

## CENTRAL ROCKY MOUNTAINS (R-2)

by

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### Conditions in Brief

The mountain pine beetle is the most serious forest insect pest in the Central Rocky Mountains. Epidemic infestations in ponderosa pine in the Black Hills and along the Colorado Front Range continued to increase. The beetle is also a problem in lodgepole pine on the Arapaho, Medicine Bow, and Shoshone National Forest. Adjacent State, private, and other Federal lands are also infested.

There are no epidemic infestations of the spruce beetle in the region at this time. This insect has been a major problem in the past. The western spruce budworm caused light to moderate defoliation in and adjacent to the San Isabel and Roosevelt National Forests this year. A slight increase in defoliation is expected for 1974.

Various insects are causing minor damage throughout the region, and there are a number of insect problems in the shelterbelts and urban areas of the Plains States.

Dwarf mistletoes, as a group, received the greatest amount of attention in the detection, evaluation, and suppression of forest tree diseases. Efforts to suppress the disease were continued on lodgepole pine commercial forest lands in Wyoming and Colorado. Dutch elm disease was detected in previously unreported areas in Nebraska, South Dakota, and Colorado. Native elm populations, where present, continued to be a reservoir for the spread and intensification of the disease. Infectious and noninfectious foliage diseases were quite prominent on different hosts in various parts of the Region. Anthracnose on American sycamore was very common in eastern Kansas and Nebraska causing moderate to severe defoliation.

### Status of Insects

**Mountain pine beetle, *Dendroctonus ponderosae* Hopk.** This beetle is the most serious insect pest in the region. There are several outbreak areas causing extensive tree mortality. The pest attacks both ponderosa and lodgepole pine. The most serious infestations are in ponderosa in the Black Hills of South Dakota and Wyoming, and along the Front Range of Colorado.

<sup>6</sup>The following organizations contributed information for this report: Cooperative Extension Services of Kansas, Nebraska, and South Dakota, South Dakota State Division of Forestry, Wyoming State Department of Agriculture, Colorado State Forest Service, and the Rocky Mountain Forest and Range Experiment Station.

The epidemic in the Black Hills has been active for over a decade and continued to increase. During the late 1960's, the epidemic retracted to the northern Black Hills, but during the last 2 years the infestation has again spread southward. Concentrated tree loss is prevalent in dense second growth stands where the basal area is high and growth is stagnated. Past efforts at control relied heavily on the use of ethylene dibromide for chemical treatment, supplemented by cutting and burning of the infested trees. The emphasis now is to reduce stand stocking in susceptible stands. Thinned stands are virtually free of mountain pine beetle activity. An energetic program of timber sales and salvage logging has been implemented mainly in the heavy beetle activity areas to suppress beetle populations and to bring the stand under management. In the past year 165,000 trees were salvage logged.

Along the Front Range there is also a problem of stagnated stands caused by poor site conditions, overstocked stands, and the widespread presence of dwarf mistletoe. The problem along the Front Range is further complicated by suburban development. Control is difficult due to the large number of small private forest landowners and the intermingled State and Federal lands. The Colorado State Forest Service has confined their chemical control program to those areas where private landowners are organized to carry out suppression on logical treatment units.

The infestation was found from Colorado Springs to the Wyoming State line, mostly at the lower to mid-elevation range of ponderosa pine. There are probably 500,000 infested trees on all landownerships along the Colorado Front Range.

There was scattered loss of ponderosa pine on private and Federal lands along the eastern slope of the Bighorn Mountains in Wyoming. This area has a long history of mountain pine beetle infestations. Losses in 1973 increased over those of the preceding year.

In lodgepole pine, a relatively large infestation is present in the Middle Park area of Colorado. The infestation has been building and spreading since first being detected in 1968. Infested trees are on private, National Forest, Bureau of Land Management, and Rocky Mountain National Park lands.

Two infestation areas approximately 15 miles apart are developing on the Medicine Bow National Forest in Wyoming. The infestation along South Spring Creek probably began in 1969 and the infestation on Green Ridge began in 1971. The intervening land is forested with susceptible lodgepole, and if both infestations continue to build and spread, heavy loss could develop.

