)	2015 flow (MGD) / Percent of Design flow	Treatment type	# of CDOs	Receiving water
Fairfax (D-1194)	9/30/10	2017-18	0.078	0.001/0.001	0.539	0.539	0.033 / 42%	Aerated lagoon	0	Lamolle River
Jeffersonville (D-1323)	3/31/10	2017-18	0.077	0.001/0.001	0.532	0.532	0.036 / 47%	Aerated lagoon	0	Lamolle River
Johnson (D-1149)	3/31/09	2017-18	0.270	0.029/0.012	0.224	0.224	0.120 / 44%	Sequential batch reactor	0	Gihon River
Morrisville (D-1155)	12/31/13	2017-18	0.550	0.018/0.007	0.352	0.352	0.221 / 40%	Sequential batch reactor	0	Lamolle River
Milton (D-1203)	12/31/10	2017-18	1.000	0.010/0.004	0.829	0.829	0.245 / 25%	Sequential batch reactor	0	Lamolle River
Hardwick (D-1143)	12/31/09	2017-18	0.371	0.023/0.009	0.410	0.410	0.220 / 59%	Aerated lagoon	0	Lamolle River
PBM Nutritionals (D-1209)	6/30/12	2017-18	0.425	NA	0.352	0.352	0.125 / 29%	Activated Sludge upgrade to Movable Bed Bio Reactor	0	Lamolle River

- Each tactical basin plan identifies estimated load reduction for each regulated sector.
- These estimates are expressed at appropriate geographic scales.
- “Critical Catchment maps” for each regulated sector
- Valuable planning and communication tool.

The Role of the Community



- ✓ Identify water quality issues – what did we miss?
- ✓ Formulate a collaborative approach – who should provide input?
- ✓ Identify partners to install a water quality improvements.

