

# Interdependence

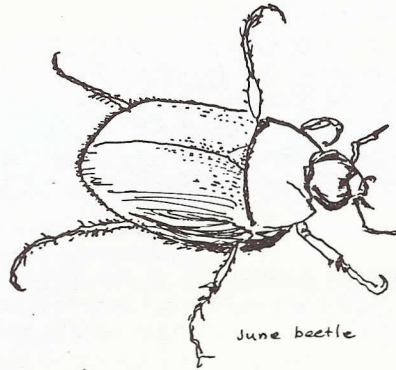
by Maria and Marc Minno

In the Winter, 1992, *Palmetto*, the article, "Florida Pines — Evergreens for the Christmas Season", presented different species of pines, and what they tell about habitats and history. But pines have another side to them. Let's look at the different species on pines, and *their* habitats and life histories.

## Insect predation

Pines interact with a myriad of fauna. Some of these species like to eat pine needles, in spite of their seemingly unpalatable texture and taste. The pine devil (*Citheronia sepulcralis*), aptly given its sinister name, is a large moth caterpillar, mottled brown and black with menacing, barbed spines. Other moth larvae found on pines include a type of inchworm (a geometrid moth), *Nepytia semiclusaria*, which also feeds on pine leaves. The pine webworm (*Tetralopha robustella*) hides inside a frass (a scientific euphemism for caterpillar droppings) nest, clipping off needles and pulling them inside the nest to eat. Leaf beetles (*Systema marginalis* and *Colaspis pini*) also feed on the needles of pines. Several types of scale insects feed on pines. among these, inconspicuous pine scales (*Chionaspis heterophyllae*) suck sap out of pine needles through tube-like mouthparts, and woolly pine scales (*Pseudophilippia quaintancii*) likewise take their meals under a thick layer of fleecy white wax, while tortoise scales (*Toumeyella parvicornis*) suck sap from growing shoots or leaves.

Several species of sawfly (in the genera *Neodiprion* and *Acantholyda*) feed on the leaves of pines. Especially in the fall, the pine sawfly larvae (*Neodiprion excitans*) can be found eating the leaves of loblolly, longleaf, and slash pines. They look like smooth caterpillars, but sawflies are related to wasps (and their larvae have more legs than caterpillars). The mother sawfly inserts a single egg into the leaf tissue on each needle in a cluster at the tip of a branch. In about 10 days, tiny, hungry larvae emerge. After several weeks of feeding and growing, sawflies pupate in cocoons, either under bark scales or in the litter or soil beneath the tree they've been eating. The flying adults soon emerge to continue the cycle; four or five generations of this species



may be completed in the course of a year in Florida!

Not only pine needles are relished by herbivores; most parts of the tree are eaten by something. Growing tips are damaged by feeding pine tip moths (*Rhyacionia subtropica*). Male catkins and young female cones of slash and longleaf pines are eaten by the larvae of another moth. Twigs and stems of pines are attacked by the deodar weevil (*Pissodes nemorensis*), which live in small holes in the shoots or in small chambers in the sapwood.

Reproduction weevils (*Hylobius pales* and *Pachylobius picivorus*) feed on pine seedlings as adults, but their larvae feed on the inner bark, leaving long, carved galleries packed with reddish-orange frass. Pine roots are munched by mole crickets (in the genera *Neocurtilla* and *Scapteriscus*) and white grubs (*Phyllophaga* spp.), the latter being the larvae of May or June beetles. The wood of pines provides home and sustenance for a diversity of metallic wood-boring beetles and longhorn beetles.

## Mammal predation

Not only insects are the enemy, however. Vertebrates, too, are guilty of damaging pines. Implicating evidence exists against beaver, cattle, rabbits, woodpeckers, deer, and flickers, among others. Fox squirrels and gray squirrels feed upon the

seeds of pines, which must be extricated from the cones. The species of squirrels in an area can be determined by the chewed-up remains of cones that they leave: gray squirrels chew the scales to get to the pine nuts, but the large fox squirrels chew even the huge longleaf pine cones down to the core.

