

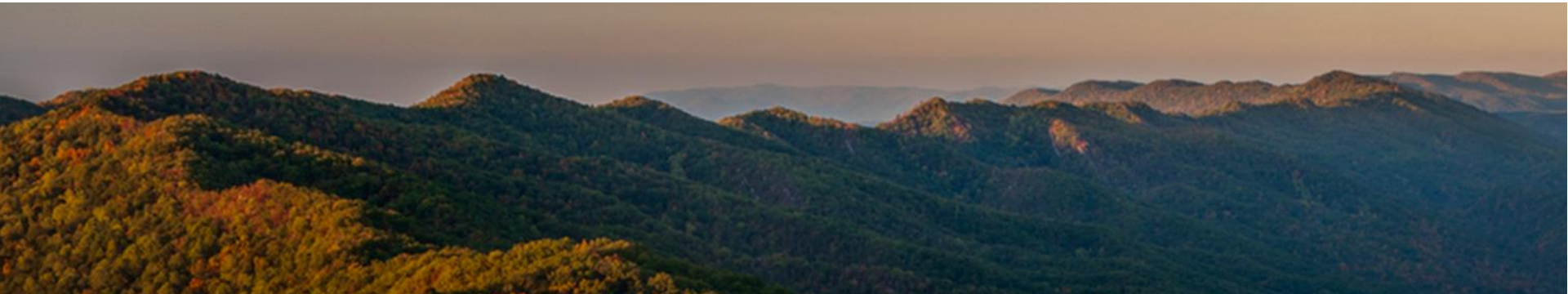
Estimating the Carbon Benefit of Family Forest Carbon Program Practices in the Northeast

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Overview

1. FFCP overview and Project Goals.
2. Drafting carbon beneficial practices.
3. Forest carbon benefit modeling of select practices.
4. Summary of FFCP NE Pilot Practices.

