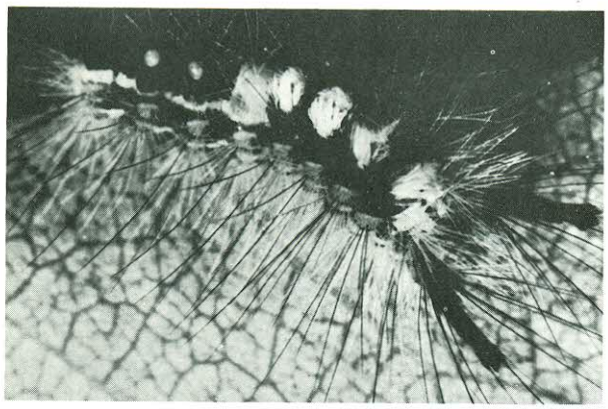
Spruce needle miner, *Taniva albolineana* (Kearf.). A few ornamental Engelmann spruce trees were lightly defoliated in Grangeville, Idaho. This insect was reported at several other locations on single spruce trees.

Rusty tussock moth, *Orgyia antiqua* (L.). Cocoons were found on western larch trees on the Sylvanite and Warland Ranger Districts, Kootenai National Forest, Mont. Damage to host trees was slight. Numerous egg masses were observed on the foliage of many species of brush-type plants on 30 acres located northeast of Missoula, Mont.



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Larvae of the rusty tussock moth were abundant on the foliage of many species of brush-type plants in the vicinity of Missoula, Mont.

CENTRAL ROCKY MOUNTAINS

By S. W. MESO, JR., and A. E. LANDGRAF, JR., Division of Timber Management, Denver, Colorado

Conditions in Brief

The Black Hills beetle continued as the most important forest insect within the Central Rocky Mountains. An outbreak of serious proportions, the worst in many years, developed in stands of ponderosa pine over an extensive area in the Black Hills of South Dakota and Wyoming. Chronic infestations on parts of the Pike, Arapaho, Roosevelt, San Isabel, and Grand Mesa-Uncompahgre National Forests, Colo., and in the north central part of the Bighorn Mountains, Wyo., were successfully checked, and concerted action by public and private landowners was initiated to reduce and contain the virulent epidemic in the Black Hills.

There were no serious infestations of other bark beetle species anywhere in the Central Rockies. The Engelmann spruce beetle, however, increased in numbers in logging slash and cull logs along the west side of Cameron Pass in northern Colorado, and these populations pose a threat to extensive stands of Engelmann spruce in the Roosevelt National Forest.

The scope and severity of spruce budworm infestations in Colorado forests declined materially from levels attained in 1962. Direct control of the spruce budworm was undertaken on only 5,280 acres of young-growth fir stands, highly prized for Christmas tree production, on the San Isabel National Forest. Infestations of pandora moth caused light damage to stands of lodgepole pine on parts of the Medicine Bow, Roosevelt and Routt National Forests, in Colorado and Wyoming. A new area of infestation, also in stands of lodgepole pine, was discovered northwest of Walden, Colo. Feeding by second-year larvae in 1964 may result in heavier damage in affected areas.

Status of Insects

Black Hills beetle, *Dendroctonus ponderosae* Hopk. Black Hills beetle infestations of varying intensities have occurred in stands of ponderosa pine in the Central Rocky Mountains, and the Black Hills of South Dakota and Wyoming for many years. Those in the Big Horn Mountains of Wyoming also have caused serious cumulative depletion of the forest resource. The severity and intensity of infestations in 1963 varied widely between locations. Those that developed on parts of the Pike, Arapaho, Roosevelt, San Isabel, and Grand Mesa-Uncompahgre National Forests in Colorado were largely contained by cutting, piling, and burning infested trees, and by spraying those not cut and burned with formulated insecticides. Infestations in some areas were thus reduced by as much as 92 percent.

An outbreak of serious proportions, the worst in many years, developed over an extensive area in the Black Hills of South Dakota and Wyoming. The area most seriously affected extends from north of Custer, S. Dak., westward into the Bear Lodge Mountains, Wyo. The attacking beetles in 1963 killed trees in groups varying in number from 2 or 3 to more than 1,000. The volume of loss is estimated at approximately 25 million board feet.

