FOREST INSECT AND DISEASE CONDITIONS IN ALASKA

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Covers—Sitka spruce of the Sitka National Monument, Sitka, Alaska, defoliated by the spruce aphid, *Elatobium abietinum* (Wlk.). On the front cover, defoliation damage caused by spruce aphids is masked by the new foliage of mid-June, which is not preferred for feeding by aphids. The back cover shows obvious damage to infested trees before new growth in spring.

Forest Insect And Disease Conditions In Alaska

SUMMARY OF CONDITIONS

Bark beetle activity caused the most significant insect damage to forested areas in Alaska during 1977. In south-central Alaska, spruce beetles caused white spruce mortality on 5059 hectares[1] throughout the Resurrection Creek drainage area of the Chugach National Forest on the Kenai Peninsula. On State lands near Tyonek on the west side of Cook Inlet, salvage of white spruce killed by the spruce beetle late in the sixties and early in the seventies is continuing. Scattered mortality of tamarack by the eastern larch beetle between Mount McKinley National Park and Minchumina and Chilchukabena Lakes to the north increased from 141,643 hectares in 1976 to 215,216 hectares in 1977.

The most widespread defoliation in interior Alaska was caused by leaf rollers, blotch miners, leaf beetles, and an unidentified Noctuid moth. Leaf beetles defoliated about 40,469 hectares of aspen southeast of Fairbanks. In the spring, leaf rollers defoliated paper birch throughout the Kenai Peninsula, and scattered infestations were noted on the west side of Cook Inlet. Little mortality occurred as infested trees refoliated in the summer. Previously unknown blotch miners damaged approximately 34,197 hectares of aspen and alder near Fairbanks. An unidentified Noctuid moth defoliated 10,117 hectares of aspen between Fairbanks and Nenana.

In the southeast Alaska western hemlock and Sitka spruce forests, western black-headed budworm and hemlock sawfly populations continued to remain endemic. Larval samples taken from western hemlock indicated that a localized buildup of the western black-headed budworm may be occurring on the northern end of Prince of Wales Island. Moderate and scattered spruce aphid damage to Sitka spruce occurred along 40 kilometers[2] of shoreline within the Tongass National Forest. Spruce aphid activity was most damaging in residential areas near Sitka. Approximately 260 hectares of black cottonwood in the Berner's Bay area north of Juneau was moderately defoliated by leaf beetles.

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[1]One hectare equals 2.471 acres.

[2]One kilometer equals 0.621 mile.

Major insect outbreaks in Alaska included the following: Eastern larch beetles infested 215,207 hectares[3]; blotch miners, 297,822 hectares; leaf beetles, 40,729 hectares; Noctuid moths, 10,117 hectares; leaf rollers, 21,044 hectares; and spruce beetles, 5059 hectares.

Hemlock dwarf mistletoe, Siroccocus shoot blight, and needle rust of western hemlock continue to be the most damaging tree diseases in southeast Alaska. Siroccocus shoot blight is concentrated in the Thomas Bay area of the Tongass National Forest. A survey of aspen stands in interior Alaska indicated that most stands were relatively free of major tree diseases during 1977.

ENTOMOLOGY

Bark Beetles

Spruce beetle, *Dendroctonus rufipennis* (Kby.)

The spruce beetle remained the most damaging forest insect in Alaska in 1977. Although activity by this bark beetle has subsided considerably from the 217,875 hectares of white spruce infested from late in the sixties through 1975 (table 1), spruce mortality is still occurring on 5,059 hectares of the Chugach National Forest. This is an increase of 1,862 hectares (58 percent) since 1976. The infestation is located in the Resurrection Creek drainage area on the Kenai Peninsula, a high-value recreational area.

Spruce beetle activity on the west side of Cook Inlet has essentially depleted all susceptible white spruce (fig. 1). Salvage operations are continuing on the affected State lands near Tyonek. As of August 1977, a total of 54.6 MM bm (million boardfeet measure) of white spruce has been harvested on the Westside Salvage Timber Sale, which is administered by the Alaska State Division of Lands, Forestry Section. Eighty percent of this volume was beetle-killed timber. Hardwood volume cut was 9.1 MM bm of birch and 13.5 MM bm of cottonwood.

In cooperation with the Intermountain Forest and Range Experiment Station, Moscow, Idaho, the deterrent pheromone methylcyclohexanone (MCH) was tested in June 1977 on plots containing green felled trees in the Resurrection Creek drainage area. MCH had greatly reduced attraction of female spruce beetles in spruce sections during earlier tests. Concentrations of MCH odor is critical, and we determined that MCH did not sufficiently volatilize to significantly reduce spruce beetle attacks in our study. However, our observations and sampling of beetles provided new information needed for future tests and for evaluating the potential for infestation originating from downed trees. For example, in untreated trees, spruce beetle attacks occurred 6.8

[3]Gross area of widely scattered infested trees.

