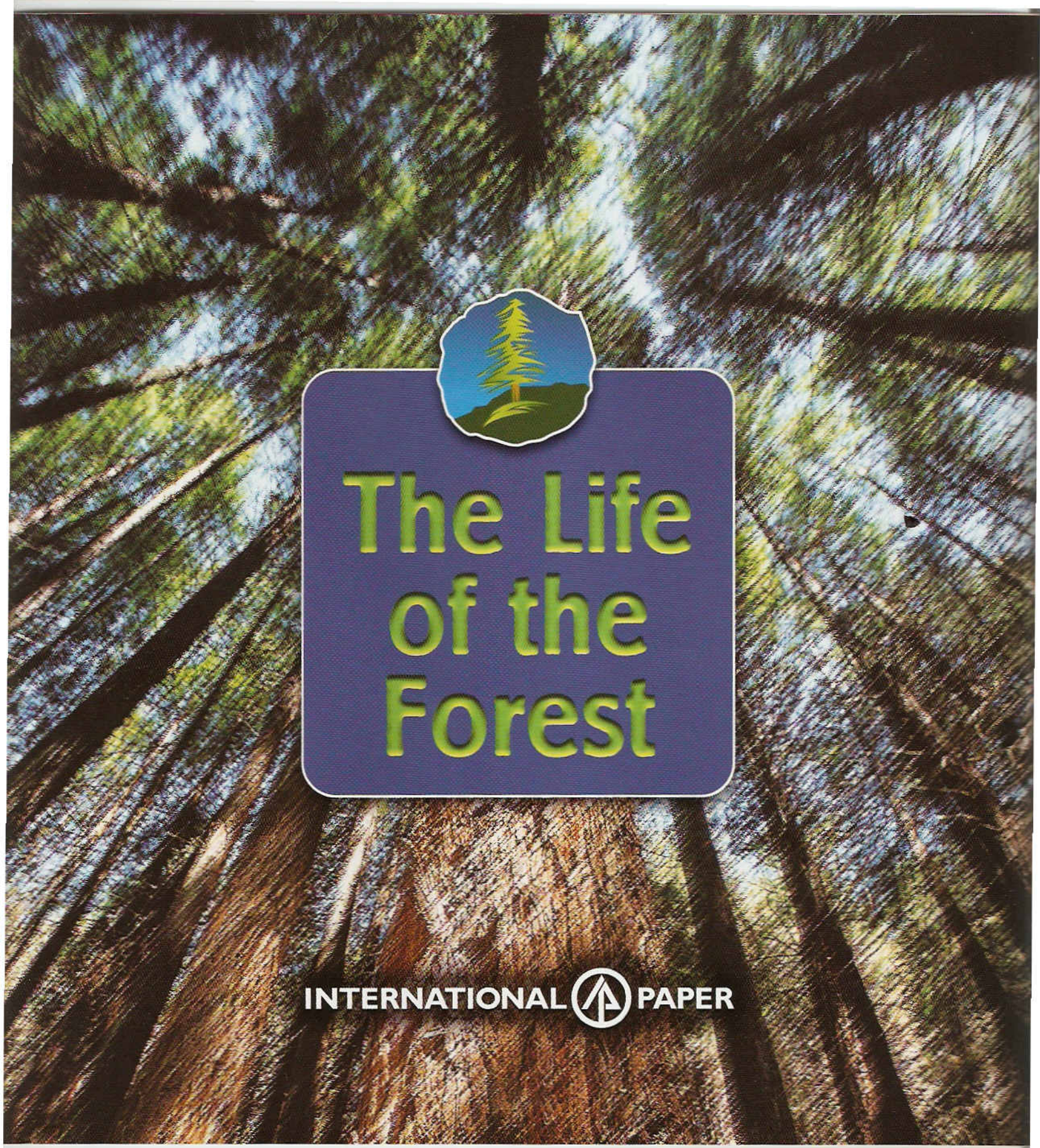

The Life of the Forest
INTERNATIONAL PAPER

Beginning
with the story of a seed,
this booklet will follow a tree's
growth throughout the years of its life in
the forest. You'll read how a tree's trunk feeds
and supports it, examine the many beautiful
leaves of familiar tree species, and marvel at the
fascinating life history of a tree as read through
its rings. Finally, we'll show you what we're doing
to grow and sustainably manage, healthier trees
to maintain the future of our forests while
providing the materials for the many
useful paper and wood products
we need.

CONTENTS

A Seed Travels Far and Wide....

Each of these fruits and seeds is scattered in different ways. Some coast along the currents of the wind, or attach to an animal's fur, or are transported inside an animal's stomach. No matter how a seed travels, or how it looks, one thing remains the same: if it lands in soil, takes root and grows, it will one day become a beautiful tree.

MAPLE

The maple seed falls with a spinning motion that slows its descent just enough so that a breeze might carry it a distance before it lands.

WHITE PINE

The seeds on a single White Pine cone are so plentiful that one cone could populate an entire meadow with trees in just a year or two!

WILLOW

Because they're embedded in fluffy tufts, these seeds can be airborne with the slightest breeze! They can then germinate in just a few hours.

