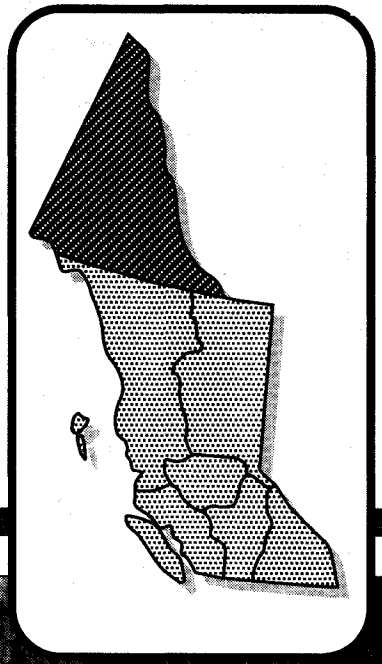
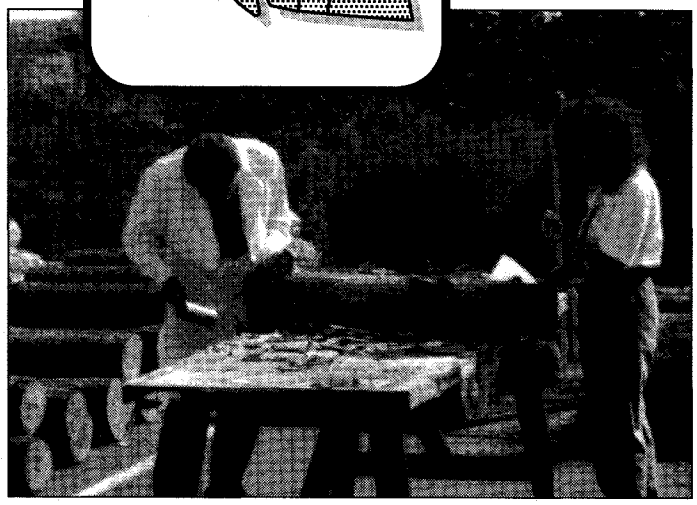
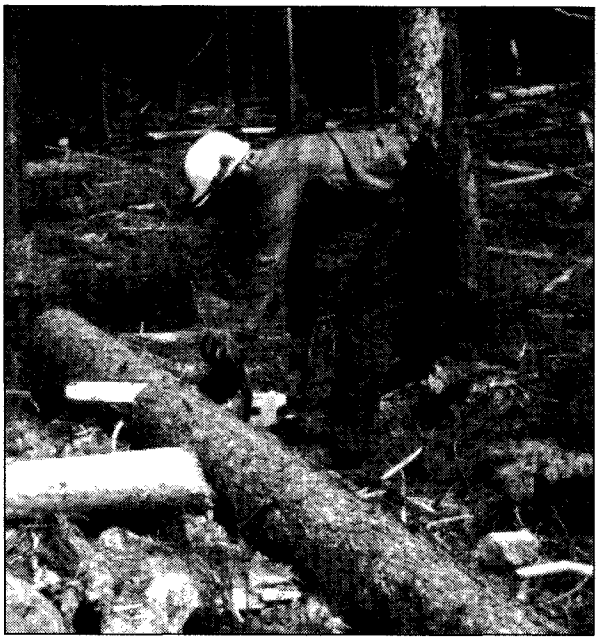


