Initial VT Climate Action Plan & Agriculture

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Vermont Agency of Agriculture, Food and Markets
Presentation to: Senate Committee on Agriculture
February 8, 2023

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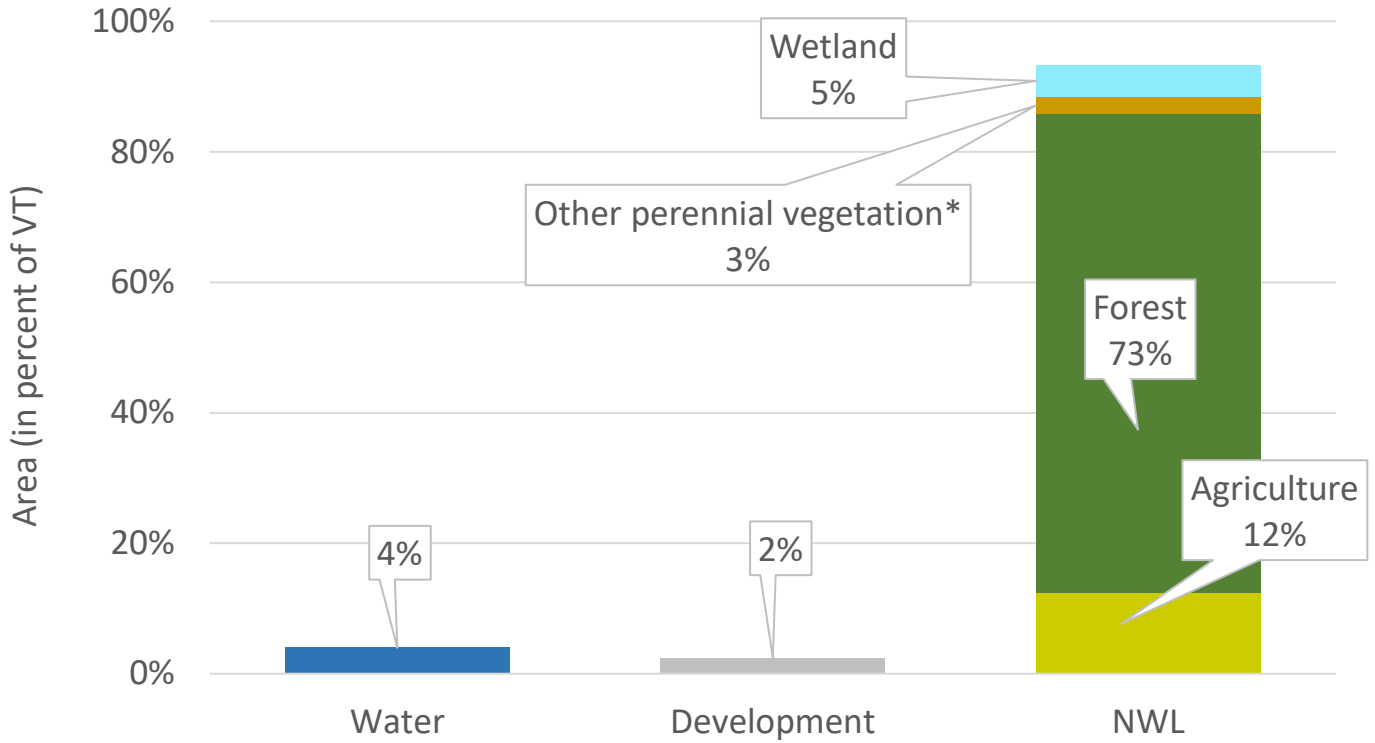
Natural & Working Lands (NWL) cover 94% of Vermont



*Other perennial vegetation includes grasslands, shrub/scrublands, and turf

Data source: 2016 National Land Cover Database; Images courtesy FPR

Ag & Eco Subcommittee Membership & Staff

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*Vermont Climate Councilor

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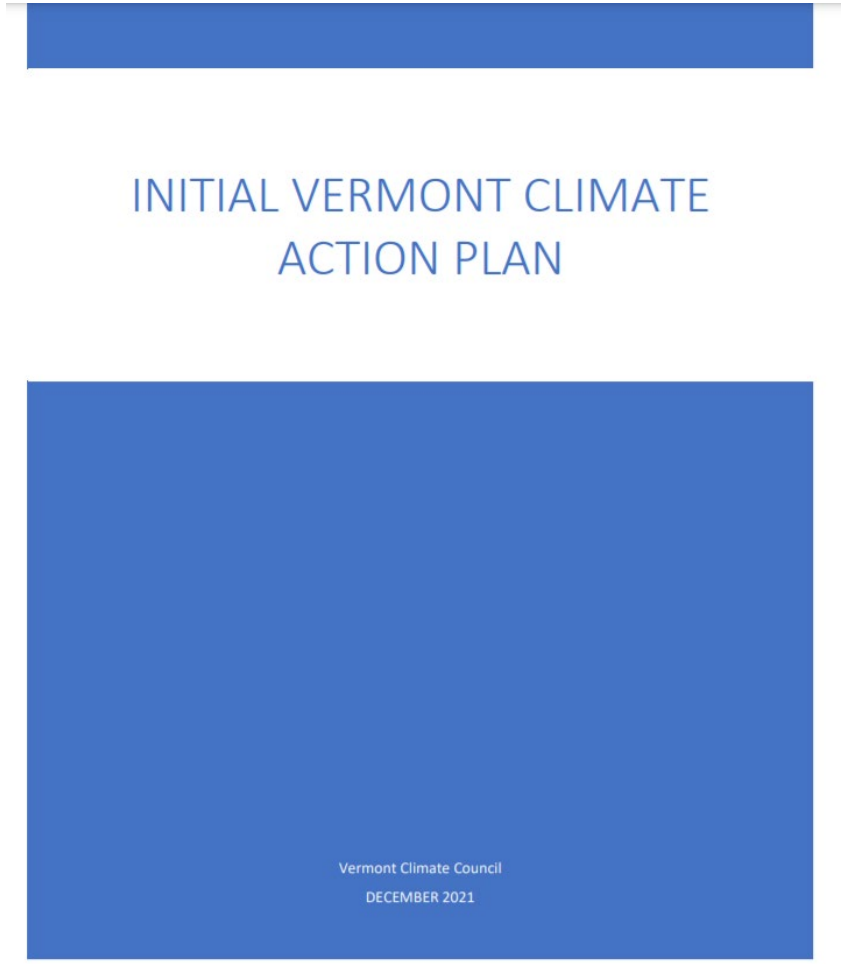
Section 11.4: Agricultural Pathways for Mitigation (19 pages)

Section 13: Pathways for Adaptation and Building Resilience in Natural and Working Lands (38 pages)

Section 14: Pathways for Sequestration and Storing Carbon (13 pages)



Source: https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2021-12/Initial%20Climate%20Action%20Plan%20-%20Final%20-%2012-1-21.pdf#page=213&zoom=100,93,96

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Vermont is Getting Warmer and Wetter: Climate Change Study

The Green Mountain State has warmed nearly 2°F, with a 21% jump in precipitation

Key findings

Climate change is here – and impacting communities across Vermont.

Vermont is getting warmer. Winters are warming more quickly. Snow season is getting shorter.

Vermont is getting wett Heavy rain events happe more often, contributing more flooding and wate quality problems.

Multiple, complex impacts could lead to surprises.

Climate impacts and risks will increase without action.

Dig in to learn more...

Source: The Vermont Climate Assessment 2021. Burlington, Vermont: Gund Institute for Environment at the University of Vermont. On the web: https://vtclimate.org

National and Vermont Climate Impacts

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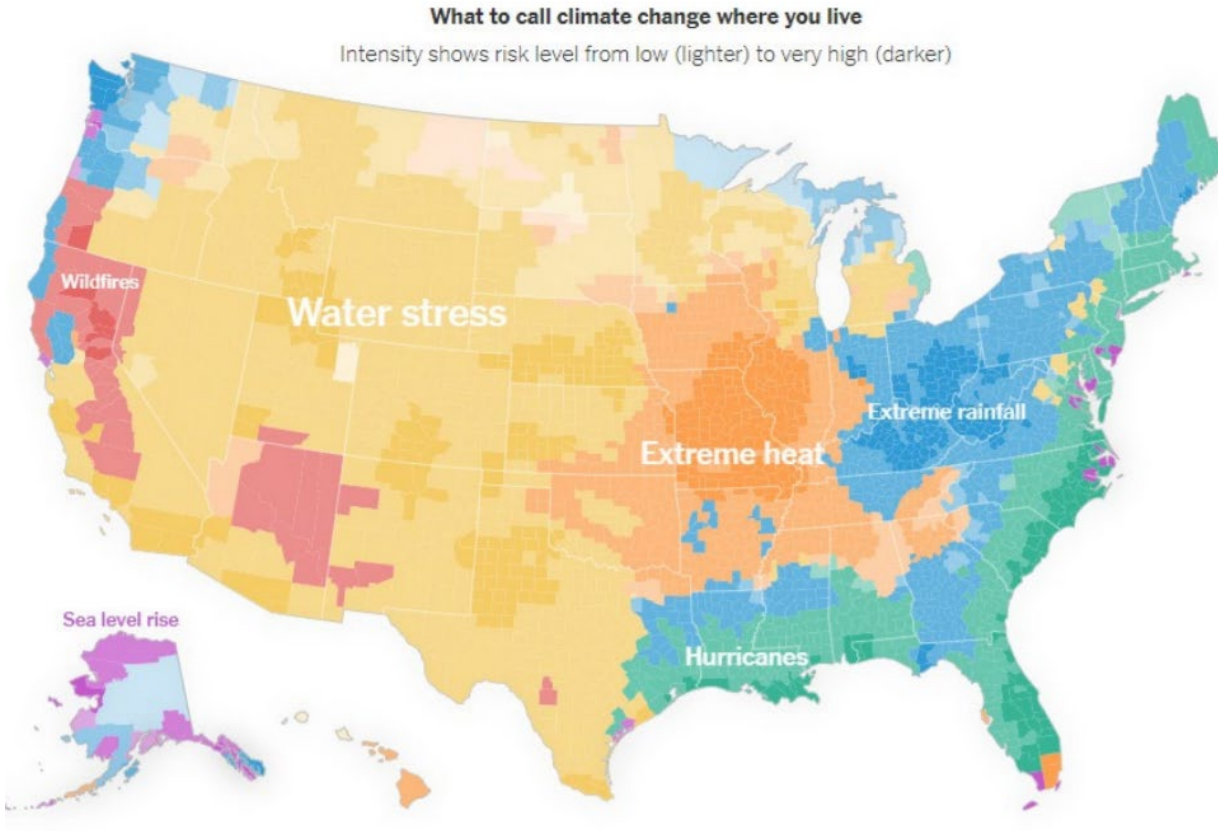

