2020 Chautauqua County Envirothon

Forestry

by:

Jeff Brockelbank - DEC Senior Forester
Northern Hardwood Forest - 1700
Pioneer Subsistence Farming – 1740
Height of Intensive Farming - 1830
Intensive Farming Abandoned - 1850
First Crop of Old-Field White Pine - 1910
Volunteer Hardwood Regeneration - 1915
Hardwood Form Second Crop - 1930
Succession in The North East

1st year
Low-growing annual grasses and forbs (ragweed, horseweed & crabgrass, many non-native weeds).

2nd to 5th year
Perennial grasses and forbs (asters, goldenrods, Queen Anne's lace, knapweed and many others).

3rd to 10th year
Woody shrubs and shade intolerant tree seedlings invade among perennial herbs and grasses (blackberries & other Rubus species, sumacs, greenbrier)

10th to 20th year
Pioneer tree saplings form thickets (Red cedar, pines, locust, aspen or cherries depending on site).

20th to 70th year
Short-lived pioneer species gradually replaced by taller and longer lived trees (Tulip tree, ash, Red maple, Black birch, Black gum).

70th to 100+ years.
Canopy dominated by long-lived hardwoods (mixed oaks, hickories, maples). Understory of shade tolerant species

Until the next disturbance
Shade tolerant species dominate the canopy and understory (hemlock, sugar maple, beech).

Pioneer Shade-intolerant Species
Which Species of herbs, shrubs and trees dominate depends on location, site history, soil moisture, topography and circumstance.

Moderately Shade Tolerant Species
Canopy trees are all about the same age (± 20 years)

Shade Tolerant species
Gaps from dying trees lead to an uneven age canopy.
Percent of New York State in Farm and Forest, 1850 to 1990
Commercial Timberland in NY (%)
Tree Identification

- Sugar (Hard) Maple
  - (Acer saccharum)
• Red (Soft) Maple
  – (Acer rubrum)
• Red Oak
  – *(Quercus rubra)*
• White Oak
  – (Quercus alba)
• Hemlock
  – (Tsuga canadensis)
• White Pine
  – (Pinus strobus)
• White Ash
  – (Fraxinus americana)
• Quaking Aspen
  – (Populus tremuloides)
• **Black Cherry**
  - *(Prunus serotina)*
• Black Birch
  – (Betula Alleghaniensis)
• American Beech
  – (Fagus grandifolia)
• Yellow Birch
  – (Betula alleghaniensis)
• Shagbark Hickory
  – (Carya ovata)
• Bitternut Hickory
  – (Carya cordiformis)
STRUCTURE OF A TREE

- branches
- top
- foliage (leaves)

- crown
- branch
- twig
- bole
- radicle
- root hair zone
- taproot
- trunk
- lateral roots
DORMANT TWIGS

- leaf scar
- stem tip
- axillary bud
- terminal bud
- leaf scar
- axillary buds
- leaf scars with bundle scars
- stipule scar
- lenticels
- chambered pith

PITH FEATURES

- continuous, diaphragmed
- 5-angled
- triangle
- circular
Ecosystem

includes all abiotic and biotic factors in one particular environment

Biotic Factors
the living parts of an ecosystem

Abiotic Factors
the nonliving parts of an ecosystem
Biotic vs. Abiotic Factors

- Living
  - Examples
    - Plants
    - Animals
    - Fungi
    - Bacteria

- Non-Living
  - Examples
    - Water
    - Sunlight
    - Soil
    - Air
    - Temperature
Silviculture & Forest Management

Even Aged vs. Uneven Aged
Forests which are composed of stands in which all the trees in a stand are roughly (within about 20 years) the same age.
Most stands in New York State are even-aged

Abandoned farmlands provided the source for many of the forests we operate in today.

