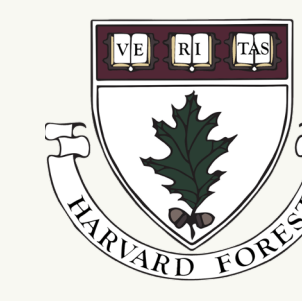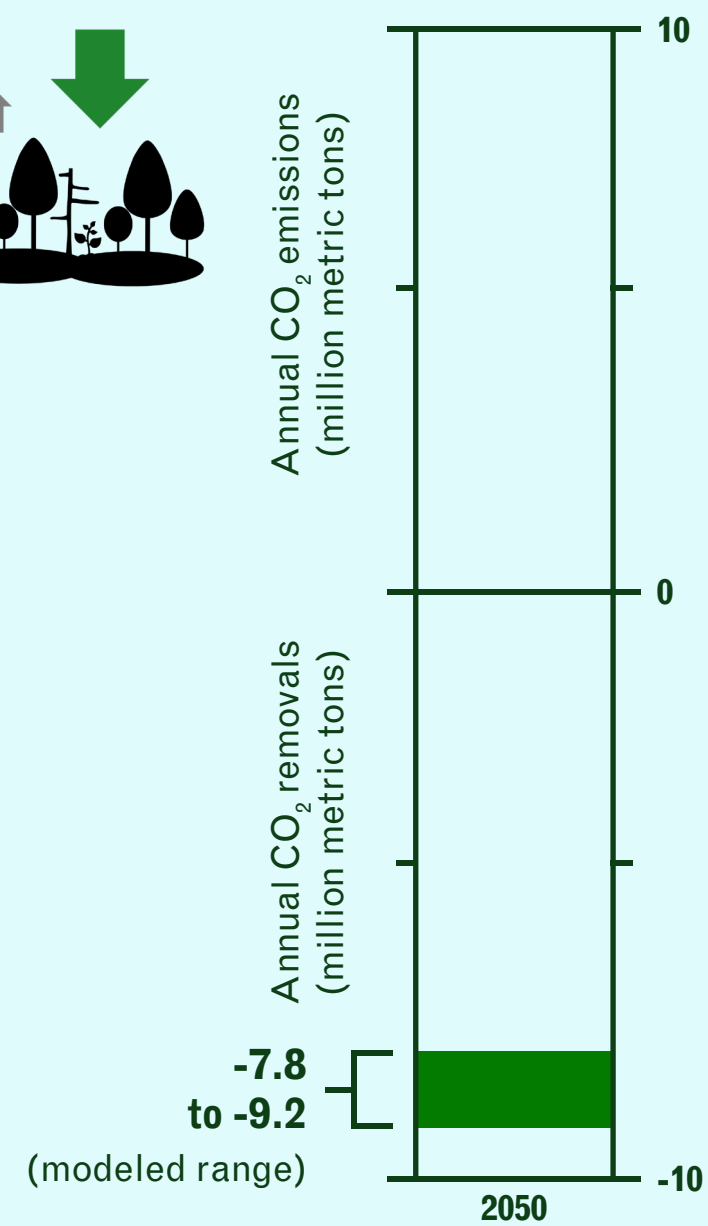# Drivers of Future Forest Change and Annual Carbon Dioxide Removal/Emissions Rates in Massachusetts

Forest Growth & Mortality

Annual CO_2 emissions (million metric tons)

Annual CO_2 removals (million metric tons)

-7.8 to -9.2 (modeled range)

10 / 0 / -10

2050

Net forest growth is the primary driver of carbon removal and will remain substantial through 2050.

Carbon removal from forest growth is expected to decline later in the century due to forest aging.

