Envirothon Training

Forestry Topics 2021

- Tree ID
- Invasives
- Forest Measurements
- Forest Ecology
- Forest Succession
- Forest Management
- Tree Anatomy
- 10 Important Hardwoods
- Forest Types

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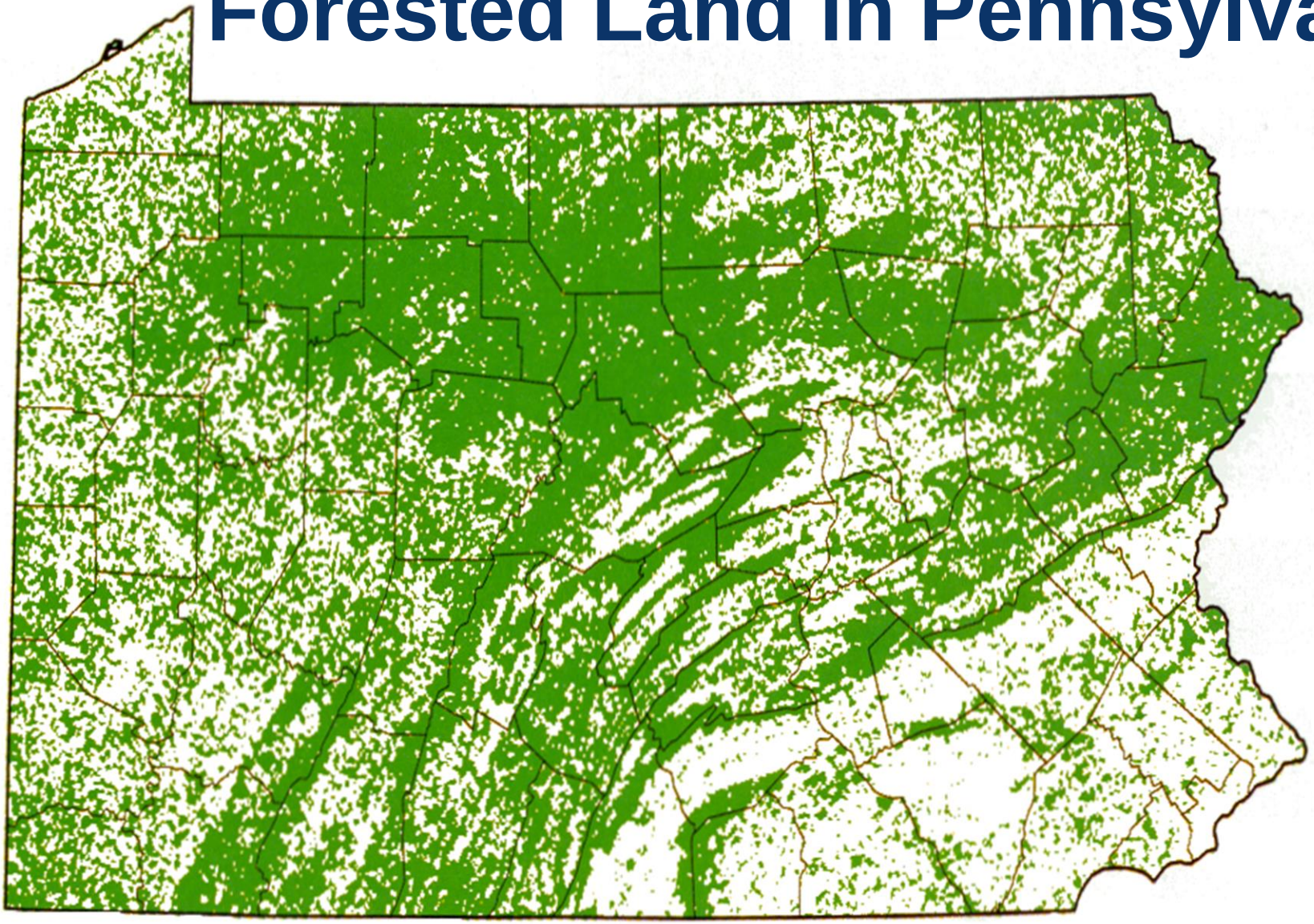
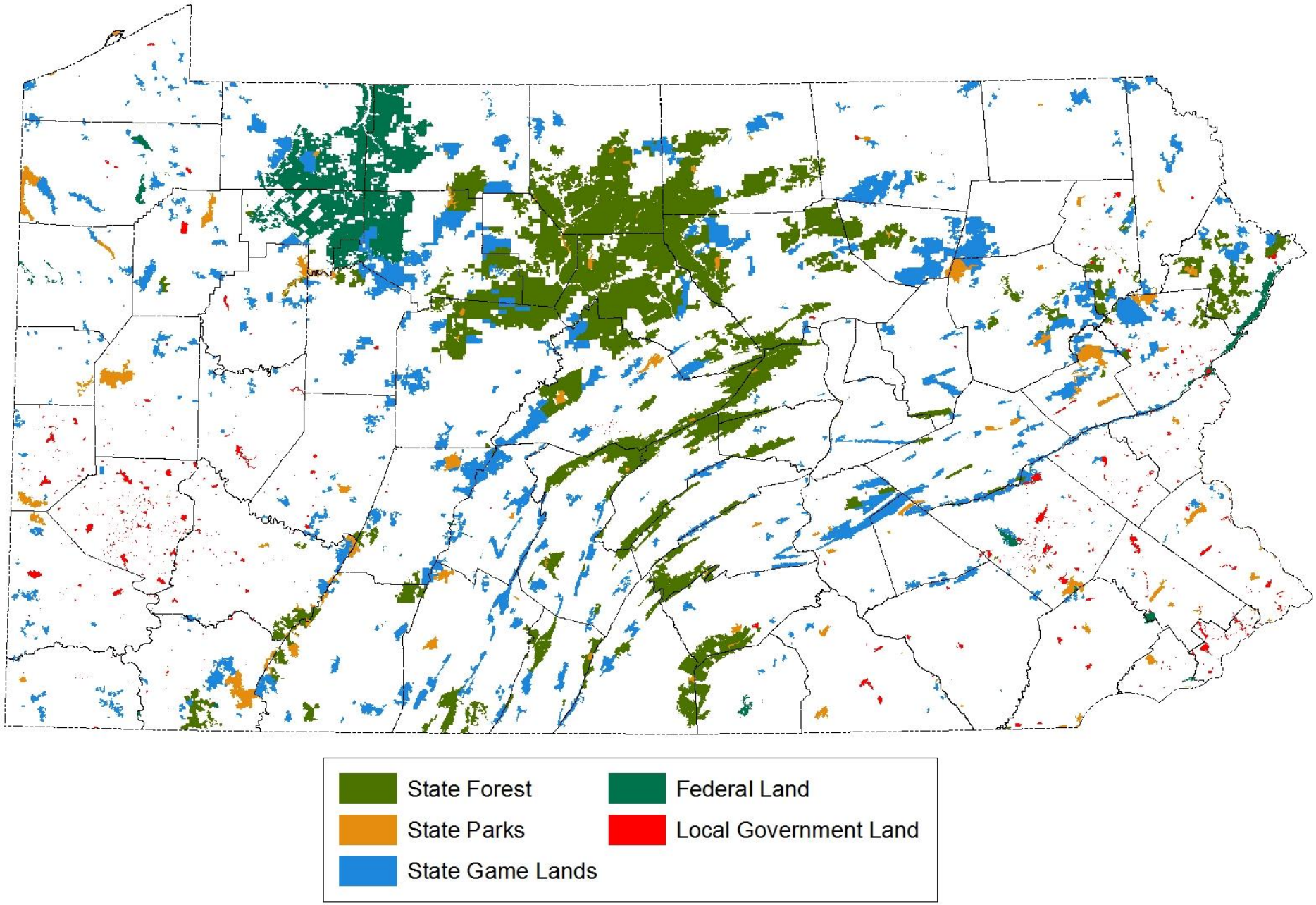
pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

