

Morticulture: The Abundant Life in Old Dead Trees

Margery Winters



A photograph of a dense forest with tall, slender trees and a thick canopy of green leaves. The scene is brightly lit, suggesting a sunny day. The trees are of various species, with some showing characteristic bark textures. The ground is covered in a layer of green undergrowth and fallen leaves.

Living trees:

- provide shade
- filter air
- produce oxygen
- soften the impact of rain
- prevent soil erosion
- produce food
- habitat for wildlife
- aesthetically pleasing

Harvested trees provide:

- **Fuel:** firewood, charcoal, wood pellets
- **Wood Products:** houses, furniture, baseball bats, musical instruments, handles, toys,, fences, floors, boats, bridges, cabinets...
- **Pulp:** paper products, including books, paper bags, notebooks, packaging material, calendars, cardboard boxes, coffee filters, egg cartons, envelopes, tissues, toilet paper, magazines, newspapers ...
- **Chemicals:** Natural dyes, scented oils, tar, pitch, turpentine, menthol ...
- **Cellulose:** Rayon, cellophane, adhesives, floor tiles, food additives and thickeners, photographic film ...







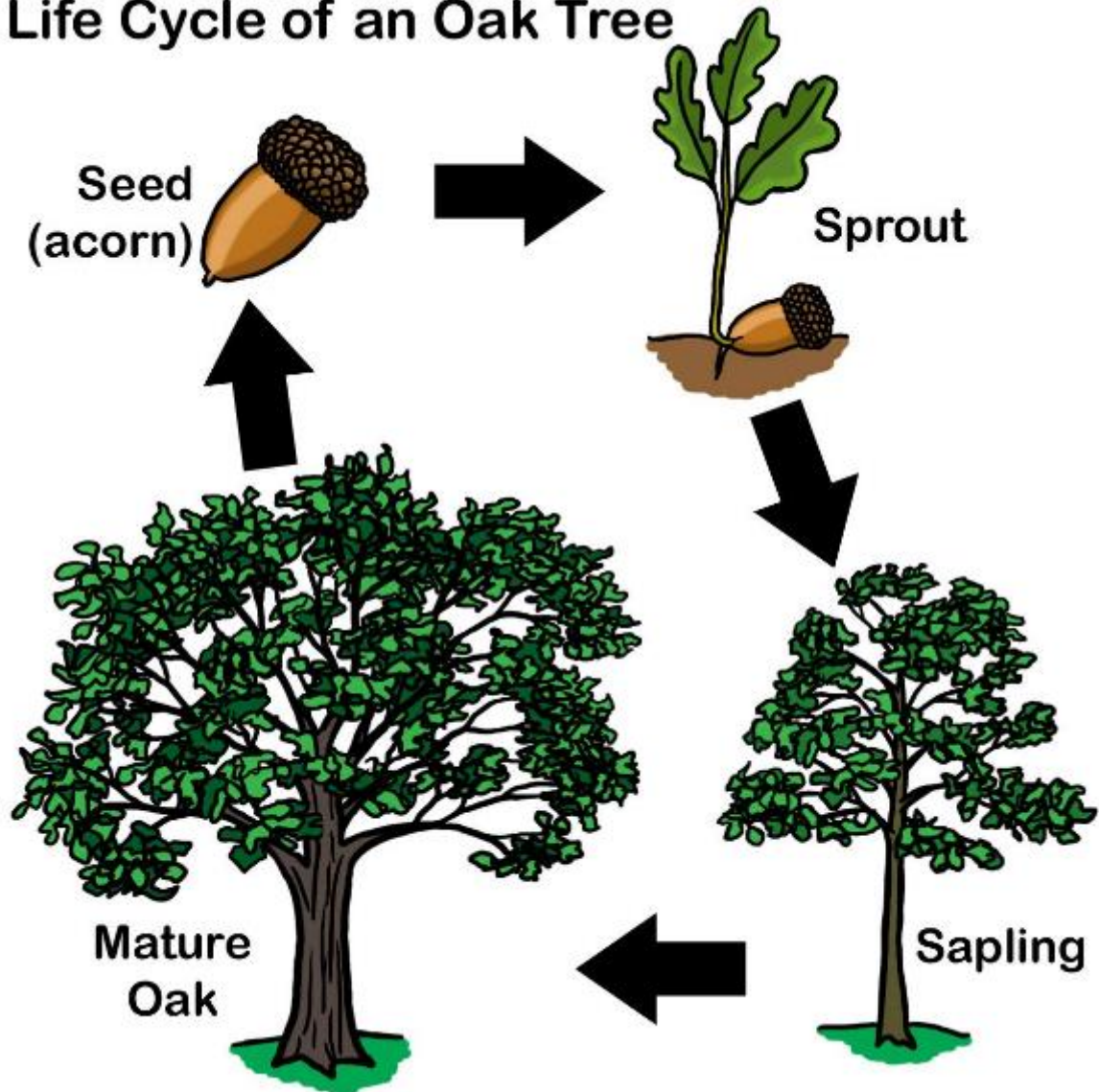


Which tree has more value?



Which tree has more value
to a forest?

Life Cycle of an Oak Tree



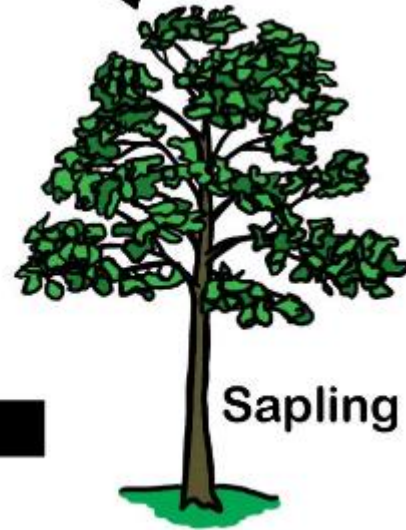
Life Cycle of an Oak Tree



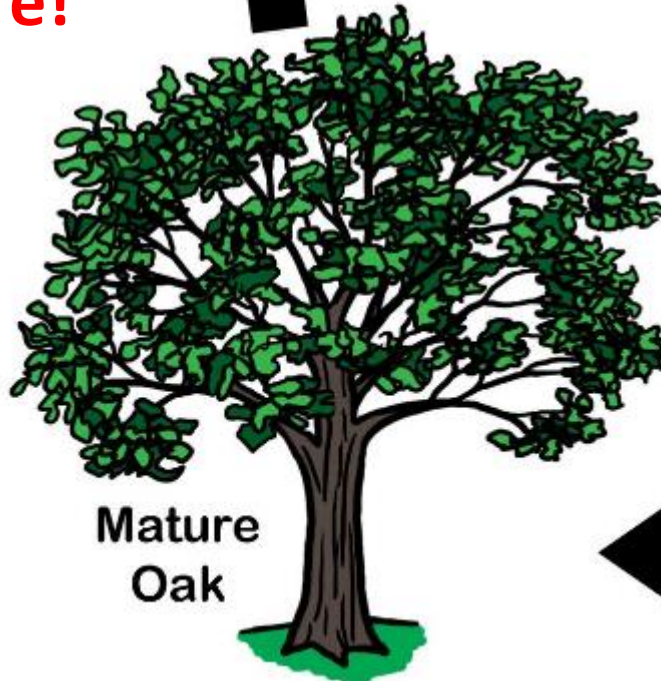
Seed
(acorn)



