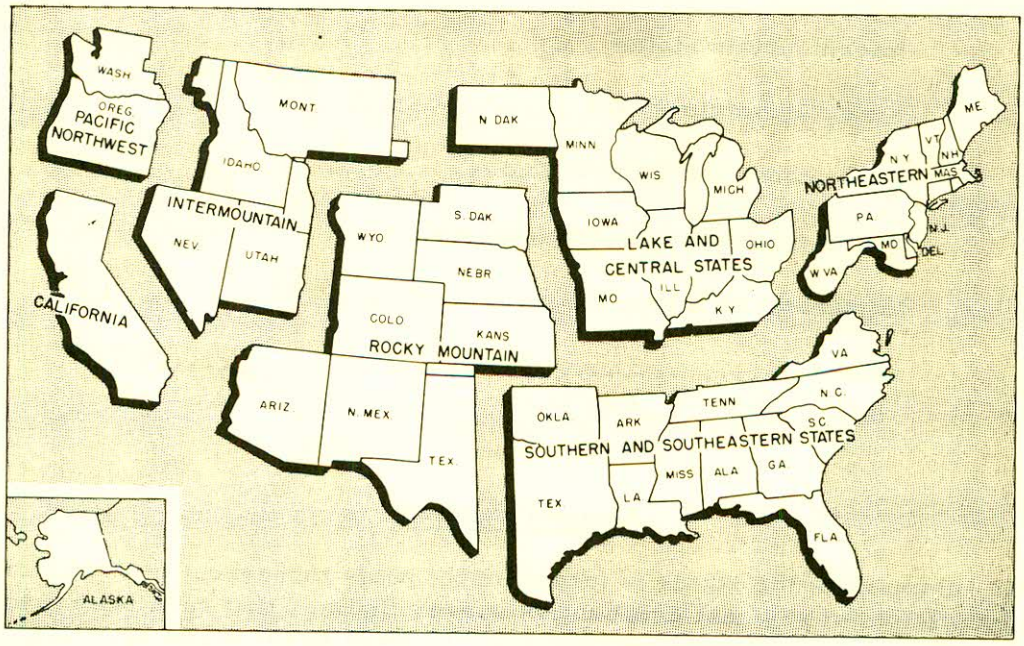
FOREST INSECT CONDITIONS IN 1955

A Status Report



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

CONTENTS

Acknowledgement

This summary of the status of forest insect pests throughout the Nation is a compilation of regional cooperative survey findings that have been made known to date. Special acknowledgement is made to the many agencies and persons who contributed to it; the Federal land-managing agencies, state forestry, entomology, and conservation organizations, lumber companies, timber operators, and private landowners. In order to facilitate reference, the status of insect pests is assembled on a regional basis.

A STATUS REPORT OF FOREST INSECTS IN 1955

Prepared by the Division of Forest Insect Research

HIGHLIGHTS

There was a decrease in the scope of infestations and in the severity of losses caused by forest insects during 1955. The decreases occurred primarily in the Pacific Coast states and in Alaska, but to some extent also in the Rocky Mountains, and in the South. Elsewhere in the Nation tree damage and tree-killing was comparable to conditions which have prevailed during the past several years.

1. The combined action of Federal, state, and private agencies in control of insect pests during 1955 averted major loss of timber in many areas. The largest annual program ever undertaken for control of the spruce budworm was successfully completed on 2,263,000 acres in Oregon, Idaho, Montana, and New Mexico. Successful large scale control also was directed against the Engelmann spruce beetle in Idaho, Montana, and Colorado; the southern pine beetle in the South and Southeastern states; and the gypsy moth in Michigan and the Northeast.

2. Outbreaks of the spruce budworm occurred throughout much of the mixed conifer and spruce-fir forests in the Rocky Mountains, in some areas of the Pacific Northwest, the Lake States, and Maine. Infestations are most severe in portions of North Idaho and Montana, and in a limited area in northern Minnesota.

3. Bark beetles and engraver beetles were less severe in 1955 than for the preceding several years. However, these insects were responsible for heavy loss of valuable timber in the pine, spruce, and fir forests of the West, and in the pine stands of the South.

4. Several species of twig and terminal-feeding insects were of major importance in portions of the Lake States, in the Northeast, and in many of the southern and southeastern states.

5. Tree defoliators, other than the spruce budworm, were not as severe in as many areas in 1955 as they were in 1954. However, several species of pine sawflies were destructive in the Lake States and in portions of the northern Rocky Mountains; tent caterpillars were epidemic in portions of the Rocky Mountains, the Lake States and the Northeast; the lodgepole needleminer infestation increased in severity in portions of California, as did the fir-needleminer in Utah; the pitch pine looper and the saddled prominent developed to outbreak proportions in the northeast, and a new tussock moth infestation was discovered in the State of Washington.

CONDITIONS IN CALIFORNIA

There was little change in forest insect infestations in California from conditions which occurred during 1954. The Douglas-fir beetle outbreak continued in the Douglas-fir forests of the North Coast, but the severity of tree-killing was somewhat less than it was last year. The lodgepole needleminer-mountain pine beetle complex in Yosemite National Park continued at a high level and is creating another ghost forest in one area of intensive recreational use. The fir engraver beetle caused heavy scattered losses in many areas throughout the Sierra-Nevada Mountains and the Jeffrey pine beetle is epidemic in some of the interior pine type. The western pine beetle appears to be increasing slightly over the low endemic level of the past few years. Although white-fir sawfly populations increased slightly, they did not cause significant defoliation. Insect damage to seeds and cones of coniferous trees continued at a high level.