Tactical basin planning: Projects Database

WDP

Projects

Name Status Grant Number

Project Type County Project ID

Basin Plan Town

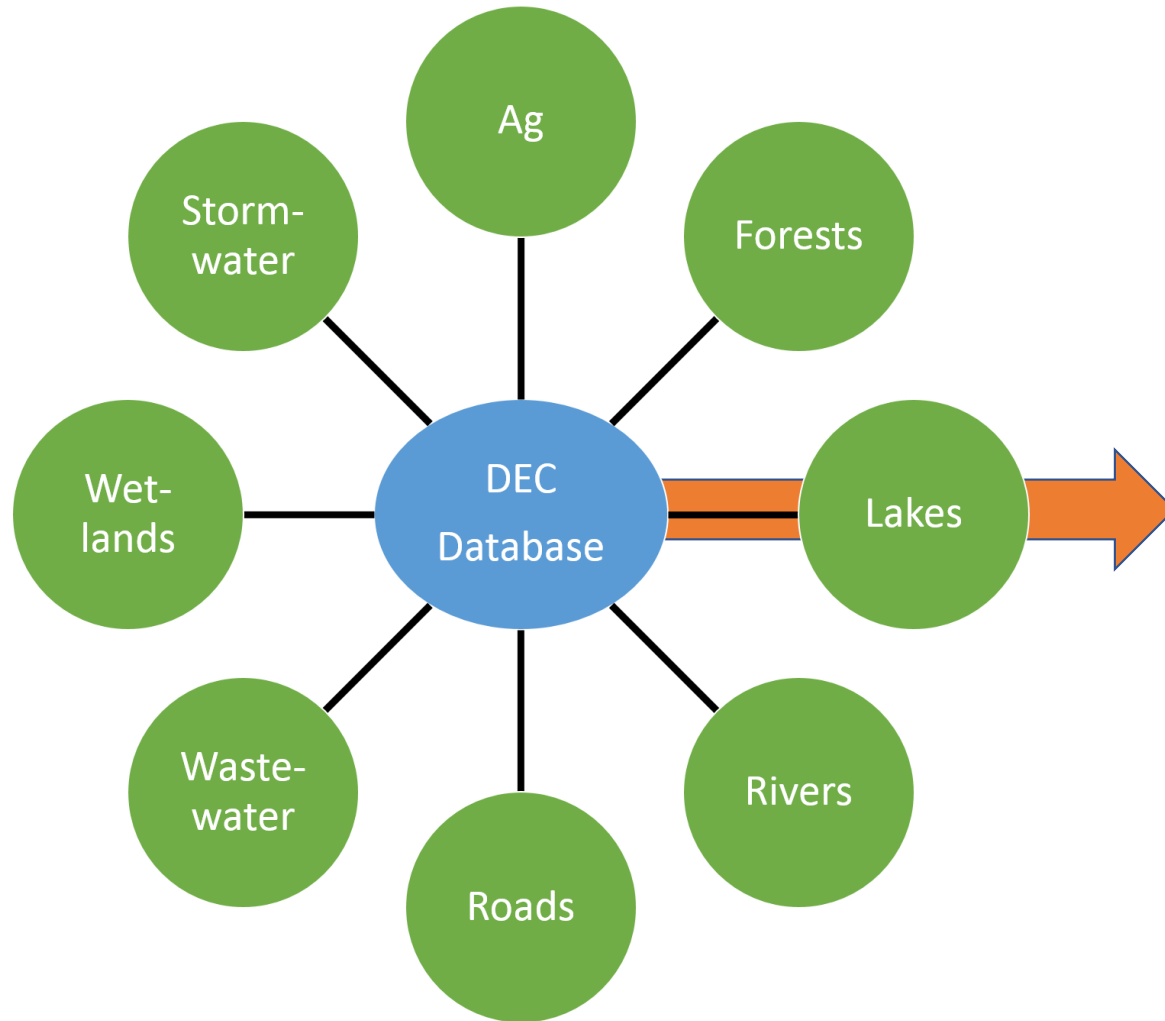
Grade Type Grade

		ID	Project Name	Project Type	Status	Grant Number(s)
Edit	View	18	Kedron Brook Agricultural Nutrient Management Planning and Flood Resiliency	Agricultural Pollution Prevention	Design Funded	2016-ERP-1-23
Edit	View	19	Enhancing Nutrient Management Plan Implementation with goCrop Software	Agricultural Pollution Prevention	Scoping Completed	2016-ERP-2-10
Edit	View	22	Agricultural Best Management Practice Implementation is South Lake Champlain and Beyond	Agricultural Pollution Prevention	Implementation Funded	2016-ERP-2-07
Edit	View	46	Crooked Creek Gully Restoration Designs	Agricultural Pollution Prevention	Design Completed	Contract-28911
Edit	View	53	Agricultural BMP Project Identification in Critical Source Areas of Hungerford Brook	Agricultural Pollution Prevention	Scoping Completed	2015-ERP-1-17
Edit	View	67	Implementing Precision Agriculture Tech to Improve Application and Minimize Nutrient Loss of Manure	Agricultural Pollution Prevention	Completed	2015-ERP-2-16
Edit	View	68	Equine Manure Runoff Management Program	Agricultural Pollution Prevention	Implementation Completed	2015-ERP-2-10
Edit	View	72	Agricultural Runoff Mitigation Project on a tributary to Beaver Brook	Agricultural Pollution Prevention	Implementation Funded	2015-ERP-2-02
Edit	View	73	Agricultural Water Quality BMP Implementation Project	Agricultural Pollution Prevention	Implementation Funded	2015-ERP-2-24
Edit	View	154	Crooked Creek Gully Restoration	Agricultural Pollution Prevention	Implementation Funded	Contract-31018
Edit	View	233	Implementation of Farmland Treatment Solutions around Lake Carmi	Agricultural Pollution Prevention	Implementation Completed	2014-ERP-2-24
Edit	View	234	Implementation of Farmland Treatment Solutions along the Missisquoi River	Agricultural Pollution Prevention	Implementation Completed	2014-ERP-2-23
Edit	View	294	Potential Agricultural BMP Sites, Seymour River area	Agricultural Pollution Prevention	Scoping Completed	
Edit	View	1151	Browns River Corridor Plan #6 Westford pasture project	Agricultural Pollution Prevention	Not Graded	
Edit	View	1198	Browns River Corridor Plan Jericho fence project #31	Agricultural Pollution Prevention	Not Graded	
Edit	View	1314	Lamoille River SGA Greensboro buffer project	Agricultural Pollution Prevention	Not Graded	
Edit	View	1337	Upper Lamoille Agricultural Mapping for Cover Crops and Conservation Tillage	Agricultural Pollution Prevention	Not Graded	
Edit	View	1368	NRCS watershed planning for Pike River	Agricultural Pollution Prevention	Not Graded	
Edit	View	1371	agricultural pollution prevention projects with 31 agricultural producers	Agricultural Pollution Prevention	Not Graded	
Edit	View	1382	BC-05 (Shenang Rd, just north of Rt.36 junction) animal exclusion	Agricultural Pollution Prevention	Not Graded	
Edit	View	1384	EB-01 (Lost Nation Rd just west of Taylor Rd junction) animal exclusion project	Agricultural Pollution Prevention	Not Graded	
Edit	View	1390	Wanzer Brook WB-01 (Dodd Rd just south of Chester A Arthur Rd junction)	Agricultural Pollution Prevention	Not Graded	
Edit	View	1462	Swanton M06 - animal exclusion13 (18)	Agricultural Pollution Prevention	Not Graded	
Edit	View	1464	Swanton M09A - animal exclusion, Agricultural Pollution prevention19 (21)	Agricultural Pollution Prevention	Not Graded	
Edit	View	1466	Swanton M3T1.01B animal exclusion, Agricultural Pollution prevention17 (22)	Agricultural Pollution Prevention	Not Graded	
Edit	View	1468	Swanton M3T1.02 - Agricultural Pollution prevention18 (23)	Agricultural Pollution Prevention	Not Graded	
Edit	View	1470	Swanton M3T1.04B - animal exclusion - river, Agricultural Pollution prevention14 (25)	Agricultural Pollution Prevention	Not Graded	

