

## Potential Solutions

Natural climate solutions (NCS) such as cropland nutrient management, agroforestry, and conservation that sequester carbon or limit GHG emissions can affect near-term GHG mitigation goals in cost-effective ways and enhance long-term ecosystem services.

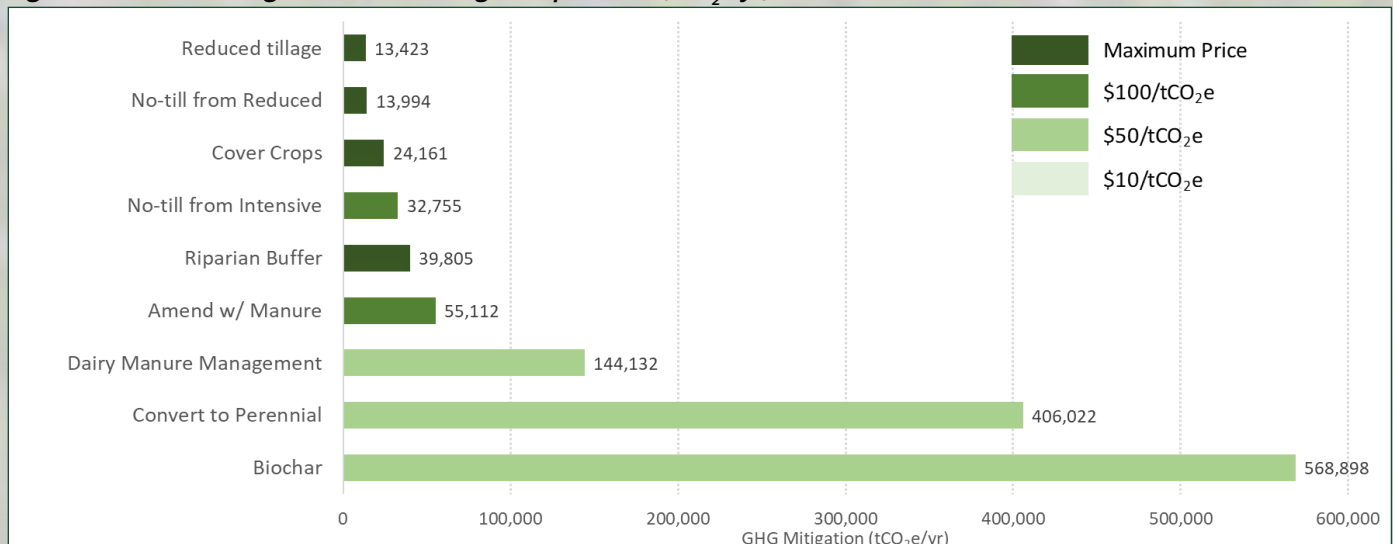
Our comprehensive assessment evaluated the benefits and costs of implementing nine potential NCS practices to mitigate GHG emissions from Maine's agricultural sector.

A key component of the Maine NCS Initiative is to determine cost-effective agricultural practices that can be implemented on a broad scale.

### Key Findings

- High mitigation potential can be derived from amending soil with biochar, converting cropland to perennial grasses, and constructing anaerobic digesters for dairy manure management (Figure 1).
- Maine's agricultural sector has a realistic potential to reduce its within-sector emissions or even be net-negative as a sector.
- Implementing NCS is expected to mitigate about 13,400 to 568,900 MtCO<sub>2</sub>e/yr at a cost of \$2.3 – \$14.5 million/yr, depending on which suite of practices are implemented.
- Maine farmers could amend soil with biochar, reduce tillage intensity, plant riparian buffers, and construct and utilize anaerobic digesters to manage dairy manure waste, thereby mitigating up to 786,000 tCO<sub>2</sub>e/yr in GHG emissions or about double the sector's current annual emissions, at an average cost of \$34/tCO<sub>2</sub>e.

Figure 1. Total Maine agriculture NCS mitigation potential (tCO<sub>2</sub>e/yr).



## 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 (MtCO<sub>2</sub>e) in 2017, approximately 2% of total state emissions (17.5 MtCO<sub>2</sub>e) 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).

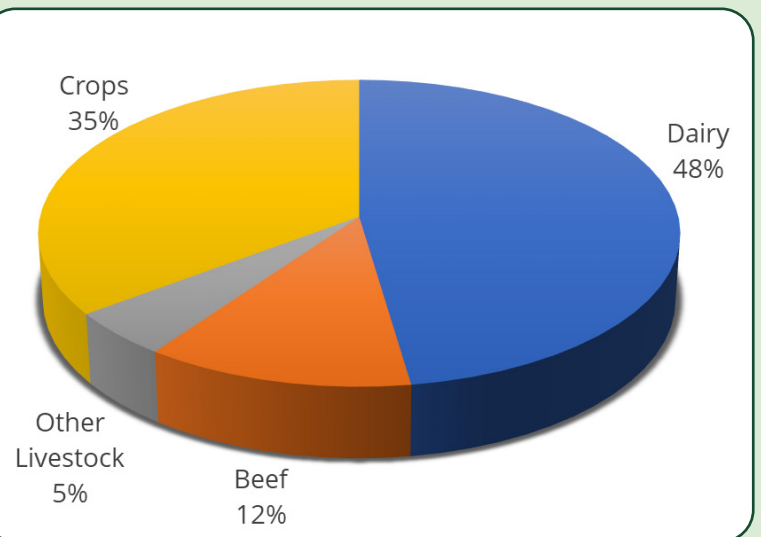


Figure 2. Maine agricultural GHG emissions (2017) by major enterprise (Source: DEP, 2020).

### Climate Change and Agriculture

- The Northeast is warming faster with more intense 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, and the growing season in Maine is two weeks longer than it was in 1950.
- Milder winters and earlier springs will adversely impact farming in Maine.
- The State has set climate change goals of reducing greenhouse gas (GHG) emissions by 80% by 2050 and having net-zero emissions by 2045.

### 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.

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