Sprout



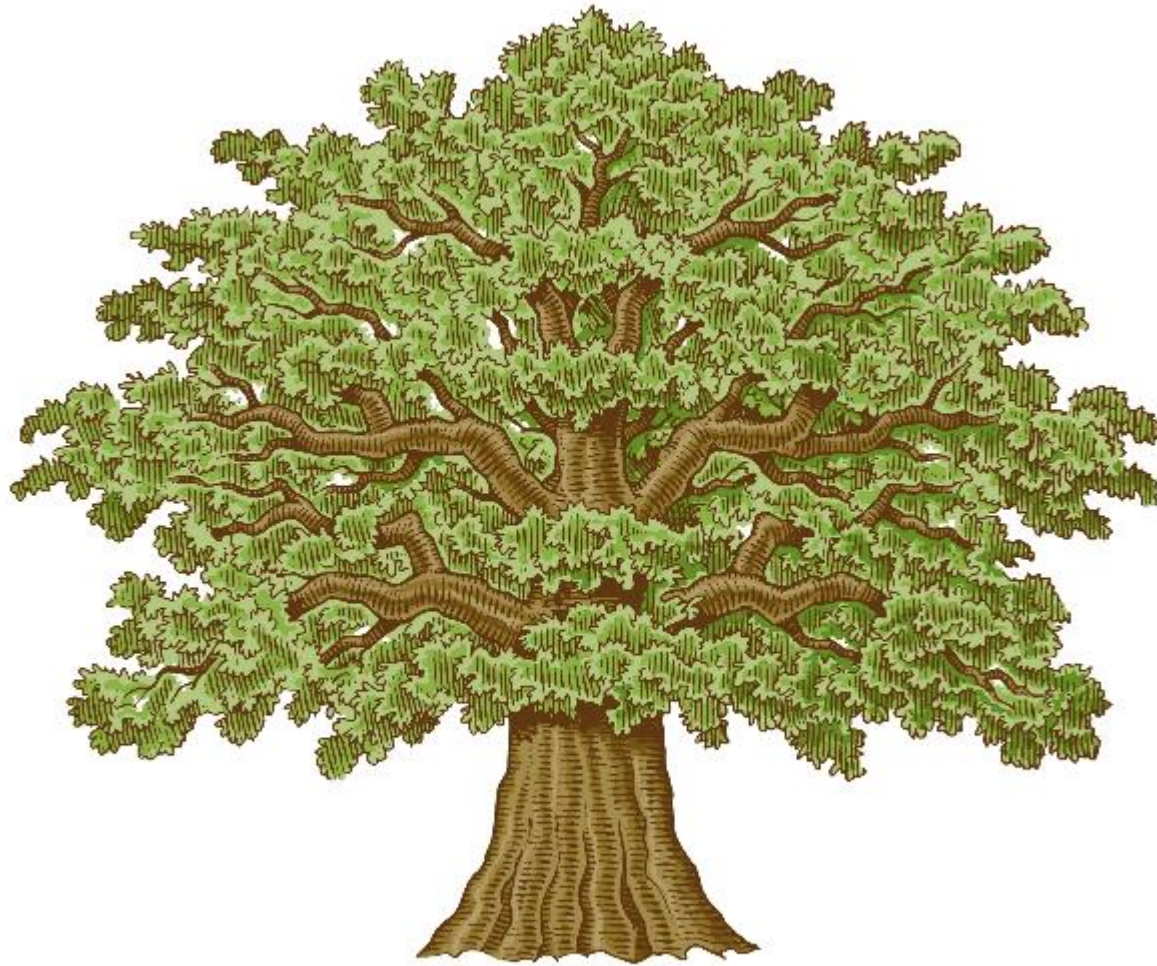
Sapling



Mature
Oak

Something is
missing here!