Natural Disturbances

8.6 (or more, depending on hurricane timing) to 0.6

10 / 0 / -10

2050
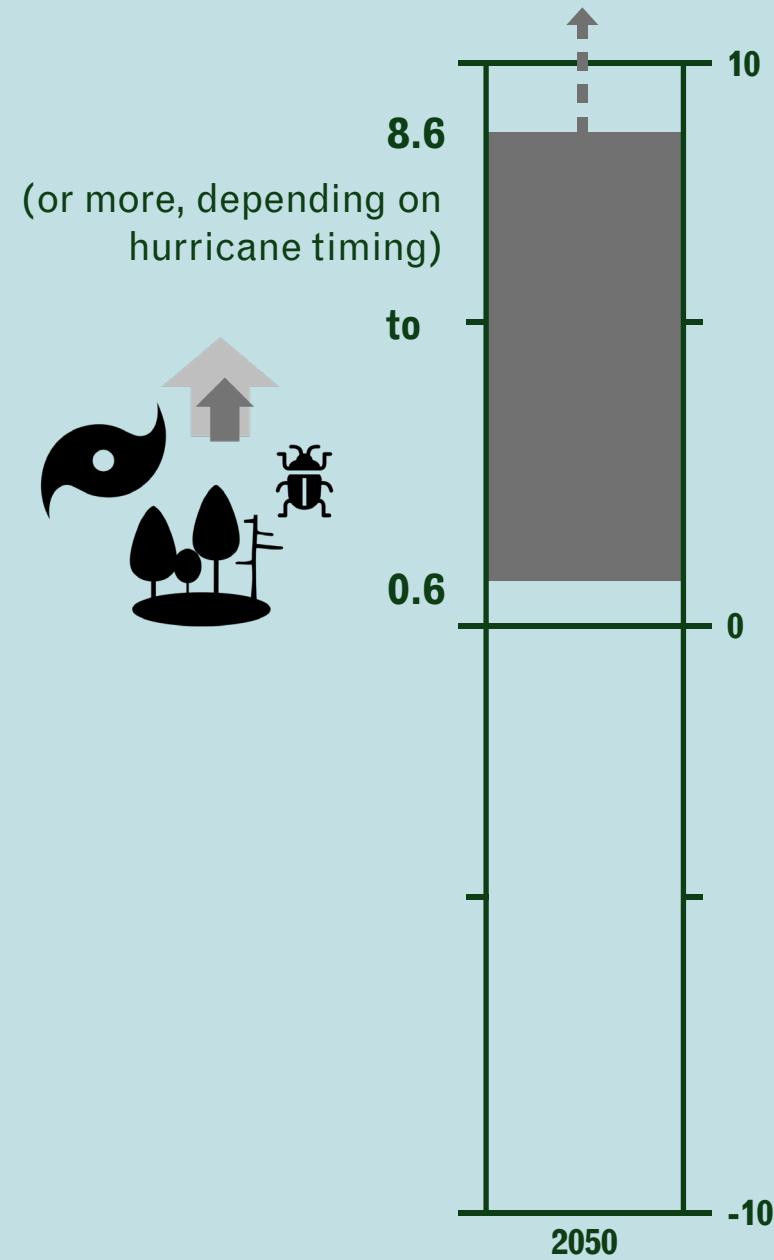
Most forest disturbances lead to modest emissions.

Major hurricanes, however, can cause large increases in annual emissions that persist over decades but gradually decline as forests recover.*