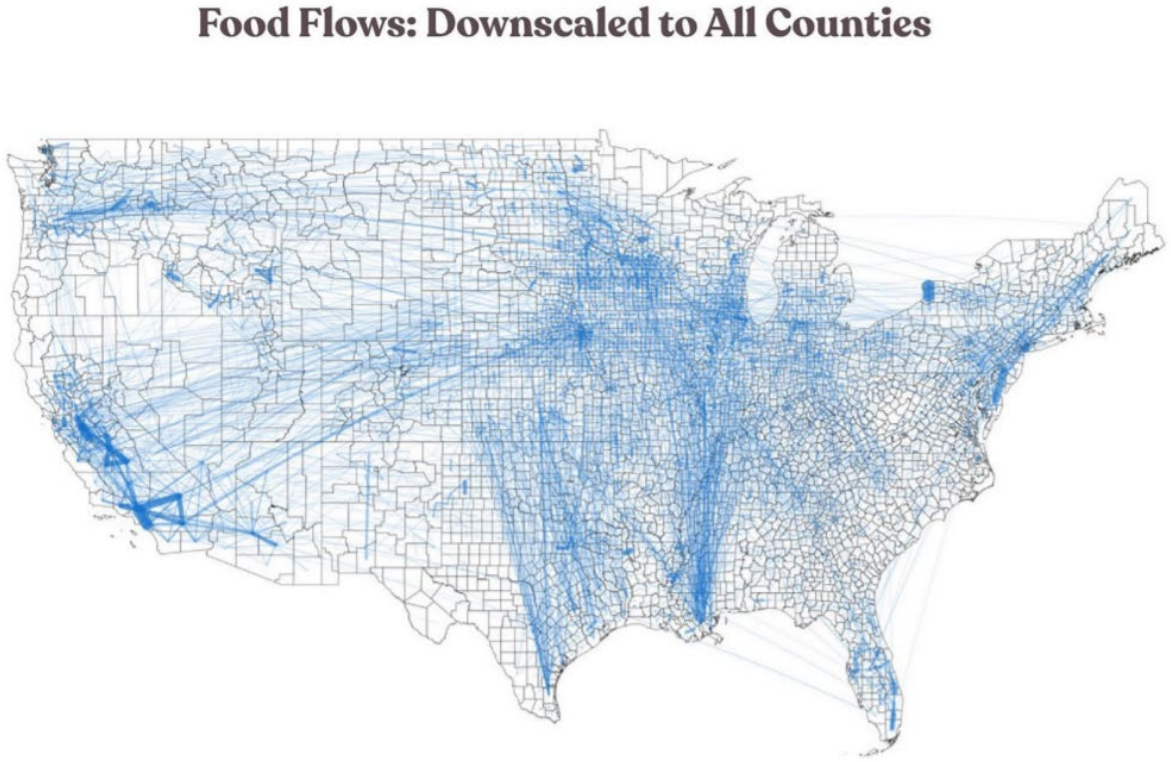

Source: Ellen Kahler, VSJF Presentation to House Agriculture:
https://legislature.vermont.gov/Documents/2022/WorkGroups/House%20Agriculture/Food%20Security/W~Ellen%20Kahler~New%20England%20Feeding%20New%20England-%20Cultivating%20a%20Reliable%20Food%20Supply~1-26-2021.pdf

National and Vermont Climate Impacts

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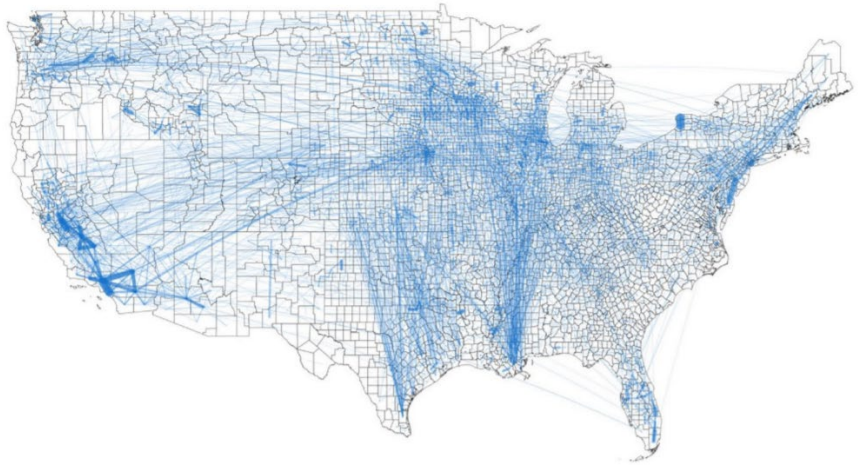
Food Flows: Downscaled to All Counties



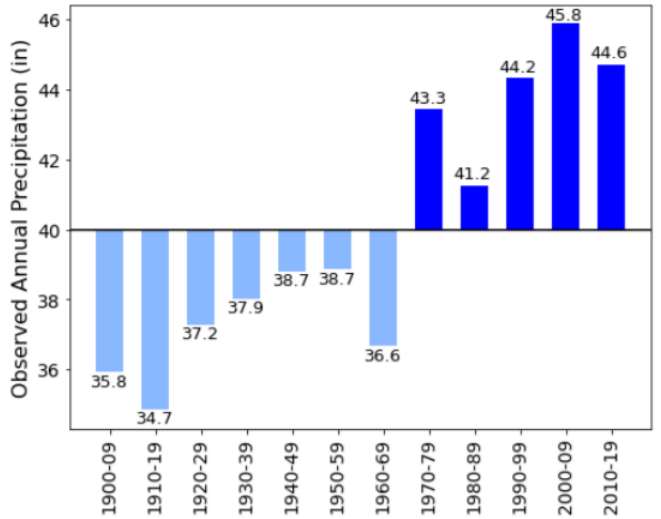


Figure 1-8: Decadal averages of observed annual precipitation in Vermont

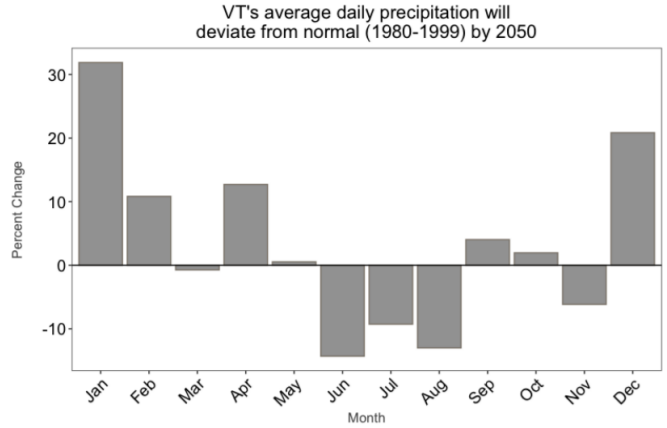


Figure 5-5: Projected daily mean precipitation in 2050 as percent deviation relative to 1980s–1990s shows lower summer growing season precipitation (USGS, 2021a)

Source: The Vermont Climate Assessment 2021. Burlington, Vermont: Gund Institute for Environment at the University of Vermont. On the web: https://vtclimate.org

Importance of Organic Matter & Soil Health

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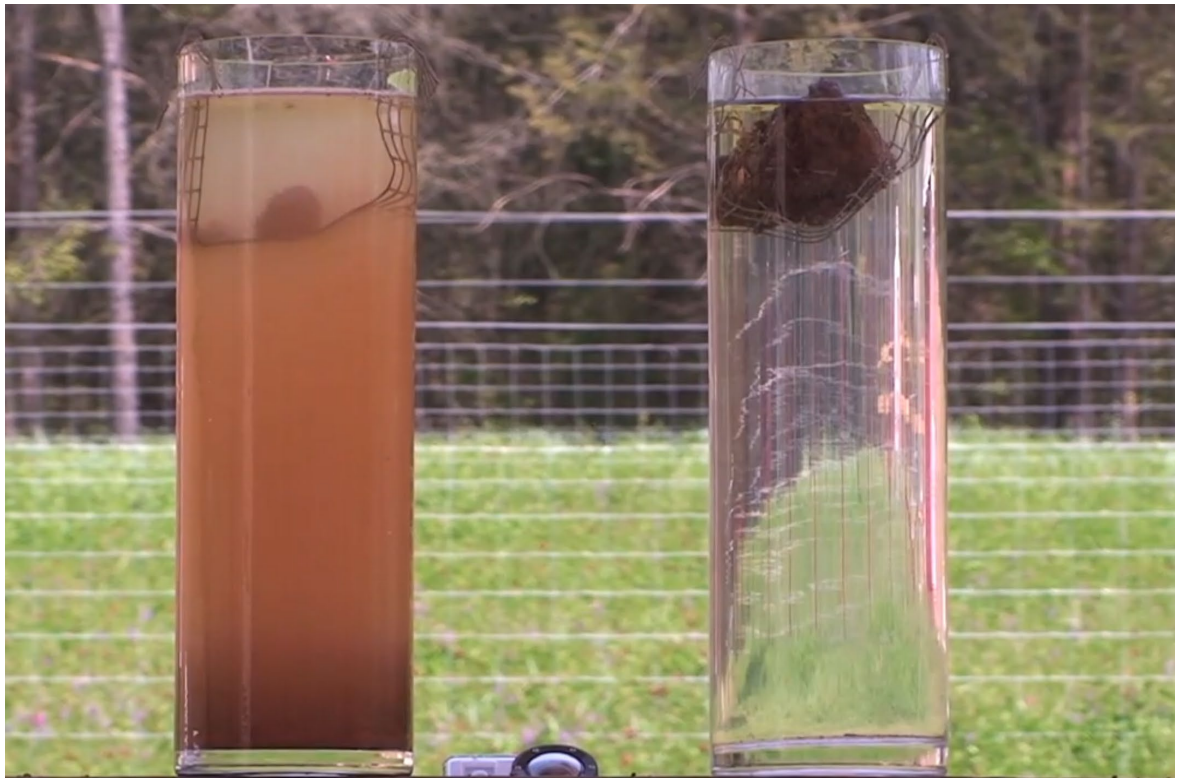

