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51st New Hampshire Association of Conservation Commissions
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How NH Town Forests Can Contribute to Climate Solutions

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NH Extension

New Hamphire Forests

New Hampshire's Forests

- 4,741,185 acres of forestland, 82.6% of the land area
- Forest Products industry and forest-based recreation are an important parts of NH's economy
  - NH Forest Products Industry: $1.4 Billion, 7,756 workers
  - Forest-based Recreation: additional $1.4 Billion, 10,800 workers

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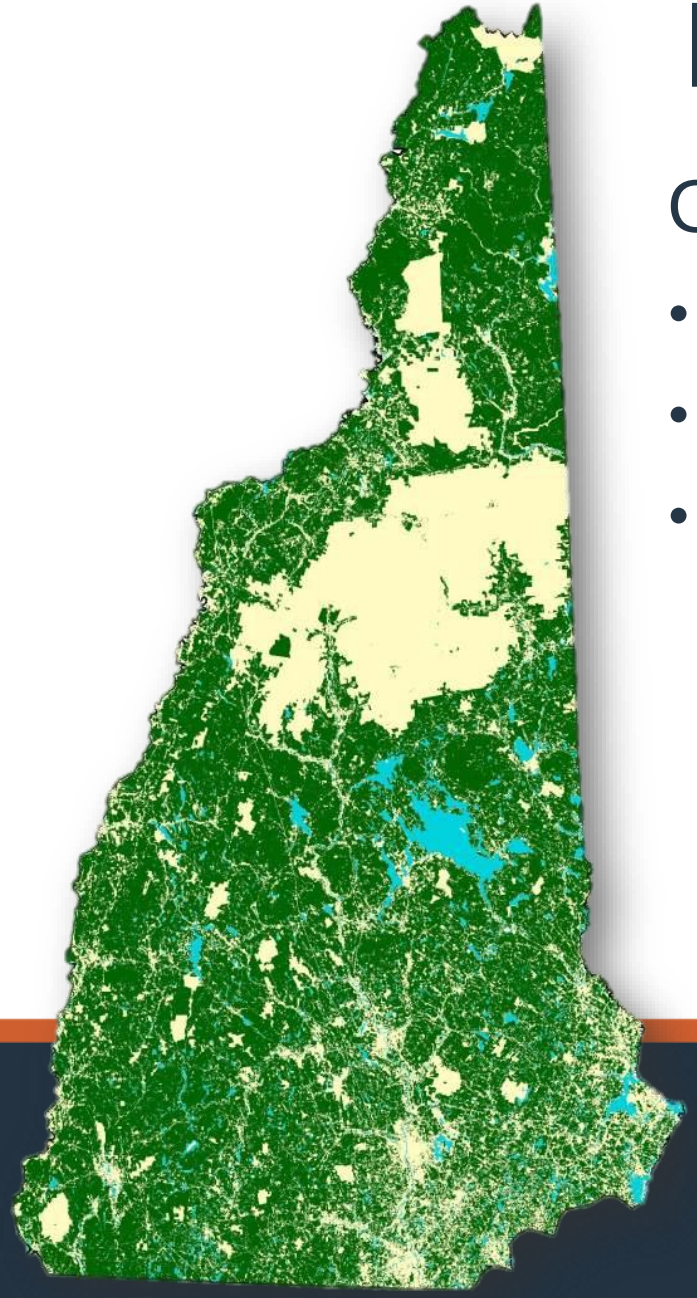
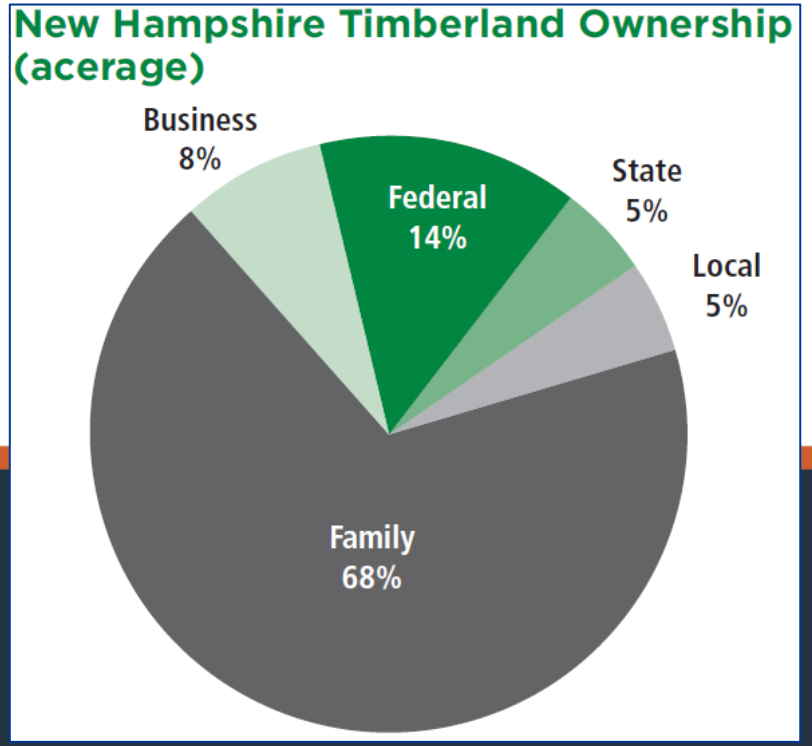
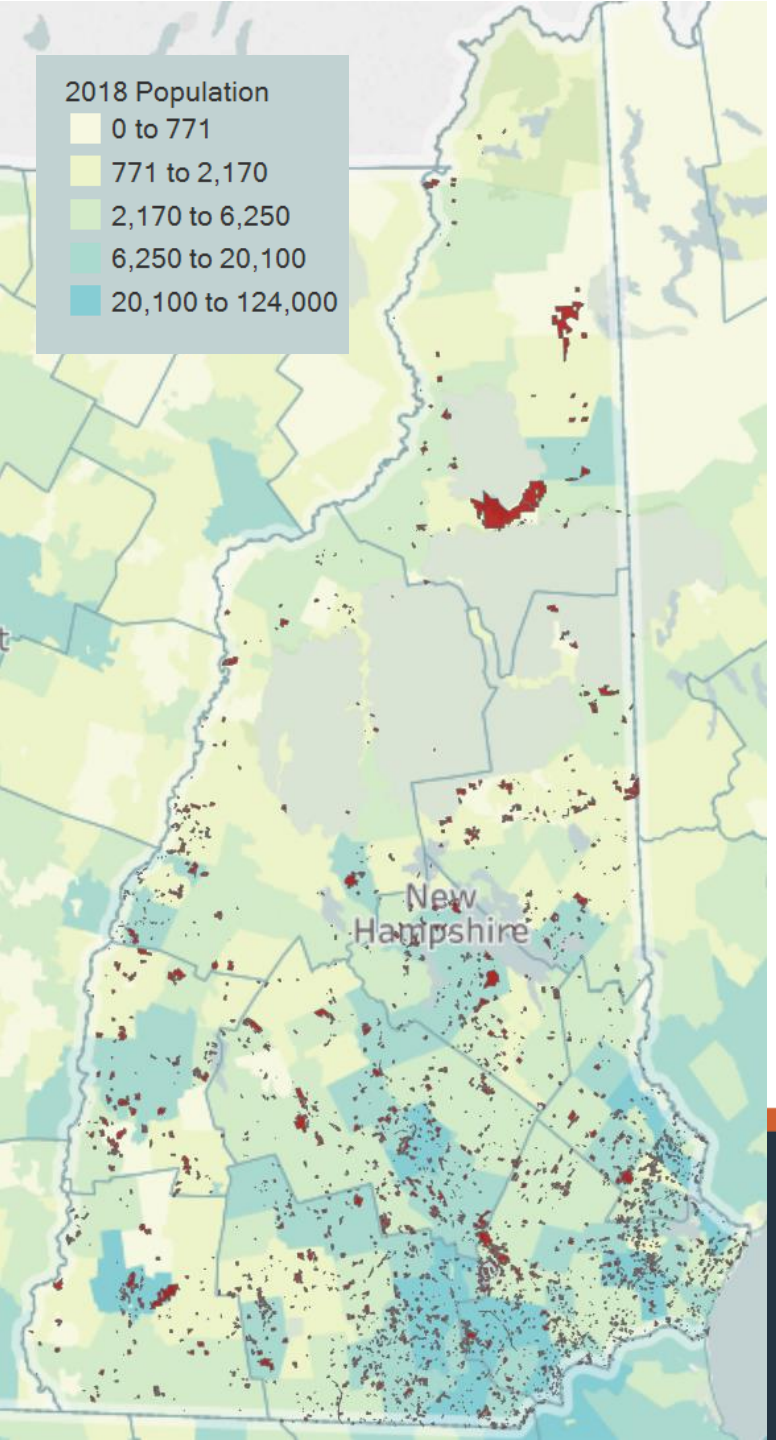


