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STATE OF OREGON
FORESTRY DEPARTMENT
PEST CONTROL LIBRARY

IN THE PACIFIC NORTHWEST

1967



INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

MARCH 1968

This is the 20th annual report
of forest insect conditions in Oregon
and Washington based on cooperative surveys
sponsored by the Northwest Forest Pest Action Council.
The combined efforts of many organizations and individuals
made these surveys possible. Special acknowledgement
is made to the principal cooperators: Oregon
State Board of Forestry and Washington
Department of Natural Resources.

COVER BACKGROUND: Egg and larval galleries of *Orthotomicus
ornatus* Sw. on the bark of ponderosa pine.

FOREST INSECT CONDITIONS IN THE PACIFIC NORTHWEST

DURING 1967

BY

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AND

L. F. PETTINGER

FEBRUARY 1968

INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
U. S. FOREST SERVICE

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SURVEY FINDINGS IN BRIEF

Forest insect outbreaks were reported on 1,910,900 acres in Oregon and Washington in 1967 (table 1). Defoliators accounted for 55 percent of this damage, bark beetles contributed 36 percent, and 9 percent was attributed to sucking insects. During the last decade, the trend of infestations was as follows.

| <u>Year</u> | <u>Infested acreage</u> | <u>Year</u> | <u>Infested acreage</u> |
|-------------|-----------------------------|-------------|-----------------------------|
| 1958 | 2,032,720 | 1963 | 1,311,085 |
| 1959 | 1,448,360 | 1964 | 1,116,130 |
| 1960 | 1,272,960 | 1965 | 1,402,610 |
| 1961 | 1,223,230 | 1966 | 1,220,712 |
| 1962 | 1,305,170 | 1967 | 1,910,900 |

The extent and intensity of outbreaks by insect species occurring in Oregon are given in table 41 and in Washington in table 42. The major problem areas of insect outbreaks are shown in the generalized map in figure 2.

Both States are divided into forest insect reporting areas as shown on the inside of back cover. These insect reporting areas are a simple convenience for reporting conditions in a geographical area. No attempt has been made to summarize insect outbreaks according to land ownership within an individual reporting area.

The main findings of aerial and ground surveys in 1967 were:

1. Mountain pine beetle.--Outbreaks in western white pine stands increased in both Oregon and Washington. Outbreaks on ponderosa pine were static in Washington and decreased in Oregon, but the potential for catastrophic outbreaks still remains. Tree killing in lodgepole pine stands increased greatly. Outbreaks on sugar pine remained at a low level.
2. Douglas-fir beetle.--The destructive outbreaks increased in Washington. Losses decreased in eastern Oregon, and remained static in western Oregon.
3. Western pine beetle.--Losses were higher in Oregon and lower in Washington. Subepidemic tree killing increased in many ponderosa pine stands, indicating a possible beetle population build-up.

4. Fir engraver.--Tree killing increased in Oregon and Washington.
5. Oregon pine ips.--The size and intensity of the infestations increased. Epidemic damage was sustained in many ponderosa pine sapling stands.
6. Engelmann spruce beetle.--Losses were generally downward, with some localized damage increasing.
7. Silver fir beetles.--Losses decreased in Pacific silver fir stands of Washington. No epidemic losses were reported in Oregon.
8. Larch casebearer.--Infestations of this introduced insect continued to spread in the western larch stands of eastern Washington. Parasites were released for the second year.
9. Larch sawfly.--Outbreaks decreased in Oregon and increased in Washington.
10. Larch bud moth.--Widespread epidemic outbreaks occurred in northeastern Washington.
11. Pine needle miner.--Outbreaks decreased in the ponderosa and lodgepole pine stands of central Oregon.
12. Western hemlock looper.--A comparatively small area of very heavy defoliation occurred on the Mt. Baker National Forest in Washington.
13. European pine shoot moth.--The infestation continued to spread within the Containment Zone in western Washington. Numerous infested pines were detected in several communities in southeastern Washington and northeastern Oregon. All infested pines found in Portland, Oregon, were fumigated or destroyed to eradicate the insect.
14. Black-headed budworm.--Subepidemic populations exist at several locations in both States.
15. Balsam woolly aphid.--Damage increased in both States. Infestations were found further south in the southern Coast Range of Oregon.

Table 1.--Summary of 1967 forest insect epidemic infestations in Oregon and Washington

| Insects ^{1/} | Oregon | | Washington | | Regional total | |
|---|--------------|----------------|--------------|------------------|----------------|------------------|
| | Infestation | Area | Infestation | Area | Infestation | Area |
| | centers | | centers | | centers | |
| | Number | Acres | Number | Acres | Number | Acres |
| Defoliators: | | | | | | |
| Sawflies on true firs | 3 | 4,400 | 0 | 0 | 3 | 4,400 |
| Sawflies on larch | 2 | 680 | 16 | 15,660 | 18 | 16,340 |
| Sawflies on knobcone pine | 15 | 6,020 | 0 | 0 | 15 | 6,020 |
| Sawflies on western hemlock | 1 | 500 | 0 | 0 | 1 | 500 |
| Larch bud moth | 0 | 0 | 76 | 139,060 | 76 | 139,060 |
| Western hemlock looper | 0 | 0 | 1 | 1,600 | 1 | 1,600 |
| Needle miners (L) | 34 | 80,460 | 0 | 0 | 34 | 80,460 |
| Needle miners (P) | 5 | 4,800 | 0 | 0 | 5 | 4,800 |
| Larch casebearer | 0 | 0 | 121 | 783,650 | 121 | 783,650 |
| Forest tent caterpillar on red alder | 8 | 10,990 | 0 | 0 | 8 | 10,990 |
| All defoliators | 68 | 107,850 | 214 | 939,970 | 282 | 1,047,820 |
| Sucking insects: | | | | | | |
| Balsam woolly aphid | 466 | 116,080 | 97 | 41,470 | 563 | 157,550 |
| Spider mites | 12 | 13,200 | 0 | 0 | 12 | 13,200 |
| All sucking insects | 478 | 129,280 | 97 | 41,470 | 575 | 170,750 |
| Bark beetles: | | | | | | |
| Douglas-fir beetle (Westside) | 643 | 47,710 | 69 | 15,960 | 712 | 63,670 |
| Douglas-fir beetle (Eastside) | 61 | 2,480 | 247 | 37,450 | 308 | 39,930 |
| Douglas-fir engraver | 3 | 220 | 0 | 0 | 3 | 220 |
| Engelmann spruce beetle | 22 | 3,170 | 24 | 4,650 | 46 | 7,820 |
| Fir engraver | 298 | 25,470 | 46 | 3,580 | 344 | 29,050 |
| Mountain pine beetle (L) | 354 | 186,690 | 8 | 2,530 | 362 | 189,220 |
| Mountain pine beetle (S) | 13 | 1,000 | 0 | 0 | 13 | 1,000 |
| Mountain pine beetle (W) | 428 | 90,040 | 240 | 74,280 | 668 | 164,320 |
| Mountain pine beetle (P) | 275 | 43,090 | 102 | 18,290 | 377 | 61,380 |
| Oregon pine ips | 633 | 55,170 | 11 | 900 | 644 | 56,070 |
| Western pine beetle | 418 | 65,870 | 26 | 6,730 | 444 | 72,600 |
| Silver fir beetles | 0 | 0 | 30 | 7,050 | 30 | 7,050 |
| All bark beetles | 3,148 | 520,910 | 803 | 171,420 | 3,951 | 692,330 |
| All insects | 3,694 | 758,040 | 1,114 | 1,152,860 | 4,808 | 1,910,900 |

^{1/} Mountain pine beetle and needle miner infestations are separated by tree species: L, lodgepole pine; S, sugar pine; W, western white pine; P, ponderosa pine.

INTRODUCTION

Epidemic outbreaks of forest insects were detected and mapped according to intensity of damage from the air. Ground surveys were made to verify the aerial survey findings, detect sub-epidemic insect populations, and evaluate threat and insect population trends.

The problems of bear damage to forest trees and dying hemlock were recorded and discussed at the request of the Northwest Forest Pest Action Council.

MAJOR DEFOLIATOR PROBLEMS

Standards used in the aerial detection survey for evaluation of forest defoliator outbreaks are as follows:

| <u>Defoliation intensity</u> | <u>Appearance of damage</u> |
|------------------------------|-----------------------------|
| Light | Barely visible from air |
| Moderate | Top 1/4 of tree defoliated |
| Heavy | Top 1/2 of tree defoliated |
| Very heavy | Top 3/4 of tree defoliated |

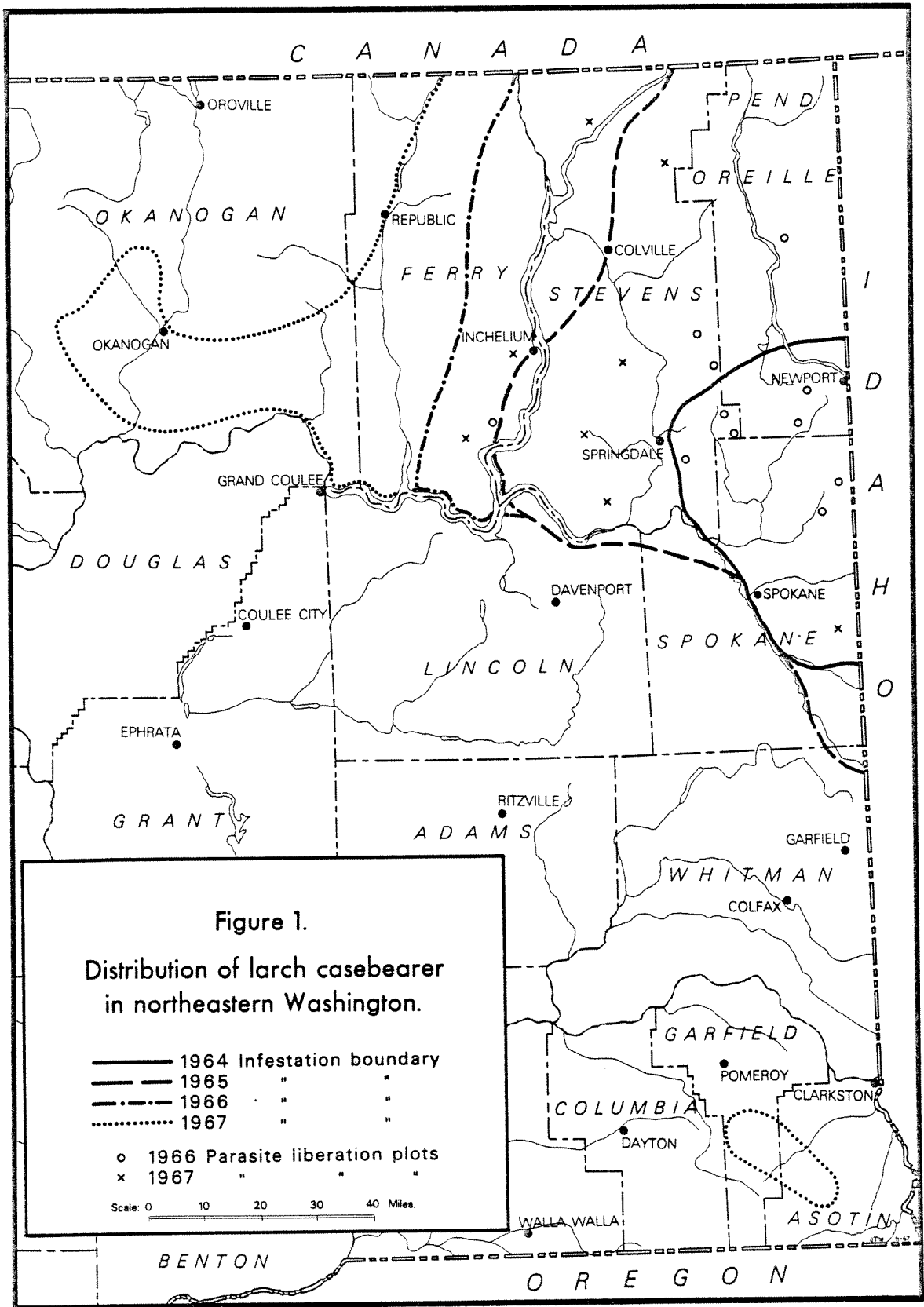
LARCH CASEBEARER, *Coleophora laricella* (Hübner)

Host: Western larch.

Damage: Infestations continued to spread in northeast Washington where light to extremely heavy populations of the moth can now be found in over 8,000 square miles of larch forests. This year the insect was found west of the Okanogan River at Loup Loup Summit on the Okanogan National Forest and was found for the first time in south-east Washington in Garfield and Asotin Counties (figure 1).

Over 783,000 acres of visible damage was mapped by aerial survey contrasted to approximately 470,000 acres in 1966 (table 2). Defoliation varies from light to extreme. Tree growth has been reduced in older infestation centers, but as yet no tree mortality has occurred.

The majority of the damage recorded occurred on the Colville and Kaniksu National Forests and the Northeast Washington District (table 3).



Trend: The insect is expected to continue its spread throughout the larch stands of eastern Washington and can be expected to move into northeastern Oregon within the next few years. Parasite liberations are not expected to cause any reduction in defoliation for 5 to 10 years.

Control: Parasites were liberated at 11 localities in 1966 and 8 locations in 1967. More liberations are planned for 1968.

Table 2.--Trend of larch casebearer infestations in Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|----------------------------------|--------|---------|---------|---------|---------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Colville N.F. | 0 | 200 | 17,180 | 63,840 | 193,500 |
| Kaniksu N.F. | 6,270 | 30,180 | 167,480 | 244,140 | 350,560 |
| Colville I.R. | 0 | 0 | 1,120 | 2,600 | 13,760 |
| Spokane I.R. | 0 | 0 | 3,440 | 22,600 | 43,100 |
| Northeast Washington District | 30,760 | 82,530 | 151,160 | 137,500 | 182,730 |
| All areas | 37,030 | 112,910 | 340,380 | 470,680 | 783,650 |

1/ N.F., National Forest; I.R., Indian Reservation

Table 3.--Extent of larch casebearer infestations in Washington in 1967 by reporting area and intensity of infestation

| Reporting area ^{1/} | :Infes- : :tation : :centers: | Intensity of infestation | | | | : All : : inten- : : sites |
|-------------------------------|-------------------------------------|--------------------------|---------|-----------------------|---------|----------------------------------|
| | | Number | Light | Moderate | Heavy | |
| | | | | - - - - Acres - - - - | | |
| Washington: | | | | | | |
| Colville I.R. | 13 | 3,520 | 3,040 | 1,600 | 5,600 | 13,760 |
| Colville N.F. | 40 | 109,730 | 27,420 | 19,120 | 37,230 | 193,500 |
| Kaniksu N.F. | 23 | 51,800 | 132,580 | 90,630 | 75,550 | 350,560 |
| Northeast Washington District | 37 | 87,920 | 41,710 | 20,820 | 32,280 | 182,730 |
| Spokane I.R. | 8 | 14,360 | 5,160 | 7,580 | 16,000 | 43,100 |
| Washington areas | 121 | 267,330 | 209,910 | 139,750 | 166,660 | 783,650 |
| Regional total | 121 | 267,330 | 209,910 | 139,750 | 166,660 | 783,650 |

^{1/} I.R., Indian Reservation; N.F., National Forest

LARCH SAWFLY, *Pristiphora erichsonii* (Htg.)

Host: Western larch.

Damage: Infestations of the larch sawfly continued in Oregon and Washington. Damage increased in northeast Washington with most of the losses located on the Okanogan and Colville National Forests (table 4).

In Oregon the infestation on the Warm Springs Indian Reservation subsided, but new and smaller infestations developed on the Mt. Hood National Forest.

Trend: Upward in Washington and static in Oregon. Tree mortality has not occurred from the defoliation, nor is any expected in the immediate future.

Control: Control is not needed in 1968. Parasites and predators usually reduce most sawfly populations within a year or two.

Table 4.--Extent of larch sawfly infestations in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All intensities |
|--------------------------|--------------------------|--------|-----------|--------|-------------|-----------------|
| | Infestation centers | :Light | :Moderate | :Heavy | :Very heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Mt. Hood N.F. | 2 | 0 | 200 | 480 | 0 | 680 |
| Oregon areas | 2 | 0 | 200 | 480 | 0 | 680 |
| Washington: | | | | | | |
| Colville N.F. | 7 | 3,400 | 9,560 | 220 | 0 | 13,180 |
| Kaniksu N.F. | 3 | 360 | 760 | 120 | 0 | 1,240 |
| Okanogan N.F. | 6 | 960 | 280 | 0 | 0 | 1,240 |
| Washington areas | 16 | 4,720 | 10,600 | 340 | 0 | 15,660 |
| Regional total | 18 | 4,720 | 10,800 | 820 | 0 | 16,340 |

1/ I.R., Indian Reservation; N.F., National Forest

LARCH BUD MOTH, *Zieraphera griseana* (Hbn.)

Host: Western larch.

