

Building Local, Buying Local: Advantages and Challenges of Sourcing Materials from New England Forests

3/9/2017

NESEA BuildingEnergy Boston

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Learning Objectives

- Recognize ecological and socio-economic impacts when managing the specification of forest derived material from local, regional, and global sources.
- Describe both the socio-economic and sustainability advantages of sourcing local wood.
- Understand how to adapt project design, engineering and construction to incorporate local wood.
- Assess the feasibility of incorporating on-site harvested trees into structural and FF&E applications.

Agenda

- Forest Sustainability in a New England context
(15 minutes)
- Walden Pond Visitor Center:
A case study for buying and building local wood
(30 minutes)
- Discussion
(15 minutes +/-)

Forest Sustainability

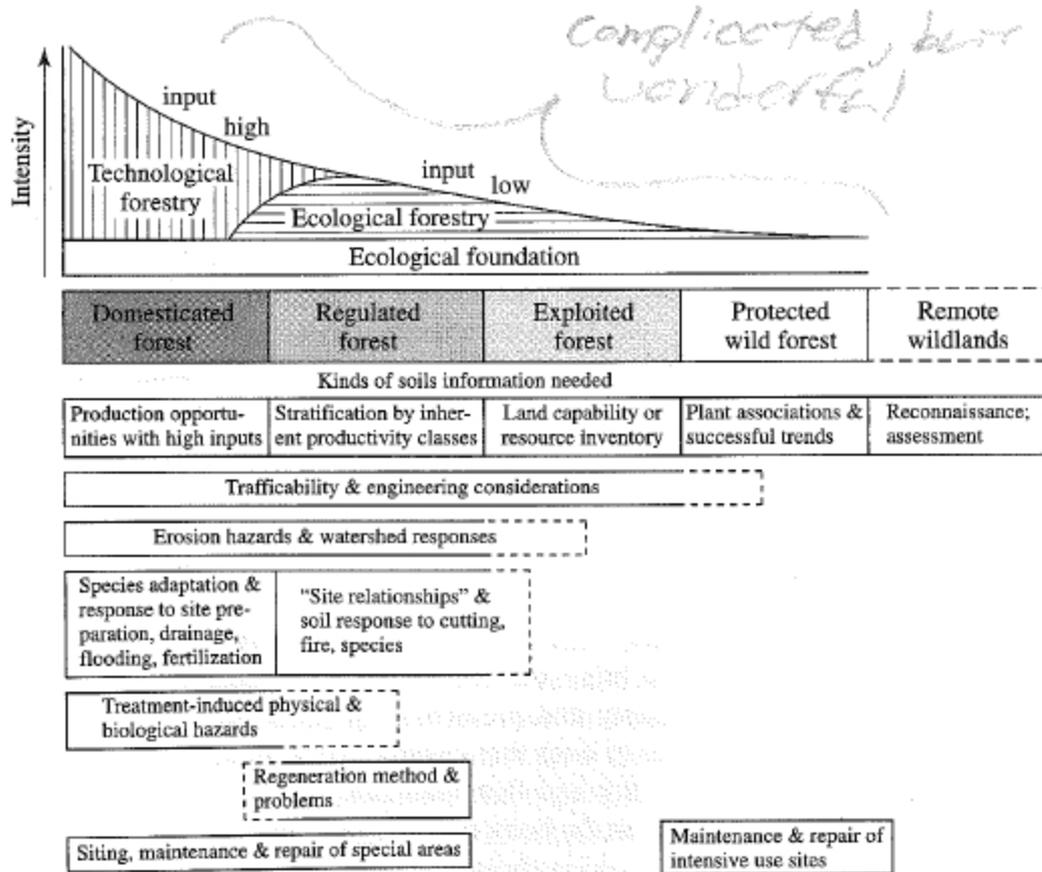


FIGURE 2-6
Conditions of the soil and other environmental factors that regulate productivity determine the intensity of forestry and many use opportunities that a site will support at a sustained level. From Stone, E.L. *Forest Soils and Forest Land Management*, B. Bernier and C.H. Winget, Eds., pages 1–9.

Definition: Sustainable Forestry,

Sustainable Forest Management (SFM) is an evolving concept based on the practice of meeting forest resource needs and values of the present without compromising the similar capability of future generations.

Accepted by:

