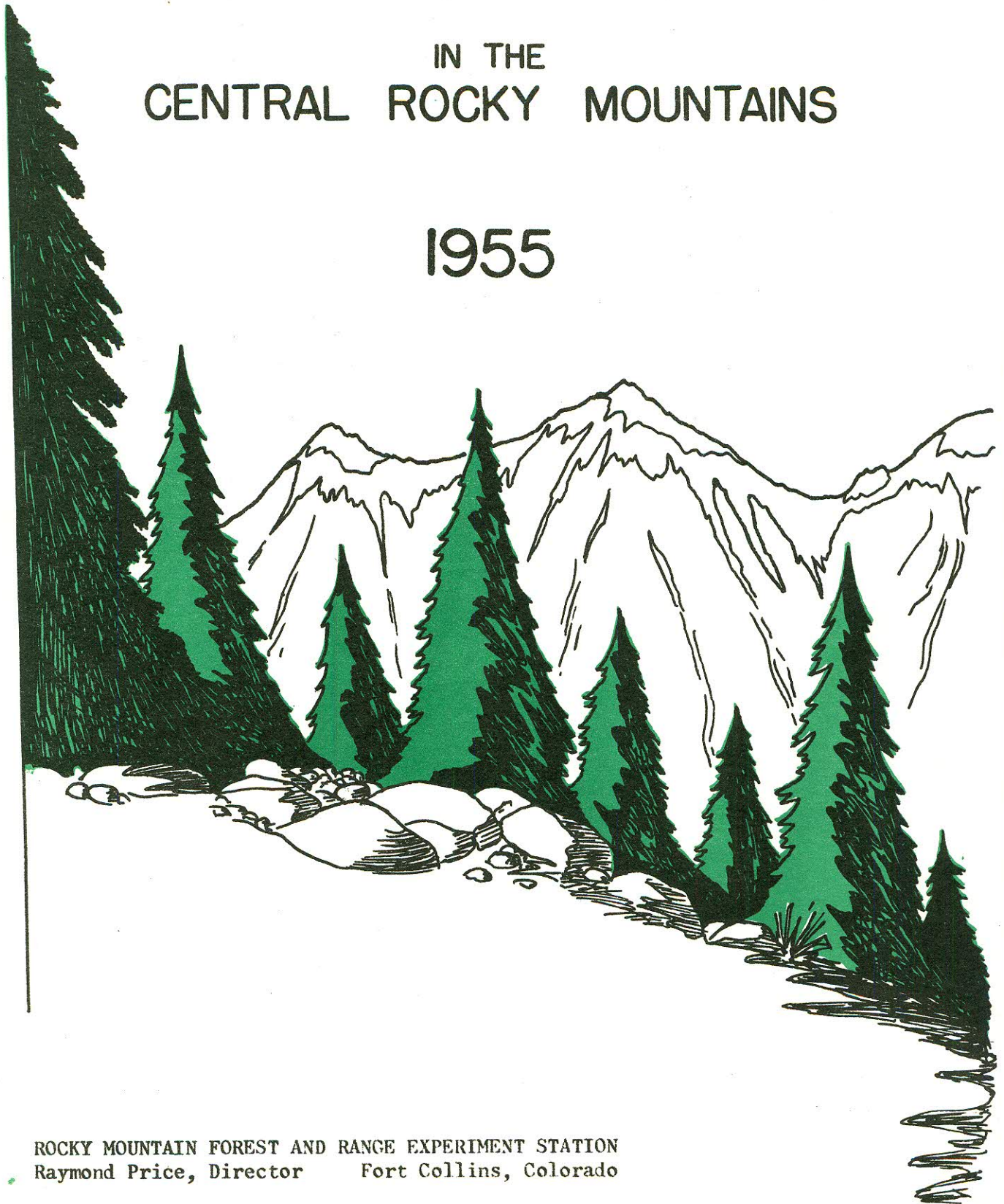


FOREST INSECT CONDITIONS

IN THE CENTRAL ROCKY MOUNTAINS

1955



ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Raymond Price, Director Fort Collins, Colorado

FOREST SERVICE U. S. DEPARTMENT OF AGRICULTURE

X

FOREST INSECT CONDITIONS
IN THE CENTRAL ROCKY MOUNTAINS

-- 1955 --

By

H. E. Ostmark and B. H. Wilford

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Forest Insect and Disease Laboratory
Fort Collins, Colorado

The Station maintains central headquarters at Fort Collins,
Colorado, in cooperation with Colorado A & M College

