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ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1976
PART III, PRINCE GEORGE FOREST DISTRICT

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by
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PACIFIC FOREST RESEARCH CENTRE
CANADIAN FORESTRY SERVICE
VICTORIA, BRITISH COLUMBIA
FILE REPORT

DEPARTMENT OF FISHERIES AND ENVIRONMENT
January 1977.

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INTRODUCTION

This file report outlines the status of forest insect and disease conditions in the Prince George Forest District for 1976, emphasizing pests capable of sudden, damaging outbreaks.

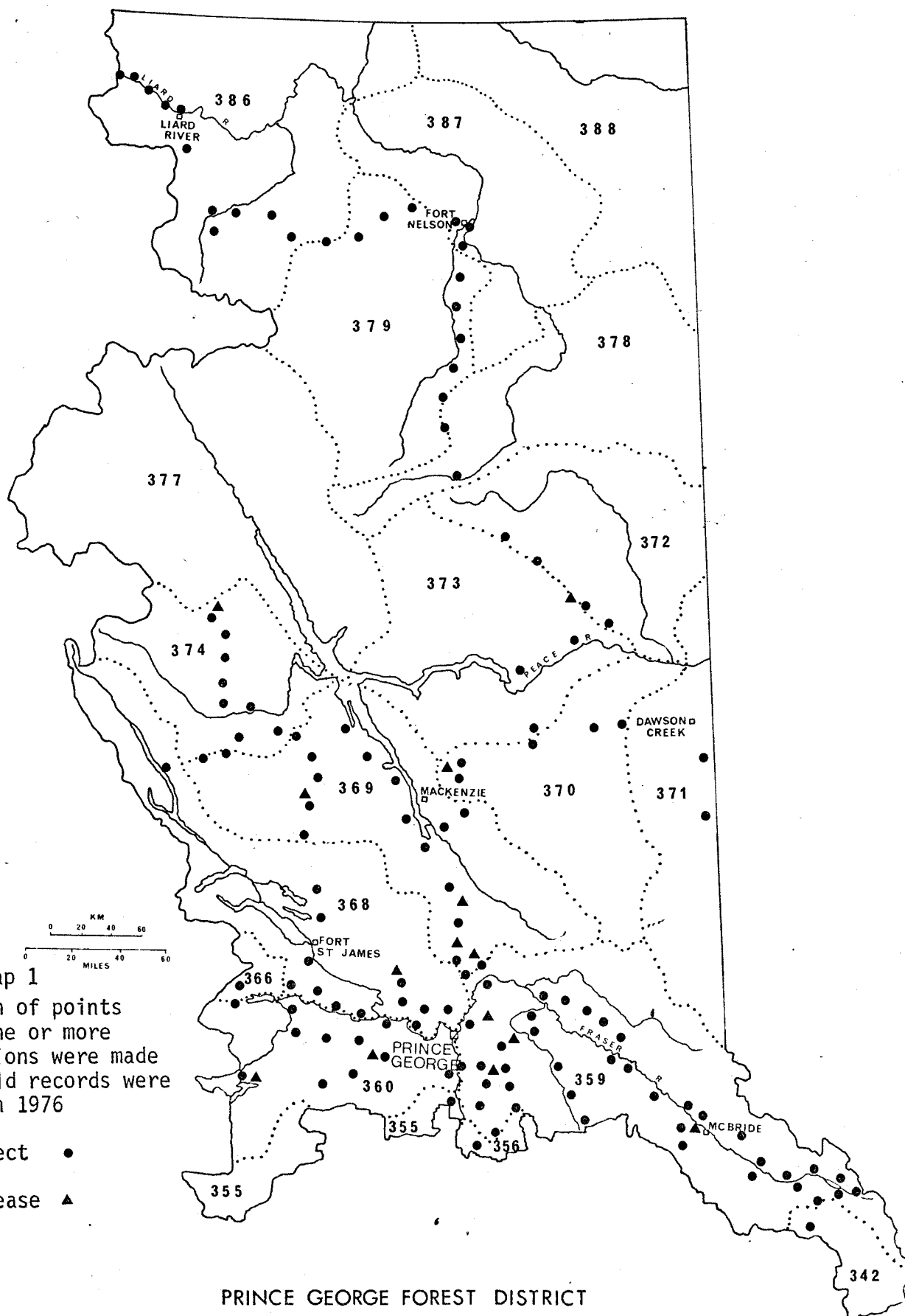
Regular field work in the District commenced on June 1 and terminated on August 11. Two hours were used in aerial surveys in the District in 1976. A special survey of cone crops on coniferous trees was conducted from June 1 to July 30. During the season, talks on insect and disease survey work were presented to youth crews and British Columbia Forest Service personnel at Mount Robson Park.