The size of the tree does not determine the age:

- A larger tree is not necessarily an older tree
- A significantly smaller tree may only be a couple of years younger, not a couple of decades
Even Aged Stand

Hancock Timberlands: Cattaraugus Co., t/o Kill Buck.
Note the flagging on either side of the trail
Tree on right side of trail

94 years old – 15” stump diameter
Tree on left side of trail

97 years old – 38” stump diameter
Even Aged Methods

Shade intolerants
- Oak
- Ash
- Cherry

• Harvest Systems
  - Clear cuts
  - Shelter wood
  - Seed Tree
Clearcutting

Trees larger than one or two inches in diameter are generally removed from a site at one time. Some trees will be left within the area to serve wildlife, soil, water, and visual needs. Examples include snags, den trees, and streamside management zones.
Shelterwood

• Several cuts over a period of up to 10 years
  – Remove over-mature and high-risk trees
  – Create uniform openings in canopy
    • Create favorable conditions for desired species to regenerate
    • Hold second cut for good seed year
  – Overstory removal once seedling regeneration is established
Seed Tree

Most of the trees are removed in one cut, leaving 12 to 15 well-spaced, good seed-producing trees per acre. When needs of other resources are present, such as visual or wildlife, the trees may be left for a longer period or permanently.
Harvest Systems – Even Aged

• Advantages
  – Favors high value, fast growing species
  – Reduces damage to residual stand
  – Lower logging costs

• Disadvantages
  – Unsightly
  – Possible regeneration failure
  – 60-90 years between major harvests
Uneven-aged Forests

Forests that are comprised of stands in which each stand may have three or more well defined age classes.
Uneven-aged Methods

- Single Tree Selection
- Group Selection
Trees Selected Based on:

• Species
• Quality
• Health
• Spacing
• Diameter
Group Selection

Small groups of trees are cut in $\frac{1}{4}$ to two acres sizes. This creates larger openings for regeneration of trees that require partial sunlight.
High-Grading removes all but the poorest quality trees, thereby greatly reducing the future timber value of a woodlot.
Impacts of Diameter-Limit Cutting

- Removes high value trees
- Concentrates growth on low quality trees
- Loss of control of stand density, and spacing
- Maximizes immediate $ yield
- Decreases long-term $ yield
Harvest System - Uneven aged

- Advantages
  - Continuous forest cover
  - Frequent sales
  - Practical for small landowners

- Disadvantages
  - Damage to residual trees
  - Encourages slower growing trees
  - Higher mgt. Costs
Even-aged, short term (group shelterwood) | Uneven-aged, long term (group selection)

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Measurements cont.

- DBH = Diameter @ breast height (4.5 feet off ground)
  - Measured with a Biltmore Stick or Diameter tape.
HOW TO USE A BILTMORE STICK
FOR DETERMINING TREE DIAMETER

DETERMINE THE DIAMETER OF THE TREE

Diameters are taken at 4 1/2 feet from the ground. (If a tree is on a slope, stand on the uphill side to measure diameter.) This is known as “DBH” (Diameter Base Height).

Step 1: Hold the side of the stick with the Tree Scale on it perpendicular to the tree and 25 inches from your eye.

Step 2: Line the left edge of the stick up to the left edge of the tree. Then use only your eyes to look at the measurement on the right side. Keep your head still.

Step 3: Tree diameters are measured in inches. Round up or down to the nearest whole inch to get the recorded diameter of the tree.

DETERMINE THE BOARD FOOT VOLUME OF THE TREE

Use the Tree Scale on the Biltmore stick or a separate Log Rule Table to determine the volume of timber in board feet.

Start on the column with the tree diameter and then read down to the row with the correct number of logs.

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One Step Worksheets: Biltmore Stick
Measurements cont.

- Tree height – measured to a 10” top or major fork

![Diagram](image-url)
Measurements cont.

Formula for Volume

\[
\text{Diameter of tree} \times \# \text{ of 16 foot logs} = \text{Volume in board feet}
\]

Formula for Standard Cords

\[4' \times 4' \times 8' = 128 \text{ cubic feet}\]
Measurements cont.