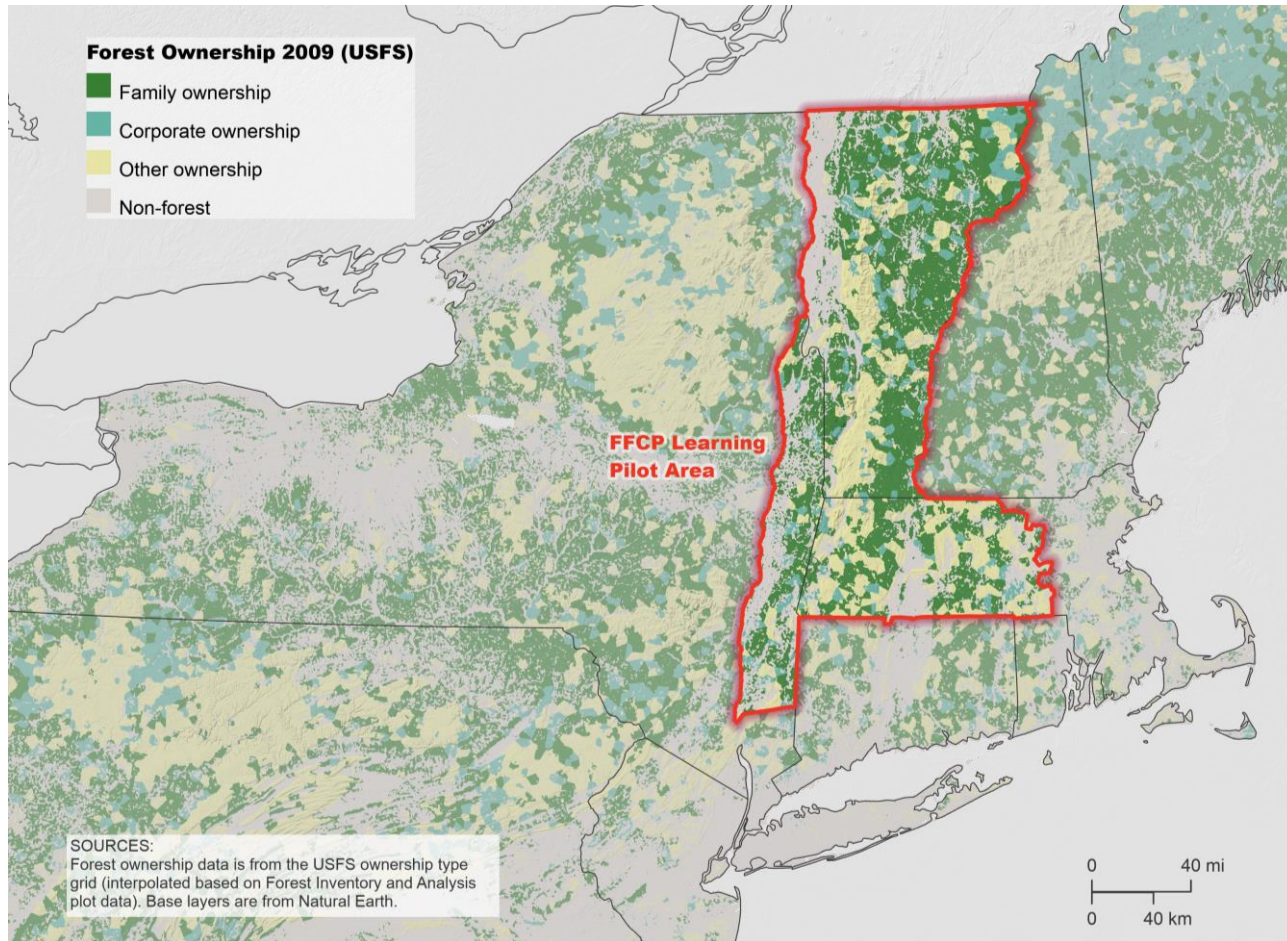


Family Forest Carbon Program

The American Forest Foundation and The Nature Conservancy have partnered to design and launch a new program, which addresses the obstacles family landowners face in participating in carbon markets.



FFCP Northeast Learning Pilot Area



FFCP Eligibility Criteria

- Non-Industrial Private Landowner owning 30 - 2,400 acres.
- No restrictions on the land that exclude timber harvest activity.
- Operable forest harvest conditions with sufficient commercial stocking (>2,000 bd ft/acre).
- Additional eligibility criteria tied to the specific practices.
- Pays the landowner to complete activities (“practices”) on their land that promote forest stewardship and are carbon friendly.



Family Forest Carbon Program

'TRADITIONAL' FOREST CARBON PROJECTS

Pays landowners for carbon sequestered

Monitors carbon values on every property

Additionality determined from modeled baseline

High costs for monitoring on a per-property basis

FAMILY FOREST CARBON PROGRAM

Pays landowners to implement specific practices

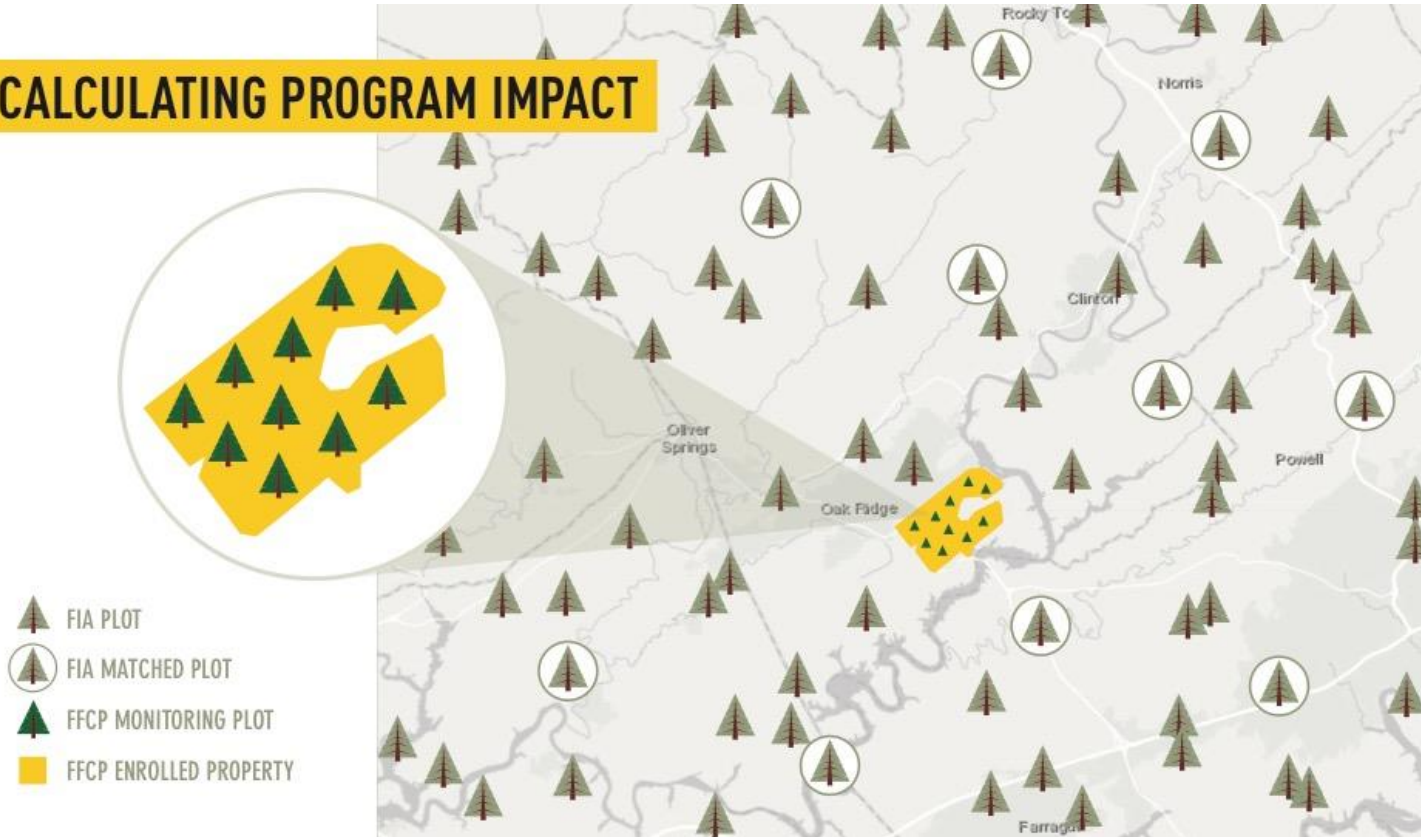
Monitors practice implementation on every property; monitors carbon values on a landscape level using random sampling