Society of American Foresters

UN Food and Agriculture Organization

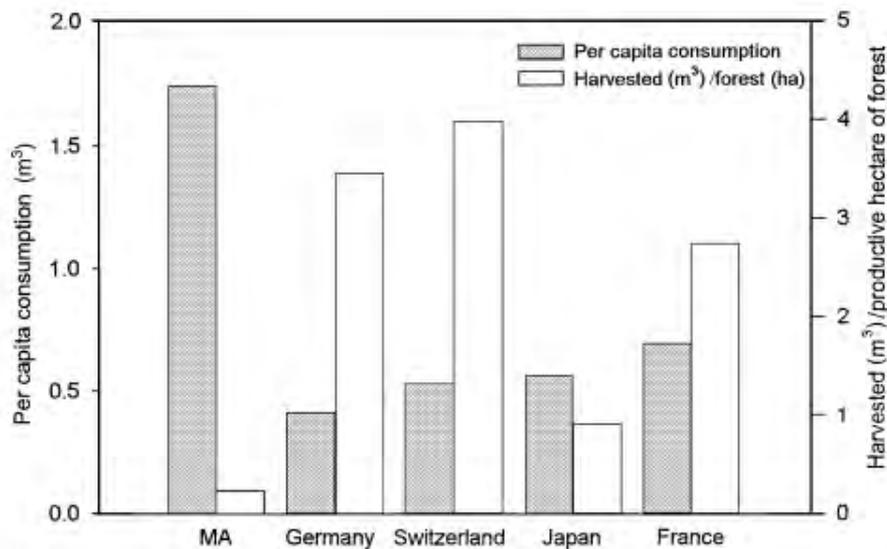
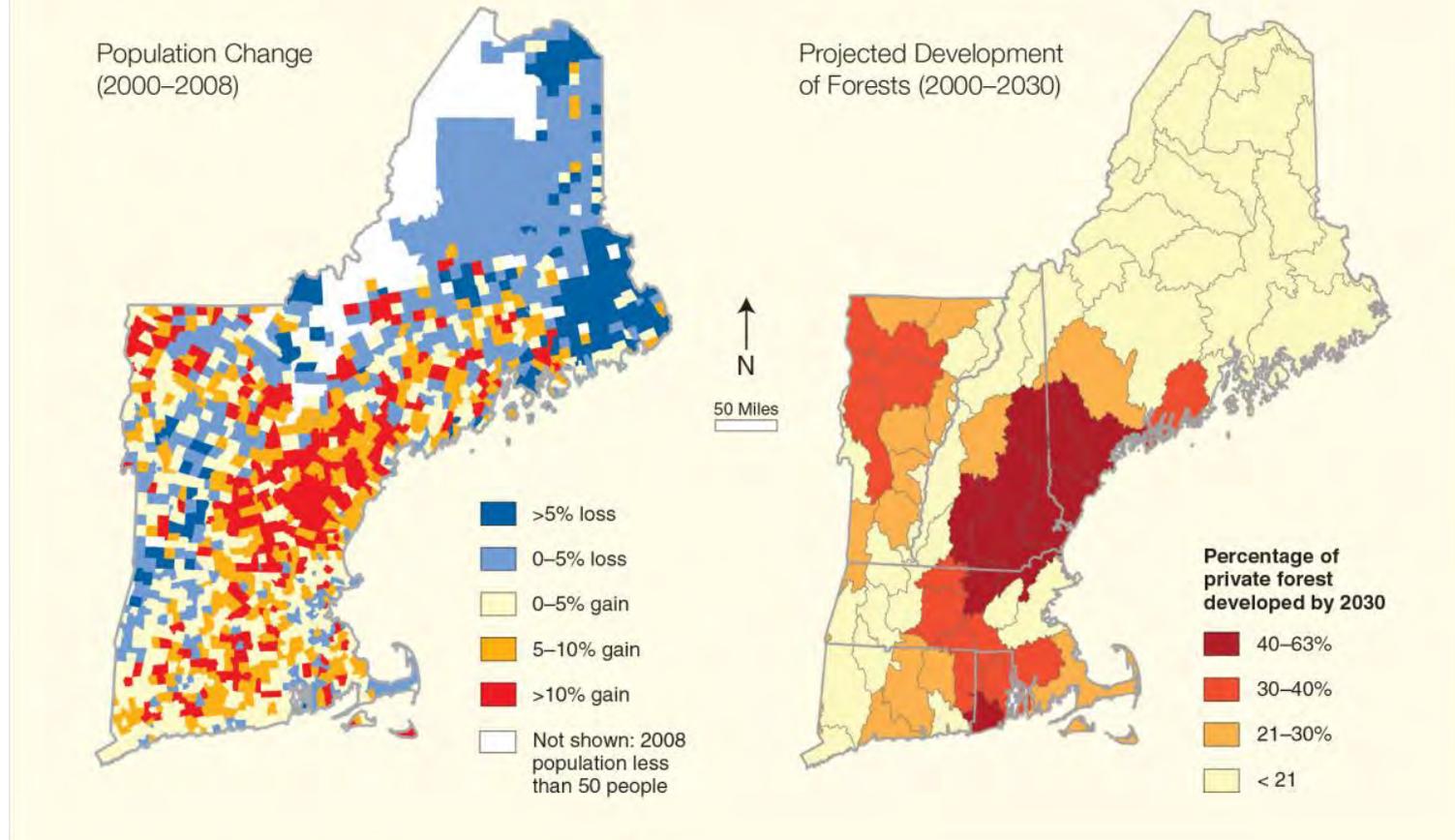


Figure 6 Per capita wood consumption and harvest per forested area: Massachusetts, Germany, Switzerland, Japan and France. Although relatively heavily forested, harvesting per unit area from Massachusetts forests is low compared with other countries. In contrast, per capita consumption of wood is several times greater in Massachusetts. [Source: Massachusetts, DEM; Howard (1997); Alerich (2000); MISER; Other nations, FAO (2000), <http://apps.fao.org>].

- Less than 2% of wood consumed in Massachusetts comes from Massachusetts
- Annual per capita wood consumption is the equivalent to:
 - One tree
 - Diameter: 24"-26" DBH
 - Height: 10-12 stories

Recent Population Change and Future Development of Forest Land



Caption: All six New England states are expected to experience dramatic rates of forest loss over the next 20 years. The areas of most intense future development overlap with those that underwent the greatest increase in population in recent years. These include the suburbanizing region that stretches from north of Boston to southern Maine and the area adjacent to Burlington, Vermont.

Sources: Population map is based on data from the U.S. Census Bureau. To represent meaningful changes, only sub-county areas with a 2008 population of 50 people or more are shown. The projected forest development map is reprinted from the *Forests on the Edge* research project, sponsored by the U.S. Forest Service. Figure is courtesy of S.M. Stein and the U.S. Forest Service (Stein et al. 2005, 2010).