THE DOUGLAS-FIR BEETLE (Dendroctonus pseudotsugae Hopk.) - There has been a sharp reduction in the amount of loss caused by the Douglas-fir beetle in the North Coast forests of the state. Although some killing of trees in groups occurred on approximately 250,000 acres in three of the National Forests in this area, there was a marked reduction in the intensity of the infestation from conditions which prevailed in 1954. The reduced rate of the current infestation appears to have been caused by natural factors although salvage of some of the infested trees contributed to the decline of the beetle population.

THE LODGEPOLE NEEDLEMINER (Recurvaria milleri Busck) - The epidemic infestation of the lodgepole needleminer continued unabated in Yosemite and Sequoia-Kings Canyon National Parks. Severe defoliation of host trees occurred on about 50,000 acres in Yosemite and on 3,000 acres in Sequoia-Kings Canyon. Many of the defoliated trees have been killed as a result of the needleminer infestation alone, but more important is the weakening effect on the trees which is giving rise to heavy group killing by the mountain pine beetle, especially in Yosemite. The current infestation is believed to have started in 1945 and it has been on the increase since that time.

THE MOUNTAIN PINE BEETLE (Dendroctonus monticolae Hopk.) - The amount of tree-killing caused by the mountain pine beetle increased in the lodgepole pine stands that were defoliated by the needleminer, and it is estimated that 46,000 trees were killed on 5,400 acres in the Conness and Alkali Creek drainages in Yosemite National Park. The rate of loss in second-growth ponderosa pine at Crystal Bay, near Lake Tahoe, remained at a high level, unchanged from conditions in 1954. The loss in sugar pine throughout the range of this tree species in the state was light.

THE JEFFREY PINE BEETLE (Dendroctonus jeffreyi Hopk.) - In general, tree-killing as a result of attacks by the Jeffrey pine beetle is light although heavier infestations occur on portions of the Inyo National Forest and to

some extent on the Plumas National Forest. The selective removal of high risk trees from the affected areas is proving successful as a measure for control.

THE WESTERN PINE BEETLE (Dendroctonus brevicomis Lec.) - Western pine beetle infestations are at a low endemic level throughout the state. Although the rate of loss in both ponderosa and Coulter pine showed a slight increase over 1954, there were no serious centers of infestations anywhere in the region.

THE FIR ENGRAVER BEETLE (Scolytus ventralis Lec.) - The fir engraver beetle, a serious pest of red and white fir, occurred at a high endemic status throughout the state. The rate of tree-killing was somewhat reduced, however, from conditions noted during 1954.

PINE ENGRAVER BEETLES (Ips confusus Lec. and I. oregoni Eichh.) - Pine engraver beetle infestations were spotty and tree-killing was confined to small trees in proximity to areas being logged. The major damage caused by these insects occurred in the southern portion of the state.

OSLAR'S TUSSOCK MOTH (Hemerocampa oslari (Barnes))- An outbreak of this insect occurred locally in the Cherry Creek drainage of the Stanislaus National Forest, the first recurrence of this defoliator in outbreak proportions in the state for many years. The infestation in the vicinity of Crane Meadows resulted in heavy defoliation and some top-killing in local areas. Artificial measures for control are not deemed necessary.

THE FIR SAWFLY (Neodiprion sp.) - Infestations of this unnamed sawfly occurred throughout most of the Sierra Nevada Mountains but tree damage was not significant. In the past, natural control factors have reduced infestations before permanent stand damage occurred.

CONDITIONS IN THE PACIFIC NORTHWEST

Insect outbreaks in the forests of Oregon and Washington currently are much less destructive than they have been for many years. Total epidemic infestations covering 2,248,820 acres compares with 7,704,120 acres of epidemics in 1954. The spruce budworm, Douglas-fir beetle, and silver fir beetles are all less severe than last year. The western pine beetle is at an all-time low level since records began early in the century. The balsam woolly aphid on Pacific silver fir and alpine fir has become more severe, and the Douglas-fir tussock moth reappeared in outbreak proportions in one area.

THE DOUGLAS-FIR BEETLE (Dendroctonus pseudotsugae Hopk.) - Epidemic infestations totalled 873,120 acres in 1955, a reduction from the 5,100,000 acres infested throughout Oregon and Washington in 1954. A few centers of heavy tree-killing exist on the Smith River-Roman Nose Mountain area in western Oregon, and on the Colville Indian Reservation in northeastern Washington. The killing of budworm-weakened trees in the Blue Mountain Area has generally subsided except in the Pine Creek and Snake River drainages.

SILVER FIR BEETLES (Pseudohylesinus spp.) - A marked decline in acreage and intensity of infestations by these bark beetles occurred in 1955 and it appears that this long standing epidemic has almost subsided. The salvage of dead and dying Pacific silver fir is still in progress in the heavier centers of infestation.

THE WESTERN PINE BEETLE (Dendroctonus brevicomis Lec.) - Infestations of the western pine beetle were at the lowest level in many years. Only 45,320 acres of epidemic infestations were recorded during the year, whereas severe damage occurred on some 1,000,000 acres in 1953 and 270,000 acres in 1954. Favorable precipitation and normal harvesting, with attention to removal of high risk trees from the stand, are steadily reducing the western pine beetle hazard in the two states.