Additionality determined from paired inventory plots on selected properties compared to a composite control baseline, updated with every verification cycle
Verra - Improved Forest Management Methodology

Monitoring costs are high but spread across participating properties

Verra – Improved Forest Management Methodology

CALCULATING PROGRAM IMPACT



Project Goal

Model carbon benefits of draft FFCP practices on private forests located in New York, Massachusetts, and Vermont to:

1. Select practices for pilot program
2. Refine practices specification
3. Determine payment rates.



Drafting Carbon Beneficial Practices

Protect forests

1. Avoid forest loss

Grow new trees and forests

2. Green developed areas
3. Reforest
4. Plant trees to increase forest stocking

Reduce stressors

5. Remove invasive vegetation
6. Protect seedlings and saplings from deer browse

Manage forests

7. Increase time between harvests
8. Establish forest reserves
9. Create gaps to promote regeneration
10. Retain more carbon in a thinning



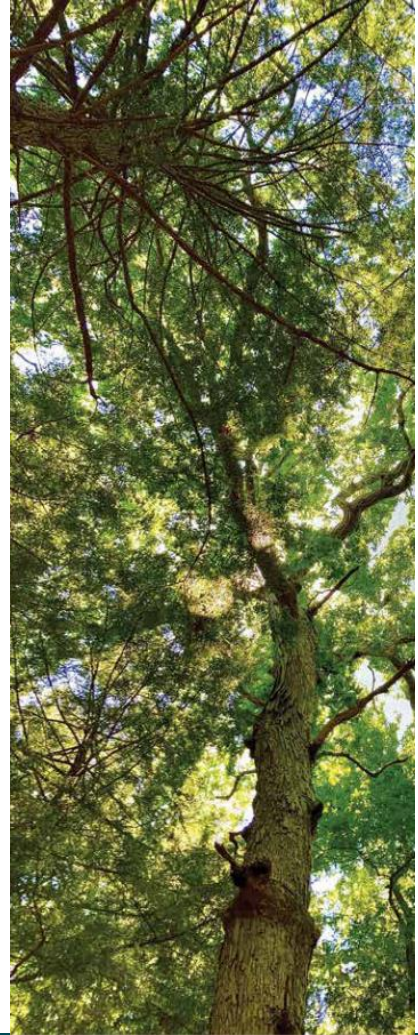


Healthy Forests for our Future:



Forest Carbon Benefit Analysis

1. Growing older forests (Deferred Harvest).
2. Create gaps to promote regeneration.
3. Retaining more carbon in thinning.
4. Promote regeneration by treating competing/invasive vegetation.

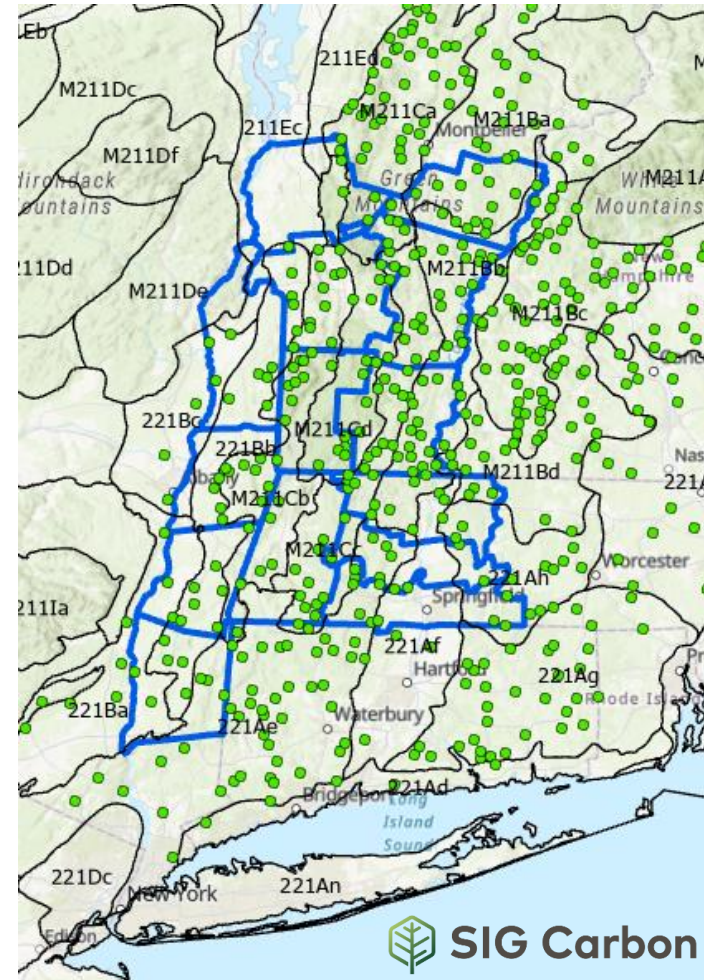


Forest Carbon Stock Change Analysis

Selected Forest Inventory and Analysis (FIA) plots to determine annual forest carbon stock change for composite baseline and modeled harvest practices.