Damage: This moth caused widespread defoliation in north central Washington where light to heavy damage occurred at several localities. All damage was located on the Colville and Okanogan National Forests and the Colville Indian Reservation (table 5).

Trend: Undetermined, probably downward.

Control: Control will not be needed in 1968. The outbreak is expected to be short lived.

Table 5.--Extent of larch budmoth infestations
in Washington in 1967, by reporting
area and intensity of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All inten- sities |
|-----------------------------|---------------------------------|------------------------------|-----------------|--------------|------------------------|-------------------------|
| | Infes- : tation : centers | : : Light | : : Moderate | : : Heavy | : : Very : heavy | |
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Washington: | | | | | | |
| Okanogan N.F. | 11 | 7,400 | 6,320 | 960 | 560 | 15,240 |
| Colville N.F. | 56 | 80,800 | 10,560 | 8,080 | 2,940 | 102,380 |
| Colville I.R. | 9 | 4,880 | 12,280 | 4,280 | 0 | 21,440 |
| Washington areas | 76 | 93,080 | 29,160 | 13,320 | 3,500 | 139,060 |
| Regional total | 76 | 93,080 | 29,160 | 13,320 | 3,500 | 139,060 |

1/ N.F., National Forest; I.R., Indian Reservation

EUROPEAN PINE SHOOT MOTH, *Rhyacionia buoliana* (Schiff.)

Hosts: Mugho, lodgepole, and Scotch pines are preferred hosts, but all species of pines are subject to attack.

Damage: Ornamental pines in 83 communities and growing stock in 44 Christmas tree plantations were surveyed outside the Containment Zone in Washington. Infested trees were found in Longview, Tenino, College Place, Prosser, Kennewick, and Walla Walla. The moth continued to spread and tree damage intensified in the Containment Zone.

In Oregon infested trees were found west of the Cascade Mountains at two locations in Portland. Well-established infestations were detected at Hermiston, Umatilla, and at McNary Dam east of the Cascade Mountains in Oregon. All infested trees in the Portland metropolitan area were fumigated or destroyed before moth flight. All other infestations outside the Containment Zone are being evaluated before control action is recommended.

Trend: Continued spread of the infestation through movement of infested stock can be expected.

Control: We have procedures and schedules for fumigating pine in bundles, as container stock, or as liners in place. This fumigating, together with strict enforcement of existing quarantines, will slow the spread of the moth.

NEEDLE MINER, *Coleotechnites near milleri*

Hosts: Lodgepole and ponderosa pines.

Damage: Continued attacks occurred on lodgepole and ponderosa pine in the upper Deschutes Basin on the Deschutes and Winema National Forests (tables 6 and 7). Infestations increased in intensity and caused some tree mortality in the older infestations.

Trend: Moderate to heavy defoliation and increased tree killing is expected next year.

Control: No control is needed in 1968.

Table 6.--Extent of needle miner infestations on lodgepole pine in Oregon in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | : Infestation : Intensity of infestation : All | | | | | |
|--------------------------|--|------------------------------|------------|---------|--------------|---------------|
| | : centers | : Light | : Moderate | : Heavy | : Very heavy | : intensities |
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 20 | 37,560 | 6,080 | 2,640 | 0 | 46,280 |
| Winema N.F. | 14 | 7,060 | 4,600 | 7,640 | 14,880 | 34,180 |
| Oregon areas | 34 | 44,620 | 10,680 | 10,280 | 14,880 | 80,460 |
| Regional total | 34 | 44,620 | 10,680 | 10,280 | 14,880 | 80,460 |

1/ N.F., National Forest

Table 7.--Extent of needle miner infestations on ponderosa pine in Oregon in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All intensities |
|--------------------------|--------------------------|------------------------------|------------|---------|--------------|-----------------|
| | : Infestation centers | : Light | : Moderate | : Heavy | : Very heavy | |
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Oregon: | | | | | | |
| Winema N.F. | 5 | 4,800 | 0 | 0 | 0 | 4,800 |
| Oregon areas | 5 | 4,800 | 0 | 0 | 0 | 4,800 |
| Regional total | 5 | 4,800 | 0 | 0 | 0 | 4,800 |

1/ N.F., National Forest

WESTERN HEMLOCK LOOPER, *Lambdina fiscellaria lugubrosa* Hulst

Host: Western hemlock

Damage: Very heavy defoliation occurred on 1,600 acres in the Bacon Creek drainage on the Mt. Baker National Forest in Washington. Fall egg surveys indicate the infestation is spreading in Bacon Creek and building up at several widely scattered locations on the Forest. Defoliation is expected next year in the Cascade River, Finney Creek, and Whitehorse Mountain area. Tree mortality is expected in the heavily defoliated area in Bacon Creek. Larval collections from ground detection plots along the coastal region of Oregon and Washington showed no significant population buildups.

Trend: Upward.

Control: Plans call for field testing promising insecticides to find a substitute for DDT, should control of a large looper infestation become necessary.

MAJOR SUCKING INSECT PROBLEMS

BALSAM WOOLLY APHID, *Adelges piceae* (Ratz.)

Hosts: Pacific silver fir, subalpine fir, and grand fir.

Damage: The infested acreage nearly tripled that reported in 1966 (table 8). The majority of the damage occurred in the Cascades with lesser amounts in the Coast Range. Seventy-four percent of the Regional losses were reported in Oregon with most of the damage located on the Mt. Hood, Umpqua, and Willamette National Forests.

In Washington, most of the losses occurred on the Gifford Pinchot and Snoqualmie National Forests (table 9).

Trend: A slight increase is expected next year in the Cascade Mountains of both States.

Control: No practical control method is available for use under forest conditions in commercial stands. Logging of infested, merchantable trees and those of declining thrift is the only means of combating this pest.

Limited field tests of promising insecticides are being made against the aphid on recreational sites in the vicinity of Mt. St. Helens. Several subalpine fir were sprayed with a back-pack mist blower using Baygon, a carbamate insecticide. Additional tests are planned for 1968.

Table 8.--Trend of balsam woolly aphid infestations
in Oregon and Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|---------------------------------|---------|---------|--------|--------|---------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 19,640 | 17,320 | 5,260 | 2,370 | 5,790 |
| Mt. Hood N.F. | 9,870 | 17,660 | 7,530 | 6,460 | 26,400 |
| Rogue River N.F. | 6,600 | 18,760 | 4,140 | 4,850 | 8,520 |
| Siskiyou N.F. | 0 | 0 | 0 | 840 | 4,660 |
| Siuslaw N.F. | 4,030 | 340 | 0 | 120 | 0 |
| Umpqua N.F. | 11,830 | 17,960 | 4,320 | 3,580 | 15,980 |
| Willamette N.F. | 44,710 | 72,760 | 19,430 | 16,780 | 49,650 |
| Winema N.F. | 410 | 0 | 0 | 0 | 0 |
| Warm Springs I.R. | 3,380 | 1,380 | 1,750 | 420 | 960 |
| Crater Lake N.P. | 1,680 | 1,320 | 3,350 | 1,840 | 4,120 |
| Coos-Douglas Dist. | 0 | 520 | 640 | 5,060 | 0 |
| Northwest Oregon District | 0 | 20 | 0 | 0 | 0 |
| Oregon areas | 102,150 | 148,040 | 46,420 | 42,320 | 116,080 |
| Washington: | | | | | |
| Gifford Pinchot N.F. | 63,930 | 25,860 | 11,040 | 8,360 | 26,720 |
| Snoqualmie N.F. | 10,560 | 5,800 | 7,800 | 1,680 | 10,520 |
| Wenatchee N.F. | 600 | 720 | 240 | 0 | 0 |
| Yakima I.R. | 6,960 | 840 | 400 | 320 | 230 |
| Southwest Wash- ington Dist. | 0 | 1,040 | 980 | 0 | 1,790 |
| Mt. Rainier N.P. | 3,260 | 1,120 | 360 | 800 | 2,210 |
| Washington areas | 85,310 | 35,380 | 20,820 | 11,160 | 41,470 |
| Regional total | 187,460 | 183,420 | 67,240 | 53,480 | 157,550 |

1/ N.F., National Forest; I.R., Indian Reservation; N.P.,
National Park

Table 9.--Extent of balsam woolly aphid infestations
in Oregon and Washington in 1967, by report-
ing area and intensity of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All inten- sities |
|------------------------------------|------------------------------|--------------|---------------|------------|--------------------|-------------------------|
| | Infes- tation :centers | : Light | : Moderate | : Heavy | : Very heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 58 | 4,890 | 720 | 180 | 0 | 5,790 |
| Mt. Hood N.F. | 90 | 22,740 | 3,380 | 280 | 0 | 26,400 |
| Rogue River N.F. | 21 | 7,520 | 1,000 | 0 | 0 | 8,520 |
| Siskiyou N.F. | 25 | 2,990 | 1,670 | 0 | 0 | 4,660 |
| Umpqua N.F. | 60 | 13,950 | 1,330 | 300 | 400 | 15,980 |
| Willamette N.F. | 196 | 38,190 | 8,770 | 1,970 | 720 | 49,650 |
| Warm Springs I.R. | 6 | 900 | 60 | 0 | 0 | 960 |
| Crater Lake N.P. | 10 | 3,920 | 200 | 0 | 0 | 4,120 |
| Oregon areas | 466 | 95,100 | 17,130 | 2,730 | 1,120 | 116,080 |
| Washington: | | | | | | |
| Gifford Pinchot National Forest | 49 | 24,000 | 1,800 | 920 | 0 | 26,720 |
| Snoqualmie N.F. | 33 | 7,320 | 2,200 | 520 | 480 | 10,520 |
| Yakima I.R. | 1 | 0 | 230 | 0 | 0 | 230 |
| Southwest Wash. District | 4 | 1,230 | 560 | 0 | 0 | 1,790 |
| Mt. Rainier N.P. | 10 | 1,350 | 380 | 480 | 0 | 2,210 |
| Washington areas | 97 | 33,900 | 5,170 | 1,920 | 480 | 41,470 |
| Regional total | 563 | 129,000 | 22,300 | 4,650 | 1,600 | 157,550 |

1/ N.F., National Forest; I.R., Indian Reservation; N.P.,
National Park

MITES

Hosts: True firs and Douglas-fir.

Damage: The spider mite infestations reported last year on the Malheur National Forest, Oregon have declined considerably. Very light defoliation occurred on 350 acres of Douglas-fir and true fir.

A larger spider mite infestation was detected near Hebo Mountain on the Siuslaw National Forest in Oregon. Moderate to heavy defoliation of the current year's foliage occurred on 12,850 acres of a 56-year-old Douglas-fir plantation.

A small outbreak of an eriophyid mite, *Trisetacus pseudotsugae* K., occurred on the Tillamook Forest of the Northwest Oregon State District. This mite caused light damage to the tops of young Douglas-fir. Similar damage was observed on western hemlock and true firs.

Trend: Unknown, probably downward.

Control: Direct control is not needed as insect predators usually keep mite populations in check.

MAJOR BARK BEETLE PROBLEMS

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae* Hopk.

Mountain pine beetle damage accounted for 60 percent of the losses attributed to bark beetles. About 85 percent of the mountain pine beetle losses occurred in lodgepole pine and western white pine stands. The remaining losses were located in young ponderosa pine and in old-growth sugar pine stands. The damage is discussed below by major host.

Host: Lodgepole pine.

Damage: Losses nearly doubled the total reported in 1966 (table 10). Region-wide, 99 percent of the tree killing occurred in Oregon with 89 percent of the losses located on the Deschutes, Fremont, and Winema National Forests. Significant tree killing was found on the Colville, Okanogan, and Wenatchee National Forests in Washington (table 11).

Trend: Tree killing is expected to remain high in the overmature stands in both States.

Control: Logging merchantable infested and intermingled green trees is recommended to reduce beetle populations and salvage timber values.

Host: Western white pine.

Damage: Fifty-five percent of the losses occurred in Oregon (table 12). Tree killing on the Willamette National Forest accounted for 78 percent of the losses detected in Oregon. Significant losses were also reported on the Mt. Hood and Umpqua National Forests.

Tree killing in Washington remained static. Most of the losses, 62 percent of the State total, occurred on the Quinault Indian Reservation and the Wenatchee and Snoqualmie National Forests (table 13).

Trend: The damage is expected to remain static in Washington due to the depletion of susceptible host; however, mortality in Oregon will continue at its present high rate.

Control: Logging merchantable infested and intermingled green trees is recommended to reduce beetle populations and salvage timber values. Direct control is impractical in western white pine due to the prevalence of blister rust.

Host: Ponderosa pine.

Damage: Region-wide, the infested acreage had increased (table 14). Seventy percent of the losses occurred in Oregon with over 50 percent of the mortality located on the Wallowa-Whitman National Forest. In Washington, most of the losses were found on the Okanogan National Forest (table 15).

Results of a recent survey on the Wallowa-Whitman National Forest in a 10-year-old mountain pine beetle infestation show growth has been set back for about 30 years. Stocking, basal area, and the average tree diameter in the stand has been greatly reduced.

Trend: Ponderosa pine losses are expected to remain high in local areas in both States.

Control: Thinning of dense, overstocked stands before the beetles attack is encouraged. Direct control is used in pole-size stands only as a "stop-gap" measure to reduce the beetle population.

Host: Sugar pine.

Damage: The number of infested acres in Oregon decreased from the high recorded in 1963 (table 16). Most of the tree killing occurred on the Rogue River and Umpqua National Forests (table 17).

Trend: Losses are expected to be less in 1968.

Control: Logging merchantable infested and intermingled green trees is recommended to reduce populations and salvage timber values.

Table 10.--Trend of mountain pine beetle
infestations in lodgepole pine in
Oregon and Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|---------------|---------------|---------------|---------------|----------------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 10,330 | 9,100 | 11,930 | 10,480 | 14,850 |
| Fremont N.F. | 13,390 | 21,950 | 47,100 | 38,380 | 109,690 |
| Malheur N.F. | 610 | 2,060 | 8,410 | 4,540 | 5,870 |
| Ochoco N.F. | 0 | 0 | 40 | 0 | 0 |
| Rogue River N.F. | 360 | 1,100 | 0 | 180 | 0 |
| Siskiyou N.F. | 0 | 190 | 80 | 30 | 0 |
| Umatilla N.F. | 2,020 | 530 | 140 | 670 | 2,910 |
| Umpqua N.F. | 2,190 | 160 | 0 | 200 | 70 |
| Wallowa-Whitman N.F. | 2,640 | 1,440 | 3,130 | 4,230 | 9,620 |
| Willamette N.F. | 355 | 160 | 0 | 0 | 400 |
| Winema N.F. | 17,060 | 17,100 | 21,560 | 29,650 | 40,900 |
| Warm Springs I.R. | 85 | 0 | 0 | 0 | 180 |
| Crater Lake N.P. | 1,180 | 2,000 | 1,800 | 1,030 | 2,200 |
| Oregon areas | 50,220 | 55,790 | 94,190 | 89,390 | 186,690 |
| Washington: | | | | | |
| Colville N.F. | 4,360 | 3,540 | 0 | 0 | 640 |
| Gifford Pinchot National Forest | 8,960 | 880 | 0 | 0 | 0 |
| Kaniksu N.F. | 600 | 0 | 0 | 0 | 0 |
| Okanogan N.F. | 1,200 | 2,170 | 440 | 0 | 650 |
| Olympic N.F. | 680 | 0 | 80 | 0 | 0 |
| Umatilla N.F. | 190 | 0 | 50 | 0 | 0 |
| Wenatchee N.F. | 390 | 1,800 | 840 | 0 | 880 |
| Colville I.R. | 480 | 180 | 0 | 0 | 0 |
| Yakima I.R. | 760 | 200 | 560 | 80 | 360 |
| Washington areas | 17,620 | 8,770 | 1,970 | 80 | 2,530 |
| Regional total | 67,840 | 64,560 | 96,160 | 89,470 | 189,220 |

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation

Table 11.--Extent of mountain pine beetle infestations on lodgepole pine in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area ^{1/} | Intensity of infestation | | | | | All intensities |
|---------------------------------|--------------------------|--------|----------|--------|------------|-----------------|
| | Number of centers | Light | Moderate | Heavy | Very heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 86 | 6,870 | 2,600 | 4,440 | 940 | 14,850 |
| Fremont N.F. | 80 | 21,030 | 72,360 | 2,350 | 13,950 | 109,690 |
| Malheur N.F. | 25 | 1,770 | 2,740 | 1,360 | 0 | 5,870 |
| Umatilla N.F. | 21 | 700 | 1,250 | 960 | 0 | 2,910 |
| Umpqua N.F. | 1 | 70 | 0 | 0 | 0 | 70 |
| Wallowa-Whitman National Forest | 29 | 2,120 | 1,330 | 4,080 | 2,090 | 9,620 |
| Willamette N.F. | 8 | 230 | 170 | 0 | 0 | 400 |
| Winema N.F. | 99 | 19,430 | 14,580 | 6,570 | 320 | 40,900 |
| Warm Springs I.R. | 1 | 0 | 180 | 0 | 0 | 180 |
| Crater Lake N.P. | 4 | 990 | 800 | 0 | 410 | 2,200 |
| Oregon areas | 354 | 53,210 | 96,010 | 19,760 | 17,710 | 186,690 |
| Washington: | | | | | | |
| Okanogan N.F. | 3 | 0 | 210 | 440 | 0 | 650 |
| Wenatchee N.F. | 3 | 800 | 80 | 0 | 0 | 880 |
| Colville N.F. | 1 | 0 | 0 | 0 | 640 | 640 |
| Yakima I.R. | 1 | 360 | 0 | 0 | 0 | 360 |
| Washington areas | 8 | 1,160 | 290 | 440 | 640 | 2,530 |
| Regional total | 362 | 54,370 | 96,300 | 20,200 | 18,350 | 189,220 |

