

2019 Rhode Island Greenhouse Gas Emissions Inventory

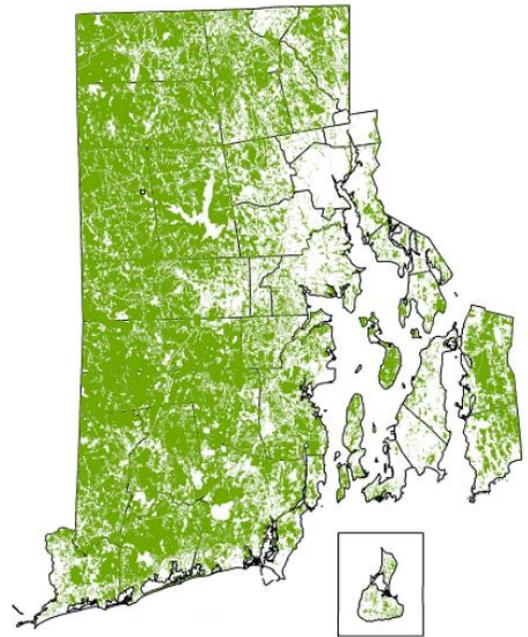
Accounting Carbon Sequestration from LULUCF

The Executive Climate Change Coordinating Council (EC⁴) sharing session on March 16, 2022 highlighted the need for a carbon-sequestration sector in Rhode Island’s annual greenhouse gas (GHG) emissions inventory. According to the U.S. Geological Survey, carbon sequestration is the process of capturing and storing atmospheric carbon dioxide. The state’s 1990 GHG inventory and 2010 GHG inventory account for seven GHG emission sectors and one GHG sequestration sector, known as Land-Use, Land-Use Change, and Forestry (LULUCF). The presence of this sector in 1990 and 2010 prevents an apples-to-apples comparison to inventory years 2011 - 2018. To meet the [2021 Act on Climate's](#) emission reduction mandates and achieve net-zero in 2050, all new inventories must include a LULUCF sector.

Background

Rhode Island’s small and diverse landscape is inherently difficult to account for carbon sequestration. The 1990 LULUCF estimate was calculated through a one-time contract with the Northeast States for Coordinated Air Use Management (NESCAUM) and is not replicable. Additionally, the 2010 LULUCF estimate was calculated through the Long-range Energy Alternatives Planning (LEAP) model used in the *Rhode Island Greenhouse Gas Emissions Reduction Plan (2016)* and is not replicable.

RIDEM can estimate LULUCF through the EPA’s State Inventory Tool (SIT), which is used for most of the statewide GHG emissions inventory. The SIT is preloaded with default LULUCF data that is nationally-apportioned to Rhode Island. Default inputs are listed below and ranked by their share of the total. Asterisks indicate inputs already provided by RIDEM’s Division of Forest Environment (DFE) annually.



Extent of Forests in Rhode Island

Forest Carbon Flux

1. Aboveground Biomass (30%)
2. Deadwood (19%)
3. Mineral Soil (7%)
4. Belowground Biomass (6%)
5. Litter (5%)
6. Organic Soil (1%)
7. Wood Products/Landfills (<1%)

Additional Inputs

1. Carbon Sequestration from Urban Trees (28%) *
2. Carbon Stored in Yard Trimmings (3%)
3. Agricultural Soil Carbon Flux (1%)
4. Carbon Emissions from Forest Fires (<1%) *
5. N₂O From Settlement Soils (<1%)

Since the SIT's default data is nationally-apportioned to states, it may not be accurate for the New England region. Connecticut, Massachusetts, and Vermont have also felt the SIT's default LULUCF data is unreliable. For this reason, RIDEM decided to omit LULUCF from the inventory between 2011 and 2018.

Estimating Carbon Sequestration from Aboveground Biomass

To ensure Rhode Island's carbon sequestration estimate reflects the local landscape, RIDEM replaced the SIT's aboveground biomass estimate with RI-specific data from DFE's *2020 Forest Action Plan*. Every ten years, DFE is required to submit a forest action plan to the U.S. Forest Service (USFS). Within the action plan, estimates for the **total forest land in RI, percentages of each forest type, and sequestration factors for each forest type** are provided by USFS's Forest Inventory and Analysis (FIA) program. RIDEM can use this information to estimate carbon sequestration from aboveground biomass, the largest subsector of LULUCF. The following example calculation demonstrates how carbon sequestration is estimated for oak/hickory forest:

- Oak/hickory sequesters an average of 1.46 MTCO₂/acre/year
- Oak/hickory covers ~61.0% or 220,287.47 acres of RI forest
- $1.46 \text{ MTCO}_2/\text{acre} * 220,287.47 \text{ acres} / 1,000,000 = 0.32 \text{ MMTCO}_2/\text{year}$

This calculation is repeated for all nine forest types, summed, and substituted into the SIT. Tee Jay Boudreau, DFE Deputy Chief, reiterated that the *2020 Forest Action Plan's* FIA data is reliable for Rhode Island. New **percentages of each forest type** and **total forest land in RI** can be requested annually from DFE. When the next forest action plan is published in 2030, **sequestration factors for each forest type** will be updated. Boudreau mentioned the current sequestration factors are adequate for the next ten years. With DFE's data, 94% of LULUCF would originate from local sources and 6% would originate from the SIT's default data.

RIDEM recognizes this methodology update has small drawbacks. When a specific input (such as aboveground biomass) is replaced in the SIT, the possibility of using any default forest carbon flux data is eliminated. The six remaining forest carbon flux inputs (deadwood, mineral soil, belowground biomass, forest litter, organic soil, and wood products) would be omitted from the inventory. Additionally, since the definition of forest land and urban area could slightly overlap, a small amount of overcounting sequestration between subsectors is possible.

Conclusion

Rhode Island requires an accurate LULUCF sector to meet the Act on Climate's 2050 'net-zero' emissions mandate. Additionally, an apples-to-apples comparison between 1990 and new inventories is impossible without a carbon sequestration sector. To recap, the following subsectors are now included in Rhode Island's LULUCF sector estimate:

- Aboveground Biomass
- Carbon Sequestration from Urban Trees
- Carbon Stored in Yard Trimmings
- Agricultural Soil Carbon Flux
- Carbon Emissions from Forest Fires
- N₂O From Settlement Soils

2019's LULUCF estimate represents a **first step** towards a reliable carbon sequestration sector for Rhode Island and should not be compared with other state's sequestration sectors at this time. In the

future, RIDEM will work towards achieving a more precise picture of carbon sequestration in Rhode Island. Partners such as the U.S. Climate Alliance, NESCAUM, and other state environmental agencies will help facilitate this growth.

Public Comment Period

Comments on accounting carbon sequestration from LULUCF will be received until **October 14, 2022** and may be submitted [here](#) or directly to:

Joseph A. Poccia | *Air Quality Specialist - Meteorologist*
Rhode Island Department of Environmental Management
Office of Air Resources
(401) 222-2808 x 2774106
joseph.a.poccia@dem.ri.gov