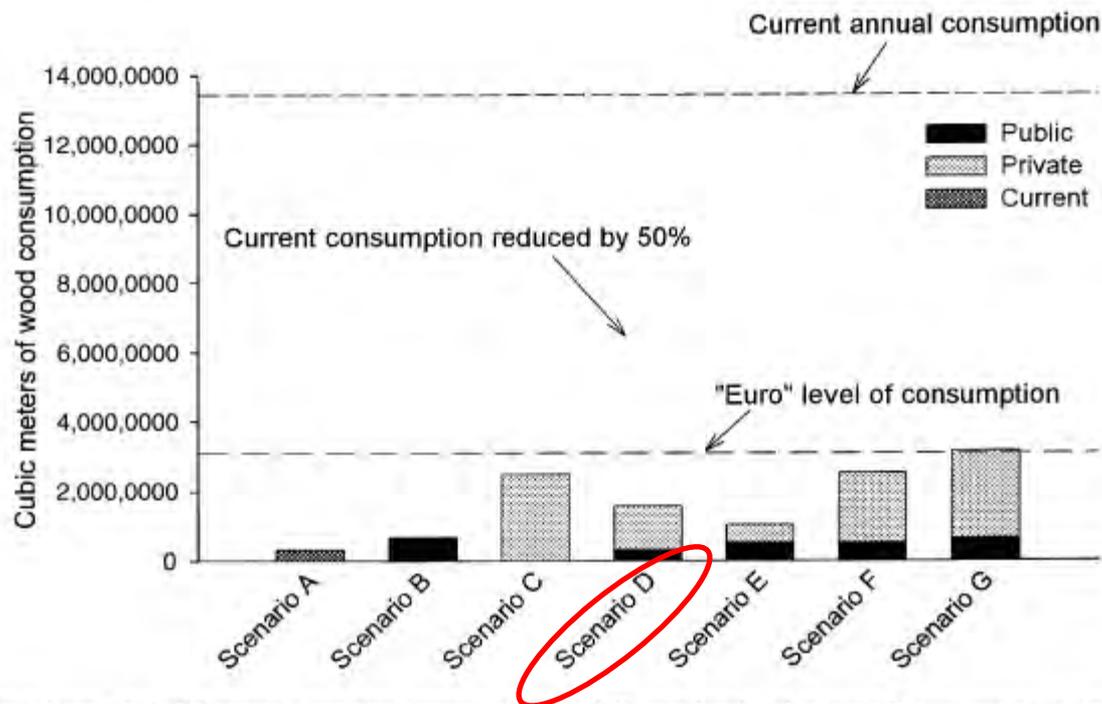


Figure 7 Massachusetts's hypothetical harvest scenarios compared with different levels of statewide consumption ($\text{m}^3 \text{ year}^{-1}$). The current annual harvest contributes little to meeting the estimated consumption of wood products in Massachusetts. Through potential decreases in consumption, coupled with various approaches to increased timber management on public and private lands, the gap between production and consumption can be made smaller. Scenario A: current annual MA harvest of $311,190 \text{ m}^3$. Scenario B: 100% timber management of public land, 0% timber management of private land. Scenario C: 0% timber management of public land, 100% timber management of private land. Scenario D: 50% timber management of public land, 50% timber management of private land. Scenario E: 80% timber management of public land, 20% timber management of private land. Scenario F: 80% timber management of public land, 80% timber management of private land. Scenario G: 100% timber management of public land, 100% timber management of private land.

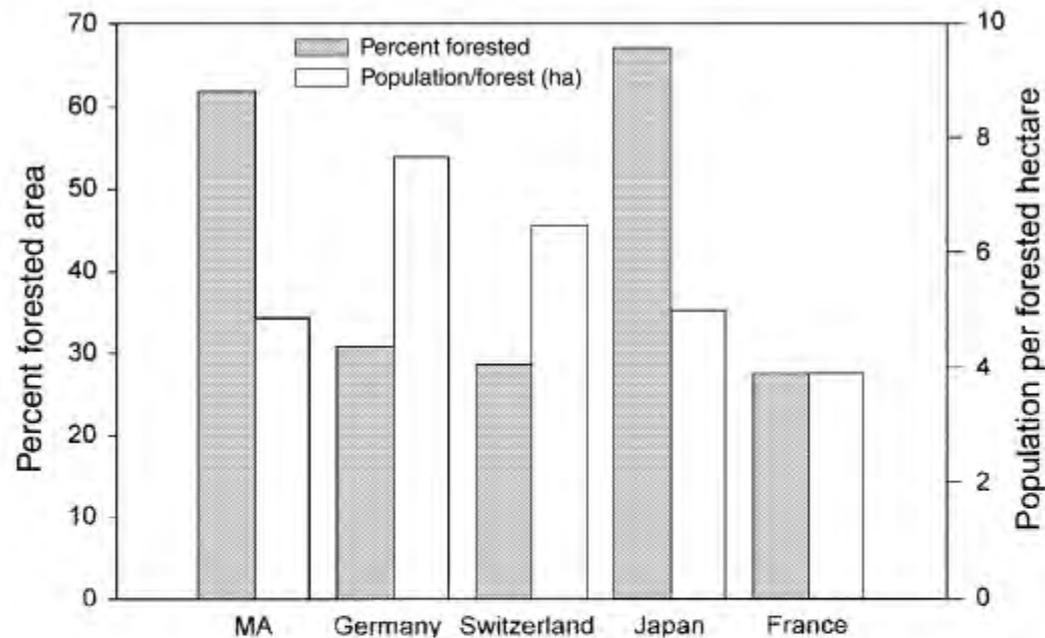


Figure 5 Comparison of percentage forested area and population density per forested area: Massachusetts, Germany, Switzerland, Japan and France. Massachusetts is more than 60% forested by area and experiences a population density per forest area comparable with Japan and France [Source: Massachusetts, Alerich, 2000; other nations, World Resources Inst. (1998), World Resources Institute, <http://www.wri.org/wr-98-99/index.html>].