^{1/} N.F., National Forest; N.P., National Park; I.R., Indian Reservation

Table 12.--Trend of mountain pine beetle infestations
in western white pine in Oregon and
Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|---------|---------|---------|---------|---------|
| | : 1963 | : 1964 | : 1965 | : 1966 | : 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 1,520 | 1,640 | 230 | 30 | 140 |
| Fremont N.F. | 0 | 0 | 0 | 100 | 0 |
| Mt. Hood N.F. | 39,770 | 36,820 | 27,810 | 7,720 | 7,510 |
| Rogue River N.F. | 0 | 190 | 920 | 480 | 720 |
| Siskiyou N.F. | 0 | 4,340 | 1,680 | 5,660 | 800 |
| Umpqua N.F. | 3,350 | 6,070 | 2,920 | 21,130 | 9,280 |
| Willamette N.F. | 22,500 | 43,440 | 38,240 | 34,750 | 70,340 |
| Warm Springs I.R. | 80 | 200 | 80 | 0 | 530 |
| Winema N.F. | 620 | 0 | 240 | 0 | 660 |
| Coos-Douglas Dist. | 0 | 0 | 0 | 80 | 0 |
| Crater Lake N.P. | 0 | 0 | 0 | 1,590 | 60 |
| Oregon areas | 67,840 | 92,700 | 72,120 | 71,540 | 90,040 |
| Washington: | | | | | |
| Colville N.F. | 0 | 3,690 | 9,280 | 4,820 | 1,700 |
| Gifford Pinchot National Forest | 98,330 | 31,300 | 12,870 | 3,720 | 5,520 |
| Kaniksu N.F. | 1,290 | 10,440 | 3,480 | 2,120 | 1,450 |
| Mt. Baker N.F. | 43,060 | 4,270 | 1,440 | 8,320 | 4,650 |
| Okanogan N.F. | 1,000 | 130 | 840 | 1,560 | 100 |
| Olympic N.F. | 23,600 | 15,870 | 7,960 | 2,320 | 600 |
| Snoqualmie N.F. | 32,060 | 22,640 | 11,960 | 9,100 | 8,440 |
| Wenatchee N.F. | 79,280 | 20,640 | 40,520 | 21,640 | 23,040 |
| Quinalt I.R. | 7,040 | 2,180 | 5,320 | 4,750 | 16,300 |
| Spokane I.R. | 0 | 0 | 0 | 240 | 0 |
| Yakima I.R. | 540 | 1,040 | 2,920 | 1,920 | 1,940 |
| Mt. Rainier N.P. | 9,740 | 4,240 | 1,920 | 880 | 920 |
| Olympic N.P. | 114,600 | 57,270 | 26,940 | 12,980 | 9,620 |
| Northwest Washington District | 0 | 1,560 | 0 | 0 | 0 |
| Northeast Washington District | 0 | 720 | 0 | 40 | 0 |
| Glenwood District | 0 | 0 | 1,160 | 0 | 0 |
| Puget Sound District | 0 | 0 | 720 | 0 | 0 |
| Washington areas | 410,540 | 175,990 | 127,330 | 74,410 | 74,280 |
| Regional total | 478,380 | 268,690 | 199,450 | 145,950 | 164,320 |

1/ N.F., National Forest; I.R., Indian Reservation; N.P., National Park

Table 13.--Extent of mountain pine beetle infestations on western white pine in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area ^{1/} | Intensity of infestation | | | | | All intensities |
|---------------------------------|--------------------------|--------|----------|--------|------------|-----------------|
| | Infestation centers | Light | Moderate | Heavy | Very heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 4 | 140 | 0 | 0 | 0 | 140 |
| Mt. Hood N.F. | 65 | 5,640 | 1,400 | 360 | 110 | 7,510 |
| Rogue River N.F. | 8 | 570 | 150 | 0 | 0 | 720 |
| Siskiyou N.F. | 11 | 800 | 0 | 0 | 0 | 800 |
| Umpqua N.F. | 83 | 6,950 | 1,040 | 1,290 | 0 | 9,280 |
| Willamette N.F. | 247 | 38,600 | 18,810 | 8,830 | 4,100 | 70,340 |
| Winema N.F. | 4 | 470 | 190 | 0 | 0 | 660 |
| Warm Springs I.R. | 5 | 210 | 0 | 320 | 0 | 530 |
| Crater Lake N.P. | 1 | 60 | 0 | 0 | 0 | 60 |
| Oregon areas | 428 | 53,440 | 21,590 | 10,800 | 4,210 | 90,040 |
| Washington: | | | | | | |
| Gifford Pinchot National Forest | 21 | 2,480 | 2,560 | 120 | 360 | 5,520 |
| Mt. Baker N.F. | 19 | 1,810 | 2,680 | 160 | 0 | 4,650 |
| Okanogan N.F. | 1 | 100 | 0 | 0 | 0 | 100 |
| Olympic N.F. | 4 | 440 | 160 | 0 | 0 | 600 |
| Snoqualmie N.F. | 28 | 4,720 | 3,280 | 440 | 0 | 8,440 |
| Wenatchee N.F. | 88 | 11,520 | 5,220 | 4,540 | 1,760 | 23,040 |
| Colville N.F. | 3 | 180 | 400 | 560 | 560 | 1,700 |
| Kaniksu N.F. | 9 | 1,130 | 320 | 0 | 0 | 1,450 |
| Quinalt I.R. | 10 | 12,620 | 920 | 2,280 | 480 | 16,300 |
| Yakima I.R. | 6 | 1,100 | 330 | 510 | 0 | 1,940 |
| Mt. Rainier N.P. | 5 | 920 | 0 | 0 | 0 | 920 |
| Olympic N.P. | 46 | 5,260 | 3,200 | 820 | 340 | 9,620 |
| Washington areas | 240 | 42,280 | 19,070 | 9,430 | 3,500 | 74,280 |
| Regional total | 668 | 95,720 | 40,660 | 20,230 | 7,710 | 164,320 |

^{1/} N.F., National Forest; I.R., Indian Reservation; N.P.; National Park

Table 14.--Trend of mountain pine beetle infestations
in ponderosa pine in Oregon and Washington,
1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|--------|--------|---------|--------|--------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 280 | 120 | 2,550 | 1,000 | 1,460 |
| Fremont N.F. | 4,970 | 2,920 | 16,740 | 8,150 | 5,310 |
| Malheur N.F. | 1,760 | 6,730 | 29,170 | 4,040 | 2,700 |
| Mt. Hood N.F. | 0 | 30 | 50 | 900 | 1,680 |
| Ochoco N.F. | 700 | 1,340 | 2,370 | 630 | 2,090 |
| Rogue River N.F. | 940 | 1,840 | 170 | 370 | 1,510 |
| Siskiyou N.F. | 0 | 1,600 | 1,290 | 260 | 80 |
| Umatilla N.F. | 3,080 | 4,680 | 3,140 | 1,460 | 2,360 |
| Umpqua N.F. | 830 | 0 | 120 | 200 | 250 |
| Wallowa-Whitman National Forest | 18,680 | 21,400 | 48,410 | 28,480 | 22,360 |
| Winema N.F. | 160 | 910 | 4,910 | 5,590 | 2,320 |
| Umatilla I.R. | 0 | 80 | 20 | 80 | 120 |
| Warm Springs I.R. | 160 | 70 | 0 | 320 | 200 |
| Crater Lake N.P. | 0 | 200 | 0 | 0 | 0 |
| Central Oregon Dist. | 660 | 520 | 680 | 2,510 | 650 |
| Coos-Douglas Dist. | 0 | 0 | 0 | 240 | 0 |
| Oregon areas | 32,220 | 42,440 | 109,620 | 54,230 | 43,090 |
| Washington: | | | | | |
| Colville N.F. | 200 | 2,530 | 3,280 | 2,080 | 2,090 |
| Gifford Pinchot National Forest | 0 | 160 | 0 | 0 | 0 |
| Okanogan N.F. | 0 | 6,480 | 15,400 | 12,040 | 11,970 |
| Snoqualmie N.F. | 0 | 0 | 280 | 0 | 0 |
| Umatilla N.F. | 430 | 1,270 | 4,280 | 1,030 | 140 |
| Wenatchee N.F. | 520 | 120 | 580 | 860 | 960 |
| Colville I.R. | 0 | 2,070 | 1,010 | 4,000 | 980 |
| Spokane I.R. | 0 | 0 | 280 | 200 | 350 |
| Yakima I.R. | 0 | 680 | 6,780 | 720 | 130 |
| Northeast Washington District | 0 | 0 | 0 | 240 | 610 |
| Glenwood District | 0 | 520 | 40 | 560 | 1,060 |
| Washington areas | 1,150 | 13,830 | 31,930 | 21,730 | 18,290 |
| Regional total | 33,370 | 56,270 | 141,550 | 75,960 | 61,380 |

1/ N.F., National Forest; I.R., Indian Reservation; N.P.,
National Park

Table 15.--Extent of mountain pine beetle infestations on ponderosa pine in Oregon and Washington in 1967 by reporting area and intensity of infestation

| Reporting area ^{1/} | :Infes- : :tation : :centers: | Intensity of infestation | | | | : All : Very : heavy : sites |
|------------------------------------|-------------------------------------|--------------------------|--------|----------|-------|---------------------------------------|
| | | Number | Light | Moderate | Heavy | |
| Oregon: | | | | | | |
| Deschutes N.F. | 20 | 1,280 | 180 | 0 | 0 | 1,460 |
| Fremont N.F. | 51 | 4,820 | 210 | 280 | 0 | 5,310 |
| Malheur N.F. | 29 | 1,430 | 760 | 510 | 0 | 2,700 |
| Mt. Hood N.F. | 12 | 1,040 | 640 | 0 | 0 | 1,680 |
| Ochoco N.F. | 26 | 1,700 | 70 | 320 | 0 | 2,090 |
| Rogue River N.F. | 9 | 1,510 | 0 | 0 | 0 | 1,510 |
| Siskiyou N.F. | 1 | 80 | 0 | 0 | 0 | 80 |
| Umatilla N.F. | 25 | 790 | 1,410 | 0 | 160 | 2,360 |
| Umpqua N.F. | 1 | 250 | 0 | 0 | 0 | 250 |
| Wallowa-Whitman National Forest | 76 | 6,900 | 8,430 | 4,950 | 2,080 | 22,360 |
| Winema N.F. | 19 | 2,240 | 80 | 0 | 0 | 2,320 |
| Umatilla I.R. | 2 | 20 | 0 | 100 | 0 | 120 |
| Warm Springs I.R. | 2 | 200 | 0 | 0 | 0 | 200 |
| Central Oregon Dist. | 2 | 50 | 0 | 600 | 0 | 650 |
| Oregon areas | 275 | 22,310 | 11,780 | 6,760 | 2,240 | 43,090 |
| Washington: | | | | | | |
| Okanogan N.F. | 62 | 2,020 | 5,080 | 3,190 | 1,680 | 11,970 |
| Umatilla N.F. | 5 | 100 | 40 | 0 | 0 | 140 |
| Wenatchee N.F. | 4 | 120 | 440 | 400 | 0 | 960 |
| Colville N.F. | 9 | 280 | 470 | 1,160 | 180 | 2,090 |
| Colville I.R. | 8 | 340 | 640 | 0 | 0 | 980 |
| Spokane I.R. | 2 | 80 | 110 | 160 | 0 | 350 |
| Yakima I.R. | 2 | 130 | 0 | 0 | 0 | 130 |
| Northeast Wash. District | 4 | 490 | 0 | 120 | 0 | 610 |
| Glenwood Dist. | 6 | 600 | 460 | 0 | 0 | 1,060 |
| Washington areas | 102 | 4,160 | 7,240 | 5,030 | 1,860 | 18,290 |
| Regional total | 337 | 26,470 | 19,020 | 11,790 | 4,100 | 61,380 |

^{1/} N.F., National Forest; I.R., Indian Reservation

Table 16.--Trend of mountain pine beetle infestations
in sugar pine in Oregon, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|-----------------------------|------|-------|-------|-------|-------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 0 | 40 | 50 | 440 | 0 |
| Fremont N.F. | 0 | 0 | 1,640 | 0 | 0 |
| Rogue River N.F. | 0 | 490 | 130 | 1,200 | 520 |
| Siskiyou N.F. | 0 | 1,030 | 4,110 | 300 | 180 |
| Umpqua N.F. | 0 | 0 | 0 | 70 | 300 |
| Winema N.F. | 0 | 0 | 20 | 360 | 0 |
| Coos-Douglas Dist. | 0 | 4,600 | 160 | 0 | 0 |
| Oregon areas | 0 | 6,160 | 6,110 | 2,370 | 1,000 |
| Regional total | 0 | 6,160 | 6,110 | 2,370 | 1,000 |

1/ N.F., National Forest

Table 17.--Extent of mountain pine beetle infestations
on sugar pine in Oregon in 1967, by reporting
area and intensity of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All inten- sities |
|-----------------------------|-------------------------------|-------|----------|-------|---------------|-------------------------|
| | Infes- :tation :centers | Light | Moderate | Heavy | Very heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Rogue River N.F. | 7 | 520 | 0 | 0 | 0 | 520 |
| Siskiyou N.F. | 4 | 180 | 0 | 0 | 0 | 180 |
| Umpqua N.F. | 2 | 300 | 0 | 0 | 0 | 300 |
| Oregon areas | 13 | 1,000 | 0 | 0 | 0 | 1,000 |
| Regional total | 13 | 1,000 | 0 | 0 | 0 | 1,000 |

1/ N.F., National Forest

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae* Hopk.

Host: Douglas-fir.

Damage: Douglas-fir beetle damage increased in Oregon and Washington west of the Cascade Mountains (table 18). In Oregon, 75 percent of the losses occurred on the Illinois Valley District, Siskiyou National Forest, and on the Applegate District, Rogue River National Forest. In western Washington, most of the mortality was detected on the Gifford Pinchot National Forest (table 19).

Tree killing east of the Cascade Mountains increased in Washington and decreased in Oregon (table 20). Ninety-four percent of the losses occurred in Washington with 69 percent of this damage located on the Okanogan and Colville National Forests (table 21). Significant killing was also detected on the Colville Indian Reservation. In Oregon, most of the damage occurred on the Wallowa-Whitman National Forest.

Trend: A downward trend is expected in the westside Douglas-fir stands and an upward trend in the eastside Douglas-fir stands.

The present increase of losses on the Rogue River and Siskiyou National Forests is the result of the 1964-65 floods. These floods weakened many trees along stream banks, caused earth slides, and provided many breeding sites for the beetles.

Control: Continued salvage of infested trees and recently windthrown trees will help reduce beetle populations and save timber values that would otherwise be lost.