- Online Projects and Tracking
- Projects are prioritized with partner input (RPCs, NRCDs).
- Database summaries are publicly available at appropriate scale.
- Ready projects meeting key criteria become the highest priority for funding.
- Tracking of practices to produce pollution reduction estimates

<https://anrweb.vt.gov/DEC/IWIS/ARK/ProjectSearch.aspx>

Work across Agencies to Track the State's Progress



Clean Water Investment & Performance Report

Financial Outcomes

Social Outcomes

Performance Outcomes

Environmental Outcomes

Tracking Clean Water Restoration Activities

VERMONT CLEAN WATER INITIATIVE 2016 INVESTMENT REPORT



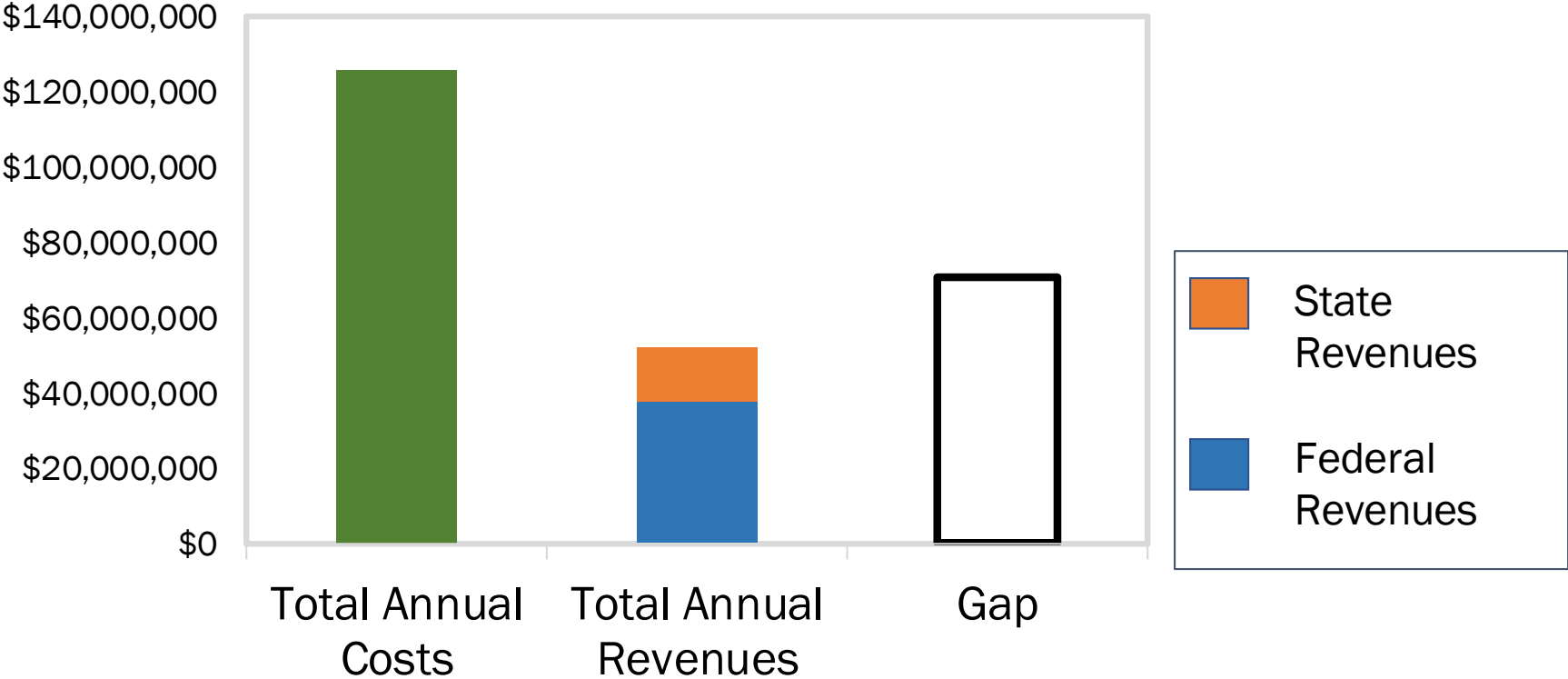
Agency of Administration
Agency of Agriculture, Food and Markets
Agency of Commerce and Community Development
Agency of Natural Resources
Agency of Transportation