C O N T E N T S

| | <u>Page</u> |
|--|-------------|
| Introduction | 1 |
| Bark beetles and borers | 2 |
| Engelmann spruce beetle | 2 |
| Black Hills beetle | 4 |
| Douglas-fir beetle | 5 |
| Mountain pine beetle | 5 |
| Red turpentine beetle | 6 |
| Western balsam bark beetle | 6 |
| Fir engraver | 6 |
| Engraver beetles | 6 |
| Poplar and willow borer | 8 |
| Defoliators | 9 |
| Great Basin tent caterpillar | 9 |
| Spruce budworm | 9 |
| Miscellaneous defoliators | 10 |
| Meristem (terminal) feeders | 11 |
| Sucking insects | 11 |
| Seed insects | 12 |
| Summary of forest insect conditions - 1955 . . | 13 |

INTRODUCTION

This report is designed to present the known extent of insect injury to the forest trees of Colorado, Wyoming, South Dakota, Nebraska, and Kansas as determined by the 1955 surveys.

Losses caused by insects declined during 1955, largely as a result of a concerted control program in many areas. For example, the reduction of the Engelmann spruce beetle populations on the Uncompahgre-San Juan epidemic area in southwestern Colorado was spectacular. As a distinct result of the assumption of responsibilities by National Forest Resource Management for operational surveys, the Fort Collins Forest Insect and Disease Laboratory of the Rocky Mountain Forest and Range Experiment Station was able to give more attention to a greater number of detection reports of both the known important destructive insects and the miscellaneous but potentially important pests.

Legend

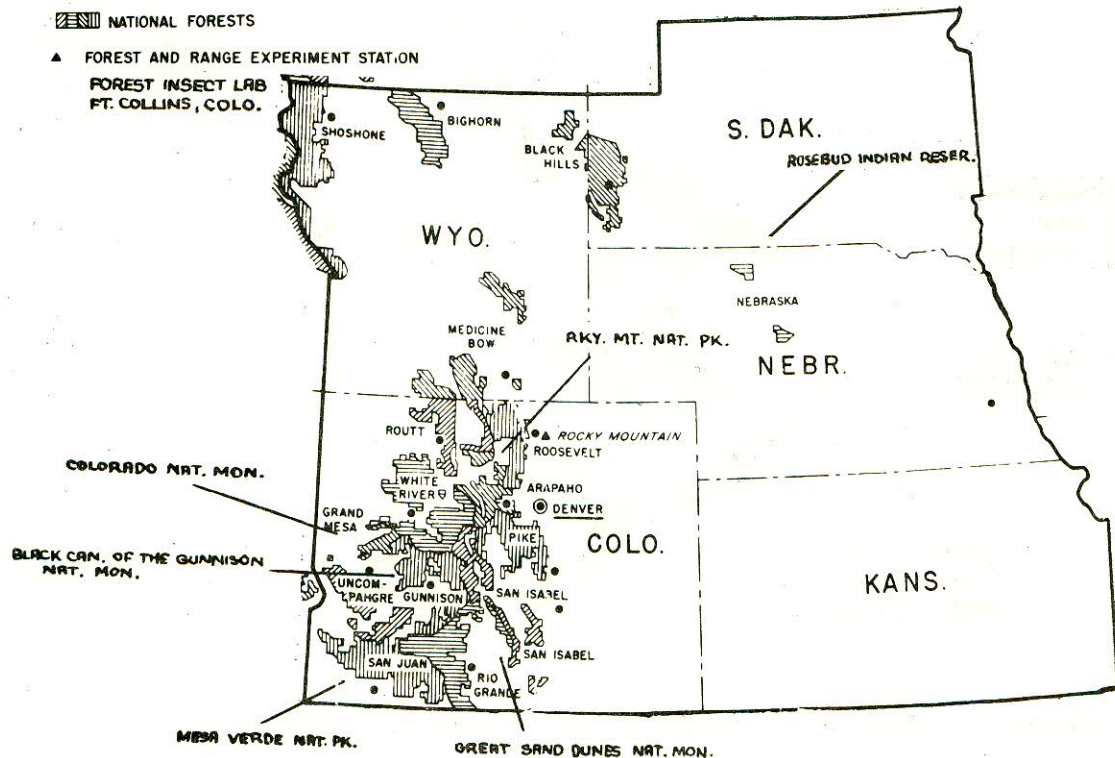


Figure 1.--Area served by the Fort Collins Forest Insect and Disease Laboratory, Rocky Mountain Forest and Range Experiment Station.

BARK BEETLES AND BORERS

ENGELMANN SPRUCE BEETLE, Dendroctonus engelmanni Hopk.

Hosts: Engelmann spruce, blue spruce, and lodgepole pine (rare).