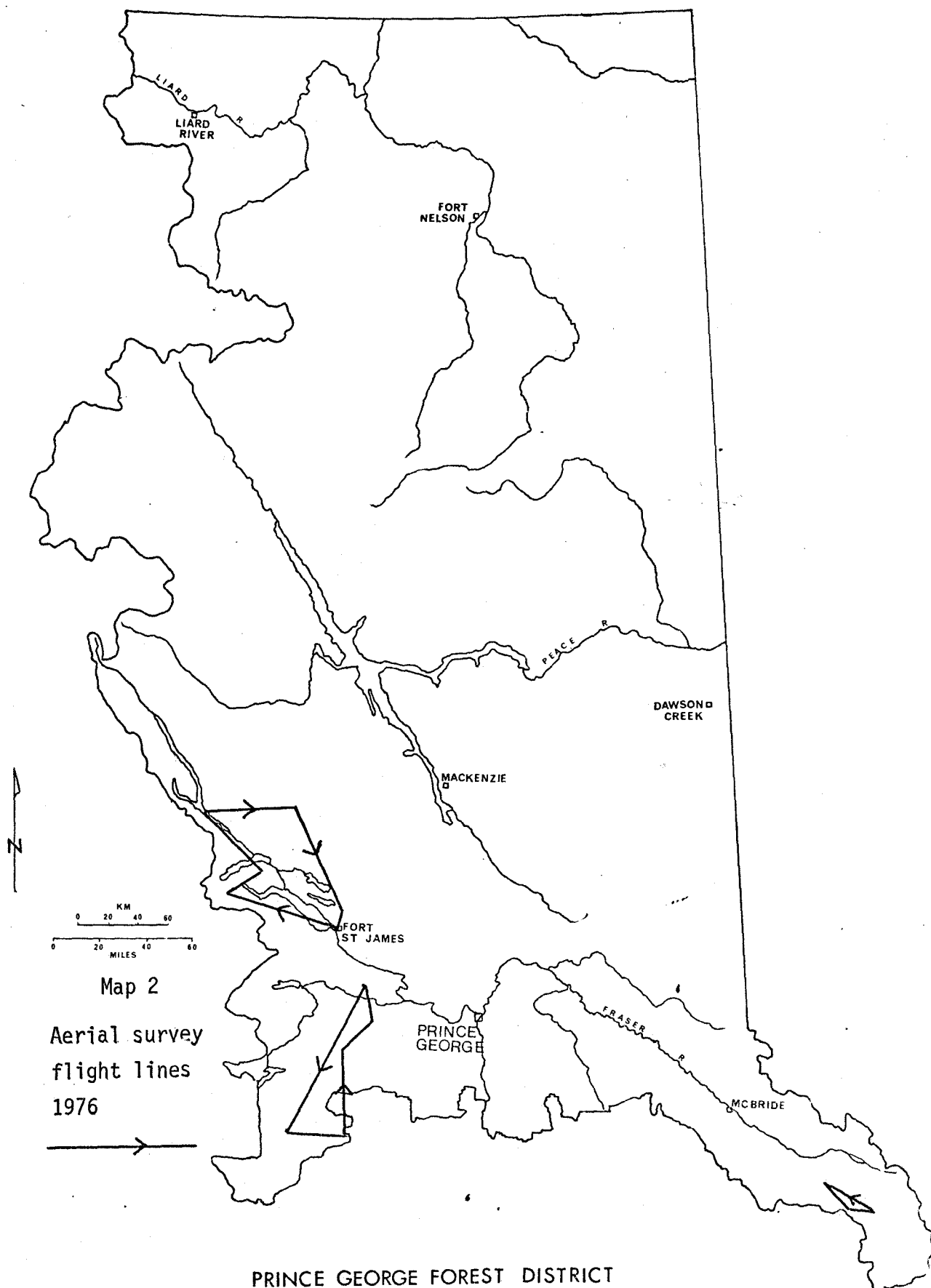
A total of 297 insect and 25 disease collections were taken in 1976. Collection localities and drainage divisions are shown on Map 1. Aerial survey flight lines are shown on Map 2.

