Some Like It HOT

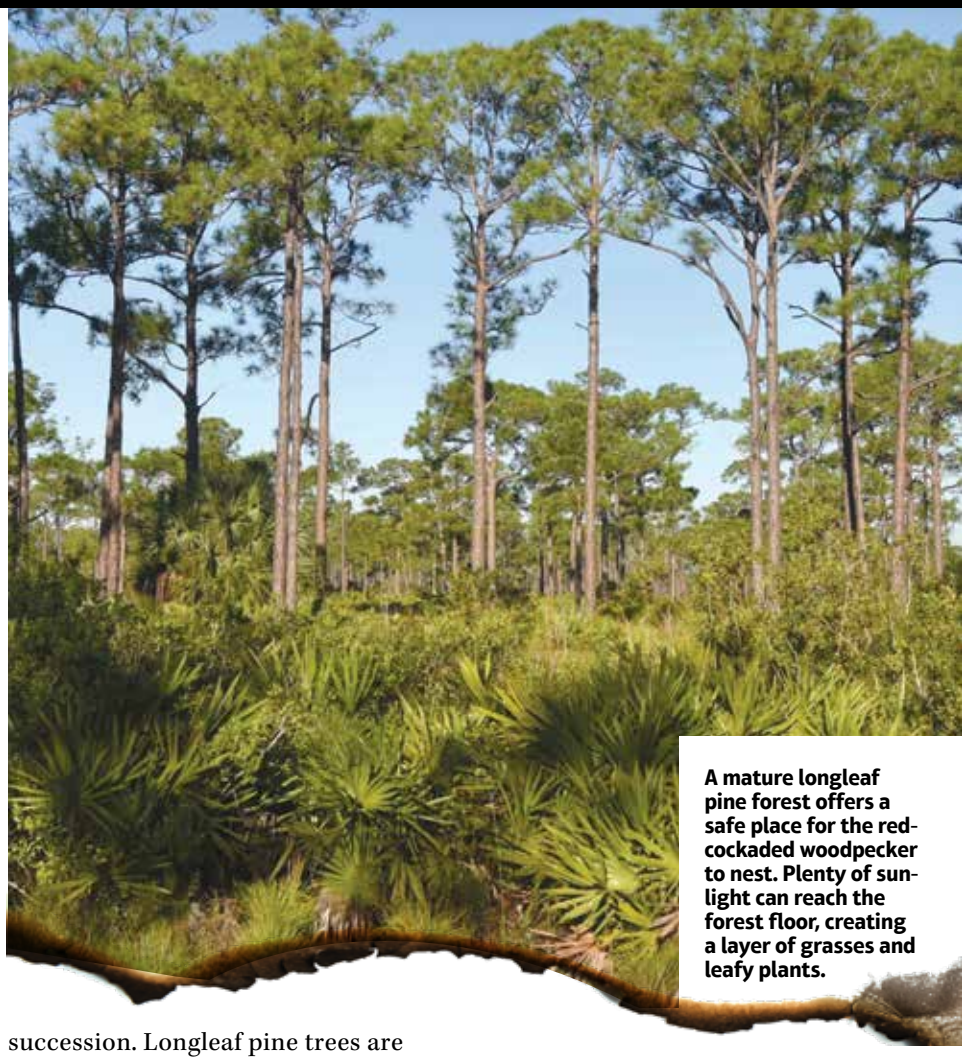
SOME SPECIES AND ECOSYSTEMS THRIVE WITH REGULAR FIRES.

by Charles C. Hofer

Fire is capable of turning a lush forest into blackened ash in a matter of minutes. After the blaze, a lifeless landscape of scorched earth is all that remains. But some plants and animals have learned to live with fire. In fact, some species need fire.

Lightning strikes have been causing natural wildfires since life first appeared on the planet. Along the way, many different trees have evolved strategies to live with these occasional fires. From the giant sequoias of coastal California to pitch pines in New Jersey, these trees rely on fire as part of their lifecycle. And entire communities of plants and animals thrive within these ecosystems.

The problem is, humans don't like wildfires. Each year, out-of-control infernos destroy homes and claim lives. People fight fires in hopes of controlling the destructive force of Mother Nature. Fire suppression over the last century has pushed many fire-dependent ecosystems to the brink. But science is coming to the rescue. Better land-management practices are helping to preserve these unique habitats—and the sensitive plants and animals that call them home.



A mature longleaf pine forest offers a safe place for the red-cockaded woodpecker to nest. Plenty of sunlight can reach the forest floor, creating a layer of grasses and leafy plants.

THE ECOLOGY OF FIRE

Fire plays a critical role in ecological succession. This is the process of how plant and animal communities change over time. Imagine a lush prairie filled with tall grasses. Unique songbirds like meadowlarks and bobolinks call this grassland home. So too do the prairie rattlesnake and badger. Over time, woody trees and shrubs might move in and slowly replace the prairie grasses. Through ecological succession, the grassland might gradually turn into a forest with towering trees. The plants and animals that thrived in the prairie ecosystem would be forced out too. However, a major disturbance—such as fire—prevents trees and shrubs from moving in. An occasional fire will stop succession by burning away the invading woody plants, allowing for the fast-growing grasses to return and maintain the prairie grassland ecosystem.