White oak trees - 600 years / red oak tree - 400 years

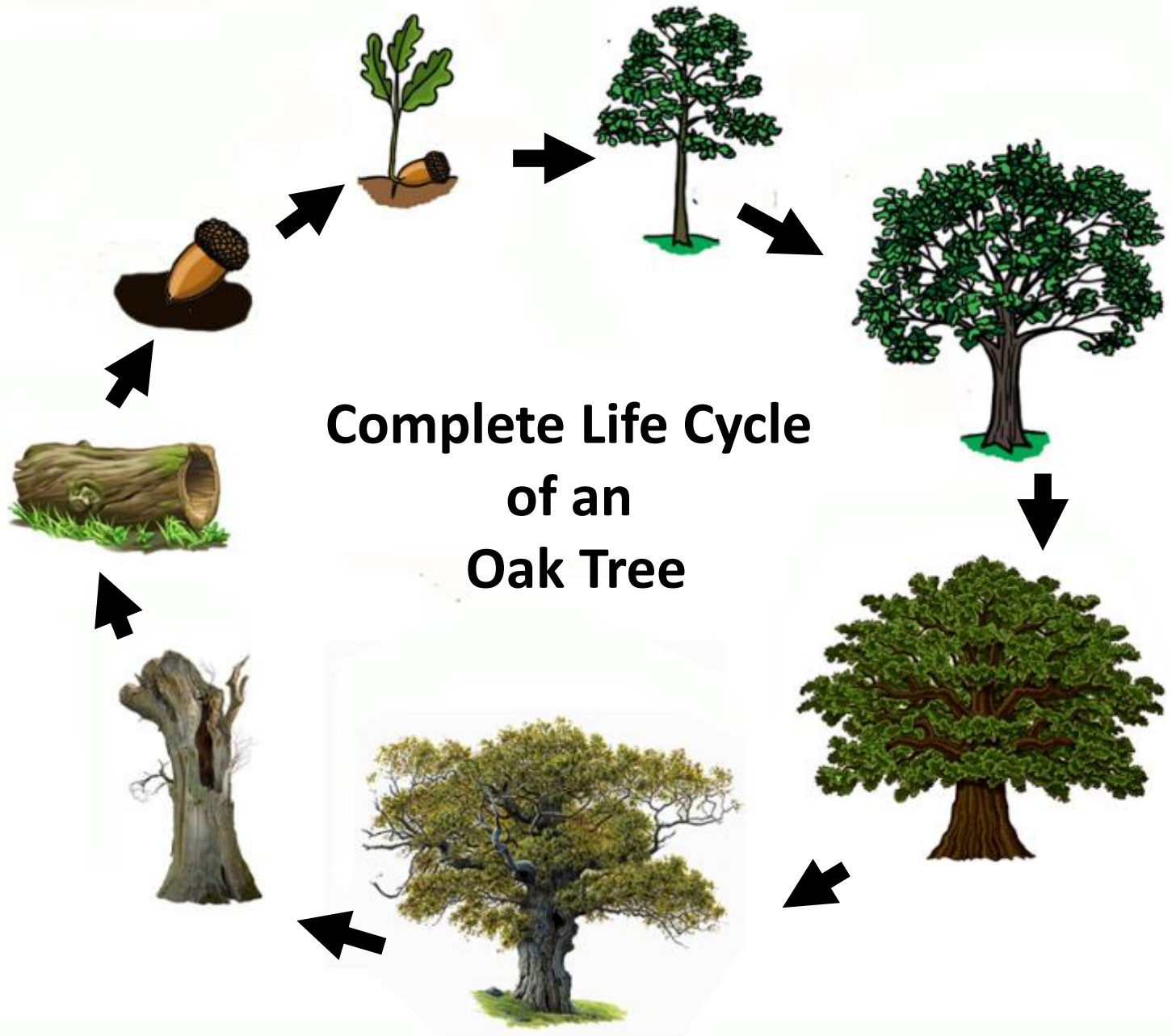


Senescence









**Complete Life Cycle
of an
Oak Tree**





Connecticut 1830 - only 20% forested

Wolf Tree





Young, mature forests



CT is now approximately 60% forested



WOLF TREE

OVER 300 YEARS AGO THIS OAK TREE WAS THE ONLY TREE GROWING IN WHAT WAS THEN AN OPEN AREA. IT RECEIVED SUNLIGHT FROM ALL SIDES, SO IT GREW IN ALL DIRECTIONS. NOW THAT THE WOODS HAVE GROWN UP AROUND IT, IT STILL DOMINATES THE AREA BY CREATING SHADE WHICH PREVENTS OTHER TREES FROM GROWING UNDER IT. HENCE THE NAME WOLF TREE









Creation of Snags

How a tree dies affects its
ultimate role in the
forest ecosystem



Microburst - Adirondacks





Hurricanes

- OVER 600 DEATHS IN NEW ENGLAND
- 63,000 HOMELESS
- \$306 MILLION IN DAMAGE
- 2 BILLION TREES KNOCKED DOWN
- 8,900 BUILDINGS DESTROYED
- 3,300 BOATS LOST

THE GREAT NEW ENGLAND HURRICANE OF 1938

SEP 22

50' WAVES AT GLOUCESTER

STORM RACED NORTH AT 58 MPH

121-MPH WINDS, 186-MPH GUSTS

SEP 21

STORM SURGE 15'-20'

SEP 20

community.accuweather.com





CWD

Coarse Woody Debris

CWWM

Coarse Woody Material



379960

Gypsy Moth defoliation



Western forest management issues monocrop plantings





THE **ECOLOGICAL IMPORTANCE**
OF **MIXED-SEVERITY FIRES**
NATURE'S PHOENIX

Dominick A. DellaSala

Chad T. Hanson





UE4 Burned Dead Forest Biome | © 2020 MAWI United GmbH. All rights reserved. | www.mawiuited.com

Most dead wood physically survives blazes



Charred trees are also resistant to decay.
Wildfire snags can survive for a century or more.




Upwards of 60% of species that nest in severely burned forests use only snags for nest sites



Salvage logging



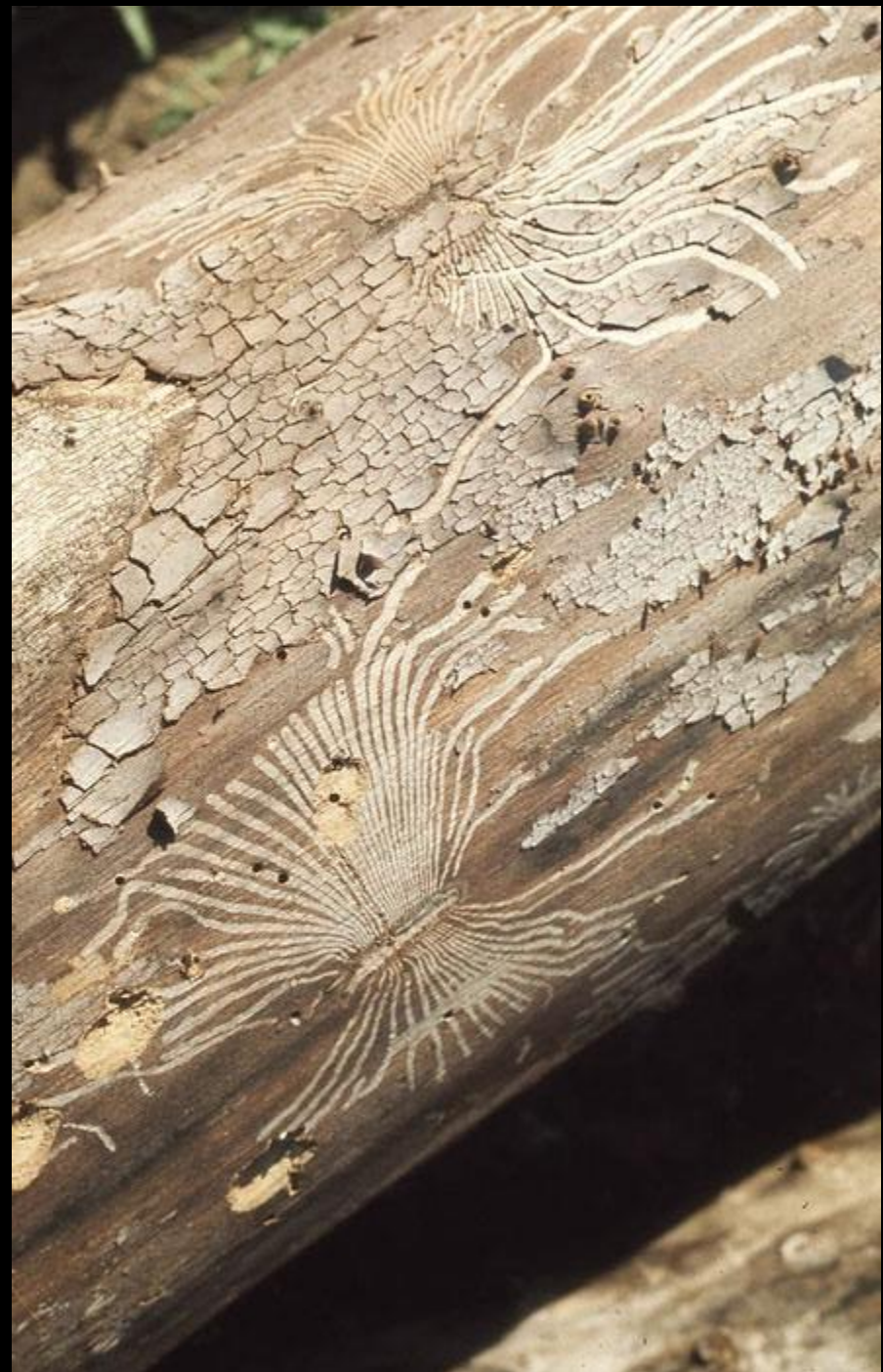
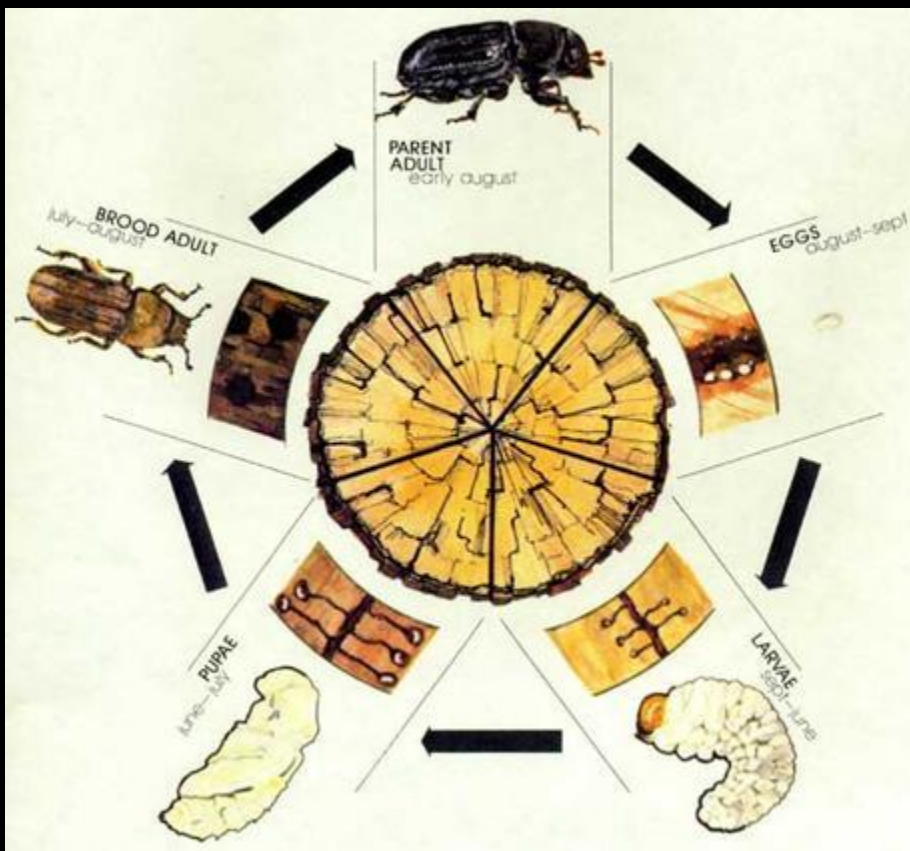