Forested Land in Pennsylvania

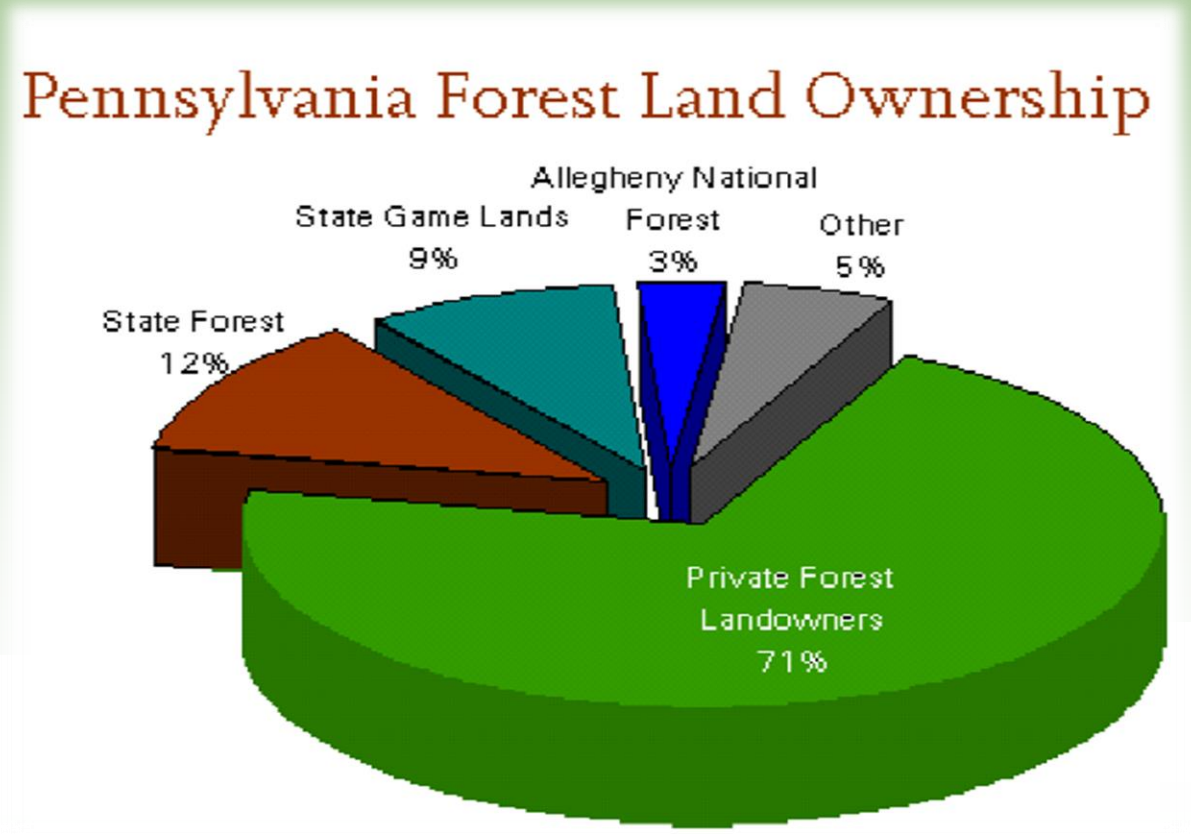


Public Lands

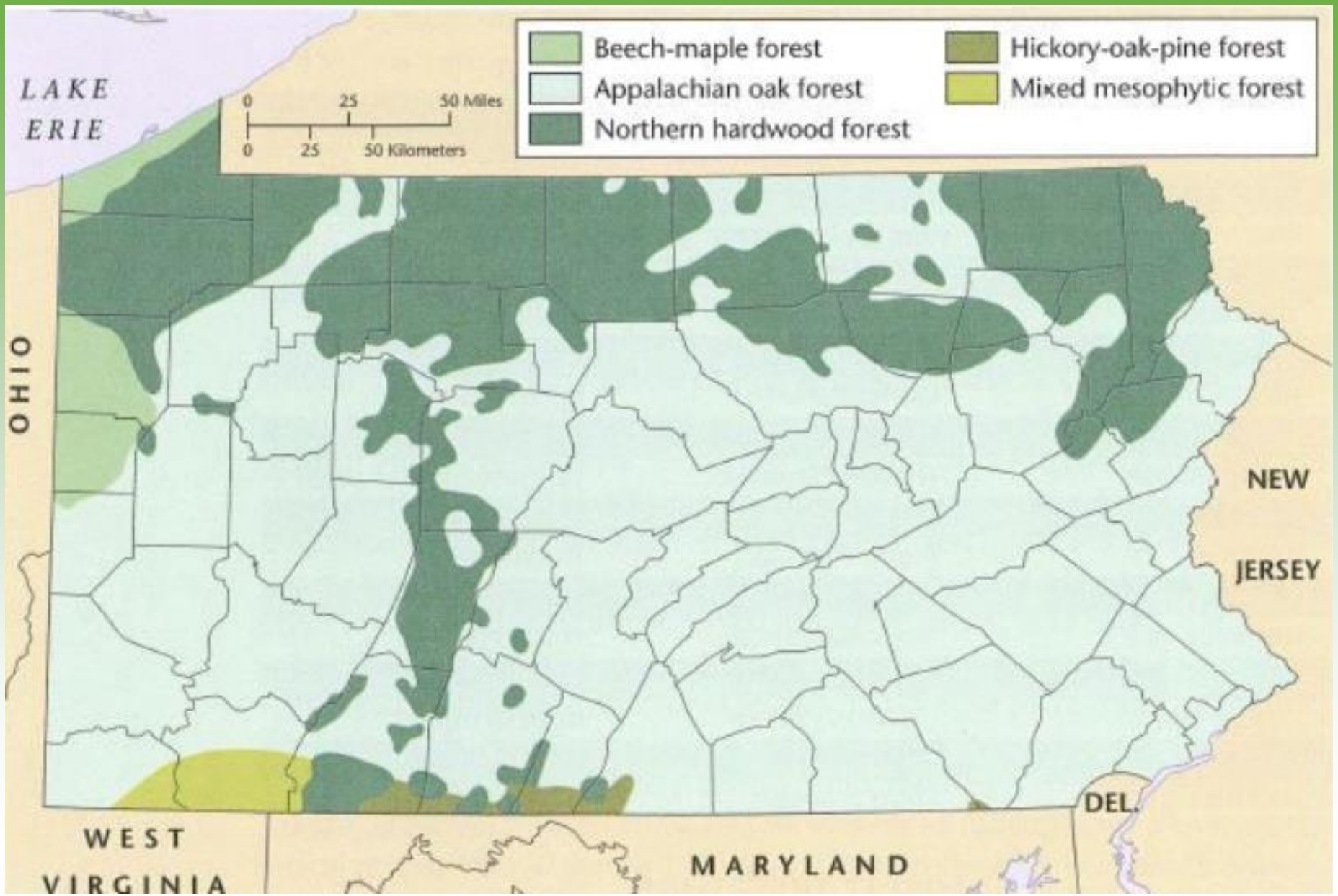


Forest Ownership

- 30% Public
  - 5 Million Acres of Forest Land
- 70% Private
  - 12 Million Acres of Forest Land



