

where have all the beetles gone?

By Richard A. Goyer and Kier D. Klepzig

Without a doubt, bark beetles are the most destructive insect pests of Southern pines. Among these, the Southern pine beetle (SPB), *Dendroctonus frontalis*, is the most notable and most noticed. During outbreak years, this small, but very aggressive, beetle can cause catastrophic losses.

Other bark beetles, such as pine engravers (*Ips* spp.) and the black turpentine beetle (*Dendroctonus terebrans*) may become abundant during late summer and during droughts. These less aggressive beetles may kill small, and occasionally even large, groups of trees. Together, the Southern bark beetles disrupt normal harvest cycles and force landowners to salvage infested and nearly green timber at reduced value in efforts to prevent their spread to remaining trees. Louisiana forests have suffered heavily in the past, especially due to SPB. In 1985-86, 1991-93 and 1995, SPB wreaked havoc in our forests, causing millions of dollars in lost revenue and resources.

No beetles here...

However, in the past few years it's been difficult to even find a SPB. In fact, it would appear that the SPB

has been almost absent from our forests as well as those of nearby East Texas. Although pine engravers have caused locally significant losses, these have been widely scattered.

We have, since 1998, escaped the ravages of the SPB. This begs the question, why? Where are the SPB? Despite years of in-depth research and the accumulation of mounds of information, we are still unable to say exactly why SPB populations fluctuate when and where they do. However, we can speculate as to some of the reasons as to why we are temporarily "out of the woods" with regards to SPB.

Bad time to be a beetle

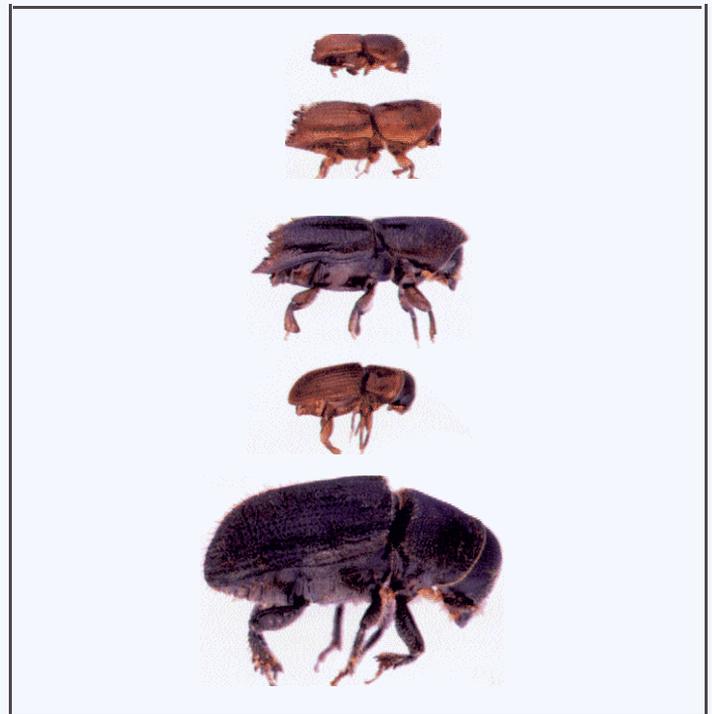
In Louisiana, pine bark beetles develop rapidly from eggs to adult—often in 30 days during warm summer months. As many as 7-8 generations may develop in a single season, allowing for rapid population increases under ideal conditions. But, what are "ideal conditions," and how might these pertain to our current situation?

