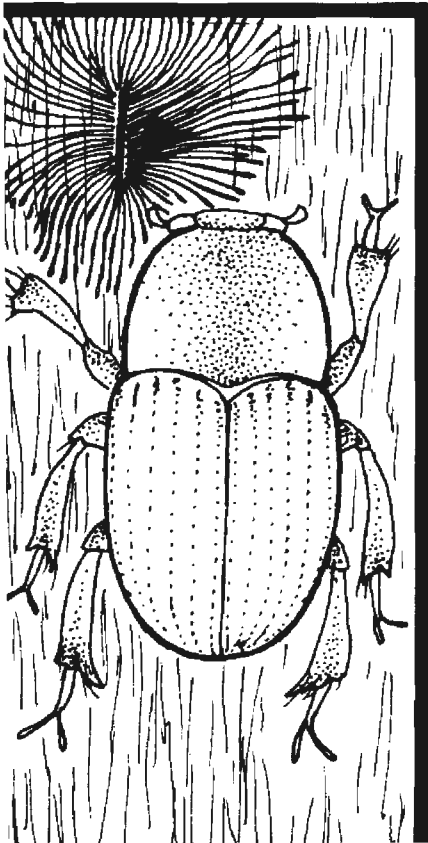




breaks of moth activities. As the more severely defoliated trees die, remaining trees appear to benefit from increased nutrients, moisture and sunlight. The fallen needles and insect frass ("a mixture of excrement and partly digested needles") have been estimated to increase nitrogen and other nutrients to nearly 10 times the amount returned in normal litterfall.

Insect Ecologist Boyd Wickman of the Pacific Northwest Station's Forestry Sciences Laboratory in Corvallis, Oregon, has studied forest pests for 25 years and comments on the close interrelationships among all components of forest ecosystems and their shared thousands of years of evolution.

He suggests that insect defoliators play roles similar to that of the bark beetle in pine forest succession, and concludes that separating out the individual strands of process may prove impossible — that only an ecosystems approach will ever come close to giving a true picture.

Wickman then goes one step further and includes scientists and managers in his ecosystems view. "It will take years," he said, "to answer the many intriguing questions about the effects of defoliation on forest ecosystems," and he believes the job "can only be done by a succession of scientists working on plots protected by a succession of cooperating land managers."

INFORMATION CROSSFILE

FORESTRY RESEARCH WEST, a report for land managers on recent developments in forestry research at the four western Experiment Stations of the Forest Service, U.S. Department of Agriculture, comes out four times a year and is full of information useful to both researchers and park managers. Add your name to their mailing list by writing *Forestry Research West*, U.S. Department of Agriculture, Forest Service, 240 West Prospect St., Fort Collins, CO 80526.

The August issue carries a piece describing the developing longterm picture of forest dynamics that is emerging from tussock moth research. It recounts evidence of enhanced growth following older out-