WITCH HAZEL

These seeds fire like a shot out of their pods, sometimes as far as ten feet away. As a result, you rarely see two Witch Hazel trees right next to each other.

MANGROVE

Pointed like little spears, the seeds from this tropical tree float to shore then lodge deep into mud where the waves can't shake them out before they take root.

COCONUT

This sea-going seed protects the young palm by a hard covering and nourishes it with coconut milk until it can establish roots on a beach.

PECAN

Even though its shell is thin, the pecan nut can float for long distances and still take root.

BLACK WALNUT

If the squirrels don't get it first, this nut can travel in streams for a long way. It's well-protected for the journey by its tough husk.

APPLE

Apple seeds travel unharmed through a horse's digestive tract after the horse eats an apple. This way, apple trees may be scattered far and wide!

CHERRY

Because cherries ripen in clusters on the tree, they are quickly eaten by birds that then distribute the seeds over wide areas.

BEECH

A tasty part of many animals' diets – from birds to bears – the prickly-husked beech nut can also ride on an animal's pelt.

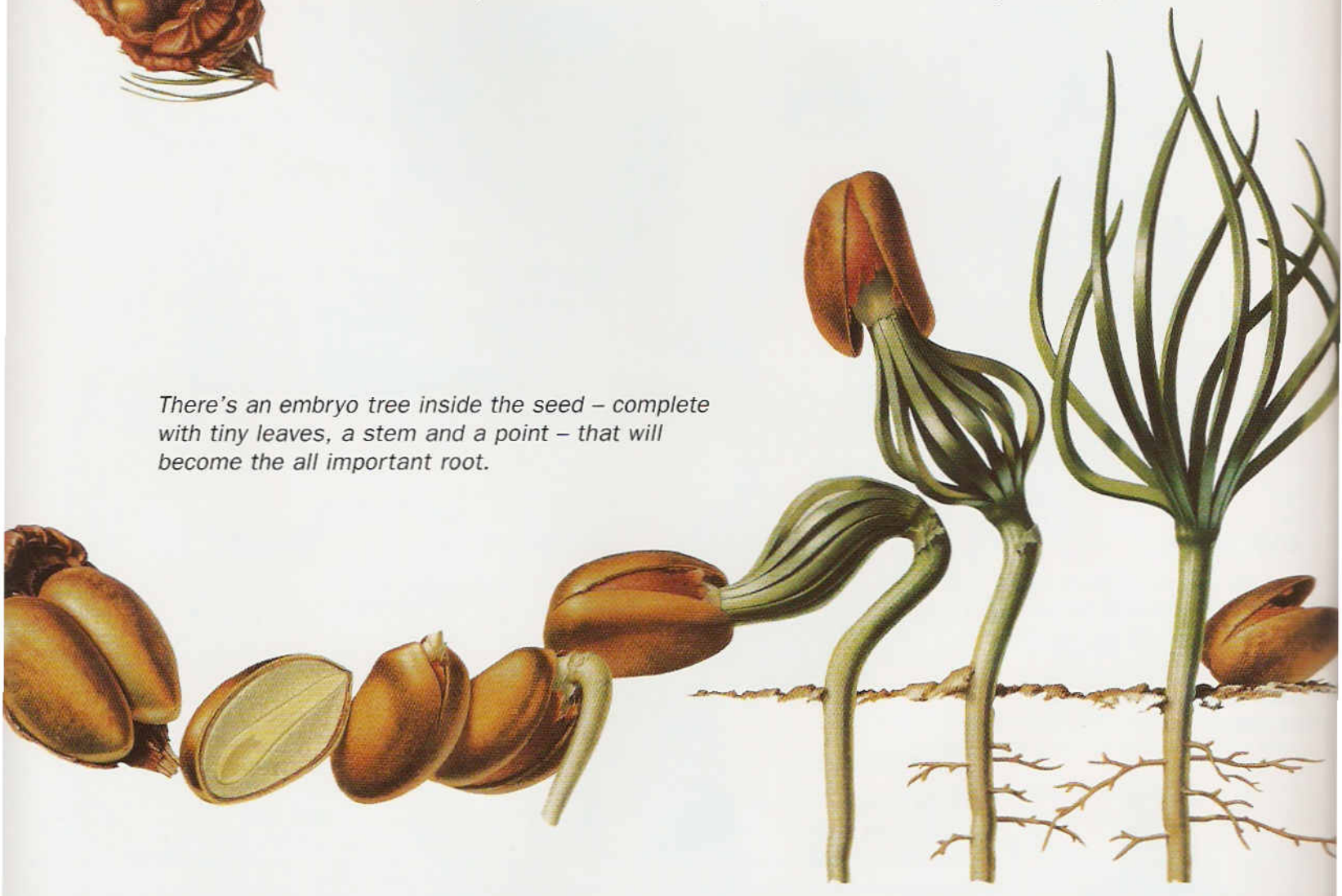
OAK

Because acorns need to be planted to germinate, oak trees often depend on hoarding squirrels to bury them in order to get their start.

