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ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1976
PART II, PRINCE RUPERT FOREST DISTRICT

by

D. F. Doidge and H. P. Koot^{1/}

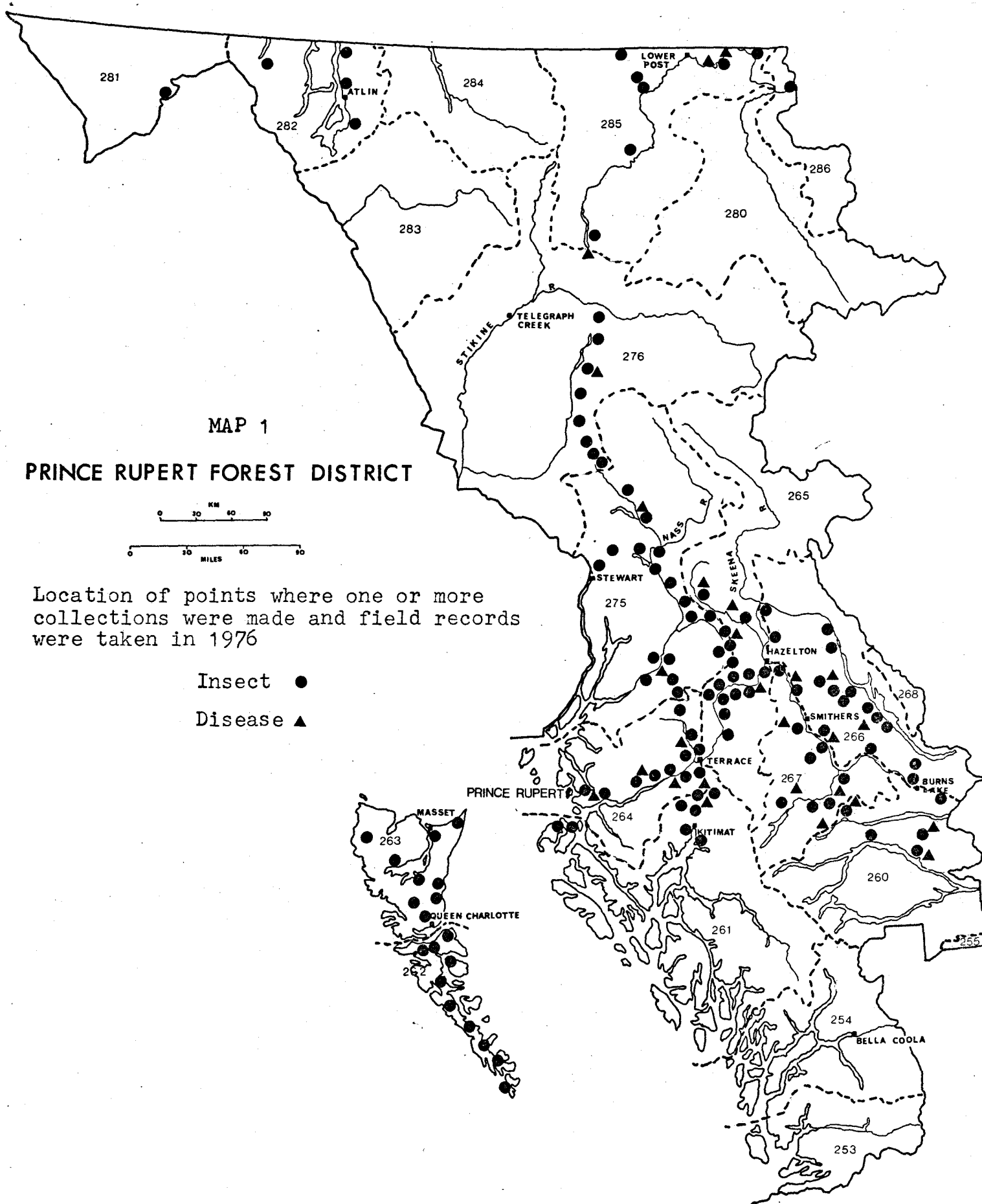
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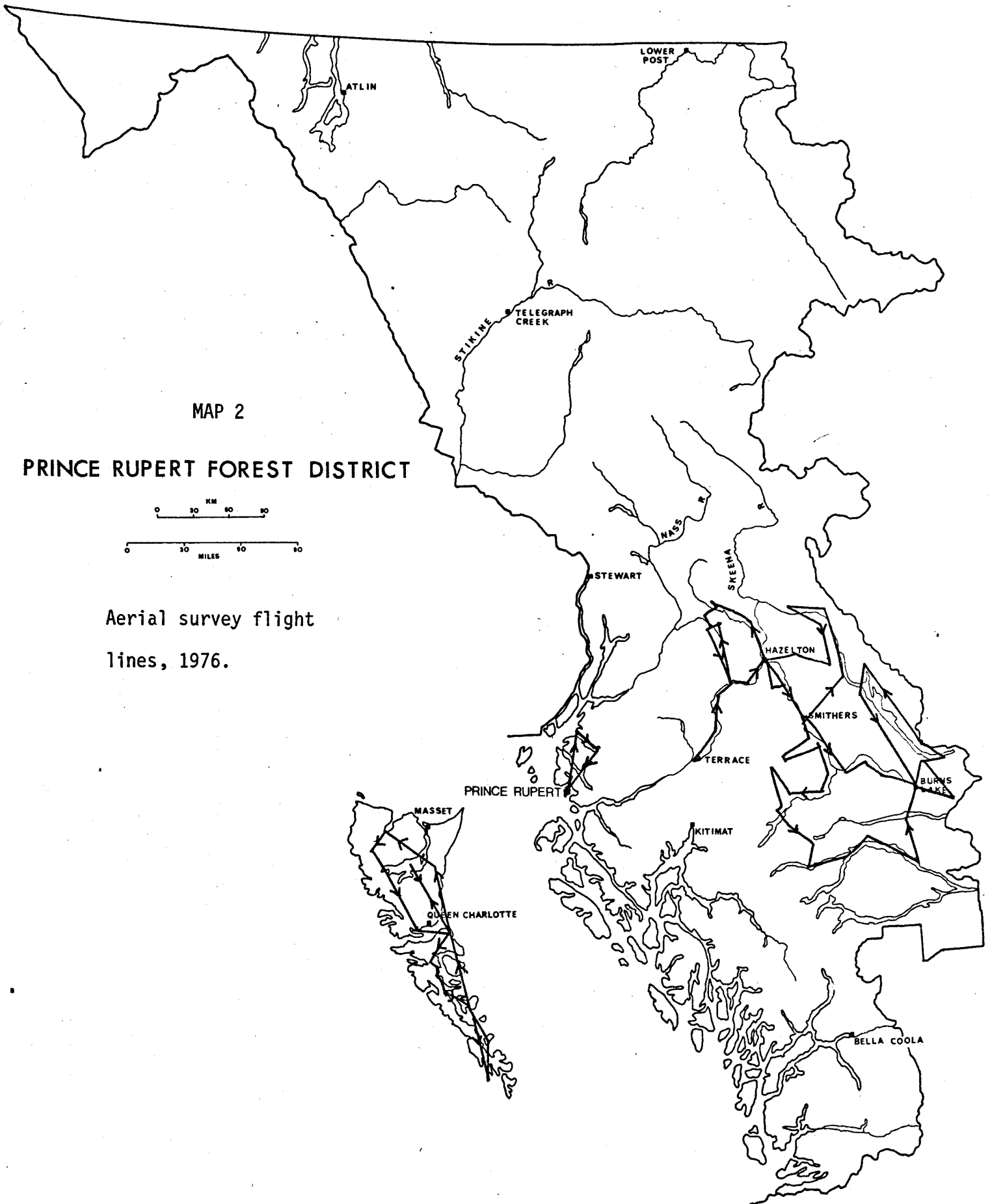
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CANADIAN FORESTRY SERVICE
VICTORIA, BRITISH COLUMBIA

- FILE REPORT -

DEPARTMENT OF FISHERIES AND ENVIRONMENT
January, 1977

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INTRODUCTION

Weather in the Prince Rupert Forest District was worse than normal even in the interior portion of the District. The cool, wet summer probably retarded insect development generally, but in the case of the mountain pine beetle, the long warm fall probably compensated and allowed normal progress of the beetle broods.