The number of collections containing defoliating larvae was reduced to 68% in 1976. Defoliation by forest tent caterpillar was again severe in the McBride area. Conifer sawflies caused extensive defoliation of overmature western hemlock along tributaries of the Fraser River from Hungary Creek to Tete Jaune Cache. Severe defoliation of trembling aspen by large aspen tortrix occurred in parts of the Peace River Region. Blotch mining of willow and western white birch leaves was moderate to severe from McBride south to Tete Jaune Cache and east to Mount Robson Park. There was a notable decrease of one-year-cycle spruce budworm populations along the Alaska Highway. There was an increase in the numbers of beetle-killed lodgepole and western white pine trees in the Stuart - Takla lakes area and along the Canoe River southeast of Valemount.

Winter drying caused widespread damage to lodgepole pines in the valleys of Minaker and Prophet rivers. Fume damage of lodgepole pine and white spruce continued near Mile 94, Alaska Highway. Spruce cone rust was present at scattered locations in the District in 1976.

Details on individual insect and disease problems appear in subsequent sections.





FOREST INSECT CONDITIONS

Currently Important Insects

Defoliators

Forest tent caterpillar, *Malacosoma disstria*

Forest tent caterpillar infestations in trembling aspen stands in the McBride area increased from 4 000 ha (10,000 acres) in 1975 to 6 600 ha (16,500 acres) in 1976 as determined from road vantage points. Light to severe defoliation occurred in patches along the Fraser River from McKale Creek south to Tete Jaune Cache. Defoliation was not as severe as expected, probably due to the unseasonal cold, wet weather which kept larvae clustered on trees for long periods during the feeding season.

Tent caterpillar cocoons were abundant on trees and shrubs by mid-July. A mass collection of late-instar larvae and some pupae from understory shrubs on July 13 showed the presence of a nuclear polyhedral virus (identified by the Insect Pathology Research Institute) which may result in a decreased population in 1977. No egg samples were taken in 1976.

No defoliation was observed in the McKenzie area where it occurred in 1975.

A sawfly on western hemlock, *Neodiprion* sp.

Light to moderate defoliation by this insect occurred for the second consecutive year on overmature western hemlock between Hungary Creek and Tete Jaune Cache. Numbers of larvae in samples from understory hemlock were: Hungary Creek - 579; Penny Road - 123; Ptarmigan Creek - 200; Goat River - 415; Dome Creek - 579; Dore Creek - 1,000. There was an estimated loss of up to 60% of foliage from overstory hemlock in mid-July and heavy deposits of frass were noted on understory shrubs.

Infestations of this sawfly in the past have not persisted for more than two or three years, hence there may be one more year of defoliation, after which populations should decline.

Populations of *Neodiprion* spp. on all hosts in the District have been fairly static in most drainages for the past three years as shown in Table 1. The large increase in D.D. 270 (359) was due to the outbreak on western hemlock.