Sapsucker

©2008 Jeffrey Phippen



Porcupine



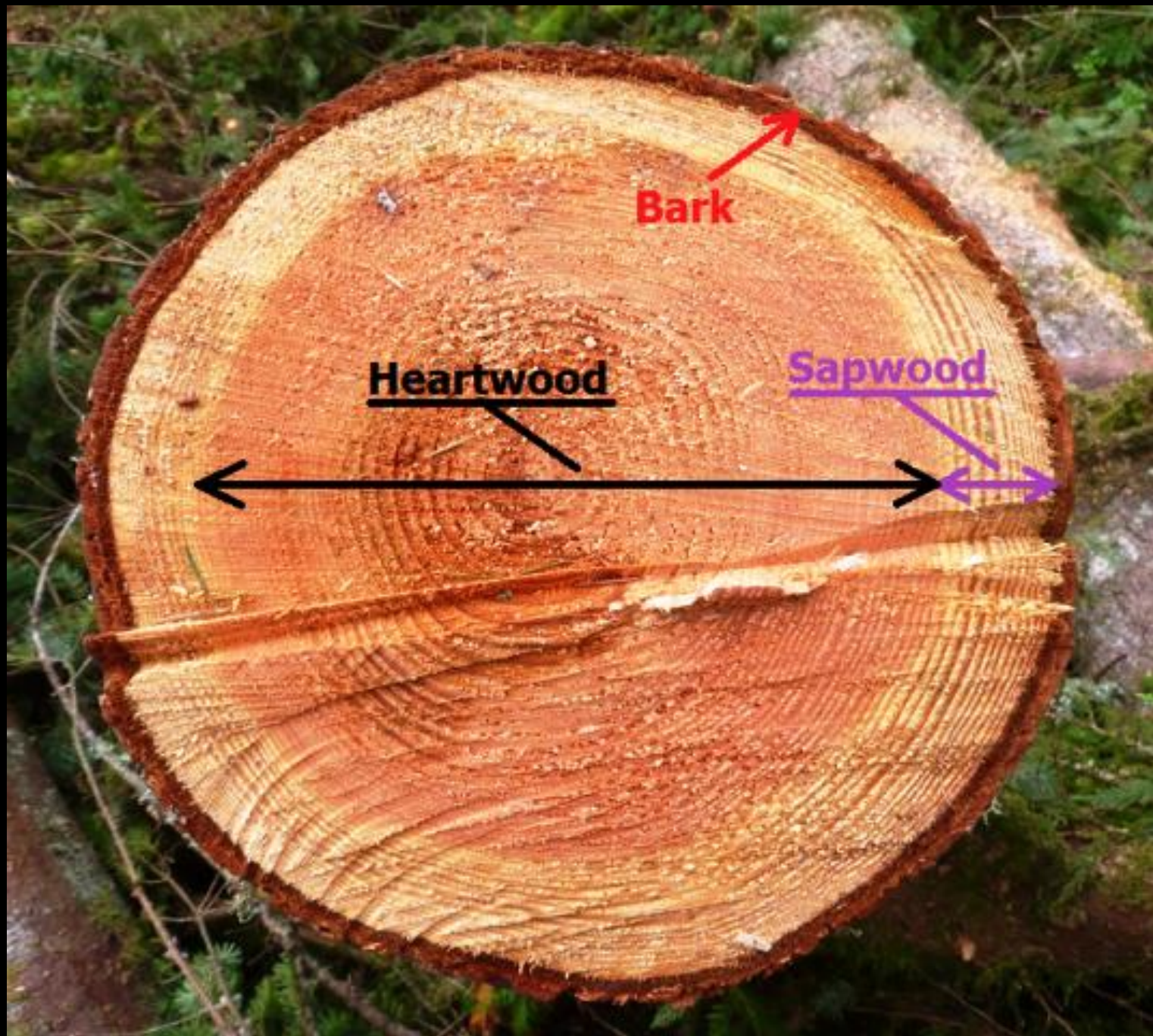
Insects attack
old or weakened trees,
speeding development
of a younger forest



Trees killed by bark beetles
have significantly greater woodpecker feeding activity,
cavity building, and insect diversity