TABLE 1.—Summary of recent spruce beetle outbreaks in Alaska's Cook Inlet area.

Period or year	Area infested[1]		
	Kenai Peninsula	West side, Cook Inlet	Total
		Hectares	
Late in the sixties through 1973	102,671	48,806	151,477
1974	121	58,033	58,154
1975	——	67,584	67,584
1976	3,197	——	3,197
1977	5,059	——	5,059
Total[2]	107,851	115,083	222,934

[1]Includes areas of continued infestation plus areas of new infestation. Dashes indicate that no infestation occurred or that no data are available.
[2]Represents total area infested during the outbreak period from late in the sixties through 1977.

times per square foot of bark surface. Attacks and subsequent broods were denser on the underside of sampled trees. Brood density was high, averaging 151 per square foot. In October, only 4 months after attack, some broods were already papae and new adults, a faster rate of development than had previously been known in Alaska.

Eastern larch beetle, *Dendroctonus simplex* (LeC.)

Eastern larch beetle infestations in the interior have increased to 215,297 hectares from 141,643 hectares in 1976. Scattered yellow eastern larch (fig. 2) was quite visible throughout the infested area bounded by Minchumina and Chilchukakena Lakes on the north and Mt. McKinley National Park on the south. The infestation extends from the Foraker River on the west and across the McKinley River to Moose Creek on the east. The infestation is moving eastward from where it was initially detected in 1974 along the upper Kantishia River drainage area.

Scattered mortality is also occurring along the Tanana River near Fairbanks. Tamarack varies considerably in stand density within the infested area; it is widely scattered over much of the area with localized concentrations of fairly dense growth.

Figure 1—White spruce tree mortality caused by the spruce beetle, *Dendroctonua rufipennis* (Kby.), near Tyonek.

Figure 2—Fading eastern larch trees killed by the eastern larch beetle, *Dendroctonus simplex* (LeC.), near Mount McKinley National Park.

DEFOLIATORS

Spear-marked black moth, *Rheumaptera hastata* (L.)

Populations of this birch defoliator remained at low levels in 1977 following a population collapse in 1976. In 1975, nearly 1.1 million hectares of paper birch in interior and south-central Alaska were defoliated. Defoliation was detected in 1977 in localized areas on the Kenai Peninsula.

A larch defoliator, *Zeiraphera* spp.

Populations of this budmoth collapsed after defoliating 238,770 hectares of tamarack in the Tanana River Valley in 1976. A granulosis virus and several parasites are thought to be responsible for the population collapse. No visiable defoliation was detected during 1977 aerial surveys.

Leaf rollers, *Epinotia* spp. and *Archips* spp.

Similar to last year, leaf rollers again defoliated birch over most of the Kenai Peninsula. Most of this defoliation was light, but extensive defoliation occurred near Trapper Joe Lake (9,713 hectares), Longmat Lake (2,752 hectares), and northeast of Tustumena Lake (6,313 hectares).

On the west side of Cook Inlet, heavy birch defoliation was detected northwest of Long Lake (769 hectares) and north of Red Shirt Lake (688 hectares). Leaf rollers on paper birch are a recurrent problem in south-central Alaska. However, several years of continued extensive defoliation by these insects is necessary to kill birch. The insect damage generally results in only a small growth loss.

Blotch miner, *Lithocolletis ontario* (Free.)

Ground and aerial surveys detected significant blotch miner damage on 209,227 hectares of quaking aspen near Fairbanks. Before last summer, damage caused by this miner was practically nonexistent. It was not until 1977 that the causal agent was identified as *L. ontario*. Likewise, a related but unidentified species of *Lithocolletis* caused considerable mining on alder in and around Fairbanks. Efforts will be undertaken next year to monitor the effects of these hardwood blotch miners.

Leaf beetles, *Chrysomela* spp.

Leaf beetles (fig. 3) were active throughout Alaska. In southeast, about 260 hectares of black cottonwood were moderately defoliated in the Gilkey River drainage area east of Berner's Bay near Juneau. In the interior, leaf beetles