Table 18.--Trend of Douglas-fir beetle infestations
in westside Douglas-fir in Oregon and
Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|--------|--------|---------|--------|--------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Mt. Hood N.F. | 0 | 450 | 400 | 760 | 580 |
| Rogue River N.F. | 3,560 | 240 | 2,580 | 2,240 | 9,420 |
| Siskiyou N.F. | 320 | 6,760 | 15,200 | 2,460 | 16,160 |
| Siuslaw N.F. | 540 | 17,890 | 54,080 | 9,360 | 4,600 |
| Umpqua N.F. | 4,100 | 2,360 | 30,260 | 1,820 | 5,960 |
| Willamette N.F. | 410 | 720 | 17,850 | 9,310 | 3,070 |
| Crater Lake N.P. | 30 | 0 | 0 | 0 | 0 |
| Coos-Douglas Dist. | 0 | 19,630 | 69,720 | 19,310 | 7,700 |
| Northwest Oregon Dist. | 0 | 0 | 1,400 | 20 | 220 |
| Oregon areas | 8,960 | 48,050 | 191,490 | 45,280 | 47,710 |
| Washington: | | | | | |
| Gifford Pinchot National Forest | 1,880 | 460 | 2,930 | 2,980 | 13,240 |
| Mt. Baker N.F. | 400 | 0 | 160 | 200 | 2,220 |
| Olympic N.F. | 120 | 0 | 440 | 80 | 0 |
| Snoqualmie N.F. | 850 | 230 | 2,260 | 680 | 0 |
| Puget Sound Dist. | 0 | 0 | 440 | 0 | 0 |
| Northwest Wash. District | 0 | 0 | 40 | 0 | 0 |
| Southwest Wash. District | 0 | 0 | 3,680 | 1,280 | 240 |
| Olympic N.P. | 320 | 80 | 80 | 0 | 260 |
| Washington areas | 3,570 | 770 | 10,030 | 5,220 | 15,960 |
| Regional total | 12,530 | 48,820 | 201,520 | 50,500 | 63,670 |

1/ N.F., National Forest; N.P., National Park

Table 19.--Extent of Douglas-fir beetle infestations on westside Douglas-fir in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area ^{1/} | Intensity of infestation | | | | | All intensities |
|---------------------------------|--------------------------|--------------|----------|-------|------------|-----------------|
| | Infestation centers | Light | Moderate | Heavy | Very heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Oregon: | | | | | | |
| Mt. Hood N.F. | 10 | 320 | 130 | 130 | 0 | 580 |
| Rogue River N.F. | 131 | 6,940 | 1,820 | 660 | 0 | 9,420 |
| Siskiyou N.F. | 170 | 11,510 | 3,410 | 1,240 | 0 | 16,160 |
| Siuslaw N.F. | 85 | 2,620 | 1,300 | 680 | 0 | 4,600 |
| Umpqua N.F. | 75 | 4,190 | 1,650 | 120 | 0 | 5,960 |
| Willamette N.F. | 72 | 2,720 | 190 | 160 | 0 | 3,070 |
| Northwest Oregon District | 4 | 220 | 0 | 0 | 0 | 220 |
| Coos-Douglas Dist. | 96 | 5,300 | 2,120 | 280 | 0 | 7,700 |
| Oregon areas | 643 | 33,820 | 10,620 | 3,270 | 0 | 47,710 |
| Washington: | | | | | | |
| Gifford Pinchot National Forest | 54 | 6,100 | 4,000 | 3,060 | 80 | 13,240 |
| Mt. Baker N.F. | 8 | 520 | 1,540 | 160 | 0 | 2,220 |
| Southwest Wash. District | 4 | 240 | 0 | 0 | 0 | 240 |
| Olympic N.P. | 3 | 100 | 160 | 0 | 0 | 260 |
| Washington areas | 69 | 6,960 | 5,700 | 3,220 | 80 | 15,960 |
| Regional total | 712 | 40,780 | 16,320 | 6,490 | 80 | 63,670 |

^{1/} N.F., National Forest; N.P., National Park

Table 20.--Trend of Douglas-fir beetle infestations
in eastside Douglas-fir in Oregon and
Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|--------|--------|--------|--------|--------|
| | : 1963 | : 1964 | : 1965 | : 1966 | : 1967 |
| Oregon: | | | | | |
| Malheur N.F. | 240 | 810 | 6,160 | 1,250 | 0 |
| Ochoco N.F. | 860 | 470 | 550 | 110 | 0 |
| Umatilla N.F. | 1,560 | 10,640 | 1,900 | 420 | 100 |
| Wallowa-Whitman National Forest | 12,510 | 52,220 | 20,710 | 1,910 | 2,280 |
| Winema N.F. | 210 | 0 | 0 | 0 | 0 |
| Umatilla I.R. | 80 | 0 | 0 | 70 | 0 |
| Warm Springs I.R. | 20 | 0 | 50 | 0 | 0 |
| Central Oregon District | 110 | 0 | 0 | 210 | 10 |
| Lookout Mt. Dist. | 0 | 0 | 0 | 620 | 10 |
| Oregon areas | 15,590 | 64,140 | 29,370 | 4,590 | 2,400 |
| Washington: | | | | | |
| Colville N.F. | 8,240 | 4,630 | 8,780 | 4,860 | 16,170 |
| Kaniksu N.F. | 160 | 360 | 180 | 80 | 330 |
| Okanogan N.F. | 31,950 | 6,830 | 12,160 | 10,400 | 11,500 |
| Umatilla N.F. | 500 | 2,710 | 0 | 0 | 50 |
| Wenatchee N.F. | 4,280 | 760 | 1,120 | 200 | 640 |
| Colville I.R. | 11,460 | 2,050 | 2,300 | 4,440 | 7,940 |
| Spokane I.R. | 70 | 0 | 0 | 160 | 0 |
| Yakima I.R. | 320 | 0 | 0 | 0 | 0 |
| Glenwood District | 90 | 0 | 280 | 2,160 | 820 |
| Northeast Wash. District | 60 | 0 | 120 | 0 | 0 |
| Washington areas | 57,130 | 17,340 | 24,940 | 22,300 | 37,450 |
| Regional total | 72,720 | 81,480 | 54,310 | 26,890 | 39,850 |

1/ N.F., National Forest; I.R., Indian Reservation

Table 21.--Extent of Douglas-fir beetle infestations on eastside Douglas-fir in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | :Infes- : :tation : :centers: | Intensity of infestation | | | | : All : :inten- : :sities |
|---------------------------------|-------------------------------------|------------------------------|----------|---------|--------------|---------------------------------|
| | | :Light: | Moderate | : Heavy | : Very heavy | |
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Oregon: | | | | | | |
| Umatilla N.F. | 3 | 100 | 0 | 0 | 0 | 100 |
| Wallowa-Whitman National Forest | 55 | 1,550 | 730 | 0 | 0 | 2,280 |
| Central Oregon District | 1 | 10 | 0 | 0 | 0 | 10 |
| Lookout Mt. Dist. | 1 | 10 | 0 | 0 | 0 | 10 |
| Oregon areas | 60 | 1,670 | 730 | 0 | 0 | 2,400 |
| Washington: | | | | | | |
| Okanogan N.F. | 67 | 4,050 | 3,770 | 2,760 | 920 | 11,500 |
| Umatilla N.F. | 1 | 50 | 0 | 0 | 0 | 50 |
| Wenatchee N.F. | 2 | 600 | 40 | 0 | 0 | 640 |
| Colville N.F. | 104 | 3,360 | 5,340 | 5,750 | 1,720 | 16,170 |
| Kaniksu N.F. | 3 | 170 | 160 | 0 | 0 | 330 |
| Colville I.R. | 66 | 2,940 | 2,860 | 1,620 | 520 | 7,940 |
| Glenwood Dist. | 4 | 580 | 240 | 0 | 0 | 820 |
| Washington areas | 247 | 11,750 | 12,410 | 10,130 | 3,160 | 37,450 |
| Regional total | 307 | 13,420 | 13,140 | 10,130 | 3,160 | 39,850 |

1/ N.F., National Forest; I.R., Indian Reservation

OREGON PINE IPS, *Ips pini* Say

Host: Ponderosa pine.

Damage: The total infested acreage increased 12 times over the loss recorded in 1966 (table 22). Most of the damage occurred in second-growth ponderosa pine stands. Infestations in Oregon accounted for 98 percent of the Regional losses with 56 percent of the damage located on the Wallowa-Whitman National Forest. Tree killing in Washington was detected on four different Forests, but losses never exceeded 400 acres on any one of the Forests (table 23).

Trend: Indications are that ips losses will be higher next year. Some of this loss will be due to the 1967 drought and the abundance of scorched trees around recent fires.

Control: Because outbreaks develop and subside rapidly, control is generally not recommended.

Table 22.--Trend of Oregon pine ips infestations
in Oregon and Washington, 1963-67

(In acres)

| Reporting area ^{1/} | Year | | | | |
|------------------------------------|---------------|--------------|---------------|--------------|---------------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 330 | 150 | 950 | 20 | 280 |
| Fremont N.F. | 1,890 | 540 | 170 | 70 | 2,760 |
| Malheur N.F. | 5,150 | 2,200 | 4,360 | 630 | 9,780 |
| Mt. Hood N.F. | 570 | 1,000 | 70 | 80 | 2,680 |
| Ochoco N.F. | 220 | 740 | 3,730 | 860 | 1,330 |
| Rogue River N.F. | 250 | 880 | 420 | 1,140 | 2,070 |
| Siskiyou N.F. | 80 | 0 | 270 | 390 | 350 |
| Umatilla N.F. | 1,470 | 0 | 30 | 0 | 2,190 |
| Wallowa-Whitman National Forest | 3,410 | 40 | 3,820 | 0 | 30,810 |
| Willamette N.F. | 0 | 0 | 0 | 0 | 20 |
| Winema N.F. | 1,790 | 1,820 | 1,780 | 0 | 950 |
| Umatilla I.R. | 0 | 0 | 110 | 0 | 260 |
| Warm Springs I.R. | 190 | 0 | 130 | 0 | 1,530 |
| Central Oregon Dist. | 230 | 0 | 160 | 680 | 120 |
| Coos-Douglas Dist. | 0 | 0 | 0 | 0 | 40 |
| Oregon areas | 15,580 | 7,370 | 16,000 | 3,870 | 55,170 |
| Washington: | | | | | |
| Colville N.F. | 200 | 330 | 140 | 0 | 0 |
| Okanogan N.F. | 590 | 0 | 800 | 120 | 370 |
| Snoqualmie N.F. | 0 | 10 | 0 | 0 | 0 |
| Umatilla N.F. | 520 | 120 | 0 | 0 | 310 |
| Wenatchee N.F. | 0 | 160 | 740 | 240 | 0 |
| Colville I.R. | 0 | 740 | 320 | 0 | 0 |
| Spokane I.R. | 0 | 200 | 320 | 0 | 130 |
| Yakima I.R. | 1,160 | 0 | 560 | 280 | 0 |
| Glenwood District | 130 | 520 | 60 | 0 | 0 |
| Northeast Wash. District | 0 | 0 | 160 | 0 | 90 |
| Washington areas | 2,600 | 2,080 | 3,100 | 640 | 900 |
| Regional total | 18,180 | 9,450 | 19,100 | 4,510 | 56,070 |

^{1/} N.F., National Forest; I.R., Indian Reservation

Table 23.--Extent of Oregon pine ips infestations in
Oregon and Washington in 1967, by reporting
area and intensity of infestation

| Reporting area ^{1/} | Intensity of infestation | | | | | All inten- sities |
|------------------------------------|---------------------------------|--------------|-----------------|--------------|------------------------|-------------------------|
| | Infes- : tation : centers | : : Light | : : Moderate | : : Heavy | : : Very : heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 8 | 280 | 0 | 0 | 0 | 280 |
| Fremont N.F. | 35 | 940 | 910 | 910 | 0 | 2,760 |
| Malheur N.F. | 118 | 3,650 | 2,060 | 1,140 | 2,930 | 9,780 |
| Mt. Hood N.F. | 42 | 1,080 | 1,260 | 290 | 50 | 2,680 |
| Ochoco N.F. | 23 | 880 | 310 | 70 | 70 | 1,330 |
| Rogue River N.F. | 24 | 1,540 | 530 | 0 | 0 | 2,070 |
| Siskiyou N.F. | 3 | 350 | 0 | 0 | 0 | 350 |
| Umatilla N.F. | 75 | 1,540 | 590 | 20 | 40 | 2,190 |
| Wallowa-Whitman National Forest | 266 | 9,800 | 13,730 | 4,910 | 2,370 | 30,810 |
| Willamette N.F. | 2 | 20 | 0 | 0 | 0 | 20 |
| Winema N.F. | 12 | 470 | 100 | 380 | 0 | 950 |
| Umatilla I.R. | 6 | 80 | 180 | 0 | 0 | 260 |
| Warm Springs I.R. | 13 | 310 | 440 | 0 | 780 | 1,530 |
| Central Oregon District | 5 | 120 | 0 | 0 | 0 | 120 |
| Coos-Douglas Dist. | 1 | 40 | 0 | 0 | 0 | 40 |
| Oregon areas | 633 | 21,100 | 20,110 | 7,720 | 6,240 | 55,170 |
| Washington: | | | | | | |
| Okanogan N.F. | 2 | 370 | 0 | 0 | 0 | 370 |
| Umatilla N.F. | 7 | 80 | 230 | 0 | 0 | 310 |
| Spokane I.R. | 1 | 130 | 0 | 0 | 0 | 130 |
| Northeast Wash. District | 1 | 90 | 0 | 0 | 0 | 90 |
| Washington areas | 11 | 670 | 230 | 0 | 0 | 900 |
| Regional total | 644 | 21,770 | 20,340 | 7,720 | 6,240 | 56,070 |

^{1/} N.F., National Forest; I.R., Indian Reservation

WESTERN PINE BEETLE, *Dendroctonus brevicomis* Lec.

Host: Ponderosa pine.

Damage: Western pine beetle epidemics increased in many areas of eastern Oregon and decreased in eastern Washington. Scattered tree killing was observed throughout most pine stands in both States. In Oregon, 54 percent of the State's losses occurred on three National Forests-- Fremont, Malheur, and Ochoco (table 24). Significant damage was also reported on the Warm Springs Indian Reservation and the Rogue River National Forest. The most extensive tree killing in Washington occurred on the Yakima Indian Reservation (table 25).

Trend: Static to upward in both States.

Control: Increased sanitation-salvage programs in over-mature ponderosa pine stands should hold tree killing to a minimum. Logging infested trees aids in reducing beetle populations.

Table 24.--Trend of western pine beetle infestations
in Oregon and Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|---------|---------|---------|--------|--------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 2,950 | 5,010 | 4,780 | 3,470 | 6,200 |
| Fremont N.F. | 43,900 | 15,990 | 30,760 | 6,650 | 12,430 |
| Malheur N.F. | 14,790 | 42,180 | 26,770 | 14,730 | 9,640 |
| Mt. Hood N.F. | 1,530 | 0 | 60 | 260 | 1,330 |
| Ochoco N.F. | 5,040 | 16,870 | 14,760 | 6,070 | 12,850 |
| Rogue River N.F. | 4,430 | 1,180 | 1,200 | 640 | 7,090 |
| Siskiyou N.F. | 130 | 3,120 | 1,350 | 210 | 900 |
| Umatilla N.F. | 5,070 | 8,170 | 4,880 | 1,760 | 1,250 |
| Umpqua N.F. | 1,260 | 740 | 0 | 0 | 20 |
| Wallowa-Whitman National Forest | 4,510 | 5,480 | 6,410 | 740 | 2,270 |
| Willamette N.F. | 360 | 0 | 0 | 0 | 0 |
| Winema N.F. | 13,160 | 9,960 | 11,710 | 2,260 | 6,420 |
| Umatilla I.R. | 50 | 0 | 0 | 0 | 0 |
| Warm Springs I.R. | 480 | 440 | 1,480 | 880 | 5,240 |
| Central Oregon Dist. | 730 | 0 | 440 | 150 | 90 |
| Coos-Douglas Dist. | 0 | 2,170 | 0 | 0 | 100 |
| Crater Lake N.P. | 0 | 0 | 0 | 0 | 40 |
| Oregon areas | 98,390 | 111,310 | 104,600 | 37,820 | 65,870 |
| Washington: | | | | | |
| Colville N.F. | 2,160 | 920 | 1,760 | 0 | 0 |
| Gifford Pinchot National Forest | 3,840 | 2,400 | 0 | 0 | 480 |
| Okanogan N.F. | 7,500 | 3,810 | 3,640 | 1,380 | 470 |
| Snoqualmie N.F. | 0 | 0 | 1,180 | 0 | 0 |
| Umatilla N.F. | 80 | 510 | 0 | 110 | 70 |
| Wenatchee N.F. | 6,890 | 1,740 | 5,160 | 4,160 | 240 |
| Colville I.R. | 320 | 2,120 | 3,360 | 1,120 | 920 |
| Spokane I.R. | 0 | 1,280 | 1,280 | 120 | 0 |
| Yakima I.R. | 9,560 | 10,480 | 7,320 | 2,200 | 3,150 |
| Glenwood District | 8,860 | 840 | 940 | 520 | 1,400 |
| Northeast Wash. District | 60 | 0 | 280 | 0 | 0 |
| Washington areas | 39,270 | 24,100 | 24,920 | 9,610 | 6,730 |
| Regional total | 137,660 | 135,410 | 129,520 | 47,430 | 72,600 |

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation

Table 25.--Extent of western pine beetle infestations in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area ^{1/} | Intensity of infestation | | | | | All intensities |
|---------------------------------|--------------------------|--------|----------|-------|------------|-----------------|
| | Infestation centers | Light | Moderate | Heavy | Very heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 32 | 5,050 | 1,150 | 0 | 0 | 6,200 |
| Fremont N.F. | 90 | 10,870 | 1,560 | 0 | 0 | 12,430 |
| Malheur N.F. | 47 | 5,500 | 4,140 | 0 | 0 | 9,640 |
| Mt. Hood N.F. | 10 | 1,330 | 0 | 0 | 0 | 1,330 |
| Ochoco N.F. | 56 | 11,170 | 720 | 960 | 0 | 12,850 |
| Rogue River N.F. | 60 | 5,120 | 1,590 | 380 | 0 | 7,090 |
| Siskiyou N.F. | 12 | 560 | 340 | 0 | 0 | 900 |
| Umatilla N.F. | 27 | 1,090 | 0 | 160 | 0 | 1,250 |
| Umpqua N.F. | 1 | 20 | 0 | 0 | 0 | 20 |
| Wallowa-Whitman National Forest | 31 | 2,050 | 220 | 0 | 0 | 2,270 |
| Winema N.F. | 30 | 6,420 | 0 | 0 | 0 | 6,420 |
| Warm Springs I.R. | 16 | 2,900 | 1,740 | 600 | 0 | 5,240 |
| Central Oregon Dist. | 3 | 50 | 40 | 0 | 0 | 90 |
| Coos-Douglas Dist. | 1 | 100 | 0 | 0 | 0 | 100 |
| Crater Lake N.P. | 2 | 40 | 0 | 0 | 0 | 40 |
| Oregon areas | 418 | 52,270 | 11,500 | 2,100 | 0 | 65,870 |
| Washington: | | | | | | |
| Gifford Pinchot National Forest | 1 | 480 | 0 | 0 | 0 | 480 |
| Okanogan N.F. | 4 | 330 | 140 | 0 | 0 | 470 |
| Umatilla N.F. | 1 | 70 | 0 | 0 | 0 | 70 |
| Wenatchee N.F. | 3 | 160 | 80 | 0 | 0 | 240 |
| Colville I.R. | 2 | 920 | 0 | 0 | 0 | 920 |
| Yakima I.R. | 11 | 1,950 | 1,200 | 0 | 0 | 3,150 |
| Glenwood District | 4 | 1,400 | 0 | 0 | 0 | 1,400 |
| Washington areas | 26 | 5,310 | 1,420 | 0 | 0 | 6,730 |
| Regional total | 444 | 57,580 | 12,920 | 2,100 | 0 | 72,600 |

^{1/} N.F., National Forest; I.R., Indian Reservation; N.P., National Park

FIR ENGRAVER, *Scolytus ventralis* Lec.