The infestation remains active near South Pass City and Atlantic City on Bureau of Land Management and Shoshone National Forest land in Wyoming.

There is a 500 acre infestation along Harrison Creek near Steamboat Springs, Colo.

Some tree mortality continues in the suburban developments around Dillon Reservoir in Colorado. Tree



loss in those developments greatly reduces the real estate values.

The infestations on Cold Springs Mountain in extreme northwestern Colorado have subsided considerably.

**Spruce beetle, *Dendroctonus rufipennis* (Kby.)**  
Spruce beetle activity was very low in 1973. The potential for a beetle population buildup continued in windthrow areas on the Rio Grande, San Juan, and Medicine Bow National Forests. Trees in the first two areas were blown down in October 1971, whereas blowdown in the latter area occurred over a several year period along the edge of timber harvest units. These trees may be attractive to the beetles for several years because the root systems are only partially destroyed when the tree falls.

**Douglas fir beetle, *Dendroctonus pseudotsugae* Hopk.**  
This bark beetle continues to cause minor losses in scattered areas throughout the region. Mortality generally occurs in small groups on steep, rocky drainages. There are no infestation areas of significant size.

**Pine engraver, *Ips pini* Say.** A fire near Chadron, Nebr., seriously burned 3,600 acres. Much of this was in ponderosa pine. Eight hundred acres were on the Nebraska National Forest, 160 acres were on the Chadron State Park, and the remainder on private lands. Past experience with the pine engraver in this area indicated that large populations could develop in trees weakened by fire. These populations then emerge and attack adjacent green trees. A plan was developed to log and remove fire-weakened trees before the beetles developed large populations. Trees on all landownerships would be removed.

**Western spruce budworm, *Choristoneura occidentalis* Freeman.** Budworm defoliation slightly increased this year especially along the Poudre River on the Roosevelt National Forest, on State and private lands west of Ft. Collins, west of Boulder, and in portions of Rocky Mountain National Park, all in Colorado. The San Isabel National Forest, which ordinarily experiences the heaviest budworm defoliation of any area in the region, sustained light to moderate defoliation. Based on data collected during an egg mass survey conducted during the late summer there will be light and moderate defoliation along the Front Range of Colorado from Boulder to Ft. Collins and west into Rocky Mountain National Park in 1974. Some light and moderate defoliation is also expected in the San Isabel National Forest.

**Pine tortrix, *Choristoneura lambertiana ponderosana* Obraztsov.** This insect is also known as the sugar pine tortrix in other Western States. An infestation on

ponderosa pine along the St. Vrain and Big Thompson canyons of the Roosevelt National Forest caused heavy defoliation. The insect was also observed near Pagosa Springs in the San Juan Mountains. Defoliation of the tops of trees and lateral branches might cause problems if the infestation persists.

**Pine butterfly, *Neophasia menapia* (Feld & Feld).**  
This insect is present on several thousand acres around Keystone in the Black Hills of South Dakota. This is the third summer that large numbers of adults have been observed in the area. Larvae were also collected. Defoliation is light to unnoticeable at the present time. Flying adults were also observed in small numbers along the Front Range of Colorado.

**Douglas fir tussock moth, *Orgyia pseudotsugata* McD.**  
The population of this insect which had caused heavy defoliation on Colorado blue spruce on the Ft. Carson military base has died out. Heavy defoliation was reported on some ornamental blue spruce in Denver.

**Lodgepole terminal weevil, *Pissodes terminalis* Hopp.**  
This weevil continues to cause damage to lodgepole pine saplings. The insect is known to be present in the Routt, Roosevelt, and Medicine Bow National Forests.

**Pine shoot moth, *Eucosma sonomana* Kearf.** This insect caused severe growth deformities in young ponderosa pine, 5 to 20 feet tall, near Turkey Springs Guard Station in the San Juan National Forest. The larvae bore into the new shoots causing terminal mortality, retarded growth and deformity resulting in dominance of the laterals. This caused the formation of multiple leaders and deformity of the trees. Damaged trees can be found in most of the ponderosa pine stands on the San Juan National Forest.