Source: USDA NRCS

Importance of Organic Matter – Mitigation, Adaptation, Resilience

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Source: USDA NRCS
Source: North Dakota State University, Soil Health Minute: Rainfall Simulator; https://youtu.be/Y4pwNIPX4AA

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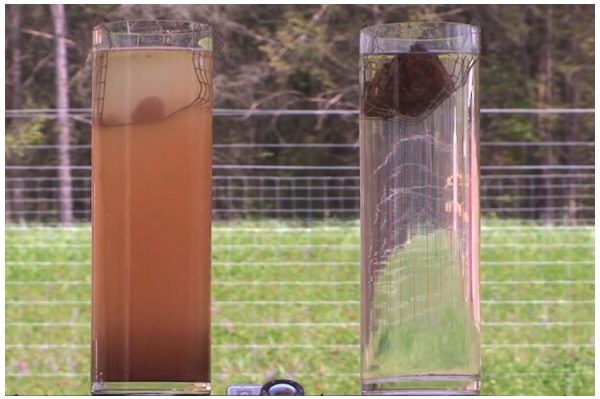
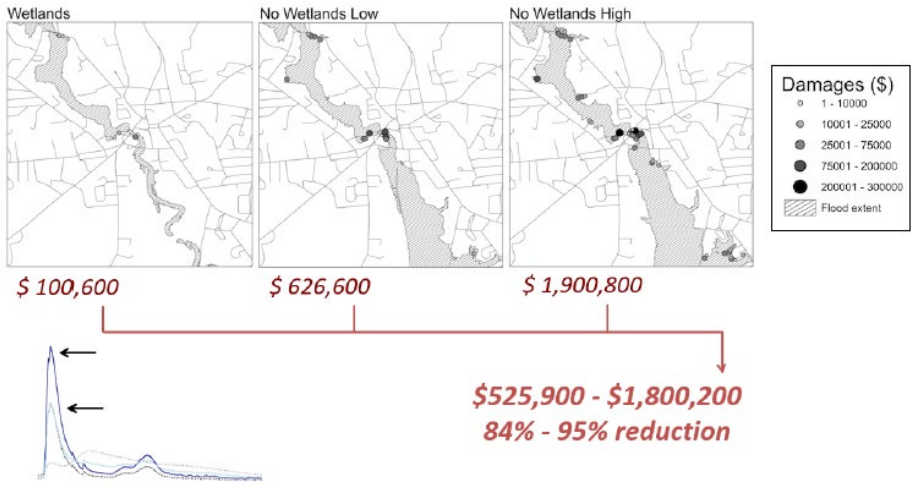


Source: USDA NRCS

Middlebury - economic damages

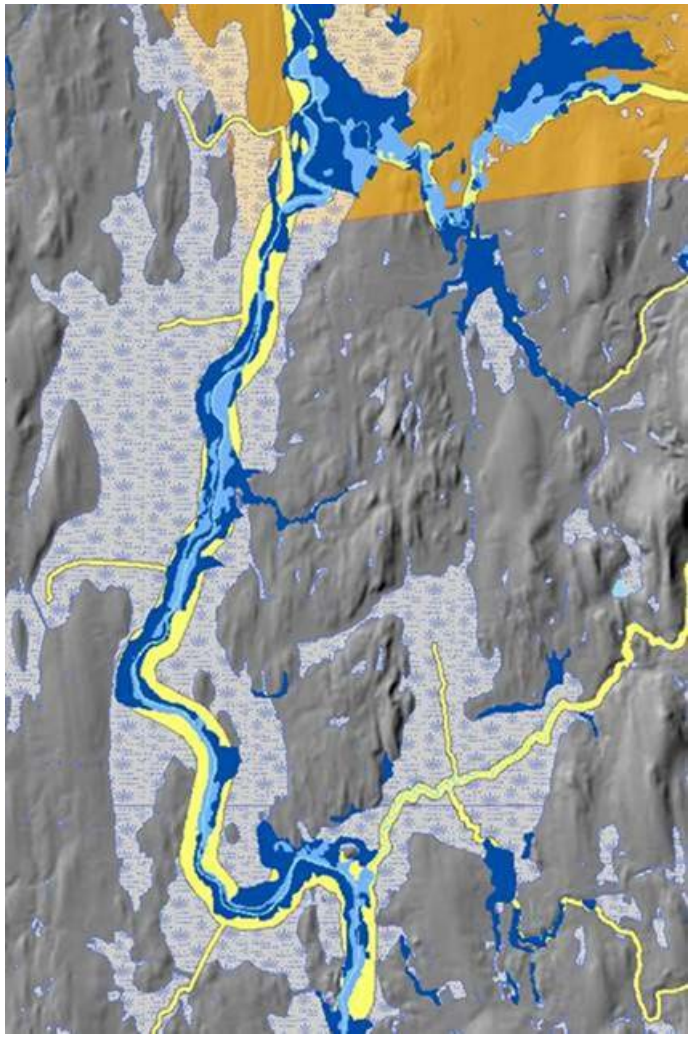


Key findings

•During Tropical Storm Irene in 2011, floodplains and wetlands diminished damages in Middlebury, VT, by 84 to 95 percent – saving potentially as much as $1.8 million in flood damages.

•Middlebury saves an annual average of $126,000 to $450,000 in damages due to the Otter Creek floodplain, which reduced damages by 54 to 78 percent, on average, across 10 flooding events.

Source: Keri Bryan Watson , Gund Institute, UVM



50% of wetlands in the watershed are managed by farms

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Table 2. Soil carbon stocks to 30 cm depth in MT carbon per hectare, collected on Vermont farms in 2021 by the State of Soil Health project.

Field Type	Number of fields	MT Carbon per hectare		
		Min	Mean	Max
Vegetable	17	31.1	65.1	98.6
Field crops	4	75.7	107.7	148.8
Corn	112	33.4	84.1	144.0
Pasture	21	63.4	95.8	170.4
Hay	37	31.3	94.1	164.1
All fields	*191*	*31.1*	*86.1*	*170.4*

Table 4. Long term research trial of corn cropping systems at Borderview Farm documents changes in organic carbon content. Treatments with the same letter did not perform significantly different from each other. ***Bolded treatments were significantly different from continuous corn.***

Corn cropping system	Organic matter % in 2021	Additional annualized change in organic matte over 11 years over continuous corn
Continuous corn	3.29% [c]	~
Corn-hay rotation, year 2	**4.25%** [a]	**0.087%** per year
Corn-hay rotation, year 7	**3.55%** [b]	**0.024%** per year
No till	**3.60%** [b]	**0.028%** per year
No till and cover crop	**3.56%** [b]	**0.025%** per year
Winter cover crop	3.28% [c]	~

Study generated rough estimates of realistic potential for soil carbon sequestration in the top 30 cm (1 foot) of agricultural soils in Vermont: Investments in soil building raising SOM from 4.3% to 6% over 19 Years.

That would sequester an equivalent of 937,494 MT CO2e annually. Annual soil carbon sequestration at that annual rate is the same as the emissions from 200,000 cars.