The field season extended from May 24th until October 10th. Aerial surveys were conducted over the Queen Charlotte Islands in July in conjunction with a field survey from July 8-15. The interior portion of the District along with the Khutzeymateen Inlet were surveyed by aircraft in September and October. The south and north coasts as well as the large lakes were not flown in 1976; monetary, weather and time problems.

A total of 444 insect and 86 disease collections were submitted to the P.F.R.C. Map 1 shows the drainages and general location of field collection points; Map 2 shows the aerial flight lines.

Numbers of defoliators found in the field decreased substantially from 1975. The number of collections containing larvae in the western part of the District decreased from 90% positive in 1975 to 64% in 1976; in the eastern portion, positive collections dropped to 52% from 86% in 1975.

Insect problems included mountain pine beetle which expanded slightly from 17,000 red-tops in 1975 to 18,000 in 1976. Two small areas of spruce beetle were detected in the eastern part of the District and western balsam bark beetle continued to be a chronic problem in spruce-balsam stands. A pine sawfly caused extensive defoliation of shore pine along the outer islands south of Prince Rupert for the second year. Blackheaded budworm caused light defoliation of the new growth of alpine fir and white spruce along the Bell-Irving River. Light populations of black army cutworm occurred near Fulton Lake; no seedlings were damaged. Population of the green velvet looper increased substantially along the west side of the Kitimat Valley; no obvious defoliation. The large aspen tortrix defoliated alder between Kitimat and Terrace. A spruce budmoth damaged buds of Sitka spruce regeneration at Deena River, on the Queen Charlotte Islands. Aphids caused heavy damage in white spruce at Perow and Chapman Lake, and in Sitka spruce south of Terrace.

Disease problems included porcupines, which killed western hemlock along the Khutzeymateen Inlet, and lodgepole pine between Terrace and Cedarvale. Inland spruce cone rust was prevalent on white and Sitka spruce in much of the District. Snow blight caused severe branch die-back to planted white spruce near Perow and at Chapman Lake.

Dwarf mistletoe is a continuing problem in western hemlock and lodgepole pine.

Mountain pine beetle, *Dendroctonus ponderosae*

The mountain pine beetle has been epidemic in mature lodgepole pine stands in Prince Rupert Forest District since 1969 when the first outbreak appeared at Date Creek. Surveys in 1976 indicated that about 18,000 of the trees killed by beetle in 1974 and 1975 (red-topped) remain unlogged in the District (Maps 3 and 4, Appendix I).

In 1972 the British Columbia Forest Service mounted a salvage and control program, then expanded it in 1973, using methods recommended by Dr. L. Safranyik of the Canadian Forestry Service. The program was considered to be 80% successful in reducing beetle populations in the Smithers - Houston areas. However, in the eastern portion of the Prince Rupert District, mountain pine beetle infestations occurred at Babine Lake, opposite Donald Landing, 350 red-tops; Smithers - Moricetown along the Bulkley River, 200; Houston, 200; and Donald Landing, 100. In the western portion of the Smithers Ranger District, the Harold Price Creek infestation continued with an estimated 4,200 red-topped lodgepole pine along with an additional 1,900 in the nearby Suskwa River Valley. The Hazelton Ranger District is currently working on the main problem area which is up the Kispiox River drainage and near Hazelton, with an estimated 1,900 red-tops.

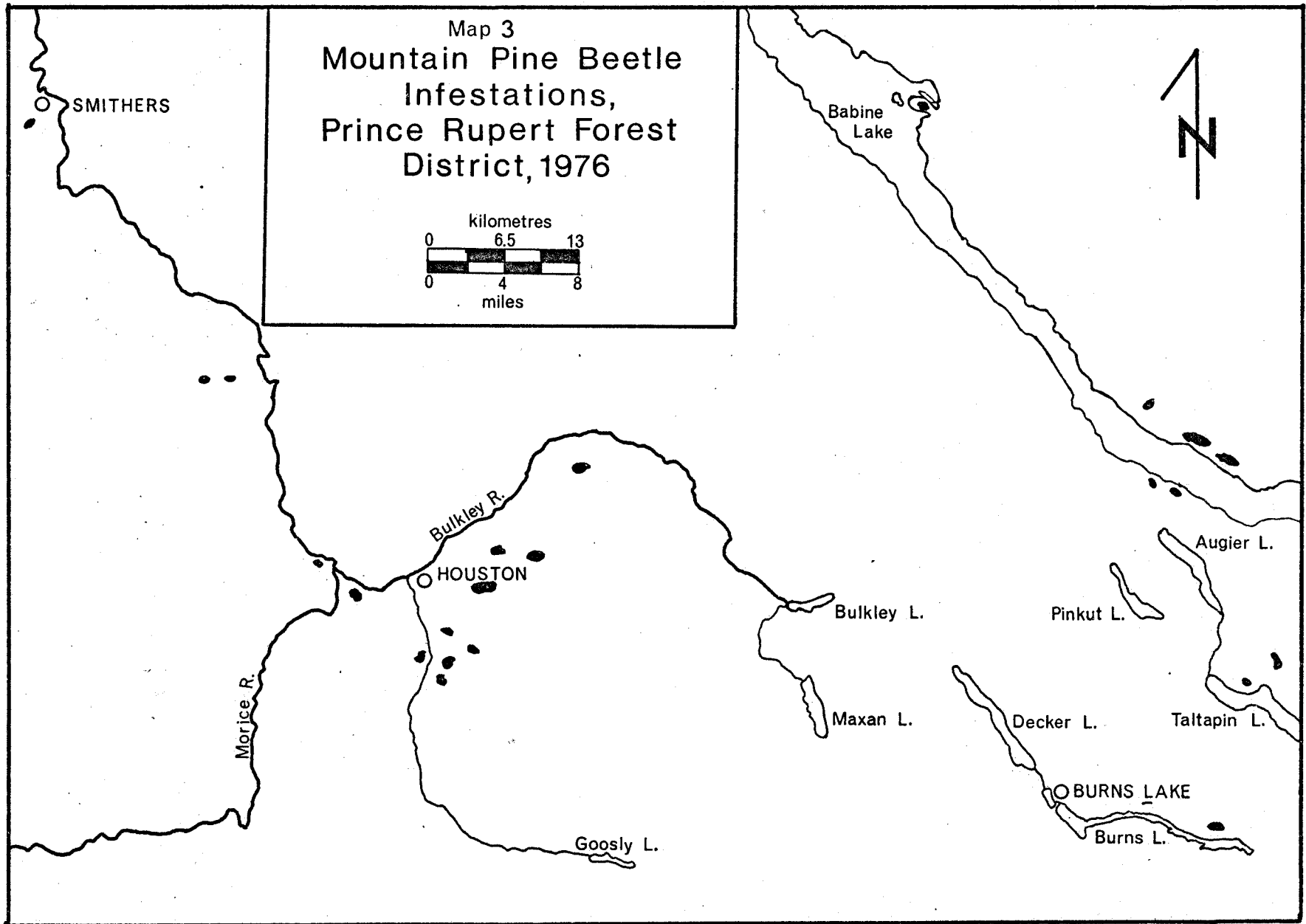
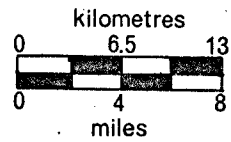
Just west of Hazelton and north of Kitwanga there was an overall increase in numbers of red-tops, larger infested areas being: Radio Tower Hill with 2,000 red-tops (down from 5,000 in 1975); opposite Carnaby, 2,000; Ritchie, 1,000; Seeley Lake, 1,000; Woodcock, 500; Kitwancool, 500; Weegett - Douse creeks, 500 (reduced by logging, from 3,000 in 1975); Price Creek, 400 (new in 1976); Kitsequecla River, 350; Kitwanga Lake, 250; Kitwanga, 200; south of Kitwanga, 140; Mill Creek, 125; Nash Y, 120; Cedarvale, 110, and Cranberry River, 100.