Forest Management

2.7 to 0.9

10 / 0 / -10

2050
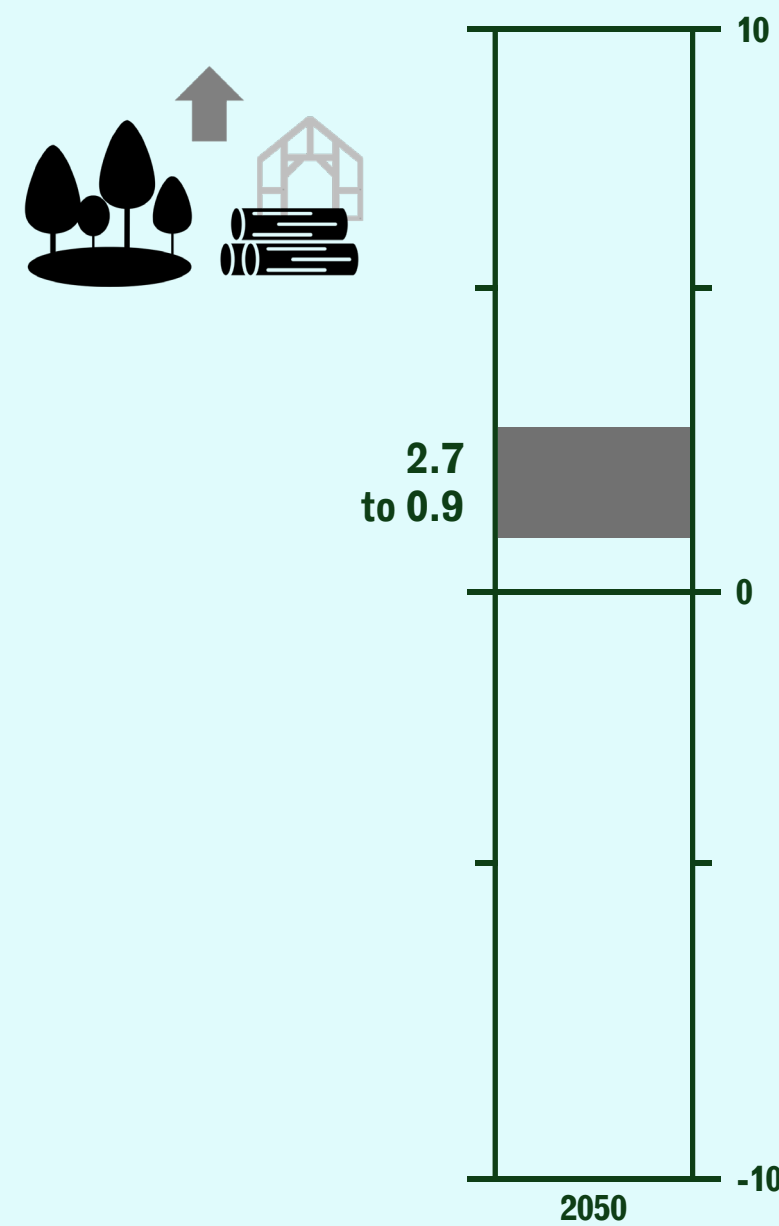
Forest harvesting results in moderate emissions but helps maintain desired forest conditions and provides local wood products, with indirect carbon removal benefits.*

Deforestation & Land Conversion

1.4 to 0.3

10 / 0 / -10

2050
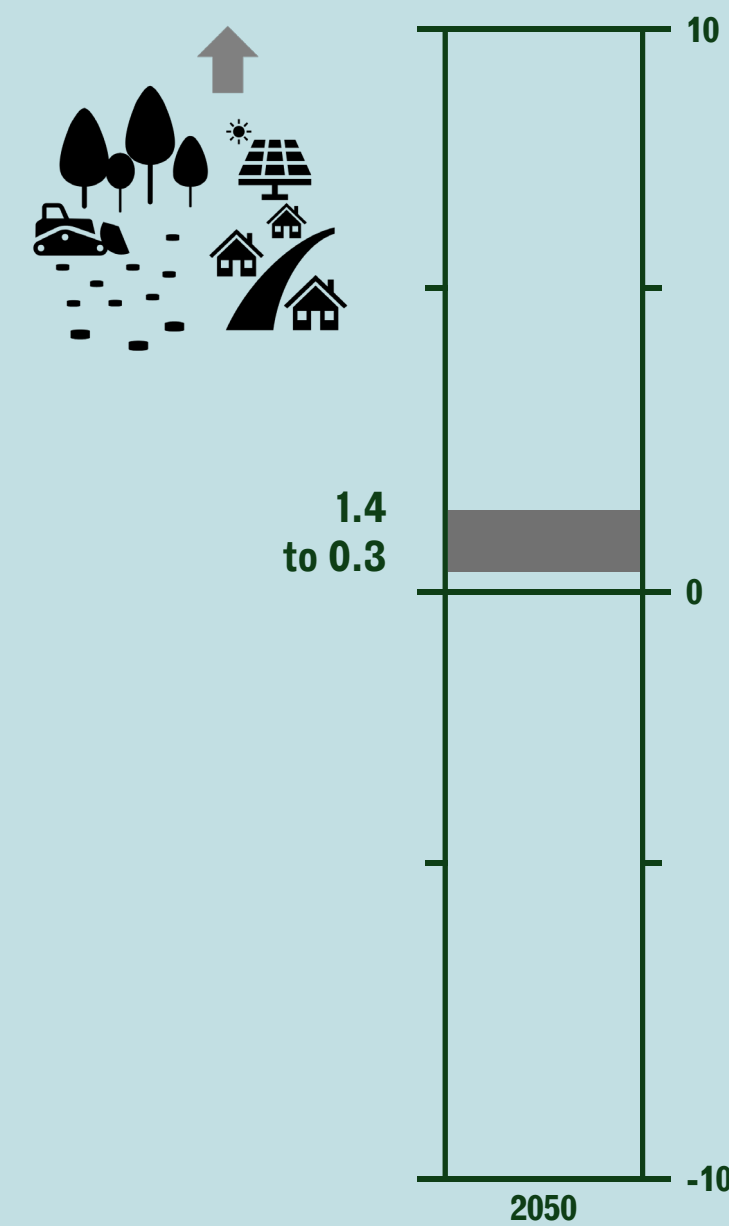
The conversion of forests and other lands for development leads to modest direct emissions and reduced carbon removal, much of which could be avoided by reduced land consumption and strategic siting.