Source: https://www.uvm.edu/sites/default/files/Northwest-Crops-and-Soils-Program/Articles_and_Factsheets/Soil_carbon_and_sequestration_2022_Research_brief.pdf

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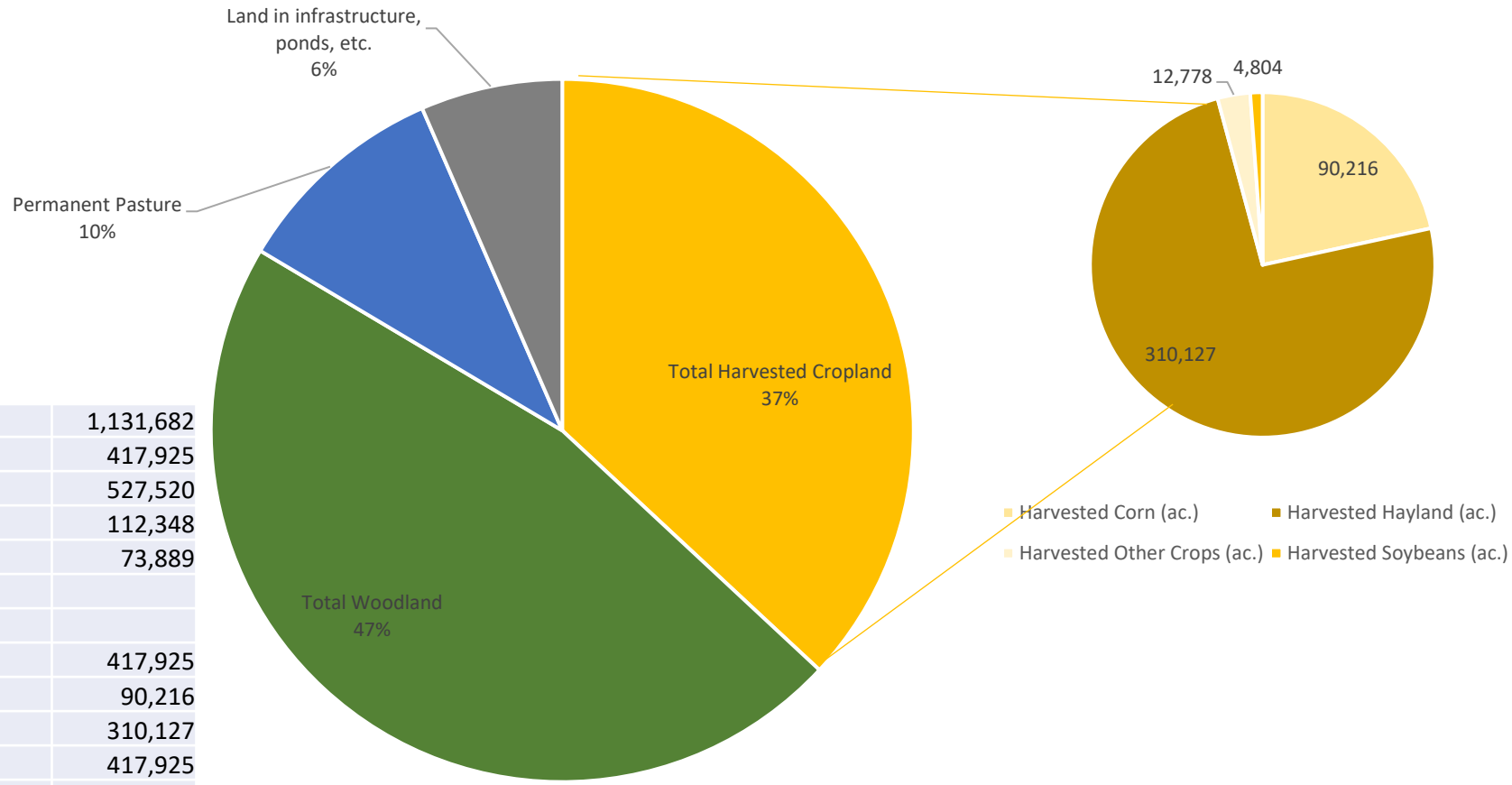
Land managed by farms in Vermont, 2017



Land in Farms	1,131,682
Total Harvested Cropland	417,925
Total Woodland	527,520
Permanent Pasture	112,348
Land in infrastructure, ponds, etc.	73,889
Total Cropland Harvested	417,925
Total Corn in VT	90,216
Total Hayland in VT	310,127
Total Other in VT	417,925
Total Soybeans	4,804

Source: 2017 USDA NASS Ag Census

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Vermont Climate Action Plan & Agriculture

Mitigation

- Reduction of GHG Emissions
- Sequestration and Storage of Carbon in Soils

Resilience

- Farms & Food Production
  - Viability
- Food System
- Watershed & Flood Resilience

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Vermont Climate Action Plan & Agriculture

Mitigation

- Reduction of GHG Emissions
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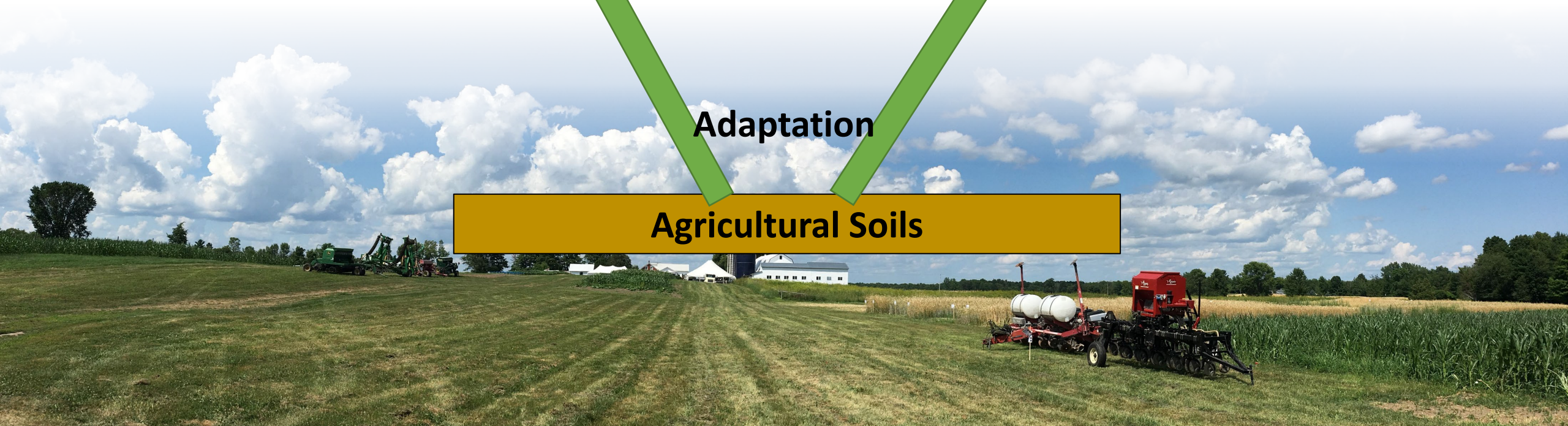
Resilience

- Food Security & Food Systems
- Farms & Food Production
  - Viability
- Watershed & Flood Resilience

Adaptation

Agricultural Soils



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Vermont Climate Action Plan & Agriculture

Mitigation

- Reduction of GHG Emissions
- Sequestration and Storage of Carbon in Soils

Resilience

- Food Security & Food Systems
- Farms & Food Production
  - Viability
- Watershed & Flood Resilience

- Reduces emissions
- Sequesters Carbon

- Improve Drought & Flood Resilience
- Decrease input costs

Adaptation

Agricultural Soils

Cover Crop

Nutrient Management

Conservation Tillage

Conservation Crop Rotation

Residue and Tillage Management, No Till

Pasture and Hay Planting

Precision Agriculture

Prescribed Grazing

Rotational Grazing

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Existing State Programs that address Section 11.4: Agricultural Pathways for Mitigation from Initial Vermont Climate Action Plan	
Recommendation Reference Number: CAP Section 11.4 & Section 14, Strategy 1, Action (a) - (j)	**AAFM Program**
a. Agronomic practice implementation	**FAP**
c. Grazing Management	
b. Expand Capital Equipment Assistance Program	**CEAP**
c. Grazing Implementation	**PSFW**
e. Edge of Field Practices: CREP	**BMP**
h. Methane Capture & Utilization	
d. Agroforestry	**Ag-CWIP**
f. Agricultural Environmental Management Program	
g. Nutrient Management Plan Development and Implementation	
i. Research Manure management for climate	
j. Research Climate feed management	
Section 14 Pathway 2: Viability	**WLEI**

Source: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-i.pdf

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1. Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts of existing state and federal water quality implementation programs as reported through the annual Clean Water Initiative Performance Report.

							(Sorted by Acreage)	
Practice Code	Practice Name	TOTAL						
		2016	2017	2018	2019	2020	Total	Average
340	Cover Crop	28,381	23,408	29,615	24,114	36,885	142,404	28,481
590	Nutrient Management	12,992	10,012	9,792	8,051	14,545	55,393	11,079
345	Conservation Tillage	8,940	9,506	10,703	12,143	8,142	49,434	9,887
328	Conservation Crop Rotation	10,516	11,709	13,156	4,632	2,181	42,194	8,439
329	Residue and Tillage Management, No Till	2,963	2,900	3,098	6,322	3,275	18,559	3,712
512	Pasture and Hay Planting	2,080	1,713	2,450	1,455	1,917	9,613	1,923
913VTAg	Precision Agriculture	0	0	0	4,041	4,297	8,338	1,668
528	Prescribed Grazing	1,808	1,224	1,472	1,826	1,074	7,404	1,481
901VTAg	Manure Injection	0	0	0	2,247	3,787	6,034	1,207
911VTAg	Rotational Grazing	0	0	0	2,889	2,563	5,452	1,090
902VTAg	Aeration	433	475	2,023	572	1,797	5,300	1,060
314	Brush Management	708	782	1,058	1,219	1,450	5,217	1,043
633	Waste Recycling	2,220	1,181	548	0	92	4,041	808
PAC	Production Area Compliance	0	792	540	1,185	1,385	3,902	780

Source: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-i.pdf

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Seven-year average reductions: 95%+ Agriculture