In the Bella Coola Ranger District near the junction of the Dean and Takia rivers there were 410 red-tops.

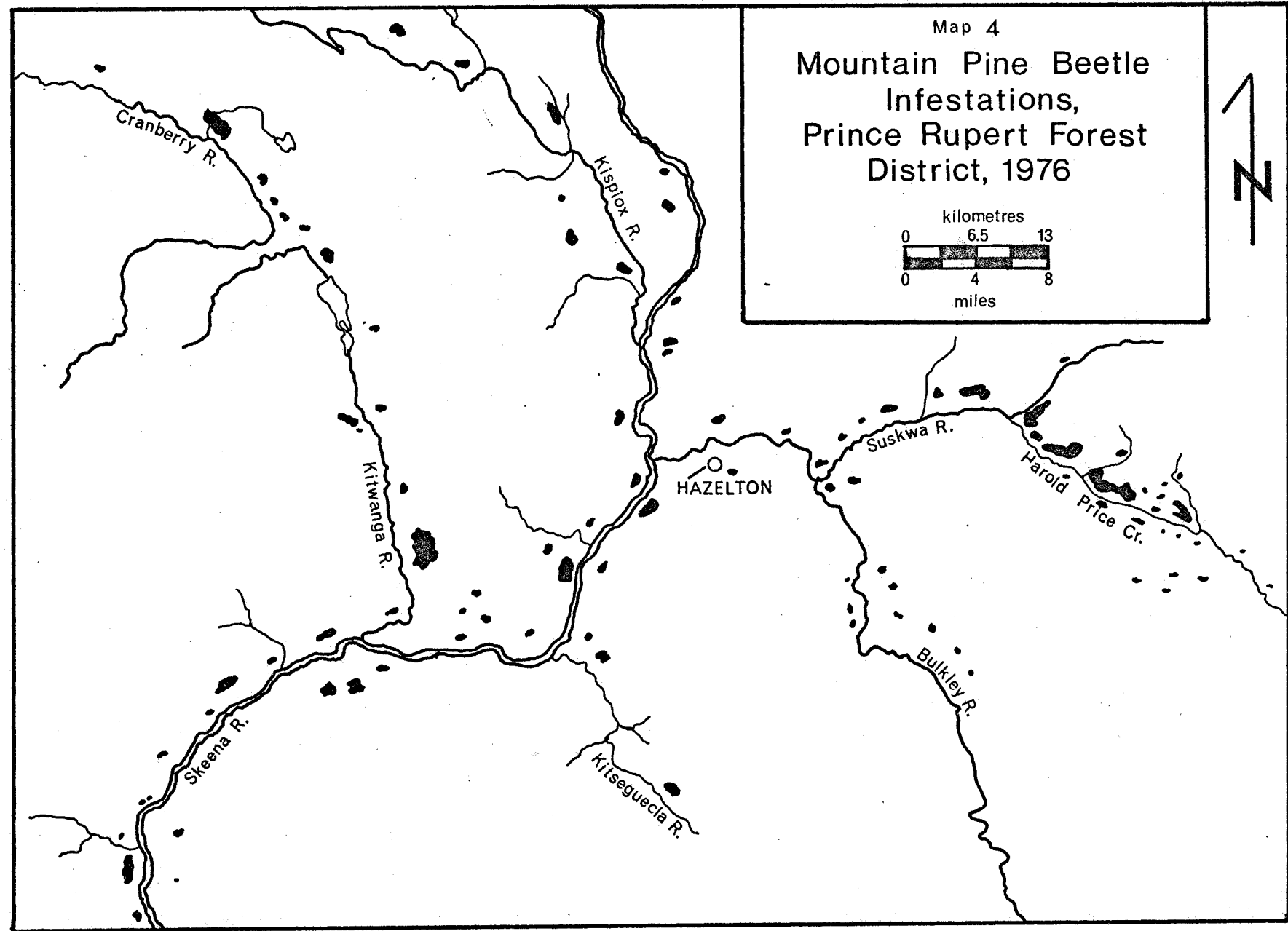
The infestation along Harold Price Creek, which is inaccessible to salvage logging, was examined in September and showed sufficient brood to continue the infestation in 1977. The infestation area has sufficient mature lodgepole pine to absorb the 1976 attack and probably part of the 1977 attack. In the upper reaches of the Creek the large areas of susceptible pine will probably be attacked in 1977 as the mature pine in the present infestation is deleted. The main flight into these areas probably won't take place until 1978. An examination of these susceptible stands revealed a light beetle population which, along with the maturity of the stand, provides the basis for the prediction of increased beetle attacks in 1978.

A cruise strip was run on Radio Tower Hill to ascertain stand deletion caused by mountain pine beetle in an area where no salvage or control was attempted. On the strip, 24% of the pine were healthy, 3% were currently infested (1976 attack), 10% were red (1975 attack), 5% had been partially attacked and 58% were gray (dead 3 years or more). This means that about 75% of the lodgepole pine trees have been killed by beetles. This is substantiated by aerial counts which show the trend: 640 red-tops in 1973, 1,000 in 1974,

Map 3
Mountain Pine Beetle
Infestations,
Prince Rupert Forest
District, 1976



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7751-2

5,000 in 1975, and then the decline in 1976 to 2,000 red-tops. The population of beetles is declining because of the reduction of susceptible lodgepole pine trees in the stand. Some salvage logging is planned.

The cool summer of 1976 caused a late beetle flight. In areas examined in September, brood development was retarded with most of the new generation still in the egg stage, however the warm fall weather probably enabled the eggs to hatch and the larvae to develop and become cold hardened.

Where the program of salvage logging of the green infested pine was implemented the beetle population was significantly reduced. Felling and burning of infested trees in areas where logging was impractical also contributed to the success of the program. In the areas where the beetle population has been reduced the emphasis should now be on management of the pine stand to minimize losses.

Spruce beetle, *Dendroctonus rufipennis*

The infestation detected in white spruce near Smithers Landing in March 1976 was mapped by helicopter during September, and is approximately 60 ha (150 acres). No salvage action has been taken against the beetle which is in reserve blocks northeast of Tanglechain Lake. During the winter of 1976-77 the infested area will be delineated and logged. During aerial surveys in September of the Fulton River - Harold Price Creek drainages, another 40 ha (100 acres) of spruce beetle infested trees were located near the old Otter fire. A road presently being built to log the Harold Price Creek mountain pine beetle infestation will pass near the Otter fire infestation and the affected trees will be logged in 1976-77.