Reforestation & Tree Planting

-0.1 to -0.3

10 / 0 / -10

2050
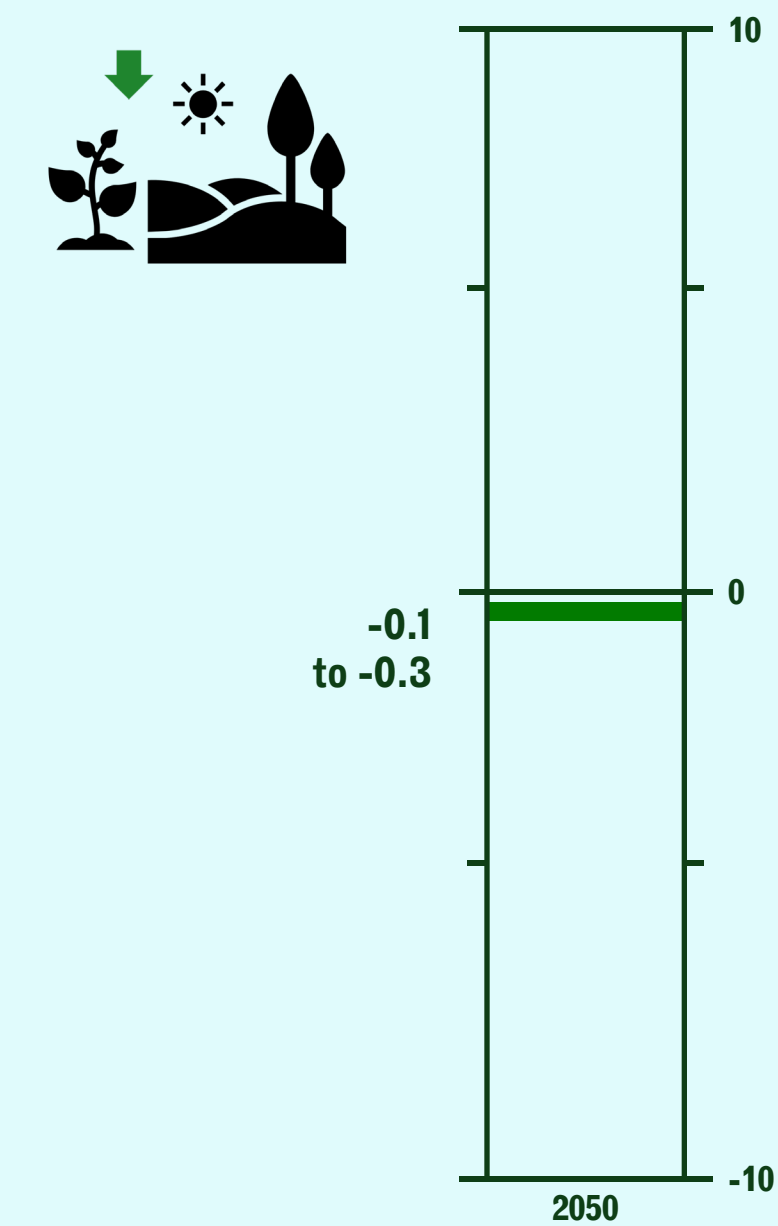
Reforestation and tree planting have lower carbon removal potential due to land and other constraints but offer many non-carbon benefits.