Table 1. Summary of *Neodiprion* spp. collections from western hemlock, Douglas-fir, white spruce and alpine fir in four drainages of the Prince George Forest District

Drainage* Division	No. samples taken during larval period			% samples containing larvae			Avg no. larvae per positive sample		
	'74	'75	'76	'74	'75	'76	'74	'75	'76
270 (359)	154	118	101	25	27	22	13.2	37.7	125.0
282 (368)	21	30	7	24	17	0	3.0	1.2	0
283 (369)	40	55	44	20	11	7	1.8	6.2	1.6
286 (360)	57	45	23	37	27	26	2.0	1.8	8.8
Totals	272	248	175	29	22	18	9.7	23.0	90.5

* Boundaries changed in 1976.

Large aspen tortrix, *Choristoneura conflictana*

Moderate to severe defoliation of trembling aspen occurred in scattered patches near Dawson Creek and Fort St. John in the Peace River region. Areas of infestation exceeded the 400 acres recorded in 1975 and at least three consecutive years of larval feeding has resulted in twig dieback on about 25% of the trees examined in the Progress and Clayhurst areas.

Other Noteworthy Insects

Two-year-cycle spruce budworm, *Choristoneura biennis*

Larval populations of *C. biennis* were low in 1976. From one to three larvae per beating sample from white spruce and alpine fir, Douglas-fir and western hemlock were found at Tumuch Lake, Bowron River, Naver Access Road, Hay Lake, Barney Creek Road, Westlake Road, Punchaw Lake Road, Dore Creek, Kiwa Creek, Jackman Road and Yellow Lake. Beating samples from white spruce and alpine fir in three drainages of the District showed little change from the 1974 populations, the previous year of larval maturity of this two-year-cycle budworm, as indicated by the following table:

Drainage* Division	No. samples taken during larval period			% samples containing larvae			Avg no. larvae per positive sample		
	'74	'75	'76	'74	'75	'76	'74	'75	'76
270 (359)	97	67	76	10	2	20	1.5	1.0	1.3
282 & 283 (368 & 369)	59	56	53	5	0	0	1.0	-	-

* Drainages changed in 1976.

The presence of larvae in 1975 indicates either a one-year-cycle budworm or an off-phase two-year-cycle.

Light to moderate defoliation of white spruce and alpine fir occurred from Mile 19 to Mile 25 along the Holmes River Valley near McBride. Analysis of branch samples revealed a total of 135 egg masses per 100 ft² of foliage, indicating a moderate population in 1977. However, since larval feeding is very light on the odd-numbered years, no damage is expected in 1977. Heavier defoliation could occur in 1978 if the population persists.

Pheromone traps were utilized again in 1976 to determine the presence of adult budworm populations. A trap consisted of a two-quart milk carton with the ends removed and trimmed to a length of 9 5/8 inches. The inside of the carton was covered with one of two sticky substances - Tree Tanglefoot or Stickum Special - resulting in a trapping surface of 154 inches². The attractant used was Trans-11-tetra decenal, mixed 4 to 5% by weight, impregnated into plasticized, cylindrical cores of 4 mm diameter. The cores were cut into 10 mm lengths, one per trap, resulting in 4 mg of attractant per trap.

The traps were set out on July 8 and 9 and retrieved on August 7 and 10. At all but three locations the number of male moths caught increased from the number in 1974, the previous flight year of this insect (Table 2). The fact that some moths were trapped in 1975, the non-flight year, again indicates

the presence of either one-year-cycle budworm or off-phase two-year-cycle.

Table 2. *Choristoneura* spp. larvae in 3-tree beating samples from white spruce and alpine fir, and adults in pheromone traps, Prince George Forest District

Location	No. larvae per 3-tree sample			Time traps in field 1976	Range of moths per trap 1976	Avg no. moths per trap		
	'74	'75	'76			'74	'75	'76
Mi. 16 Naver Rd. ^{1/}	2	0	1	July 9 - Aug 10	55 - 89	6	12	77
George Cr ^{2/}	3	0	0	" "	19 - 69	28	12	41
Hay L ^{2/}	0	-	1	" "	24 - 47	30	7	34
Hwy. 16, Willow R ^{2/}	2	0	0	" "	19 - 42	2	0	27
Crystal L ^{1/}	1	1	0	July 8 - Aug 7	14 - 32	2	1	24
Davie L ^{1/}	1	1	0	" "	0 - 4	-	1	2
Tudyah L ^{2/}	1	0	0	" "	1 - 4	4	1	2
Pine Pass ^{2/}	0	0	0	" "	6 - 16	38	18	11
Beaver Cr ^{2/}	0	0	0	" "	11 - 12	36	31	11
Link Cr ^{2/}	0	0	0	" "	31 - 53	25	16	39
Narrow L ^{2/}	2	0	0	July 9 - Aug 10	43 - 65	53	14	54

^{1/}Traps using Stickum Special.