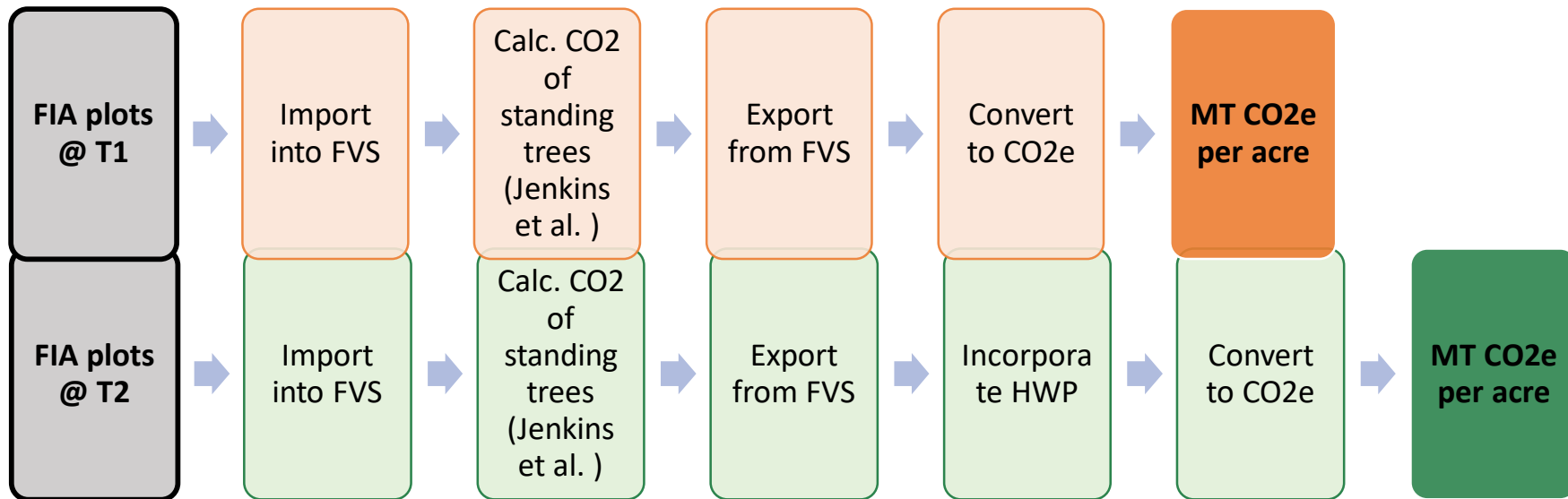
- Ownership: Private
- Origin: Natural
- Ecoregion: Lower New England (221) and Green Mt (M221)
- Forest type groups: Maple/beech/birch and Oak/hickory
- Volume criteria: >2,000 bd ft/acre

Forest Type	Plots	
	n (543)	% Harvested
Maple Beech (221)	103	37%
Maple Beech (M211)	284	21%
Oak Hickory (211)	156	11%



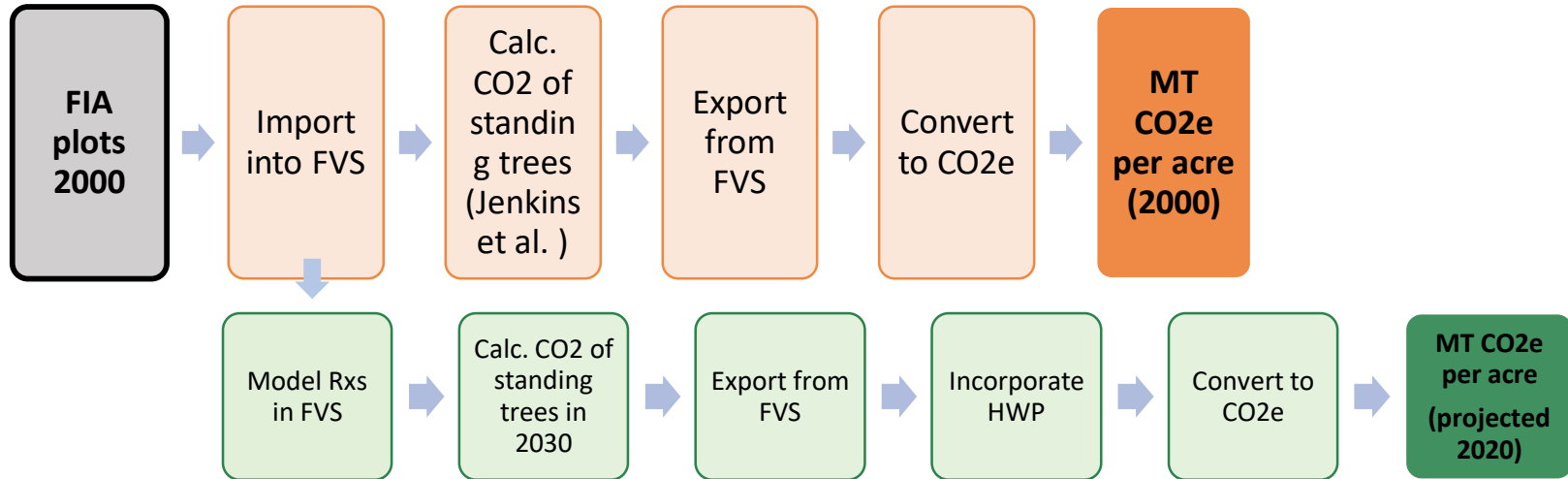
Baseline: Annual Stock Change (MT CO₂e/acre/year)