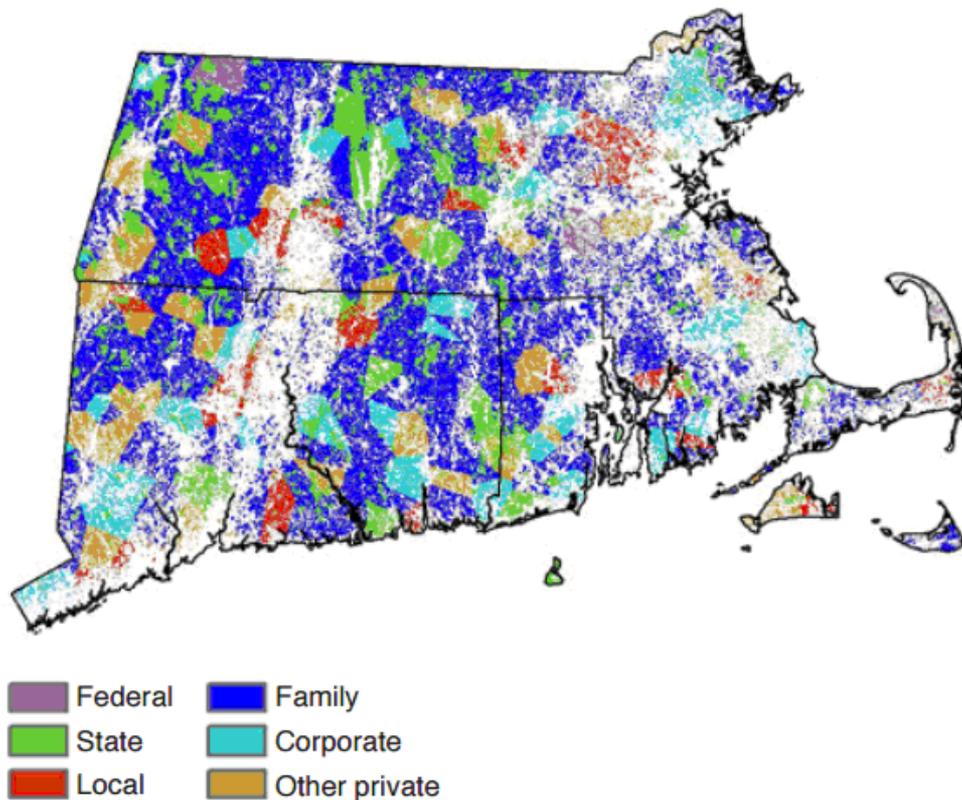
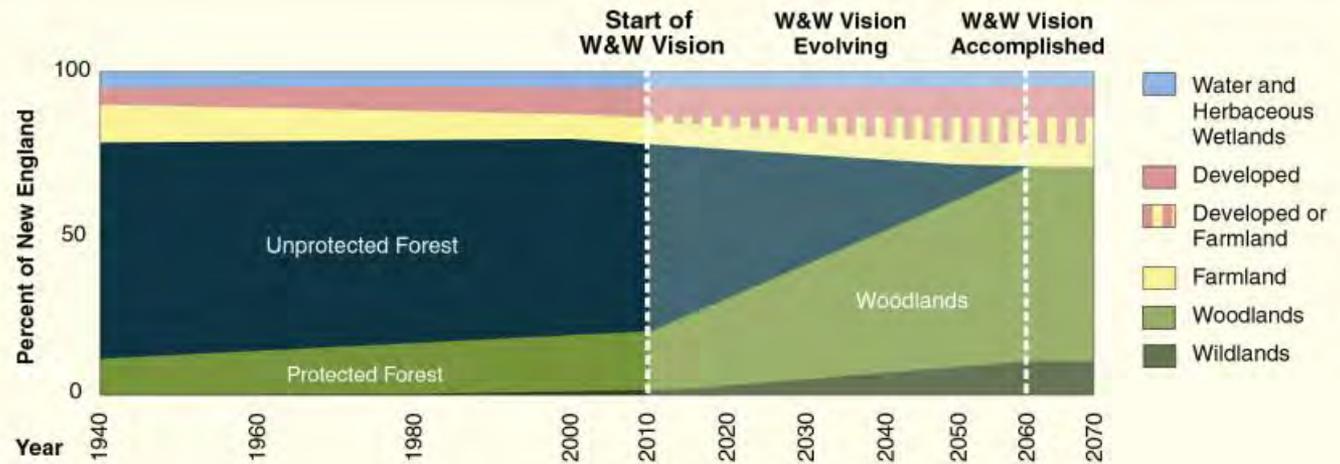


Figure 12.—Forest ownership across Southern New England, 2011 (Hewes et al. 2014).

- Private individuals and families are responsible for the majority of forest conservation work in the Northeast
- Forestry in CT, MA, ME, NH, NY, RI, VT is responsible for directly employing over **12,500** individuals
- Drinking water filtration, wildlife habitat mitigation, timber harvesting