## Fungal predation

A menagerie of hard-to-detect creatures infest pines and other conifers, making them sick, or spotted, or causing other symptoms of distress. To the tree, their presence is an infection, but the pathogen is just trying to find a home. The longleaf pine is host to a particular fungus that causes redheart disease. This fungus doesn't kill the tree, but it really bothers foresters because it softens the heartwood. The endangered red-cockaded woodpecker, however, depends upon the action of the fungus on the wood for its roosting and nesting cavity, which it builds in a live pine tree with redheart disease.

Another kind of fungal infection is good for the pine tree. Pines, like most trees, participate in an intimate and mutually beneficial relationship with mycorrhizae. Mycorrhizae is a general term referring to any variety of fungal hyphae that grow in close association with the fine roots of a plant. The part we most often think of when we hear the word "fungus" is the mushroom, but this is a relatively minor portion of the organism. Fungi often exist in the soil as a fine network of pale threads known as hyphae, which may cover an area of several square meters, or even more. These hyphae plumb the depths of the soil in search of minerals, and find their way into the fine roots of trees and other plants. Once attached to a green plant, the fungus extracts sugars important for its livelihood. What's mutually beneficial about that? Well, the tree, in exchange

for its surplus sugars, receives mineral nutrients from the soil (via the hyphae) from a much greater distance than it could exploit with its own roots. Trees that are deprived of their mycorrhizae are usually stunted and unhealthy.

#### Keeping the balance

Why don't prolific, ravenous, pine-eaters eat up all our pine trees? Many little bits weigh together to keep the natural system in balance. Take the aforementioned sawflies, for example, which have been known to eat most of the leaves off an unfortunate tree or two — what stops them from eating up all our pines?

Well, predators from tree swallows to spiders feed on flying adult sawflies, while wheel bugs (*Arilus cristatus*), pentatomid bugs (such as *Podisus fretus*), and their ilk prey upon the sawfly larvae. At least two other kinds of wasps parasitize the sawfly eggs. The larvae are parasitized by several additional species of flies and wasps, some of these being parasites of parasites! The sawflies also get sick and die from bacterial, fungal, and viral infections. Shrews foraging in the soil and litter under trees destroy sawfly cocoons, and in wet years, standing water beneath trees may drown them. It's a wonder any sawflies are left!

Pine trees are often the target of lightning strikes. The blast may split the tree in a spiral, revealing its growth pattern. Pines damaged or killed by lightning are important hosts of many species of wood- and bark-boring beetles. As adults, some are big and showy, others are minuscule; as larvae, most are tasty morsels for the birds. Standing, dead, insect-ridden trees provide wonderful feeding and nesting sites for red-headed, red-bellied, and pileated woodpeckers. An environmentally-aware resident in Gainesville left a dead snag in the front yard, labeled "Woodpecker's Restaurant". And there's an ongoing political war between ordinary people and silviculturalists (with at least one battleground in the Ocala National Forest) over leaving "useless" old trees up for the woodpeckers to nest in.

#### Maintaining the cycle

Even when dead, pine trees keep on giving. If you bring wood indoors, you may already know of the treasures it produces when left to itself for awhile. Any pine wood from a nice forest will yield a menagerie of small creatures. Iridescent metallic wood-boring beetles, ambrosia beetles, bark beetles, and other insects feed upon the wood. Over time, they complete their life cycles in the log and bore out to mate and lay eggs on another dead log. A single log can produce new life for over a year.

Dead or alive, pine trees are storehouses of history. Because they grow at different rates during different seasons, the wood shows annual rings. Fire scars and drought years, years when the tree was shaded, and good years, all will be marked in the rings by their width, and the presence of charcoal. Counting the rings tells us the age of the tree. Holling Clancy Holling wrote a whole book on the history to be found within a cottonwood, and Aldo Leopold described the history written in the rings of a felled oak tree in *A Sand County Almanac*:

"Fragrant little chips of history spewed from the saw cut, and accumulated on the snow before each kneeling sawyer. We sensed that these two piles of sawdust were something more than wood: that they were the integrated transect of a century: that our saw was biting its way, stroke by stroke, decade by decade, into the chronology of a lifetime, written in concentric annual rings of good oak."

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