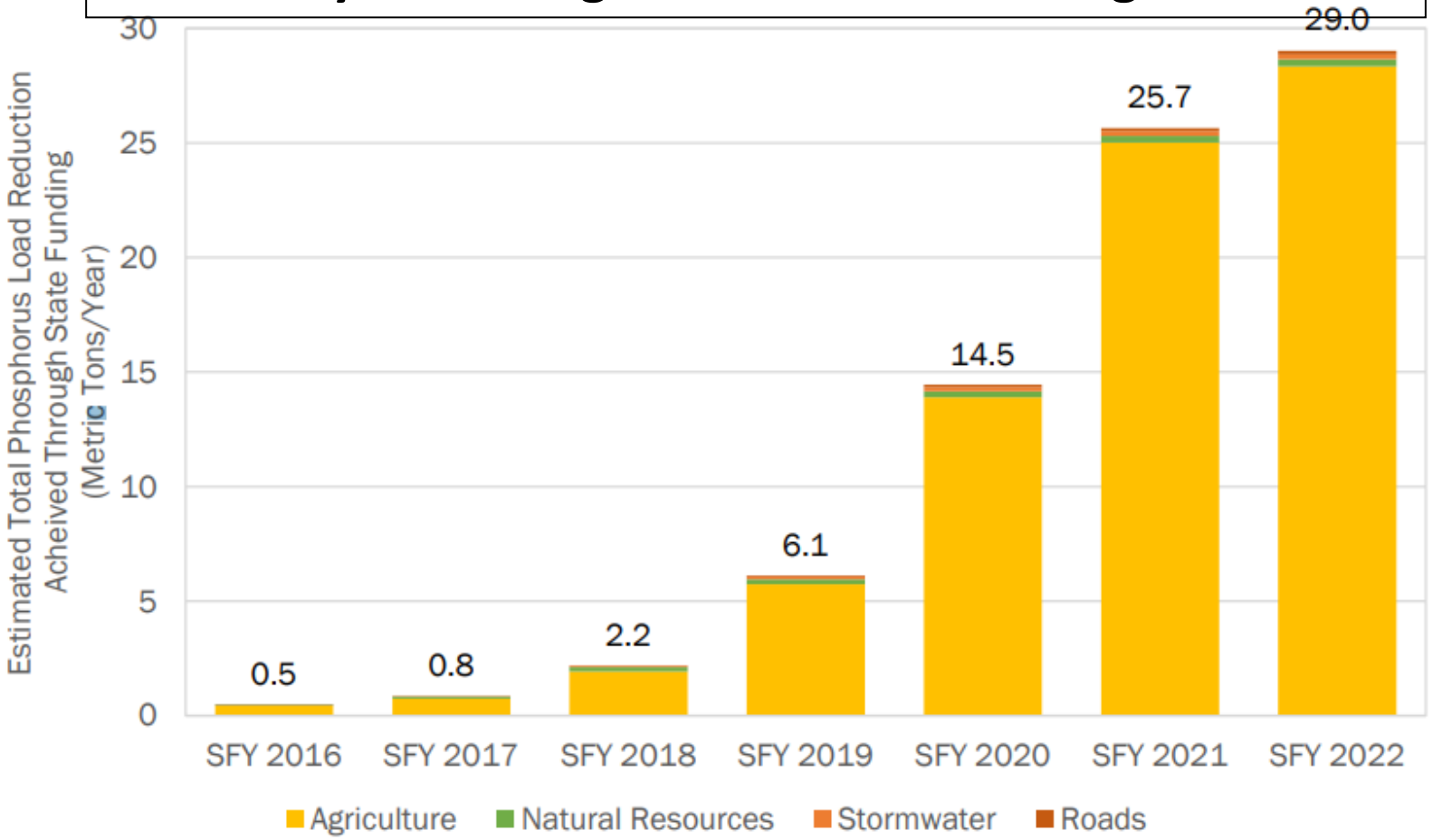

Figure 21. Annual estimated total phosphorus load reductions (metric tons per year) associated with state-funded clean water projects in the Lake Champlain and Lake Memphremagog basins by land use sector, SFY 2016–2022.[32]

Source: https://legislature.vermont.gov/assets/Legislative-Reports/Vermont-Clean-Water-Initiative-2022-Performance-Report.pdf (page 36)

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Agriculture = Most cost effective

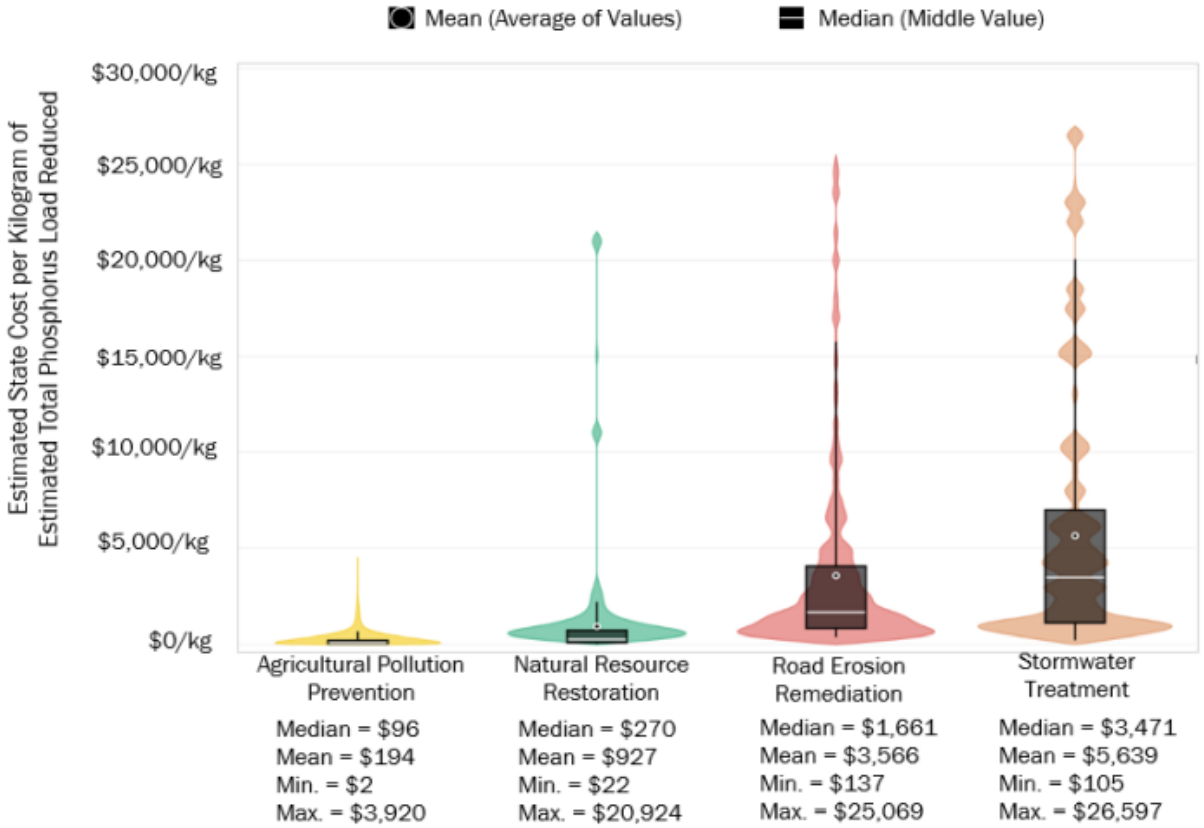

FIGURE GUIDE

The violin plots, pictured below, combine a box plot (see black rectangles/lines) and a density plot (see colored shapes).

A box plot shows the minimum, maximum, median, and average cost effectiveness values.

A density plot shows the relative number of projects falling into each range of cost effectiveness. Wider sections of the colored shapes represent more projects than thinner sections.

Figure 22. State investment per estimated kilogram of total phosphorus load reduced over the design life of each project type, based on clean water projects funded through State of Vermont agencies completed SFY 2016–2022 (excludes local and federal leveraged funds).[35]

Source: https://legislature.vermont.gov/assets/Legislative-Reports/Vermont-Clean-Water-Initiative-2022-Performance-Report.pdf (page 38)

10 V.S.A. § 578(a) Greenhouse gas reduction requirements

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§ 578. Greenhouse gas reduction requirements

(a) Greenhouse gas reduction requirements. Vermont shall reduce emissions of greenhouse gases from within the geographical boundaries of the State and those emissions outside the boundaries of the State that are caused by the use of energy in Vermont, as measured and inventoried pursuant to section 582 of this title, by:

(1) not less than 26 percent from 2005 greenhouse gas emissions by January 1, 2025 pursuant to the State's membership in the United States Climate Alliance and commitment to implement policies to achieve the objectives of the 2016 Paris Agreement;

(2) not less than 40 percent from 1990 greenhouse gas emissions by January 1, 2030 pursuant to the State's 2016 Comprehensive Energy Plan; and

(3) not less than 80 percent from 1990 greenhouse gas emissions by January 1, 2050 pursuant to the State's 2016 Comprehensive Energy Plan.

Source: https://aoa.vermont.gov/sites/aoa/files/Boards/VCC/ACT153%20As%20Enacted.pdf