Hosts: Grand fir, subalpine fir, and white fir.

Damage: Infestations in Oregon accounted for 88 percent of the losses in the Northwest (table 26). In Oregon, 66 percent of the outbreaks were found on the Wallowa-Whitman and Umatilla National Forests. Losses in Washington remained static with most of the tree killing occurring on the Okanogan National Forest (table 27).

Trend: Probably upward. Beetle activities increase during drought periods. The 1967 drought in Oregon, the longest on record, is expected to favor an increase in damage caused by the fir engraver.

Control: Control, other than logging merchantable, infested trees, is seldom necessary because fir engravers usually subside when moisture conditions return to normal. Spotting infested trees is difficult since broods frequently develop and emerge without killing the trees.

Table 26.--Trend of fir engraver infestations

Oregon and Washington, 1963-67

(In acres)

| Reporting area ^{1/} | Year | | | | |
|---------------------------------|--------|---------|--------|--------|--------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Deschutes N.F. | 430 | 290 | 60 | 0 | 40 |
| Fremont N.F. | 33,110 | 39,050 | 5,260 | 280 | 540 |
| Malheur N.F. | 1,810 | 5,090 | 5,400 | 450 | 490 |
| Mt. Hood N.F. | 620 | 120 | 270 | 580 | 580 |
| Ochoco N.F. | 1,840 | 9,930 | 8,770 | 810 | 1,710 |
| Rogue River N.F. | 80 | 1,170 | 270 | 730 | 2,130 |
| Siskiyou N.F. | 0 | 0 | 0 | 0 | 240 |
| Umatilla N.F. | 8,660 | 24,040 | 22,200 | 4,100 | 7,370 |
| Umpqua N.F. | 0 | 0 | 0 | 30 | 0 |
| Wallowa-Whitman N.F. | 8,370 | 36,120 | 19,310 | 3,360 | 11,760 |
| Willamette N.F. | 660 | 0 | 0 | 260 | 0 |
| Winema N.F. | 1,040 | 3,400 | 1,570 | 550 | 210 |
| Umatilla I.R. | 0 | 180 | 530 | 60 | 20 |
| Warm Springs I.R. | 50 | 0 | 0 | 0 | 160 |
| Crater Lake N.P. | 30 | 40 | 10 | 0 | 0 |
| Central Oregon Dist. | 1,580 | 710 | 150 | 270 | 290 |
| Lookout Mt. Dist. | 0 | 480 | 0 | 0 | 10 |
| Steens Mt. Dist. | 0 | 200 | 0 | 0 | 0 |
| Oregon areas | 58,280 | 120,820 | 63,800 | 11,480 | 25,550 |
| Washington: | | | | | |
| Colville N.F. | 880 | 490 | 2,580 | 180 | 100 |
| Gifford Pinchot N.F. | 160 | 0 | 100 | 0 | 0 |
| Kaniksu N.F. | 0 | 2,840 | 280 | 120 | 0 |
| Mt. Baker N.F. | 940 | 280 | 0 | 160 | 0 |
| Okanogan N.F. | 4,190 | 3,510 | 3,200 | 1,880 | 1,120 |
| Snoqualmie N.F. | 880 | 840 | 0 | 40 | 0 |
| Umatilla N.F. | 3,610 | 4,000 | 11,880 | 2,290 | 1,470 |
| Wenatchee N.F. | 5,040 | 2,860 | 3,340 | 1,120 | 320 |
| Colville I.R. | 0 | 80 | 490 | 80 | 160 |
| Yakima I.R. | 160 | 320 | 120 | 0 | 130 |
| Glenwood District | 0 | 0 | 0 | 0 | 280 |
| Washington areas | 15,860 | 15,220 | 21,990 | 5,870 | 3,580 |
| Regional total | 74,140 | 136,040 | 85,790 | 17,350 | 29,130 |

^{1/} N.F., National Forest; N.P., National Park; I.R., Indian Reservation

Table 27.--Extent of fir engraver infestations
in Oregon and Washington in 1967, by
reporting area and intensity of
infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All inten- sities |
|------------------------------------|-----------------------------------|---------|------------|---------|-------------------|-------------------------|
| | : Infes- : tation : centers | : Light | : Moderate | : Heavy | : Very : heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Deschutes N.F. | 1 | 40 | 0 | 0 | 0 | 40 |
| Fremont N.F. | 8 | 330 | 210 | 0 | 0 | 540 |
| Malheur N.F. | 12 | 460 | 30 | 0 | 0 | 490 |
| Mt. Hood N.F. | 12 | 520 | 60 | 0 | 0 | 580 |
| Ochoco N.F. | 12 | 620 | 370 | 200 | 520 | 1,710 |
| Rogue River N.F. | 16 | 2,130 | 0 | 0 | 0 | 2,130 |
| Siskiyou N.F. | 4 | 240 | 0 | 0 | 0 | 240 |
| Umatilla N.F. | 102 | 2,980 | 2,970 | 780 | 640 | 7,370 |
| Wallowa-Whitman National Forest | 115 | 5,970 | 3,930 | 1,800 | 60 | 11,760 |
| Winema N.F. | 2 | 210 | 0 | 0 | 0 | 210 |
| Umatilla I.R. | 2 | 20 | 0 | 0 | 0 | 20 |
| Warm Springs I.R. | 4 | 160 | 0 | 0 | 0 | 160 |
| Central Oregon District | 8 | 290 | 0 | 0 | 0 | 290 |
| Lookout Mt. Dist. | 1 | 10 | 0 | 0 | 0 | 10 |
| Oregon areas | 299 | 13,980 | 7,570 | 2,780 | 1,220 | 25,550 |
| Washington: | | | | | | |
| Okanogan N.F. | 8 | 360 | 390 | 370 | 0 | 1,120 |
| Umatilla N.F. | 31 | 1,200 | 270 | 0 | 0 | 1,470 |
| Wenatchee N.F. | 2 | 320 | 0 | 0 | 0 | 320 |
| Colville N.F. | 1 | 0 | 100 | 0 | 0 | 100 |
| Colville I.R. | 1 | 0 | 0 | 160 | 0 | 160 |
| Yakima I.R. | 1 | 130 | 0 | 0 | 0 | 130 |
| Glenwood Dist. | 2 | 280 | 0 | 0 | 0 | 280 |
| Washington areas | 46 | 2,290 | 760 | 530 | 0 | 3,580 |
| Regional total | 345 | 16,270 | 8,330 | 3,310 | 1,220 | 29,130 |

1/ N.F., National Forest; I.R., Indian Reservation

SILVER FIR BEETLES, *Pseudohylesinus* spp.

Host: Pacific silver fir.

Damage: Outbreaks of these beetles subsided (table 28). Epidemic outbreaks occurred on several areas of the Mt. Baker and Snoqualmie National Forests in Washington (table 29). Many of the infested areas are also heavily infected with *Armillaria mellea* root rot. For the fifth consecutive year, no outbreaks were reported in Oregon.

Trend: Presumably downward.

Control: No control other than logging infested trees and those of declining thrift in outbreak centers is needed in 1968.

Table 28.--Trend of silver fir beetles infestations
in Washington, 1963-67

(In acres)

| Reporting area ^{1/} | Year | | | | |
|---------------------------------|--------|-------|-------|--------|-------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Washington: | | | | | |
| Gifford Pinchot N.F. | 200 | 0 | 0 | 120 | 0 |
| Mt. Baker N.F. | 51,120 | 520 | 5,660 | 9,740 | 4,650 |
| Olympic N.F. | 0 | 0 | 1,440 | 400 | 640 |
| Snoqualmie N.F. | 3,360 | 560 | 1,260 | 1,000 | 1,400 |
| Southwest Wash. District | 0 | 0 | 0 | 120 | 80 |
| Olympic N.P. | 0 | 150 | 920 | 1,120 | 280 |
| Mt. Rainier N.P. | 160 | 0 | 0 | 0 | 0 |
| Washington areas | 54,840 | 1,230 | 9,280 | 12,500 | 7,050 |
| Regional total | 54,840 | 1,230 | 9,280 | 12,500 | 7,050 |

^{1/} N.F., National Forest; N.P., National Park

Table 29.--Extent of silver fir beetles infestations in Washington in 1967, by reporting area and intensity of infestation

| Reporting area ^{1/} | Intensity of infestation | | | | | All intensities |
|------------------------------|--------------------------|-------|----------|-------|------------|-----------------|
| | Infestation centers | Light | Moderate | Heavy | Very heavy | |
| | Number | Acres | | | | |
| Washington: | | | | | | |
| Mt. Baker N.F. | 17 | 2,260 | 2,390 | 0 | 0 | 4,650 |
| Olympic N.F. | 3 | 640 | 0 | 0 | 0 | 640 |
| Snoqualmie N.F. | 7 | 1,160 | 240 | 0 | 0 | 1,400 |
| Southwest Wash. District | 1 | 80 | 0 | 0 | 0 | 80 |
| Olympic N.P. | 2 | 160 | 120 | 0 | 0 | 280 |
| Washington areas | 30 | 4,300 | 2,750 | 0 | 0 | 7,050 |
| Regional total | 30 | 4,300 | 2,750 | 0 | 0 | 7,050 |

^{1/} N.F., National Forest; N.P., National Park

ENGELMANN SPRUCE BEETLE, *Dendroctonus obesus* (Mann.)

Host: Engelmann spruce.

Damage: Infestations remained static in Washington with most of the tree killing centered on the Okanogan National Forest (table 30). In Oregon, all of the losses occurred on the Wallowa-Whitman and Umatilla National Forests (table 31). Most of the infested acreage in both States is found at high elevations and in inaccessible areas.

Trend: Static in both Washington and Oregon.

Control: None is needed. In accessible stands, infested merchantable trees should be salvaged to reduce beetle populations.

Table 30.--Trend of Engelmann spruce beetle infestations in Oregon and Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------------|--------|-------|--------|--------|-------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Malheur N.F. | 0 | 0 | 0 | 310 | 0 |
| Umatilla N.F. | 1,420 | 840 | 190 | 520 | 300 |
| Wallowa-Whitman National Forest | 2,690 | 2,760 | 7,220 | 5,340 | 2,870 |
| Oregon areas | 4,110 | 3,600 | 7,410 | 6,170 | 3,170 |
| Washington: | | | | | |
| Colville N.F. | 0 | 0 | 0 | 160 | 240 |
| Kaniksu N.F. | 0 | 0 | 0 | 0 | 390 |
| Okanogan N.F. | 4,890 | 280 | 380 | 2,000 | 3,760 |
| Snoqualmie N.F. | 1,480 | 0 | 0 | 0 | 0 |
| Umatilla N.F. | 4,040 | 320 | 310 | 30 | 140 |
| Wenatchee N.F. | 600 | 0 | 3,080 | 1,840 | 120 |
| Colville I.R. | 0 | 0 | 0 | 160 | 0 |
| Yakima I.R. | 0 | 0 | 0 | 240 | 0 |
| Washington areas | 11,010 | 600 | 3,770 | 4,430 | 4,650 |
| Regional total | 15,120 | 4,200 | 11,180 | 10,600 | 7,820 |

1/ N.F., National Forest; I.R., Indian Reservation

Table 31.--Extent of Engelmann spruce beetle infestations
in Oregon and Washington in 1967, by reporting
area and intensity of infestation

| Reporting area ^{1/} | : Infes- : Intensity of infestation : All : tation : : : Very : inten- : centers: Light: Moderate : Heavy: heavy: sites | | | | | |
|------------------------------------|---|-----------------------|-------|-------|-----|-------|
| | Number | - - - - Acres - - - - | | | | |
| Oregon: | | | | | | |
| Umatilla N.F. | 6 | 230 | 70 | 0 | 0 | 300 |
| Wallowa-Whitman National Forest | 16 | 840 | 1,530 | 500 | 0 | 2,870 |
| Oregon areas | 22 | 1,070 | 1,600 | 500 | 0 | 3,170 |
| Washington: | | | | | | |
| Okanogan N.F. | 15 | 1,600 | 1,340 | 620 | 200 | 3,760 |
| Umatilla N.F. | 3 | 90 | 50 | 0 | 0 | 140 |
| Wenatchee N.F. | 1 | 120 | 0 | 0 | 0 | 120 |
| Colville N.F. | 2 | 240 | 0 | 0 | 0 | 240 |
| Kaniksu N.F. | 3 | 390 | 0 | 0 | 0 | 390 |
| Washington areas | 24 | 2,440 | 1,390 | 620 | 200 | 4,650 |
| Regional total | 46 | 3,510 | 2,990 | 1,120 | 200 | 7,820 |

^{1/} N.F., National Forest

CONE AND SEED INSECTS

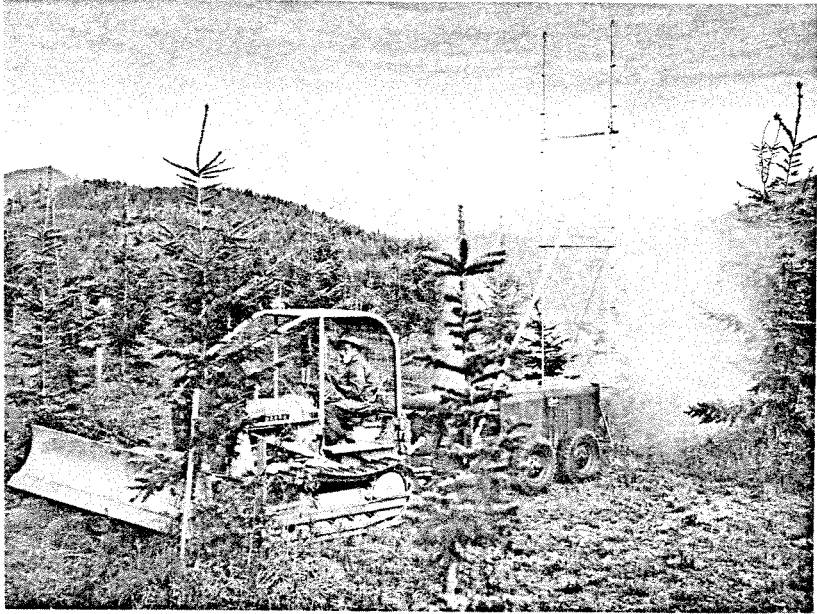
The detection and evaluation of cone and seed insects have become important with the establishment of Douglas-fir production areas on many of the westside National Forests. Some of the major cone and seed insects causing problems are as follows:

| <u>Common Name</u> | |
|--------------------------|--|
| Douglas-fir cone midge | <i>Contarinia oregonensis</i> Foote |
| Scale midge | <i>Contarinia washingtonensis</i> Johnson |
| Douglas-fir cone moth | <i>Barbara colfaxiana</i> (Kearf.) |
| Fir cone worm | <i>Dioryctria abietella</i> (D. & S.) |
| Douglas-fir seed chalcid | <i>Megastigmus spermatrophus</i> Wachtl |

The 1966 Douglas-fir cone crop was generally very good and the seeds were viable. The seed and cone insects were attracted but scattered and absorbed by the plentiful crop and their damage was considered to be light. In contrast the 1967 crop was very light and the lack of pollen reduced filled seed numbers. Cones at the Siskiyou and Olympic National Forests seed areas were heavily infested with cone midges. Cone moths continue to reduce seed yield at the Peavine seed production area on the Rogue River National Forest. The lack of filled seed reduced Douglas-fir seed chalcid impact. Remaining seed production areas contained so few cones that it would be too costly to collect and evaluate the insect problems.