Bark boring beetles carry fungal spores

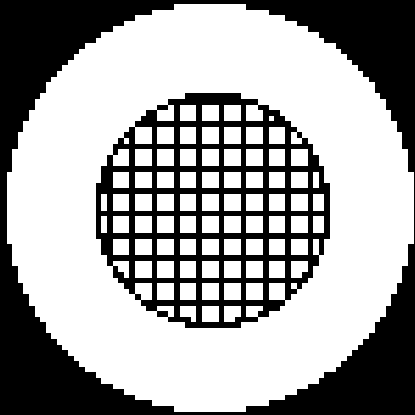


Bark

Heartwood

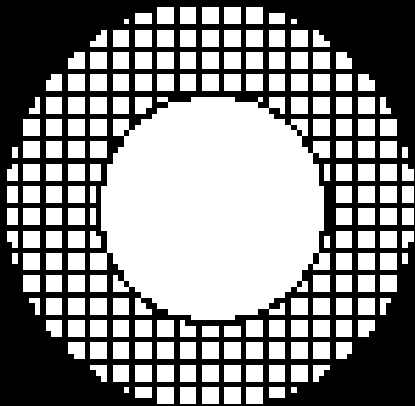
Sapwood

Typical patterns of decay in living vs dead trees:



Live tree:

decay in heartwood,
sapwood resistant to decay



Dead tree:

sapwood decays faster
than heartwood



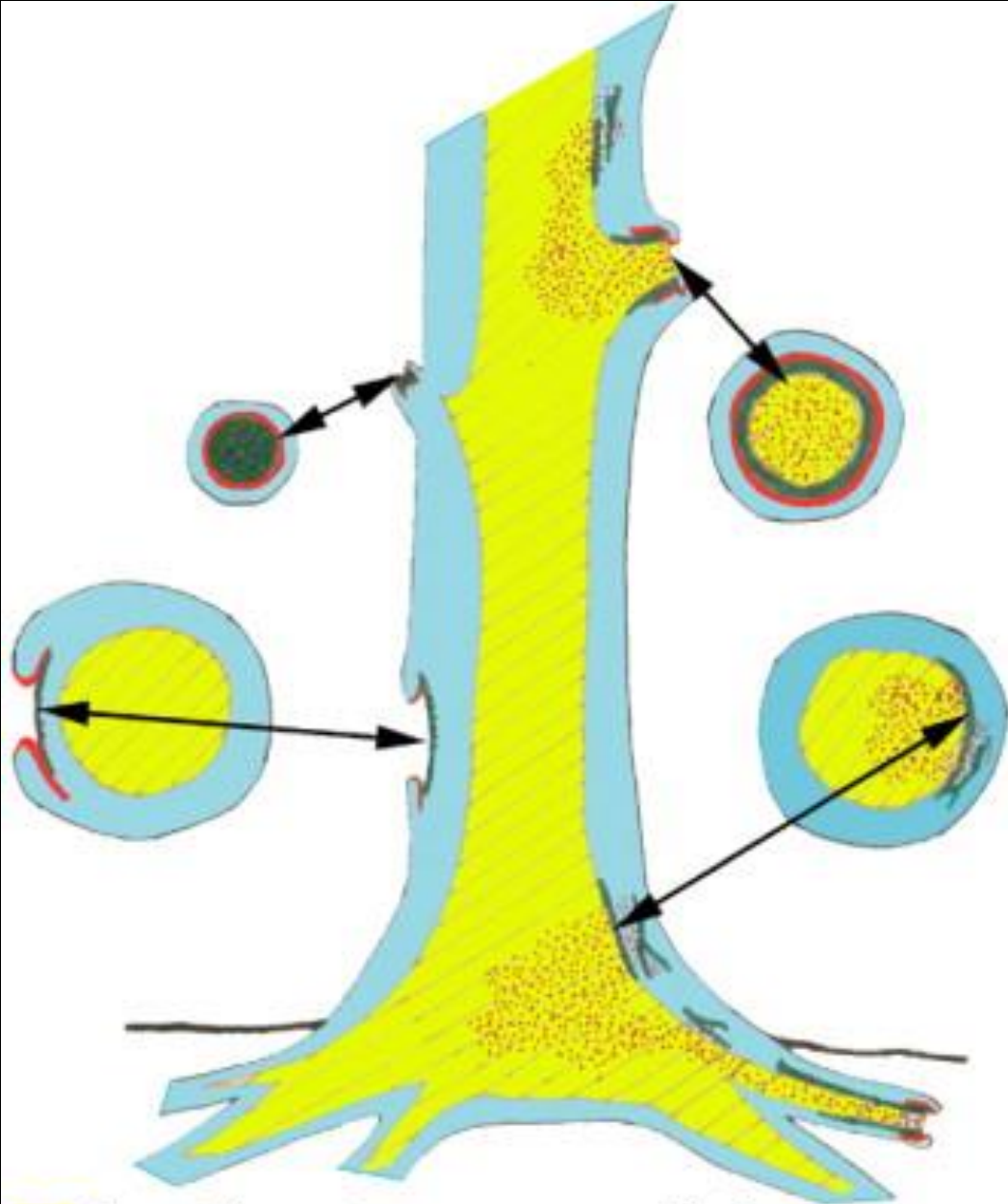
**Heart Rot
in living trees**





Sapwood rot





Heart-Ripewood
 Sapwood
 Decayed wood

Barrier zone
 Reaction zone



Bark beetle-killed trees provided significantly greater woodpecker feeding activity, cavity building, and insect diversity compared to snags created by girdling.

How long will it take a log to rot?



Oak wood held above the ground or is on a very dry site can persist almost indefinitely.

How long will it take a log to rot?



Completely degraded in **15–20 years**
if in contact with moist soil

How long will it take a log to rot?



Oak stumps from past logging in the midwestern US take 25–50 years to rot completely away.







The prime source for organic matter in forest soils is decomposing woody material in forests, much of which comes from fallen dead trees





Brown rot



White rot



Brown rot eats cellulose
and leaves decay resistant lignin



White rot fungus eats lignin,
leaves cellulose

Adds to soil organic matter



Holds water like a sponge



Nurse stump



Nurse Log



Nurse log



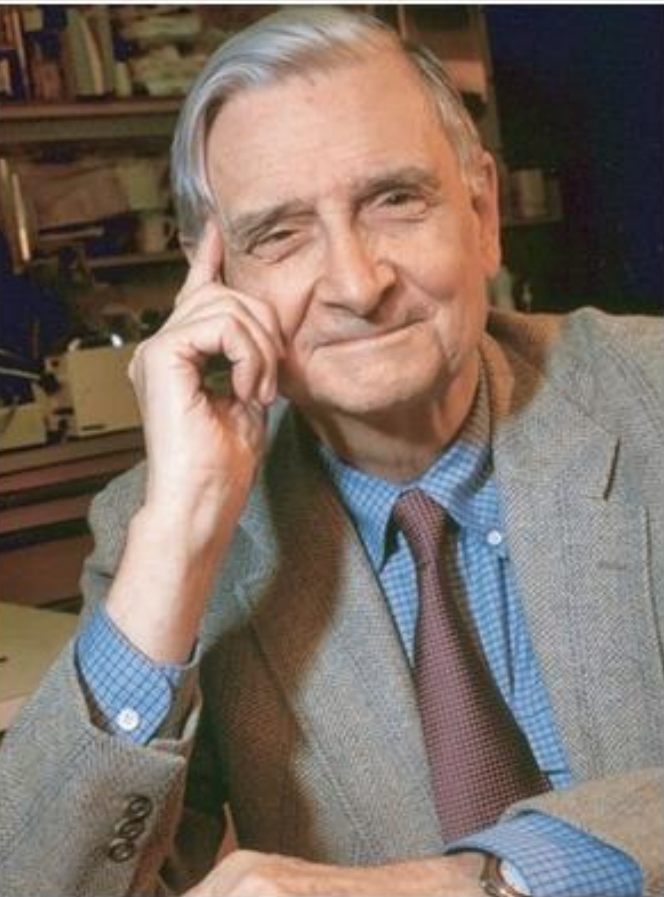
An ecologically healthy forest has dead trees, broken tops, and down logs.