The severity of the epidemic in the Black Hills prompted landowners and land managers to initiate a major campaign to reduce

populations and retard spread. A multiphase action program, consisting of timber salvage, cutting, piling, burning, and spraying infested trees was decided upon, and the control program was begun early in October. Resumption of control operations is planned during the spring months of 1964 with the expectation that a major part of the infestation will be suppressed prior to emergence of new adults in July and August.

Mountain pine beetle, *Dendroctonus monticolae* Hopk. Mountain pine beetle infestations of serious proportions have persisted in stands of lodgepole pine on parts of the Shoshone National Forest, Wyo., for the past several years. The rate of tree killing reached a peak in 1962. The beetle populations were greatly reduced in 1963 by cutting, piling, burning and spraying infested trees. It is anticipated that infestations in affected areas will be brought under control with but limited followup suppression work in 1964.

Engelmann spruce beetle, *Dendroctonus engelmann* Hopk. Engelmann spruce beetle populations throughout the Central Rocky Mountains were reported at the lowest level since 1956. The long-standing outbreaks in stands of Engelmann spruce on the Grand Mesa-Uncompahgre, Rio Grande, and San Isabel National Forests have been brought under control by timely cutting of green spruce trees to trap the attacking adults. A persistent infestation of potential significance along Wolf Creek on the west side of Wolf Creek Pass, San Juan National Forest, Colo., is being contained by use of trap trees and an uninterrupted timber sale. The potential for an outbreak in the Roosevelt National Forest exists because of a current buildup of beetle populations in spruce logging slash and cull logs on non-Federal lands along the west side of Cameron Pass in northern Colorado.

The reduction of Engelmann spruce beetle populations and resultant decrease of infestations in stands of Engelmann spruce in the Central Rocky Mountains is attributed to (1) less timber blown down by strong winds during the past 3 years; (2) increased predation of larval broods by woodpeckers; (3) modified practices of logging in spruce stands to permit the burning of slash and cull logs, and (4) systematic ground inspection of potential problem areas for earlier discovery of incipient outbreaks.

Spruce budworm, *Choristoneura fumiferana* (Clem.). The scope and severity of spruce budworm infestations declined materially throughout the Central Rocky Mountains. Area of defoliation in 1962 was 718,300 acres. In 1963 it totaled 46,880 acres. On the basis of information obtained from budworm egg-mass surveys in July, it seems likely that the severity of tree defoliation in current infestation areas will be less in 1964. The decline of populations was due to unknown natural control factors.

Direct control of the spruce budworm was undertaken in 1963 on the San Isabel National Forest, Colo., on only 5,280 acres of young-growth fir stands that were highly prized for Christmas tree production. Excellent control was attained by helicopter application of ½ pound of DDT per 1 gallon of solution per acre. No adverse effects of spraying were noted or reported.

Pandora moth, *Coloradia pandora* Blake. An infestation of this important forest defoliator has persisted at varying levels of intensity in stands of lodgepole pine along the Colorado-Wyoming border for the past several years. First-year feeding larvae in 1963 again caused light damage to host trees in the general area of older infestations. A new infestation of more severe proportions was discovered in an area northwest of Walden, Colo.

The larval population of the pandora moth on parts of the Medicine Bow, Roosevelt, and Routt National Forests in Colorado and Wyoming, was found to be infected by an unknown pathogen. Its effect on the trend of infestations has not been determined.

Oregon pine ips, *Ips oregonis* (Eichh.). The Oregon pine ips, a periodic pest of ponderosa pine in the Black Hills of South Dakota and Wyoming, caused little damage in 1963. Little or no damage is expected in 1964.

Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopk. Douglas-fir beetle infestations were at low endemic levels in most stands of Douglas-fir in the Central Rocky Mountains. Tree killing above endemic levels, however, was reported from the Devil Mountain area, and from the north Powderhorn area, southwest of Gunnison, Colo.

Western balsam bark beetle, *Dryocoetes confusus* Sw. Endemic infestations were reported throughout the spruce-fir type in Colorado and Wyoming. No change in infestation levels is expected in 1964.