$$\text{Annual carbon stock change} = \frac{\text{MT CO}_2\text{e/acre @T2} - \text{MT CO}_2\text{e/acre @T1}}{\text{Years between T1 and T2}}$$

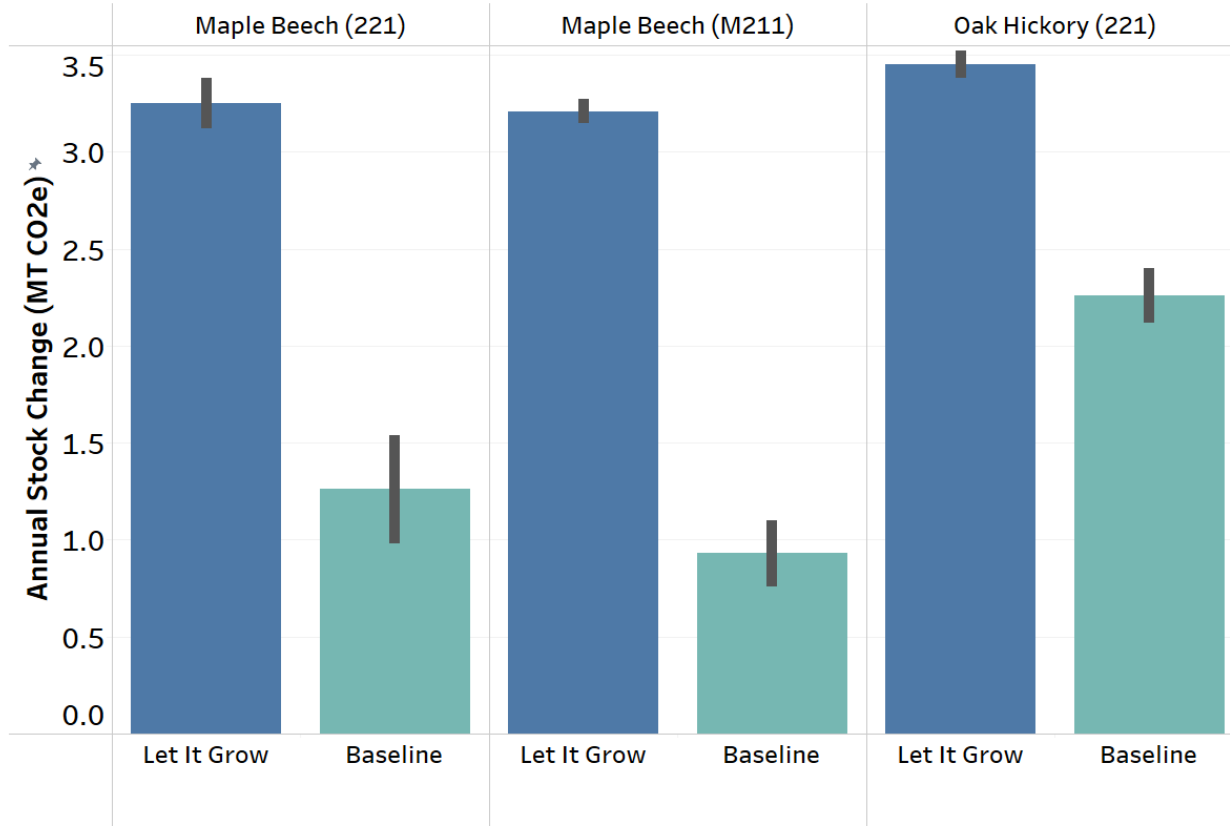


Rxs: Annual Stock Change (MT CO₂e/acre/year)

Annual carbon stock change =
$$\frac{\text{MT CO}_2\text{e/acre (projected 2020)} - \text{MT CO}_2\text{e/acre (2000)}}{20 \text{ yrs}}$$



Growing Older Forests (Deferred Harvest)



Average carbon stocking above baseline (MT CO2e/acre/yr)

Maple/Beech/ Birch	Oak/Hickory (221)
2.0 – 2.3	1.2

Create Gaps to Promote Regeneration

Description: Carbon benefits come from reducing the total harvestable area and retaining carbon in snags, downed wood, and large-diameter trees in harvested gaps.