New England Land Cover: Past, Present, and Future

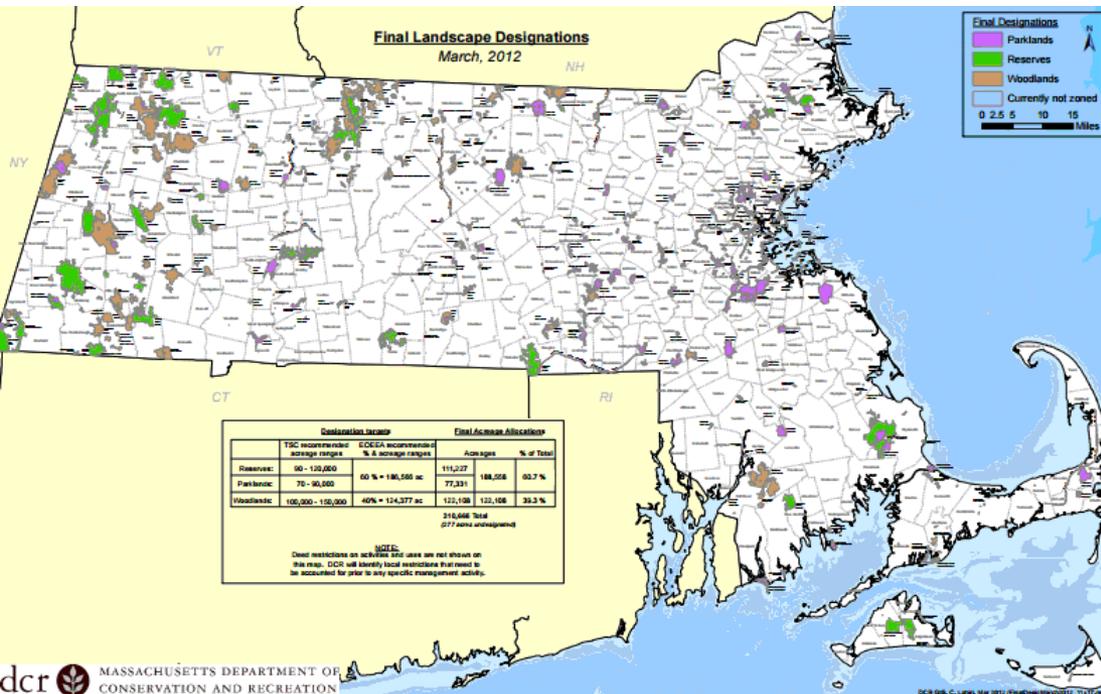


Caption: Projections for the implementation of Wildlands and Woodlands demonstrate that roughly a doubling in the rate of forest conservation over current levels is needed to achieve the vision within 50 years.

Sources: Data from Foster and Aber (2004), Irland (1999), Redman and Foster (2008), NRCS NRI (1982), NLCD (1992, 2001), Wilkinson et al. (2008).

Foster, D.R., B.M. Donahue, D.B. Kittredge, K.F. Lambert, M.L. Hunter, B.R. Hall, L.C. Irland, R.J. Lillieholm, D.A. Orwig, A.W. D'Amato, E.A. Colburn, J.R. Thompson, J.N. Levitt, A.M. Ellison, W.S. Keeton, J.D. Aber, C.V. Cogbill, C.T. Driscoll, T.J. Fahey, and C.M. Hart. 2010. *Wildlands and Woodlands: A Vision for the New England Landscape*. Harvard Forest, dist. by Harvard University Press, Cambridge, Massachusetts. 36pp.

Leading by Example



- **Forest Futures Visioning Process, April 2009 – April 2010**
- **Public review process for public forest land designation**
- **Outcomes**
 - **60.7% of forest land is allocated as Reserves and Parklands**
 - **39.3% of forest land is allocated as working woodlands approved for commercial timber sales**

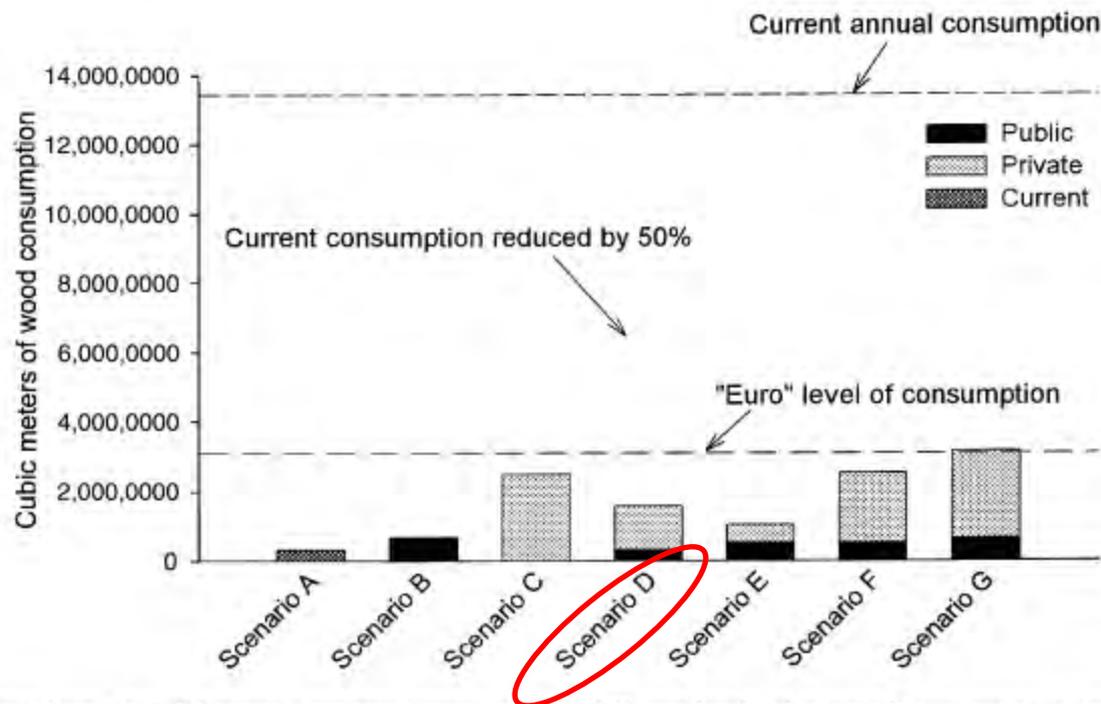


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Walden Pond Visitor Center Concord, MA