New Hampshire's Forests

Ownership

- More than 2/3 of NH is Privately Owned Forestland
- Stewards of NH's Natural Resources
- Private decisions impact public good
  - Clean water
  - Climate benefits (carbon)
  - Timber production
  - Wildlife
  - Scenery

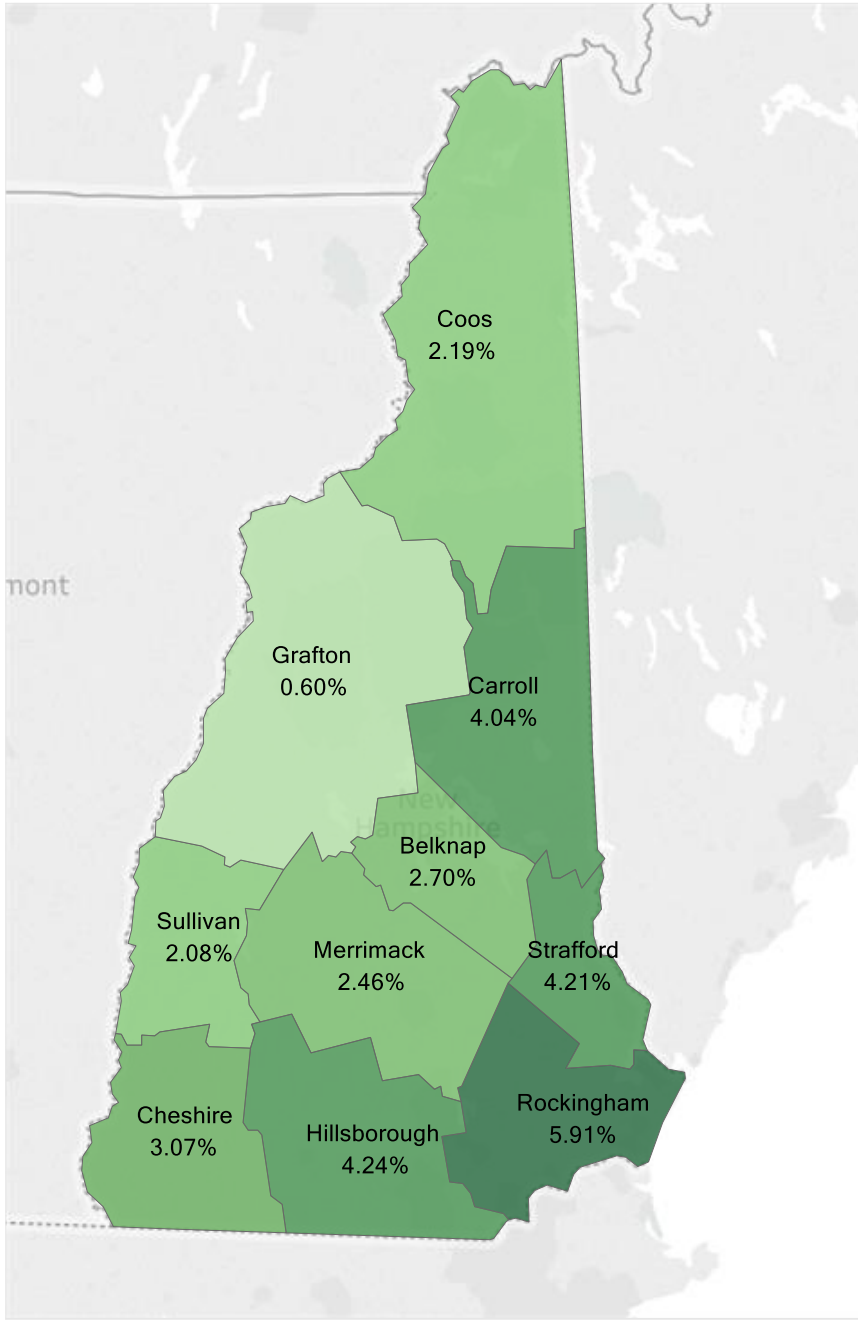


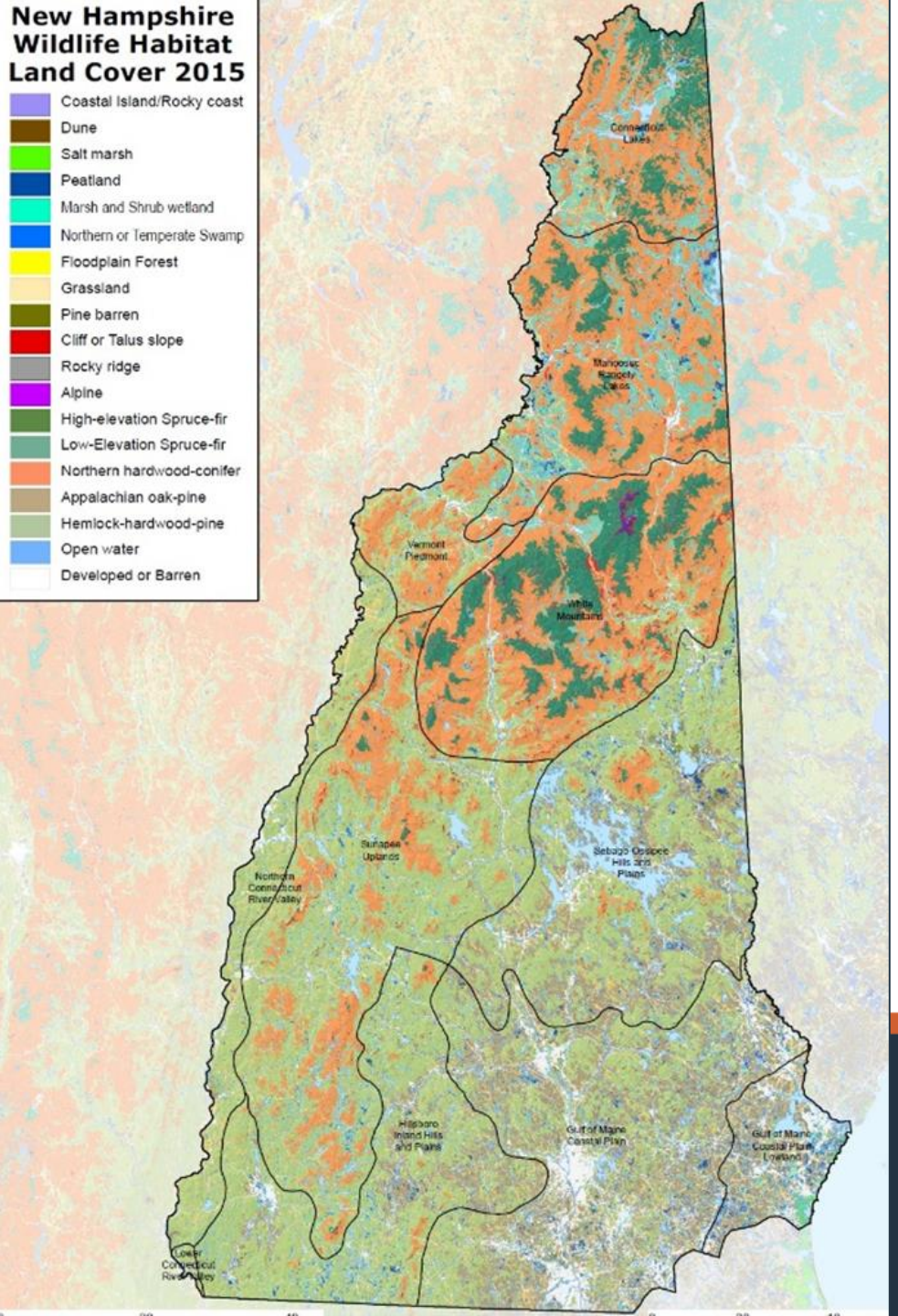


Town-Owned Forests

- 1,435 parcels (“forests”)
- 158,455 acres
- 3% of NH forested land

% of County in Town Ownership





New Hampshire's Forests

Forest Types

- White Pine
- Spruce / Fir