...Then Takes Root

However it is scattered, a tiny seed, once it takes root in the soil, can – with encouragement, the right amount of sunlight and water, nutrients and a little luck – one day become a mighty tree. It's just one more example which proves that the life cycle of our forest is a complex, delicate and truly amazing process.

There's an embryo tree inside the seed – complete with tiny leaves, a stem and a point – that will become the all important root.



Splitting from the shell of the seed, the embryo's root probes its way toward the ground.

As soon as the tiny root pierces the ground, the tree begins to take in water and mineral nutrients.

Soon, the tree's leaves emerge to create their own supply of chlorophyll, giving the tree food and carbon dioxide.

All upward growth takes place within the "terminal bud," a cluster of actively dividing cells at the base of the leaves.

How a Tree Eats, Drinks and Breathes

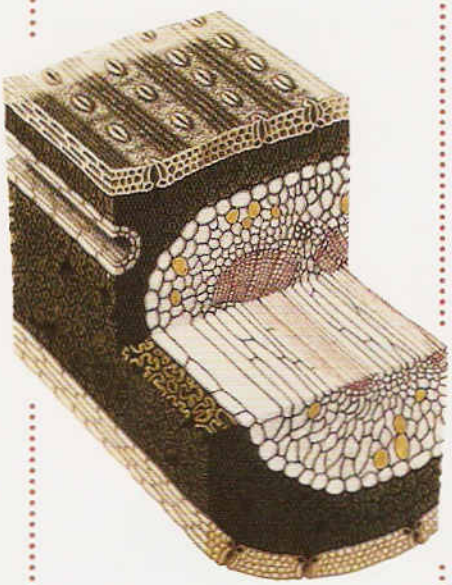
Only the very tips of a tree's roots, its leaves, buds, a thin layer of cells and the seeds are living. But those few living parts of the tree, approximately one percent of its entire bulk, perform functions so complex that they can build a structure a hundred feet high.

ROOT SYSTEM

Trees, like most plants, absorb water and dissolved minerals in the soil from their roots. At the very tips of those roots are living, growing cells that push the roots deep into the earth.

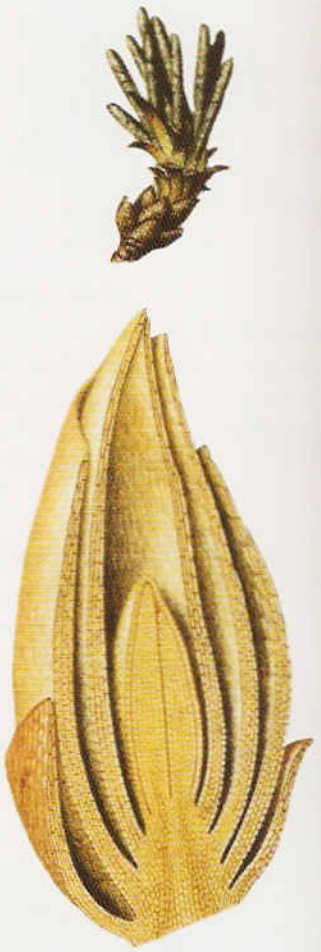
CAMBIUM LAYER

The cambium layer stretches from a tree's roots to the tips of its branches and makes up the only living cells in a tree's trunk. The cells on the outside of the cambium layer become bark; those that form on the inside become wood.



LEAVES OR NEEDLES

The leaves, or needles, of a tree are able to utilize sunlight with the aid of chlorophyll in order to create the energy that the tree's living cells need to grow.



LEAF BUD

The growth of a tree's leaf buds is what gives a tree its height. It does this in tandem with growing its cambium layer so that trunk, branches and height all grow at the same thickness, at the same time.

It's All in the Trunk

A tree's trunk is a wondrous thing. It is created layer by layer, new wood on one side, new bark on the other. It grows outward, pushing the bark before it, leaving wood behind.

How does it know how many billions of wood cells it needs to grow in order to support what is destined to become a gigantic tree, complete with leafy crown? It's one of those timeless mysteries of life, repeated over and over again into infinity.

The outer bark constantly renews itself and protects the tree from extremes in weather, too much moisture, too little moisture, and insects.

The inner bark is the "pipeline" through which food is passed to the rest of the tree.

The cambium cell layer is the growing part of the tree's trunk that annually produces new bark and new wood.

Sapwood is new wood and the conduit through which water is moved up to the tree's leaves.

Heartwood is the core, supporting pillar of the tree. While dead, it is still as strong as steel, able to support the weight of many tons.

A Crowning Glory of Leafy Splendor

Every one of these leaves or needles represents a tree found in the United States today. While they appear to be widely different in shape and size, each one does the job of making food for the tree it's attached to. The narrow needles of a Douglas Fir can


American Holly


Horse Chestnut


Rocky Mountain Juniper


California Laurel


Black Locust


Southern Magnolia


Sugar Maple


Mulberry

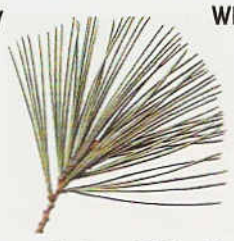

White Oak


Osage-Orange


Cabbage Palmetto


Pecan


Persimmon


Eastern White Pine


Balsam Poplar


Redwood


Sassafras


Giant Sequoia


Red Spruce


Sweetbay


Sweetgum


American Sycamore


Tamarack


Hackberry


Hawthorn

expose as much as three acres of chlorophyll surface to the sun. Some of the broad leaves help evaporate water and reduce wind resistance, too. All in all, they are a very useful and beautiful topping to our majestic forests.