Managed forest



Dead trees are so important to wildlife
that $2/3$ of all wildlife species
use dead trees or downed wood during
some portion of their life cycle.



I turned to the teeming small creatures that can be held between the thumb and forefinger: the little things that compose the foundation of our ecosystems, the little things, as I like to say, who run the world.

— *E. O. Wilson* —

AZ QUOTES

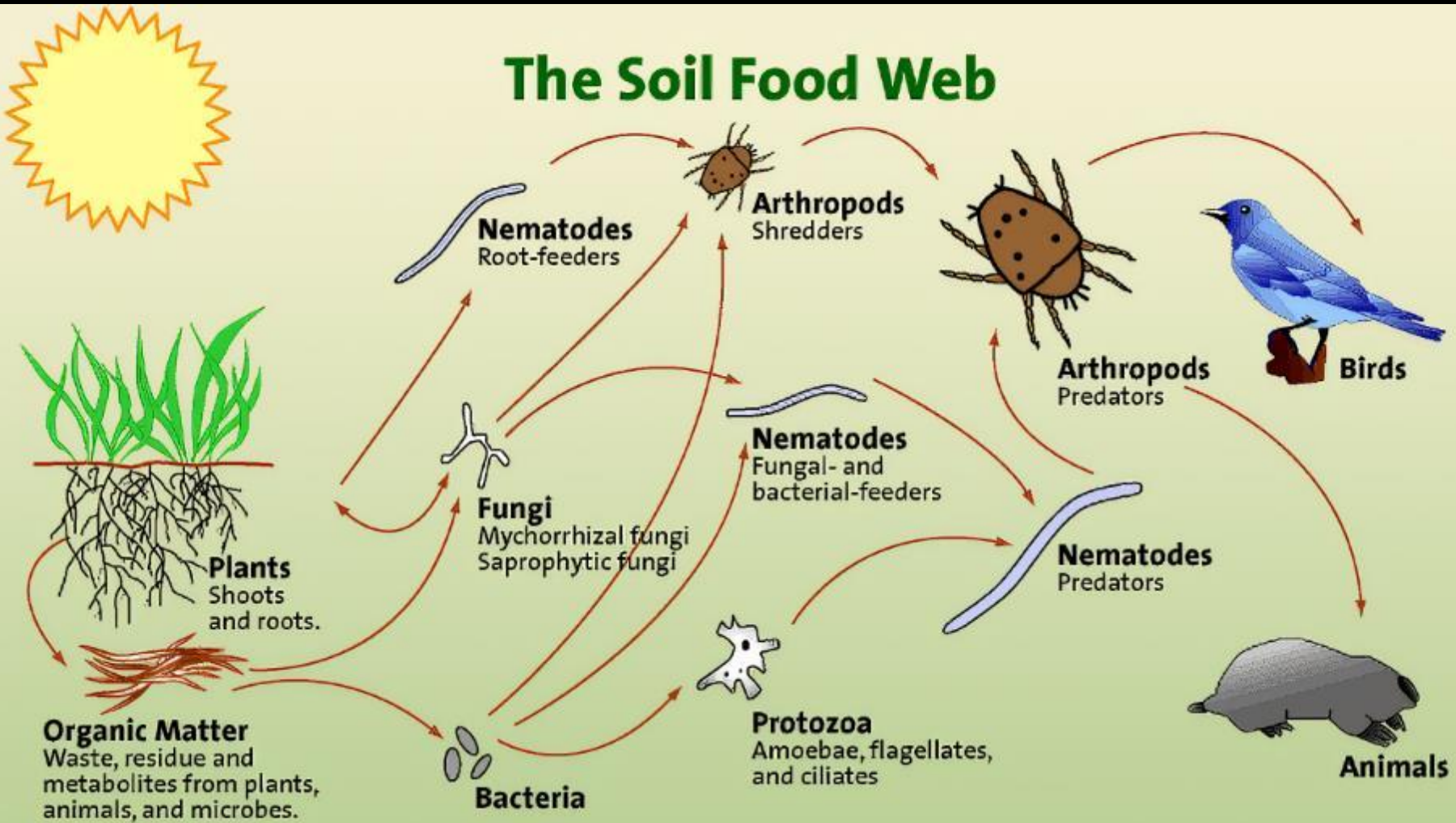
Dead Wood & Small Creatures



Forest Floor Food Web



The Soil Food Web



First trophic level:
Photosynthesizers

Second trophic level:
Decomposing Mutualists
Pathogens, Parasites
Root-feeders

Third trophic level:
Shredders
Predators
Grazers

Fourth trophic level:
Higher level predators

Fifth & higher trophic level:
Higher level predators



Termites



Bark boring beetles



Carpenter Ant

Ants are among the most common invertebrate in forest ecosystems and critically important