Funding for project implementation comes from many sources



... but current spending does not address full need → funding gap

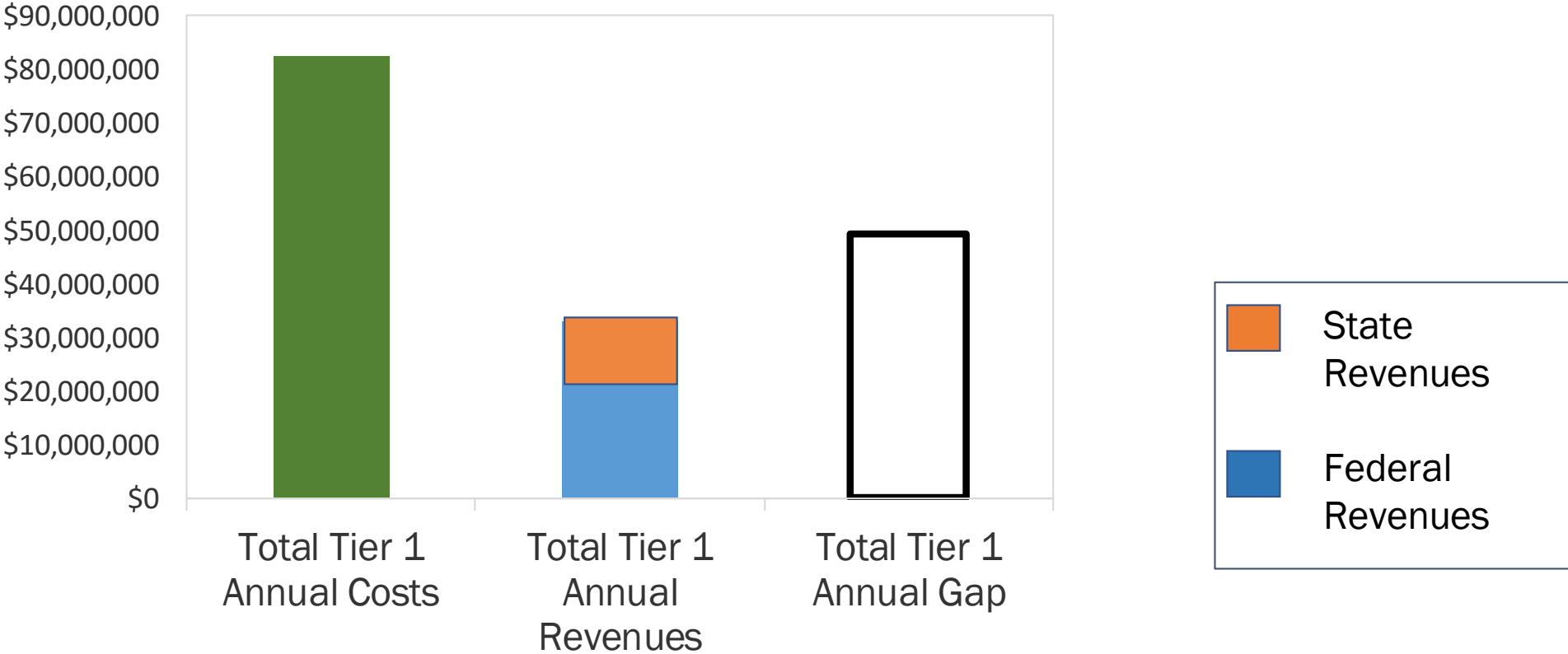
Vermont Total Annualized Clean Water Costs, Revenues and Funding Gap*