^{2/}Traps using Tree Tanglefoot.

One-year-cycle spruce budworm, *Choristoneura fumiferana*

Larval collections of this budworm were made at miles 494 to 540, Alaska Highway (Liard River to Fireside) in the third week of June. Larvae ranged from fourth to ultimate instar and 3-tree beatings contained an average of 35 larvae, a notable decrease from the average of 124 collected in 1975. Light defoliation apparent at the time of examination would likely increase by the end of larval feeding. Time prohibited another visit to make final defoliation estimates or to determine the number of egg masses on which 1977 populations could be predicted.

A budmoth of spruce, *Zeiraphera destitutana*

Beating samples from white spruce between miles 494 and 540 of the Alaska Highway yielded an average of 50 budmoth larvae in 1976, increasing from 4 in 1975. Budmoth feeding, combined with that of spruce budworm; resulted in light defoliation of understory and the upper crown of overstory trees.

Bark Beetles

Mountain pine beetle, *Dendroctonus ponderosae*

Groups of from 5 to 100 red-topped lodgepole and western white pine trees were noted during aerial surveys in scattered locations in the Stuart - Takla lakes area, from Pinchi Lake north to Chuchi Lake and southeast of Valemount along the Canoe River. Estimated numbers of beetle-killed lodgepole pine trees were as follows: west side of Stuart Lake (four locations) - 50; Whitefish Lake - 50; Nancut - 90; Cunningham Lake - 80; south end of Takla Lake - 50; Chuchi Lake - 140; southeast of Chuius Mountain - 120; Hatdudatehl Creek - 50; north of Pinchi Lake - 15; north of Valemount at Swift Creek - 150. In white pine stands, red-topped trees were observed southeast of Valemount at Ptarmigan Creek - 100; Hugh Allan Creek - 75, and Buster Creek - 30.

There were no examinations of mountain pine beetle broods as most of the infestations were inaccessible. However, the 780 beetle-killed trees recorded in 1976 represent more than a 100% increase over the 1975 total and could be the forerunner of more serious outbreaks, unless the infested trees are logged and utilized, or burned.

Spruce beetle, *Dendroctonus rufipennis*

During the winter of 1975-76, blowdown of white spruce trees occurred in several areas of the District. Blowdown mapped by the British Columbia Forest Service covered the following acreages: Narrow Lake (2 areas) - 430; Purden - Bowron boundary south of Craze Creek (2 areas) - 845; Indianpoint Creek (3 areas) - 210; Indian Lake (2 areas) - 60.

Blowdown occurred in many other parts of the District along roads and the perimeter of logged areas. Examinations for spruce beetle were made in June at some of these locations. At Thursday Creek southeast of Prince George, 1/2 ft² bark samples yielded from 2 to 27 spruce beetle larvae. At Narrow Lake, five samples yielded the following: 16 larvae and 1 adult; 17 larvae; 9 larvae; 13 larvae and 1 adult; 12 larvae. Spruce blowdown from Narrow Lake to Strathnaver and along the Bowron River and Tumuch Lake roads was examined with negative results. Low populations of larvae were found east of Prince George along Highway 16, at Pine Pass and along Mesalinka River north of Germansen Landing. Populations were higher along the Nation River where a maximum of 15 attacks per 1/2 ft² bark sample was found.