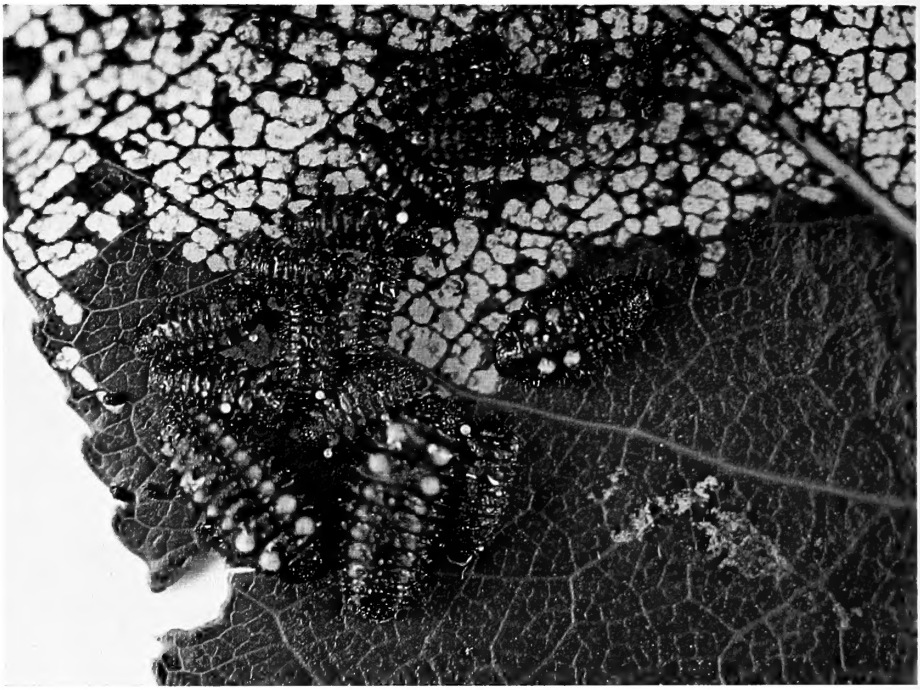

Figure 3—Leaf beetle larvae, *Chrysomela* spp., feeding on black cottonwood trees.

defoliated 40,469 hectares of aspen between Delta Junction and Tok, southeast of Fairbanks.

Noctuid moth, *Noctuidae*

For the second consecutive year, an unidentified Noctuid defoliator damaged 10,117 hectares of bottomland alder between Fairbanks and Delta. Upland alder remain unaffected. This infestation has declined from the 40,469 hectares defoliated in 1976. A virus is suspected as the cause of the population decline.

Spruce aphid, *Neomyzaphis abietina* (Wlkr.)

Spruce aphids caused moderate damage to Sitka spruce on all Areas of the Tongass National Forest. Damage was limited to older spruce along the tidelands. Aphid damage occurred near Ketchikan along 32 kilometers of shoreline on the southern end of Suemez Island and 4 kilometers along Calder

Bay on the northern end of Prince of Wales Island. Spruce aphid damage on the Stikine Area was detected along 2 kilometers of shoreline at Pt. Barrier on the southern end of Kupreanof Island and in scattered pockets on Monte Carlo Island. On the Chatham Area, damage was most prevalent in the vicinity of Sitka on Baranof Island (cover photographs). Population increases were probably fostered by the mild winter weather in 1976, reducing winter mortality.

Western black-headed budworm, *Acleris gloverana* (Wlshm.)

Populations of this potentially destructive defoliator of southeast Alaska western hemlock-Sitka spruce forests continues to remain endemic for the second consecutive year. Budworm populations have periodically caused considerable damage in southeast Alaska and throughout the Prince William Sound area. The most recent outbreak was near Ketchikan from 1958 to 1965. This was followed by the defoliation of 11,736 hectares in Prince William Sound area late in the sixties.

In August, larval samples were collected from western hemlock at 82 permanent plots established on all three Areas of the Tongass National Forest; Ketchikan Area (31), Stikine Area (19), and Chatham Area (32). Two sample plots, Calder Bay and Tuxekan, had larval counts indicating a possible budworm buildup on the northwest part of Prince of Wales Island. Populations of western black-headed budworm are thought to be kept in check mainly by the cool summer temperatures of southeast Alaska.

Hemlock Sawfly, *Neodiprion tsugae* (Midd.)

Larval samples taken along with the western black-headed budworm samples indicated that sawfly populations in southeast Alaska continue to remain endemic. No areas of current defoliation were detected during the annual aerial surveys. In the past, hemlock sawfly populations caused considerable western hemlock growth loss and mortality in the Ketchikan Area, mainly along the Ward Creek drainage area north of Ketchikan.

STATUS OF DISEASES

Aspen disease survey

An extensive survey of aspen diseases was undertaken along the road system of south-central and interior Alaska in cooperation with Forest Disease Research (Rocky Mountain Forest and Range Experiment Station). Additional collections were made with the aid of Forest Survey personnel (Forestry Sciences Laboratory at Juneau) in the Porcupine-Upper Yukon area.