Forest Types of PA



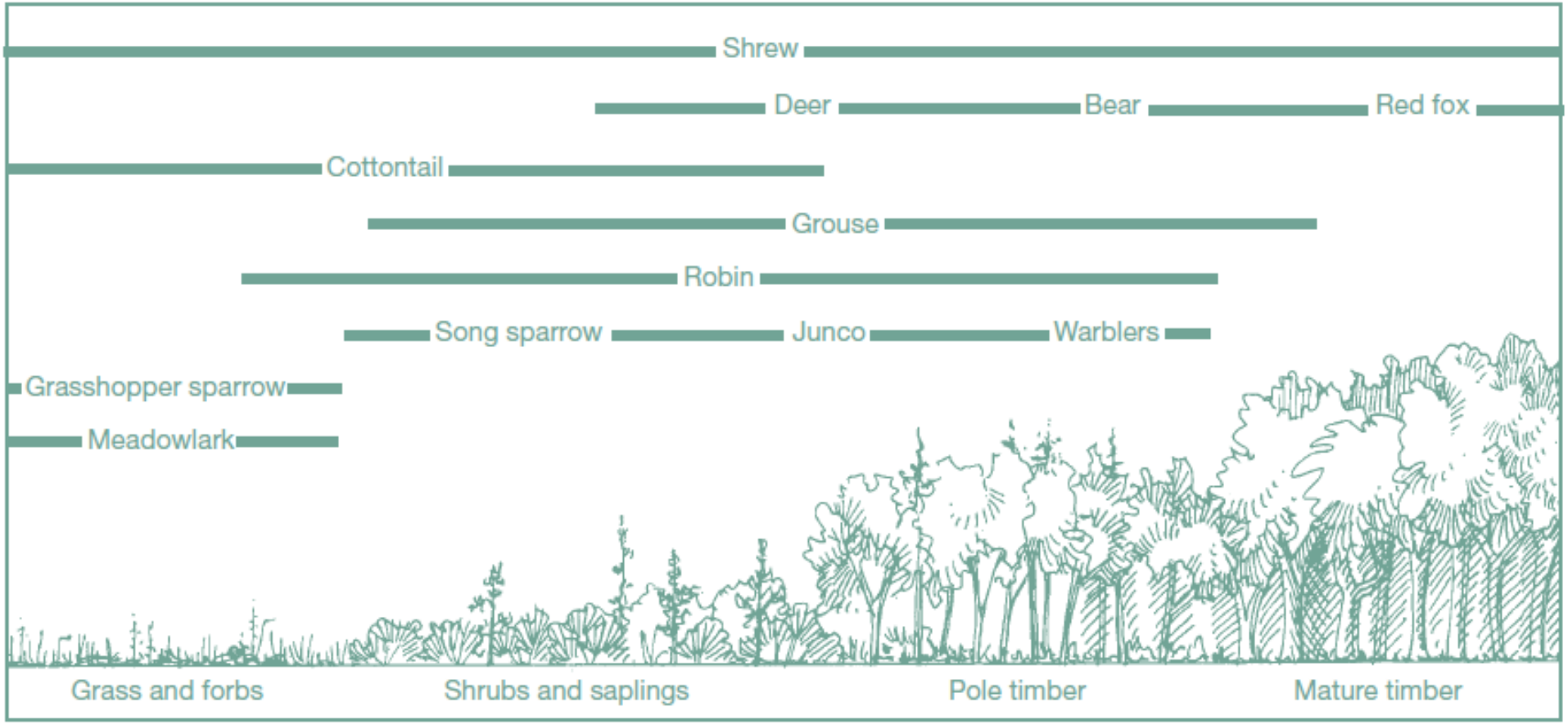
Forest Succession & Wildlife Habitat

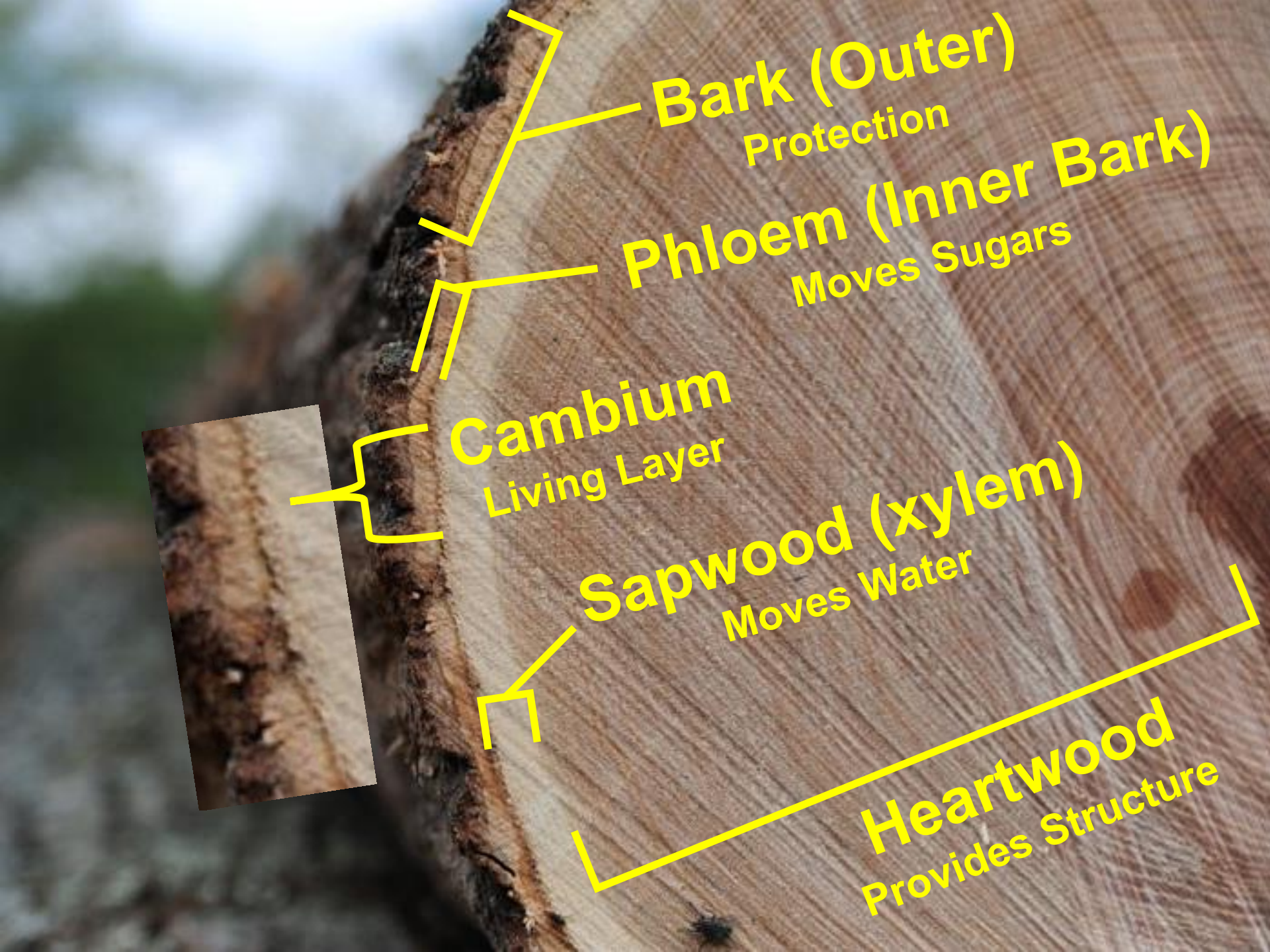
Field to Forest Succession

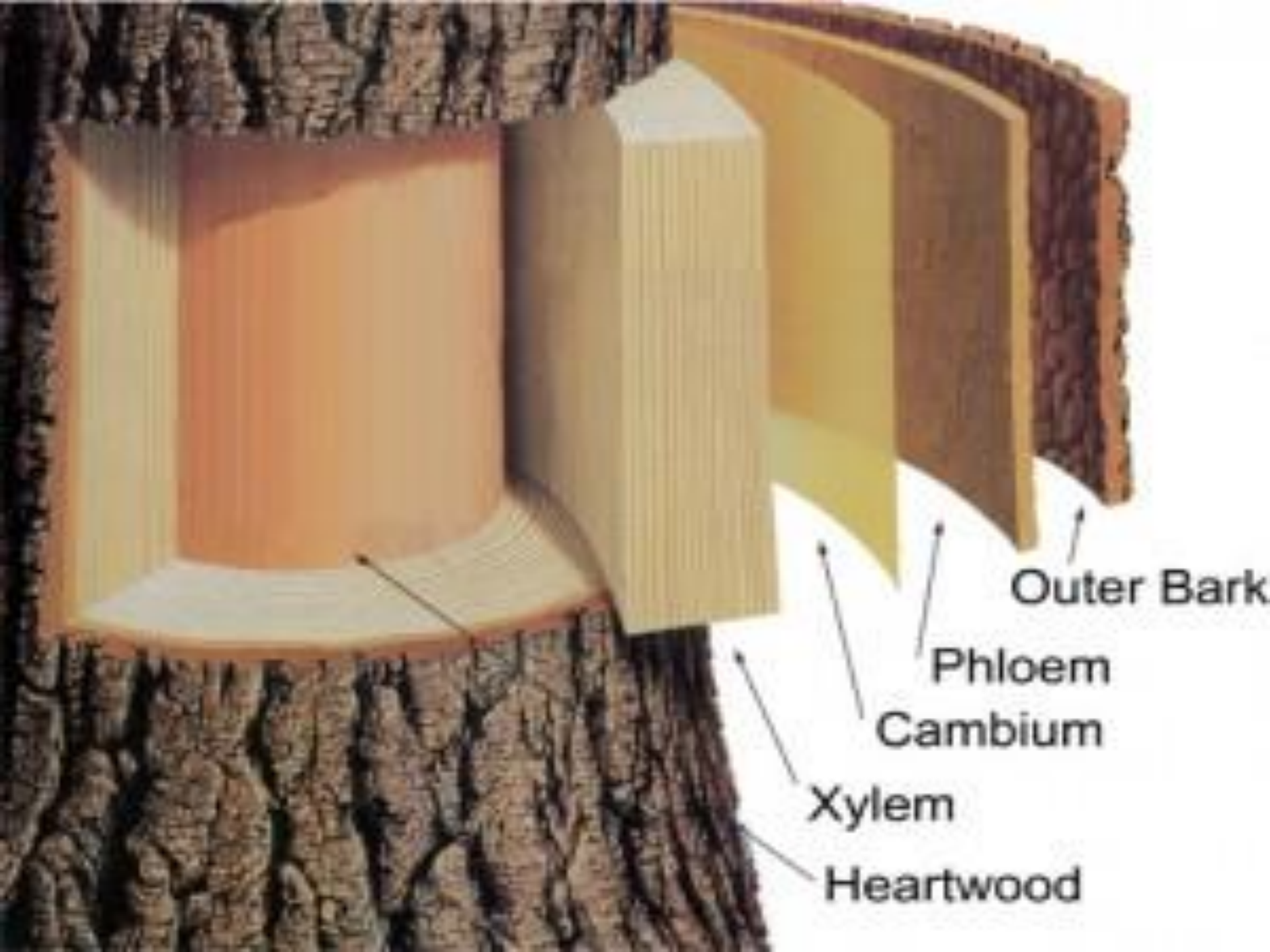
1st year	2nd to 5th year	3rd to 10th year	10th to 20th year	20th to 70th year	70th to 100+ yrs.	Until the next disturbance
Low-growing annual grasses and forbs (ragweed, horseweed & crabgrass, many non-native weeds).	Perennial grasses and forbs (asters, goldenrods, Queen Anne's lace, knapweed and many others).	Woody shrubs and shade intolerant tree seedlings invade among perennial herbs and grasses (blackberries & other *Rubus* species, sumacs, greenbrier)	Pioneer tree saplings form thickets (Red cedar, pines, locust, aspen or cherries depending on site).	Short-lived pioneer species gradually replaced by taller and longer lived trees (Tulip tree, ash, Red maple, Black birch, Black gum).	Canopy dominated by long-lived hardwoods (mixed oaks, hickories, maples). Understory of shade tolerant species	Shade tolerant species dominate the canopy and understory (hemlock, sugar maple, beech).