A limited cone and seed insect control project was carried on at Buckhead seed production area on the Willamette National Forest. A one percent dimethoate spray was applied by ground hydraulic equipment. Total seed loss of the unsprayed cones amounted to 60 percent while the sprayed cones sustained an 8 percent loss.

Early indications reveal that the Douglas-fir cone crop in 1968 might be heavy. Pollen production in some areas is also expected to be heavy.



Spraying to control Douglas-fir cone and seed insects in a seed orchard.

OTHER FOREST PEST PROBLEMS

A TENT CATERPILLAR, *Malacosoma* sp.

Larval feeding caused moderate to heavy defoliation on red alder in the Coast Range of Oregon from the Columbia River south to the Coquille River (table 32). Some defoliation is expected in 1968. Control is not needed since parasites usually check most outbreaks before any tree killing occurs.

HEMLOCK SAWFLY, *Neodiprion tsugae* Midd

Very light defoliation of western hemlock occurred on the Bear Springs District, Mt. Hood National Forest, Oregon, and around Spirit Lake on the Gifford Pinchot National Forest, Washington. The trend is undetermined, but is presumed to be downward. No control is needed in 1968. High parasitism should hold tree damage to a low level.

SAWFLIES, *Neodiprion* spp.

Moderate but limited damage occurred in true fir stands on the Winema and Mt. Hood National Forest in Oregon (table 33). A different *Neodiprion* sawfly was found defoliating knobcone pine on the Siskiyou National Forests (table 34). The trend is unknown for either of the two species. Control is seldom necessary as parasites usually check most sawfly outbreaks in a year or two.

BLACK-HEADED BUDWORM, *Acleris variana* (Fern.)

In several true fir and Douglas-fir stands, very light populations exist on the Mt. Hood National Forest in Oregon and on the Gifford Pinchot National Forest in Washington. Elsewhere, this insect was more prevalent than normal, but it caused no damage. No large outbreaks are expected in 1968.

DOUGLAS-FIR TUSSOCK MOTH, *Hemerocampa pseudotsugata* McD.

Douglas-fir tussock moth was not found at any of the 30 permanent ground plots in Oregon and Washington. These plots were established in 1966 and have been visited annually to detect very light tussock moth and other defoliator populations.

SPRUCE BUDWORM, *Choristoneura fumiferana* (Clem.)

Spruce budworm was not detected in either Oregon or Washington. The same 60 plots used for the Douglas-fir tussock moth ground surveys are used for the spruce budworm.

SPRUCE APHID, *Neomyzaphis abietina* (Wlkr.)

Spruce aphid caused light defoliation to Sitka spruce along the Columbia River in Oregon and Washington. The trend is unknown. Control is not needed in 1968.

GREEN-STRIPED FOREST LOOPER, *Melanophia imitata* (Wlkr.)

The green-striped forest looper was found on several of the hemlock looper plots in Oregon and Washington, but no serious defoliation is expected in 1968.

CYPRESS TIP MOTH, *Argyresthia* prob. *franciscella* Busck

A Cypress tip moth caused light to moderate defoliation of western redcedar in the Ozette Lake area of the Olympic National Park, Washington. Severe tree damage has not occurred, nor is any expected. Moth populations should lower next year due to high larval parasitism.

Table 32.--Extent of forest tent caterpillar infestations in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | :Infes- : Intensity of infestation : All :tation : : : :Very :inten- :centers:Light: Moderate :Heavy:heavy:sities | | | | | |
|---------------------------|---|------------------------------|--------|---|---|--------|
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Oregon: | | | | | | |
| Siuslaw N.F. | 4 | 110 | 3,641 | 0 | 0 | 3,751 |
| Northwest Oregon District | 4 | 0 | 7,240 | 0 | 0 | 7,240 |
| Oregon areas | 8 | 110 | 10,881 | 0 | 0 | 10,991 |
| Regional total | 8 | 110 | 10,881 | 0 | 0 | 10,991 |

1/ N.F., National Forest

Table 33.--Extent of sawfly infestations on true firs in Oregon in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | :Infes- : Intensity of infestation : All :tation : : : :Very :inten- :centers:Light: Moderate :Heavy:heavy:sities | | | | | |
|--------------------------|---|------------------------------|-----|-----|---|-------|
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Oregon: | | | | | | |
| Mt. Hood N.F. | 1 | 1,200 | 0 | 0 | 0 | 1,200 |
| Winema N.F. | 1 | 0 | 210 | 710 | 0 | 920 |
| Warm Springs I.R. | 1 | 2,280 | 0 | 0 | 0 | 2,280 |
| Oregon areas | 3 | 3,480 | 210 | 710 | 0 | 4,400 |
| Regional total | 3 | 3,480 | 210 | 710 | 0 | 4,400 |

1/ N.F., National Forest; I.R., Indian Reservation

Table 34.--Extent of sawfly infestations on knob-
cone pine in 1967, by reporting area
and intensity of infestation

| Reporting area 1/ | Intensity of infestation | | | | | |
|----------------------|-----------------------------------|-------------|-------------|--------------|-------------------|-------------------------------|
| | : Infes- : tation : centers | : : : | : : : | : : : | : Very : heavy | : All : inten- : sities |
| | <u>Number</u> | | | <u>Acres</u> | | |
| Oregon: | | | | | | |
| Siskiyou N.F. | 15 | 320 | 2,380 | 1,700 | 1,620 | 6,020 |
| Oregon areas | 15 | 320 | 2,380 | 1,700 | 1,620 | 6,020 |
| Regional total | 15 | 320 | 2,380 | 1,700 | 1,620 | 6,020 |

1/ N.F., National Forest

ALDER FLEA BEETLE, *Altica ambiens* (LeC.)

Light larval feeding was observed on red alder in the Coast Range in Oregon. Continued defoliation is expected in localized areas in 1968. Control is seldom necessary since most outbreaks subside before tree mortality occurs.

DOUGLAS-FIR ENGRAVER, *Scolytus unispinosus* (LeC.)

Several epidemics of the Douglas-fir engraver were detected in Oregon on the Siuslaw and Umpqua National Forests (table 35). The damage occurs in the tops of Douglas-firs. The trend is expected to remain static next year. Small drought-weakened trees in plantations were killed by the beetle on the Willamette National Forest. Control efforts against this pest are limited to salvaging accessible, merchantable, infested trees and those of declining thrift in the outbreak centers.

Table 35.--Extent of Douglas-fir engraver infestations in Oregon in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | :Infes- : :tation : :centers | : Intensity of infestation : : : : : :Light: Moderate: Heavy : Very : : : : : heavy | | | | : All : :inten- : :sites |
|--------------------------|------------------------------------|--|-----------------------|---|---|--------------------------------|
| | | Number | - - - - Acres - - - - | | | |
| Oregon: | | | | | | |
| Siuslaw N.F. | 2 | 200 | 0 | 0 | 0 | 200 |
| Umpqua N.F. | 1 | 20 | 0 | 0 | 0 | 20 |
| Oregon areas | 3 | 220 | 0 | 0 | 0 | 220 |
| Regional total | 3 | 220 | 0 | 0 | 0 | 220 |

1/ N.F., National Forest

DYING HEMLOCK

The acreage of mature and overmature western hemlock dying from unknown causes decreased slightly (table 36). The majority of the dying hemlock was found on the Mt. Baker and Olympic National Forests and the Olympic National Park (table 37). Two small centers of dying hemlock were found on the Gifford Pinchot National Forest.

Table 36.--Trend of dying hemlock in Oregon and Washington, 1963-67

(In acres)

| Reporting area <u>1/</u> | Year | | | | |
|------------------------------|---------|---------|--------|--------|--------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Northwest Oregon District | 3,820 | 0 | 0 | 80 | 0 |
| Siuslaw N.F. | 0 | 0 | 0 | 0 | 0 |
| Oregon areas | 3,820 | 0 | 0 | 80 | 0 |
| Washington: | | | | | |
| Gifford Pinchot N.F. | 0 | 0 | 0 | 0 | 170 |
| Mt. Baker N.F. | 42,760 | 115,340 | 57,690 | 41,160 | 21,920 |
| Olympic N.F. | 80,720 | 60,830 | 16,040 | 6,680 | 17,940 |
| Olympic N.P. | 32,480 | 21,450 | 5,200 | 5,480 | 4,680 |
| Snoqualmie N.F. | 2,560 | 0 | 2,480 | 2,200 | 0 |
| Southwest Wash. District | 0 | 0 | 2,080 | 240 | 0 |
| Northwest Wash. District | 0 | 5,840 | 2,000 | 0 | 0 |
| Quinault I.R. | 1,800 | 0 | 0 | 0 | 0 |
| Washington areas | 160,320 | 203,460 | 85,490 | 55,760 | 44,710 |
| Regional total | 164,140 | 203,460 | 85,490 | 55,840 | 44,710 |

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation

Table 37.--Extent of dying hemlock in Washington
in 1967, by reporting area and intensity
of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All inten- sities |
|------------------------------------|-------------------------------|------------------------------|---------------------|------------------|---------------------------|-------------------------|
| | Infes- :tation :centers | : : :Light | : : :Moderate | : : :Heavy | : : :Very :heavy | |
| | <u>Number</u> | - - - - <u>Acres</u> - - - - | | | | |
| Washington: | | | | | | |
| Gifford Pinchot National Forest | 2 | 120 | 50 | 0 | 0 | 170 |
| Mt. Baker N.F. | 31 | 12,840 | 8,560 | 520 | 0 | 21,920 |
| Olympic N.F. | 7 | 12,200 | 3,900 | 1,840 | 0 | 17,940 |
| Olympic N.P. | 5 | 3,440 | 1,240 | 0 | 0 | 4,680 |
| Washington areas | 45 | 28,600 | 13,750 | 2,360 | 0 | 44,710 |
| Regional total | 45 | 28,600 | 13,750 | 2,360 | 0 | 44,710 |

1/ N.F., National Forest; N.P., National Park

TREE DAMAGE BY BEARS

Tree damage and killing by bears in young Douglas-fir and western hemlock stands increased in Washington and decreased in Oregon (table 38). The seriousness of this problem is compounded by bears habitually working in understocked stands. Serious damage occurred on the Siuslaw and Willamette National Forests and on the Northwest Oregon District (table 39). In Washington the most seriously damaged areas were on the Gifford Pinchot, Olympic, and Snoqualmie National Forests and the Southwest Washington District. The outlook for next year is for little overall change with local areas increasing or decreasing in damage received.

Table 38.--Trend of tree damage by bears in Oregon
and Washington, 1963-67

(In acres)

| Reporting area ^{1/} | Year | | | | |
|------------------------------------|----------------|----------------|---------------|---------------|---------------|
| | 1963 | 1964 | 1965 | 1966 | 1967 |
| Oregon: | | | | | |
| Mt. Hood N.F. | 2,720 | 960 | 1,510 | 2,000 | 620 |
| Siskiyou N.F. | 0 | 80 | 0 | 0 | 0 |
| Siuslaw N.F. | 27,810 | 7,100 | 3,410 | 8,130 | 3,640 |
| Umpqua N.F. | 150 | 180 | 0 | 0 | 1,080 |
| Willamette N.F. | 2,250 | 7,200 | 2,100 | 5,270 | 2,750 |
| Northwest Oregon District | 32,610 | 37,770 | 10,330 | 20,560 | 10,260 |
| Oregon areas | 65,540 | 53,290 | 17,350 | 35,960 | 18,350 |
| Washington: | | | | | |
| Gifford Pinchot National Forest | 36,620 | 19,220 | 26,440 | 10,280 | 22,740 |
| Olympic N.F. | 59,800 | 32,390 | 30,320 | 5,200 | 20,860 |
| Snoqualmie N.F. | 18,730 | 6,760 | 10,420 | 1,960 | 2,560 |
| Quinault I.R. | 360 | 2,280 | 560 | 160 | 200 |
| Yakima I.R. | 0 | 240 | 0 | 280 | 0 |
| Southwest Wash. District | 34,560 | 12,390 | 12,200 | 18,160 | 18,380 |
| Glenwood District | 0 | 0 | 0 | 760 | 220 |
| Puget Sound Dist. | 0 | 0 | 260 | 0 | 0 |
| Olympic N.P. | 0 | 0 | 380 | 0 | 0 |
| Mt. Rainier N.P. | 0 | 0 | 0 | 0 | 90 |
| Washington areas | 150,070 | 73,280 | 80,580 | 36,800 | 65,050 |
| Regional total | 215,610 | 126,570 | 97,930 | 72,760 | 83,400 |

^{1/} N.F., National Forest; N.P., National Park; I.R., Indian Reservation

Table 39.--Extent of bear damage in Oregon and Washington in 1967, by reporting area and intensity of infestation

| Reporting area <u>1/</u> | Intensity of infestation | | | | | All intensities |
|---------------------------------|--------------------------|--------|----------|-------|------------|-----------------|
| | Infestation centers | Light | Moderate | Heavy | Very heavy | |
| | Number | Acres | | | | |
| Oregon: | | | | | | |
| Mt. Hood N.F. | 9 | 620 | 0 | 0 | 0 | 620 |
| Siuslaw N.F. | 43 | 3,170 | 470 | 0 | 0 | 3,640 |
| Umpqua N.F. | 3 | 1,080 | 0 | 0 | 0 | 1,080 |
| Willamette N.F. | 26 | 2,180 | 570 | 0 | 0 | 2,750 |
| Northwest Oregon District | 72 | 7,630 | 2,630 | 0 | 0 | 10,260 |
| Oregon areas | 153 | 14,680 | 3,670 | 0 | 0 | 18,350 |
| Washington: | | | | | | |
| Gifford Pinchot National Forest | 33 | 14,240 | 7,700 | 520 | 280 | 22,740 |
| Olympic N.F. | 50 | 14,100 | 4,720 | 1,400 | 640 | 20,860 |
| Snoqualmie N.F. | 9 | 1,320 | 1,240 | 0 | 0 | 2,560 |
| Quinault I.R. | 1 | 200 | 0 | 0 | 0 | 200 |
| Southwest Wash. District | 34 | 11,480 | 4,680 | 1,380 | 840 | 18,380 |
| Glenwood District | 1 | 220 | 0 | 0 | 0 | 220 |
| Mt. Rainier N.P. | 1 | 0 | 90 | 0 | 0 | 90 |
| Washington areas | 129 | 41,560 | 18,430 | 3,300 | 1,760 | 65,050 |
| Regional total | 282 | 56,240 | 22,100 | 3,300 | 1,760 | 83,400 |

1/ N.F., National Forest; N.P., National Park; I.R., Indian Reservation

APPENDIX

Aerial surveys: The general aerial detection surveys were made in July and August. The surveys were coordinated by the U. S. Forest Service in cooperation with the Oregon State Department of Forestry and the Washington State Department of Natural Resources. Larch casebearer surveys in early June in north-eastern Washington were coordinated with Region 1, U. S. Forest Service, Missoula Montana. Flying time for all aerial surveys totaled 222.8 hours (table 40).