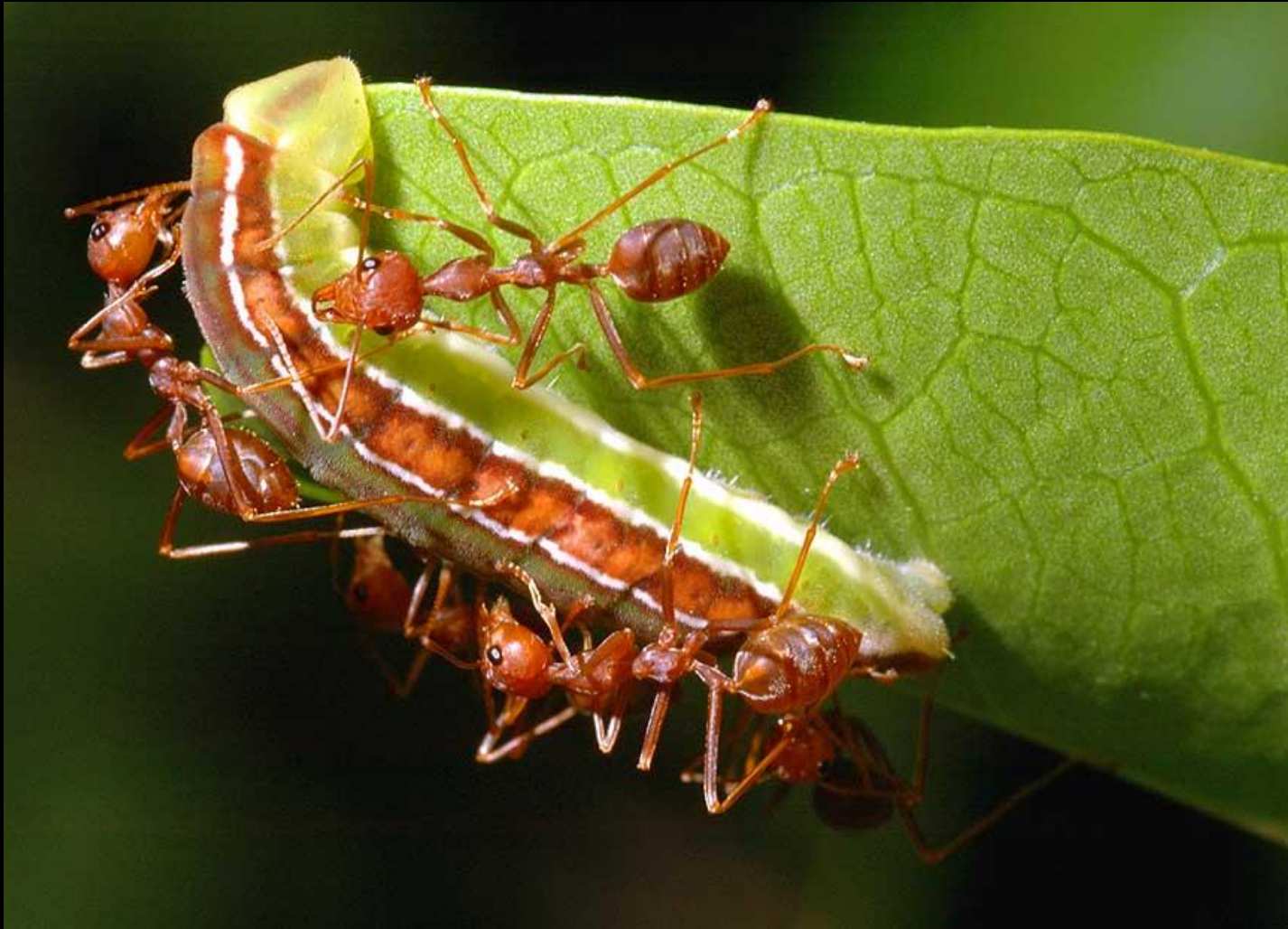
As the aging tree's heartwood softens & rots, carpenter ants move in



By removing the rotten wood they open up space in which to nest.



**Carpenter ants
help to return the
nutrients to the soil
bringing the cycle
back to the beginning**



Ants are major predators of insects that attack trees

Including gypsy moths and tent caterpillars



Ants create the best compost
Anthills are localized hotspots of nutrients.

trees
provide ants
with shelter



ants feed on
herbivorous
insects

Indirect Mutualism



ant wastes
nourish the tree







Forest ants are a valuable food source for birds and even larger animals like bears



Home for Pollinators

Hundreds of species solitary & colonial bees are primary pollinators of flowers and berry-producing shrubs



Carpenter Bee



**Woody debris provides
a well-stocked
"grocery store"**





The removal the dead trees
after a wildfire or beetle outbreak,
robs the soil of the energy for micro-organisms.
The organic influx is essential to micro-community.



**Dead wood is one of the greatest resources
for animal species in the forest**



Salamanders are the most abundant vertebrate animals in many forest ecosystems and compose the greatest vertebrate biomass in eastern forests.



Salamanders are a major source of food for many species in the forest food chain.



Salamanders
are also
predators

Eat beetle larvae, fly larvae, ground beetles, spiders, sow bugs, round worms, and other invertebrates that feed on forest debris



**More than 40 vertebrate species
rely on the presence of woody debris**

Rotting wood retains small pockets of moist cover
critical for the survival of small animals
when other parts of the forest floor dry out







Keystone Species





Red-bellied



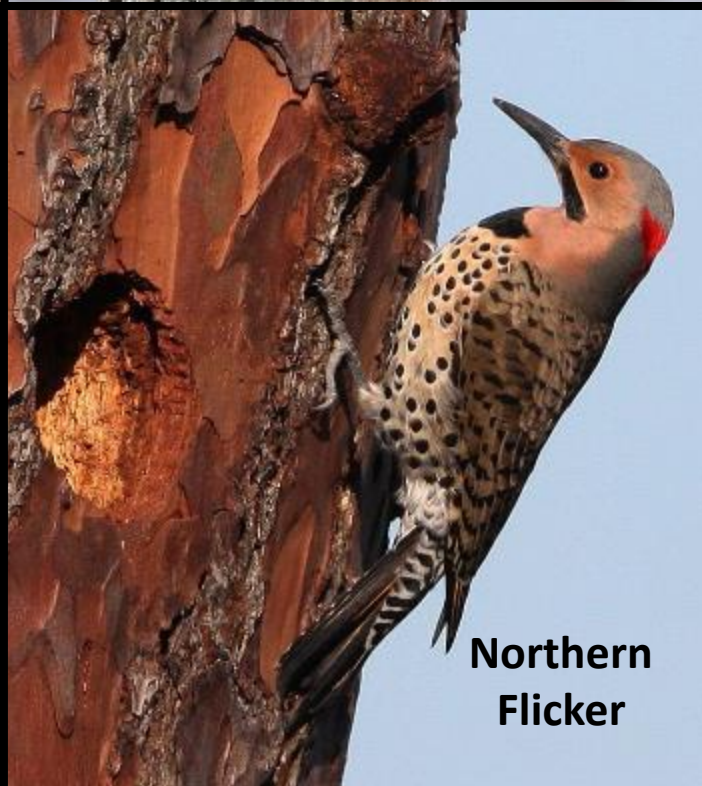
Downy



Red-headed



Hairy



**Northern
Flicker**



**Yellow-bellied
Sapsucker**



As many as 45% of all North American native bird species rely on snags for at least a portion of their life cycle.









Laura Schuyler





Insectivorous cavity-nesting songbirds play an important role in the regulation of forest insect populations









Pileated
woodpeckers
won't open up
healthy trees



Danielle Brigida / NWF

Snakes, mice, and shrews seek refuge in rotting logs



Mushrooms feeding on dead wood are food for insects, turtles, birds, mice, squirrels, and deer.