- Hemlock
- Red Oak
- Northern Hardwoods
- Mixed

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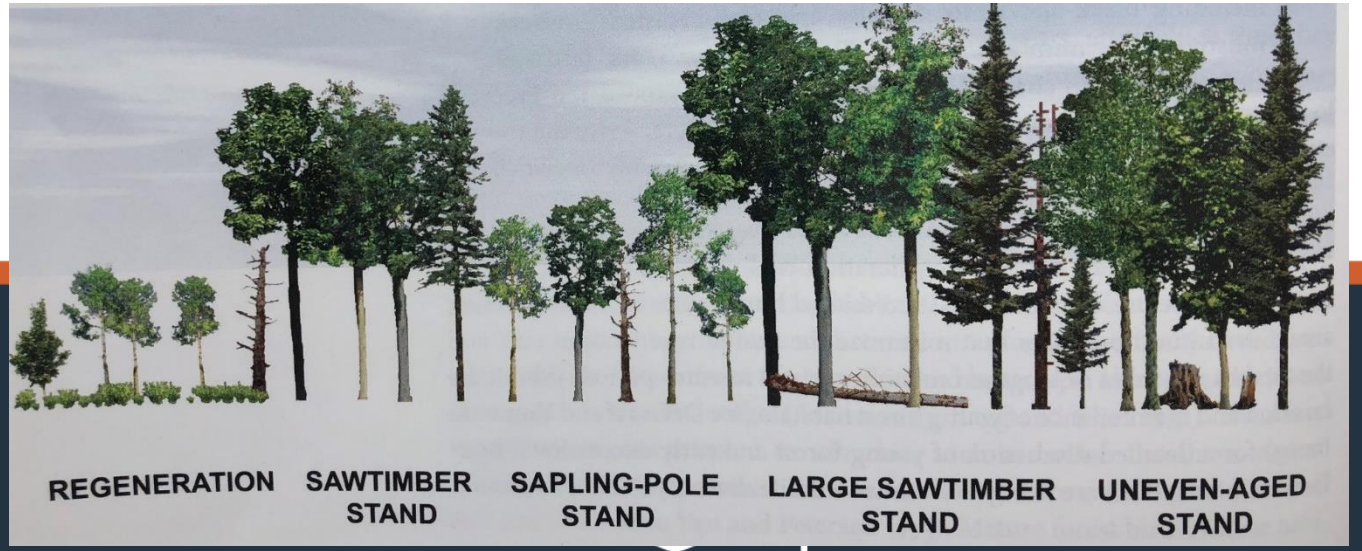
New Hampshire's Forests

Structure

- Distribution of age classes
- Distribution of size classes
- Important for wildlife habitat
- Carbon storage vs carbon sequestration
- Not a lot of variation currently



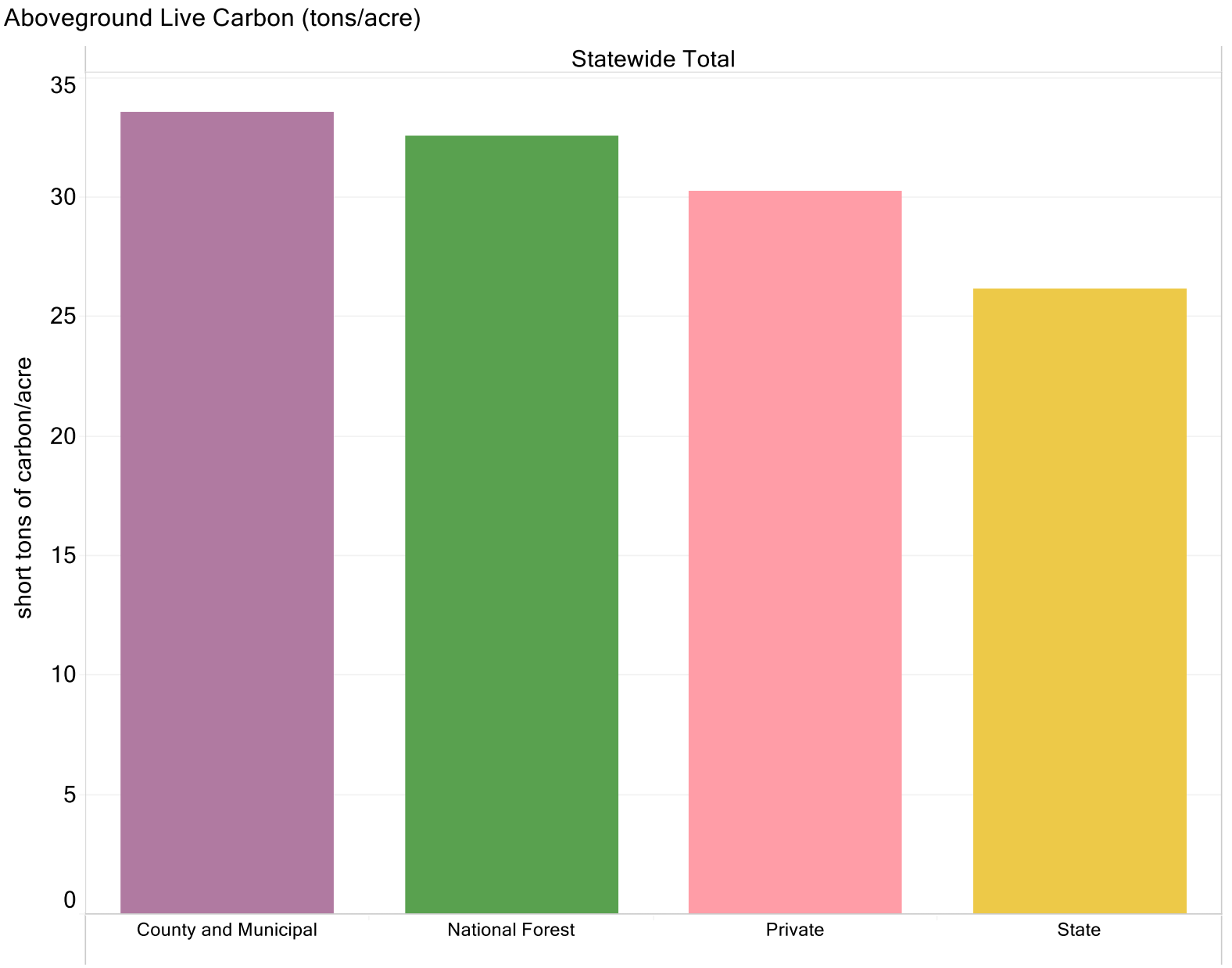
New Hampshire's Growth and Yield

State	Net Growth (includes Mortality)	Harvest	Ratio
New Hampshire	188M cu. ft.	95M cu. ft.	2.0