THE MOUNTAIN PINE BEETLE (Dendroctonus monticolae Hopk.) - The mountain pine beetle is aggressively epidemic in portions of Oregon and Washington each year, particularly in lodgepole pine and western white pine, in the Cascade Mountain Range. In 1955, the largest centers of infestation occurred on the Gifford Pinchot, Wenatchee, and Mt. Baker National Forests in Washington, and on the Deschutes National Forest and on the Klamath Indian Reservation in Oregon. Epidemic infestations were recorded on 295 centers totalling 175,000 acres.

FIR ENGRAVER BEETLES (Scolytus spp.) - Fir engraver beetle infestations declined throughout Oregon and Washington. Although epidemic outbreaks have been annually recorded in inaccessible locations along the crest of the Cascade Mountains, in 1955 only 18,760 acres of severe damage was recorded in Washington and 31,320 acres in Oregon.

PINE ENGRAVER BEETLES (Ips spp.) - Killing of ponderosa pine young growth and poles by Ips was recorded on 51,910 acres. There were 99 centers of damage totalling 46,950 acres in eastern Oregon and 13 centers totalling 4,960 acres in eastern Washington.

THE ENGELMANN SPRUCE BEETLE (Dendroctonus engelmanni Hopk.) - Engelmann spruce beetle populations declined to the point that it was difficult to locate infested trees. Centers of infestations on the Snoqualmie and Umatilla National Forests subsided as a result of salvage and natural control.

THE SPRUCE BUDWORM (Choristoneura fumiferana (Clem.)) - Spruce budworm populations are at their lowest level since detailed records began in 1947. Epidemic infestations dropped from 1,034,440 acres in 1954 to 542,430 acres in 1955. The increased effectiveness of natural control, and the generally light to moderate intensity of the current infestations, resulted in decisions against continuation of aerial spraying during 1956. During the period from 1949 - 1955, epidemic budworm populations on some 3,840,000 acres have been successfully treated by aerial application of DDT.

THE BALSAM WOOLLY APHID (Chermes piceae (Ratz)) - Infestations of the balsam woolly aphid, mostly on Pacific silver fir, were more extensive and more severe in 1955, than in the past few years. Pronounced mortality of Pacific silver fir occurred in the Lewis and Toutle River drainages in Washington and new infestations, largely in alpine fir, were recorded on the Mt. Hood and Willamette National Forests in Oregon. Experience with infestations of this insect in eastern Canada indicates that direct measures for control are impractical; it was encouraging, therefore, to find considerable numbers of predators attacking the woolly aphid in the Mt. Hood infestation area.

THE DOUGLAS-FIR TUSSOCK MOTH (Hemerocampa pseudotsugata McD.) An outbreak of the Douglas-fir tussock moth occurred on approximately 9,000 acres in portions of Stevens, Spokane, and Pend Oreille counties in Northeastern Washington. Recent observations indicate that natural factors have reduced the threat of this infestation to a point where artificial measures for control may not be necessary.

CONDITIONS IN THE INTERMOUNTAIN STATES

Damage caused by forest insects in the Intermountain States is severe in several localities. The largest infestations occur in Idaho and Montana where the spruce budworm and the Douglas-fir beetle are especially active in fir stands. In portions of Utah, the Mountain pine beetle and the Black Hills beetle are epidemic in lodgepole and ponderosa pine. There has been a general lessening of damage caused by the pine and fir engraver beetles, the western pine beetle, and the pine butterfly. Control measures during 1954 and 1955, especially the aerial spraying to destroy the pine butterfly and spruce budworm, were effective in bringing about reduced damage.

THE DOUGLAS-FIR BEETLE (Dendroctonus pseudotsugae Hopk.) - The Douglas-fir beetle is currently epidemic in many parts of western Montana, in Idaho, and in portions of Utah. Cumulative tree-killing over the past five years has resulted in a loss of from 5 to 75 percent of the Douglas-fir stands in some areas. Group-killing of Douglas-fir increased sharply in 1954 and the high rate of loss continued during 1955. An intensive effort

is being made to accelerate the salvage of infested trees as a means of reducing the severe timber losses caused by this insect.

THE SPRUCE BUDWORM (Choristoneura fumiferana (Clem.)) - Populations of spruce budworm began to increase in Idaho and Montana some six years ago and the insect is now epidemic on 2,847,000 acres in the two states. Aerial application of formulated DDT spray was used for control on 1,290,900 acres during the year and plans are being made to continue aerial spraying during 1956.

THE ENGELMANN SPRUCE BEETLE (Dendroctonus engelmanni Hopk.) - The Engelmann spruce beetle outbreak which became widespread over western Montana and Northern Idaho in 1952 seems to have returned to a near endemic status. Although there are a few spots of active infestation remaining, a marked infestation decline is the rule in most areas. A new outbreak covering some 9,000 acres was discovered on the Bridger National Forest in western Wyoming where it is estimated that six million board feet of timber are infested. The salvage of infested trees is being used as a measure of control.

THE BLACK HILLS BEETLE (Dendroctonus ponderosae Hopk.) - Aggressive infestations of the Black Hills beetle have existed on portions of the Dixie National Forest and at Bryce Canyon National Park since 1949. Although a reduction of the insect population has been accomplished through the application of direct measures for control, infestations have constantly appeared in new areas. The combined forces of artificial and natural control have not materially changed the course of the outbreaks to date.