Forest Insect and Disease Conditions

Yukon Territory • 1992

Rod Garbutt





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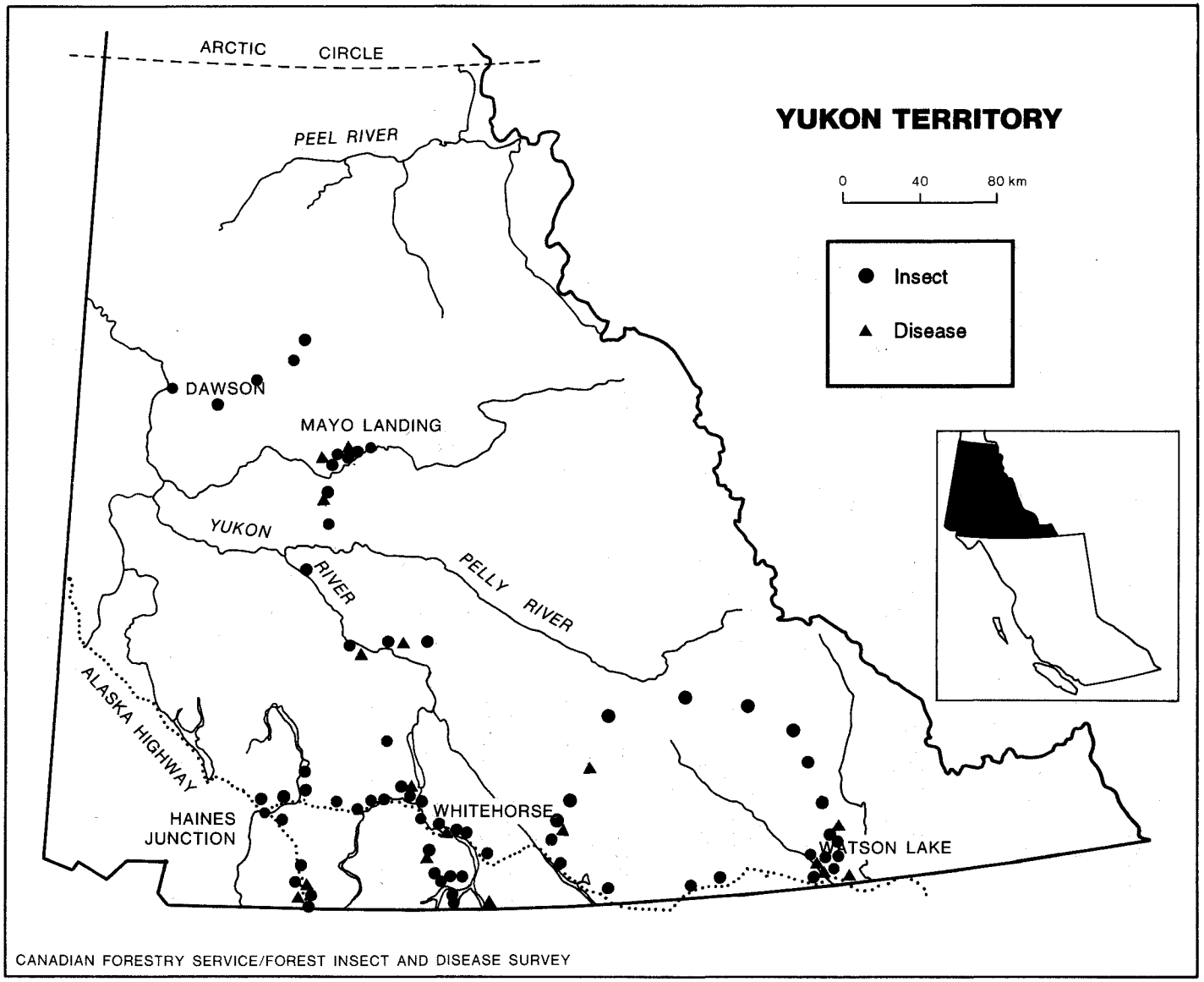

Locations where one or more insect or disease samples were collected, Yukon Territory, 1992.

Foreword

Forest Insect and Disease Survey (FIDS) is a nation-wide network within Forestry Canada, with the responsibility of: (1) producing an overview of forest pest conditions and their implications, including predictions where possible; (2) maintaining records and surveys to support quarantines; (3) supporting forestry research with field studies, records and Herbarium and Insectary collections; (4) providing advice and extension on forest insect and disease conditions; (5) developing and testing survey techniques; (6) and conducting related biological and impact studies.

Introduction

This report summarizes forest insect and disease conditions in the Yukon Territory in 1992. Pests are listed by host with emphasis given to those capable of sudden damaging outbreaks.

During the 13-day survey in late June and early July, over 60 insect and disease collections were made at permanent sample sites and pest-affected stands (Map 1) throughout the southern Yukon.

Yukon Forest Service staff were contacted at Whitehorse to inform them of Forest Insect and Disease Survey (FIDS) work plans, and to exchange information about current forest pest activities. Contact was made and information exchanged with Parks Canada administrative and field staff on pest problems within the proposed Chilkoot Pass National Park. The collection and submission by Parks staff, of samples from Lindeman Lake is gratefully acknowledged.

Summary

Eastern spruce budworm populations decreased in the Liard River drainage.

A pine needle cast caused light-to-severe discolouration of year-old needles of lodgepole pine over a broad area centered at Watson Lake. The distribution and frequency of attacks by **lodgepole terminal weevil** increased significantly, infesting from 1 to 5% of leaders in many young stands in the southern Yukon from Watson Lake to Lake Laberge.

Populations of **larch sawfly** remained low, causing only trace defoliation of tamarack in the southeast.