Model Specifications

Project start year: 2000

Modeling time period: 20 years

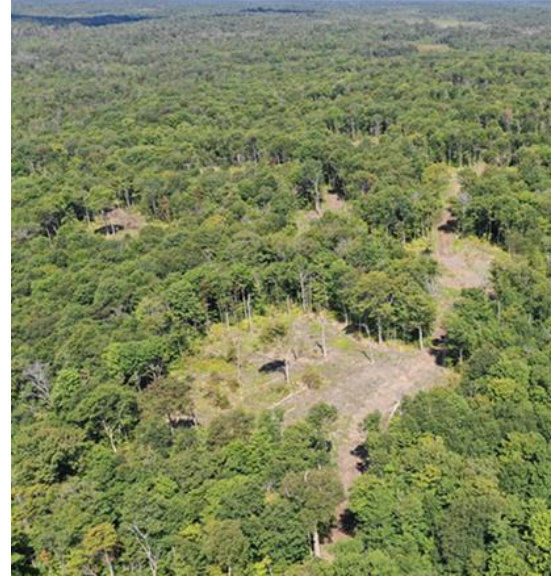
Treatment within 10 years (2010)

Retain 4 trees, >14" DBH per acre

Treatment areas:

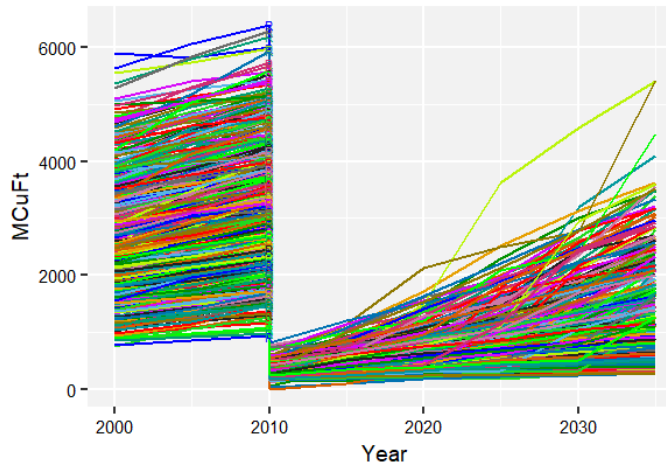
10% of project area

20% of project area

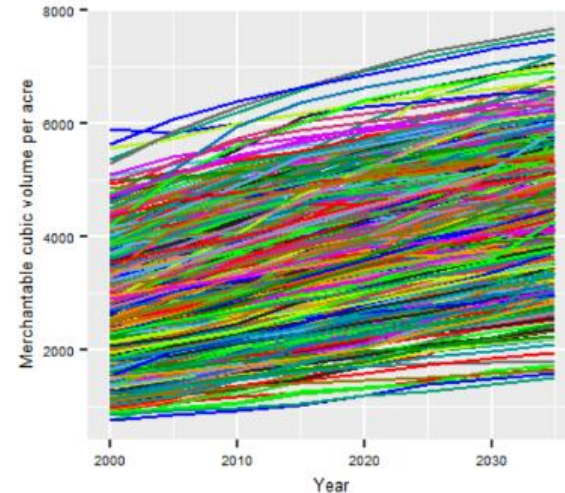


Create Gaps to Promote Regeneration: Harvest Rxs

Project Area Harvested (%)	Project Area-Unharvested (%)	Retention (TPA)	Harvest Interval	AVG BA Removed (%)
10%	90%	4 trees, >14" dbh	20yrs	8
20%	80%	4 trees, >14" dbh	20yrs	16