Annual Costs = \$116M, Annual Revenues = \$52.4M, Annual Gap = \$63.3M

* Includes Public and Private Costs Statewide

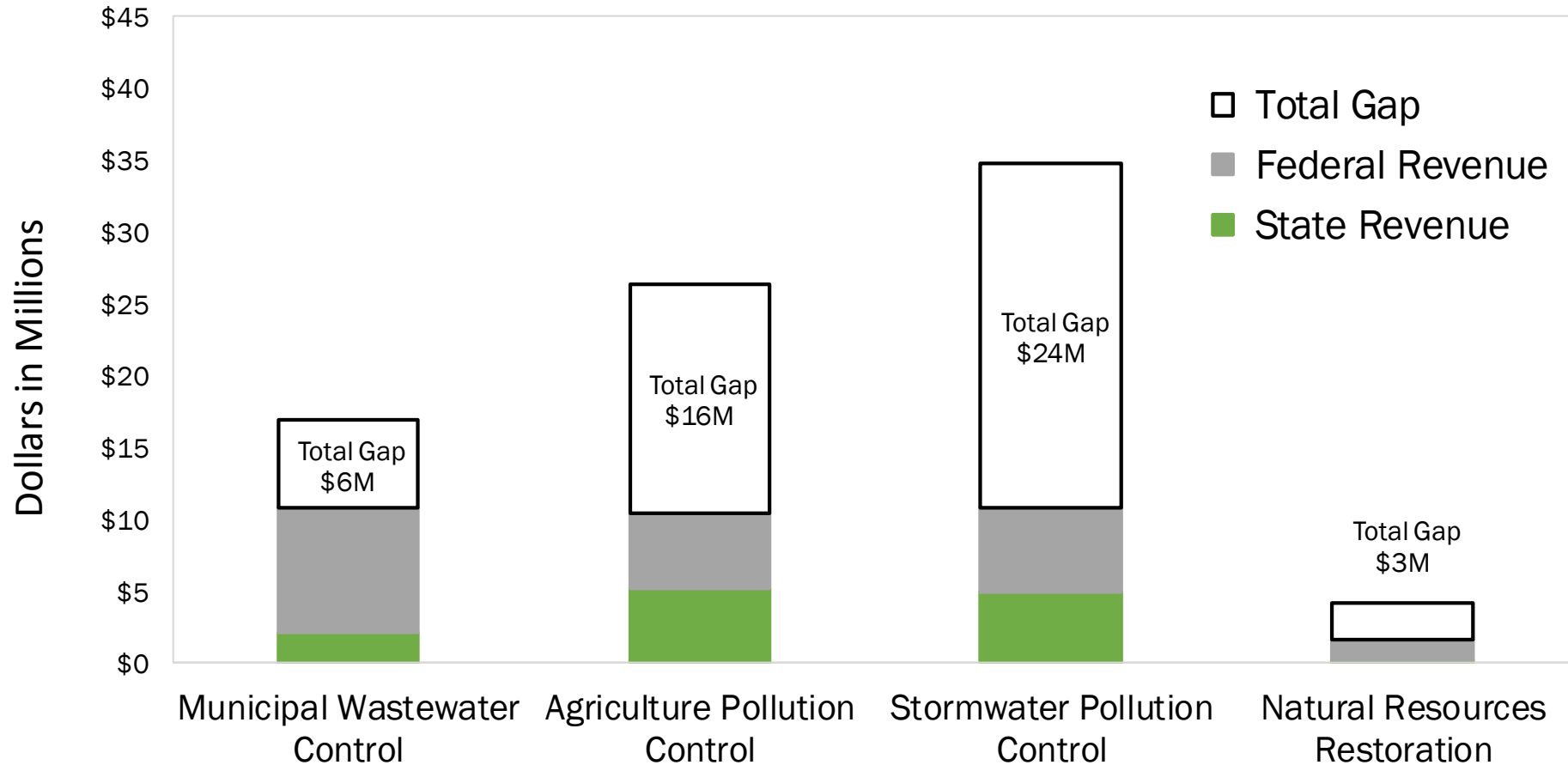
Vermont Tier 1 Annualized Clean Water Costs, State and Federal Revenues and Funding Gap*



Tier 1 Annual Costs = \$82M, Tier 1 Annual Revenues = \$32M, Tier 1 Annual Gap = \$49M

* Tier 1 Defined as: Incremental costs associated with TMDLs, Act 64 (2015) and CSO Policy (2016); includes public and private costs statewide

Vermont Total Annualized “Tier 1” Clean Water Costs, Revenues, and Funding Gap, by Sector*