Combined Effect

Forests could be a net emissions source for ~5 years after a hurricane

-1.4 to -6.5

10 / 0 / -10
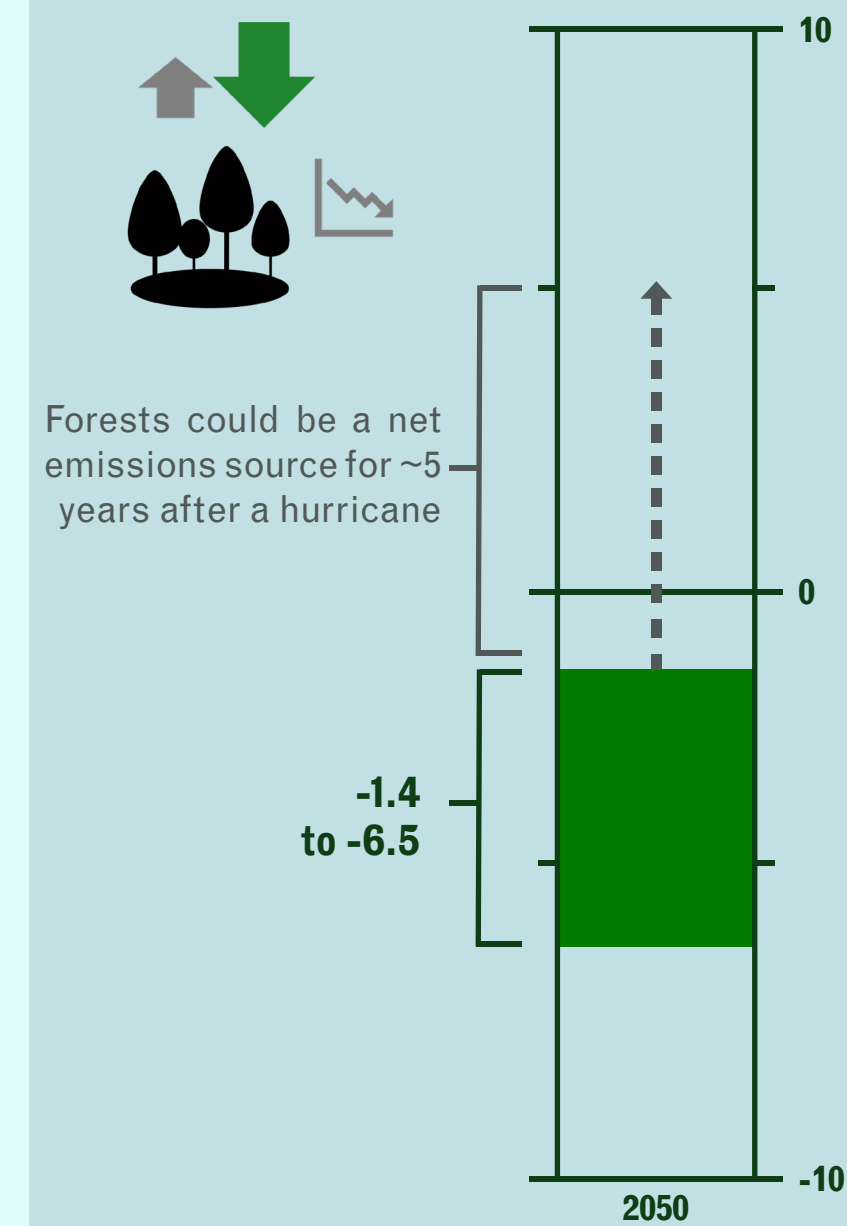
2050

Massachusetts forests will likely continue to absorb carbon each year through 2050 but face several risks and trends that could lower carbon removal rates, particularly later in the century.

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* Forest disturbances and harvesting are generally followed by elevated forest growth, reduced mortality, and higher carbon removal rates. This can, in some cases, help stabilize long-term carbon removal rates.

The numbers shown in this infographic reflect the modeled scenario results in the Forest Carbon Study (See Tables A8 and A19 and Figures 24, 28, and 30).