Pioneer Shade-intolerant Species	Moderately Shade-tolerant Species	Shade Tolerant Species
Which species of herbs, shrubs and trees dominate depends on location, site history, soil moisture, topography and circumstance.	Canopy trees are all about the same age (± 20 yrs).	Gaps from dying trees lead to an uneven age canopy.

Forest Succession & Wildlife



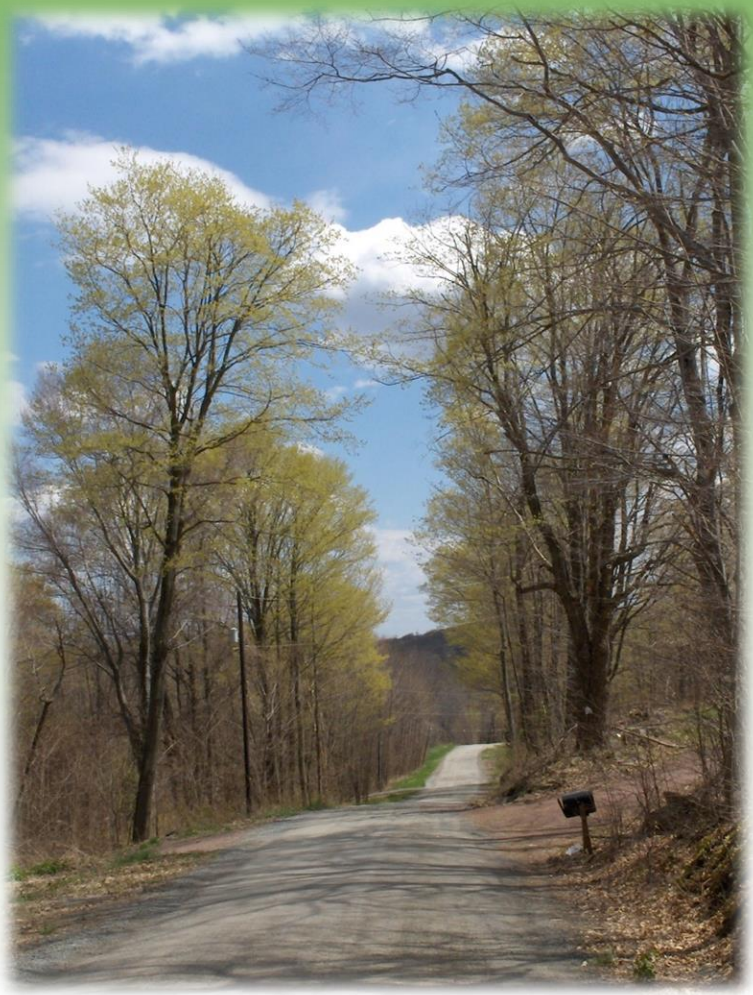

Bark (Outer)
Protection
Phloem (Inner Bark)
Moves Sugars
Cambium
Living Layer
Sapwood (xylem)
Moves Water
Heartwood
Provides Structure


Outer Bark
Phloem
Cambium
Xylem
Heartwood

Tree Types

Evergreen

Deciduous



Leaf Types

- Scale-Like
- Broad and Flat
- Needles

Scale-like

Broad and Flat

Needles

Leaf Type Comparison

Branching Orientation

- Alternate
- Opposite
- Whorled

Alternate

Opposite

Whorled

Leaf Structure

- Simple
- Pinnately Compound
- Palmately Compound

Simple Leaf

Petiole (leaf stalk)

Bud

Pinnately Compound Leaf

Leaflet

Petiole (leaf stalk)

Bud

Palmately Compound Leaf

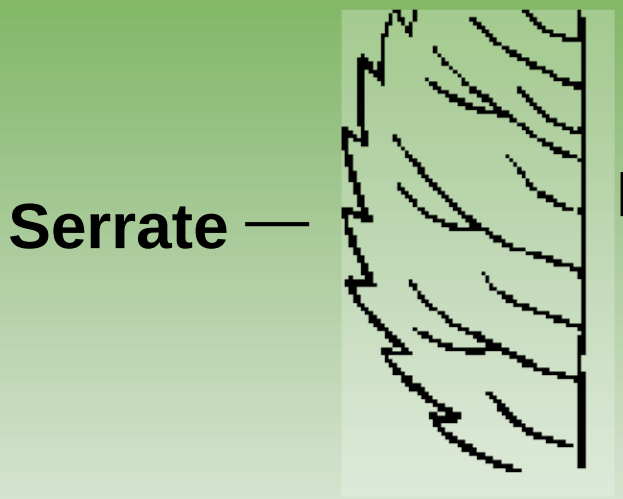
Leaflet

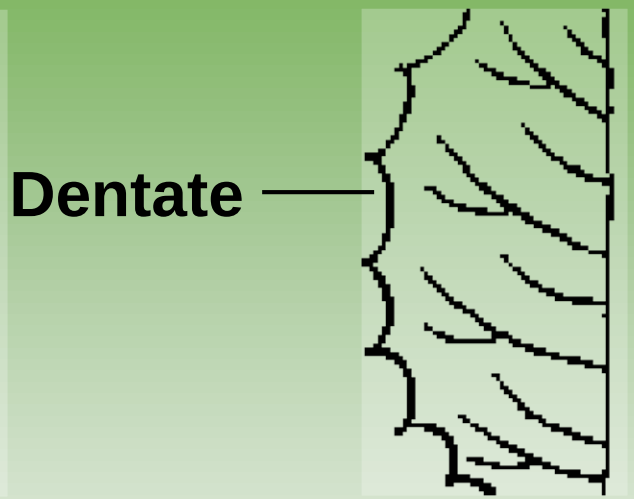
Petiole
(leaf stalk)