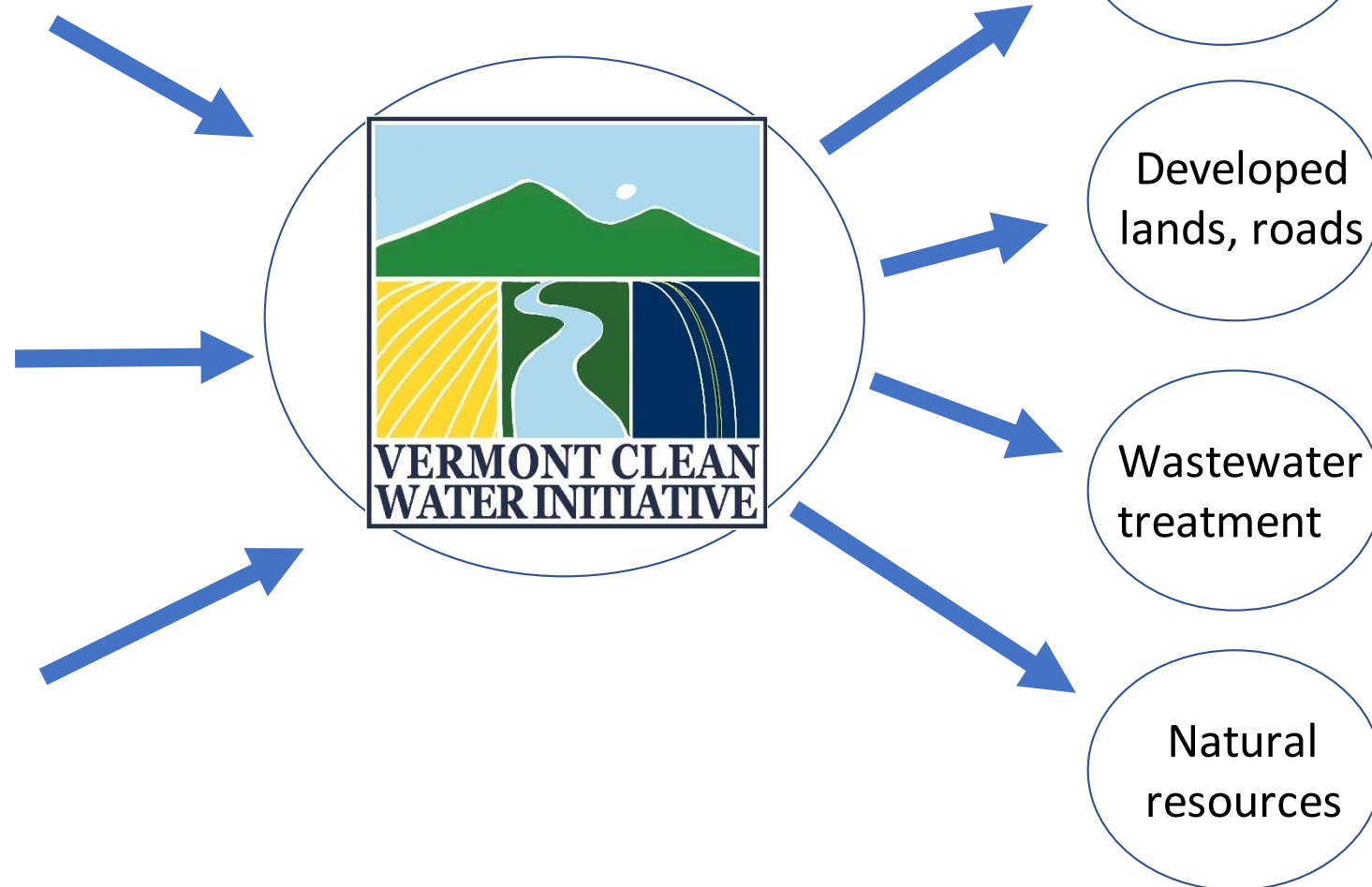
Annual Tier 1 Costs = \$82M, Annual Revenues = \$32M, Annual Gap = \$49M

* Tier 1 Defined as: Incremental costs associated with TMDLs, Act 64 (2015) and CSO Policy (2016); includes public and private costs statewide