Status: Populations generally were curtailed in 1955 by natural-control factors supplemented by chemical and logging control in areas where the natural factors were not adequate. Even so, the Engelmann spruce beetle currently is the most destructive forest insect in the region. This insect normally is found throughout the spruce-fir type in the central Rocky Mountains. Of 21 reports received and investigated by Laboratory entomologists, the majority showed that natural-control factors are holding the beetle at endemic to high-endemic levels (fig. 2).

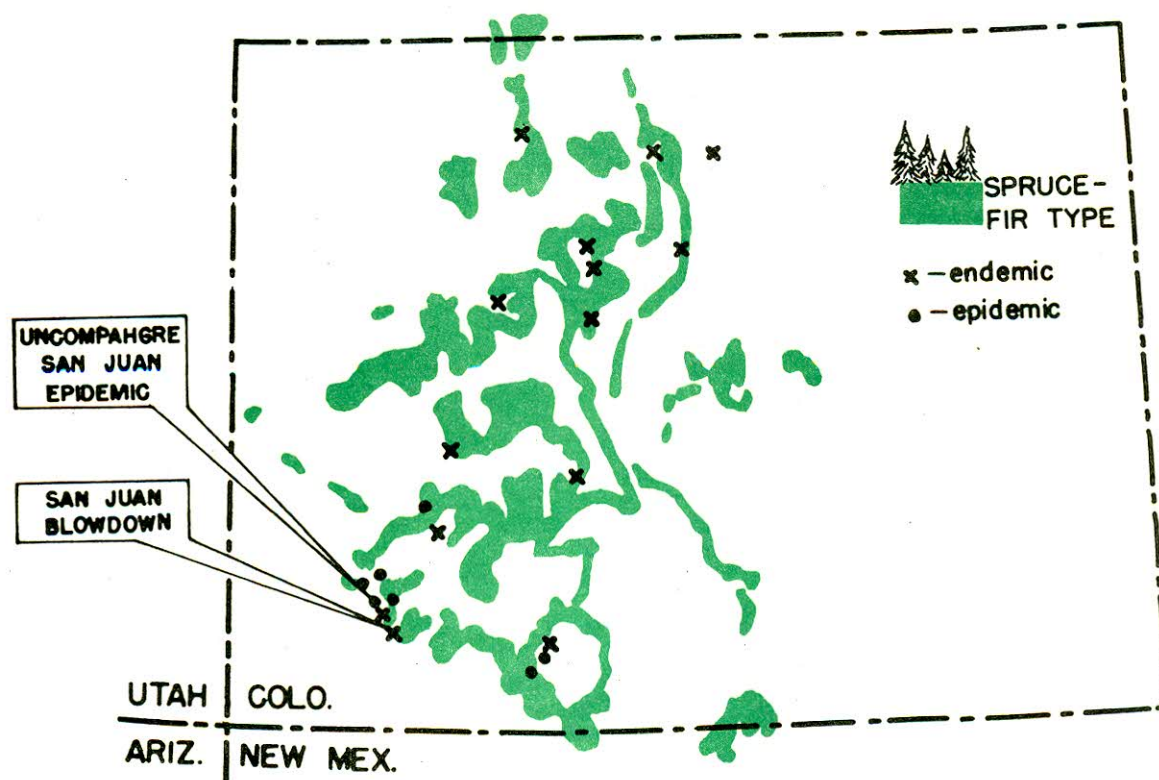


Figure 2.--Reports of Engelmann spruce beetle infestations.

With the Uncompahgre-San Juan epidemic under control (fig. 2), attention is focused on blowdowns and cull logs, which are potential sources of new beetle outbreaks. If surveys show that the beetle population is increasing in this material, consideration of control treatment will be necessary. Regardless, the material will need to be kept under observation until it is no longer suitable for beetle development.

A blowdown in November 1954 on approximately 200,000 acres of the San Juan National Forest (fig. 2) was systematically surveyed a year later; attacks were generally light in the down material. Study plots were established by which close checks on the trend of spruce beetle populations of the area will be maintained.

Control: Engelmann spruce beetle epidemics are controlled by one or a combination of the following:

1. Chemical treatment
2. Logging
3. Use of trap trees
4. Natural-control agents, chiefly woodpeckers

On the Uncompahgre-San Juan project in 1955, the spruce beetles in 325,844 infested trees were destroyed by chemical treatment or through logging. Of this number, 235,844 were chemically treated with a water emulsion containing 3 pounds of ethylene dibromide per 5 gallons of mix, at a cost of \$3.31 per tree; 90,000 infested spruce were logged out at an operational cost of \$0.195 per tree. A grand total of 524,961 infested trees were treated chemically or logged during the two-year (1954-1955) campaign at a total cost of \$1,475,338 (average cost of \$2.81 per tree). A mopup program for 1956 is planned tentatively to treat or log 25,000 trees that may be attacked during 1956.