Honey Locust


Bald Cypress


American Basswood


Beech


Paper Birch


Butternut


Northern Catalpa


Black Cherry


Eastern Red Cedar


Northern White Cedar


Eastern Redbud


Eastern Cottonwood


Flowering Dogwood


American Elm


Balsam Fir


Kentucky Coffee Tree


Douglas Fir


Ginkgo


Yellow Poplar


Black Tupelo


astern Hemlock


Black Walnut


Black Willow


Pacific Yew


Box Elder

Ever Hear a Tree's Life Story?

It's easy, if you know how to listen. Every spring and summer, a tree adds new layers of wood to its trunk. Because the wood formed in the spring grows fast and consists of large cells, it's lighter. The slower summer growth has denser, darker cells. To determine a tree's age, just count its dark rings. In addition to its age, you can piece together the tree's whole growing history by examining the *shape and pattern* of the rings. Listen to what this Pine has to say:

A pine seedling is planted in damp earth.

19

Five years later, the tree is strong and healthy. The rings are spaced widely, indicating five years of good rains and sunny springs and summers.

19

The rings show it's still growing straight and strong, but other trees must be crowding in around it—taking their share of water from the root supply and making more shade—because the rings have narrowed.

19

Growth has speeded up and the rings are nice and even again. Some of the surrounding trees must have been harvested to allow the pine more root room and sunshine.

19

Forest records indicate a forest fire this year and the rings on the pine confirm it. The tree was minimally damaged by the fire and covered the scarred spot with healthy wood in the following years.

19

This series of narrow rings indicate the possibility of an insect infestation. The larva of the sawfly eats the leaves and leaf buds of several different kinds of coniferous trees.

19

These rings are the result of a serious drought. Just one or two summers of poor rainfall wouldn't be enough to dry the ground so that it slowed the tree's growth this much.