The most serious threat from spruce beetle occurred on T.S.H.L. A 04041 near C.P. 104 (north of Narrow Lake) in 320 acres of scattered blowdown. In September a 40-chain cruise line showed an average of 8 to 9 blowdown spruce per acre of which 93% were attacked by spruce beetle. Attack density ranged from light to heavy. About 10% of the infested windfalls had pitched out the beetles and another 20% of the attacks failed because of heavy pitch flow. From 10 to 20% of the broods were expected to complete development and emerge to attack in 1977; the balance will attack in 1978.

This area should be examined in 1977 and 1978 as it is close to the more extensive areas of blowdown mentioned early in this report.

The British Columbia Forest Service have stated that they expect to have all the spruce which blew down in 1976 salvaged by the end of 1977, which would eliminate the threat of a major outbreak of spruce beetle in the mature stands of spruce.

Douglas-fir beetle, *Dendroctonus pseudotsugae*

Moderate attacks occurred in felled and bucked Douglas-fir trees around the periphery of logging 20 miles west of Punchaw Lake about mid-July. Lower populations of parent adults, eggs and larvae were found in decked logs at Purden Lake Park east of Prince George.

A small infestation in over-mature Douglas-fir trees along Barney Creek Road has occurred over the past few years, killing a few trees annually. In 1976, an estimated 300 dead trees were scattered over about 30 acres. No evidence of current beetle activity was observed.

Ambrosia beetle, *Trypodendron lineatum*

A small pocket of white spruce blowdown at Thursday Creek southeast of Prince George was moderately infested with ambrosia beetles in June. Thirty per cent of the trees examined were infested with an average of 15 holes per 1/2 ft². The damage was of concern to companies engaged in salvage logging since it results in considerable degrading of sawlogs.

Moderate to heavy beetle attacks occurred in some decked logs and occasional blowdown spruce along Bowron River, Tumuch Lake and Bowron-Coal roads.

Lodgepole pine terminal weevil, *Pissodes terminalis*

Lodgepole pine trees in an old burned area south of Uslika Lake were host to terminal weevils in 1976. At three locations between Wasi Creek and Oslinka River, 9, 8, and 4 terminals, respectively, per tenth acre plot were infested.

Dryocoetes-Ceratocystis complex

This insect-disease complex continued to kill alpine fir trees in the Pine Pass area where an estimated 180 recently killed trees were recorded in 1976.

Leaf blotch miner, *Lyonetia saliciella*

Severe discoloration and mining of leaves of western white birch and willow and, to a lesser degree alder, occurred between McBride and Valemount, south of Valemount along the Canoe River and from Tete Jaune Cache east to Mount Robson Park.

Table 3. Other insects of current minor significance

Insect	Host(s)	Locality	Remarks
<i>Acleris gloverana</i> Western blackheaded budworm	aIF, wS, D, wH	General	Defoliator; 15% of sam- ples were positive with avg of 2.7 larvae.
<i>Actebia fennica</i> Black army cutworm	shrubs and ground cover	Ptarmigan Cr, Bear L - Purden Mtn	Defoliator. No larvae found during examina- tions.
<i>Adelges cooleyi</i> Cooley spruce gall aphid	wS	Not known	
<i>Contarinia</i> spp. Douglas-fir needle midges	D	Not known	
<i>Epirrita autumnata</i> Green velvet looper	aIF, wS, wH	General	Defoliator; 14% of sam- ples positive with avg of 2.4 larvae.
<i>Ips</i> spp.	wS, 1P	Bowron R, Tumuch L and Naver roads	Moderate populations in blowdown trees and decked logs.
<i>Lasiomma anthracina</i> Seed maggot	wS cones	Kenny Dam	45% of cones in one sample infested.
<i>Lambdina fiscellaria</i> <i>lugubrosa</i> Western hemlock looper	aIF, wS, D, wH	General	Defoliator; low popula- tions, little change from 1975.
<i>Malacosoma pluviale</i> Western tent caterpillar	deciduous shrubs	South of Chetwynd	A few tents present.
<i>Nyctobia limitaria</i> Green balsam looper	aIF, wS, wH	General	Defoliator; low population, avg 1.7 larvae per positive sample.

cont'd...