Smaller projects accounted for the treatment of 21,331 infested trees in 1955 and the projection of 1,100 trees for 1956 control work.

Control accomplishments in 1955 and estimates of control needs in 1956 are as follows:

| <u>National Forests</u> | <u>1955</u> | <u>1956</u> |
|-------------------------|------------------------------|--------------|
| Arapaho | 119 (trap trees) | 100 |
| San Juan | 16,685 (cull logs and trees) | no estimate |
| Uncompahgre-San Juan | 325,844 | 25,000 |
| White River | <u>4,527</u> | <u>1,000</u> |
| Totals | 347,175 | 26,100 |

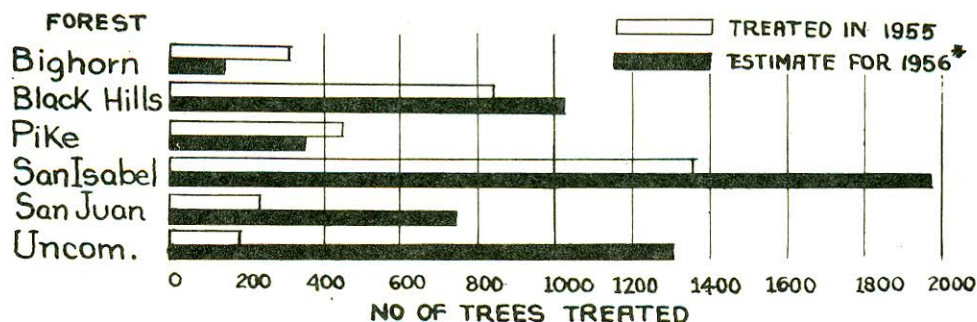
BLACK HILLS BEETLE, Dendroctonus ponderosae Hopk.

Hosts: Ponderosa, lodgepole, limber, pinyon, and whitebark pines.

Status: The Black Hills beetle is aggressive in ponderosa pine stands throughout the region. However, prompt detection and suppression of incipient outbreaks and maintenance control in high-hazard areas have resulted in a general decrease in the trend of tree killing over the past several years.

Control: The principal methods of control are by logging and application of chemicals to standing or felled trees. For some of the chemical control work, water emulsions of ethylene dibromide were used, at the rate of 2 pounds of ethylene dibromide per 5 gallons of mix; for others an orthodichlorobenzene fuel oil solution, at the rate of 1 gallon of orthodichlorobenzene to 5 gallons of fuel oil, was used.

In 1955, control was carried out on six national forests often in cooperation with interested private and municipal agencies. A total of 3,480 infested trees were treated at an average cost of \$5.51 per tree.



*The estimated numbers of infested trees for 1956 probably will appear high by treating time. During the period between fall surveys and spring treating, natural factors such as woodpeckers, insectivorous parasites and predators, and adverse weather conditions probably will have reduced the numbers of treatable trees. The original 1955 estimate, for example, was 9,705 infested trees, but by spring only 3,480 needed to be treated.

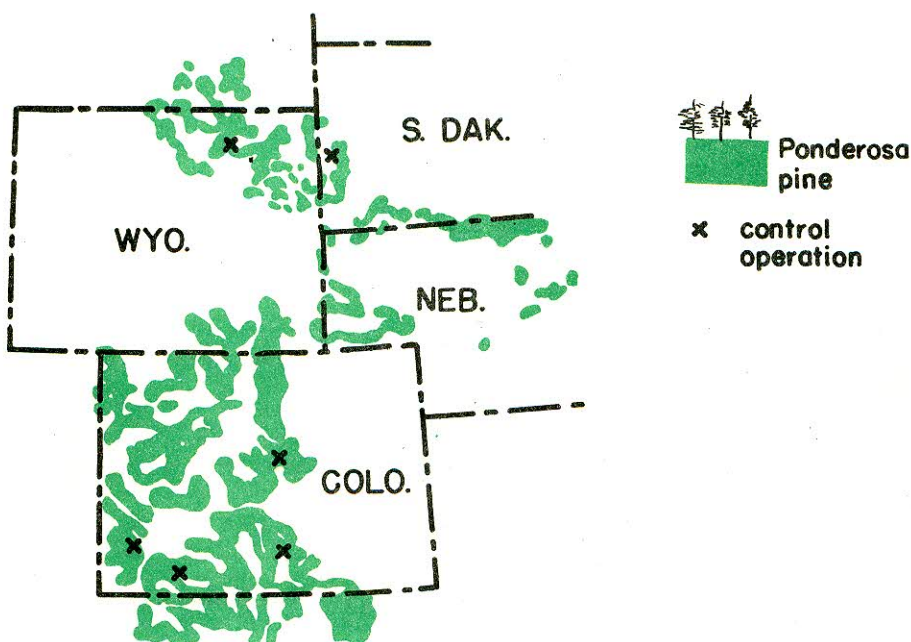


Figure 3.--Black Hills beetle-control areas.