The spruce beetle in the Prince Rupert District normally has a 2-year life cycle. The beetles near Tanglechain Lake were in the larval stage in the spring of 1976 therefore they will attack in late spring of 1977. No ground checks were made of the infested area near the Otter fire. The area had some grey trees and the infestation is probably continuing.

Western balsam bark beetle, *Dryocoetes-Ceratocystis* complex

In 1976 an estimated 5,200 dead alpine fir were mapped in the District during aerial surveys. No specific survey was done for the balsam bark beetle and any counts made were incidental to the main reason for the flight, i.e., mountain pine beetle. Counts therefore, are very conservative, and comparisons from year to year probably aren't valid as fluctuation of balsam red-top counts are in direct relation to the extent of the aerial surveys for other insects considered more important in the District the particular year. Areas noted included: McKendrick Pass, 2,000 red-tops; Cumming Creek, 1,000; Astlais Mtn, 400; Millar Creek, 300; Guess Lake, 200; Dome Mtn, 200; Huckleberry Mtn, 180; Pendleton Bay, 120; Morice River, 100; Thautil River, 100; Jonas Creek, 100; Winfield Creek, 100; Meed Creek, 100; Tachek Creek, 60; Mosquito Hill, 50; Elliot Creek, 30; Sibola Creek, 20.

Studies have shown that approximately 35% of alpine fir mortality is due to direct attack by the beetle, the remainder being attributed to the beetle-induced, lesion-causing fungus *Ceratocystis dryocoetidis*. Initial beetle attacks may be pitched out, but subsequent attacks on trees weakened by lesions are often successful; coalescing lesions may kill trees without further beetle activity.

Alpine fir trees killed by the complex may retain their needles for up to 5 years therefore determination of year of actual attack must be made on the ground. Aerial surveys are the best method for surveying the large tracts of infested alpine fir, especially since the infested stands are usually inaccessible.

Control is not presently feasible except through stand management.

Western blackheaded budworm, *Acleris gloverana*

Blackheaded budworm populations in the District are at their lowest level in 6 years. The incidence of larvae in beating samples was very low, the exception being drainage division 275 along the Bell-Irving River, where three samples from alpine fir averaged 50 larvae each; a decrease from 400 in 1975. Only a trace of defoliation was noticed on the current year's foliage. A further decline is expected in 1977.

Plots established to study the effects of defoliation over a period of years were examined in mid-summer on the Queen Charlotte Islands at Kwaikans Island in Masset Inlet and at Deena Creek (established 1976). Tree mortality as a result of heavy budworm defoliation in 1973 and 1974 was 27% on immature western hemlock at Kwaikans Island and 13% in a mature stand at Deena Creek. Some additional tree mortality can be expected in both areas for several years to come. Table 1 shows a summary of collection results from 1973 to 1976.

Populations of larvae on western hemlock were at low levels in 1976 in the District.

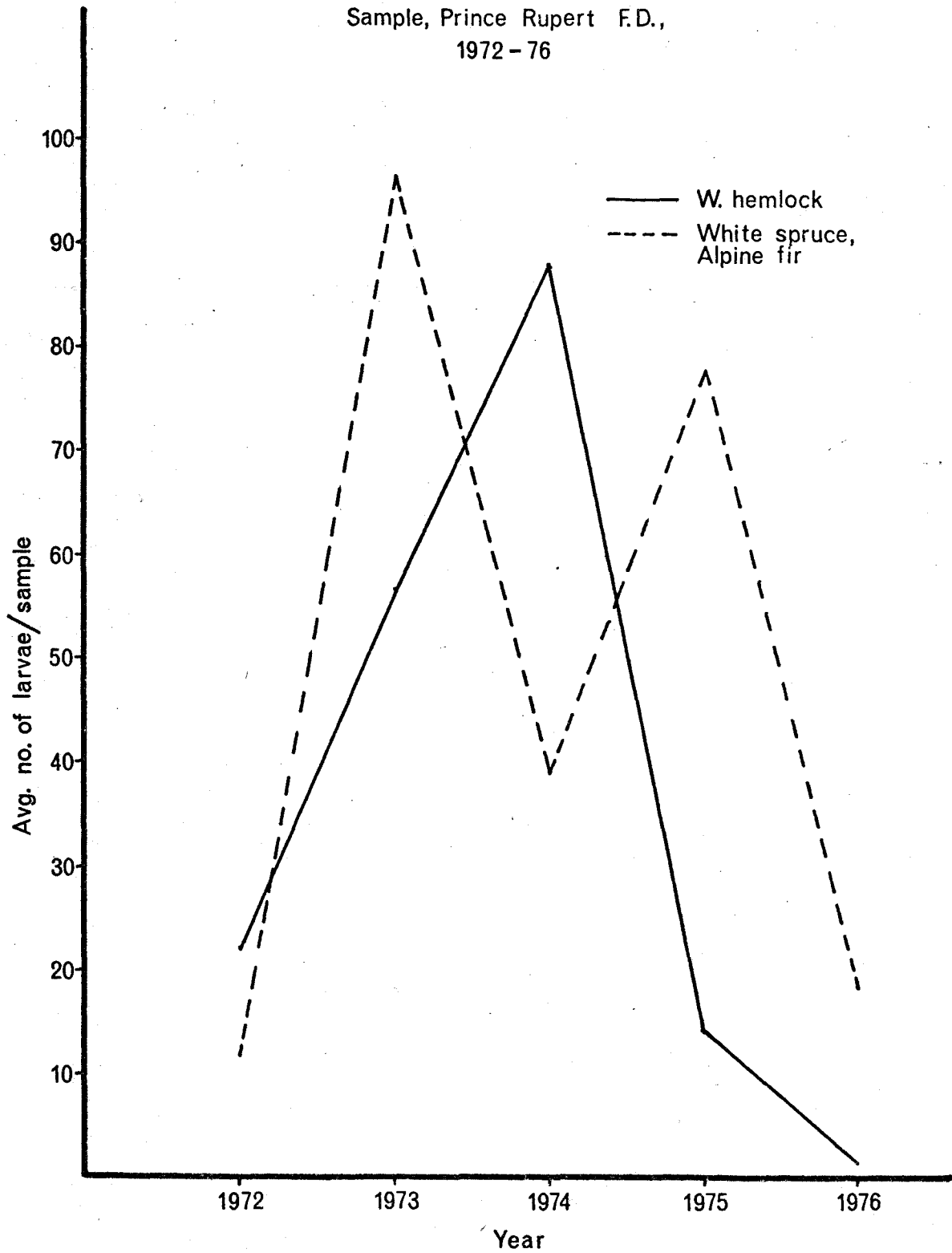
Table 1. Summary of blackheaded budworm collections from western hemlock, white spruce and alpine fir, by drainage division^{1/}, Prince Rupert Forest District

Host	Drainage division	No. of samples during larval period				% samples containing larvae				Avg no. larvae per positive sample			
		73	74	75	76	73	74	75	76	73	74	75	76
Western hemlock	261	26	17	17	13	65	76	4	0	8	100	8	0
	262	20	13	7	7	50	69	14	0	100	39	2	0
	263	22	17	10	15	27	76	60	0	4	43	120	0
	264	44	28	35	22	52	82	53	5	6	75	2	1
	265	18	14	14	12	67	57	57	0	5	70	1	0
	275	0	18	2	11	0	72	2	9	0	15	0	1
White spruce	266	26	32	32	18	69	75	81	11	65	40	54	1
	267	16	22	17	8	75	64	76	25	145	33	66	1
Alpine fir	266	25	30	24	17	72	70	87	12	72	42	69	2
	267	15	15	15	8	80	53	67	0	106	33	95	0
	275	1	11	5	8	0	9	40	50	0	1	400	50

^{1/}See Map 1.