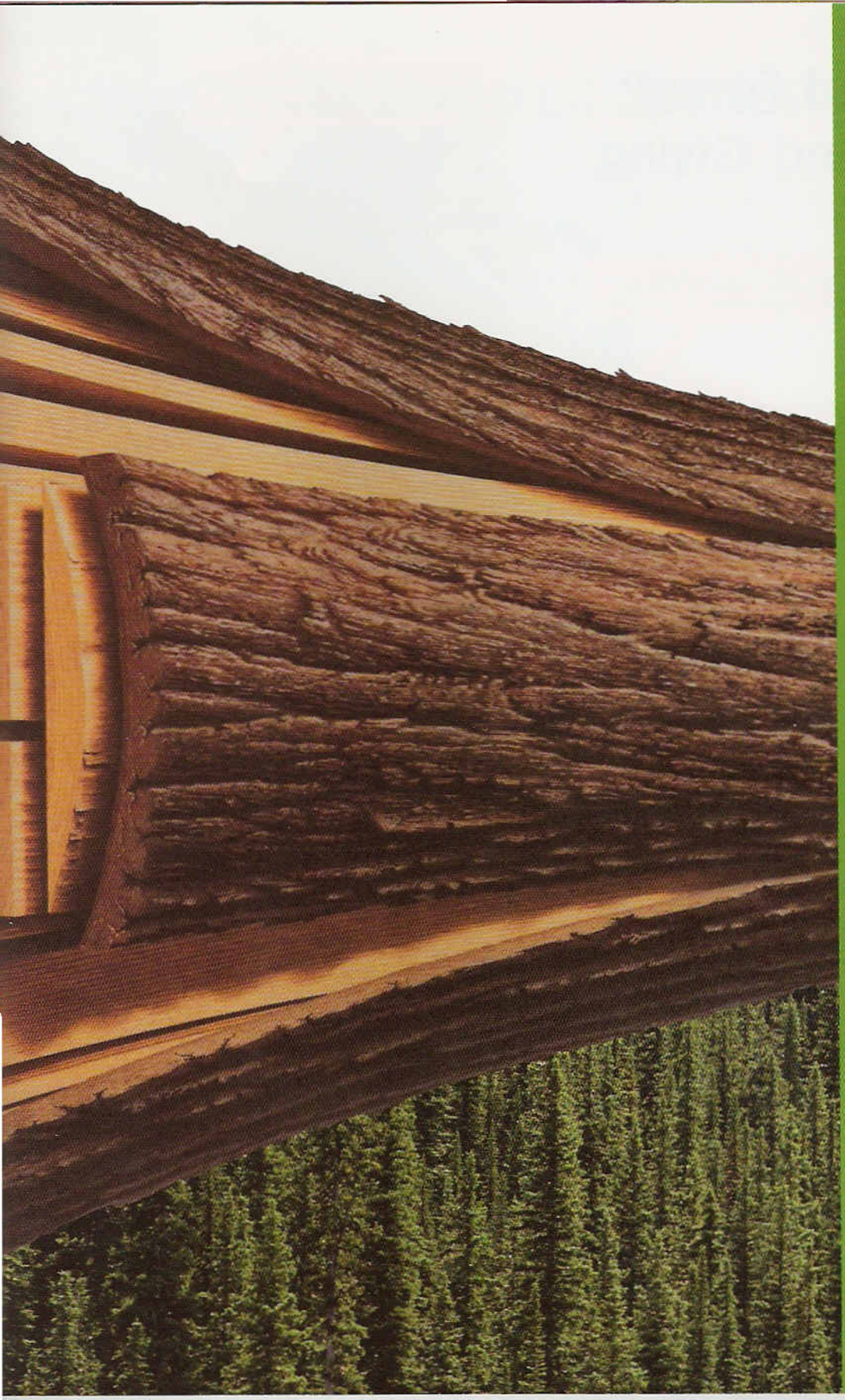
19

The rings here show a healthy growth for the last five years, clearly the result of plenty of water and lots of sun. The tree's needles are a vibrant green and its branches are long and strong; overall, a beautiful and healthy tree.

20

We're Working Every Log Harder So There's Less Waste

To help conserve the resources in our forests, we make sure we get the most out of every tree we harvest. We sustainably manage the forests at a rate that will provide us with a continuous supply of the trees we need for our paper and wood products and, at the same time, keep our forests plentiful and beautiful. So, even though we use *more* wood and paper today than we did fifty years ago, we are actually able to use *less* forest acreage in the process. Now *that's* sustainable forest management.



How The Log Is Used

Debarking the log is important since it can't be used for papermaking. The bark is used, instead, for fuel and soil mulch.

The rounded sides of the log, unusable as lumber, are sent directly to the chipper to be turned into chips for pulp and paper mills.

The outer portions of the log are typically the most knot-free and so are made into boards or planks measuring from one to three inches.

The center of the log has more knots but it's also typically the strongest part of the log so it's ideal for use as structural beams.

Plywood is a sandwich of thin wooden veneers which is made by peeling the log in thin layers.

Wood chips are transformed into pulp and manufactured into large rolls of paper, some weighing as much as 25 tons!

A Well-Managed Forest Keeps Giving and Giving

Whether it's great campsites, a resource for products we need and depend upon, or home to a wide variety of wildlife, our forests are an important and necessary part of our world. To keep our forests productive *and* beautiful as well as a safe habitat for hundreds of different forest species, it's necessary to carefully sustain and manage their growth. We do this through scientific forestry practices such as landscape management, reforestation, afforestation and careful use of herbicides and fertilizers.

Helping Our Endangered Species

There are more than 1,800 threatened or endangered species in the United States today. Each of these organisms plays an essential role in the forest's self-sustaining cycle of life, so when changes to the ecosystem threaten their continued existence, we know it's time for all of us to take deliberate and consistent action. Today, private landowners are doing whatever is necessary to conserve the habitat and help recover these rare plants and animals.

A

Atlantic Salmon. As the result of concentrated efforts on the part of private landowners and conservation groups, there is optimism this species can be restored to many of its historic runs in northeastern U.S.

B

Florida Panther. With fewer than 50 panthers left in the wild, an effort is currently underway by private and public organizations to prevent their extinction by enlarging their habitat.

C

Tar River Spinymussel. Landowners are maintaining buffers to stop the soil from washing into streams and suffocating these unusual mussels.

D

Cooley's Meadowrue. This endangered perennial herb is now being protected through active management activities that include the use of prescribed fire, seed propagation and replanting.

E

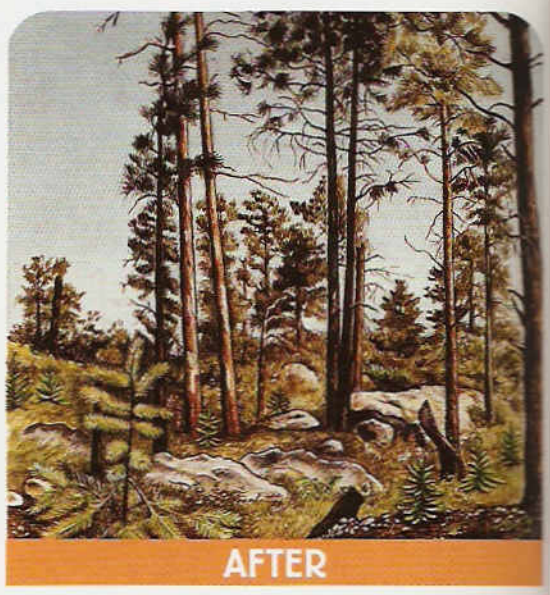
Flatwoods Salamander. Forest product companies worked with the U.S. Fish and Wildlife Service in the largest research of amphibians ever undertaken in order to study this species.