In the southeastern United States, the longleaf pine ecosystem relies on the destructive forces of fire to halt succession. Longleaf pine trees are pyrophytes—fire-dependent plants. (*Pyro-* is Greek for "fire" and *-phyte* means "plant.") Pyrophytes have evolutionary adaptations that allow them to thrive in areas disturbed by fire.

Picture this: a lightning strike ignites a wildfire in a longleaf pine forest. The blaze scorches several acres, burning away the lush, green layer of grasses and small trees. Then, several weeks later, a tiny green mass sprouts from the blackened ground. It looks like a clump of grass, except these blades are thick and round. These are the needle-like leaves of a young longleaf pine. Although the fire destroyed its trunk, its roots survived below ground. So did the roots' meristems, the parts of the tree roots that grow. Eventually these meristems can sprout a new small sapling that might grow into a mighty pine tree.

The red-cockaded woodpecker, native to the southeastern US, is considered endangered.

But the longleaf pine's evolutionary tricks don't stop there. Pine saplings possess complex root systems that store a lot of energy. A new tree uses this energy to grow quickly after a fire and outpace

the green plants like palmetto and wiregrass that might block out the sun. As the young pine grows, its lowest branches will fall off. A mature pine will have a tall, straight trunk with almost no branches. Fewer branches means less fuel for a fire. But wait, there's more! The tree's thick bark contains resin, a gooey substance that protects the tree from insects and disease . . . and fire. After just a few years, a tall trunk with fortified bark will allow the pine to survive all but the most ferocious of infernos.