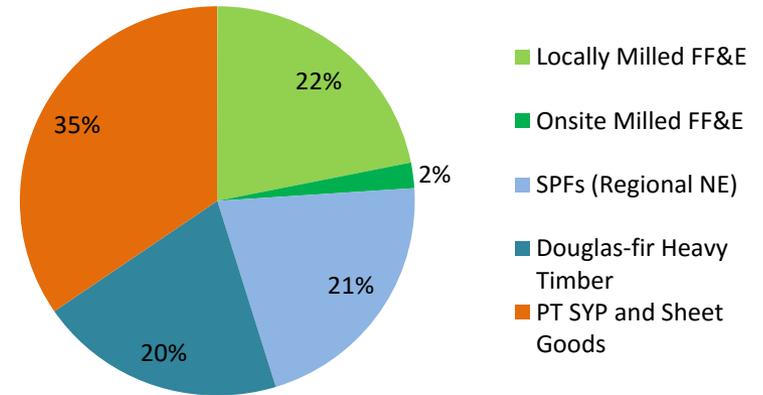
- Site of Henry David Thoreau's cabin from *Walden* (1845)
- Over 500,000 visitors per year
- 7,000 ft² Net-Zero Facility
- Specified 20,500 BF from local sawmills
- Reclaimed 1,800 BF of trees using a portable mill onsite



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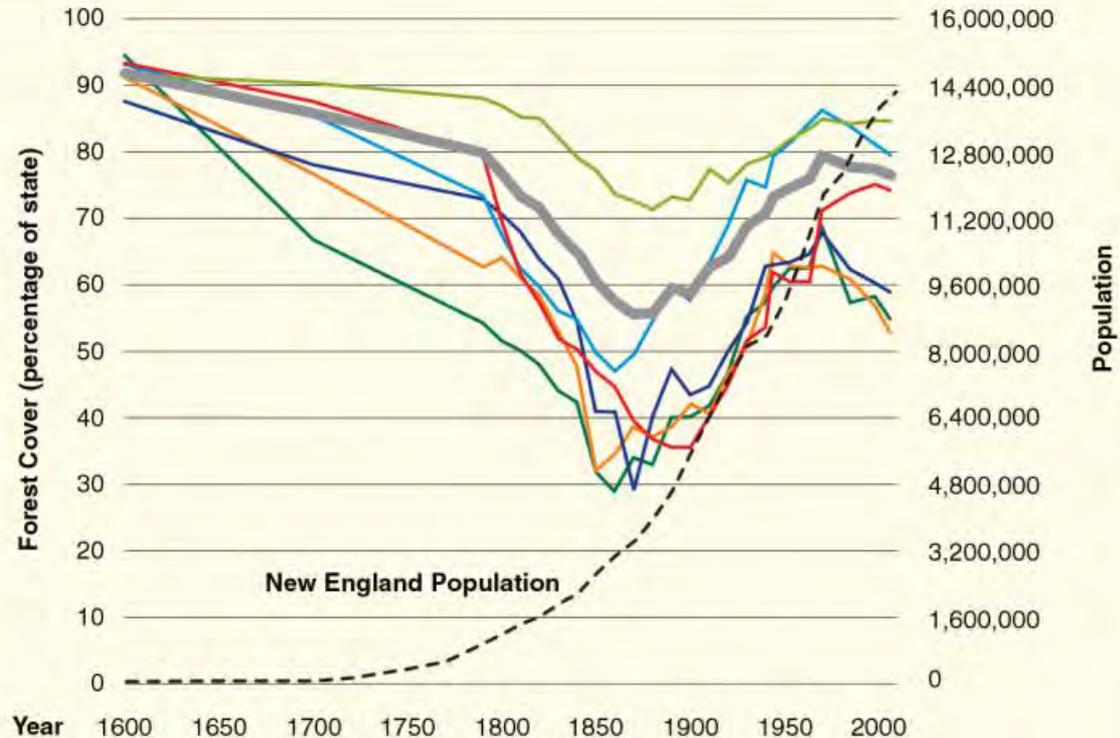
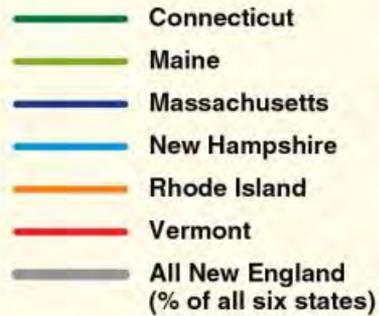


Distribution of 85.6 MBF of wood used for Constuction
Walden Pond Visitor Center
Concord Massachusetts, 2016



- Project was successful in contributing to landscape sustainable forestry targets by currently exceeding local forest resource consumption outlined by Berlik et al.
- Utilization of Douglas-fir heavy timber was an intentional decision to balance design objectives with forest sustainability.

New England Forest Cover and Human Population



Caption: Historical changes in forest cover show that reforestation of abandoned farmland from the mid-19th through the late 20th century has provided a second chance to determine the fate of the region's forests. Recent trends show the loss of forest throughout the region.

Source: Modified and updated from Foster, D. R., and J. Aber, editors. 2004. *Forests in time: the environmental consequences of 1,000 years of change in New England*. Yale University Press, New Haven, Connecticut.