Table 40.--Summary of cooperative aerial survey activities in 1967

| Area covered | : Timber area : : surveyed | : <u>Survey flight time</u> : | | |
|--------------------|-------------------------------|-------------------------------|--------------|---------|
| | | : Mapping | : Ferry | : Total |
| | <u>M acres</u> | - - - | <u>Hours</u> | - - - |
| Western Oregon | 15,858 | 54.5 | 4.5 | 59.0 |
| Eastern Oregon | 14,881 | 48.2 | 7.6 | 55.8 |
| All Oregon | 30,739 | 102.7 | 12.1 | 114.8 |
| Western Washington | 13,061 | 36.1 | 6.2 | 42.3 |
| Eastern Washington | 9,989 | 51.4 | 14.3 | 65.7 |
| All Washington | 23,050 | 87.5 | 20.5 | 108.0 |
| All areas | 53,789 | 190.2 | 32.6 | 222.8 |

Table 41.--Extent of infestations in Oregon in 1967, by reporting area, insect species, and intensity of infestation

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers: | Intensity of infestation | | | | : All : inten- : sities |
|--|---------------------------------|--------------------------|------------|---------|---------|-------------------------------|
| | | : Light | : Moderate | : Heavy | : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Central Oregon District: | | | | | | |
| Douglas-fir beetle | 1 | 10 | 0 | 0 | 0 | 10 |
| Fir engraver | 8 | 290 | 0 | 0 | 0 | 290 |
| Mountain pine beetle (P) | 2 | 50 | 0 | 600 | 0 | 650 |
| Oregon pine ips | 5 | 120 | 0 | 0 | 0 | 120 |
| Western pine beetle | 3 | 50 | 40 | 0 | 0 | 90 |
| All insects | 19 | 520 | 40 | 600 | 0 | 1,160 |
| All damage | 19 | 520 | 40 | 600 | 0 | 1,160 |
| Coos-Douglas District: | | | | | | |
| Douglas-fir beetle | 96 | 5,300 | 2,120 | 280 | 0 | 7,700 |
| Oregon pine ips | 1 | 40 | 0 | 0 | 0 | 40 |
| Western pine beetle | 1 | 100 | 0 | 0 | 0 | 100 |
| All insects | 98 | 5,440 | 2,120 | 280 | 0 | 7,840 |
| All damage | 98 | 5,440 | 2,120 | 280 | 0 | 7,840 |

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See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers: | Intensity of infestation | | | | : All : inten- : sities |
|--|---------------------------------|--------------------------|------------|---------|-------------------|-------------------------------|
| | | : Light | : Moderate | : Heavy | : Very : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Crater Lake N.P.: | | | | | | |
| Mountain pine beetle (L) | 4 | 990 | 800 | 0 | 410 | 2,200 |
| Mountain pine beetle (W) | 1 | 60 | 0 | 0 | 0 | 60 |
| Western pine beetle | 2 | 40 | 0 | 0 | 0 | 40 |
| Balsam woolly aphid | 10 | 3,920 | 200 | 0 | 0 | 4,120 |
| All insects | 17 | 5,010 | 1,000 | 0 | 410 | 6,420 |
| All damage | 17 | 5,010 | 1,000 | 0 | 410 | 6,420 |
| Deschutes N.F.: | | | | | | |
| Fir engraver | 1 | 40 | 0 | 0 | 0 | 40 |
| Mountain pine beetle (L) | 86 | 6,870 | 2,600 | 4,440 | 940 | 14,850 |
| Mountain pine beetle (W) | 4 | 140 | 0 | 0 | 0 | 140 |
| Mountain pine beetle (P) | 20 | 1,280 | 180 | 0 | 0 | 1,460 |
| Oregon pine ips | 8 | 280 | 0 | 0 | 0 | 280 |
| Western pine beetle | 32 | 5,050 | 1,150 | 0 | 0 | 6,200 |
| Balsam woolly aphid | 58 | 4,890 | 720 | 180 | 0 | 5,790 |
| Needle miners (L) | 20 | 37,560 | 6,080 | 2,640 | 0 | 46,280 |
| All insects | 229 | 56,110 | 10,730 | 7,260 | 940 | 75,040 |
| All damage | 229 | 56,110 | 10,730 | 7,260 | 940 | 75,040 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers | Intensity of infestation | | | | : All : Very : heavy : sites |
|--|--------------------------------|--------------------------|------------|---------|---------|---------------------------------------|
| | | : Light | : Moderate | : Heavy | : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Fremont N.F.: | | | | | | |
| Fir engraver | 8 | 330 | 210 | 0 | 0 | 540 |
| Mountain pine beetle (L) | 80 | 21,030 | 72,360 | 2,350 | 13,950 | 109,690 |
| Mountain pine beetle (P) | 51 | 4,820 | 210 | 280 | 0 | 5,310 |
| Oregon pine ips | 35 | 940 | 910 | 910 | 0 | 2,760 |
| Western pine beetle | 90 | 10,870 | 1,560 | 0 | 0 | 12,430 |
| All insects | 264 | 37,990 | 75,250 | 3,540 | 13,950 | 130,730 |
| All damage | 264 | 37,990 | 75,250 | 3,540 | 13,950 | 130,730 |
| Lookout Mt. District: | | | | | | |
| Douglas-fir beetle | 1 | 10 | 0 | 0 | 0 | 10 |
| Fir engraver | 1 | 10 | 0 | 0 | 0 | 10 |
| All insects | 2 | 20 | 0 | 0 | 0 | 20 |
| All damage | 2 | 20 | 0 | 0 | 0 | 20 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers | Intensity of infestation | | | | : All : inten- : sites |
|--|--------------------------------|--------------------------|------------|---------|-------------------|------------------------------|
| | | : Light | : Moderate | : Heavy | : Very : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Malheur N.F.: | | | | | | |
| Fir engraver | 12 | 460 | 30 | 0 | 0 | 490 |
| Mountain pine beetle (L) | 25 | 1,770 | 2,740 | 1,360 | 0 | 5,870 |
| Mountain pine beetle (P) | 29 | 1,430 | 760 | 510 | 0 | 2,700 |
| Oregon pine ips | 118 | 3,650 | 2,060 | 1,140 | 2,930 | 9,780 |
| Western pine beetle | 47 | 5,500 | 4,140 | 0 | 0 | 9,640 |
| Spider mite | 6 | 350 | 0 | 0 | 0 | 350 |
| All insects | 237 | 13,160 | 9,730 | 3,010 | 2,930 | 28,830 |
| All damage | 237 | 13,160 | 9,730 | 3,010 | 2,930 | 28,830 |
| Mt. Hood N.F.: | | | | | | |
| Douglas-fir beetle | 10 | 320 | 130 | 130 | 0 | 580 |
| Fir engraver | 12 | 520 | 60 | 0 | 0 | 580 |
| Mountain pine beetle (W) | 65 | 5,640 | 1,400 | 360 | 110 | 7,510 |
| Mountain pine beetle (P) | 12 | 1,040 | 640 | 0 | 0 | 1,680 |
| Oregon pine ips | 42 | 1,080 | 1,260 | 290 | 50 | 2,680 |
| Western pine beetle | 10 | 1,330 | 0 | 0 | 0 | 1,330 |
| Balsam woolly aphid | 90 | 22,740 | 3,380 | 280 | 0 | 26,400 |
| Sawflies on true firs | 1 | 1,200 | 0 | 0 | 0 | 1,200 |
| Larch sawfly | 2 | 0 | 200 | 480 | 0 | 680 |
| Sawflies on hemlock | 1 | 500 | 0 | 0 | 0 | 500 |
| All insects | 245 | 34,370 | 7,070 | 1,540 | 160 | 43,140 |
| Bear damage | 9 | 620 | 0 | 0 | 0 | 620 |
| All damage | 254 | 34,990 | 7,070 | 1,540 | 160 | 43,760 |

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See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved | 1/ | 2/ | :Infes- :tation :centers: | Intensity of infestation | | | | : All : inten- : sities |
|--|-----|----|---------------------------------|--------------------------|----------|-------|---------------|-------------------------------|
| | | | | Light | Moderate | Heavy | Very heavy | |
| | | | Number | ----- Acres ----- | | | | |
| Northwest Oregon District: | | | | | | | | |
| Douglas-fir beetle | 4 | | 220 | 0 | 0 | 0 | 0 | 220 |
| Tent caterpillar on red alder | 4 | | 0 | 7,240 | 0 | 0 | 0 | 7,240 |
| All insects | 8 | | 220 | 7,240 | 0 | 0 | 0 | 7,460 |
| Bear damage | 72 | | 7,630 | 2,630 | 0 | 0 | 0 | 10,260 |
| All damage | 80 | | 7,850 | 9,870 | 0 | 0 | 0 | 17,720 |
| Ochoco N.F.: | | | | | | | | |
| Fir engraver | 12 | | 620 | 370 | 200 | 520 | 0 | 1,710 |
| Mountain pine beetle (P) | 26 | | 1,700 | 70 | 320 | 0 | 0 | 2,090 |
| Oregon pine ips | 23 | | 880 | 310 | 70 | 70 | 0 | 1,330 |
| Western pine beetle | 56 | | 11,170 | 720 | 960 | 0 | 0 | 12,850 |
| All insects | 117 | | 14,370 | 1,470 | 1,550 | 590 | 0 | 17,980 |
| All damage | 117 | | 14,370 | 1,470 | 1,550 | 590 | 0 | 17,980 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | : Infes- : tation : centers: | Intensity of infestation | | | | : All : Very : heavy : sities |
|--|------------------------------------|--------------------------|----------|-------|-------|--|
| | | Light | Moderate | Heavy | heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Rogue River N.F.: | | | | | | |
| Douglas-fir beetle | 131 | 6,940 | 1,820 | 660 | 0 | 9,420 |
| Fir engraver | 16 | 2,130 | 0 | 0 | 0 | 2,130 |
| Mountain pine beetle (S) | 7 | 520 | 0 | 0 | 0 | 520 |
| Mountain pine beetle (W) | 8 | 570 | 150 | 0 | 0 | 720 |
| Mountain pine beetle (P) | 9 | 1,510 | 0 | 0 | 0 | 1,510 |
| Oregon pine ips | 24 | 1,540 | 530 | 0 | 0 | 2,070 |
| Western pine beetle | 60 | 5,120 | 1,590 | 380 | 0 | 7,090 |
| Balsam woolly aphid | 21 | 7,520 | 1,000 | 0 | 0 | 8,520 |
| All insects | 276 | 25,850 | 5,090 | 1,040 | 0 | 31,980 |
| All damage | 276 | 25,850 | 5,090 | 1,040 | 0 | 31,980 |
| Siskiyou N.F.: | | | | | | |
| Douglas-fir beetle | 170 | 11,510 | 3,410 | 1,240 | 0 | 16,160 |
| Fir engraver | 4 | 240 | 0 | 0 | 0 | 240 |
| Mountain pine beetle (S) | 4 | 180 | 0 | 0 | 0 | 180 |
| Mountain pine beetle (W) | 11 | 800 | 0 | 0 | 0 | 800 |
| Mountain pine beetle (P) | 1 | 80 | 0 | 0 | 0 | 80 |
| Oregon pine ips | 3 | 350 | 0 | 0 | 0 | 350 |
| Western pine beetle | 12 | 560 | 340 | 0 | 0 | 900 |
| Balsam woolly aphid | 25 | 2,990 | 1,670 | 0 | 0 | 4,660 |
| Sawflies | 15 | 320 | 2,380 | 1,700 | 1,620 | 6,020 |
| All insects | 245 | 17,030 | 7,800 | 2,940 | 1,620 | 29,390 |
| All damage | 245 | 17,030 | 7,800 | 2,940 | 1,620 | 29,390 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers: | Intensity of infestation | | | | : All : Very : heavy : sites |
|--|---------------------------------|--------------------------|------------|---------|---------|---------------------------------------|
| | | : Light | : Moderate | : Heavy | : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Siuslaw N.F.: | | | | | | |
| Douglas-fir beetle | 85 | 2,620 | 1,300 | 680 | 0 | 4,600 |
| Douglas-fir engraver | 2 | 200 | 0 | 0 | 0 | 200 |
| Spider mite | 6 | 0 | 12,850 | 0 | 0 | 12,850 |
| Tent caterpillar on red alder | 4 | 110 | 3,641 | 0 | 0 | 3,751 |
| All insects | 97 | 2,930 | 17,791 | 680 | 0 | 21,401 |
| Bear damage | | | | | | |
| | 43 | 3,170 | 470 | 0 | 0 | 3,640 |
| All damage | 140 | 6,100 | 18,261 | 680 | 0 | 25,041 |
| Umatilla I.R.: | | | | | | |
| Fir engraver | 2 | 20 | 0 | 0 | 0 | 20 |
| Mountain pine beetle (P) | 2 | 20 | 0 | 100 | 0 | 120 |
| Oregon pine ips | 6 | 80 | 180 | 0 | 0 | 260 |
| All insects | 10 | 120 | 180 | 100 | 0 | 400 |
| All damage | 10 | 120 | 180 | 100 | 0 | 400 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers | Intensity of infestation | | | | : All : inten- : sities |
|--|--------------------------------|--------------------------|-----------------|--------------|------------------------|-------------------------------|
| | | : : Light | : : Moderate | : : Heavy | : : Very : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Umatilla N.F.: | | | | | | |
| Douglas-fir beetle | 3 | 100 | 0 | 0 | 0 | 100 |
| Engelmann spruce beetle | 6 | 230 | 70 | 0 | 0 | 300 |
| Fir engraver | 102 | 2,980 | 2,970 | 780 | 640 | 7,370 |
| Mountain pine beetle (L) | 21 | 700 | 1,250 | 960 | 0 | 2,910 |
| Mountain pine beetle (P) | 25 | 790 | 1,410 | 0 | 160 | 2,360 |
| Oregon pine ips | 75 | 1,540 | 590 | 20 | 40 | 2,190 |
| Western pine beetle | 27 | 1,090 | 0 | 160 | 0 | 1,250 |
| All insects | 259 | 7,430 | 6,290 | 1,920 | 840 | 16,480 |
| All damage | 259 | 7,430 | 6,290 | 1,920 | 840 | 16,480 |
| Umpqua N.F.: | | | | | | |
| Douglas-fir beetle | 75 | 4,190 | 1,650 | 120 | 0 | 5,960 |
| Douglas-fir engraver | 1 | 20 | 0 | 0 | 0 | 20 |
| Mountain pine beetle (L) | 1 | 70 | 0 | 0 | 0 | 70 |
| Mountain pine beetle (S) | 2 | 300 | 0 | 0 | 0 | 300 |
| Mountain pine beetle (W) | 83 | 6,950 | 1,040 | 1,290 | 0 | 9,280 |
| Mountain pine beetle (P) | 1 | 250 | 0 | 0 | 0 | 250 |
| Western pine beetle | 1 | 20 | 0 | 0 | 0 | 20 |
| Balsam woolly aphid | 60 | 13,950 | 1,330 | 300 | 400 | 15,980 |
| All insects | 224 | 25,750 | 4,020 | 1,710 | 400 | 31,880 |
| Bear damage | 3 | 1,080 | 0 | 0 | 0 | 1,080 |
| All damage | 227 | 26,830 | 4,020 | 1,710 | 400 | 32,960 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | : Infes- : Intensity of infestation : All | | | | | : Very : inten- : heavy : sites |
|--|---|-----------------------|--------------|-----------|-----------|------------------------------------|
| | : tation : : centers: | : Light : | : Moderate : | : Heavy : | : heavy : | |
| | Number | - - - - Acres - - - - | | | | |
| Wallowa-Whitman N.F.: | | | | | | |
| Douglas-fir beetle | 55 | 1,550 | 730 | 0 | 0 | 2,280 |
| Engelmann spruce beetle | 16 | 840 | 1,530 | 500 | 0 | 2,870 |
| Fir engraver | 115 | 5,970 | 3,930 | 1,800 | 60 | 11,760 |
| Mountain pine beetle (L) | 29 | 2,120 | 1,330 | 4,080 | 2,090 | 9,620 |
| Mountain pine beetle (P) | 76 | 6,900 | 8,430 | 4,950 | 2,080 | 22,360 |
| Oregon pine ips | 266 | 9,800 | 13,730 | 4,910 | 2,370 | 30,810 |
| Western pine beetle | 31 | 2,050 | 220 | 0 | 0 | 2,270 |
| All insects | 588 | 29,230 | 29,900 | 16,240 | 6,600 | 81,970 |
| All damage | 588 | 29,230 | 29,900 | 16,240 | 6,600 | 81,970 |
| Warm Springs I.R.: | | | | | | |
| Fir engraver | 4 | 160 | 0 | 0 | 0 | 160 |
| Mountain pine beetle (L) | 1 | 0 | 180 | 0 | 0 | 180 |
| Mountain pine beetle (W) | 5 | 210 | 0 | 320 | 0 | 530 |
| Mountain pine beetle (P) | 2 | 200 | 0 | 0 | 0 | 200 |
| Oregon pine ips | 13 | 310 | 440 | 0 | 780 | 1,530 |
| Western pine beetle | 16 | 2,900 | 1,740 | 600 | 0 | 5,240 |
| Balsam woolly aphid | 6 | 900 | 60 | 0 | 0 | 960 |
| Sawflies on true firs | 1 | 2,280 | 0 | 0 | 0 | 2,280 |
| All insects | 48 | 6,960 | 2,420 | 920 | 780 | 11,080 |
| All damage | 48 | 6,960 | 2,420 | 920 | 1 780 | 11,080 |

See footnotes at end of table.