Western Blackheaded Budworm

Average Number of Larvae per
Sample, Prince Rupert F.D.,
1972 - 76



7751-1

Pine sawflies, *Neodiprion* sp.

The infestation of sawflies on shore pine on the outer islands south of Prince Rupert is continuing and moving north. An aerial survey was impossible in 1976 due to extremely bad flying weather, however the British Columbia Forest Service supplied a boat for a limited survey and some ground checks during the first week of October. Areas examined from the boat included Hunts Inlet on Porcher Island where the sawfly population is in significant numbers and will cause defoliation in 1977. There appears to be a lot of disease and parasitism in the cocoons on this island. Only the new growth (1976) remains on the pines at Hunts Inlet. McCauley Island, which was heavily defoliated in 1975, will have pine mortality (25-30%) in some areas; the sawfly population appeared to be low in 1976. On Pitt Island near Holmes Lake there could be light mortality of the pine even though no further defoliation occurred in 1976. Lewis Island has a moderate sawfly population without much evidence of disease or parasitism; expecting extensive defoliation in 1977. The pines on Digby Island were examined on the ground and an aerial survey of the island was done but no evidence of the sawfly was found. The island is the primary source of Christmas trees for Prince Rupert.

[Information Forestry Vol.3(2), Winter 76-77, on page 3 notes thata conifer sawfly is reported infesting lodgepole pine on over 130,000 acres in the Kamloops (30,000 acres) and Prince Rupert Forest districts.]

Black army cutworm, *Actebia fennica*

On June 8th black army cutworms were noted feeding on scattered patches of fireweed and other broadleaved vegetation on the higher ridges within an 800 ha (2,000 acre) 1974 prescribed burn along the north side of Fulton Lake. The area was in the process of being planted with conifer seedlings. No seedlings were damaged as there was an abundance of the preferred broadleaved hosts.

Two other areas about 3 km (2 miles) to the east were also prescribed-burned in the fall of 1975. When examined in the spring of 1976, they were uninfested by the cutworm. These areas were planted in the spring of 1976. The burns were about 60 ha (150 acres) each and it was anticipated that they would attract an army cutworm flight in late summer, 1976. Light and pheromone traps were set out on the burned areas to check this theory, and to gather data to make a population prediction for spring 1977.

Table 2. Traps baited with 97 micrograms of 2-9-Dodecen-1-01 Acetate to attract adult male *Actebia fennica*, Prince Rupert Forest District, 1976.

Location	Trap no.	No. adults per trap	Remarks	Location	Trap no.	No. adults per trap	Remarks
Fulton Lake area "A"	1	0		Fulton Lake area "B"	1	0	
	2	3			2	0	
	3	0			3	0	
	4	0			4	1	
	5	0			5	0	
	6	0			6	16	
	7	2			7	9	
	8	1			8	0	
	9	4			9	9	
	10	0			10	3	
	11	2			11	4	
	12	0			12	9	
	13	missing			13	missing	
	14	missing			14	missing	
	15	missing			15	missing	

The first five traps were set out on July 19 and the remaining 10 traps on July 28. A problem developed because the traps are set out in large open areas and the wind action caused the wires on the traps to wear through and the traps fall on the ground. Each trap was on the ground at some time; this may be one of the reasons for the light numbers of adults in traps. A stick running the length of the ridge of the trap will alleviate this problem.

Light traps were also set out in the same areas to monitor the adult flight to areas A and B, both male and female in this case. It was thought that light traps might be more effective than sex attractant traps - no conclusions (Table 3).

Table 3. Black army cutworm adults collected by light traps near Fulton Lake infestation, Prince Rupert Forest District, 1976

Location	Date traps in field	Date insects collected	No. moths collected	Remarks
Area A	July 19	July 28	0	
B	"	"	0	
A	"	Aug. 3	2	
B	"	"	0	
A	"	Aug. 8	1	
B	"	"	5	
A	"	Aug. 14	2	
B	"	"	25	
A	"	Aug. 18	1	Long interval (Aug. 18-Sept. 15) due to having to return to Victoria - monetary reasons
B	"	"	10	
A	"	Sept. 15	13	
B	"	"	79	

The light traps attracted army cutworm adults indicating that adults migrated from the infestation near Fulton Lake to the smaller prescribed burns approximately 3.2 km (2 miles). No larvae had been found in these two areas in 1976.

These areas will be examined in the spring of 1977 to assess larval populations and if a population exists where none was found in 1976, then maybe light traps could be utilized as an early warning system for black army cutworm.

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

Larval populations of this budworm, on white spruce and alpine fir, continued at low population levels in the District. Thirteen positive samples averaged less than two larvae each. No significant defoliation by this species has occurred since the termination of the previous outbreak in 1964 along Babine Lake.

Traps to assess adult male budworm populations were baited with a sex attractant (97 parts trans-11-tetradecenal) and set out at seven locations in the interior of the District. The average number of male moths per trap collected in 1976 were: Oweegee Creek, 150; Glacier Creek, 201; Bell-Irving River, 202; Skunsnat Creek, 17; Smithers Landing, 34; Telkwa River, 3; and Morice FDR, Mi. 15, 6. Several traps at Glacier and Oweegee creeks were destroyed by bears. With the exception of Skunsnat Creek, there was an increase in number of moths captured. This increase probably is related to the fact that 1976 was a "flight" year, when *C. biennis* completes its life cycle, and more moths are present than during the so-called "non-flight" year.

Light *C. biennis* populations are expected in 1977 in most areas, though some minor feeding damage of the new growth of alpine fir and white spruce may become evident along the Bell-Irving River.

Green velvet looper, *Epirrita autumnata*

A light infestation of this looper occurred in mature, mixed hemlock and amabilis fir stands up to 600 feet (183 metres) along the west side of the Kitimat Valley between Kitimat and Lakelse Lake. No defoliation was evident, but up to 147 larvae were collected in a beating sample at Raley Creek; elsewhere larvae were common in low numbers.

This insect has no history of causing severe defoliation in B. C., and any small epidemics recorded were of short duration, lasting only 1 or 2 years, without causing tree mortality.

Large aspen tortrix, *Choristoneura conflictana*

Light to moderate defoliation of red alder occurred along the west side of the Kitimat River Valley between Kitimat and Terrace, particularly along streams. Leaf rolling was very pronounced in late June, especially near the Alcan Smelter in Kitimat, and along the Wedeene River. Trees had partially recovered by August.

Outbreaks are generally characterized by the buildup of large populations that persist for 2 or 3 years and then suddenly collapse; that being the case, at least one more year of defoliation can be expected.

Spruce budmoth, *Zeiraphera* sp.

Light to moderate bud damage by the larvae of spruce budmoth was common on Sitka spruce in western portions of the District in 1976.

At Deena River on Moresby Island, 135 acres of pre-commercially thinned Sitka spruce had terminal and lateral bud damage. Alterations in form and height growth was evident on approximately 30% of the trees. This is the second year of damage in this area.

Dead tips were also common along the Skeena River between Terrace and Kitwanga. At Cedarvale up to 60% of the buds were infested in a localized area of regeneration Sitka spruce. Tree growth was not seriously affected.

Previous history indicates that epidemic populations causing damage last approximately 5 years. That being the case, continued infestation of young Sitka spruce can be expected in 1977.