Great Basin tent caterpillar, *Malacosoma fragile* (Stretch). Large acreages of aspen throughout Colorado often are heavily defoliated by the Great Basin tent caterpillar. Outbreak infestations usually persist for several years before they decline to endemic proportions. A downward trend in persistent infestations in southern Colorado was first reported in 1958, and low popula-

tions in most affected areas continue to date. However, in one area near Cumbers Pass, Rio Grande National Forest, in the vicinity of previous epidemics, an upsurge in populations was reported. In addition, a new outbreak was discovered in 1963 along the West Fork, Cimarron River, Grand Mesa-Uncompahgre National Forests. There is no previous history of severe caterpillar infestations in this location.

Large aspen tortrix, *Choristoneura conflictana* (Wlk.). The scope and intensity of large aspen tortrix infestations increased in southern Colorado in 1962 after a 5-year interim of low-level populations. Light defoliation of aspen occurred again in 1963 on parts of the San Juan, Grand Mesa-Uncompahgre, and Gunnison National Forests.

Pine needle miner, *Recurvaria* sp. This unidentified needle miner has persisted in endemic number in stands of ponderosa pine in parts of Colorado for many years. Damage to host trees was insignificant in 1963. Centers of infestation were reported along State Highway 160, west of Durango, and on Lookout Mountain, west of Golden, Colo.

Other insects. Aspen and birch trees in the Black Hills of South Dakota were heavily defoliated by an undetermined leaf beetle, *Chrysomela* sp. Stands of lodgepole pine northwest of the Shadow Mountain Recreational Area, near Grand Lake, Colo., were lightly infested by an undetermined sawfly. This sawfly infestation has persisted in the same general area for the past several years.

SOUTHWESTERN STATES [1]

By D. D. LUCHT and D. A. PIERCE, Division of Timber Management, Albuquerque, New Mexico

Conditions in Brief

Damage from insects to the multiple use resources of the Southwest was less this year than at any time during the past 5 years. Cultural, direct, and natural controls contributed to this improvement in forest insect conditions.

The threat posed by the major Engelmann spruce beetle outbreak near Taos, N. Mex., has been materially reduced through sale of infested stems and burning of infested down material. An aggressive Black Hills beetle population initially attacked and killed 2,500 limber pine in the Manzano Mountains near Albuquerque, N. Mex. With the limber pine almost eliminated, the beetle started attacking adjacent ponderosa pine. Outbreaks of the Douglas-fir beetle continued throughout the Douglas-fir type. Losses are most severe on the Kaibab National Forest, Ariz.

The spruce budworm continued to be a problem in some areas of the Southwest. This pest was active on 350,000 acres of mixed conifer type on State and private land near Chama and Cimarron, N. Mex. These areas were excluded from the 2-year control program that reduced the 1.1-million-acre infestation to its present level of 350,000 acres in northern New Mexico. In southern New Mexico two new infestation centers totaling 100,000 acres were detected.

Defoliation of aspen by the Great Basin tent caterpillar is becoming a major problem in the Southwest as more emphasis is being placed on recreation values. Land managers received numerous complaints from visitors in 1963 concerning the severe defoliation observed in recreation areas. The most severe defoliation occurred on the North Rim units of Grand Canyon National Park and the Kaibab National Forest, Ariz.

Status of Insects

Engelmann spruce beetle, *Dendroctonus engelmanni* Hopk. Tree killing by this beetle declined in New Mexico and remained static in Arizona. The major outbreak at Lagunitas Recreation Area, Carson National Forest, subsided to very low levels from heavy predation by woodpeckers. The 6-year-old outbreak on the eastern division of the Carson National Forest, Taos, N. Mex., declined in intensity as a result of timber sales and burning of infested cull material. About 3,000 acres of slash and other debris were burned in 1963. The infestation near Flagstaff, Ariz., remains active and is being suppressed by burning of infested cull material.

Spruce budworm, *Choristoneura fumiferana* (Clem.). A total of 566,000 acres of mixed conifer were sprayed to control spruce budworm on Federal and Indian lands in 1963. Of this total, 466,000 acres were located on the western divisions of the Carson and Santa Fe National Forests in northern New Mexico, and 100,000 acres in the Chuska Mountains, Navajo Indian Reservation, northeastern Arizona. This defoliator remained active on 350,000 acres of State and

[1] Includes all forested lands in Arizona and New Mexico and National Park Service land in southern Colorado and western Texas.