Foster, D.R., B.M. Donahue, D.B. Kittredge, K.F. Lambert, M.L. Hunter, B.R. Hall, L.C. Irland, R.J. Lillieholm, D.A. Orwig, A.W. D'Amato, E.A. Colburn, J.R. Thompson, J.N. Levitt, A.M. Ellison, W.S. Keeton, J.D. Aber, C.V. Cogbill, C.T. Driscoll, T.J. Fahey, and C.M. Hart. 2010. *Wildlands and Woodlands: A Vision for the New England Landscape*. Harvard Forest, dist. by Harvard University Press, Cambridge, Massachusetts. 36pp.

Working Onsite Milling into Design



Advantages

- Builds a direct connection with land, people, and project
- Assists the project with waste reduction and carbon management
- Feasible in urban and rural applications

Limitations

- Economics limit production to
 - Heavy timber (Softwoods>Hardwoods)
 - Specialty applications (Hardwoods>Softwoods)
- Sawmill is disconnected from conventional material stream

Working Local Mills into Design



Advantages

- Builds a direct connection with land, people, and project
- Assists the project with local material credits and carbon management
- Support nearby rural communities and working forest landscapes

Limitations

- Economics limit production to
 - Heavy timber (Softwoods>Hardwoods)
 - Specialty applications (Hardwoods>Softwoods)
- Sawmill is either highly specialized or diversified with low production



Working Regional Commodity Mills into Design



Photo credit: Wood Buisness.



Photo credit: Logging and Sawmilling Journal

Advantages

- Builds a direct connection with land, people, and project
- Assists the project with lowering material embodied energy and carbon management
- Support nearby rural communities and working forest landscapes

Limitations

- Economics limit production to
 - Specialized product line (Softwoods)

Thinking Locally

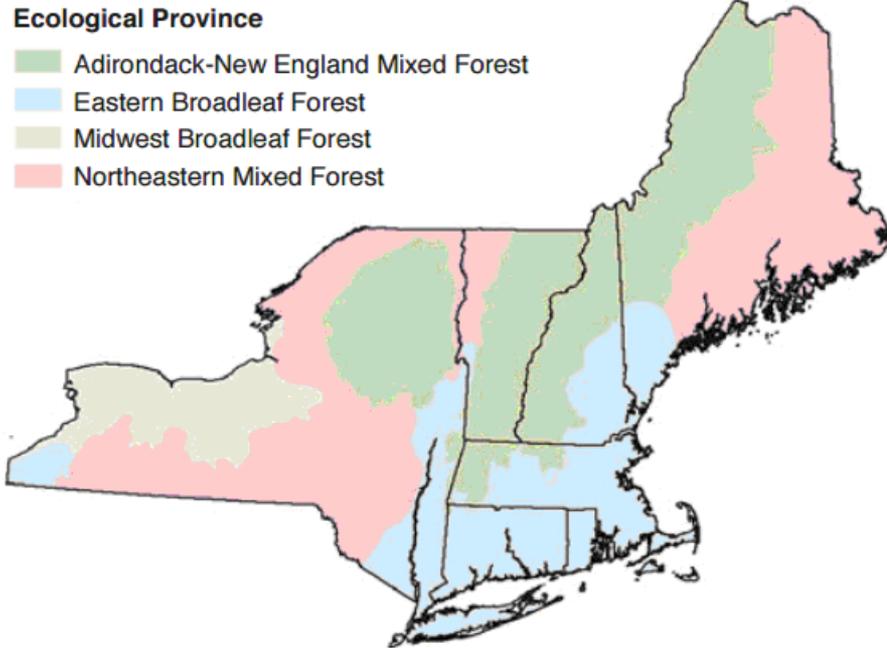
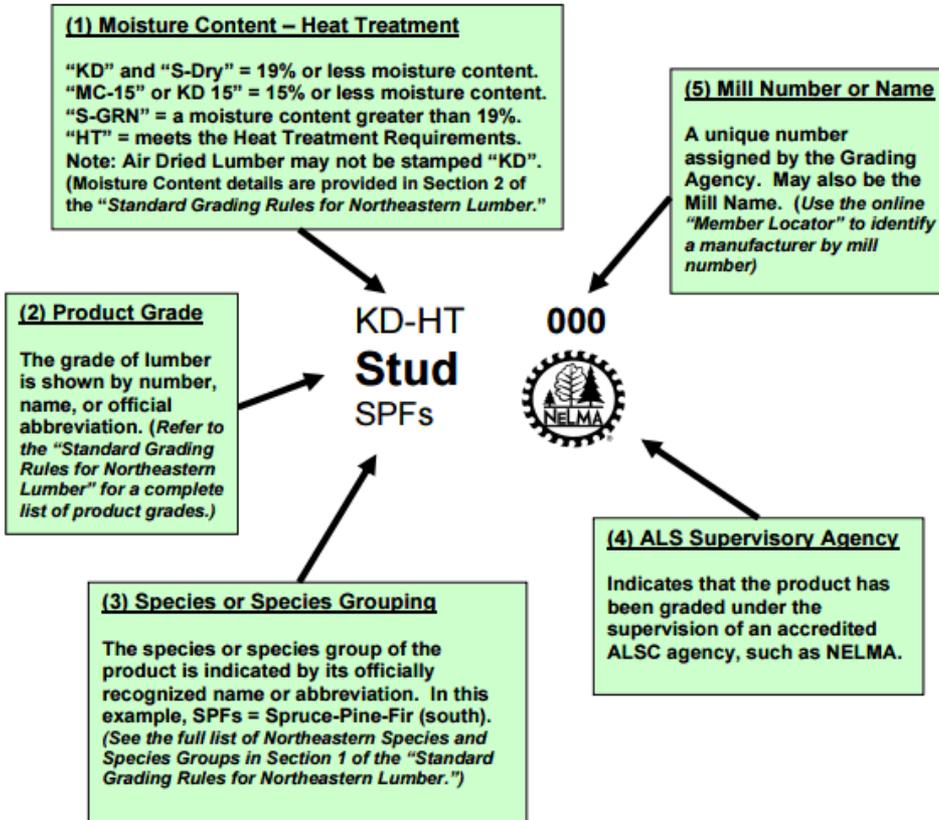


Figure 5.—Ecoregion provinces of the northeastern United States (Bailey 1995).