THE MOUNTAIN PINE BEETLE (Dendroctonus monticolae Hopk.) - The mountain pine beetle occurs in outbreak conditions only in a few scattered areas in the northern part of the Intermountain States. These comprise some in lodgepole pine forests in western Montana, a single serious outbreak in lodgepole pine in Northeastern Washington - western Idaho, and an infestation in ponderosa pine in northern Idaho. In the southern portion of this region, a new outbreak developed on the Teton National Forest in Wyoming with an estimated 3,000 trees killed on approximately 1,500 acres. Another outbreak which has been causing considerable loss on the Wasatch and Ashley National Forests in Utah since 1941 increased in severity during 1955.

THE FIR NEEDLEMINER (Epinotia meritana Hein.) - Approximately 10,000 acres of white fir was defoliated at Bryce Canyon National Park and on adjacent areas on the Dixie National Forest in Utah by the fir needleminer. The area of infestation has increased nearly tenfold in the last four years and on 2,000 acres, 90 percent or more of the foliage on the trees has been destroyed. Several attempts have been made to control this infestation, but results have been inconsistent.

THE SPRUCE MEALYBUG (Puto sp.) - Some 60,000 acres of Engelmann spruce are infested with this insect in southern Utah and the outbreak is increasing in extent and severity. The mealybug affects all sizes of trees causing branch and top-killing, deformation of young stock, and a weakening of sawtimber. There have been no efforts thus far to initiate control.

THE LODGEPOLE PINE SAWFLY (Neodiprion burkei Midd.) - An outbreak of the lodgepole pine sawfly developed on approximately 14,000 acres in southwestern Yellowstone National Park, Wyoming. Associated with this outbreak is an infestation of what may prove to be black-headed budworm (Acleris variana Fern.) in alpine fir.

UNKNOWN DEFOLIATORS - Approximately 33,000 acres of western larch were defoliated in northern Idaho and Montana by insects that have not yet been identified. Although two looper and two sawfly species have been collected from the infested areas, there is another insect, as yet unknown, that may be the primary one. Several thousand acres of lodgepole pine in the Swan River Valley, Montana also were defoliated during the year. Ground investigations indicated that a small lepidopterous insect had been active in the area but only pupal cases remained at the time of the survey and identification of the insect was not possible.

THE SOUTHWESTERN PINE BEETLE (Dendroctonus barberi Hopk.) - The southwestern pine beetle continues to be active in ponderosa pine on the Charleston Mountain area of the Nevada National Forest. Direct measures for control to combat this infestation were undertaken during 1955 and it is planned to continue control in 1956 in an effort to reduce populations to an endemic level.

CONDITIONS IN THE ROCKY MOUNTAIN STATES

There was a decrease in the scope and severity of forest insect infestations throughout the forested area in the Rocky Mountains. The large-scale outbreak of Engelmann spruce beetle in Southern Colorado was brought under control by the logging and milling of infested trees, and by the use of chemical sprays. The major part of the spruce budworm infestation in New Mexico was controlled by aerial application of DDT spray, and several outbreaks of the Black Hills beetle were checked by spraying infested trees with toxic oils.

THE ENGELMANN SPRUCE BEETLE (Dendroctonus engelmanni Hopk.) - Although the Engelmann spruce beetle is at epidemic levels in scattered localities in Colorado, conditions regionwide have been reduced to endemic levels. The severe outbreak on the San Juan-Uncompahgre National Forests was brought under control by spraying or logging 325,844 infested trees during the year. There is a threat of another epidemic infestation,

however, due to a blowdown of spruce timber over a gross area of 200,000 acres on a portion of the San Juan National Forest. A close check of beetle populations is being made in this blowdown area and salvage of the down trees is planned to avert an epidemic in adjacent stands.

THE BLACK HILLS BEETLE (Dendroctonus ponderosae Hopk.) - The Black Hills beetle is aggressive in some of the ponderosa pine stands throughout the Rocky Mountains, but in general, there was a decrease in beetle populations and loss during 1955. Several infestations were controlled by action programs and there was no recurrence of severe tree-killing in any of the affected areas.

THE DOUGLAS-FIR BEETLE (Dendroctonus pseudotsugae Hopk.) - The intensity of tree-killing caused by the Douglas-fir beetle increased in southern Colorado and in New Mexico. It is estimated that some 10,000,000 board feet of timber was killed in New Mexico and a like amount in the forests of southern Colorado. Due to inaccessability of many areas where infestations are most severe, efforts in control have been practically nil since salvage of infested trees is the only practicable method of coping with the extensive outbreaks.

THE SPRUCE BUDWORM (Choristoneura fumiferana (Clem.)) - Severe infestations of the spruce budworm are widespread in susceptible host types in New Mexico and Arizona, and in the southern part of Colorado. Some 460,000 acres of the infestations were treated by aerial applications of DDT spray during 1955, but an equal acreage, or more, is affected. Defoliation in all areas that were not sprayed increased in intensity during the year.

THE GREAT BASIN TENT CATERPILLAR (Malacosoma fragilis Stretch) - The aspen stands over extensive areas in the Southern Rocky Mountains have been defoliated by this insect annually for the past decade. In some stands where defoliation has been continuous during that period, tree mortality has been severe. Inasmuch as the aspen stands throughout the region are of low commercial value, direct measures for control have been limited to high use recreational areas. However, an effort is now being made to introduce a polyhedral virus disease into the population in an effort to effect lasting control over larger areas.