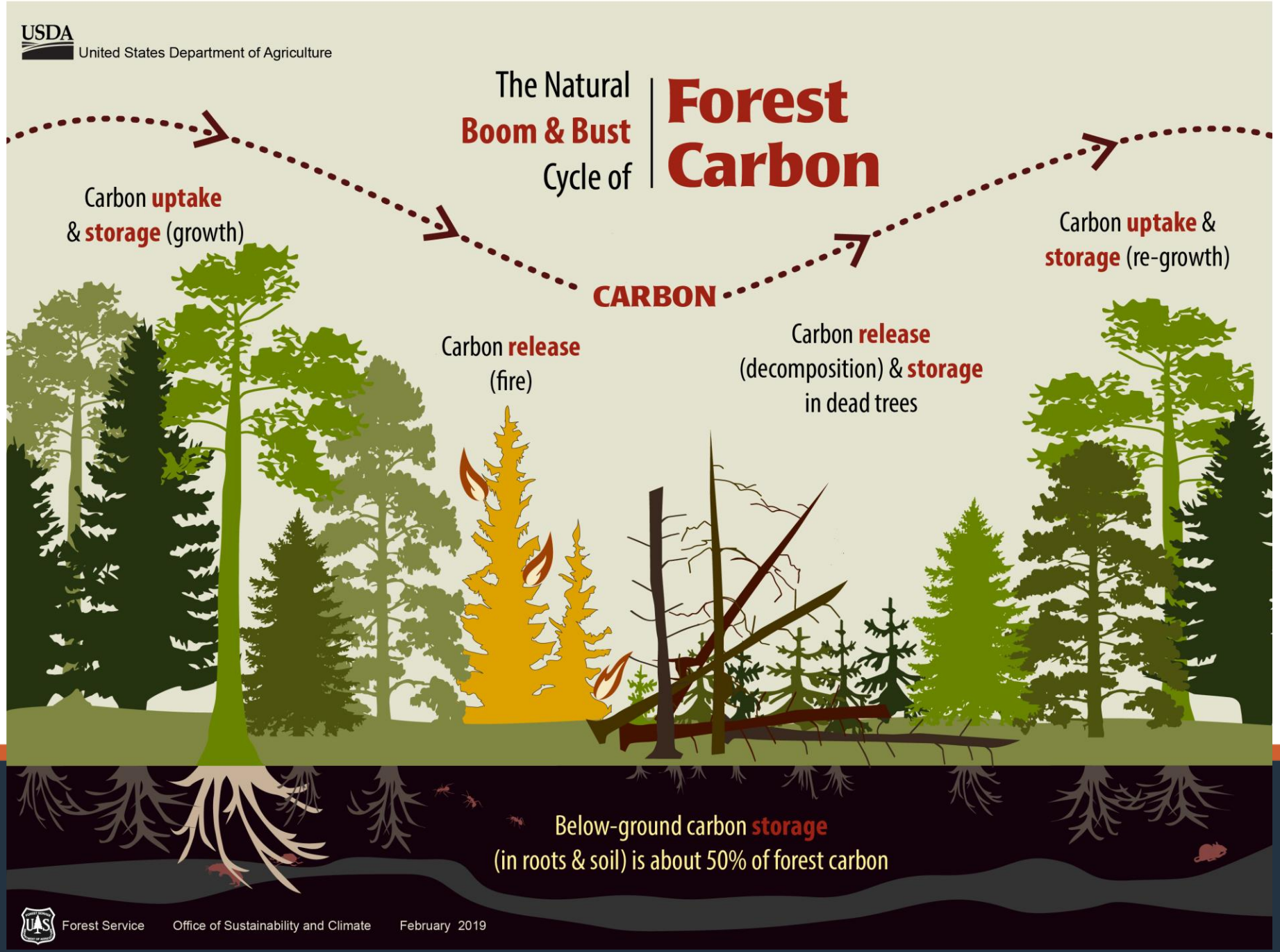
- Growing ½ cord per acre per year (after mortality)
- Harvesting ¼ cord per acre per year

Forest Carbon

Forest Carbon by Ownership in NH



Carbon Dynamics



https://www.fs.usda.gov/sites/default/files/Carbon-Graphics-June-2019.pdf

FIVE FOREST CARBON POOLS

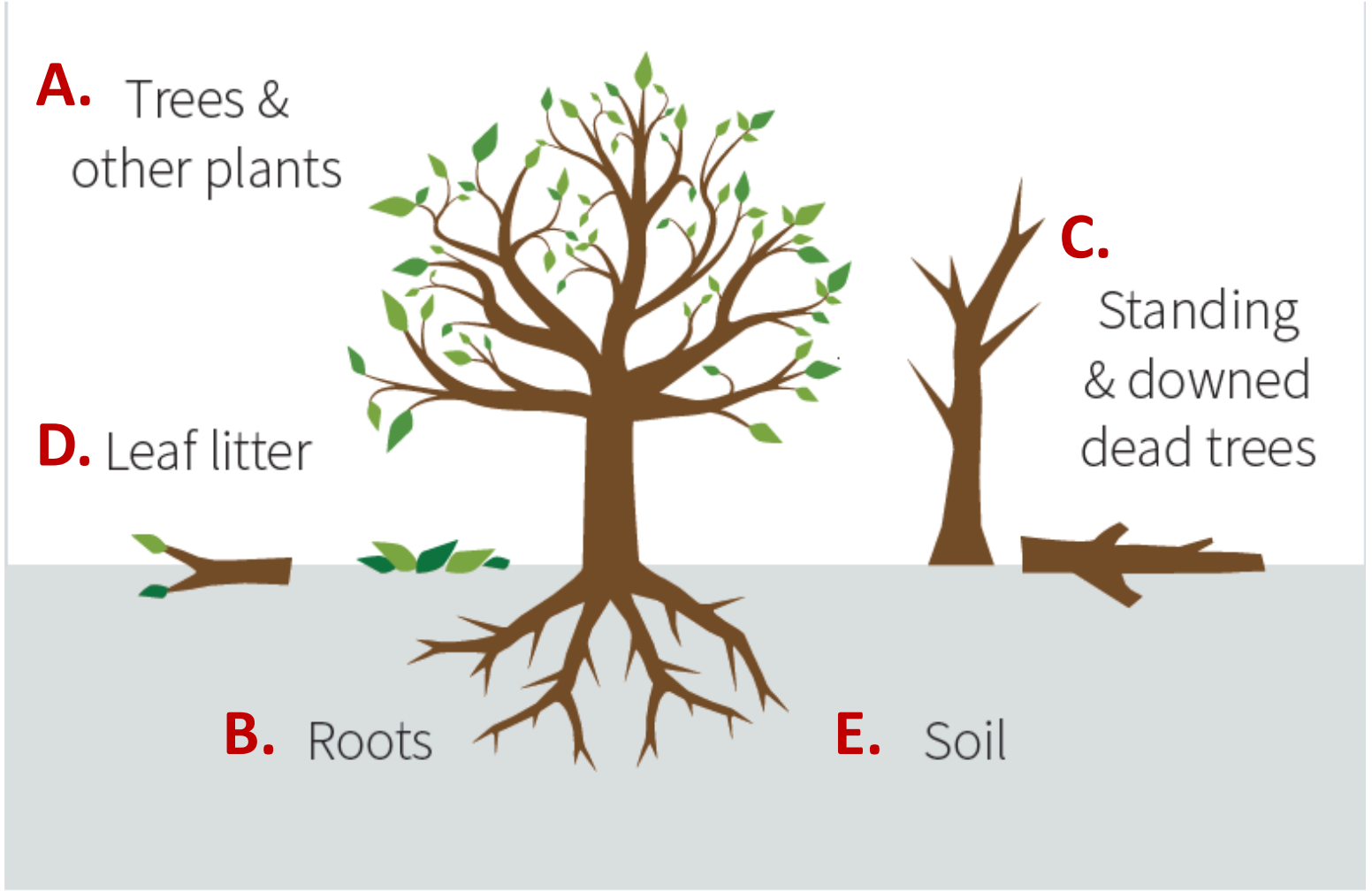
A. **Live aboveground**
(trees, shrubs, and other plants)

B. **Live belowground**
(roots)

C. **Deadwood**
(standing dead trees [snags] and downed logs)

D. **Litter**
(leaves, needles, and small branches)

E. **Soil organic matter**
(organic material in the soil, such as dead and decayed biomass [e.g., plant material and insects])



https://extension.unh.edu/resource/your-woodlot-your-legacy-managing-forest-carbon

Cantanzaro, P. and D'Amato, A.
https://masswoods.org/sites/masswoods.org/files/Forest-Carbon-web_2.pdf