**Pitch nodule moth, *Petrova arizonensis* (Hein)** For several years this insect has caused stunting and deformity of piñon pine in a large area of Colorado extending from Buena Vista to Salida to Canyon City. Damage can be very noticeable with some tree mortality resulting from several years repeated infestation. During the past year the incidence of this insect has dropped greatly.

**Tip moths.** The western pine tip moth, *Rhyacionia bushnelli* Busck, and the southwestern pine tip moth, *Rhyacionia neomexicana* Dyar, were present in pines in windbreaks and pine plantings in Nebraska and Kansas. They caused stunting and deformity by infesting and killing the terminals and some laterals. The southwestern pine tip moth was found in Colorado all along the Front Range and across the southern portion of the State to the San Juan Mountains. This insect can cause severe damage anywhere young pines are found in this area. Another tip moth, *Dioryctria* sp., caused extensive



damage to terminals of pinyon pine in Owl Canyon north of Ft. Collins, Colo.

**Needle Miners.** These insects caused damage in ponderosa pine, pinyon pine, and white fir in Colorado. A miner, *Coleotechnites* sp., reported last year on ponderosa pine west of Boulder, Colo. suffered a severe drop in population and was no longer a problem. It had infested about 9,000 acres. Another *Coleotechnites* sp., infested pinyon pine in Denver, Salida, and Durango. Defoliation was noticeable only in the Durango area. A miner tentatively identified as *Epinotia meritana* Hein., has caused moderate to heavy defoliation of white fir near North La Veta Pass for 2 years (fig. 16). In 1973 there was about 3,000 acres of heavy defoliation and light defoliation on another 10,000 acres on Sheep and Iron Mountains.



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Figure 16.—Trees without needles are white fir which were defoliated by white fir needle miner and trees with needles are Douglas-fir.

**Strawberry root weevil, *Otiorhynchus ovatus* (L.)** This weevil which caused the loss of 400,000 spruce seedlings in the Mt. Sopris Tree Nursery, White River National Forest, in 1972, again caused losses in 1973. Control measures reduced the loss, but the weevils damaged between 1 and 2 percent of the spruce seedlings lifted in 1973. Efforts to suppress the damage caused by this beetle were continued.

**Aspen leaf miner, *Phyllocnistis populiella* Chamb.** This leaf miner was found in the Lead-Deadwood area and along Spearfish Canyon in the Black Hills National Forest. The miner caused severe defoliation in some areas. The damage associated with leaf scorch was caused by a very hot, dry period in July. Long-term or permanent damage is probably negligible.

**Red-humped oakworm, *Symmerista canicosta* Franc.** This insect is ordinarily a pest in the Northern Lake States. In 1972, and again in 1973, the insect was found in eastern South Dakota between Newton and Sioux Falls. Noticeable defoliation occurred around Newton in oak (fig. 17).



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Figure 17.—An oak leaf with feeding larvae of red-humped oakworms.

**Fruit tree leaf roller, *Archips argyrospilus* (Walker).** In the past 2 years this insect has caused moderate defoliation on mountain mahogany, chokecherry, skunkbrush, and wildrose along the western edge of the Black Hills National Forest. This year damage from this insect was minimal.



**Other insects.** In addition to damage from tip moths in Nebraska and Kansas, several other insects were reported causing damage in the Plains States. The elm leaf beetle, *Pyrrhalta luteola* (Muller) defoliated elms in Wyoming, South Dakota, Kansas, and Nebraska. The spring cankerworm, *Paleacrita vernata* (Peck), caused severe defoliation of shelterbelts in South Dakota, and in north central and northeastern Nebraska. It was also found in Wyoming. The bagworm, *Thyridopteryx ephemeraeformis* (Haworth) was a pest in eastern Kansas and was found on eastern red cedar in eastern South Dakota. Two species of the forest tent caterpillar, *Malacosoma* spp., defoliated hardwoods in northeastern South Dakota. Some aerial spraying was conducted for suppression of these caterpillars. The walnut caterpillar, *Datana intergerrima* G & R, defoliated walnut and the yellow-necked caterpillar, *Datana ministra* (Drury), defoliated pine oak in eastern Kansas. Lilac, birch, and poplar borers were also reported in South Dakota.