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae Hopk.

Host: Douglas-fir.

Status: The Douglas-fir beetle apparently has been increasing steadily during the past years. Several instances of significant tree mortality have been reported from the San Juan and White River National Forests. Survey and control procedures are being investigated. The first attempts at control with chemicals, using a water emulsion containing 3 pounds of ethylene dibromide in 5 gallons of mix, are tentatively set for the spring of 1956 on the White River National Forest.

MOUNTAIN PINE BEETLE, Dendroctonus monticolae Hopk.

Hosts: Lodgepole, limber, and ponderosa pines.

Status: This beetle is reported to be epidemic in a stand of limber and lodgepole pine on the Shoshone National Forest in northwestern Wyoming. An estimated 200 limber pines are infested.

RED TURPENTINE BEETLE, Dendroctonus valens Lec.

Hosts: Pine species; spruce and fir occasionally are attacked.

Status: Red turpentine beetle activity in Scotch pine plantations on the Nebraska National Forest was reported and inspected. Trees had succumbed after several years of basal attacks.

Fading ponderosa pines in farmyards in the vicinity of Colorado Springs, Colorado, were found to be infested with this insect. Apparently trampling and rubbing by the animals had injured the trees to the extent that they were attractive to this beetle. Trees so infested often are mistaken from the air for Black Hills beetle attacks.

WESTERN BALSAM BARK BEETLE, Dryocoetes confusus Sw.

AND THE FIR ENGRAVER, Scolytus ventralis Lec.

Hosts: D. confusus - subalpine fir; sometimes other firs, spruce, and pine.

S. ventralis - all true firs.

Status: These two bark beetles are present throughout the range of subalpine fir in Colorado. They exist chiefly in an endemic state; occasionally they are responsible for considerable tree mortality. The low commercial value of fir thus far makes control impractical; should widespread tree mortality develop on important watershed or recreational areas control measures will become feasible.

ENGRAVER BEETLES, Ips spp.

Hosts: All coniferous tree species; prefer logs and weakened, dying trees; will attack healthy trees when epidemic.

Status: For several years medium to severe drought conditions have prevailed in parts of Colorado. Trees, especially ponderosa pine, became weakened and were attacked by several species of Ips thereby hastening their death. Some species kill the tops of ponderosa pines and reduce their value as timber trees. These

trees are often mistaken from the air for Black Hills beetle-killed trees and can lead to erroneous estimations of the abundance of the latter. The species most often encountered in ponderosa pine are:

1. Western six-spined engraver, Ips ponderosae Sw.
2. Arizona five-spined engraver, Ips lecontei Sw.
3. Knaus' ips, Ips knausi Sw. (fig. 4)
4. Smaller western pine engraver, Ips latidens (Lec.)
5. Oregon pine engraver, Ips oregoni (Eichh.)
6. Ips guildi Blkm.

The most common species of Ips in Engelmann spruce is Ips pilifrons Sw. It is especially attracted to fresh spruce slash and logs. It often competes for the bark area in trap trees cut for Engelmann spruce beetle control. On the other hand, by filling in on natural blowdowns it offers competition, which aids in the reduction of spruce beetle populations.

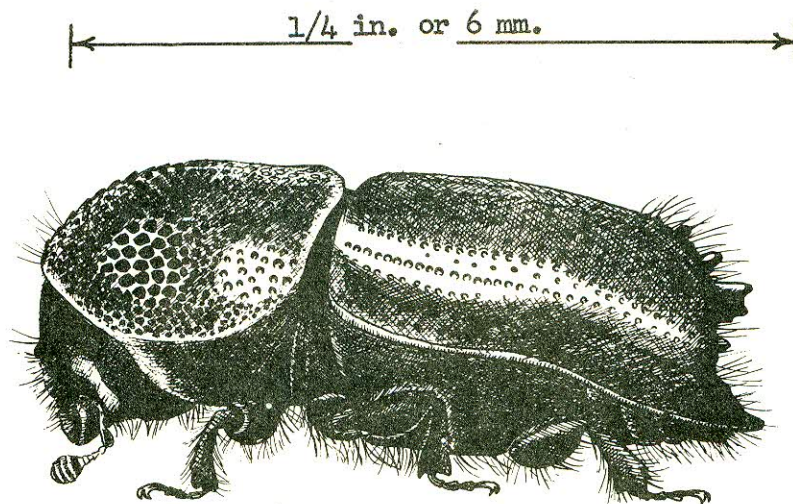


Figure 4.—Knaus' ips, Ips knausi.