Vermont's Current Greenhouse Gas (GHG) Emissions Profile

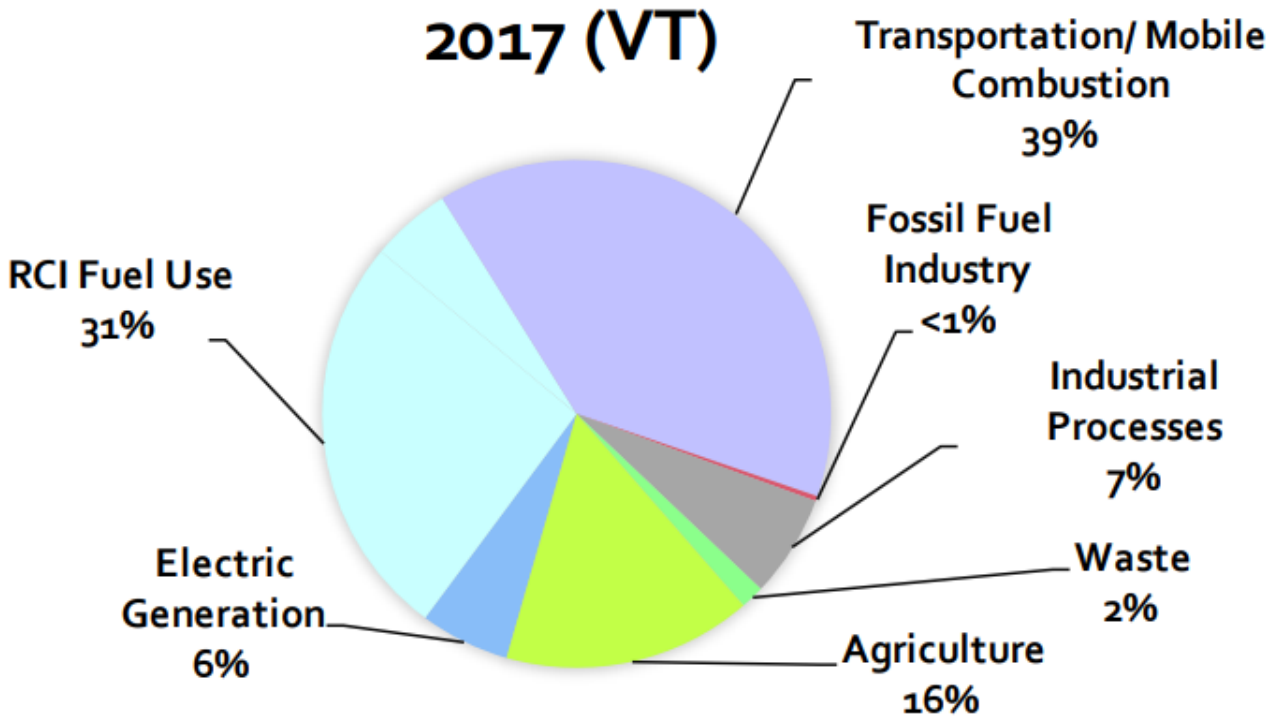


Figure 4: Vermont GHG percent contributions by sector.

Source: https://dec.vermont.gov/sites/dec/files/aqc/climate-change/documents/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2017_Final.pdf

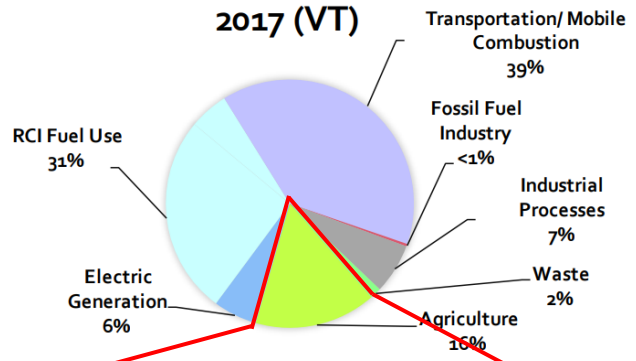
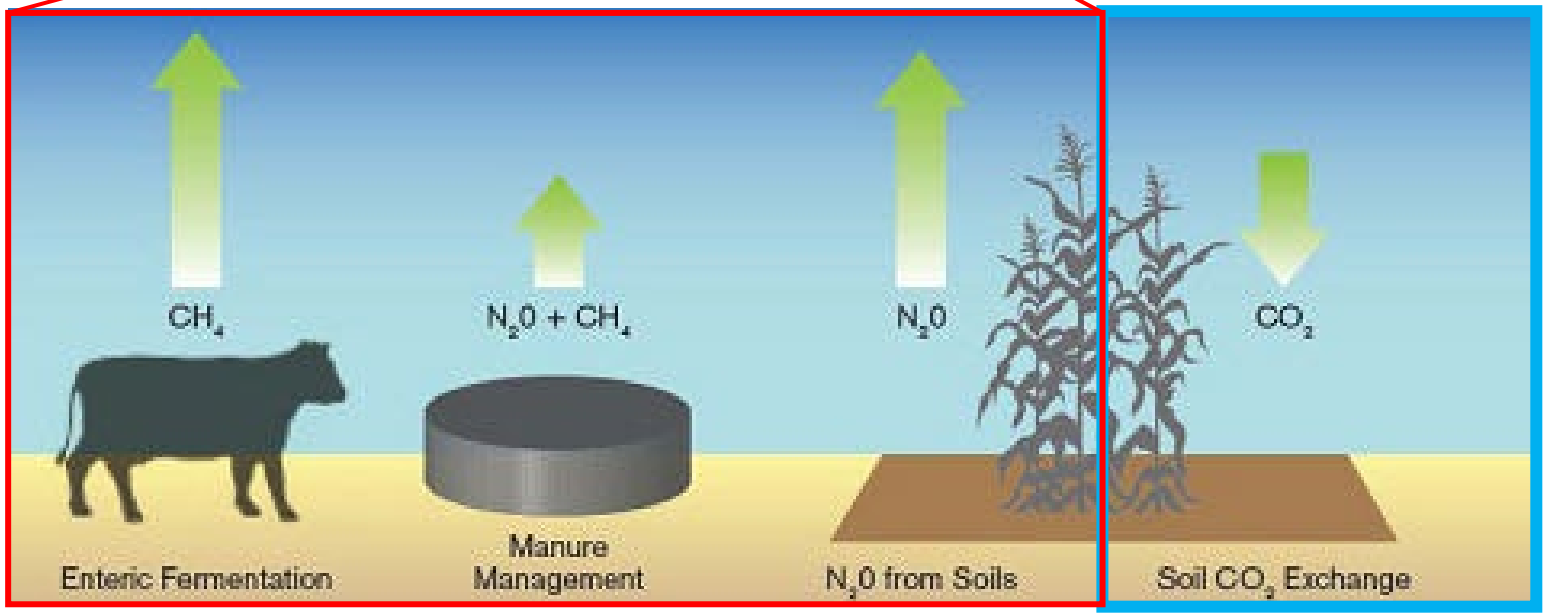


Figure 4: Vermont GHG percent contributions by sector.

GHG Emissions & Sequestration



Source: https://www.agr.gc.ca/eng/agriculture-and-the-environment/agricultural-practices/climate-change-and-agriculture/greenhouse-gases-and-agriculture/?id=1329321969842
Source: https://dec.vermont.gov/sites/dec/files/aqc/climate-change/documents/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2017_Final.pdf

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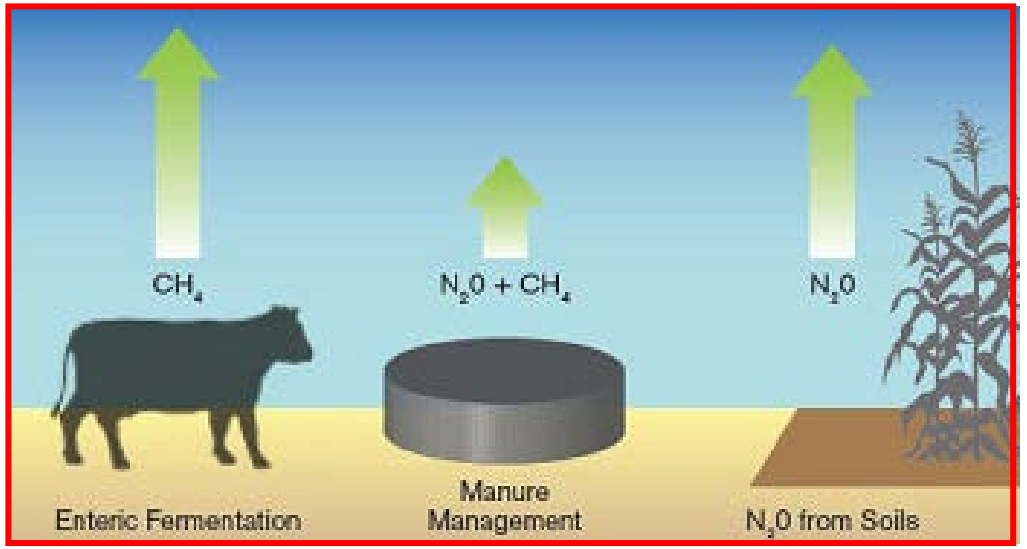
Vermont's Current Greenhouse Gas (GHG) Emissions Profile: Agriculture

Agriculture
Enteric Fermentation
Manure Management
Agricultural Soils
Liming and Urea Fertilization



Agriculture	1.23	1.19	1.30	1.32	1.30	1.32	1.29	1.29	1.28	1.38	1.29	1.29	1.26	1.28	1.25	1.29	1.31	1.35	1.38	1.37
Enteric Fermentation	0.70	0.67	0.69	0.68	0.67	0.66	0.65	0.63	0.63	0.64	0.64	0.64	0.62	0.63	0.62	0.64	0.64	0.63	0.64	0.64
Manure Management	0.18	0.19	0.26	0.29	0.30	0.32	0.31	0.33	0.32	0.33	0.34	0.33	0.33	0.33	0.32	0.32	0.32	0.34	0.36	0.35
Agricultural Soils	0.35	0.34	0.34	0.34	0.32	0.33	0.33	0.32	0.32	0.31	0.30	0.32	0.31	0.31	0.30	0.32	0.33	0.33	0.33	0.33
Liming and Urea Fertilization	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.01	0.01	0.00	0.00	0.01	0.03	0.05	0.05	0.05

Source: https://dec.vermont.gov/sites/dec/files/aqc/climate-change/documents/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2017_Final.pdf

Source: https://www.agr.gc.ca/eng/agriculture-and-the-environment/agricultural-practices/climate-change-and-agriculture/greenhouse-gases-and-agriculture/?id=1329321969842