Larvae were common in the interior regions of the District on white spruce, but no foliage damage occurred.

Cooley spruce gall aphid, *Adelges cooleyi*

Douglas-fir planted on a large burn near Perow approximately 6 years ago are heavily infested with *Adelges cooleyi*. A plot, examined in August 1976, indicated an average of 74% infection per tree and on the plot, nine trees had every needle infested. These trees are planted out of their range and on a pine-spruce site, thus providing the perfect alternate host situation for the insect. It is recommended that the Douglas-fir trees be removed.

Woolly aphids, *Pineus prob similis*

Plantations of white spruce at Perow and Chapman Lake were heavily infested by this aphid, which causes galls to form on the host. Plots examined at Perow were 60% infested with as much as 80% of the branches on some trees having galls. White spruce on the Chapman Lake plantation were 38% infested with as many as 90% of the branches involved. At Chist Creek, approximately 10% of an 8-year-old Sitka spruce plantation was heavily infested with woolly aphids. Healthy trees were up to 10 feet tall and exhibited up to 3 feet of new leader, whereas those displaying heavy browning and gall formation were stunted to only half the size.

One of the main concerns, besides the obvious growth loss caused by the aphids, is that in some cases the insect forms its galls on the leaders of the trees, causing a weakened area and making the trees more susceptible to breakage by snow.

Saddleback looper, *Ectropis crepuscularia*

No saddleback looper larvae were collected in the former infestation area of Kitimat. Only one larva was collected in the entire District.

Spruce weevil, *Pissodes strobi*

Spruce weevil damage was common on white and Sitka spruce along both sides of Highway 16 between Prince Rupert and Burns Lake. No special surveys were conducted for the weevil in 1976.

A conifer seedling weevil, *Steremnius carinatus*

No evidence of this weevil was found or reported in the District in 1976.

A pine needle miner, *Recurvaria* sp.

This insect appears to have collapsed in 1976. No insects were collected and no damage was noted.

Aspen leaf miner, *Phyllocnistis populiella*

Trembling aspen between Hazelton and Smithers and up the Kispiox Valley were heavily infested, discolouring the trees a lovely shade of silver in July, 1976. No obvious permanent damage is expected.

A pine terminal weevil, *Pissodes terminalis*

Leaders on lodgepole pine between miles 30 and 31 on the West Morice Forest Development Road were examined and 11 attacks were noted. This level of damage provides no problem.

A pine needle miner, *Pulicalvaria* sp.

This insect mines bases of needles of lodgepole pine. On an area examined on the Perow burn plantation, 48% of the trees were infested. No major damage is expected to result as new growth in 1977 will replace the lost foliage. Infestations are usually localized.

Cone Insects

The cone crop on white spruce was generally heavy throughout the eastern portion of the District; in contrast, the cone crop was light on Sitka spruce in the western part of the Prince Rupert District. As is usual when a cone crop is heavy, cone insects are also plentiful. In 1976, 15 areas were sampled in the eastern region of the District and 5 areas of Sitka spruce in the western area. The most common insect found infesting the cones was: *Lasiomma anthracina* (a spiral spruce-cone borer) which damages scales and destroys seeds with no external evidence of damage until the larvae emerge; of the 20 areas examined, 19 had infested cones. Other insects infesting spruce cones were: *Laspeyresia youngana* (a spruce seedworm) which feeds almost entirely on seeds with no external evidence of damage, 14 of the areas examined were infested; *Dasineura canadensis* (a spruce cone gall midge), forms a gall in the cone scale usually not adjacent to a seed, occurs in small numbers and probably has little effect on seed production, occurred at 7 locations; *Dasineura rachiphaga* (a spruce cone axis midge), one of the most common insects in spruce cones in British Columbia, but despite its large numbers it is less destructive than other cone and seed insects - no external evidence of damage, occurred at 6 locations; *Mayetiola carpophaga* (a spruce seed midge), in this case each larva feeds in and destroys a single seed, although it may occur in large numbers in some localities, it is not generally common, so overall losses are slight, 4 of the areas examined were infested; *Megastigmus piceae* (a spruce seed chalcid), also an insect which feeds in and destroys a single seed per larva, not a common pest in British Columbia and only occurred at 2 of the areas examined.

Cone insects are cyclic with the cone crop and if the cone crop in the Interior is heavy in 1977, so will the insect population.

Porcupine Damage

Porcupine damage was widespread in the District this year on western hemlock and lodgepole pine. Extensive tree mortality and top-killing occurred in a previously logged area of 25-year-old western hemlock along both sides of Khutzeymateen Inlet, between McGregor Point and Larch Creek. Approximately 10 to 20% of the stand was affected over 2,000 acres.

Between Terrace and Little Oliver Creek, porcupines killed approximately 600 immature lodgepole pine trees in scattered groups of 25 to 200 trees each.

Elsewhere, small pockets of lodgepole pine were killed at Topley Landing, Fulton Lake and Telkwa River.

Fume Damage

A limited detection survey for fluoride damage and its effect was carried out during summer in the Kitimat area. The source of fluoride emission is the Alcan aluminum smelter. Two days were spent on this survey: one day in company with Hubert Bunce (forester for Reid, Collins and Associates) examining and learning to recognize fluoride injury on ground vegetation and immature conifer species, and another day taking increment cores from various tree species for growth rate analysis.

Increment core samples were extracted from Sitka spruce, amabilis fir, western hemlock and black cottonwood along the east side of the Eurocan pulp mill at Radley Park and the Kitimat reservoir. Fluoride concentrations there are 200-300 ppm, 100-200 ppm and 0-24 ppm, respectively.^{1/} Analysis of core samples indicated a reduction in growth rate with maturity, but no abnormal decline. Though too few trees were sampled for suitable analysis, there was no obvious pollution effect on growth rates. However, these being the less sensitive-mature trees and still living, shows they may be the more resistant individuals within the population.

Very light fluoride injury in the form of marginal necrosis was evident on fireweed, amabilis fir, western hemlock and black cottonwood examined near Claque Mountain Park, just west of Kitimat.

^{1/} Fluoride concentration data supplied by H. Bunce.

Blowdown

The British Columbia Forest Service reported fringe blowdown in logging on the east side of Babine Lake over 1,000-1,500 acres. No ground checks were done in 1976.

Snow blight, *Lophophacidium hyperboreum*

This disease, a new record in British Columbia, caused dieback of 60% of white spruce trees examined on the Perow burn plantation, and on 3% of the trees at the Chapman Lake plantation. The plantation at Perow is 6-12 years old and the Chapman Lake trees were planted 8 years ago. Further surveys by the British Columbia Forest Service in the spring of 1977 should confirm the actual extent of this disease.

Bud necrosis, *Camarosporium strobilinum*

This disease, normally a bud fungus, affected 80% of trees on a plantation of approximately 4- to 5-year-old white spruce near Division Lake (Burns Lake Ranger District) as a dieback. With this change of damage-type, it could be a danger to further plantations.

Inland spruce cone rust, *Chrysomyxa pirolata*

This cone rust was prevalent on both Sitka and white spruce, particularly on white spruce in the eastern portion of the District, where cone crops were heavy. Random samples of 100 cones each were made at 20 locations (Table 4).

Percentage of cones infected ranged from 0 to 51%. Incidence of cone rust on white spruce was highest at Kispiox Valley, mile 36 (51%), Kispiox Valley, mile 20 (42%) and Owen Lake (41%); on Sitka spruce, incidence was highest at Kleanza Creek (34%).