THE SOUTHWESTERN PINE BEETLE (Dendroctonus barberi (Hopk.)) - The average annual loss of ponderosa pine timber in New Mexico, Arizona, and Colorado caused by the southwestern pine beetle, and associated bark beetle species (D. convexifrons, D. approximatus and D. arizonicus), is estimated at approximately 150 million board feet. Killing by these insects increased during 1955 and, in some areas, there was a heavy depletion of the pine resource. Wherever possible infested trees are being salvaged as a measure of control.

THE FIR ENGRAVER BEETLE (Scolytus ventralis Lec.) - The severe killing of white fir by this insect on the Sandia Mountains in Central New Mexico ended abruptly in 1955. In a portion of the infestation where 37,000 trees had been attacked and killed in 1954, no newly attacked trees were found in 1955. The natural factors that were responsible for the decline of this epidemic are not known.

THE MOUNTAIN PINE BEETLE (Dendroctonus monticolae Hopk.) - It is estimated that 200 trees were killed in a small outbreak of the mountain pine beetle in limber pine on a portion of the Shoshone National Forest in Wyoming. The outbreak area is stocked with limber pine and lodgepole pine, but despite the fact that lodgepole pine is a common host of the mountain pine beetle, tree-killing was confined to the limber pine.

CONDITIONS IN THE LAKE STATES AND CENTRAL STATES

There are many species of destructive forest insects throughout the extensive area comprising the Lake States and Central States region. Their occurrence in outbreak proportions varies from year to year and from place to place. During 1955, several species of defoliating insects increased in number and caused severe damage in many areas. The spruce budworm was found to be more extensive in the Lake States than was reported last year and the gypsy moth was found at one site approximately 12 miles distant from the original infestation area at Lansing, Michigan.

THE SPRUCE BUDWORM (Choristoneura fumiferana (Clem.)) - Spruce budworm infestations of varying intensities occurred throughout most of the susceptible spruce-fir timber type in Minnesota, Wisconsin, and Michigan. Although the outbreak condition on the Keweenaw Peninsula in northern Michigan declined sharply, heavy defoliation occurred along the Canadian border in Minnesota. Infestations elsewhere were light.

THE JACK-PINE BUDWORM (Choristoneura pinus. Free.) - Damage caused by this insect varied in intensity but defoliation was noticeable throughout most of the Lake States area. In general, populations appeared to be increasing. In Luce County, Michigan, outbreak conditions shifted eastward into open-grown jack pine stands. A severe infestation also occurred over most of three counties in north central Minnesota and infested acreages increased materially in portions of Wisconsin.

FOREST TENT CATERPILLAR (Malacosoma disstria Hbn.) - Although the outbreak of the forest tent caterpillar decreased materially throughout most of the Lake States region, there were many areas severely defoliated during the year. Heavy feeding continued in northern Wisconsin on a gross area of more than 9 million acres. Moderate to heavy defoliation occurred on approximately 19,000 acres in Michigan, primarily in the

Lower Peninsula; in Minnesota about 400,000 acres were affected in the east-central part of the state.

THE SARATOGA SPITTLEBUG (Aphrophora saratogensis (Fitch)) - The Saratoga spittlebug continued to be of major importance in red pine plantations in Wisconsin and Michigan. Severe infestations during 1955 required artificial measures for control on approximately 12,000 acres in the two states. Fortunately, many of the pine plantings are now reaching an age and height where nymphal host plants are being crowded out and as a result, the trees are less susceptible to serious injury.

THE LARCH SAWFLY (Pristiphora erichsonii (Htg.)) - Epidemic infestations of the larch sawfly continued in northern Minnesota and moderate to heavy feeding occurred throughout rather widely separated stands in northern Michigan. Noticeable defoliation occurred in the tamarack stands throughout the northern and central part of Wisconsin. However, tree mortality as a result of sawfly defoliation occurred only in "off-site" stands in northeastern Minnesota.

PINE SAWFLIES (Neodiprion and Diprion spp.) - Several species of pine sawflies occurred in scattered localities throughout the Lake States and Central States region. The European pine sawfly, (N. sertifer (Geoff.)) continued to be a major pest of red pine throughout the southern half of lower Michigan, and in much of Ohio and Indiana. An outbreak covering approximately 650 acres in Adams County, Wisconsin was sprayed in an effort to eliminate the only known infestation in that state. The introduced pine sawfly, (D. similis (Htg.)) occurred in all counties in northwestern Wisconsin and in many sections of central and east central Minnesota. The jack-pine sawfly, (N. americanus banksianae (Roh.)) and the red-pine sawfly, (N. nanulus nanulus (Schedl)) also caused noticeable defoliation in the Lake States.

THE EUROPEAN PINE SHOOT MOTH (Rhyacionia buoliana (Schiff)) - The severity of European pine shoot moth infestations increased sharply in lower Michigan. Roadside snowbreaks in Houghton County were heavily infested and the insect spread into adjacent plantations. In southeastern Wisconsin, infestations have spread to the North and West and populations appear to be increasing. Many of the red pine plantations in the Central States are so severely affected that planting of red pine has been curtailed sharply. Effective measures for control of this insect have not been developed.

THE WALKINGSTICK (Diapheromera femorata (Say)) - The oak stands in some localities in east-central and northeast Wisconsin were completely defoliated by this insect pest, and light to moderate feeding occurred in the northwestern portion of the state. In Minnesota, however, populations were at the lowest level since 1941. A light infestation occurred only in

one small area in upper Michigan. Artificial control by airplane spraying was satisfactory on a 1,000 acre outbreak on the Ménominee Indian Reservation.