Vermont's Current Greenhouse Gas (GHG) Emissions Profile

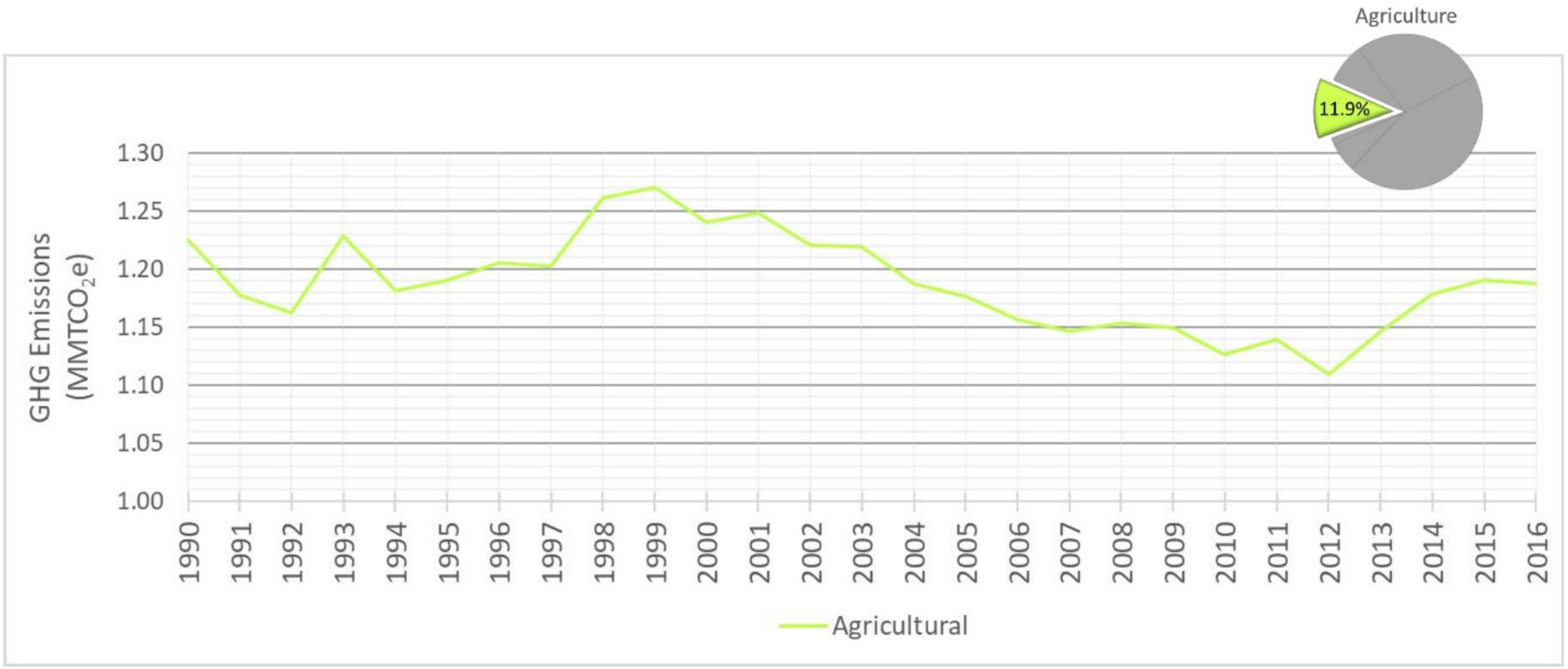
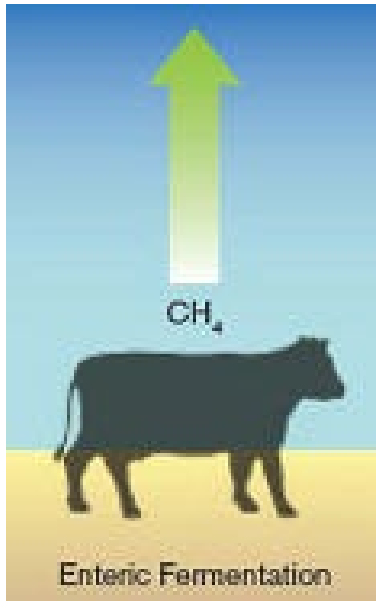


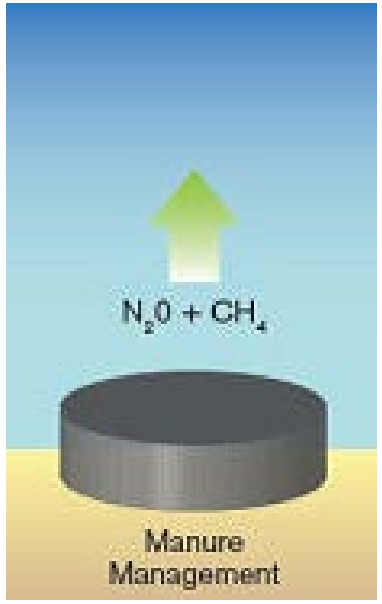
Figure 13: Vermont Agricultural Sector GHG Emissions (1990 – 2016).

Mitigation Summary



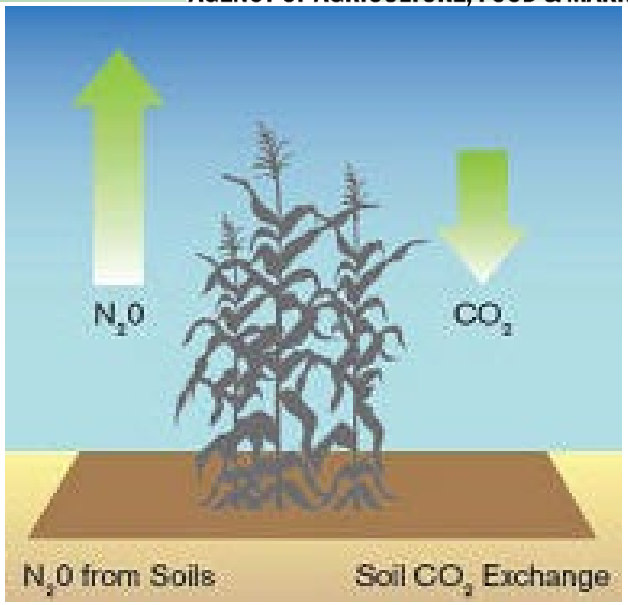
Example Mitigation Strategies:

1. Dietary adjustments
2. Improved genetics
3. Improving reproductive performance



Example Mitigation Strategies:

1. Waste Storage Digestion / Energy Production
2. Covering Waste Storage Facilities



Example Mitigation Strategies:

1. Reduced Tillage
2. Cover Crop
3. Crop Rotation

Methods for Growing Crops have different environmental outcomes

Management:

Full width tillage
No Nutrient Management
No Field specific conservation practices

Management:	DEC P Reductions	USDA COMET ERCs:
Cover crop	30% P Efficency	0.15 tons CO_2e/ac/yr
Reduced and No-Till	50% P Efficency	0.19 tons CO_2e/ac/yr
Riparian Buffers	40% P Efficency	0.74 tons CO_2e/ac/yr
Crop Rotation	25% P Efficency	0.22 tons CO_2e/ac/yr

Source: https://comet-planner.com

Agricultural conservation practice tracking

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COMET-Planner Emission Reduction Coefficients (ERC)	Units:	tons CO2e/ac/yr		*CO2 Equivalents*		*Addison County*		Vermont		Negative = Emissions				http://comet-planner.com/	
NRCS Conservation Practices	**Soil Carbon**	**Biomass Carbon**	**Fossil CO2**	**Biomass Burning CO2**	**Biomass Burning N2O**	**Biomass Burning CH4**	**Liming**	**Total CO2**	**Direct Soil N2O**	**Indirect Soil N2O**	**Total N2O**	**Soil CH4**	**Total Emission Reductions**	**Minimum Total Emission Reductions***	**Maximum Total Emission Reductions***
Crop Land															
Cover Crop (CPS 340) - Add Non-Legume Seasonal Cover Crop (with 25% Fertilizer N Reduction) to Non-Irrigated Cropland	0.16	0	0	0	0	0	0	0.16	-0.01	0	-0.01	0	**0.15**	-0.09	0.54
Cover Crop (CPS 340) - Add Legume Seasonal Cover Crop (with 50% Fertilizer N Reduction) to Non-Irrigated Cropland	0.39	0	0	0	0	0	0	0.39	-0.19	-0.04	-0.23	0	**0.16**	-0.15	0.84
Conservation Crop Rotation (CPS 328) - Decrease Fallow Frequency or Add Perennial Crops to Rotations	0.21	0	0	0	0	0	0	0.21	0.01	0	0.01	0	**0.22**	N.E.**	N.E.**
Residue and Tillage Management - Reduced Till (CPS 345) - Intensive Till to Reduced Till on Non-Irrigated Cropland	0.17	0	0	0	0	0	0	0.17	0.01	0	0.01	0	**0.19**	0.05	0.34
Residue and Tillage Management - No-Till (CPS 329) - Intensive Till to No Till or Strip Till on Non-Irrigated Cropland	0.5	0	0	0	0	0	0	0.5	0.04	0.01	0.05	0	**0.56**	0.29	0.77
Residue and Tillage Management - No-Till (CPS 329) - Reduced Till to No Till or Strip Till on Non-Irrigated Cropland	0.4	0	0	0	0	0	0	0.4	0.03	0.01	0.04	0	**0.44**	0.22	0.61
Nutrient Management (CPS 590) - Improved N Fertilizer Management on Non-Irrigated Croplands - Reduce Fertilizer Application Rate by 15%	-0.02	0	0	0	0	0	0	-0.02	0	0	0	0	**-0.01**	-0.17	0.13
Nutrient Management (CPS 590) - Replace Synthetic N Fertilizer with Compost (CN ratio 10) on Non-Irrigated Croplands	0.2	0	0	0	0	0	0	0.2	-0.15	-0.04	-0.19	0	**0.01**	-0.27	0.23
Nutrient Management (CPS 590) - Replace Synthetic N Fertilizer with Compost (CN ratio 25) on Non-Irrigated Croplands	0.49	0	0	0	0	0	0	0.49	-0.1	-0.02	-0.12	0	**0.37**	0.11	0.6
Nutrient Management (CPS 590) - Replace Synthetic N Fertilizer with Dairy Manure on Non-Irrigated Croplands	0.22	0	0	0	0	0	0	0.22	-0.13	-0.03	-0.16	0	**0.06**	-0.18	0.27