POPLAR AND WILLOW BORER, Cryptohynchus lapathi (L.)

The poplar and willow borer (fig. 5) has been collected in the Black Hills National Forest where it may be a primary factor in the death of young willows.

The feeding of this weevil in the cambial region often results in complete girdling of the stem. Later the immature grub burrows into the wood.

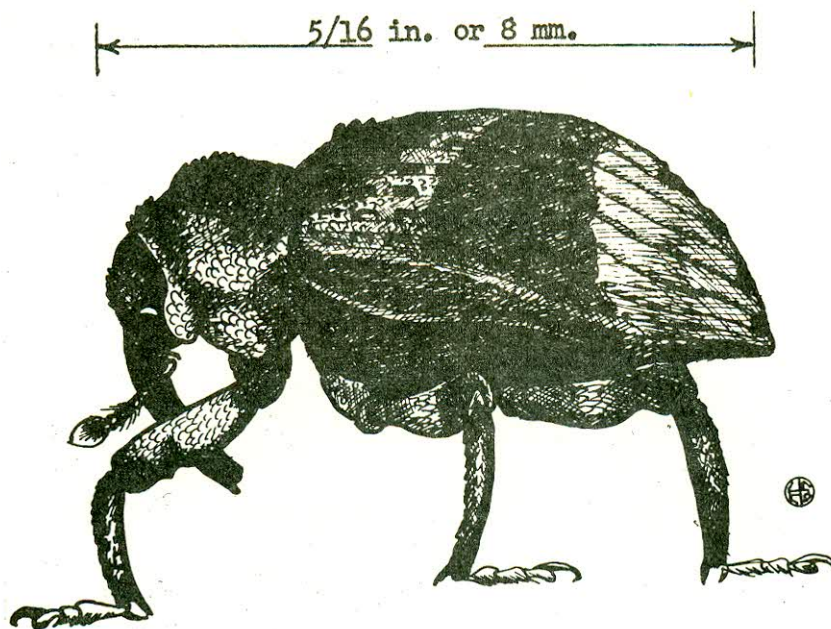


Figure 5.--The poplar and willow borer, Cryptohynchus lapathi.

DEFOLIATORS

GREAT BASIN TENT CATERPILLAR, Malacosoma fragilis Stch.

Hosts: Aspen, poplar, willow, bitterbrush, and other shrubs and trees.

Status: For 6 years this moth has been epidemic and creating a serious nuisance in recreational and watershed areas in the aspen stands of southern Colorado. Defoliation is severe in many places and tree mortality is increasing. Most complaints have been from owners of summer homes who object to the unsightliness of defoliated trees and the hordes of caterpillars which litter the ground and contaminate the water.

The 1955 fall survey revealed a decreasing trend in intensity of the infestation with several exceptions. Most of the exceptions are on lands with high recreational or esthetic value. Of approximately 141,200 infested acres, 91,500 are severely infested. Of these, about 24,800 are in high-use recreational areas.

Control: Aerial spraying with DDT will provide good control. However, to be most effective the entire infested area should be covered. About 1,600 acres of the more important high use recreational land were sprayed early in 1955. The results were excellent, but temporary. An egg mass count late in 1955 showed that an influx of moths from surrounding areas had heavily reinfested the area. A program to spray 5,000 acres is being planned for 1956.

SPRUCE BUDWORM, Choristoneura fumiferana (Clem.)

Hosts: Douglas-fir, true firs, spruce; sometimes ponderosa and lodgepole pines.

Status: Reports of spruce budworm activity are increasing, especially in the southern and southwestern forests of Colorado adjacent to epidemic areas in New Mexico. The spruce budworm has not yet caused the widespread destruction in the central Rocky Mountains it has caused elsewhere. However, its presence in spruce-fir stands presents a potentially dangerous situation. No control is planned for 1956.

MISCELLANEOUS DEFOLIATORS

A tiger moth, Halisidota ingens Hy. Edws. (fig. 6), has been very abundant in recent years on young ponderosa pine on the Roosevelt National Forest in northern Colorado. Control has not been necessary.