Table 41.--Extent of infestations in Oregon in 1967 ... (Concluded)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- | Intensity of infestation | | | | : All |
|--|---------------|--------------------------|------------|---------|--------|----------|
| | :tation | : Light | : Moderate | : Heavy | : Very | : inten- |
| | centers: | Light | Moderate | Heavy | heavy | sities |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Willamette N.F.: | | | | | | |
| Douglas-fir beetle | 72 | 2,720 | 190 | 160 | 0 | 3,070 |
| Mountain pine beetle (L) | 8 | 230 | 170 | 0 | 0 | 400 |
| Mountain pine beetle (W) | 247 | 38,600 | 18,810 | 8,830 | 4,100 | 70,340 |
| Oregon pine ips | 2 | 20 | 0 | 0 | 0 | 20 |
| Balsam woolly aphid | 196 | 38,190 | 8,770 | 1,970 | 720 | 49,650 |
| All insects | 525 | 79,760 | 27,940 | 10,960 | 4,820 | 123,480 |
| Bear damage | 26 | 2,180 | 570 | 0 | 0 | 2,750 |
| All damage | 551 | 81,940 | 28,510 | 10,960 | 4,820 | 126,230 |
| Winema N.F.: | | | | | | |
| Fir engraver | 2 | 210 | 0 | 0 | 0 | 210 |
| Mountain pine beetle (L) | 99 | 19,430 | 14,580 | 6,570 | 320 | 40,900 |
| Mountain pine beetle (W) | 4 | 470 | 190 | 0 | 0 | 660 |
| Mountain pine beetle (P) | 19 | 2,240 | 80 | 0 | 0 | 2,320 |
| Oregon pine ips | 12 | 470 | 100 | 380 | 0 | 950 |
| Western pine beetle | 30 | 6,420 | 0 | 0 | 0 | 6,420 |
| Sawflies on true firs | 1 | 0 | 210 | 710 | 0 | 920 |
| Needle miners (L) | 14 | 7,060 | 4,600 | 7,640 | 14,880 | 34,180 |
| Needle miners (P) | 5 | 4,800 | 0 | 0 | 0 | 4,800 |
| All insects | 186 | 41,100 | 19,760 | 15,300 | 15,200 | 91,360 |
| All damage | 186 | 41,100 | 19,760 | 15,300 | 15,200 | 91,360 |

1/ Mountain pine beetle and needle miner damage has been separated by tree species attacked: L, lodgepole pine; P, ponderosa pine; W, western white pine; K, knobcone pine; S, sugar pine.

2/ Reporting areas are abbreviated as follows: N.F., National Forest; I.R., Indian Reservation; N.P., National Park.

Table 42.--Extent of infestations in Washington in 1967, by reporting area, insect species, and intensity of infestation

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers | Intensity of infestation | | | | : All : inten- : sites |
|--|--------------------------------|--------------------------|------------|---------|---------|------------------------------|
| | | : Light | : Moderate | : Heavy | : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Colville N.F.: | | | | | | |
| Douglas-fir beetle | 104 | 3,360 | 5,340 | 5,750 | 1,720 | 16,170 |
| Engelmann spruce beetle | 2 | 240 | 0 | 0 | 0 | 240 |
| Fir engraver | 1 | 0 | 100 | 0 | 0 | 100 |
| Mountain pine beetle (L) | 1 | 0 | 0 | 0 | 640 | 640 |
| Mountain pine beetle (W) | 3 | 180 | 400 | 560 | 560 | 1,700 |
| Mountain pine beetle (P) | 9 | 280 | 470 | 1,160 | 180 | 2,090 |
| Larch sawfly | 7 | 3,400 | 9,560 | 220 | 0 | 13,180 |
| Larch bud moth | 56 | 80,800 | 10,560 | 8,080 | 2,940 | 102,380 |
| Larch casebearer | 40 | 109,730 | 27,420 | 19,120 | 37,230 | 193,500 |
| All insects | 223 | 197,990 | 53,850 | 34,890 | 43,270 | 330,000 |
| All damage | 223 | 197,990 | 53,850 | 34,890 | 43,270 | 330,000 |
| Colville I.R.: | | | | | | |
| Douglas-fir beetle | 66 | 2,940 | 2,860 | 1,620 | 520 | 7,940 |
| Fir engraver | 1 | 0 | 0 | 160 | 0 | 160 |
| Mountain pine beetle (P) | 8 | 340 | 640 | 0 | 0 | 980 |
| Western pine beetle | 2 | 920 | 0 | 0 | 0 | 920 |
| Larch bud moth | 9 | 4,880 | 12,280 | 4,280 | 0 | 21,440 |
| Larch casebearer | 13 | 3,520 | 3,040 | 1,600 | 5,600 | 13,760 |
| All insects | 99 | 12,600 | 18,820 | 7,660 | 6,120 | 45,200 |
| All damage | 99 | 12,600 | 18,820 | 7,660 | 6,120 | 45,200 |

See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | Intensity of infestation | | | | | All inten- sities |
|--|-----------------------------------|-----------------------|-------------|-------------|-------------|-------------------------|
| | : Infes- : tation : centers | : : : | : : : | : : : | : : : | |
| | Number | - - - - Acres - - - - | | | | |
| Gifford Pinchot N.F.: | | | | | | |
| Douglas-fir beetle | 54 | 6,100 | 4,000 | 3,060 | 80 | 13,240 |
| Mountain pine beetle (W) | 21 | 2,480 | 2,560 | 120 | 360 | 5,520 |
| Western pine beetle | 1 | 480 | 0 | 0 | 0 | 480 |
| Balsam woolly aphid | 49 | 24,000 | 1,800 | 920 | 0 | 26,720 |
| All insects | 125 | 33,060 | 8,360 | 4,100 | 440 | 45,960 |
| Bear damage | | | | | | |
| Dying hemlock | 2 | 120 | 50 | 0 | 0 | 170 |
| All damage | 160 | 47,420 | 16,110 | 4,620 | 720 | 68,870 |
| Glenwood District: | | | | | | |
| Douglas-fir beetle | 4 | 580 | 240 | 0 | 0 | 820 |
| Fir engraver | 2 | 280 | 0 | 0 | 0 | 280 |
| Mountain pine beetle (P) | 6 | 600 | 460 | 0 | 0 | 1,060 |
| Western pine beetle | 4 | 1,400 | 0 | 0 | 0 | 1,400 |
| All insects | 16 | 2,860 | 700 | 0 | 0 | 3,560 |
| Bear damage | 1 | 220 | 0 | 0 | 0 | 220 |
| All damage | 17 | 3,080 | 700 | 0 | 0 | 3,780 |

See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers: | Intensity of infestation | | | | : All : inten- : sites |
|--|---------------------------------|--------------------------|------------|---------|--------------|------------------------------|
| | | : Light | : Moderate | : Heavy | : Very heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Kaniksu N.F.: | | | | | | |
| Douglas-fir beetle | 3 | 170 | 160 | 0 | 0 | 330 |
| Engelmann spruce beetle | 3 | 390 | 0 | 0 | 0 | 390 |
| Mountain pine beetle (W) | 9 | 1,130 | 320 | 0 | 0 | 1,450 |
| Larch sawfly | 3 | 360 | 760 | 120 | 0 | 1,240 |
| Larch casebearer | 23 | 51,800 | 132,580 | 90,630 | 75,550 | 350,560 |
| All insects | 41 | 53,850 | 133,820 | 90,750 | 75,550 | 353,970 |
| All damage | 41 | 53,850 | 133,820 | 90,750 | 75,550 | 353,970 |
| Mt. Baker N.F.: | | | | | | |
| Douglas-fir beetle | 8 | 520 | 1,540 | 160 | 0 | 2,220 |
| Mountain pine beetle (W) | 19 | 1,810 | 2,680 | 160 | 0 | 4,650 |
| Silver fir beetles | 17 | 2,260 | 2,390 | 0 | 0 | 4,650 |
| Western hemlock looper | 1 | 0 | 0 | 0 | 1,600 | 1,600 |
| All insects | 45 | 4,590 | 6,610 | 320 | 1,600 | 13,120 |
| Dying hemlock | 31 | 12,840 | 8,560 | 520 | 0 | 21,920 |
| All damage | 76 | 17,430 | 15,170 | 840 | 1,600 | 35,040 |

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See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | Intensity of infestation | | | | | All inten- sities |
|--|-------------------------------|--------------|----------|--------|-----------------|-------------------------|
| | Infes- :tation :centers | Light | Moderate | Heavy | Very : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Mt. Rainier N.P.: | | | | | | |
| Mountain pine beetle (W) | 5 | 920 | 0 | 0 | 0 | 920 |
| Balsam woolly aphid | 10 | 1,350 | 380 | 480 | 0 | 2,210 |
| All insects | 15 | 2,270 | 380 | 480 | 0 | 3,130 |
| | | | | | | |
| Bear damage | 1 | 0 | 90 | 0 | 0 | 90 |
| All damage | 16 | 2,270 | 470 | 480 | 0 | 3,220 |
| | | | | | | |
| Northeast Washington: | | | | | | |
| Mountain pine beetle (P) | 4 | 490 | 0 | 120 | 0 | 610 |
| Oregon pine ips | 1 | 90 | 0 | 0 | 0 | 90 |
| Larch casebearer | 37 | 87,920 | 41,710 | 20,820 | 32,280 | 182,730 |
| All insects | 42 | 88,500 | 41,710 | 20,820 | 32,280 | 183,430 |
| All damage | 42 | 88,500 | 41,710 | 20,940 | 32,280 | 183,430 |

See footnotes at end of table

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers | Intensity of infestation | | | | : All : inten- : sites |
|--|--------------------------------|--------------------------|------------|---------|--------------|------------------------------|
| | | : Light | : Moderate | : Heavy | : Very heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Okanogan N.F.: | | | | | | |
| Douglas-fir beetle | 67 | 4,050 | 3,770 | 2,760 | 920 | 11,500 |
| Engelmann spruce beetle | 15 | 1,600 | 1,340 | 620 | 200 | 3,760 |
| Fir engraver | 8 | 360 | 390 | 370 | 0 | 1,120 |
| Mountain pine beetle (L) | 3 | 0 | 210 | 440 | 0 | 650 |
| Mountain pine beetle (W) | 1 | 100 | 0 | 0 | 0 | 100 |
| Mountain pine beetle (P) | 62 | 2,020 | 5,080 | 3,190 | 1,680 | 11,970 |
| Oregon pine ips | 2 | 370 | 0 | 0 | 0 | 370 |
| Western pine beetle | 4 | 330 | 140 | 0 | 0 | 470 |
| Larch sawfly | 6 | 960 | 280 | 0 | 0 | 1,240 |
| Larch bud moth | 11 | 7,400 | 6,320 | 960 | 560 | 15,240 |
| All insects | 179 | 17,190 | 17,530 | 8,340 | 3,360 | 46,420 |
| All damage | 179 | 17,190 | 17,530 | 8,340 | 3,360 | 46,420 |
| Olympic N.F.: | | | | | | |
| Mountain pine beetle (W) | 4 | 440 | 160 | 0 | 0 | 600 |
| Silver fir beetles | 3 | 640 | 0 | 0 | 0 | 640 |
| All insects | 7 | 1,080 | 160 | 0 | 0 | 1,240 |
| Bear damage | 50 | 14,100 | 4,720 | 1,400 | 640 | 20,860 |
| Dying hemlock | 7 | 12,200 | 3,900 | 1,840 | 0 | 17,940 |
| All damage | 64 | 27,380 | 8,780 | 3,240 | 640 | 40,040 |

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See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | : Infes- : Intensity of infestation : All : tation : : : : Very : inten- : centers: Light : Moderate : Heavy : heavy : sites | | | | | |
|--|--|--------------|-------|-------|-----|--------|
| | <u>Number</u> | <u>Acres</u> | | | | |
| Olympic N.P.: | | | | | | |
| Douglas-fir beetle | 3 | 100 | 160 | 0 | 0 | 260 |
| Mountain pine beetle (W) | 46 | 5,260 | 3,200 | 820 | 340 | 9,620 |
| Silver fir beetles | 2 | 160 | 120 | 0 | 0 | 280 |
| All insects | 51 | 5,520 | 3,480 | 820 | 340 | 10,160 |
| Dying hemlock | 5 | 3,440 | 1,240 | 0 | 0 | 4,680 |
| All damage | 56 | 8,960 | 4,720 | 820 | 340 | 14,840 |
| Quinault I.R.: | | | | | | |
| Mountain pine beetle (W) | 10 | 12,620 | 920 | 2,280 | 480 | 16,300 |
| All insects | 10 | 12,620 | 920 | 2,280 | 480 | 16,300 |
| Bear damage | 1 | 200 | 000 | 0 | 0 | 200 |
| All damage | 11 | 12,820 | 920 | 2,280 | 480 | 16,500 |

See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers | Intensity of infestation | | | | : All : inten- : sites |
|--|--------------------------------|--------------------------|------------|---------|-------------------|------------------------------|
| | | : Light | : Moderate | : Heavy | : Very : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Snoqualmie N.F.: | | | | | | |
| Mountain pine beetle (W) | 28 | 4,720 | 3,280 | 440 | 0 | 8,440 |
| Silver fir beetles | 7 | 1,160 | 240 | 0 | 0 | 1,400 |
| Balsam woolly aphid | 33 | 7,320 | 2,200 | 520 | 480 | 10,520 |
| All insects | 68 | 13,200 | 5,720 | 960 | 480 | 20,360 |
| Bear damage | 9 | 1,320 | 1,240 | 0 | 0 | 2,560 |
| All damage | 77 | 14,520 | 6,960 | 960 | 480 | 22,920 |
| Southwest Washington: | | | | | | |
| Douglas-fir beetle | 4 | 240 | 0 | 0 | 0 | 240 |
| Silver fir beetles | 1 | 80 | 0 | 0 | 0 | 80 |
| Balsam woolly aphid | 4 | 1,230 | 560 | 0 | 0 | 1,790 |
| All insects | 9 | 1,550 | 560 | 0 | 0 | 2,110 |
| Bear damage | 34 | 11,480 | 4,680 | 1,380 | 840 | 18,380 |
| All damage | 43 | 13,030 | 5,240 | 1,380 | 840 | 20,490 |

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See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Continued)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | :Infes- :tation :centers: | Intensity of infestation | | | | : All : Very : heavy : sites |
|--|---------------------------------|--------------------------|------------|---------|---------|---------------------------------------|
| | | : Light | : Moderate | : Heavy | : heavy | |
| | <u>Number</u> | <u>Acres</u> | | | | |
| Spokane I.R.: | | | | | | |
| Mountain pine beetle (P) | 2 | 80 | 110 | 160 | 0 | 350 |
| Oregon pine ips | 1 | 130 | 0 | 0 | 0 | 130 |
| Larch casebearer | 8 | 14,360 | 5,160 | 7,580 | 16,000 | 43,100 |
| All insects | 11 | 14,570 | 5,270 | 7,740 | 16,000 | 43,580 |
| All damage | 11 | 14,570 | 5,270 | 7,740 | 16,000 | 43,580 |
| Umatilla N.F.: | | | | | | |
| Douglas-fir beetle | 1 | 50 | 0 | 0 | 0 | 50 |
| Engelmann spruce beetle | 3 | 90 | 50 | 0 | 0 | 140 |
| Fir engraver | 31 | 1,200 | 270 | 0 | 0 | 1,470 |
| Mountain pine beetle (P) | 5 | 100 | 40 | 0 | 0 | 140 |
| Oregon pine ips | 7 | 80 | 230 | 0 | 0 | 310 |
| Western pine beetle | 1 | 70 | 0 | 0 | 0 | 70 |
| All insects | 48 | 1,590 | 590 | 0 | 0 | 2,180 |
| All damage | 48 | 1,590 | 590 | 0 | 0 | 2,180 |

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See footnotes at end of table.

Table 42.--Extent of infestations in Washington in 1967 ... (Concluded)

| Reporting area and insects involved <u>1/</u> <u>2/</u> | : Infes- : Intensity of infestation : All : tation : : : : Very : inten- : centers: Light : Moderate : Heavy : heavy : sities | | | | | |
|--|---|-----------------------|-------|-------|-------|--------|
| | Number | - - - - Acres - - - - | | | | |
| Wenatchee N.F.: | | | | | | |
| Douglas-fir beetle | 2 | 600 | 40 | 0 | 0 | 640 |
| Engelmann spruce beetle | 1 | 120 | 0 | 0 | 0 | 120 |
| Fir engraver | 2 | 320 | 0 | 0 | 0 | 320 |
| Mountain pine beetle (L) | 3 | 800 | 80 | 0 | 0 | 880 |
| Mountain pine beetle (W) | 88 | 11,520 | 5,220 | 4,540 | 1,760 | 23,040 |
| Mountain pine beetle (P) | 4 | 120 | 440 | 400 | 0 | 960 |
| Western pine beetle | 3 | 160 | 80 | 0 | 0 | 240 |
| All insects | 103 | 13,640 | 5,860 | 4,940 | 1,760 | 26,200 |
| All damage | 103 | 13,640 | 5,860 | 4,940 | 1,760 | 26,200 |
| Yakima I.R.: | | | | | | |
| Fir engraver | 1 | 130 | 0 | 0 | 0 | 130 |
| Mountain pine beetle (L) | 1 | 360 | 0 | 0 | 0 | 360 |
| Mountain pine beetle (W) | 6 | 1,100 | 330 | 510 | 0 | 1,940 |
| Mountain pine beetle (P) | 2 | 130 | 0 | 0 | 0 | 130 |
| Western pine beetle | 11 | 1,950 | 1,200 | 0 | 0 | 3,150 |
| Balsam woolly aphid | 1 | 0 | 230 | 0 | 0 | 230 |
| All insects | 22 | 3,670 | 1,760 | 510 | 0 | 5,940 |
| All damage | 22 | 3,670 | 1,760 | 510 | 0 | 5,940 |

1/ Mountain pine beetle damage has been separated by tree species attacked: L, lodgepole pine; P, ponderosa pine; W, western white pine.

2/ Reporting areas are abbreviated as follows: N.F., National Forest; I.R., Indian Reservation; N.P., National Park.