### Status of Diseases

**Dwarf mistletoes, *Arceuthobium* spp.** Lodgepole pine dwarf mistletoe, *A. americanum* Nutt. ex Engelm. was controlled on 800 acres in Colorado and Wyoming. An extensive type evaluation survey was completed in a 10,000-acre timber management unit in the Roosevelt National Forest to determine the need for control.

A study of the significance of stem infections in the spread of *A. americanum* was conducted in the Medicine Bow and Routt National Forests. Over 1,300 stem infections on 1,000 seedling to sawtimber size trees, were carefully examined for different characteristics related to seed production and spread potential. A report on the results of the study will be published elsewhere. In another study, a 16-unit campground in the Shoshone National Forest, containing mostly dwarf mistletoe infected lodgepole pine, was examined to appraise the condition of the trees in the immediate vicinity of each unit (fig. 18). The data will be used to develop recommendations that the land manager can use to prolong the life of the trees and improve the general condition of the campground.

**Limber pine dwarf mistletoe, *A. cyanocarpum*** Coulter and Nels. was discovered in two previously unreported areas in the Bighorn Mountains in Wyoming. Tree mortality was evident in one large infection center covering several acres.

Heavy brooming caused by Pinyon dwarf mistletoe, *A. divaricatum* Engelm. on *Pinus edulis* Engelm. was present in both the Colorado National Monument and Black Canyon National Monument. Mortality was not seen in the areas examined.

The rapid development of residential construction along the Front Range in Colorado has stimulated a great deal of interest from property owners on what



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Figure 18.—Lodgepole pine with numerous brooms, caused by dwarf mistletoe, in a heavily used campground. Several dead trees pose an immediate hazard to a developed campsite (Shoshone National Forest, Wyo.).

they can do about the dwarf mistletoe in their pine trees. The southwestern dwarf mistletoe, *A. vaginatum* subsp. *cryptopodum* (Engelm.) Hawks. and Wiens. on ponderosa pine is very common and causing a great deal of damage and mortality wherever its development is not hindered. Homeowners were advised about the problem and given information on treating their trees. The mountain pine beetle also occurs in some of the same areas, making for an even more difficult problem.

**Dutch elm disease, *Ceratocystia ulmi*** (Buism.) C. Mor. The disease continues to spread into previously unreported areas in South Dakota, Nebraska, and Colorado. In Nebraska, the disease was found in Sheridan and Dawes Counties, bringing the total to 86 out of the 93 counties in the State that now report the disease. Heavy losses of American elms occurred in the Indian Caves State Park in the southeastern part of the State. Considerable mortality also occurred throughout the native elm populations in the eastern counties. In South Dakota new reports of the disease came from 11



counties bringing the known total to 37 out of 67 counties in the State. Most of the new discoveries were in the northeastern part of the State. The heaviest losses are occurring in the native elm populations, and in communities where a strong sanitation program is lacking.

In Colorado the disease was discovered for the first time in 39 municipalities in 4 counties, extending the known occurrence to 18 out of 63 counties in the State. In Kansas the disease has spread throughout the significant portions of the planted and natural elm population in the State. In Wyoming the disease has been reported only from the city of Cheyenne.

**Rusts.** A long-range study to determine the fate of *Cronartium comandrae* Pk. infections on young lodgepole pine was established in the Wind River Ranger District of the Shoshone National Forest. A total of 102 branch and stem infections on 83 trees showing different degrees of activity were selected for study. All except one of the infections occurred within 3 feet of the ground, which is similar to the distribution pattern of *C. ribicola* infections on eastern and western white pine. One of the stem cankers used in the study was heavily infected with the hyperparasite *Tuberculina maxima* Rostr. None of the many other cankers seen in the stand showed any evidence of *T. maxima*.

The frequent occurrence of stem galls caused by western gall rust *Peridermium harknessii* Moore and *C. comandrae* cankers was observed while evaluating a campground in the Shoshone National Forest. Approximately 22 percent of the trees were infected with rust. Many of the Comandra blister rust infections had girdled the stem in the upper part of the crown, resulting in spiked top trees. The stem galls were old infections that had deformed the stem. The galls did not appear to adversely affect the structural strength of the stem.