1. How do we better understand where our materials come from?
2. Consider becoming more involved in managing material sourcing.
 - and/or ask for help
3. Start small with easy changes
 - FF&E
 - Residential heavy timber
 - Regional commodities
4. Plan ahead to assume failure as a part of learning in the material stream

Structural Lumber



NELMA® Northeastern Lumber Manufacturers Association

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2013 STANDARD GRADING RULES FOR NORTHEASTERN LUMBER

NELMA is one of seven lumber rules writing agencies in the U.S. and Canada accredited by the American Lumber Standard Committee (ALSC) to write grade rules that are certified as conforming to the American Softwood Lumber Standard PS20.

We are pleased to provide our 2013 edition of the *Standard Grading Rules for Northeastern Lumber* online for easy reference and general understanding of the northeastern lumber and timber grades. A hard-bound book [may be purchased from NELMA](#) or refer to the following sections from the grading rules for viewing or downloading:

- [Introduction & Table of Contents](#)
- [Section 1: Species, Grades, Grademarks, Tally & Sizes, Glued Products](#)
- [Section 2: Moisture Content and Inspection Provisions](#)
- [Section 3: Eastern White Pine Board Grades](#)
- [Section 4: Other Northeastern Species & Special Board Grades](#)
- [Section 5: National Grading Rules \(NGR\) for Framing and Decking](#)
- [Section 6: Beams & Stringers, Posts and Timbers](#)
- [Section 7: Design Values](#)
- [Section 8: Design Value Tables](#)
- [Section 9: Measurement of Characteristics](#)
- [Section 10: Glossary & Abbreviations](#)
- [Section 11: Eastern Pattern Charts](#)

STANDARD GRADING RULES FOR NORTHEASTERN LUMBER
NELMA
2013

Structural Lumber Continued

For purposes of the Massachusetts State Building Code, *native lumber* is wood processed in the Commonwealth of Massachusetts by a mill registered in accordance with the regulations of the BBS. Such wood is ungraded but is stamped or certified in accordance with specific requirements of the Massachusetts State Building Code (780 CMR). *Native lumber* as so defined above, is restricted to use in one- and two-family dwellings, barns, sheds, agricultural and accessory buildings and structures and other limited uses.

- Using local timbers and lumber for is possible
- It is fairly easy in certain applications
- Massachusetts and other states have provisions within building code to enable this
- Clear communication with the mill, builder, structural engineer, designer, and code official is essential
- Start thinking early

Furniture, fixtures, and equipment

Ask the State Forester

<http://www.northeasternforests.org/>

CISA

<http://www.buylocalfood.org/>

Vermont Wood Manufacturers

<http://www.vermontwood.com/>

Connecticut Grown

http://www.ct.gov/deep/cwp/view.asp?a=2697&Q=484488&deepNav_GID=1631

MDAR Commonwealth Quality

<http://www.mass.gov/eea/agencies/agr/commonwealth-quality-program.html>

- Creates an opportunity to get out of the office to build a direct connection between the project, forest, and people.
- Heavily reliant on forming relationships with secondary manufacturers and primary sawmills
- Clear communication
- Know the limitations of third party certification in specifically tracking individual pieces of wood
 - FSC
 - SFI/PEFC/American Tree Farm
- **Start thinking early**
- Remember that the forest also needs high quality wood too.

Thinking Locally

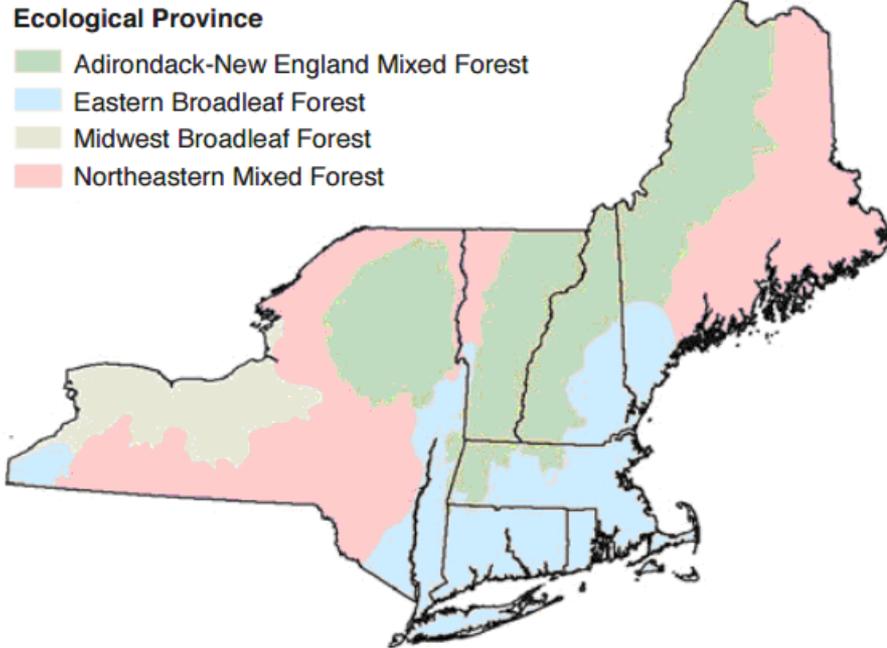


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