• Chain = A unit of length equal to 66’ and composed of 100 links.

• Rick = Is a pile of evenly stacked cordwood, staves, bolts or other short-length wood
An **increment borer** is a specialized tool used to extract a section of wood from a living tree with relatively minor injury to the tree. It enables the user to count the rings in the core sample to determine the age of the tree or the growth rate of the tree.

- **A** = The Handle. A metal tube with square slot and clip to allow fixing of the Auger.
- **B** = The Auger. A hardened steel tube with a cutting tip at one end and a square section at the other.
- **C** = The Extractor. A thin steel half-moon blade.
Insects & Diseases

- Defoliators
- Borers
- Bark Beetle

- Foliage Disease
- Root Disease
- Fungal Diseases
Spotted Lantern Fly
Gypsy Moth
Gypsy Moth Defoliation
Pests cont.

E. Tent Caterpillar / Forest Tent Caterpillar
Pests cont.

Spring / Fall
Cankerworm
Pests cont.

White Pine Weevil
Pests cont.

Asian Long horned Beetle
Pests cont.

Hemlock Woolly Adelgid
Emerald Ash Borer
Emerald Ash Borer Galleries
EAB Woodpeckering

More prevalent on the south side of the tree
Exit Holes

Figure 4. D-shaped exit holes where adult beetles emerged.
Sirex noctilio
a.k.a
European Wood Wasp

Pointed projection

Larva

Black spine
Signs of Sirex

Exit holes

Dennis Haugen, USDA Forest Service
Pests cont.

Call: 1-800-TIPP-DEC
Diseases of trees

Beech Bark Disease

Beech Scale
Dutch Elm Disease
Chestnut Blight
Ash Yellows Disease
Fomes annosus
Root Rot

Fig. 17. Generalized life cycle of *Heterobasidion annosum*, the cause of annosus root rot (formerly, *Fomes annosus* — cause of annosus root rot).
Best Management Practices

• BMP’s should always be incorporated into any timber harvest. They are design to ensure water quality.

• The following are 2 of the most important BMP’s that should be utilized on every job.
Proper methods for the control and dispersal of water on truck roads, skid trails, and log landings to minimize erosion and reduce sedimentation and temperature changes in streams and water bodies.
EPA Defines BMP (1975)

“...a practice...determined...to be the most effective, practicable...means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.”
Rain Infiltration Rates of Soil by Land Use

Graph showing the decrease in rain infiltration rates of soil with different land uses:
- Undisturbed
- Pasture
- Logging Roads
- Campgrounds
- Trails

The graph indicates a significant decrease in infiltration rates as the land use changes from undisturbed to trails.
Potential Problems During Timber Harvesting

1. Sedimentation
2. Thermal pollution
3. Biogeochemical alteration (nutrient loading)
The Goal of Timber Harvesting BMPs

- Maintain or improve water quality
- Improve production efficiency
- Limit unnecessary costs
- Support Landowner goals
What Causes the Problem?

- Force at impact of water droplets
- Water movement diverted by roads
- Water carries exposed soil
Common Sense Says.....

- Disturb as little soil as possible
- Deal with water in small amounts and when it is moving slowly:  
  \[ \text{Force} = \text{Mass} \times \text{Acceleration} \]
- Avoid streams whenever possible
- Put the job to rest
Logging Roads and Trails Should Follow Contours
Portable Skidder Bridge
Take Home Points

• Keep the water off the roads
• Plan for water quality
• Budget for water quality
• Inspect for water quality
Uses of Trees and Wood

- White Ash – Baseball Bats
- Black Cherry – High Quality Furniture
- White Pine/Hemlock – Framing lumber
- Red Oak – Furniture, trim, flooring
- Conifers – Windbreaks
- Hardwoods – Erosion control / watershed protection
- All trees- wildlife habitat
Websites

- www.nysenvirothon.net.
- http://atlas.nyflora.org/
- http://www.dec.state.ny.us
- http://www.dnr.cornell.edu/ext/bmp/