An annual pest survey within a joint Canada-Sweden co-operative growth trial at Takhini found lodgepole pine and Siberian larch to have recovered somewhat from **frost** and **snowshoe hare** damage sustained in the winter of 1990-91.

A long term study was initiated this year in the Takhini Forest Reserve to monitor the effects of airborne pollutants on forest health. The study is part of the **Acid Rain National Early Warning System (ARNEWS)**, and is one of a growing number established nationwide.

A pests of young stands **(POYS)** survey within a long term growth and yield study area near Watson Lake found a moderate incidence of **stem deformation** in white spruce and lodgepole pine.

Climatic factors such as winter **cold**, which have contributed to the chronic dieback and foliage loss of white spruce and other coniferous and deciduous species, decreased following a relatively mild winter.

For the fourth consecutive year, **large aspen tortrix** populations caused widespread defoliation of trembling aspen. The damage was less widespread this year but was more severe, affecting almost all pure stands between Carcross and Jakes Corner.

Branch tip mortality caused by the stripping of immature cones by **squirrels**, was common in the southeast.

A summary of the incidence of **other noteworthy pests** is included as Table 3, at the end of this report.

Spruce Pest

Eastern spruce budworm,
Choristoneura fumiferana

Aerial surveys conducted to map budworm-caused defoliation of white spruce in the Liard and Fort Nelson river drainages of the Fort Nelson Forest District, found damage to be considerably reduced this year. Ground observations in the Smith River area found trace-to-light defoliation. Though no aerial surveys were conducted in the La Biche River Valley in the extreme southeast corner of the Yukon, populations have historically risen and fallen in synchrony with those in the Liard.

In standard three-tree beating samples taken throughout southern areas of the Territory, spruce budworm larvae were collected only at Haines Junction and at km 50 of the Dempster Highway where 8 and 7 larvae respectively were found.

Defoliation by spruce budworm can cause growth loss, and repeated severe defoliation can cause branch mortality and top-kill. Damage in recent years has been limited primarily to current growth with a subsequent slight loss of growth potential.

Recent historical patterns suggest that populations will remain active but defoliation will remain within the light-to-moderate range in 1993.

Pine Pests

Pine needle casts,
Lophodermella concolor and *L. montivaga*

Evidence of damage caused by these needle diseases was more widespread and the severe in 1992. Similar to 1991 the most severe damage occurred in the Watson Lake vicinity where 90% of young pines, particularly along roadsides, lost an average of 30% of their year-old lower crown needles. Infection levels ranged as high as 100% of the 1991 needles. Overstory trees were only lightly infected.

Light and moderate levels of needle loss were seen intermittantly in roadside stands as far west as Rancheria, and for 150 km north of Watson Lake along the Robert Campbell Highway. Infections on needle samples remitted to the FIDS Herbarium from the Watson Lake area and km 144 Robert Campbell Highway were caused by *L. motivaga*. *Lophodermella concolor* was found in samples from all other areas.

Most samples infected by both species were found to contain a secondary invader, *Hendersonia pinicola,* a competing fungus that is known to inhibit fruiting in the two needle casts. Though not fully understood, this inhibition shows promise as a potential biological control against these two damaging diseases.

Severe repeated infections causing significant loss of foliage will result in a loss of growth potential. If suitable moisture was available to promote transfer of disease spores to sucseptible young needles at the time of bud break, infections could be as severe or more severe in 1993.

Lodgepole terminal weevil,
Pissodes terminalis

Following two successive years when single lodgepole terminal weevil attacks were found just north of Watson Lake, infestations of the weevil were seen in young lodgepole pine stands throughout the southern Yukon. Attack levels as high as 15% of the terminals were seen at km 1085 Alcan Highway with lower levels of attack at Watson Lake and Spirit Lake (10%), along the Atlin Road (5%), Takhini Hot Springs Road (1%), and scattered along the south stretches of the Canol Road and Robert Campbell Highway (<1%). Most infested terminals found were collected and sent Ontario to support two separate research projects, but three terminals from each of the km 1085 Alcan Highway and Watson Lake infestations were examined in the field for weevil projeny. Only one terminal from each site contained a single living larva. The remaining terminals were either empty or contained a single dead larva.

In almost every weevil-infested stand, most notably near Watson Lake and Atlin, terminal

buds of an equal or lesser number of trees had been attacked by another insect, probably the fir coneworm, *Dioryctria abietivorella.* Damage caused by the two insects could be distinguished because coneworm caused discoloration of the terminal buds and surrounding needles only, whereas the terminal weevil caused discoloration of the entire terminal. The coneworms had emerged before the late June survey was conducted.