First, there must be a source of beetles from the previous season. There have been no sizable (or even

Table 1

Southern Pine Beetle activity Number of Infestations

state (partial data)	(2000)	2001
Oklahoma	0	
Arkansas	0	
Texas	0	
LOUISIANA	0	0
Mississippi	809	137
Alabama	26,407	11,974
Kentucky	1,664	3,422
Georgia	2,682	2,604
Tennessee	9,883	12,746
Viiginia	1,946	598
Florida	1,172	2,889
S. Carolina	13,124	22,137
N. Carolina	2,199	3,860
Maryland	0	NA



Louisiana's five pine bark beetles (top to bottom) are small *Ips* engraver, medium *Ips* engraver, large *Ips* engraver, SPB and Black Turpentine Beetle. (Photo by G. J. Lenhard).

detectable) SPB infestations in east Texas, Louisiana, or Arkansas for the past four years.

Obviously, there are some beetles secreted in timber somewhere. Probably, natural enemies such as woodpeckers, other beetles, and tiny wasps and flies are keeping bark beetle numbers in check, at least to a certain degree, in our region. These organisms may build up as the SPB increases (more SPB means more to eat, which means more reproduction of natural enemies), once there are enough of the natural enemies present, they are able to help cause a decrease in SPB.

The flipside of this dynamic is that once the SPB population crashes, so do the populations of natural enemies. This leads to a cyclical pattern - peaks of SPB followed by peaks of natural enemies, declines of SPB followed by declines of natural enemies which, eventually, help to allow SPB numbers to peak again.

In addition, the bluestain fungus carried by SPB – and tiny mites riding on SPB - as they attack trees, may play a role in causing the collapse of SPB populations. Within attacked trees, this fungus competes with developing SPB larvae for host tissue. As more SPB crowd into trees, levels of the fungus increase as well. When the fungus becomes very abundant, it interferes with SPB larval nutrition and SPB numbers decline.

The interactions among this group of natural enemies and competitors can be very complex, but together these organisms can play a large role in bringing a SPB outbreak to a close.

Second, lightning struck, weakened, overcrowded and overmature trees are ideal focal points for initial outbreaks. We have had moisture deficits in the past few years (especially 1999-2000), and this has also resulted in fewer lightning-producing storms. Fewer lightning struck trees mean fewer starting points for SPB. Also, steady, late-season rashes

of engraver beetle infestations have served to eliminate some moisture-stressed, older trees that might normally serve as refuge for low numbers of SPB. These infested trees also harbor and allow the build up of insects that prey upon both the pine engravers and SPB. These natural enemies may be reducing the numbers of SPB dispersing in early spring.

Changes in timber harvesting may also have dampened the incidences of SPB attack. As production levels have declined in the Pacific Northwest, pressure on Southern timber has increased. These trends led to higher timber values in the late 1990s.

As a result, many landowners cut their mature timber to capture higher revenues. This may have

reduced the SPB risk by lowering the number of overmature trees. Also, an increased emphasis on chip-n-saw or somewhat smaller diameter wood has made plantation thinning more viable. This also could, in part, have resulted in less dense, overcrowded stands with lower risk of SPB' attack.

The combination of favorable climatic conditions, harvesting procedures that remove overmature and weak trees, and increased demand for all diameter classes has, in effect, accomplished what pest specialists have preached for decades. Maintaining vigorous trees and removing stressed trees helps to prevent bark beetles from becoming established.

Out of the woods?

So, are we completely out of the woods? No! Beetle populations continue to flourish and, in some cases, meet new levels of epidemic proportions. At the same time

Louisiana and Texas are enjoying respites from SPB, epidemics have raged in parts of Alabama, Tennessee, North Carolina, Kentucky, Ohio and even New Jersey (!) (Table 1). We are indeed fortunate to have benefited from an extended decline in beetle populations. One must only remember the most severe outbreak of SPB in Louisiana's recorded history that took place, in the mid-1980s that was preceded by 3-4 years of little to no activity. We can continue to help prevent serious outbreaks through continued vigilance, early detection, and silvicultural operations that reduce high risk trees and stands.

Southern pine beetles are cyclical creatures, their numbers rarely stay low for long. They will be back. However, with pro-active management and detection, we can make that comeback less devastating, disruptive, and economically damaging.