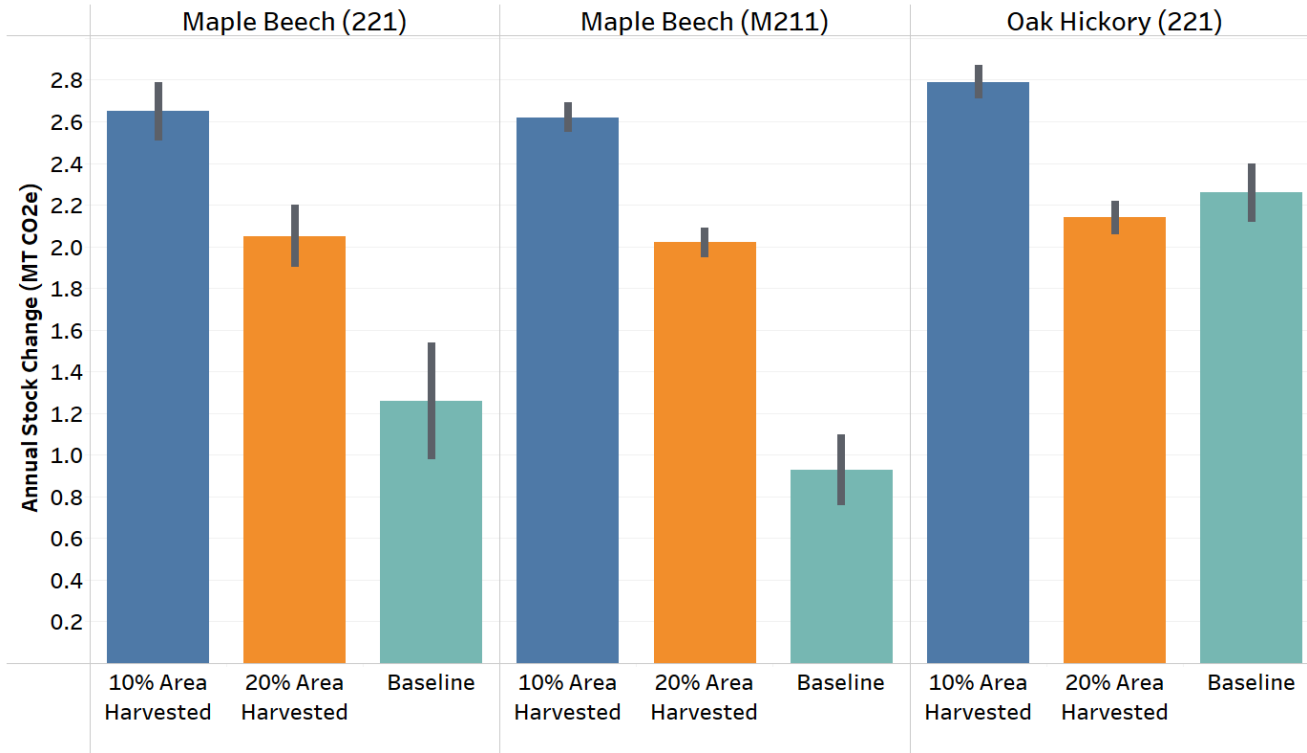


Harvest (10-20% of Project Area)



Let it grow/unharvested (80-90% of project area)

Create Gaps to Promote Regeneration



Average carbon stocking above baseline (MT CO₂e/acre/yr)

Maple/Beech/Birch	Oak/Hickory
0.8 - 1.1	-0.1

Retaining More Carbon in Thinning Harvests

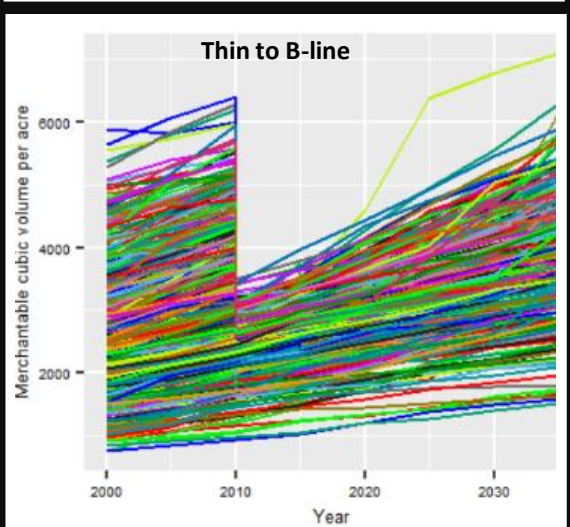
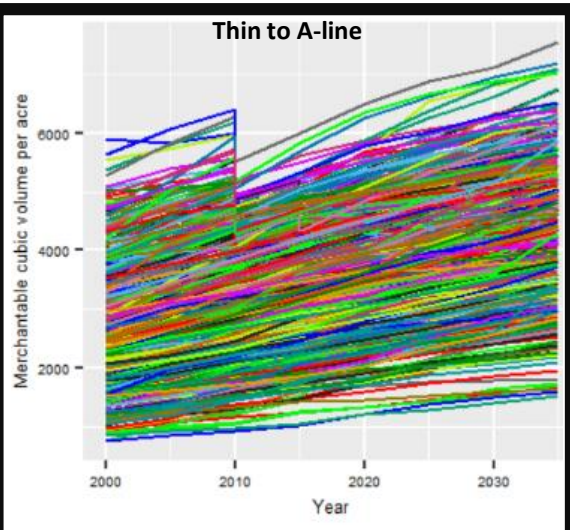
Description: This is a thinning practice that produces carbon benefits by removing intermediate and co-dominant trees while increasing the average diameter of the residual stand.