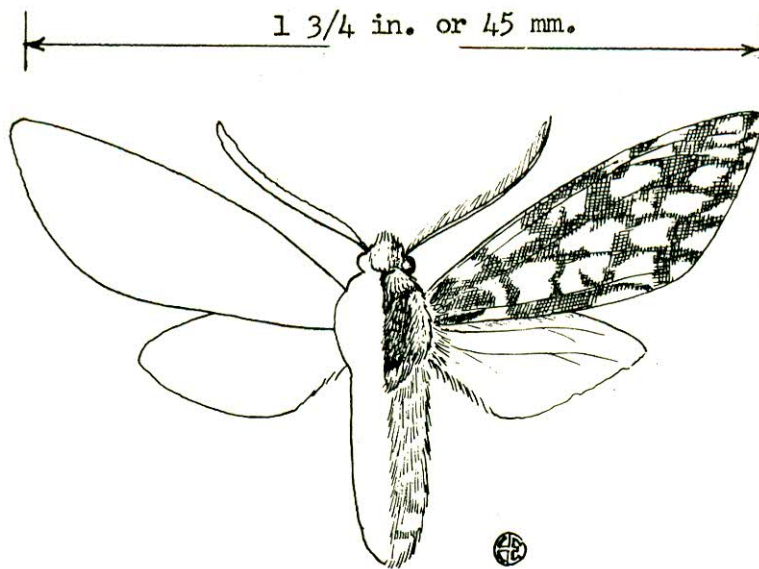


Figure 6.--Halisidota ingens.

A strain of the spruce budworm, Choristoneura fumiferana (Clem.) has been defoliating ponderosa and Austrian pines in plantations on the Nebraska National Forest. No tree killing by repeated defoliation has occurred. Apparently Scotch pine and jack pine were not fed upon.

The pinyon sawfly, Neodiprion sp., is present at the Colorado National Monument near Grand Junction. Defoliation of pinyon recently has been very light. This insect is also present at Mesa Verde National Park in southwestern Colorado. Control with DDT, applied by mist blower, is planned for 1956.

A sawfly of the genus Neodiprion (probably fulviceps) was found severely defoliating ponderosa pine on the Rosebud Indian Reservation in South Dakota.

A caterpillar discovered killing Gambel oak in some areas in Montrose County, Colorado, was tentatively identified as Lambdina punctata (Hlst.). Since oak brush is a problem in this area there is a remote possibility of utilizing this insect as an agent for biological control of Gambel oak. In Mesa Verde National Park defoliation of Gambel oak by this caterpillar is considered a detraction from the Park's natural beauty. Control is planned for 1956.

A hair-streak butterfly (Mitoura spinetorum (Hemt.)), was collected in the larval stage along with a braconid parasite, Apanteles (new species), near memoriae Ashm., feeding on dwarf-mistletoe on the Roosevelt National Forest in Colorado. This butterfly might possibly be of value for biological control of dwarfmistletoe.

MERISTEM (TERMINAL) FEEDERS

Hosts: Mainly ponderosa pine reproduction or young plantations.

Two tip moths, the western pine tip moth, Rhyacionia frustrana bushnelli (Busck), and the southwestern pine tip moth, Rhyacionia neomexicana (Dyar), are responsible for light to severe damage to ponderosa pine in plantations on the Nebraska National Forest. In the heavily hit areas 100 percent of the buds were damaged.

Tip moth damage also is present on pinyon at the Great Sand Dunes and Black Canyon of the Gunnison National Monuments.

SUCKING INSECTS

The pinyon needle scale, Matsucoccus acalyptus Herbert, presents the most serious insect problem at Mesa Verde National Park and Colorado National Monument. Pinyon is one of the principal tree species in these areas and prevention of insect damage to these trees is of major concern.

The life history and control methods are not known although control tests with Dendrol and a water emulsion of malathion have been made.

Although not essentially a forest insect, the European elm scale, Gossyparia spuria (Mod.), is a serious pest of shade trees

in the towns and cities of this region. Besides weakening the trees the scale excretes honey dew, which is a public nuisance.

The Cooley spruce gall aphid, Chermes cooleyi Gill., is common on Engelmann and blue spruce throughout their range. These aphids cause little harm except where the conelike galls are considered unsightly. Douglas-fir is an alternate host. The overwintering stage on Douglas-fir, when abundant, causes the needles to brown and drop off.

SEED INSECTS

Pinyon cones infested with the pinyon cone beetle, Conophthorus edulis Hopk., (fig. 7), were collected at the Great Sand Dunes National Monument. The insects were reared at the Laboratory and identified. They destroyed nearly all of the 1954 seed crop at the Monument.

