

Overview

Maine has set climate change goals of reducing gross greenhouse gas (GHG) emissions by 80% by 2050 and having net-zero emissions by 2045.

Natural climate solutions (NCS) such as soil amendments, cover cropping, and improved manure management that sequester carbon or limit GHG emissions can provide cost-effective near-term GHG mitigation and enhance ecosystem services.

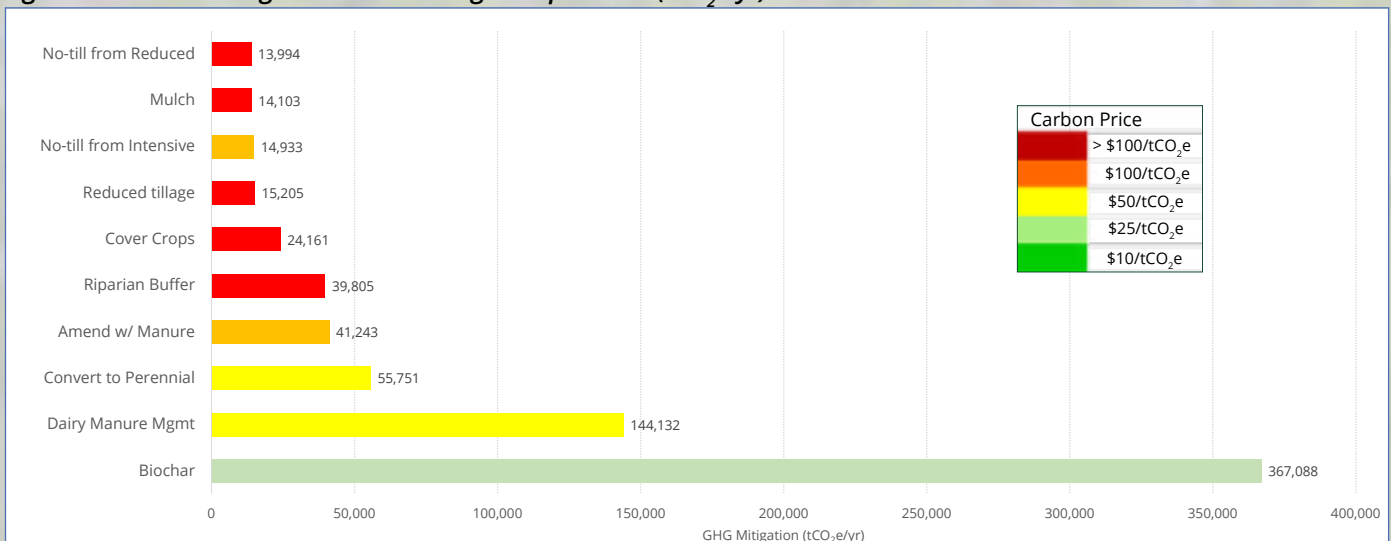
Our comprehensive assessment evaluated the benefits and costs of implementing ten potential NCS practices to mitigate greenhouse gas emissions from Maine's agricultural sector.

A key component of this project was identifying cost-effective agricultural practices that can be implemented on a broad scale.

Key Findings

- ✧ High mitigation potential from amending soil with biochar, constructing anaerobic digesters for dairy manure management, and converting cropland to perennial grasses (Figure 1).
- ✧ Maine's agricultural sector has a realistic potential to reduce within-sector emissions or even become net-negative as a sector.
- ✧ A combined approach of amending soils with biochar, reducing tillage intensity, planting riparian buffers, and adopting anaerobic digesters could mitigate nearly 1.5 times the sector's current emissions or up to 566,000 tons carbon dioxide equivalent per year (tCO₂e/yr) at a cost of \$18.9 million/yr or \$33/tCO₂e.
- ✧ Farmer focus groups identified upfront costs, labor, and information needs as key barriers to NCS adoption.

Figure 1. Total Maine agriculture NCS mitigation potential (tCO₂e/yr).



Photos courtesy Johnny Sanchez.

Natural Climate Solutions Initiative

GHG Emissions from Agriculture

- Agriculture encompasses 1.3 million acres across 8,000 farms, has an annual economic impact of \$3.8 billion, supports 25,000 jobs, and represents about 5% of Maine's GDP.
- The agricultural sector in Maine emitted 0.38 million metric tons of carbon dioxide equivalents (MtCO₂e) in 2017, approximately 2% of total state emissions (17.5 MtCO₂e) across all reported sectors.
- About 65% of the sector's emissions are from livestock (via enteric fermentation and manure management), with dairy contributing 48% of the total (Figure 2).

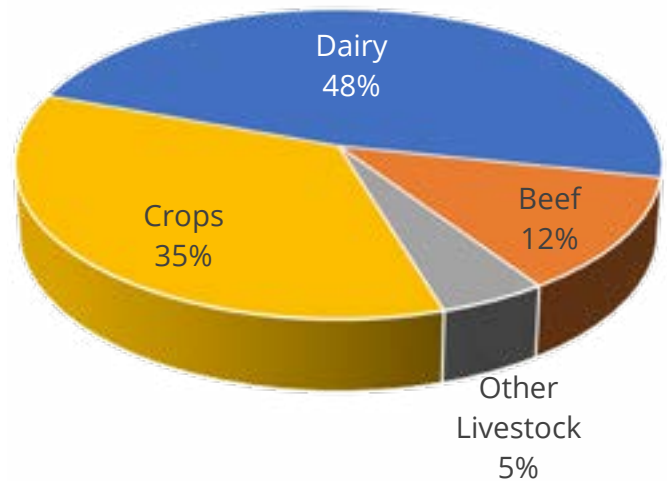


Figure 2. Percent of Maine agricultural GHG emissions by major enterprise (Source: DEP, 2020).

Climate Change and Agriculture

- The Northeast is warming faster with more total precipitation and a greater intensification of rain events compared to the rest of the U.S.
- Maine's temperature has increased by 3.2°F and precipitation has increased by 15% since 1895, with a declining character of snow and low temperatures in winter. Maine's growing season is two weeks longer than it was in 1950.
- More than anything, increased weather variability is adversely impacting farming in Maine.

Funding support for this project was provided by the Doris Duke Charitable Foundation, Maine Farmland Trust, and the Senator George J. Mitchell Center for Sustainability Solutions.

For more details, please see the **full report** on the Maine NCS project website.
CRSF.UMAINE.EDU/FOREST-CLIMATE-CHANGE-INITIATIVE/NCS

The Maine Natural Climate Solutions (NCS) Initiative project seeks to:

- Assess current practices to determine the degree to which foresters and farmers are using NCS;
- Determine the most cost-effective NCS for Maine;
- Understand key barriers of adopting NCS; and
- Generate information about which practices can be implemented on a broader scale.

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The mission of the Center for Research on Sustainable Forests (CRSF) is to conduct and promote leading interdisciplinary research on issues affecting the management and sustainability of northern forest ecosystems and Maine's forest-based economy. The Forest Climate Change Initiative (FCCI) seeks to better coordinate regional research and scientists working on the potential effects of climate change on forests, while also effectively collaborating to address key statewide research needs and opportunities.