Model Specifications

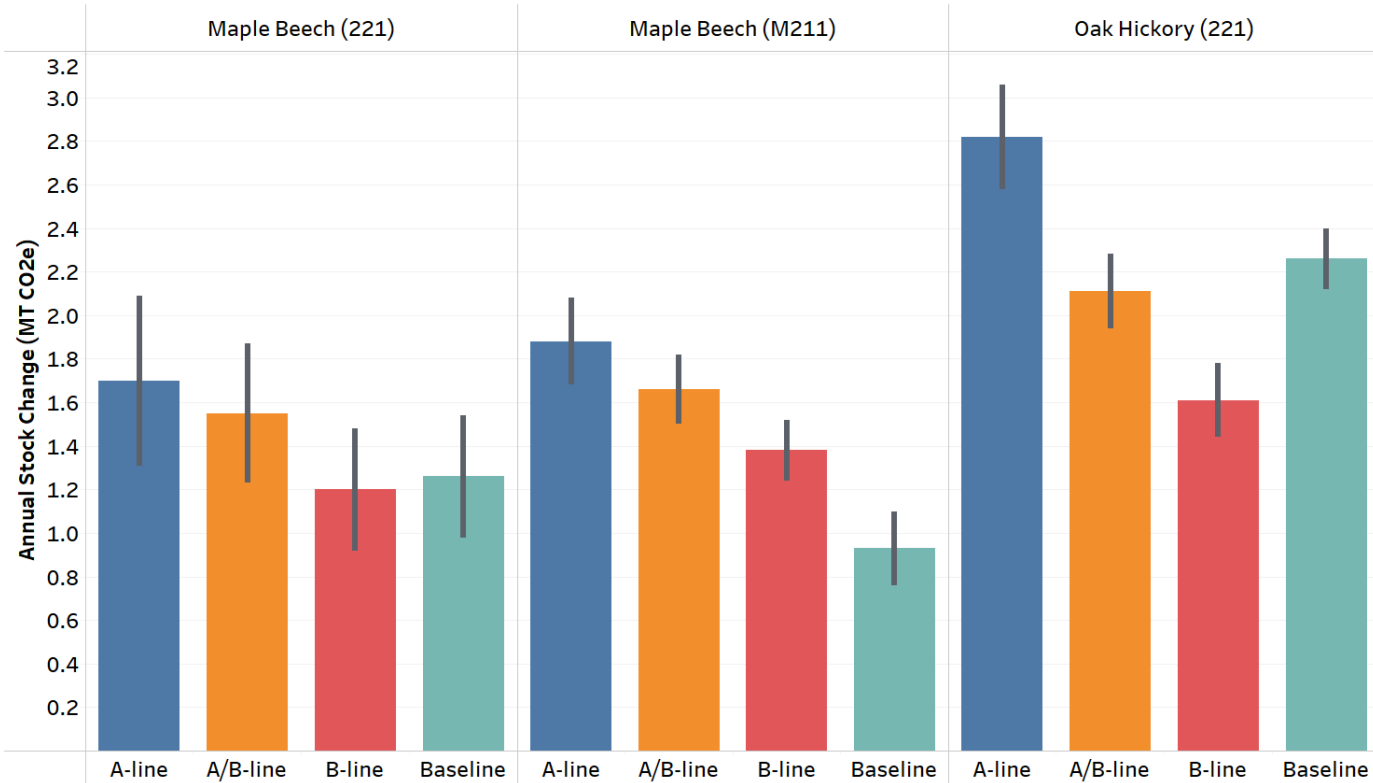
- Based on stocking guide/Stocking Chart (Ducey & Knapp 2010, Gunn, Ducey, & Belair 2019).
- Modeling time period: 20 years.
- Treatment at 10 years (2010).
- Treatments:
 - Thin to A-line: Average A-line BA = 146 sqft/acre.
 - Thin to midpoint between A and B-lines: Average midpoint BA = 100 sqft/acre.
 - Thin to B-line: Average B-line BA = 87 sqft/acre.

Retaining More Carbon in Thinning Harvests



Treatment	Thinning Threshold	Change in BA	Change in QMD
A-line	146 (ft.2/acre)	-10%	-1.2%
Between A & B Line	100 (sq.ft./acre)	-22%	-4.7%
B-line	87 (ft.2/acre)	-27%	-6.6%

Retaining More Carbon in Thinning Harvests



Average carbon stocking above baseline (MT CO₂e/acre/yr)

Maple/Beech/ Birch	Oak/Hickory
1.2 - 1.5	0.5

Treat Competing/Invasive Vegetation to Promote Regeneration

- Results inconclusive
- Difficult to determine baseline conditions
- Area of future analysis



Northeast Pilot Practices

Two practices offered over 20-year contract

1. Growing Older Forests (Deferred Harvest)
2. Enhance Your Woodland (Total timber harvest over the contract period < 15% of total basal area within the overall enrolled area)
 - a) Create Gaps to Promote Regeneration
 - b) Retain Carbon in Thinning

Eligibility Requirements

1. Non-industrial private landowner owning 30 - 2,400 acres
2. Operable forest harvest conditions with sufficient commercial stocking
3. Maple/Beech/Birch Forest Type



Summary

- Launch Northeast Learning Pilot in Spring 2022
- Two practices will be offered
- Practice payment information coming soon
- Researching viability of other practices to go to scale
 - Remove competing invasive vegetation
 - Protect seedlings and saplings from deer browse
 - Reforestation
- Forest Carbon Benefit Assessment for New York





Questions?