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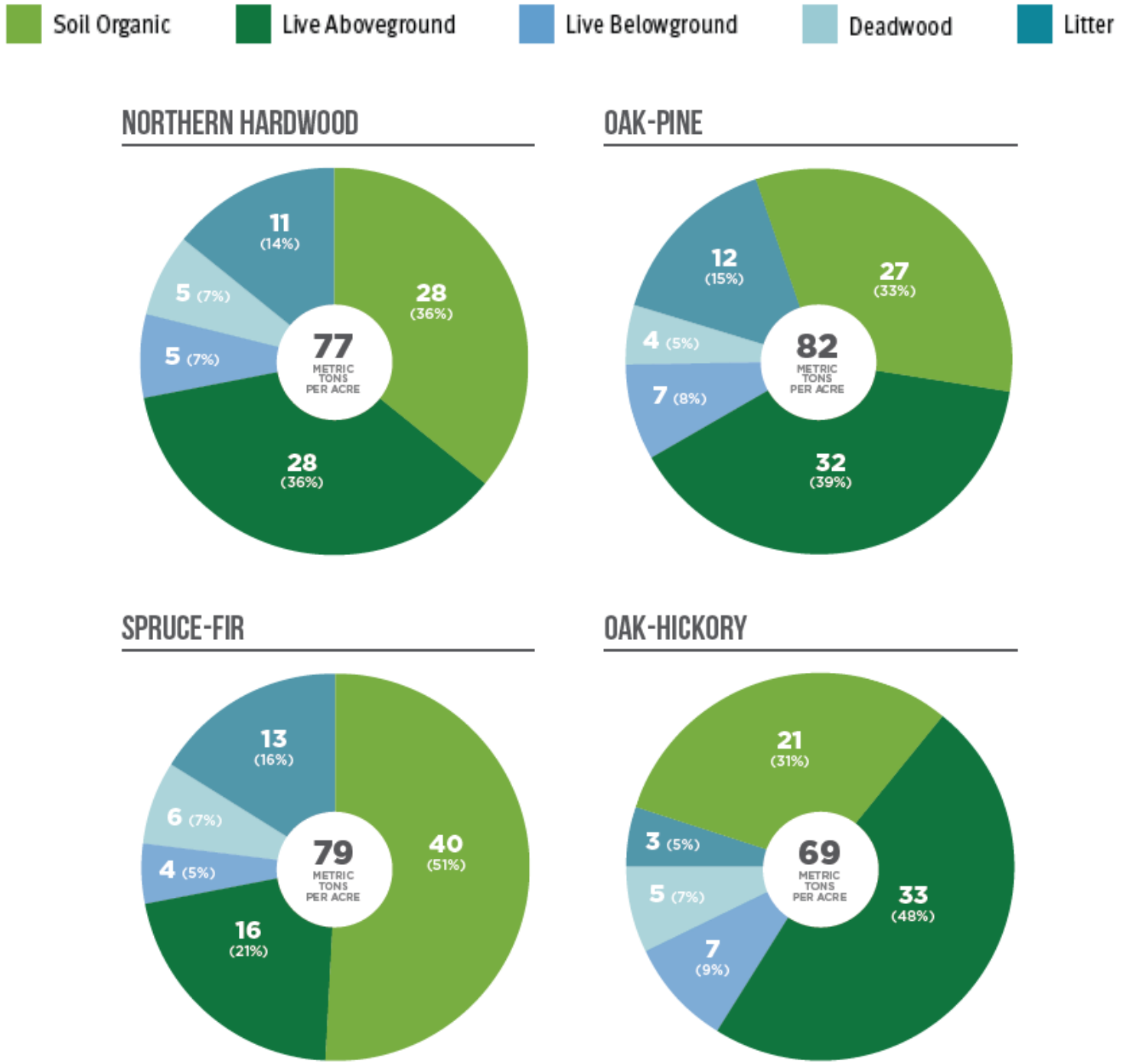
Carbon Pools by Forest Type



- Cantanzaro, P. and D'Amato, A.https://masswoods.org/sites/masswoods.org/files/Forest-Carbon-web_2.pdf

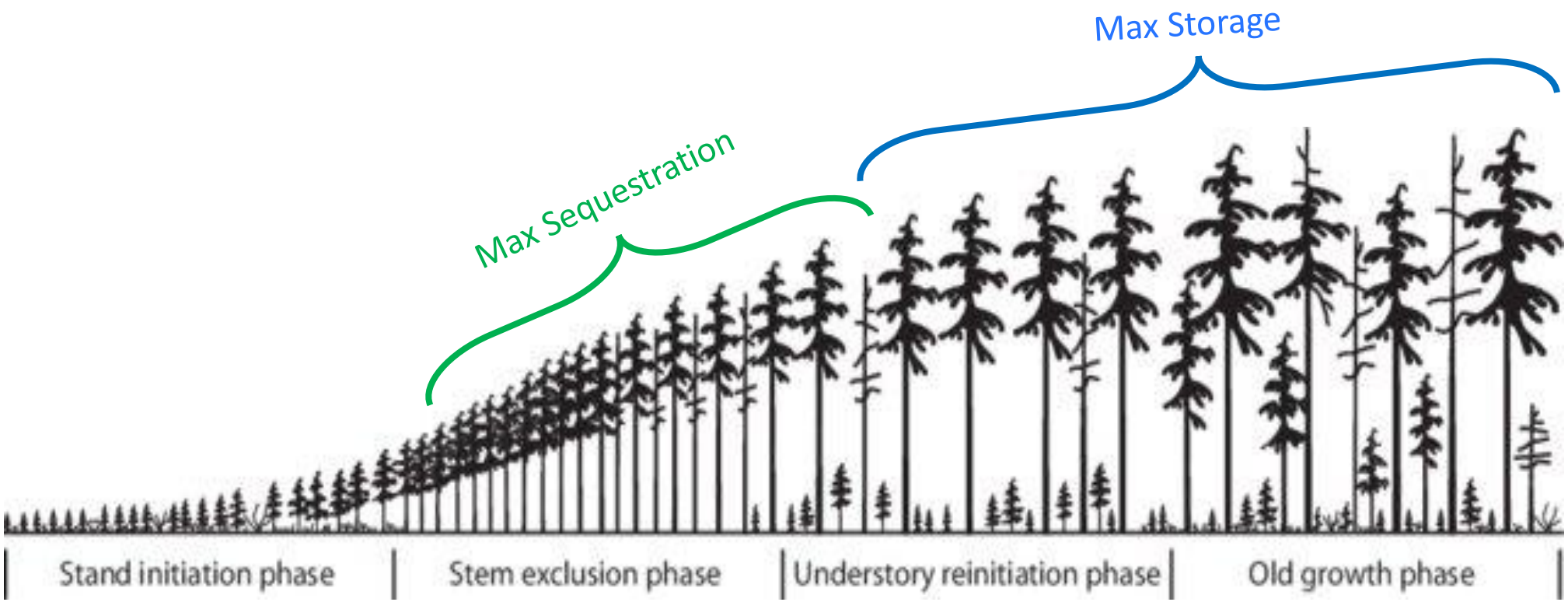
Carbon Storage

- The amount of carbon that is retained in a carbon pool within the forest.
- The amount of carbon at a given time
- In Northeast U.S. carbon storage peaks at older ages, around 200 years.