Table 3 - cont'd.

Insect	Host(s)	Locality	Remarks
<i>Operophtera bruceata</i> Bruce spanworm	deciduous hosts	General	Defoliator; no larvae collected.
<i>Pikonema</i> spp. Spruce sawflies	WS	General	Defoliators; low populations, 18% of collections positive with avg of 3.2 larvae.
<i>Pissodes strobi</i> Spruce weevil	WS	Bowron R Rd., Aleza L	Occasional roadside trees infested.
<i>Pristiphora erichsonii</i> Larch sawfly	EL	Northern part of District	Defoliator; no larvae collected in 1976.

FOREST DISEASE CONDITIONS

Common diseases which cause tree mortality, growth loss, and quality reduction include dwarf mistletoes and stem and root rot fungi. These organisms, once established in a stand, persist for many years. They usually intensify at a slow rate, making annual summaries of their status repetitious. For this reason the following report may omit some of the more important diseases. Emphasis is placed on new outbreaks, and the status of annually varying foliage diseases and abnormal weather conditions, which immediately affect tree appearance and often cause dieback and mortality.

Currently Important Diseases

Weather Damage

Winter drying caused widespread injury to lodgepole pine and white spruce in the mountainous regions along the Alaska Highway. Foliage discoloration was most severe in the Trutch Mountain area along the Minaker and Prophet River valleys from Mile 175 to 212, Alaska Highway. Examinations on 25 white spruce trees showed that all had lost 100% of the foliage and most of the buds appeared to be dead. The nature of the terrain prevented an accurate estimation of the extent of the damage without an aerial survey.

Similar conditions were observed from Mile 402 to 405 near Muncho Lake, Toad River Valley and the Wokkpash - Racing River area.

Another area of what was attributed to climatic injury occurred at Kuyakuz Mountain, 60 miles southwest of Vanderhoof. The damage was surveyed from a helicopter and ground checks were made on June 22. The affected area was on the northwest side of the mountain at about 5,600 feet elevation and consisted of two patches separated by about one mile, each of about 100 acres. The stand in this area is predominantly lodgepole pine with some alpine fir; both species were affected.

One patch had suffered extensive blowdown and downed trees were scattered amongst standing dead ones. All trees had apparently been dead for some years as all were gray and had lost most of the branches. Evidence of climatic injury around the periphery of this area was shown by reddened foliage on small alpine fir trees. No ground checks were made because of lack of suitable landing areas.

The second patch had no blowdown but there were many trees which had completely reddened crowns and some had lost most of the foliage. The center of this damage was in a low, wet basin and some trees had apparently been killed by flooding. However, other dead trees were on ridges surrounding the basin and were above any possible high water line.

Ground checks failed to disclose evidence of insect damage except of a secondary nature. A number of trees had basal scars typical of those

caused by fire, but many such trees were alive and healthy. There were stems with cankers similar to those of *Atropellis* sp. but lacked the characteristic blue staining of the wood.

Laboratory examination of root, branch and stem samples from several trees showed evidence of *Ceratocystis* sp. but not of the type that kills trees. There were signs of flooding stress in some samples and cankers which could be the result of winter-heat conditions. No definite conclusion as to the cause of the damage was reached.

Tip blight, *Delphinella* sp.

Tip blight on alpine fir was widespread in the District in 1976, affecting trees of all sizes in patches from Hixon to north of the Parsnip River and from Prince George east to Mount Robson Park. The disease occurred only on current year's growth but affected most of the new shoots on those trees which were infected. The disease caused needles to wither, curl and drop. By July 23, estimations of up to 90% loss of current year's growth were made on individual trees.

Fume damage

Damage from H₂S fumes emitting from the Canadian Superior Oil Ltd. refinery at Mile 94.5, Alaska Highway, occurred over a 5-acre area in 1972. Continuing fume emission has killed 30 white spruce and lodgepole pine trees, all over 10 inches dbh, and resulted in the loss of 70% to 90% of the foliage on all the remaining affected trees.