THE PINE TORTOISE SCALE (Toumeyella numismaticum (P. & M.)) - A very marked reduction in scale populations occurred throughout most of Wisconsin. Some tree mortality occurred in a few jack pine plantations in the northeastern portion of the state. In northern Michigan some 75 percent of the trees on about 2,000 acres were killed in Schoolcraft County.

THE GYPSY MOTH (Porthetria dispar (L.)) - Large-scale spraying was initiated during the year for control of the gypsy moth near Lansing, Michigan. Scouting and trapping on some 1.7 million acres subsequent to the spraying program indicated that control was highly successful. Additional infestation is now known only at one site approximately 12 miles distant from sprayed area.

THE WHITE-PINE WEEVIL (Pissodes strobi (Peck)) - Due to tree deformity caused by the attacks of the white-pine weevil, this insect is one of the most important pests affecting pine plantations throughout the region. Weevil damage in Michigan and Wisconsin was more extensive in 1955 than in past years. In many of the white pine and jack pine plantations in these two states, 40 percent or more of the trees were "weeviled". Open growing white pine was heavily attacked in northern Wisconsin. Red pine is becoming a common host to the weevil and tree injury is often more severe than on either white pine or jack pine.

THE VARIABLE OAK LEAF CATERPILLAR (Heterocampa manteo (Dbldy.)) Susceptible oak and birch in the northwestern part of Minnesota were completely defoliated by this insect in 1955. Heavy feeding also occurred in oak stands in northern Wisconsin.

THE BIRCH LEAF SKELETONIZER (Bucculatrix canadensisella Chamb.) - This insect caused widespread defoliation of paper birch throughout the Lake States. Due to the lateness of the season when defoliation occurred, tree damage was not severe.

THE LARCH CASEBEARER (Coleophora laricella (Hbn.)) - Moderate to heavy feeding by this insect occurred locally in tamarack stands in Michigan and Wisconsin. However, for the region as a whole, populations were lightly distributed.

THE SMALLER EUROPEAN ELM BARK BEETLE (Scolytus multistriatus (Marsh)) - Subnormal precipitation in portions of the Central States region during the past few years has caused a reduction in vigor of the elm trees and as a result, there has been a general increase in populations of the elm bark beetle.

CONDITIONS IN THE SOUTHERN AND SOUTHEASTERN STATES

The southern pine beetle, the black turpentine beetle, and the pine engraver beetles were the most serious insect pests affecting the forests in the Southern and Southeastern states, with several large-scale outbreaks occurring in portions of North and South Carolina, Tennessee, Georgia, Alabama, and Mississippi. Unusually dry conditions prevail in all areas where the bark beetles are troublesome and large-scale control programs have been necessary to suppress epidemic infestations. There were numerous outbreaks of several species of defoliating insects throughout the region, but resultant tree mortality was not severe in any area.

THE SOUTHERN PINE BEETLE (Dendroctonus frontalis Zimm.) - Extensive control operations were undertaken during the year to suppress epidemic infestations of the southern pine beetle. Control measures included salvage cutting and the spraying of infested trees with formulated BHC insecticide. On portions of the Talladega National Forests in Alabama spot infestations continued to appear in areas surrounding the control units, and in districts as much as 80 miles distant. The latter areas of outbreaks consisted of half-acre spots of beetle-killed timber and scattered dead trees. In one area near Dadeville, Alabama many spot infestations died out suddenly, before control action was taken. In mid-December no living southern pine beetles could be found and there were no exit holes on many of the trees. Woodpeckers were numerous, and the presence of predaceous clerid beetles and a white fungus associated with dead bark beetles was noted. Spot infestations continued in Georgia, North Carolina, South Carolina, Virginia, and Tennessee despite large-scale concerted efforts to suppress the outbreaks by direst means. The critical areas of infestation remaining in the Southeastern States are grouped in northern Georgia, eastern North Carolina and in western Tennessee. Only a few small outbreaks now remain in central Virginia.

THE PINE ENGRAVER BEETLES (Ips spp.) - During the dry September and October weather Ips beetles became noticeably more active in many parts of the South. Infestations occurred in several counties in east Texas, in southern Arkansas, in southwest Mississippi, and in Sumpter County, Alabama. Noteworthy of these engraver beetle infestations was the unusual aggressiveness of Ips avulsus (Eichh.). In many instances, as many as 20 to 40 green pines were found harboring active populations of this small Ips beetle without the association of other Ips species.

In south Georgia, the serious Ips outbreak which developed during the spring and summer months was less severe by early October. In all areas of infestation there has been an active campaign to salvage infested and killed trees and, in some cases, infested slash has been sprayed with BHC to reduce populations.

THE BLACK TURPENTINE BEETLE (Dendroctonus terebrans (Oliv.)) - The black turpentine beetle occurred in outbreak proportions in many areas throughout the southern and southeastern states. In each case, increased beetle activity and resultant damage and death of attacked trees appeared to be associated with timber cutting, turpentining, or fires. Small groups of pines were killed in several counties in east Texas and throughout the southernmost tier of counties in Arkansas. In Mississippi, heaviest tree damage occurred on the Homochitto and De Soto National Forests; in Louisiana, on the Kisatchie National Forest. In the southeast, heaviest damage occurred throughout the Gum Belt in Florida and Georgia. Infestations of outbreak proportions also occurred in portions of North Carolina.

