

Carbon Storage Potential in New England Forests: Comparing NEFF and Highstead Estimates

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Summary

The New England Forestry Foundation (NEFF) and the Highstead Foundation have separately concluded that there is a huge opportunity to harness the forests of New England as a natural climate solution, and that storing additional carbon in the forest through improved forest management (IFM) represents the biggest share of the opportunity. The overview below compares the results of separate analyses by the two organizations to estimate the scale of this opportunity. Despite substantial differences in methodology and assumptions, both analyses indicate that the potential to store additional carbon in New England's forests over the next three decades is in the range of several hundred million metric tons.

The NEFF study estimated the total opportunity if Exemplary Forestry were implemented on all private forest land in counties with low timber stocking as 542 MMT. NEFF did not attempt to estimate how much of this opportunity is likely to be realized, since that will depend on the policies and incentives that society chooses to implement. In contrast, the Highstead study reported the potential at three levels of adoption of IFM, from a low of 75 MMT CO₂e if 20% of understocked timberland acres undergo IFM to a high of 281 MMT CO₂e if 85% of eligible acres undergo IFM.

Terms and definitions

*All carbon storage values are in CO₂e
 *Highstead numbers have been converted from short tons to metric tons for comparison
 MT= metric ton; MMT = million MT
 IFM = improved forest management
 EF = Exemplary Forestry, an approach to IFM developed by NEFF that views wildlife habitat, climate mitigate, and timber production as three coequal priorities

| | Area addressed | Acres of forest (million) | Carbon pools included | Per-acre potential from in-forest storage | Total potential from applying IFM on <i>all</i> of the addressed area (MMT CO ₂ e) |
|------------------|---|-----------------------------------|---|---|---|
| NEFF | Understocked counties of northern New England, private forestland only | 16.5 (understocked counties only) | Aboveground biomass, dead wood, forest floor litter, and belowground biomass (live and dead coarse roots) | 33 | 542 |
| Highstead | Understocked timberland in New England, excluding area projected to be deforested | 10.4 (understocked acres only) | Aboveground biomass, dead wood, and forest floor litter | 35 | 368 |

New England Forestry Foundation

NEFF estimated the opportunity to increase carbon storage in the forest from applying Exemplary Forestry silviculture (EF; a type of IFM that addresses carbon storage and other forest values) to all private forest land in understocked counties in the Acadian Forest of New England. NEFF defined “understocked” based on merchantable volume of timber, with understocked counties having average volumes below 25 cords/acre, which is the minimum average volume expected to be maintained in forests under EF management.

The NEFF analysis predicted a total opportunity of 542 MMT within 30 years over 16.5 million acres of private forest land in understocked counties in New England, including all carbon in the forest except the mineral soil carbon pool. This estimate was based on FVS modeling for a 5-million-acre region of northwestern Maine, which showed that a forest that is currently in average condition for the region can reach and maintain average carbon stocking of 167 MT CO₂e/acre within 25 years of implementing EF management. This is an increase of 33 MT/acre over current carbon stocking. The modeling indicated that average carbon stocking would surpass 167 MT CO₂e/acre by year 25 and remain at or above that level through at least year 60 (the length of the modeling period). The NEFF analysis compared current carbon storage in the forest to future storage under EF, without attempting to quantify future carbon storage under business-as-usual trends. The NEFF analysis did not address future carbon storage in counties that already meet the minimum average stocking targets for EF.

The NEFF analysis also did not address the role of forest reserves in storing additional carbon. The EF standards recommend designating appropriate ecological reserves to be excluded from active management, but NEFF’s modeling of EF silviculture addressed actively managed lands only.

Highstead

Highstead estimated the opportunity from applying IFM to increase stocking on understocked timberland across all of New England (excluding land projected by separate analyses to be developed or reserved from harvest). Highstead defined stocking based on FIA stocking classes, which measure the relative density of the stand – essentially, how much of the available growing space is occupied by tree canopies. Their analysis addressed timberland in the non-stocked (0-9%), poorly stocked (10-34%) and medium-stocked (35-59%) classes and assumed that improved forest management would move each understocked stand into the next higher stocking class. The absolute gain in carbon storage per acre varies by state and stocking class, but NEFF views these as conservative targets for the gains that can be achieved on understocked acres through IFM.

The Highstead analysis estimated a potential of 184 MMT of additional carbon storage within 30 years, assuming a moderate tier of IFM adoption, in which half of the understocked acres of timberland (excluding reserves and forest predicted to be lost to development) in New England undergo IFM. This would equate to a total potential of 368 MMT for all understocked acres, or 35 MT per understocked acre, including aboveground carbon pools only (aboveground biomass, dead wood, and forest floor litter).

This per-acre estimate is slightly higher than the NEFF estimate, primarily because the Highstead analysis looks at stocking on a finer scale. The Highstead analysis only looks at understocked stands, while the NEFF analysis considers all stands in understocked counties. In addition, approximately 27% of

the potential increased carbon storage estimated by Highstead comes from southern New England, a region not addressed in the NEFF study because all of the counties in southern New England (excluding counties in southeastern MA where pitch pine-oak forest types dominate) have average timber volumes greater than 25 cords/acre. Since the amount of additional carbon storage per acre from moving a stand up one stocking class is higher in southern New England, this likely contributes to a higher average potential per acre in the Highstead study.