F

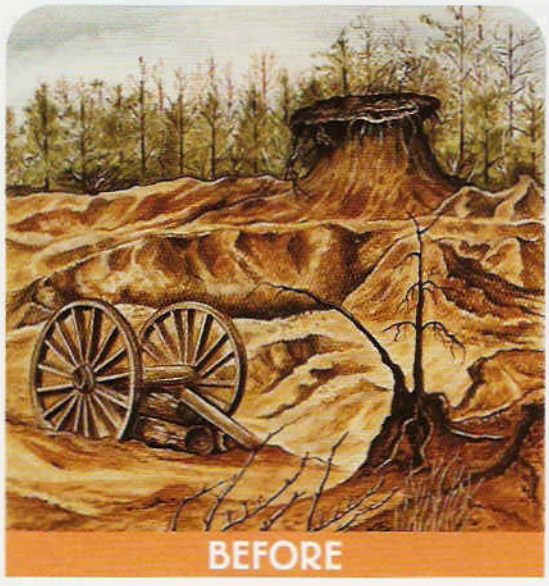
Red-Cockaded Woodpecker. Private landowners are installing nesting boxes high in trees to provide the cavities these birds need to roost in.

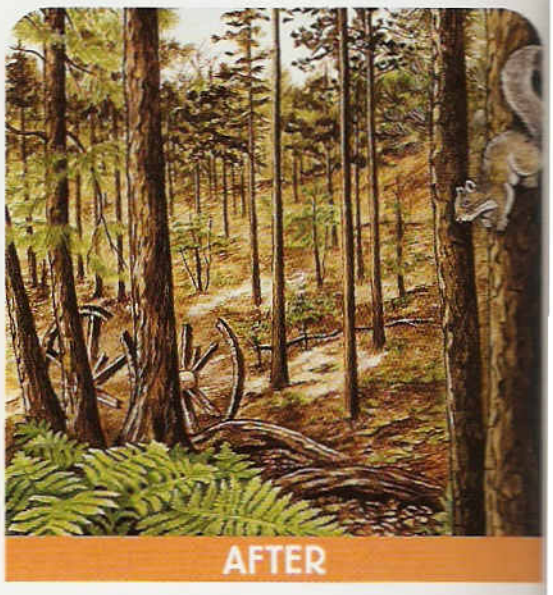
The Bounce-Back Forest

Forests are constantly changing. Sometimes the reason may be because of a tornado or forest fire or because a homesteader needed to clear the land to create a farm. Whatever the reason, eventually the forest comes back: the homesteaders abandon their farm and the forest reclaims it, a managed pine forest is replanted, new growth pushes up after a flood, drought, or fire. With the help of committed professionals, the forest will continue to go on to be bigger, stronger and better than it was before.

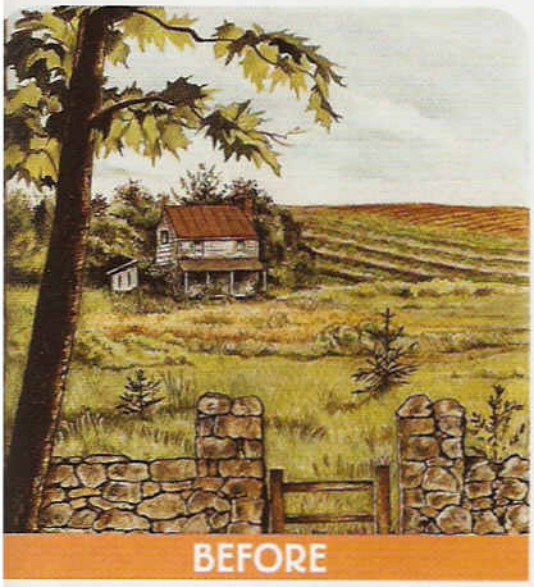


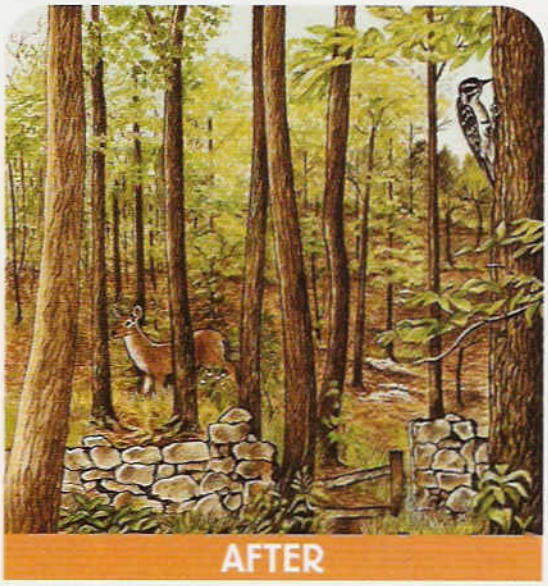
Natural Disaster. A fire can destroy an entire forest in just a few hours, but tiny green shoots will soon appear as a new forest begins to sprout from the ashes.