THE PALES WEEVIL (Hylobius pales (Hbst.)) AND OTHER WEEVIL SPECIES One or more species of weevils (H. pales; Pissodes nemorensis Germ. and Pachylobius picivorus Germ.) caused severe damage to seedling pines in areas where cutting was followed by immediate planting. In addition, severe damage to pine seedling occurred in areas that were planted subsequent to fire. It is suspected that weevil damage is more widespread throughout the southern and southeastern states than is known at present.

THE NANTUCKET PINE TIP MOTH (Rhyacionia frustrana (Comst.)) - General observations indicate that this insect is present in young plantations throughout the southern and southeastern states. It is especially active on poor sites and along roadsides. Infestations were reported on natural loblolly pine seedlings in central Mississippi and in southern Alabama. Planted slash pine was heavily infested in the vicinity of Athens, Texas and severe damage occurred in northwestern Louisiana.

MISCELLANEOUS PINE INSECT PESTS - Heavy crops of longleaf pine cones in Louisiana were infested by cone insects, notably the larvae of Dioryctria moths and Ernobius beetles. It is estimated that at least 20 percent of the cones were destroyed. The pine webworm, (Tetralopha robustella Zell.) was common on loblolly pine seedlings in many localities throughout the southern states. The red-headed pine sawfly (Neodiprion lecontei Fitch) defoliated young loblolly pines in a portion of San Augustine County, Texas and the loblolly pine sawfly (Neodiprion taedae linearis Ross) was found in small patches in northern Louisiana and in southeastern Texas.

HARDWOOD INSECTS - Heavy to complete defoliation of hardwoods occurred in many areas during late September and early October. The orange-striped oakworm (Anisota senatoria (A. & S.)), the yellow-necked oakworm (Datana ministra (Drury)), and the variable oak-leaf caterpillar (Heterocampa manteo (Dbldy.)) were the most common insects defoliating thousands of acres of oaks in east Texas, southwestern Louisiana, and in northeastern Mississippi. The fall webworm (Hyphantria cunea (Drury)) was generally common on pecan, sweetgum, persimmon, and other hardwoods in east Texas, southwest Louisiana, and in Jackson County,

Mississippi. Because defoliation occurred late in the season, severe damage to the trees is not expected.

THE HICKORY BARK BEETLE (Scolytus quadrispinosus Say.) - This insect caused considerable mortality of hickories in the Morganton, Shelby-Forest City, North Carolina areas during the summer months. No organized control of any kind was attempted in the affected areas.

THE SMALLER EUROPEAN ELM BARK BEETLE (Scolytus multistriatus Marsh.) - The smaller European elm bark beetle developed to epidemic proportions at Platt National Park, Sulphur, Oklahoma. Severe drought in the area reduced tree vigor to a point where the beetle readily established broods in the weakened trees. Direct control was initiated to suppress the infestation.

THE PINE COLASPIS BEETLE (Colaspis pini Barber) - This insect severely defoliated young slash pines in plantations in the coast areas of Texas, Louisiana, and Mississippi. Defoliated stands resembled those hit by wildfire. However, virtually no mortality ensued as the trees recovered quickly without benefit of artificial measures for control.

THE CYPRESS LOOPER (Anacamptodes pergracitis (Halst.)) - Approximately 450 acres of virgin southern bald cypress near Hope, Arkansas was completely defoliated by the cypress looper. Other than two areas south of Alexandria, Louisiana, which were defoliated in 1953, this is the only infestation on record for this insect in this region.

THE COTTONWOOD LEAF BEETLE (Chrysomela scripta Fab.)- This leaf-feeding insect occurred in unusually large numbers in cottonwood plantations and nurseries in southern Mississippi, the first outbreak of this insect in this area since 1944. Complete control in areas sprayed was obtained by aerial application of endrin-water emulsion at the rate of 0.2 pounds of active toxicant per acre.

CONDITIONS IN THE NORTHEASTERN STATES

Forest insect conditions in the northeast were characterized by a decrease in the area and severity of attack by some pests and increased damage by species that usually are less important. The forest tent caterpillar and the gypsy moth declined, and spruce budworm defoliation was observed only in one area in northeastern Maine. In contrast, pine sawflies, the saddled prominent, and the pitch pine looper developed to serious proportions in some areas. The beech scale, and the associated Nectria fungus, presents a new threat to the beech stands at a number of points in central Vermont where the insect is now firmly established. The white-pine weevil, the balsam woolly aphid, the red pine scale, and the European

pine shoot moth continued at damaging levels.

THE SPRUCE BUDWORM (Choristoneura fumiferana (Clem.))- Spruce budworm populations in New York, Vermont, and New Hampshire were light whereas a heavier infestation occurred in the northeastern townships of Maine. During mid-June, there was a considerable influx of moths into the Madawaska Lake-Presque Isle - Squapan Lake Areas and as a result, light to medium defoliation over a large area in northern Maine is expected during 1956.

PINE SAWFLIES (Neodiprion spp.) - Several species of pine sawflies are perennial pests in the Northeastern states and extensive areas of loblolly and Virginia pine in Maryland, New York, and New Jersey have been seriously infested for several years. The red-headed pine sawfly, (N. lecontei Fitch) was most prevalent in New York, and the European pine sawfly (N. sertifer Geoff.) occurred in epidemic numbers in northern New Jersey. Spot infestations of N. sertifer has caused serious damage to red pines throughout southeastern Connecticut for several years and infestations were numerous during 1955. Defoliation of loblolly pine caused by N. taedae taedae Ross occurred on the Eastern shore of Maryland along the larger waterways but the insect appeared to be on the decline. N. pratti pratti (Dyar.) was abundant over a wide area in central Maryland causing severe defoliation of Virginia pines. The heaviest feeding was observed in the Patuxent River drainage and in a small area near Fenwick.