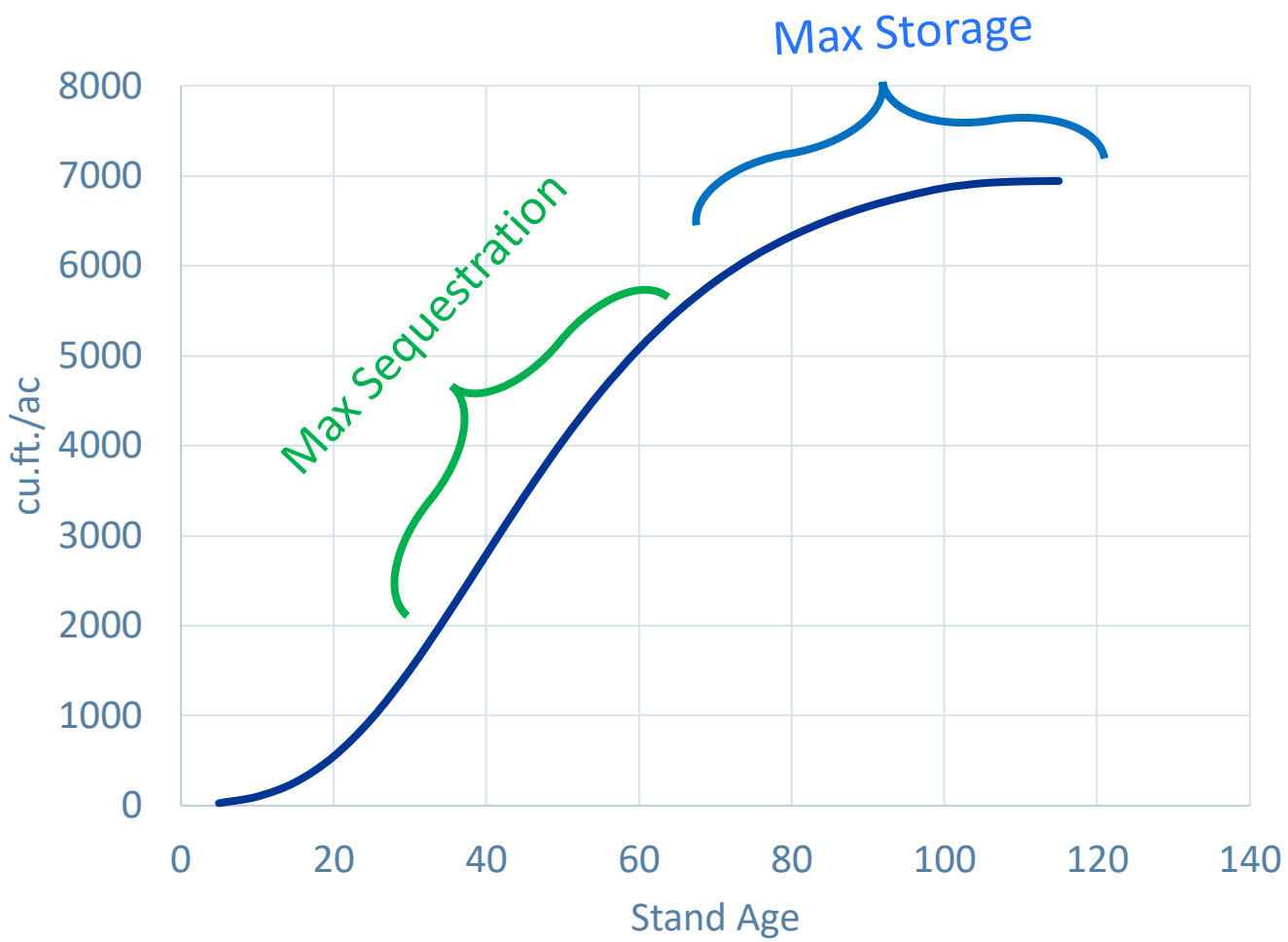
Carbon Sequestration

- The process of removing carbon from the atmosphere during photosynthesis.
- The rate of carbon removed.
- In Northeast U.S., carbon sequestration peaks when forests are young to intermediate in age (30 – 70 years old)

Carbon Storage vs Carbon Sequestration



Carbon Storage vs Carbon Sequestration



Black birch stand in stem exclusion phase. Estimated 30 – 40 years old.

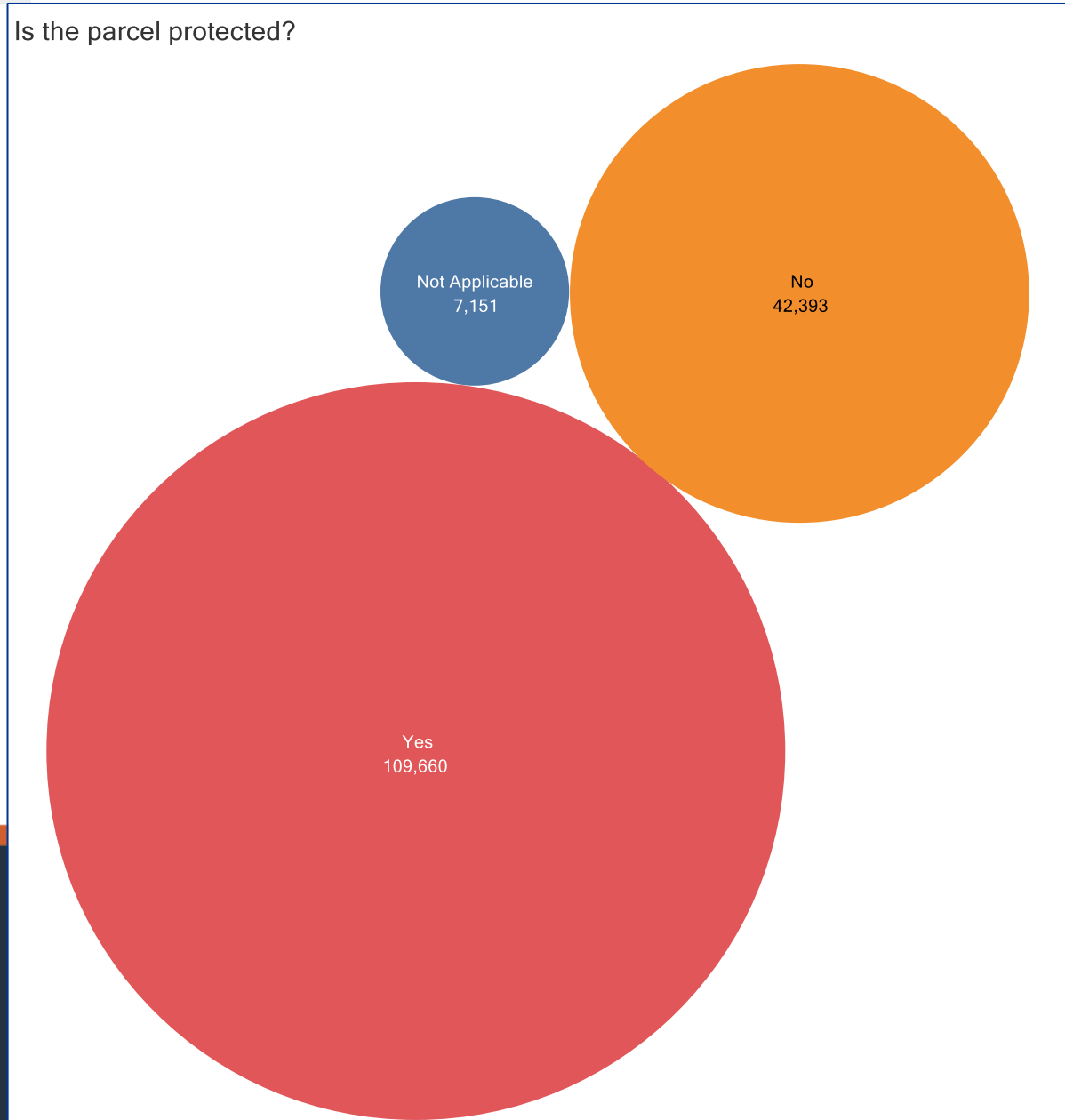
Sequestration is high, storage is relatively low.

Strategies for Managing Forest Lands for Climate Benefits

1. Keep Forests as Forests

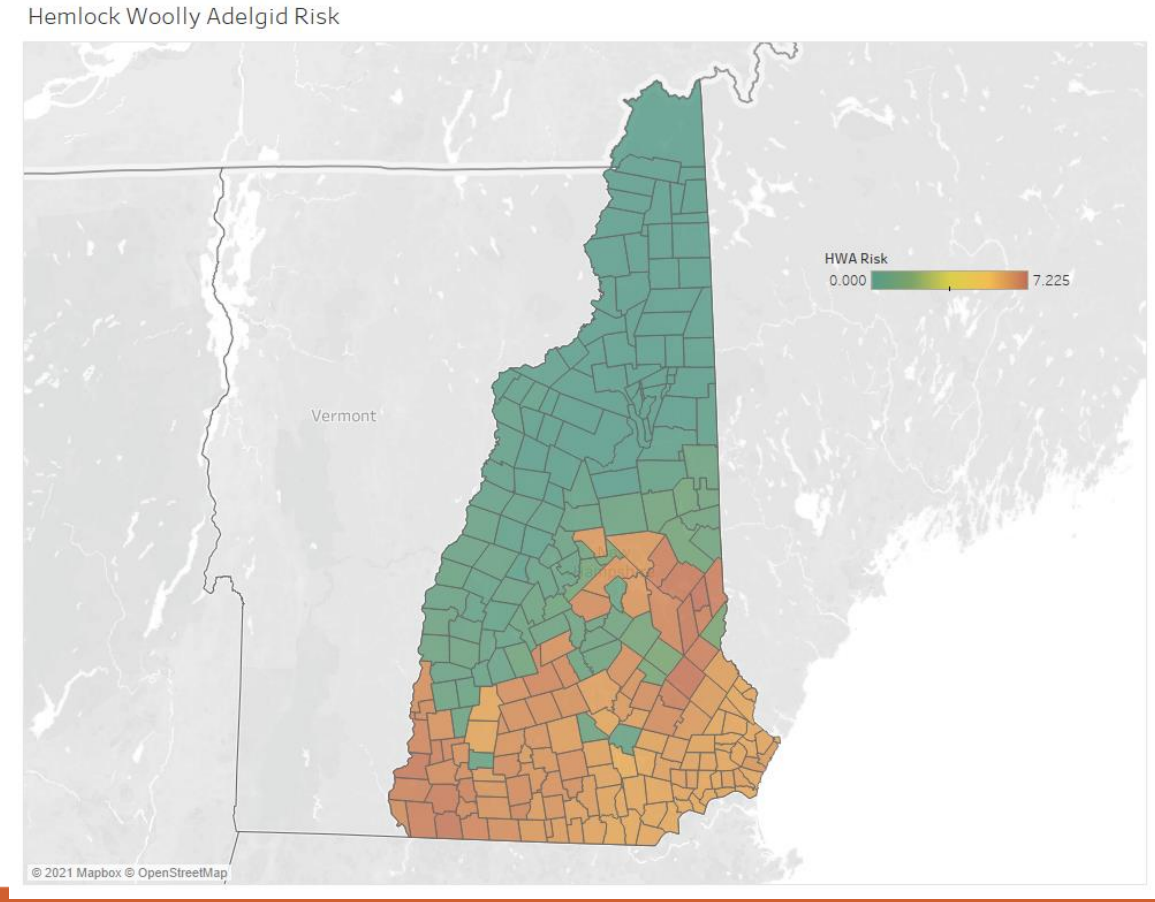
Protection status of town forests

- Unprotected (27%)
- Permanent protection (69%)
- Unknown (4%)
- 109,660 acres of town-owned permanently protected land



2. Maintain diversity of species

Species diversity reduces risk of pests or pathogens that target specific species.