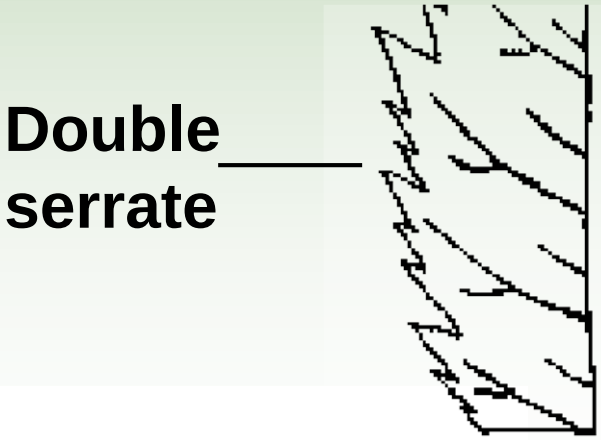
Bud

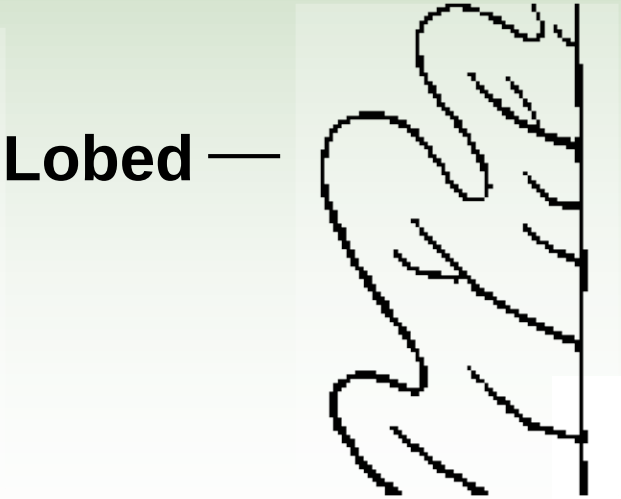
Leaf Comparison

Leaf Margins



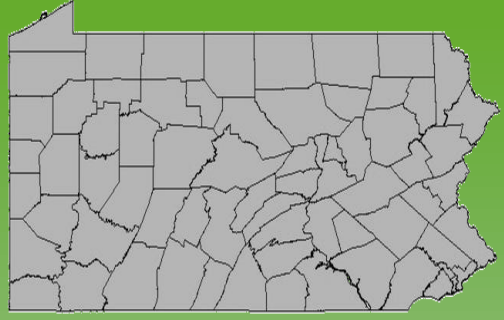






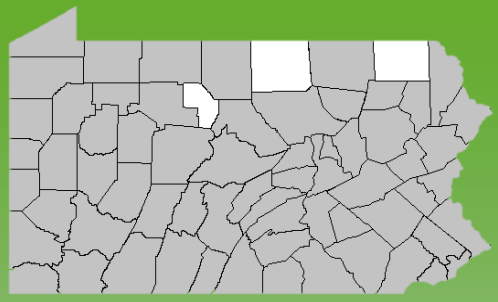
American beech

Fagus grandifolia



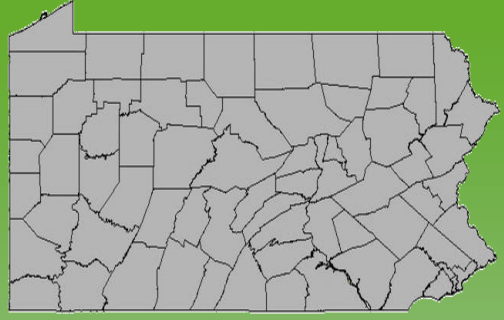
black gum

Nyssa sylvatica



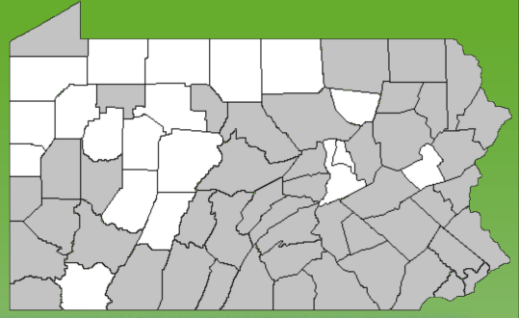
chestnut oak

Quercus prinus



Eastern redcedar

Juniperus Virginiana



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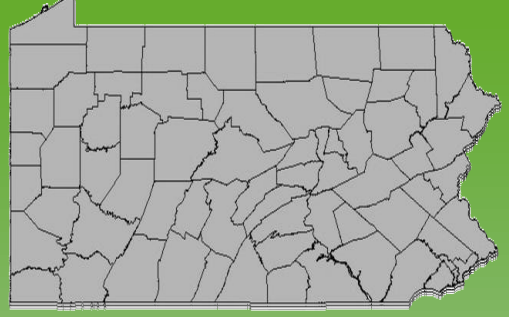
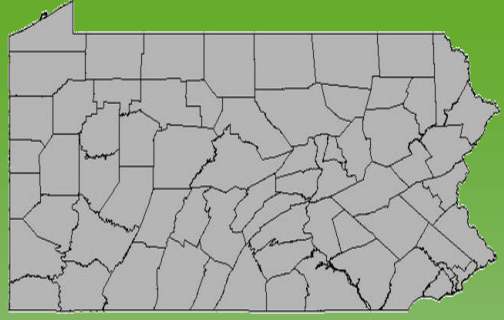
hickory

Carya spp.