A detection survey for white pine blister rust *Cronartium ribicola* Fisch. on limber pine revealed the disease was well established and intensifying near the southern end of the Laramie Mountains in southeastern Wyoming. The damage was restricted to occasional branch flagging. A new infection center was detected in the southern Big Horn Mountains about 25 miles north of an infection center discovered in 1969.

**Foliage diseases.** General observations on needle casts of conifers in Colorado showed a low level of incidence. In contrast, near Manhattan, Kans., brown spot needle blight of Scotch pine caused by *Scirrhia acicola* (Dearn.) Siggers, showed the heaviest damage since it was first evaluated in 1970. In a systematic survey of 62 Christmas tree plantings in 31 counties in Nebraska, Dr. Charles Maier of Wayne State College found *Dothistroma pini* Hulb., on Austrian and ponderosa pine as the most prevalent needle cast fungus. The disease was present in 21 plantings or about 34 percent of those

surveyed. Other less prevalent foliage diseases found during the survey were *Lecanosticta acicola* (Thuem.) Syd., *Diplodia pinea* (Desm.) Kickx., and *Phomopsis juniperovora* Hahn.

The common foliage diseases of aspen in Colorado were noticeably inconspicuous in 1973. One small pocket of aspen covering about 10 acres in the San Juan National Forest was infected with inkspot caused by *Ciborinia whetzellii* (Seav.) Seav. The disease was causing moderate to severe damage on the understory trees while the overstory trees showed only very light amounts of infection. In many locations in eastern Nebraska and Kansas, American sycamore trees were severely defoliated by anthracnose caused by *Gnomonia platani* Kleb. Additional reports from these same States and the State of South Dakota indicated the common occurrence of leaf blister disease caused by *Taphrina* sp. on elm, maple, and oak.

**Noninfectious diseases.** Several reports and evaluations were made concerning weather-caused or climatic diseases. In the San Juan National Forest in Colorado and in northwestern and southcentral Kansas, ponderosa pine showed damage to the needles that was diagnosed as scorch. The damage, although localized in Colorado, was quite common on planted ponderosa pine in many areas in western Kansas. Similar damage on Gambel oak and aspen in Colorado, and on cottonwood and aspen in the Black Hills National Forest in South Dakota was diagnosed as leaf scorch. In eastern South Dakota leaf scorch damage was widespread on green ash where some tree mortality is expected. Winter drying or redbelt was common on pinyon pine in southern Colorado. Localized pockets of winter drying were seen on mature lodgepole pine and lodgepole pine regeneration in northern Colorado. Frost injury on aspen was widespread in northern Colorado which probably contributed to the low incidence of infectious foliage diseases.

**Miscellaneous.** Evaluation surveys of 16 campgrounds located in predominantly aspen type in Colorado were made to determine the cause for and degree of tree deterioration and mortality. The surveys conducted cooperatively by Region 2 and Rocky Mountain Forest, and Range Experiment Station personnel consisted of a 10 percent sample of the campsites. The greatest amount of tree mortality was caused by *Cenangium singulare* (Rehm.) Davids. & Cash. Aspen trees in developed recreation areas are often wounded by people using the site. These wounds frequently become infection courts for *C. singulare* and other canker causing fungi. Earlier studies by research station personnel showed rapid deterioration and tree mortality in developed sites subjected to heavy use and abuse. Corrective measures involve underplanting or releasing coniferous species and avoiding aspen types in the selection of new recreational sites.



Another canker disease, *Botryodiplodia hypodermia* (Sacc.) Petr. & Syd., caused extensive damage to Siberian elm in South Dakota (fig. 19). A survey of shelterbelts in 11 counties in 1971 showed a high incidence of Siberian elm canker, particularly on 8-year-

old trees in the eastern half of the State. One symptom of the disease is oozing of the sap from bark lesions which is readily detected in early spring before the trees leaf out. The cankers frequently cause partial top-kill and can result in tree mortality.



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Figure 19.—Canker of Siberian elm, showing sap oozing from the bark and necrosis of the inner bark (South Dakota).