C. pirolata causes destruction of seed and opens cones prematurely.

Table 4. Percentage of cones infected by *Chrysomya pirolata*, Prince Rupert Forest District, 1976

Location	Host	% Infection	Remarks
Fulton Lake	WS	0	
Morice FDR	WS	22	
W. Morice FDR	WS	21	
Owen Lake	WS	41	
Owen Lake (N)	WS	34	
Tahtsa Lake	WS	7	
Hudson Bay Mtn	WS	16	
Smithers	WS	9	
Fulton Lake (W)	WS	36	
Chapman Lake	WS	2	
Smithers Landing	WS	11	
Kispiox Valley, Mi. 20	WS	42	
Kispiox Valley, Mi. 36	WS	51	
Elliot Creek	WS	21	
Smithers Landing Rd. Mi. 34	WS	4	
Kleanza Creek	sS	34	
Legate Creek	sS	0	
Cedarvale	sS	5	
Tseax River	WS	1	
Kitsequecla River	sS	7	

Comandra blister rust, *Cronartium comandrae*

Comandra blister rust was found in a localized 5-acre area of 3- to 15-foot lodgepole pine at the Dease Lake junction to Telegraph Creek. Stem and branch cankers occurred on approximately 25% of the trees examined; of this number, a few were killed by complete girdling.

The British Columbia Forest Service reports the rust as occurring in surrounding areas also, but not extensively.

Western gall rust, *Endocronartium harknessii*

This rust is the most common, most conspicuous and often the most destructive rust of lodgepole pine in western Canada. Irregularly round or pear-shaped galls on stems or branches are the most noticeable symptoms. The galls are woody and perennial, growing larger and producing spores each year until they have girdled and killed the affected branch or stem. It is a short cycle rust, i.e., completes its life cycle on pine alone, without alternate hosts, and when the host dies, the rust dies as well.

Stem galls are potentially the most damaging, so at the three areas examined special note was made of the percentage of galls affecting the stems of the pines. At Nadine Lake, 79% of the trees examined were infected with 63% having stem galls; Bulkley Canyon had 35% infection and 12% stem galls and along the Kispiox River near the Steelhead Fishing Camp 84% of pine were infected with 54% having stem galls.

These areas were either in roadside pine or small clearings produced by fire or logging, but this disease is a potential problem in pine plantations.

Stalactiform rust, *Cronartium coleosporioides*

This rust of lodgepole pine is often prevalent in reproduction stands, along roadsides and in re-stocking burns. Three areas where it occurred in the Prince Rupert District were: Francis Lake - Morice Lake roads junction, where 25% of the pine examined were infected; Bulkley Canyon, 28%, and Owen Lake, 20%. Branch and tree mortality result from girdling although on larger stems growth loss and deformity are the principal results of infection.

The disease alternates between pines and Indian paintbrush, the secondary host. However, once the pine is infected the disease is perennial until the infected portion dies.

Aspen foliage disease, *Venturia macularis*

Infections of this pathogen were widespread on trembling aspen in eastern portions of the District. A moist spring and summer served to intensify and spread the disease.

Heavy damage in the form of many withered blackened leaves was evident between Southbank and Grassy Plains, and near Rose Lake. Light to moderate damage occurred from Houston to Burns Lake, between Ootsa Landing and Wistaria, and Burns Lake north to Pendleton Bay. Scattered pockets were observed along the Perow-Jarman road, Forestdale Canyon, near Owen Lake and between Cedarvale and Hazelton.

Other diseases collected

Lophodermella sp.

A pine needle cast which lightly infected approximately 10% of lodgepole pine at mile 11.0 Smithers Landing road.

Isthmiella quadrispora

A needle blight of alpine fir which lightly infected 10% of trees in an area along the Smithers Landing road in the Chapman burn.

Melampsora epitea complex

Willow leaf rust at Skins Lake Dam near Ootsa Landing lightly infected all the willows in the area.

Special Survey for Mistletoe in Young Stands

A special survey was conducted in mid-June to determine frequency of mistletoe in young hemlock stands and to locate possible areas for experiment and demonstration of control through sanitation and thinning.

Listings of potential hemlock areas were obtained from the British Columbia Forest Service and industrial contacts. Of interest were areas 5-15 (logged in 60's) or 16-25 years old (logged in 50's).

Seven suitable areas of naturally regenerated western hemlock were examined north and south of Terrace, and only at one location near the Terrace airport was mistletoe a significant problem. The following table illustrates the impact of mistletoe in previously logged areas containing residuals and naturally seeded hemlock. One hundred trees were examined in each location.

Table 5.

Area	Infection/total residuals	Infection/total regeneration		Regen. age (years)
		<10 feet	>10 feet	
Whitebottom (Lakelse Lake Rd.)	1/1	0/38	0/61	5-20
Star Creek	1/28	0/24	0/48	21
Airport	28/32	0/58	3/10	15
Chist Creek	17/24	0/45	0/31	5

In four areas surveyed in the Kalum Block north of Terrace, no mistletoe infection of natural regeneration was found, and only at Star Creek was there an infected residual recorded. However, south of Terrace, infected residuals were found in all three areas examined, but only at the airport location was there any infection of natural regeneration.

Elytroderma disease of pines, *Elytroderma deformans*

Roadside lodgepole pine trees near Lower Post suffered up to 70% foliage discoloration along a 1-mile stretch of road. Nearly all trees were affected.

A shoot blight, *Sirococcus strobilinus*

Only at Chist Creek flats was there any infection found in 1976. Tip wilting of juvenile western hemlock was noticed on nearly all trees over approximately 5 acres. Though initial incidence of tip wilting was high, there was unusual recovery of many wilted buds.

APPENDIX I.

Mountain Pine Beetle

Prince Rupert East and Prince Rupert West

Forest Districts

APPENDIX I

Mountain Pine Beetle

Eastern Portion of Prince Rupert District

Harold Price Creek: present infestation, 4,200 red-tops over approximately 1,000 acres; in 1973 there were 1,100 red-tops, 1974, 2,000 and 1975, 2,000 again. Present area of infestation is inaccessible to logging either for purpose of salvage or control because of the steepness of the terrain as well as environment constraints. Large areas of susceptible lodgepole exist near the present infestation and at present has not roads, but a system is in the process of being built from the Chapman Lake end in anticipation of a beetle problem; roads should be near the hazard area by winter of 1978. Recommendations based on cruise strips and silvic walk-throughs are that 1978 is the dangerous year if the present infestation continues. Brood checks in the infestation in September indicated sufficient brood for 1977.

Natlan Creek - Suskwa River: present infestation 1,040 red-tops over approximately 250 acres; in 1973 there were 150 red-tops, 1974, 1,000 and 1975, 2,000. Population is apparently declining. No ground checks were done in 1976. Some salvage logging was conducted but was halted because of environmental considerations.

Kline Lake (Kispiox River Valley), Hazelton Ranger District: 650 red-tops over approximately 150 acres at present; in 1973, 150 red-tops, 1974, 500, and 1975, 1,000 red-tops. Salvage and control logging has reduced the beetle populations, remaining red-tops are in fringe areas and will be cleaned up.

Babine Lake across from Donald Landing (Burns Lake): present count, 325 red-tops in scattered groups of 5-100 red-tops among large areas of susceptible lodgepole pine. No plans for logging on this side of Babine Lake for at least 6 years. Expect increase as no action intended, none recommended.

Bulkley Canyon (Smithers): presently 260 red-tops in scattered groups of 40-80 red-tops. The B.C.F.S. has let timber sales over this area for logging but ? some private land problems.

Murder Creek (Hazelton): 170 red-tops in 1976, increased from 110 in 1974. Area presently being logged - should be cleaned up winter of 1976.