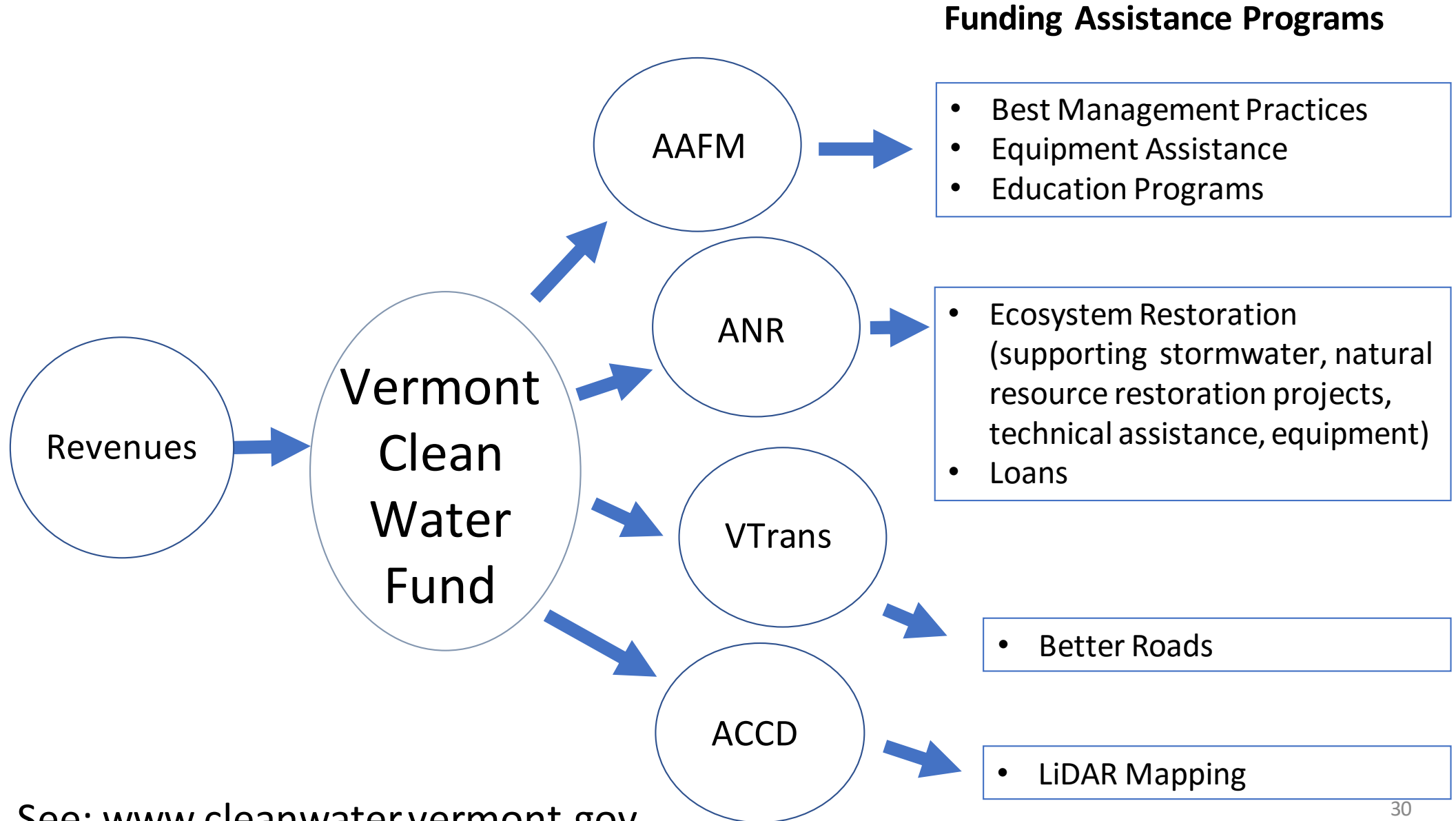
Revenue Sources



Revenue Sources that Support Vermont's Clean Water Needs



Vermont's Clean Water Fund



Proposed State Clean Water Funding, SFY2018*

State Agency to Manage Pass-Through Funds	Funding Source	FY18 Proposed Budget	FY18 Recommended Adjustment	FY18 Total Recommended Budget
Agency of Natural Resources	Clean Water Fund	\$2.09M		\$2.09M
	Capital Bill	\$12.0M	\$7.2M	\$8.7M
Agency of Transportation	Clean Water Fund	\$1.1M		\$1.1M
	Capital Bill		\$1.0M	\$1.0M
	Transportation Fund	\$0.4M		\$0.4M
	Federal (Fed. Highway Admin.)	\$6.3M		\$6.3M
Agency of Agriculture, Food & Markets	Clean Water Fund	\$0.85M		\$0.85M
	Capital Bill	--	\$2.25M	\$2.25M
Agency of Commerce & Community Development	Clean Water Fund	\$0.46M		\$0.46M
Not Yet Allocated	Clean Water Fund (10%) Reserve	\$0.5M		\$0.5M
TOTAL		\$23.7M	\$23.7M	\$23.7M



* State Proposed 2-Year Budget (for FY18 & FY19) = \$50M

An aerial photograph of a Vermont landscape. In the foreground, a large, dark blue lake is visible. A road with a bridge crosses the lake. The middle ground shows green fields and a small cluster of buildings. In the background, more green fields and a large body of water are visible under a clear sky.