*Minimum and maximum emission reductions represent the minimum and maximum total emissions over a range of soil, climate and management conditions within multi-county regions. Min/Max emissions are not estimated for all practices, due to limitations in quantification methods

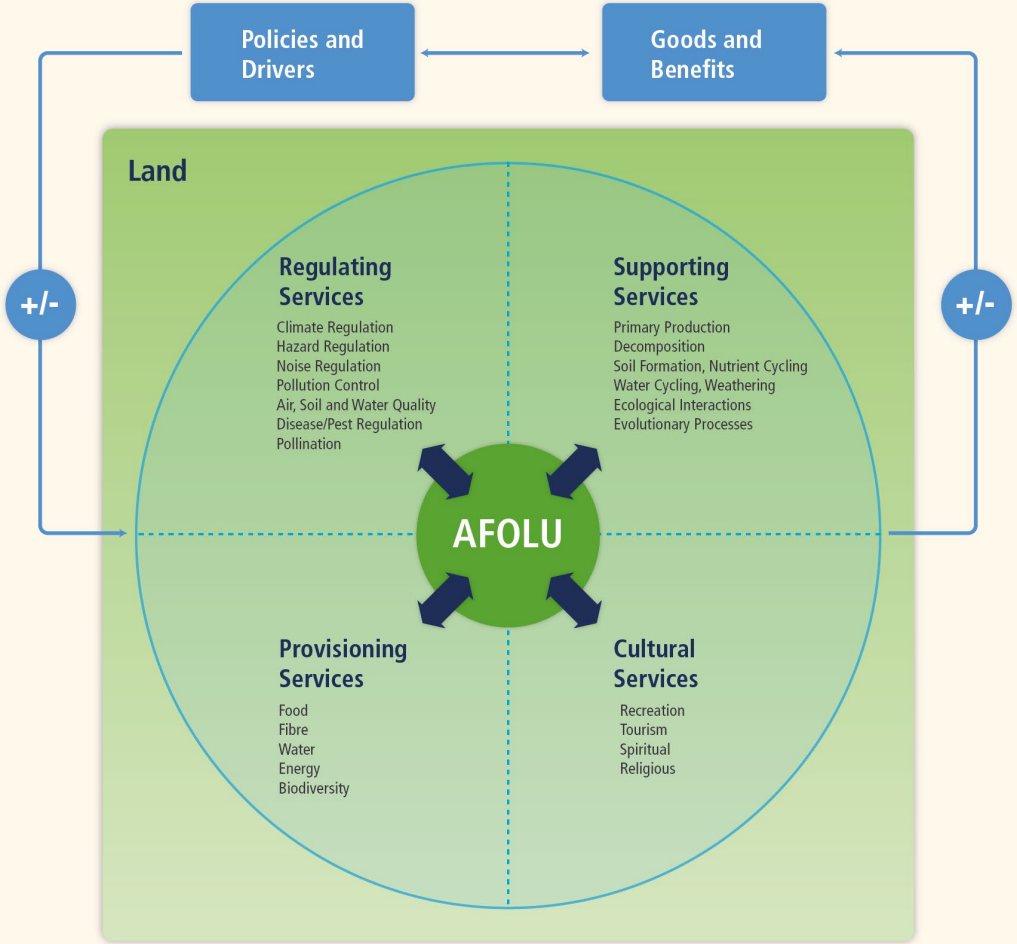
**Values were not estimated due to limited data on reductions of greenhouse gas emissions from this practice

Source: https://dec.vermont.gov/sites/dec/files/wsm/erp/docs/2021-01-15_CleanWaterPerformanceReport_SFY2020-FINA-PDF-A.pdf

Agriculture, Forestry and Other Land Use (AFOLU)

Executive Summary

Agriculture, Forestry, and Other Land Use (AFOLU) is unique among the sectors considered in this volume, since the mitigation potential is derived from both an enhancement of removals of greenhouse gases (GHG), as well as reduction of emissions through management of land and livestock (*robust evidence; high agreement*). The land provides food that feeds the Earth's human population of ca. 7 billion, fibre for a variety of purposes, livelihoods for billions of people worldwide, and is a critical resource for sustainable development in many regions. Agriculture is frequently central to the livelihoods of many social groups, especially in developing countries where it often accounts for a significant share of production. In addition to food and fibre, the land provides a multitude of ecosystem services; climate change mitigation is just one of many that are vital to human well-being (*robust evidence; high agreement*). Mitigation options in the AFOLU sector, therefore, need to be assessed, as far as possible, for their potential impact on all other services provided by land. [Section 11.1]



Source: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter11.pdf
Image Source: https://www.ipcc.ch/site/assets/uploads/2018/02/01_figure_11.1.png

USA NDC: 04/22/2021 (Rejoining the Paris Agreement)

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The United States of America

Nationally Determined Contribution

Reducing Greenhouse Gases in the United States:
A 2030 Emissions Target

After a careful process involving analysis and consultation across the United States federal government and with leaders in state, local, and tribal governments, **the United States is setting an economy-wide target of reducing its net greenhouse gas emissions by 50-52 percent below 2005 levels in 2030.** The National Climate Advisor developed this NDC in consultation with the Special Presidential Envoy for Climate, and it was approved by President Joseph R. Biden Jr..

Beyond the energy sector, the United States will also reduce emissions from forests and agriculture and enhance carbon sinks through a range of programs and measures for ecosystems ranging from our forests and agricultural soils to our rivers and coasts. Actions to be pursued include, for example:

- **Agriculture and lands:** America's vast lands provide opportunities to both reduce emissions, and sequester more carbon dioxide. The United States will support scaling of climate smart agricultural practices (including, for example, cover crops), reforestation, rotational grazing, and nutrient management practices. In addition, federal and state governments will invest in forest protection and forest management, and engage in intensive efforts to reduce the scope and intensity of catastrophic wildfires, and to restore fire-damaged forest lands. Alongside these efforts, the United States will support nature-based coastal resilience projects including pre-disaster planning as well as efforts to increase sequestration in waterways and oceans by pursuing "blue carbon."

Source: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/United%20States%20of%20America%20First/United%20States%20NDC%20April%2021%202021%20Final.pdf

Ag Emission Reccomendations in CAP

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WATER QUALITY DIVISION

1. Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts of existing state and federal water quality implementation programs as reported through the annual Clean Water Initiative Performance Report.

2. The Vermont Climate Council has recommended developing and issuing a Request for Proposals (RFP) that will review and analyze methodological gaps of emission inventory tools currently used by the State of Vermont to quantify greenhouse gas emissions for evaluating changes in the Agriculture, Forestry and Other Land Use (AFOLU) sector and the tools' alignment with the Intergovernmental Panel on Climate Change (IPCC), Environmental Protection Agency (EPA), and peer state methodologies and approaches. The specific recommendations for this RFP can be found in the Carbon Budget Report memo found in Appendix 10.

3. Based on the findings of the technical RFP mentioned in action step (b) of this strategy, the VCC should consider recommending that the State of Vermont GHG emissions inventory protocol established in 10 V.S.A. § 582 be amended to include an inventory of GHG emissions that align with the intent and standards of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories that will include a net GHG emission accounting for the agriculture, forestry and other land use (AFOLU) sector

Source: https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2021-12/Initial%20Climate%20Action%20Plan%20-%20Final%20-%2012-1-21.pdf

1. United States Climate Alliance Funded Technical Research Project:

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request for Proposals

Review of Agricultural Sector Greenhouse Gas Emissions and Sequestration in Vermont

Release Date: September 26, 2022
Proposals Due: October 21, 2022

Contact for Proposals: Jane Lazorchak, Director of the Global Warming Solutions Act, Agency of Natural Resources | jane.lazorchak@vermont.gov; (802) 505-0561

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WATER QUALITY DIVISION

EPA SIT & National Inventory Currently Two Chapters

SIT Chapter 5

EPA SIT	Category	GHG	VT	DEC
	Agriculture (emissions)			
2	**Enteric Fermentation**	CH4	Yes	Yes
3	**Manure Management**	CH4, N2O	Yes	Yes
4	**Agriculture Soils**	N2O		
4a	**Plant Residues & Legumes**	N2O	Yes	Yes
	Histosols (conversion)	N2O	Yes	No
4b	**Plant Fertilizers**	N2O	Yes	Yes
4c	**Animal Calculation Values**	N2O	Yes	Yes
5	**Rice Cultivation**	CH4	No	No
6	**Liming of Soils**	CO2	Yes	Yes
7	**Urea Fertilization**	CO2	Yes	Yes
8	**Ag Residue Burning**	CH4, N2O	No	No

SIT Chapter 6

EPA SIT	Category	GHG	VT	DEC
	Land Use, Land-Use Change, and Forestry (sequestration)			
7	**Ag Soil Carbon Flux** (Cropland and Grassland)		Yes	No
	Cropland Remaining Cropland			
	Land Converted to Cropland			
	Grassland Remaining Grassland			
	Land Converted to Grassland			
2	**Forest Carbon Flux**	flux	Yes	No
2a	Forest Remaining Forest			
	Land Converted to Forest			
	Forest Converted to Land			
3	**C Storage in Urban Trees**	storage	Yes	Yes
4	**Settlement Soils** (developed land	N2O	Unknown	No
5	**Forest Fires**	CH4, N2O	No	No
6	**Food Scraps & Yard Trimmings** (la	flux	Unknown	No

Source: https://www.epa.gov/sites/default/files/2018-01/documents/2018_complete_report.pdf

Contact

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AGENCY OF AGRICULTURE, FOOD & MARKETS
WATER QUALITY DIVISION

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