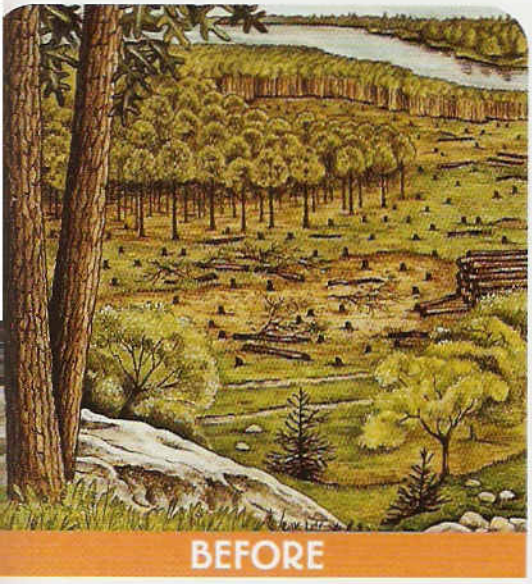


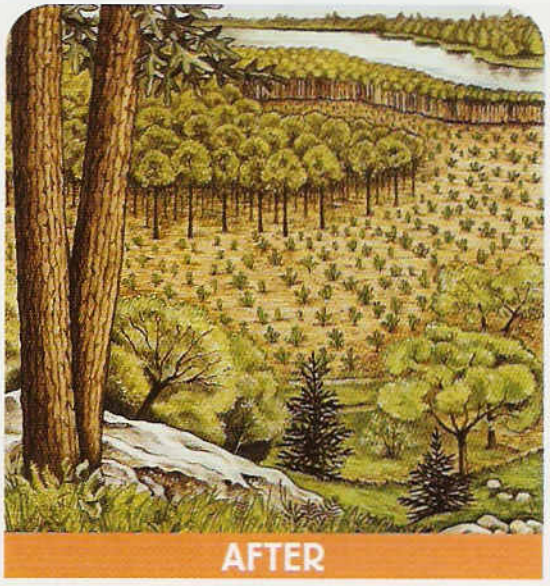
The Human Factor. With the help of professional foresters, much of the eroded, abused land has been made productive and beautiful once more.





latural Succession. The forest is able to regenerate on its own, overtaking abandoned farms and creating ew homes for fish, plants and wildlife.





Managed Forests. Careful planning and sustainable forest management allow us to harvest for paper and ood products that we need and still ensure our forests will thrive for years to come.

Like all living things, the forest is constantly changing and growing.

Think of Them as Tree Condos

A wide range of birds, bugs, squirrels and mice call the tree "home." Whether it's a source for berries and nuts or protective cover or a snug little nest, a single tree in the forest can serve as a vital habitat for literally thousands of creatures.

1. **Red-banded leaf hoppers** join thousands of other leaf-eating insects on a tree's canopy.

2. The **white-breasted nuthatch** swoops under the canopy to prey on trunk insects.

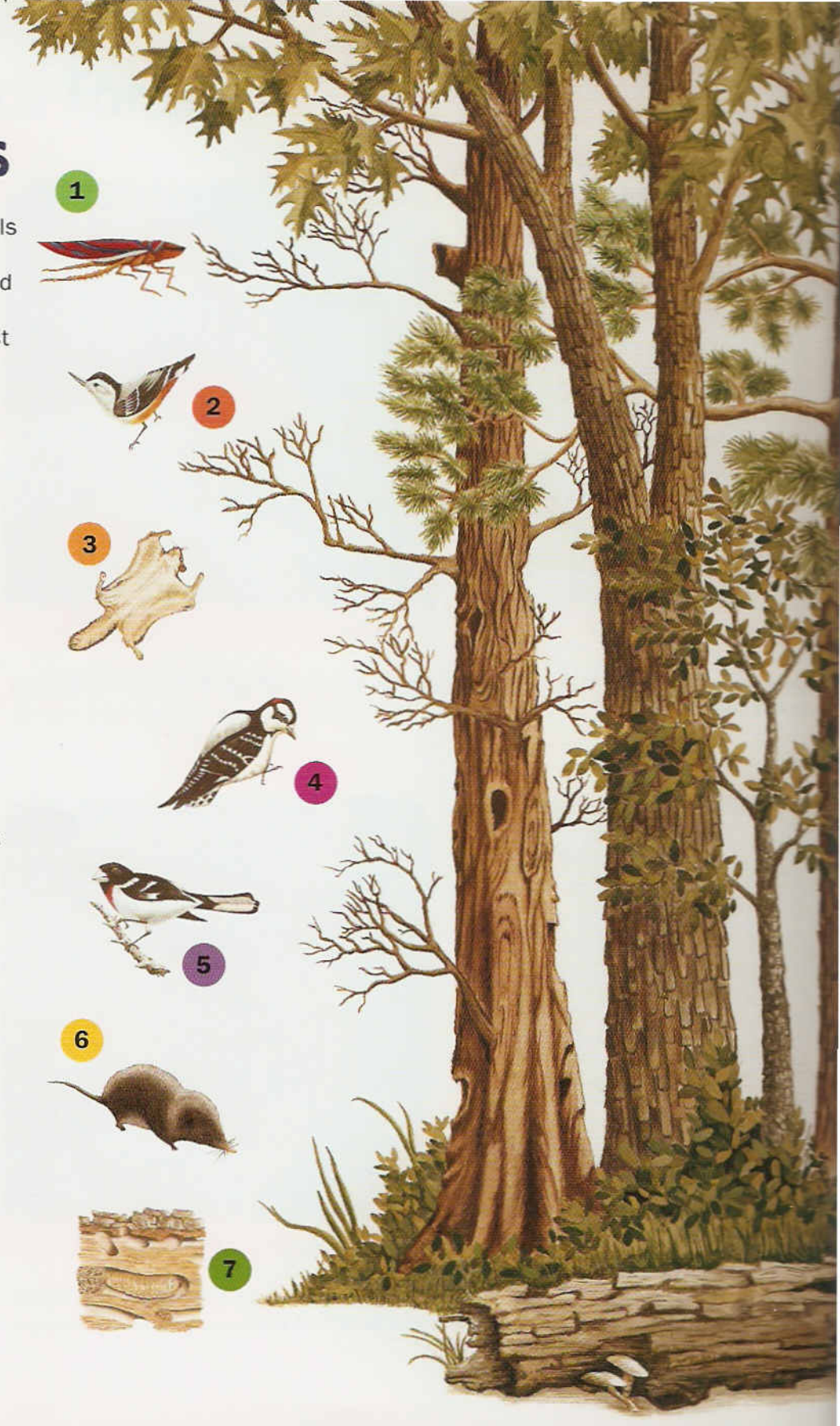
3. **Flying squirrels**, as well as many songbirds, find safety high in the branches of trees.