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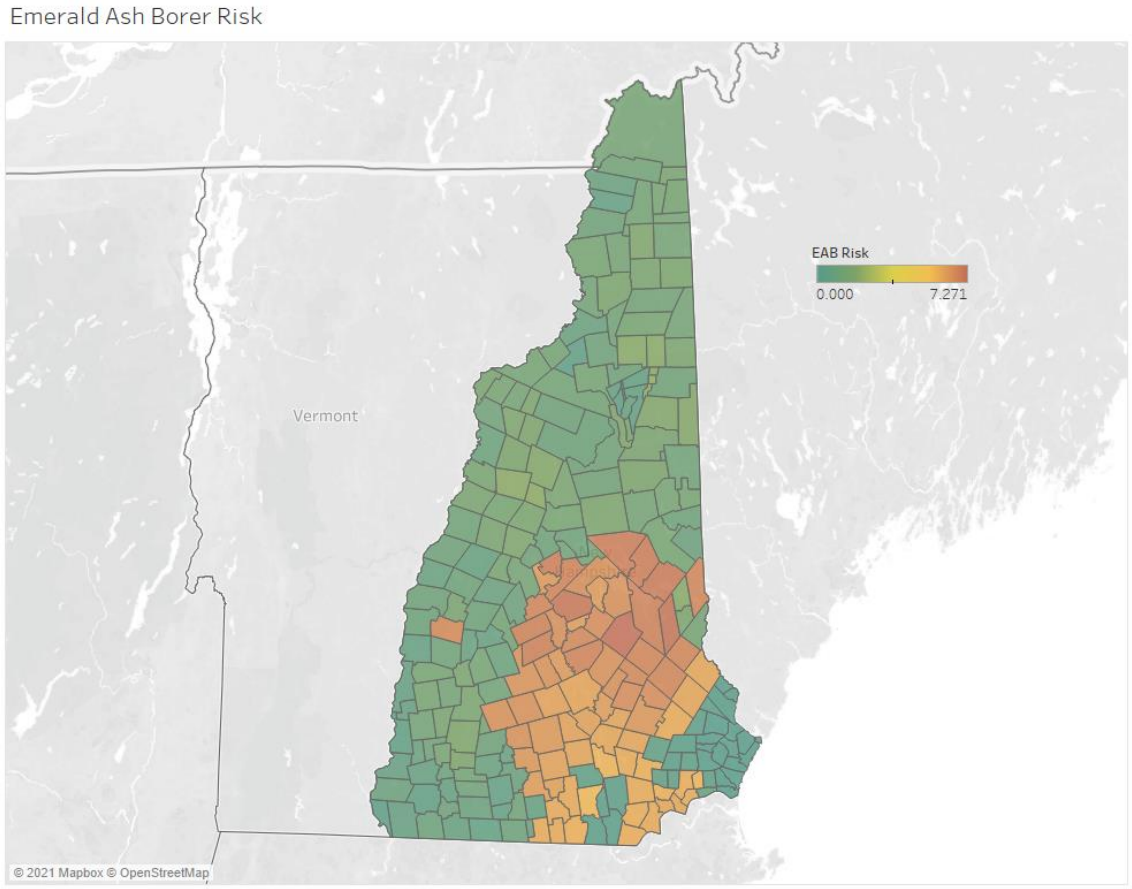

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2. Maintain diversity of species

Increase resiliency

Consider the adaptability (range) of tree species under climate change

https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf

Northern New England
(Ecological subsections M211A, B, C, and D, and M211E and J)

Tree Species	Low Emissions (PCM B1)	High Emissions (GFDL A1FI)
Balsam Fir	−	−
Black Spruce	−	−
Northern White Cedar	−	−
Paper Birch	−	−
Red Spruce	−	−
Tamarack	−	−
White Spruce	−	−
American Beech	●	−
Quaking Aspen	●	−
Sugar Maple	●	−
Yellow Birch	●	−
Bear/Scrub Oak	●	●
Bigtooth Aspen	●	●
Eastern White Pine	●	●
Red Maple	●	●
American Basswood	●	+
Bitternut Hickory	●	+
Black Cherry	●	+
Pitch Pine	+	●
Black Birch	+	+
Black Oak	+	+
Chestnut Oak	+	+
Northern Red Oak	+	+
Shagbark Hickory	+	+
White Oak	+	+
Threatened by Current Forest Health Issues (Do not target)		
Black Ash	−	−
Eastern Hemlock	●	●
White Ash	●	●

Southern New England
(Ecological subsection M221A)

Tree Species	Low Emissions (PCM B1)	High Emissions (GFDL A1FI)
Balsam Fir	−	−
Black Spruce	−	−
Eastern White Pine	−	−
Northern White Cedar	−	−
Paper Birch	−	−
Quaking Aspen	−	−
Red Spruce	−	−
White Spruce	−	−
Tamarack	−	●
American Beech	●	−
Northern Red Oak	●	−
Red Maple	●	−
Yellow Birch	●	−
Bear/Scrub Oak	●	●
Black Cherry	●	●
Sugar Maple	●	●
Bigtooth Aspen	+	●
Pitch Pine	+	●
American Basswood	●	+
Bitternut Hickory	+	+
Black Oak	+	+
Chestnut Oak	+	+
Shagbark Hickory	+	+
White Oak	+	+
Threatened by Current Forest Health Issues (Do not target)		
Black Ash	−	−
Eastern Hemlock	●	●
White Ash	●	●

3. Multi-age or uneven-age structure

Balance storage and sequestration

Harvest durable wood products

(sawlogs and veneer)

3. Multi-age or uneven-age structure

Mitigates risk of natural wind disturbances, including

- Hurricanes
- Straight line winds
- Microbursts

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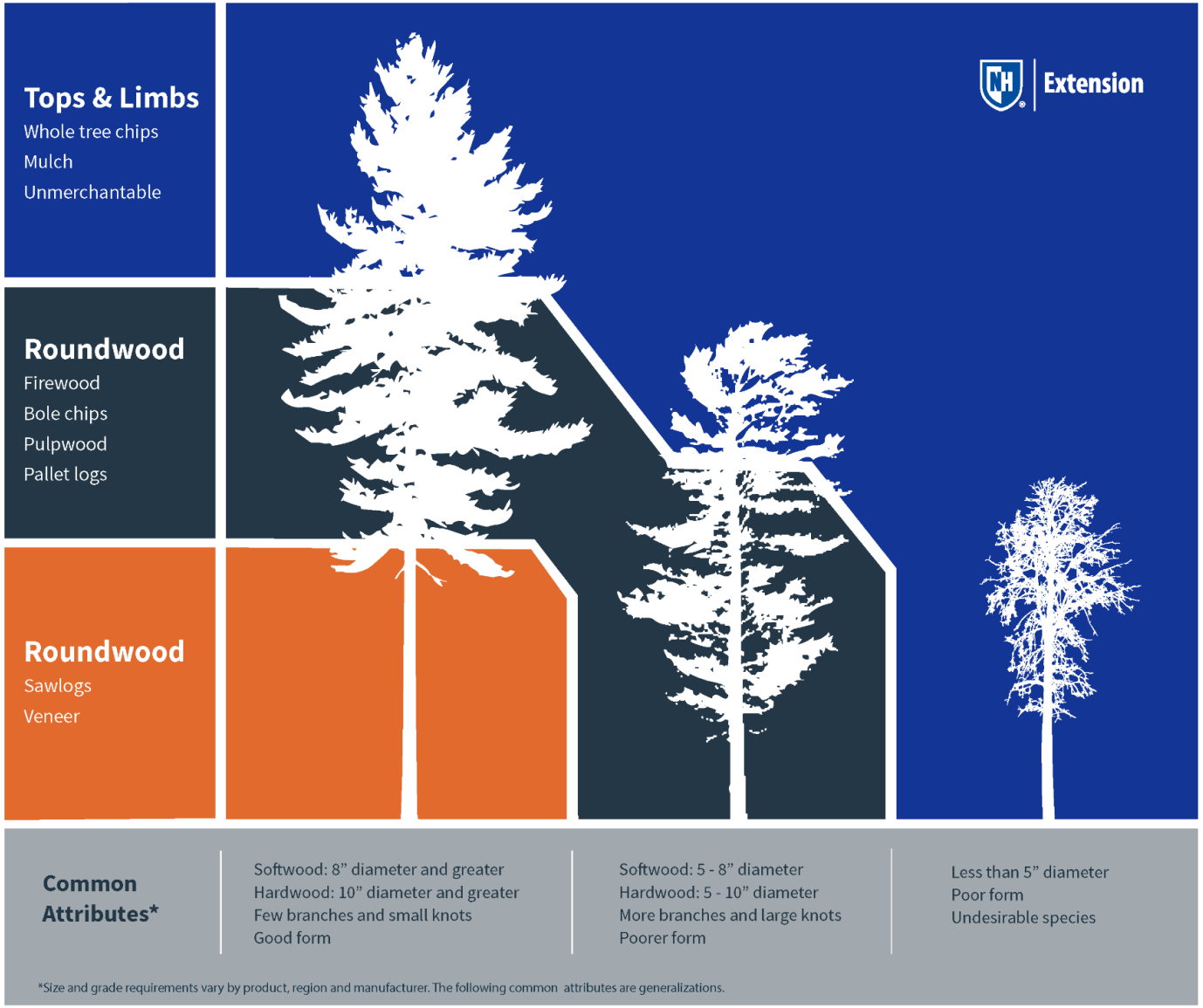
4. Favor trees of good form and vigor