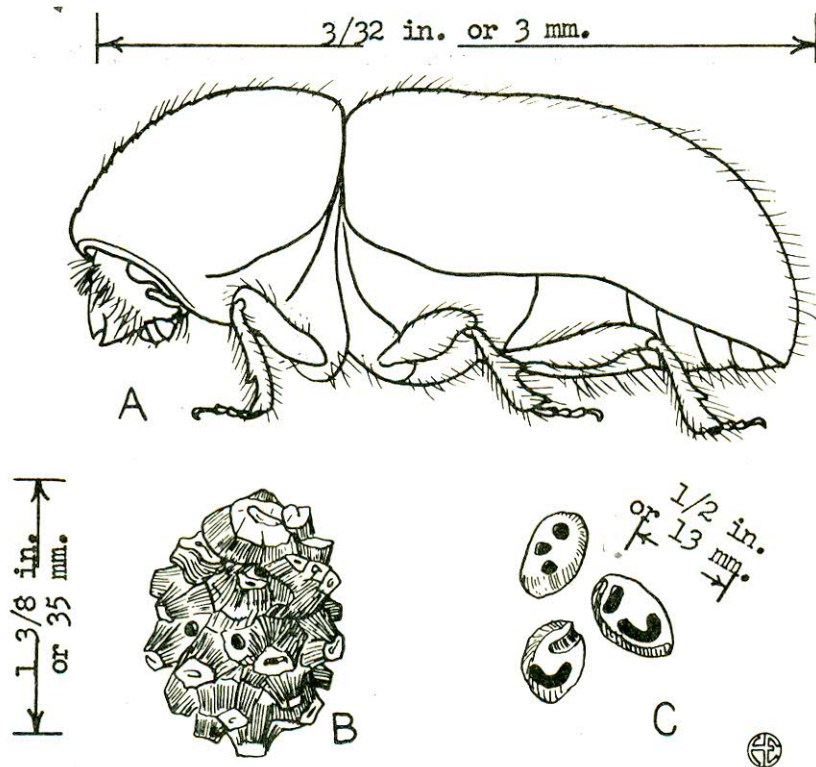


Figure 7.--Pinyon cone beetle, Conophthorus edulis Hopk.
A, Adult. B, Infested pinyon cone. C, Infested pinyon seeds.

SUMMARY OF FOREST INSECT CONDITIONS - 1955

| | <u>Hosts</u> | <u>Importance</u> ^{1/} | <u>Trend</u> |
|---|---------------------------------|---------------------------------|--------------------------|
| BARK BEETLES AND BORERS | | | |
| Engelmann spruce beetle | Engelmann spruce | 1 | Decreasing ^{2/} |
| Black Hills beetle | Ponderosa pine | 1 | Decreasing |
| Douglas-fir beetle | Douglas-fir | 1 | Increasing |
| Mountain pine beetle | Limber pine | 3 | Static |
| Red turpentine beetle | Pines | 3 | Static |
| Western balsam bark beetle | Firs | 3 | Increasing |
| Fir engraver | Firs | 3 | Increasing |
| Western six-spined engraver | Ponderosa pine | 3 | Varying |
| Arizona five-spined engraver | Ponderosa pine | 3 | Varying |
| Knaus' ips | Ponderosa pine | 3 | Varying |
| Smaller western pine engraver | Ponderosa pine | 3 | Varying |
| Oregon pine engraver | Ponderosa pine | 3 | Varying |
| <u>Ips guildi</u> | Ponderosa pine | 3 | Varying |
| <u>Ips pilifrons</u> | Engelmann spruce | 3 | Varying |
| Poplar and willow borer | Willow spp. | 2 | Increasing |
| DEFOLIATORS | | | |
| Great Basin tent caterpillar | Aspen | 1 | Slightly decreasing |
| Spruce budworm | Douglas-fir; fir | 1 | Increasing |
| <u>Halisidota ingens</u> | Ponderosa pine | 3 | Static |
| <u>Choristoneura fumiferana</u> (strain) | Ponderosa and Austrian pines | 2 | Static |
| <u>Neodiprion</u> sp. | Pinyon | 3 | Decreasing |
| <u>Neodiprion</u> sp. (probably <u>fulviceps</u>) | Ponderosa pine | 3 | Increasing |
| <u>Lambdina punctata</u> | Gambel oak | 3 | Increasing |
| MERISTEM FEEDERS | | | |
| Western pine tip moth | Ponderosa pine | 2 | Static |
| Southwestern pine tip moth | Ponderosa pine | 2 | Static |
| SUCKING INSECTS | | | |
| Pinyon needle scale | Pinyon | 2 | Increasing |
| European elm scale | Elms | 3 | Static |
| Cooley spruce gall aphid | Spruces; Douglas-fir | 3 | Static |
| SEED INSECTS | | | |
| Pinyon cone beetle | Pinyon seeds | 3 | Static |

^{1/} Importance is rated by local and regional values of the host. 1 = Major; 2 = Major, locally; 3 = Minor.

^{2/} Decreasing in control areas. Endemic losses in the extensive virgin spruce stands continue to be high.