The canker causing fungi, *Cryptosphaeria populina* (Pers.) Sacc., *Cenangium singulare* (Rehm) Davidson and Cash, *Ceratocystis frimbriata* Ell. and Halst., and *Cytospora chrysosperma* Per. ex. Fr., were encountered in most stands. *Ceratocystis alba* Devay and Davidson was collected near Palmer, and *C. crassivaginata* was found at Moose Lake northwest of Fort Yukon.

Phellinus tremulae (Bond) Bond and Boris was the most common decay fungus in all of the stands examined (fig. 4). *Cryptochate rufa* (Fr.) Boidin was found near Fairbanks, Tok, Coopers Landing, and Chandalar Creek. *Ganoderma applanatum* (Pers. ex Wallr.) Pat. was collected at Mile 1236 Alaska Highway. *Pholiota aurivella* (Fr.) Kumm was common in overmature mixed hardwood stands near Fairbanks. An *Armillariella mella* (Vahl. ex Fr.) Karst center was found in a "poor site" stand on the Bonanza Creek Experimental Forest and also at a campground near Tok.

A leaf and top dieback fungus, *Pollaccis radiosa* (Lib.) Bald and Cif., was found on 0.6 to 1.2 meters[4] high aspen reproduction on the Willow Experiment Forest near Palmer. *Rhytidella baranyay* Funk and Zalasky and *Curcurbitaria staphula* Dearness, two fungi which cause rough bark, were found at Cooper Landing and Fairbanks, respectively.

During the course of the survey, both mixed and pure balsam poplar stands were examined, and the following was found: *Cryptosphaeria populina* from the Bonanza Creek Experimental Forest, Cooper Landing, and at Mile 122 on the Richardson Highway, and *Cenanqium populneum* (Pers.) Rehm from Talkeetna.

With the exception of the mixed stands at the Bonanza Creek Experimental Forest, most aspen stands examined were healthy, probably a result of the sanitizing effects of frequent fires throughout interior Alaska. The Bonanza Creek stands were overmature with a high incidence of decay and fungi. The aspen is being replaced by white spruce.

The fungi causing cankering and rough bark were not at epiphytotic levels anywhere and are causing minimal losses. The leaf and top dieback fungi have the potential to cause serious damage to reproduction, but they are not doing so at this time.

The *A. mellea* damage found in the Tok campground was a direct result of trunk and root damage by campers. The tree loss within this campground will continue until the stems and roots of the remaining trees are protected from injury.

[4]One meter equals 3.28 feet.

Figure 4—Aspen decay caused by false tinder fungus, *Phellinus tremulae* (Bond) Bond ex Boris.

Hemlock dwarf mistletoe, *Arceuthobium tsugense* (Rosend.) G.N. Jones

Hemlock dwarf mistletoe control work was accomplished on two of the three Areas of the Tongass National Forest in 1977. A contract was made for the removal of residuals on 486 hectares of recently logged stands on the Stikine Area. Of the 486 hectares contracted, 283 hectares were completed by October 1977. On the Chatham Area, mistletoe infected residuals were removed on 193 hectares in 1977. Removal of dwarf mistletoe infected residuals in harvested areas prevents the spread of this disease to healthy reproduction.

Hemlock needle rust, *Pucciniastrum vaccinii* (Wint.) Joerst

An unusually high incidence of needle rust occurred on hemlock reproduction stands at Thomas Bay near Petersburg. From a distance, the affected reproduction presented a distinctly orange coloration. This rust attacks current-year needles and, at times, the cone scales. Generally, little damage is done. However, some growth loss or mortality may occur from this outbreak. The high incidence of this rust is possibly a result of the record dry weather in summer 1977.

Siroccocus shoot blight, *Sirococcus strobilinus* (Desm.) Petrak

Sirococcus shoot blight is common as far north as Yakutat. However, the blight does not appear to be doing much damage anywhere, except for Thomas Bay where it is still causing terminal and lateral shoot damage on western hemlock trees (fig. 5).

A study of *S. strobilinus* at Thomas Bay has been completed, and copies of the report are available from the Forest Service. It was found that the current accumulative disease severity in potential crop trees is low.

Figure 5—Abnormal leader growth on western hemlock trees caused by Siroccocus shoot blight, *Siroccocus strobilinus* (Desm.) Petrak, near Thomas Bay.

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PESTICIDE PRECAUTIONARY STATEMENT

This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.

Detection of forest insects and diseases depends on prompt field reporting by land management personnel, property owners, and forest users and on systematic surveys conducted by forest entomologists and pathologists. Please report forest or shade tree insects or diseases to one of these offices:

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State & Private Forestry
USDA, Forest Service
Pouch 6606
Anchorage, Alaska 99502
(Telephone 907-276-0939)

Forest Insect and Disease Management
State & Private Forestry
USDA, Forest Service
P.O. Box 1628
Juneau, Alaska 99802
(Telephone 907-586-7484)