Cone crop estimations

Cone crops on coniferous tree species were estimated at scattered locations in the District in 1976. Cone crop ratings were obtained by observations on 25 to 50 dominant or codominant trees of a species and applying the criteria in Table 4.

A total of 100 cone crop estimations were made by Forest Insect and Disease Survey personnel and an unknown number were recorded by forest industry and British Columbia Forest Service personnel.

Table 4. Cone crop ratings on coniferous tree species,
Prince George Forest District, 1976

Crop rating	Criteria
1 - no crop	No cones on seed trees
2 - very light	Few cones on less than 25% of seed trees
3 - light	Few cones on more than 25% of seed trees
4 - medium	Many cones on 25 - 50% of seed trees
5 - heavy	Many cones on more than 50% of seed trees

Heavy crops were reported on Douglas-fir near Stuart Lake.

Heavy crops on white spruce occurred north of Summit Lake, north of Merton Lake, at Whitefish Bay and near Tezzeron Lake. Crops in the Boreal region were rated as light to very light with collectable crops in the following areas: Peace - Clearwater; Pine Pass; Km 522, Km 850 and Km 856, Alaska Highway.

A medium crop on alpine fir was reported in the Tezzeron Lake area.

A detailed report of cone crop estimations for the Province is covered in: 1976 Cone Crop Bulletin, British Columbia Forest Service/Canadian Forestry Service, Joint Report No. 4, July, 1976.

Table 5. Other diseases of current minor significance

Disease	Host(s)	Locality	Remarks
<i>Chrysomyxa arctostaphyli</i> Spruce broom rust	WS	Ste. Marie L	7 of 25 trees infected with maximum of 3 brooms. Common in District.
<i>Chrysomyxa ledicola</i> Spruce Labrador-tea rust	WS	Chetwynd	Up to 80% of current foliage affected on 90% of trees examined on 5 acres.
<i>Chrysomyxa pirolata</i> Inland spruce cone rust	WS	Kenny Dam	26% of cones in one sample infected.
<i>Cronartium coleosporioides</i> Stalactiform blister rust	1P	McBride	10 of 25 trees infected over about 1/2 acre.

Table 5 - cont'd.

Disease	Host(s)	Locality	Remarks
<i>Cytospora</i> sp. Canker disease	tA	Crocker Cr	Stems of 7 out of 25 trees infected on one acre.
<i>Isthmiella quadrispora</i> Needle cast	a1F	Narrow L, Summit L	Less than 20% of foliage infected on 10% of trees examined.
<i>Lophodermella concolor</i> Needle cast	1P	Cluculz L, Willow R Rd., Baldy Hughes Rd., Old Strathnaver	Up to 70% of foliage infected on 15% to 60% of trees examined.
<i>Lophodermella pinastri</i> Needle cast	1P	Old Strathnaver	Found in conjunction with <i>L. concolor</i> .
<i>Lophodermium autumnale</i> Needle cast	a1F	Narrow, Aleza and Summit ls	Light infection in conjunction with other diseases.
<i>Melampsora epitea</i> complex Leaf rust	W	McBride, Parson R Rd.	20% to 50% of trees with up to 75% of foliage infected.
<i>Phaeocryptopus nudus</i> Needle cast	a1F	Narrow and Aleza ls	Found in conjunction with <i>L. autumnale</i> and <i>I. quadrispora</i> .
<i>Potebniamyces balsamicola</i> Branch canker	a1F	Willow R Rd.	2 or 3 branches per tree infected on 30% of trees examined.
<i>Pucciniastrum epilobii</i> Fir-fireweed rust	a1F	George Cr	Very light infection.
<i>Pucciniastrum goeppertianum</i> Fir-blueberry rust	a1F	Narrow L, Mile 42 Cr	From 20% to 60% of current needles infected on 90% of trees examined.
<i>Rhizothyrium abietis</i> Needle fungus	a1F	Wright Cr Rd., Summit L	Light infection found in conjunction with <i>I. quadrispora</i> and <i>L. autumnale</i> .