THE PITCH PINE LOOPER (Lambdina athasaria pellucidaria G. & R.)) - This looper, a close relative to the hemlock looper Lambdina fiscellaria fiscellaria (Guen.) has occurred in outbreak proportions on pitch pine over much of Cape Cod, Massachusetts, and in portions of Connecticut, at periodic intervals for many years. The current outbreak began in 1953 and reached epidemic proportions during 1954 and in 1955. Although tree defoliation in 1955 was generally lighter than last year, the infestation was widespread and it became necessary to initiate direct measures for control. Aerial application of DDT spray was carried out on 203,100 acres by the State of Massachusetts, and an additional 20,000 acres were sprayed at three separate United States Army installations.

THE RED-PINE SCALE (Matsucoccus resinosae B. & G.) - This scale insect is a major pest of red pine in portions of Connecticut and New York. A survey of the present distribution of this insect in Connecticut reveals that it now covers an area of approximately 90 square miles in Fairfield County, an extension of infestations of one-half to two miles beyond the limit in 1953. No increase was reported of spot infestations in southeastern New York or of those on Long Island. However, the pest was found in large numbers on new hosts (Pinus donsiflora and P. tabulaeformis) in Yonkers, New York during the year.

THE BALSAM WOOLLY APHID (Chermes piceae Ratz) - This insect recurs annually as a major pest of balsam fir in Maine, New Hampshire, and Vermont. Tree mortality as a result of aphid attacks was reported over a wide area in each of those states during 1955. Infestations in New York were less severe, and tree damage in the Green Mountain and White Mountain National Forests were reported as decreasing.

THE FOREST TENT CATERPILLAR (Malacosoma disstria Hbn.) - The large-scale outbreak of this insect pest decreased in scope and intensity in New York and northern New England, although some 6 million acres of susceptible host type was defoliated during the year. A further decline in populations is expected during 1956.

THE GYPSY MOTH (Porthetria dispar (L.)) - The intensity of gypsy moth populations decreased sharply in New England due to a high incidence of disease, parasites, predators, and large-scale spraying. However, a build-up of populations and increased defoliation occurred on the periphery of the generally infested area in eastern New York, southwestern Connecticut, and in Vermont. Trapping and scouting during the summer of 1955 indicated a considerable spread of the moth to the south and west of the regulated area in New York, northern New Jersey, and northeastern Pennsylvania. It is estimated that this spread increased the total area of infestation in the northeastern states by about eight and three-fourths million acres.

THE BEECH SCALE (Cryptococcus fagi (Baer)) - This insect is present in large numbers on much of the Green Mountain National Forest in Vermont and is causing severe damage to beech in New Hampshire and Maine. There has been no change in the severity and scope of infestations in New York from those which occurred in 1954.

THE SADDLED PROMINENT (Heterocampa guttivitta (Wlkr.) At periodic intervals of about 10 years this insect develops to epidemic proportions in susceptible oak, birch, beech and sugar maple stands throughout much of New England and New York. During 1955, heavy feeding occurred on 23,000 acres in western Massachusetts and on 3,000 acres in Rensselaer County, New York. Beech and sugar maple were most heavily fed upon although oak and birch also were attacked.

CONDITIONS IN ALASKA

There was a diversity in insect conditions in Alaska during 1955. Bark beetle activity increased but the black-headed budworm outbreak has virtually come to an end. The hemlock sawfly became epidemic over a wide area but heavy defoliation was confined to relatively small patches.

THE BLACK-HEADED BUDWORM (Acleris variana Fernald) - The black-headed budworm outbreak on the Tongass National Forest and in Glacier Bay National Monument continued to diminish in 1955. The heart of the outbreak now comprises only 620,000 acres in the vicinity of Icy Strait but noticeable defoliation continued along the westside of the mouth of Glacier Bay. Parasites are believed to be the agents contributing most to the outbreak decline and only a few scattered pockets of the infestation are to be expected during 1956. Little or no permanent damage occurred in either hemlock or spruce stands.

THE HEMLOCK SAWFLY (Neodiprion tsugae Midd.) - The hemlock sawfly developed to epidemic proportions on approximately a 1.2 million acre area between Ketchikan and Wrangell. The heaviest defoliation occurred on Revillagigedo Island and on the Cleveland Peninsula. As yet, no permanent injury to the hemlock stands is evident.

LEAF BEETLES (Chrysomela interrupta complex) - Leaf beetles were epidemic on black cottonwood and willows on the moraines of Mendenhall, Eagle, and Herbert Glaciers north of Juneau. The defoliation on cottonwood was very heavy and many of the tops of trees were completely stripped.

THE ALASKAN SPRUCE BEETLE (Dendroctonus borealis Hopk.) - And (Ips interpunctus, Eich.) - Barkbeetle activity in Interior Alaska increased, particularly in the vicinity of Soldotna and Homer on the Kenai Peninsula where recent road and power line construction has resulted in large quantities of favorable host material for the insects. Although woodpecker feeding has helped to keep the spruce beetle populations at a low level, a steady toll of white spruce is being taken. Countless epidemic pockets of Ips-killing occurred in the Yukon - Porcupine - Coleen - Chandalar River country. Some of this type of damage has been prevalent for a number of years and it is suspected that populations have built up in the large numbers of fire-weakened trees.

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20