Hazelton - Kispiox and Skeena Rivers drainages

Date Creek	250	red-tops	- declining, being logged at present.
Shegunia Creek	120	" "	- new area, has been cruised, green infested trees marked.
Sediesh Creek	112	" "	- new area, no action.
Hazelton Creek	110	" "	- new area.
Pinent Creek	100	" "	- new area.
Sunday Lake	100	" "	- static, private land.
Tenas Hill	50	" "	- declining - salvage logged.
New Hazelton	50	" "	- static, private land.
Sammon Lake	40	" "	- declining - salvage logged.
Four Mile Mtn	30	" "	- static.
Bras Lake	10	" "	- static, private land.

All the above areas have been checked by the B.C.F.S., however as the areas are all small with limited host available to both the beetle and the logger, some of the areas won't be logged. Could present problems in 1977.

Bulkley River between Smithers and Hazelton

Sharpe Creek	40	red-tops
Meed Creek	40	" "
Seaton Creek	35	" "
Moricietown	35	" "
Gramophone Creek	25	" "
Reiseter Creek	25	" "

Above areas are along the Bulkley River; B.C.F.S. is aware of them. Gramophone, Meed and Reiseter red-tops are the result of missing some green infested trees when the salvage logging was done, probably will be cleaned up.

Coffin Lake (Telkwa): 25 red-tops in 1976, scattered fringe trees, extensive clear cuts were made in 1975 logging green infested trees in this area. In August 1976, pheromone baited trees were used in an attempt to consolidate beetle flight into a limited number of trees as well as to try and pull the flight down from an inaccessible section to an area where any attacked trees could be cleaned up; trees were definitely attacked, however have no data on overall success of operation.

Bob Creek (Houston): 25 red-tops in 1976; this area had 500 red-tops in 1975. Area was systematically logged, i.e., green infested trees first, then salvage of the red-tops, dramatically reducing the beetle population.

Dungate Creek (Houston): 50 red-tops, down from 500 red-tops in 1974, because of successful salvage and control logging.

McKilligan Creek (Houston): 75 red-tops in 1976, 285 in 1973, 400 in 1974 and 65 in 1975. Area being clear cut, salvage logged - successfully. Pheromone baited trees were also used in this area - no quantitative data.

Aitken Creek (Houston): 50 red-tops in 1976; 1973, 150; 1974, 500; and 1975, 15. Area salvage logged, - control successful.

Gilmore Lake (Houston): 10 red-tops in 1976; 40 in 1973; 200 in 1974, and 15 in 1975. This area was also salvage logged, - control successful.

Derek (Houston): 30 red-tops in 1976; a small area near Northwood Mill, probably caused by beetles flying from infested decks.

Donald Landing (Burns Lake): 35 red-tops in 1976, 65 in 1975. Once was salvage logged. These trees are on the fringe of the clear cut; the cutting boundary will be changed to include infested area (green infested trees are marked), and area logged.

Pinkut Creek (Burns Lake): 15 red-tops in 1976, 50 in 1975. Area has been logged, infested left are on a steep slope; only a few infested trees, these will be felled and burned.

Tintagel (Burns Lake): 15 red-tops in 1976, 250 in 1974. Area is scattered patches of mature lodgepole mostly on private land; in process of being logged; green infested trees are all marked.

<u>Wright Bay</u>	3	red-tops	in	1976) Burns Lake Ranger District
<u>Tochcha Lake</u>	30	"	"	"	
<u>Wilkinson Bay</u>	40	"	"	"	

These are small areas on the east side of Babine Lake - no action will be taken - population will probably increase.

Mountain Pine Beetle in Lodgepole Pine,

West Prince Rupert District

A. Hazelton southwest to Kitwanga

1.) Seeley Lake - 250 acres

Increase from 850 red-tops in 1975 to 1,000 in 1976. Area has been progressively logged to remove (salvage) infested timber since 1970. Remaining infested trees on very steep slope and partially in private hands, therefore no more removal. Infestation expected to continue until remaining pine depleted.

2.) Opposite Carnaby (Burdick Cr - Nash Y areas) - 1,000+ acres

Increase from 700 red-tops in 1975 to 2,200 in 1976. Infestation first reported in 1970. Approximately 700 acres of infested lodgepole pine type have been logged to date. Sanitation logging of pine type to be initiated in near future, though logging of Indian Reserve land a contentious issue in this area. Further increases expected in 1977.

3.) Kitsegucla River - Juniper Creek - 100 acres

Slight increase in 1976 to 500 red-tops, from 400 in 1975. Infestation came to prominence in 1973; no action taken. With the exception of Juniper Creek, where removal is anticipated, majority of infested trees at the base of "the Nipples" along Kitsegucla River is inaccessible. Expansion of infestation there is restricted by limited lodgepole pine type.

B. Kitwanga north to Weegett Creek

1.) Kitwanga - 25 acres

Infestation has remained static since first reported in 1972. Logging restricted due to Indian land claims issue. There were 200 red-tops in 1976.

2.) Radio Tower Hill - 2,000 acres

Decrease; 5,000 red-tops in 1975, 2,000 in 1976. Infestation first reported in 1971 when 200 red-tops were recorded. At present 76% of the pine component has been lost to beetles. Some salvage logging in progress; extensive salvage program to be initiated in 1977 and 1978 where no conflict exists with Indian Lands.

3.) Kitwancool - 200 acres

Increase to 500 red-tops from 460 in 1975. First reported in 1972 when 15 acres infested. No salvage or control anticipated as trees are on Indian land. Some expansion into surrounding trees expected.

4.) Kitwanga Lake - Cranberry River - 50 acres

Increase; 400 red-tops in 1976 from 200 in 1975. This infestation area comprised of small pockets of 5 to 100 red-tops each. Progressive logging of infested areas anticipated, as this is critical wildlife range. Considerable pine component left for beetle to remain active. Continuing increase in trend expected.

5.) Weegett Creek - Douse Creek - 200 acres

Decrease, due mainly to intensive cutting in C.P. 100 in the past few years. 3,000 red-tops in 1975, 525 in 1976. Infestation first reported in 1970. Climatic changes north of the main infestation at Weegett Cr and a forest type change to the east will prevent further expansion in these directions. Infestation to continue in remaining pine.

C. Kitwanga south to Terrace

1.) Price Creek - 100 acres

Increase. First detected in 1974. 500 red-tops in 1975. No action taken to date due to commitments elsewhere. This area has potential to spread extensively in large pine flat of 1,000+ acres. Probable increase in 1977.

2.) Mill Creek

No previous reports of beetle in this area. Present status is 145 red-tops over 20 acres. Spread will be restricted by lack of pine.

3.) Woodcock - 50 acres

Increased from 160 red in 1975 to 500 in 1976. First reported in 1974. Pine is presently inaccessible but future plans include removal of susceptible type. Continuation of trend in 1977.

4.) Cedarvale

Increase. Scattered small pockets of red-tops. 50 red-tops counted in 1975, 110 in 1976. No immediate plans for removal. A portion of trees on private land. Small increases in numbers of red trees expected in 1977. First report 1974.

5.) Ritchie - 200 acres

Increase. First reported in 1974 when 300 red-tops counted. In 1976, 1,000 trees recorded. Infestation originated from beetles having flown from infested logs left on railway siding. Area is inaccessible to logging. Much of pine component in area is depleted.

6.) Flint Creek - 30 acres

Small patch of 30 infested trees. First reported in 1975. Pine type surrounding infested trees to be removed by logging already in progress.