Some common lichens are more abundant on bare barkless branches of dead trees than on live ones



Old trees often have the
most lichen diversity

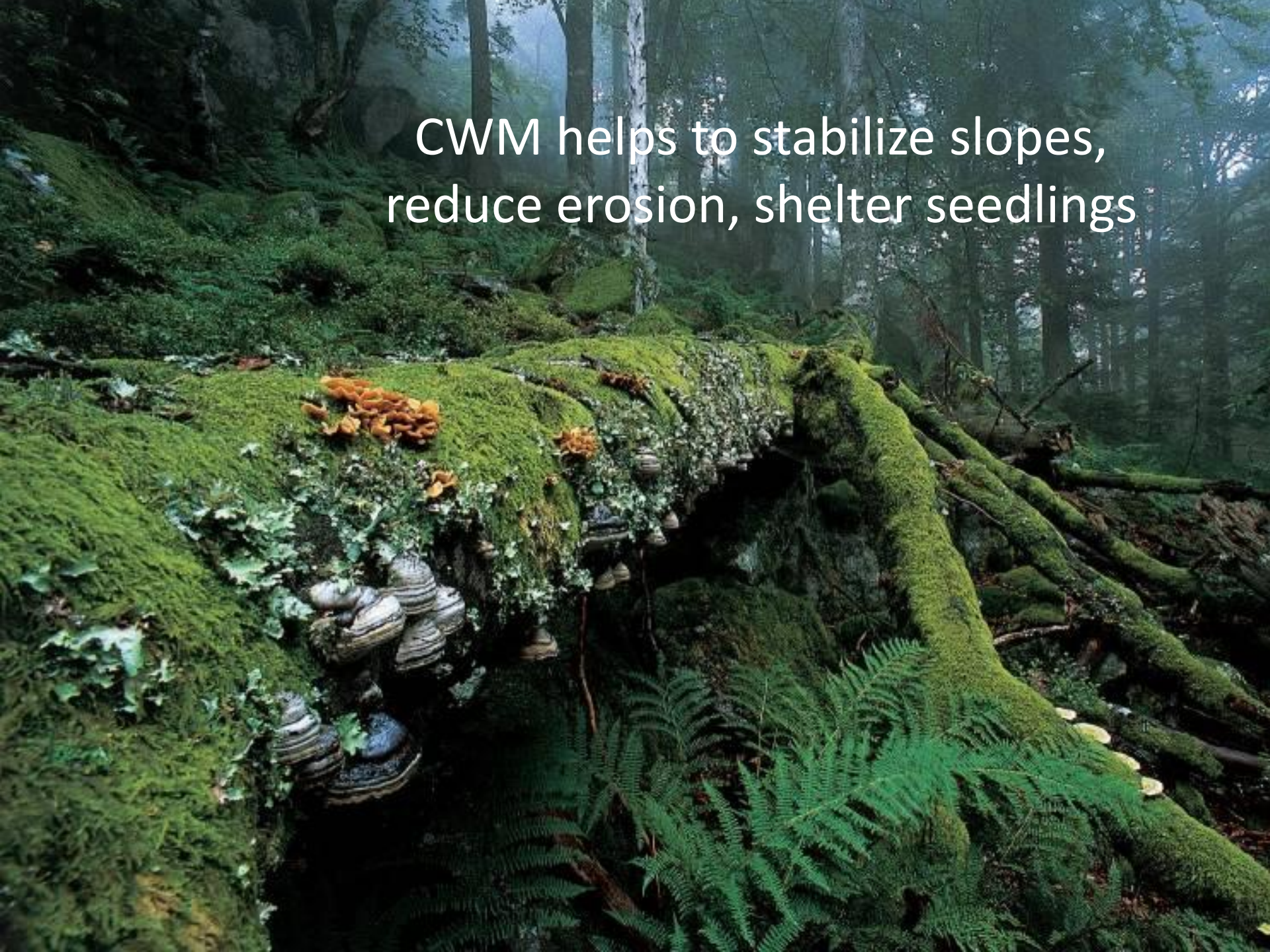
The bark of a single sugar maple
may harbor a dozen species
or more.

Very old trees are exceptionally valuable for fungi



Role and importance of fungi in the wood decay system and in habitats is only starting to be recognized

CWM helps to stabilize slopes,
reduce erosion, shelter seedlings





**Important role in
stream restoration**





Down logs slow the velocity of the water, allowing sediment to settle out



More wood, more fish

Restoring Finland's river ecosystems: 'We're basically starting from zero'

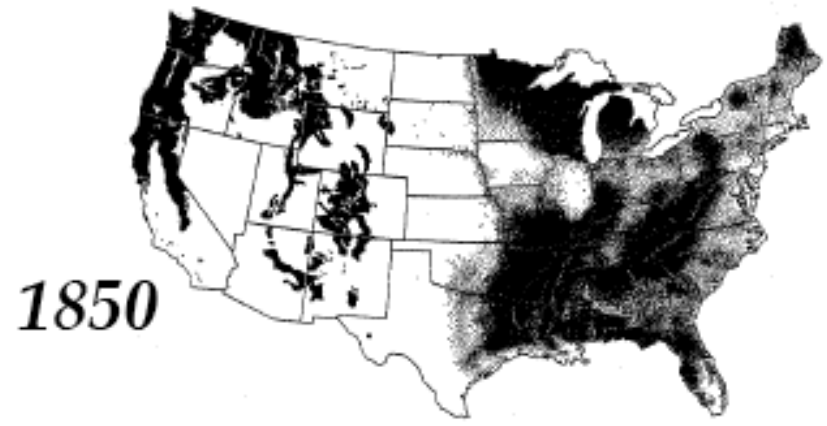
Rewilding teams are facing a huge task to encourage the return of wildlife after decades of damage by the forestry industry




The Guardian January 22, 2022



Where are the future wolf trees?



Virgin Forest



Old Growth Forest

Cathedral Pines - Cornwall, CT

Less than one tenth of one **percent** of **Massachusetts forests** have **old-growth forest** characteristics



Belden Forest – Simsbury

1st CT listing in Old Growth Forest Network

A photograph of a lush, green forest. The scene is filled with tall, slender trees, likely deciduous, with a dense canopy of bright green leaves. The ground is covered in a thick layer of green undergrowth, including ferns and other forest plants. The lighting is soft and diffused, suggesting a slightly overcast day or a deep forest setting. The overall atmosphere is one of a healthy, mature forest.

Proforestation

- the practice of protecting existing natural forests to foster continuous growth, carbon accumulation, and structural complexity.

A photograph of a lush, green forest. The scene is filled with tall, slender trees, their trunks varying in shades of brown and grey. The canopy is thick with vibrant green leaves, creating a dappled light effect on the forest floor. The ground is covered in a dense layer of green undergrowth, including ferns and other leafy plants. The overall atmosphere is serene and natural.

Proforestation

- the practice of protecting existing natural forests to foster continuous growth, carbon accumulation, structural complexity, and wildlife diversity.



The real jewel of my
disease-ridden woodlot is
the prothonotary warbler

...

The flash of his
gold-and-blue plumage
amid the dank decay
of the June woods
is in itself proof
that dead trees are
transmuted into living
animals, and vice versa.

Aldo Leopold



Charter Oak

“In the end, we will conserve only what we love;
we will love only what we understand
and we will understand only what we are taught.”

— **Baba Dioum**