Websites:

Tactical Basin Planning

[dec.vermont.gov/watershed/map/
basin-planning](https://dec.vermont.gov/watershed/map/basin-planning)

Vermont Clean Water Initiative

cleanwater.vermont.gov/

Extra Slides

Vermont's Plan of Action – Act 64 and the Phase I Plan

- Enhance agricultural water quality rules-Required Agricultural Practices, RAPs
- Develop a stormwater permit for state highways
- Develop a stormwater permit for town roads
- Require additional stormwater treatment for more densely developed areas
- Improve rules for managing rivers and floodplains
- Enhance water quality rules for logging-Accepted Management Practices, AMPs
- Establish a new Clean Water Fund
- Develop implementation plans, tracking system and annual report

VERMONT LAKE CHAMPLAIN
PHOSPHORUS TMDL PHASE 1
IMPLEMENTATION PLAN

SEPTEMBER 15, 2016

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



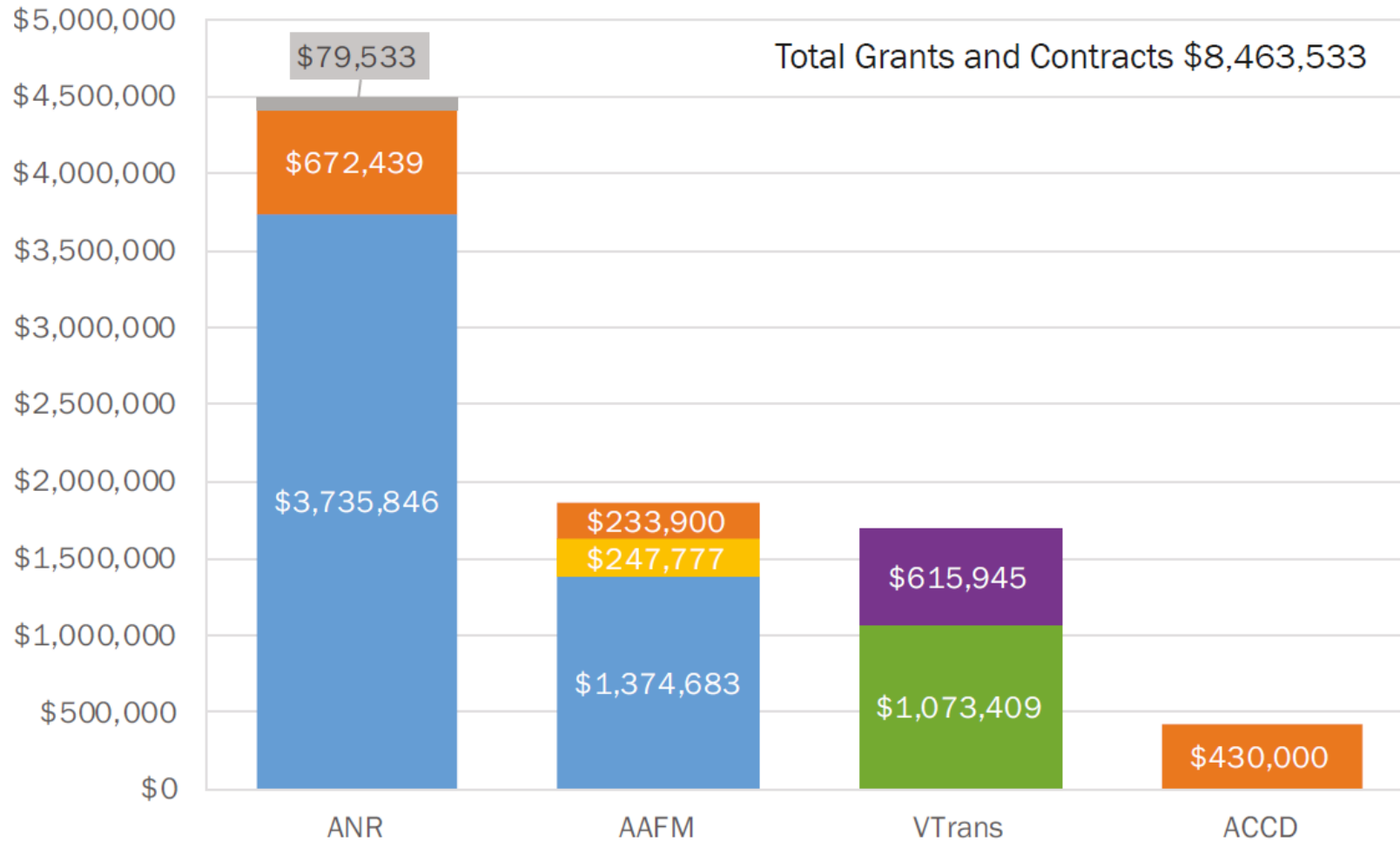
We're All In!

The Vermont Clean Water Act (Act 64, 2015)





Investments by Agency and Fund



- Capital Fund
- Clean Water Fund
- Watershed Grant Fund
- General Fund
- Transportation Alternatives Federal Funds
- Transportation Fund