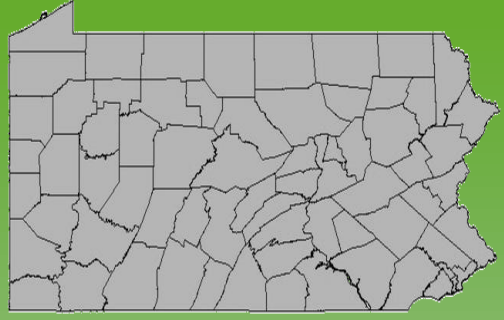
shagbark hickory

red maple
Acer rubrum



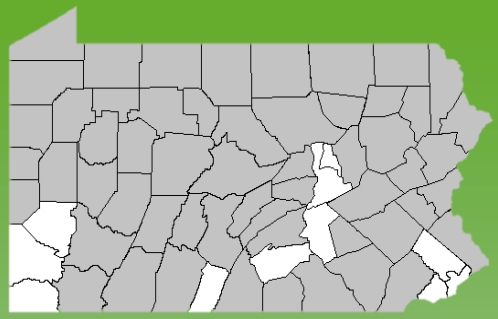
sassafras

Sassafras albidum



yellow birch

Betula alleghaniensis



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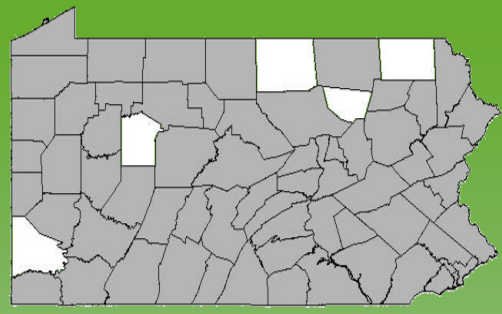
yellow-poplar (tulip-poplar)

Liriodendron tulipifera



What is an Invasive?

USDA

"Invasive plants are [usually] **introduced species** that can thrive in areas beyond their natural range of dispersal. These plants are characteristically **adaptable**, **aggressive**, and have a **high reproductive capacity**. Their vigor combined with a **lack of natural enemies** often leads to outbreak populations."

Asian Longhorned Beetle Non-Native

Major Hosts

- Maple, horse chestnut, black locust, willow, elm, birch, poplars, and green ash

Key Features

- Adult: glossy jet black, up to 20 white spots on back, antennae with distinct white bands on each segment
- Coarse sawdust under exit holes
- Exit hole: round ~3/8 inch

Control

- Eradication
- Minimum of 1/8th of a mile radius for treatment area






Eastern Tent Caterpillar

Native

Major Host

- cherry, apple, and other fruit trees

Key Features

- 100 to 250 eggs in mass
- Webs at Branch Unions
- 5 larva stages of Caterpillar
- White & yellowish Strip With White Dots

Control

- Aerial Applications of Bacillus thuringiensis (BTK)
- Aerial Applications of Approved Insecticides

Emerald Ash Borer

Non-Native

Major Hosts

- All ash species

Key Features

- Eggs deposited in bark crevices
- Peak emergence June & July
- Adults fly up to a mile
- Metallic green wing covers
- Feeds on the cambium layer creating “S” galleries

Control

- Stem Injection or Soil Drench with Insectiside

Forest Tent Caterpillar

Native

Major Hosts

- sugar maple, ash, aspen

Key Features

- 5 larva stages of Caterpillar
- 100 to 250 eggs in mass
- Egg Mass at Ends of Branches
- Does Not Form Tents
- Eggs over-winter until following spring

Control

- Aerial Applications of Bacillus thuringien (BTK)
- Aerial Applications of Approved Insecticides

Figure 3: New (above) and old (below) egg Masses. Photo courtesy of US Forest Service.

Gypsy Moth

Non-Native

Major Host

- All Oak Species, Maple, Ash, Hickory

Key Features

- 10 blue dots & 12 red dots
- Male (brown) & Female (white)
- Females are flightless
- Eggs over-winter until following spring
- Located on tree trunks & under branches

Control

- Aerial Applications of Bacillus thuringiensis (BTK)
- Aerial Applications of Approved Insecticides

Hemlock Wooly Adelgid

Non-Native

Major Host

- All Hemlocks

Key Features

- Small Aphid
- Found in 2/3 of PA Counties
- Two generations per year
- Feeds by attaching itself to the base of the needle and sucking sap

Control

- Several different Insecticides bark and root applications
- is partially controlled by low temperature winters

Spotted Lanternfly

Non-Native

Major Hosts

- Tree of heaven, grapes, apples, pines, cherry, fruit trees
- Feeds on over 80 different plants

Key Features:

- forewing is grey with black spots and the wings tips are black blocks outlined in grey, hind winds have patches of red and black with white band partially separating

Control

- Removal of 90% of Ailanthus trees leaving treated “trap trees”.
- Remove all female Ailanthus.

Norway Maple

Acer Platinoides

Tree of Heaven (Ailanthus)

Ailanthus altissima

Japanese Barberry

Berberis thumbergii

Autumn Olive

Elaeagnus umbellata

Winged Euonymus (Burning Bush)

Euonymus alatus

Bush Honeysuckle

Lonicera spp.

Oriental Bittersweet

Celastrus orbiculatus

Garlic mustard

Alliaria petiolata

Mile-a-Minute

polygonum perfoliatum

Japanese Stilt Grass

Microstegium vimineum

Bradford Pear

Pyrus calleryana

Japanese Knotweed

Polygonum cuspidatum