4. Each kind of **woodpecker** specializes in finding insects from a different part of the bark.

5. The **rose-breasted grosbeak** likes to nest in the tree's protected shrub layer.

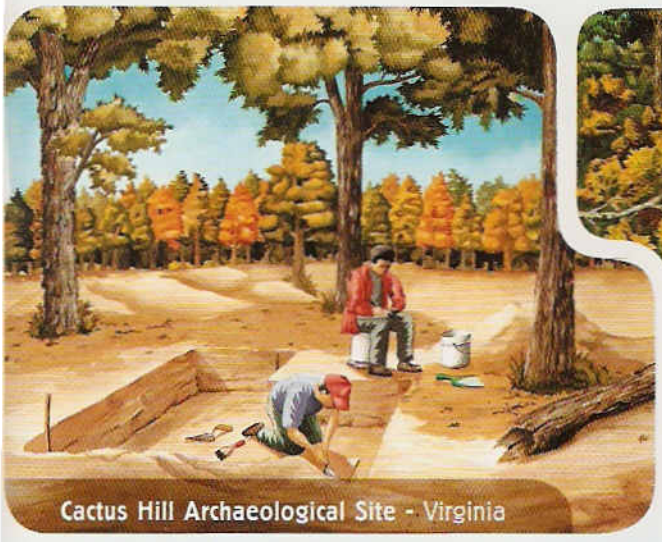
6. Under the tree's cover of shrubs, the **shrew** feeds on insects, worms and rodents.

7. Many **insects** in their larval stage feed upon the woody parts of trees, helping to speed the process of decay – especially in dead trees – thereby contributing to the cyclical life of the forest.



Very Special Places Need Very Special Care

Throughout our forestlands are sites that have a special significance. We have many locations with special biological, geological or historical importance. From scenic overlooks and waterfalls to unique habitats for plants and animals, these areas are so important to us that we developed our own program, Special Places in the Forest™, to identify and manage them. The unique places shown here are just a handful of our special places.

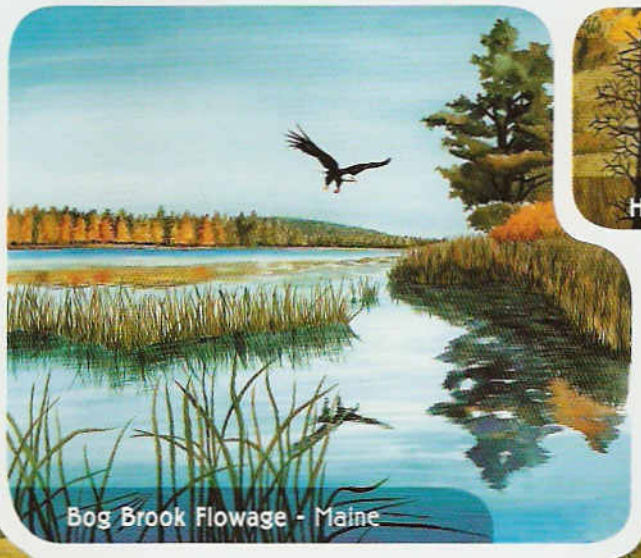


Cactus Hill Archaeological Site - Virginia

Little Grinder's Creek - Tennessee

Hague Bat Hibernaculum - New York

Flomaton Longleaf Pine Stand - Alabama



Bog Brook Flowage - Maine

Pondberry Limesink - South Carolina

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