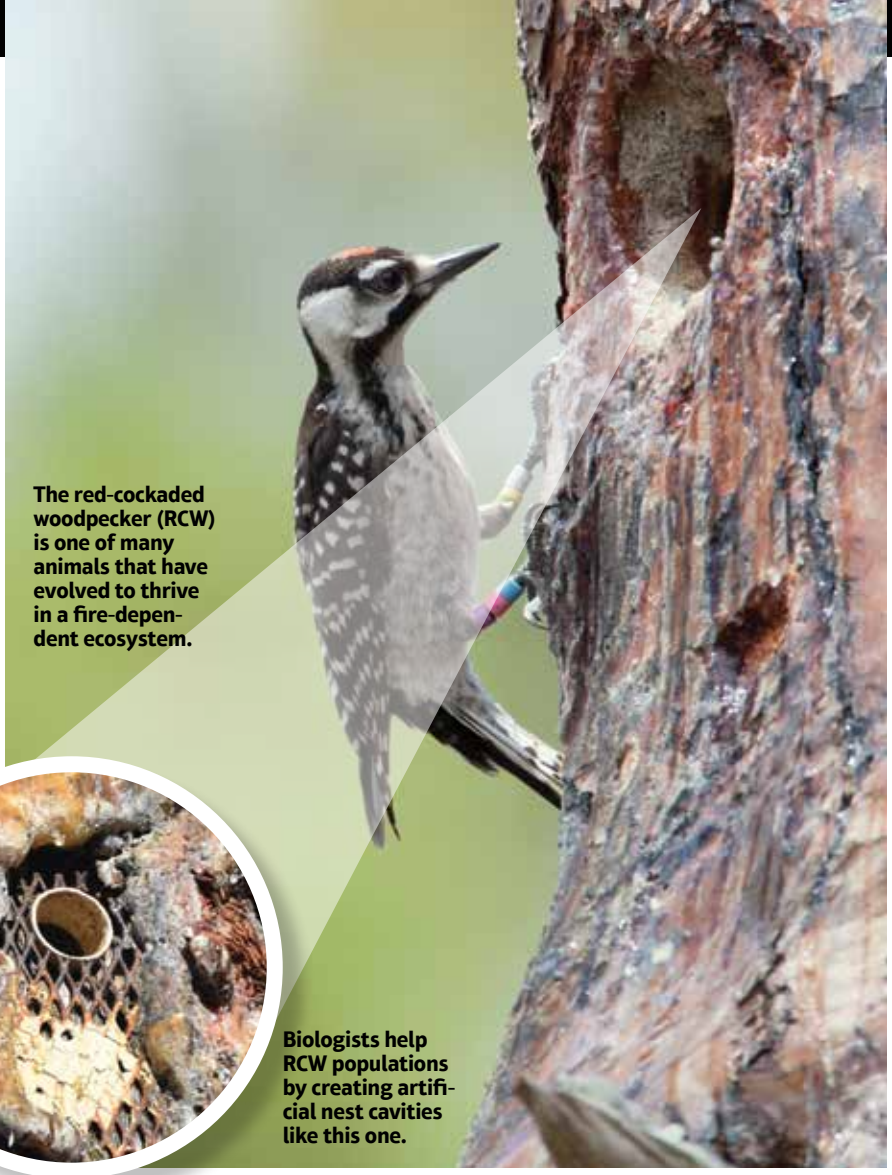
HOME IN THE BLAZE

Thanks to the longleaf pine's fire-proofing, many plants and animals have adapted to thrive in this ecosystem. One such fire-friendly resident is the red-cockaded woodpecker (RCW). Like most woodpeckers, the RCW is a cavity nester, meaning it drills holes in dead trees to nest in. Unlike other woodpeckers, though, RCWs tend to drill holes in live trees, preferring longleaf pine. The live tree offers a sturdier home than an old, dead tree that may blow down in the wind.

Nesting in a living, fire-resistant tree has other advantages too. Remember the longleaf pine's thick resin below its bark? Drilling just a few well-placed holes around the nest opening gets that gooey resin flowing. Soon, a sticky layer covers the area around the nest entrance. It's the perfect way to keep out any unwanted guests, like the black rat snake that loves to slither up trees to snack on fresh eggs.

The longleaf pine's high canopy also makes for a safer nest. Since fires regularly burn away smaller trees and shrubs, there is very little understory in the longleaf pine forest. A thin understory helps prevent predators from climbing or slithering into an RCW nest.

The RCW isn't the only animal here that needs fire to maintain its home in the longleaf pine forest. The



The red-cockaded woodpecker (RCW) is one of many animals that have evolved to thrive in a fire-dependent ecosystem.

Biologists help RCW populations by creating artificial nest cavities like this one.

ESA AND RCW

The red-cockaded woodpecker (RCW) was one of the first species listed under the Endangered Species Act (ESA) of 1973. This federal law helps protect plants and animals that are dangerously close to going extinct. It also provides habitat protections and funding for scientific studies and and habitat management and protection. These include reintroduction efforts, where

RCW are moved to new places to help connect populations. Another tactic is creating artificial cavities in longleaf pine where RCWs live, giving the birds a little head-start by providing safe areas to nest and roost. Throughout the Southeast, many individuals and organizations have rallied to help the RCW and longleaf pine forest. Thanks to their efforts—along with good science and improved land management practices—the RCW and longleaf pine forest are holding steady in the few areas where they remain.

gopher tortoise feeds mostly on low-growing leafy plants. Meanwhile, the sandhill crane and bobwhite quail hide their nests in the tall grasses. Without regular fires, areas with many longleaf pines would slowly become hardwood forests, says Jamie Rager of the Florida Fish and Wildlife Conservation Commission. A dense forest canopy would create too much shade for the leafy plants and grasses to survive. Rager says, "The animals that live in the longleaf pine ecosystem depend on the open ground, free of hardwoods or a dense understory."

MANAGING FIRE

These forests once stretched from Florida to Virginia and west to Texas. At the turn of the twenty-first century, only about 5 percent of the longleaf pine forests remained.

Most of this habitat loss was due to poor land management—and not much planning for the future. During the eighteenth and nineteenth centuries, America grew fast. Pine forests were cut down to provide building lumber. Mills up and down the East Coast relied on pine trees to make paper products. Expanding farms and ranchlands cleared plenty of pine forest too. By the early twentieth century, the longleaf pine forest—and all the plants and animals it supported—was on its way to extinction. Then scientists came to the rescue.

Silviculture is the science of maintaining healthy forests. Today, silviculture techniques strike a balance between harvesting trees for human use and maintaining healthy habitats for wildlife. Improved silviculture over the last century has led to more sustainable forests. It has also helped protect healthy ecosystems.

Bobwhite quails nest in the tall grasses of pine forests.

Silviculture has played an especially important role in protecting fire-dependent ecosystems. Carefully controlled fires are a common silviculture technique used to maintain a healthy longleaf pine forest. These "prescribed fires" re-create the occasional natural fires that might spark every five years or so from a lightning strike. Firefighters watch the blaze closely, while cleared spaces, called fire breaks, contain the fire to specific areas. These and other safety measures ensure the fire doesn't get out of control.

In the end, the prescribed fire halts succession. Fire allows the ecosystem to start over, to come back stronger and healthier. Rager says, "Regular, prescribed fires prevent build up of fuel on the forest floor." Reducing this load of wood debris will prevent a normal fire from turning into an uncontrollable, raging inferno.

Once the prescribed fire burns out, the process of rebirth begins again. Longleaf pines soon sprout from the blackened earth. Grasses and leafy plants return. So too do the RCW and other residents that call this ecosystem home. From the destruction brought by fire, new life returns to the longleaf pine forest.

Blackened trunks on these pines suggest a fire recently burned through here. A lush layer of leafy plants has already returned to the forest floor.

Charles C. Hofer is a wildlife biologist living in the desert of southern Arizona, where it's hot enough without fire.