- Timber stand improvement (TSI): remove slow-growing trees of poor form and health.
- Allocate space and resources to vigorous trees with good form.
- Increases growth rate of residual trees
- Produces sawtimber (durable wood products)

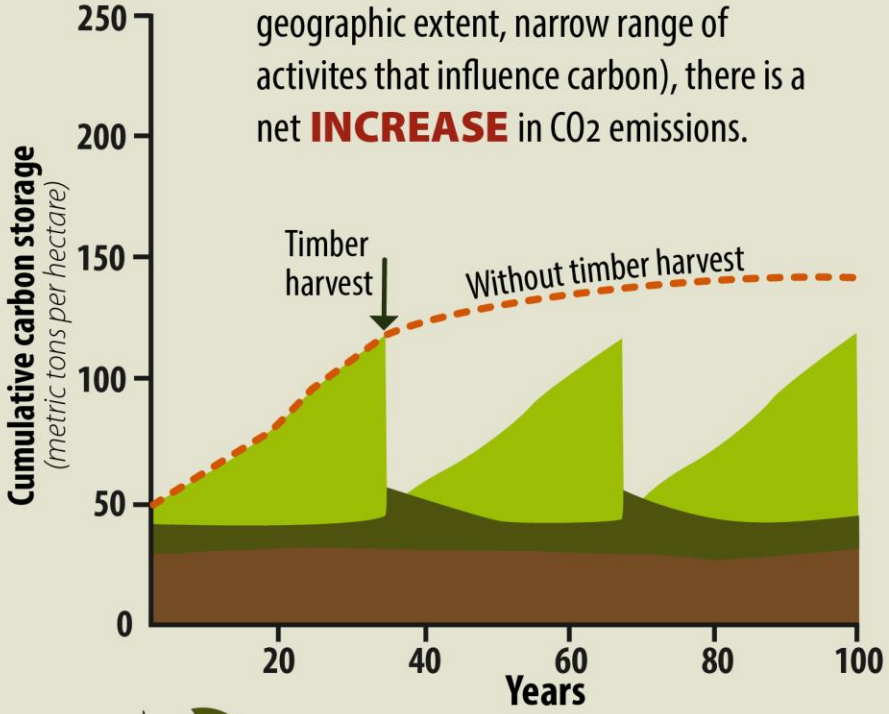


USDA United States Department of Agriculture

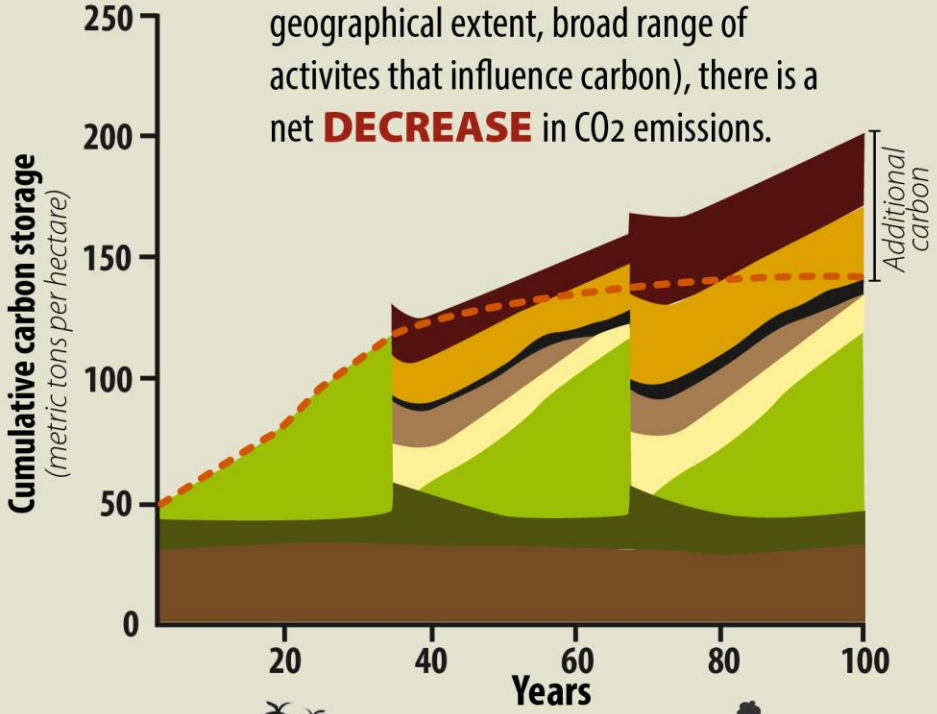
Carbon **BENEFITS** in the Broad View

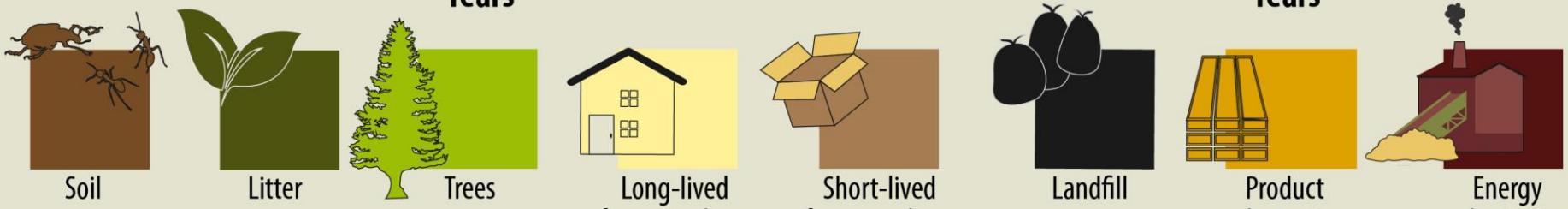
How Carbon Stacks Up

In the **NARROW VIEW** of the forest system (shorter time scale, smaller geographic extent, narrow range of activites that influence carbon), there is a net **INCREASE** in CO_2 emissions.



In the **BROAD VIEW** of the forest system (longer time scale, broader geographical extent, broad range of activites that influence carbon), there is a net **DECREASE** in CO_2 emissions.





Forest Service Office of Sustainability and Climate February 2019

Final Thoughts

Managing for carbon is one of many potential objectives (wildlife, recreation, aesthetics, timber revenues, etc.)

Forest management decisions often require trade-offs

Carbon credit markets are becoming available to landowners ($$$)

If managing for carbon, consider balancing storage and sequestration

Durable wood products (boards, furniture, etc) are an important carbon pool.

Thank you

https://extension.unh.edu/countyforesters

Securing Forest Carbon regional initiative is supported by