Weevils attack developing terminals, killing them down to the first branch whorl. High incidences and repeated attacks will result in growth loss and formation of forks and crooks. Damage of this type has never been reported from the Yukon. Considering the dramatic increase in the weevil population in 1992, despite the apparent low survival of the projeny this year, the potential for significant future damage now exists. The activity of this pest will be closely monitored in years to come.

Larch Pest

Larch sawfly,
Pristiphora erichsonii

Larch sawfly populations remained low, similar to the 1991 levels. Early season examinations were conducted in late June to determine the frequency of oviposition (egg laying) in elongating lateral shoots. In stands along Highway 37 near the British Columbia - Yukon border, an average of 1% or less of the shoots of all understory trees were crooked due to excavation by adults prior to oviposition. In stands along the Robert Campbell Highway up to 200 km north of Watson Lake, only small numbers of branches were attacked on between 1 and 10% of the trees. At km 175, evidence of localized moderate and severe 1991 defoliation lingered on some roadside trees in the form of bare branches, primarily in the upper crowns.

Larvae that hatch from a single oviposition site can defoliate one or more branches before reaching maturity. Even a low frequency of oviposition such as that observed in the border stands often results in trace-to-light defoliation on immature and understory trees. Little or no noticeable damage is expected in stands north of Watson Lake.

Severe defoliation results in significant loss of growth potential. Though none has been recorded in the Yukon, repeated severe defoliation has caused mortality of western larch in southeastern British Columbia.

Historical population fluctuations for this pest suggest that numbers will remain low in 1993.

Special Directed Surveys

Joint Canada-Sweden lodgepole pine trial

Pest conditions in the six-year-old lodgepole pine trials in the Takhini Forest Reserve were evaluated by FIDS during the annual Yukon survey.

Survival in the replicates of lodgepole pine was consistent with previous years findings. Of 14 randomly selected replicates examined, an average cumulative mortality of 11% was found after six growing seasons. These results were strongly influenced by the results from one replicate plot, located on the southeast corner of the plantation, which lost 33 of the 64 trees, likely from a combination of frost and snowshoe hare feeding. With this plot removed from the data set, average mortality dropped to 8%, close to the 6% found in the interior of the plantation in 1991.

Following a severe dieback in the smaller Siberian larch trial, reported last year, some of the affected trees produced adventitious shoots from near the root collar and showed renewed signs of life this year. As a result, cumulative mortality in the Siberian larch replicates averaged 18%, 4% less than reported last year.

Surviving seedlings of both species appeared more vigorous in 1992, following a relatively mild winter and an apparent collapse of the snowshoe hare population.

The Takhini trial is the most northerly of five experimental plantations established in the

Table 1. Summary of pest damage within a growth and yield trial at Watson Lake, Yukon Territory, 1992

Species[1]	Avg. no. trees/plot[2]	Trees/ha	Needle cast (%)[3]	Environmental damage (%)[4]	Western gall rust (%)[5]	Lodgepole term. weevil
lP	19.8	3000	85	11	3	2
wS	3.8	130	-	26	-	-

[1] lP = lodgepole pine, wS = white spruce
[2] Based on 10, 3.99m (1/200 ha) plots.
[3] Percent of trees infected with *Lophodermella* sp. (probably *L. montivaga*).
[4] Dieback causing deformities such as multiple leaders, forks and crooks.
[5] *Endocronartium harknessii*

Pacific Region in co-operation with Svenska Cellulose, a Swedish forest company. Lodgepole pine in the plots were grown from seed produced in Swedish seed orchards. The parent trees had been grown in Sweden from seed collected within various northern B.C. provenances. One of the purposes of the trials is to determine how the trees, one generation removed from their native environment, respond to native pests and environmental conditions when reintroduced. The plots will be re-assessed in 1993.

Acid Rain National Early Warning System (ARNEWS)

In an expansion of the nationwide program designed to monitor amounts and effects of airborne pollutants and acid rain, a long term study plot was established this year in the Takhini Forest Reserve, near Whitehorse. Initially, during the establishment year, the plot boundaries were laid out and each tree growing within the 10m x 40m plot was tallied, measured and numbered. In addition, all herbaceous plants and species of lichen were identified within subplots. Foliage and soil samples taken from immediately outside the plot will be chemically analyzed. These analyses will provide baseline information against which all future samples will be compared.

During the study, plot trees will be assessed, remeasured, and certain samples taken annually. More detailed analyses will be carried out every five years.

Pests of Young Stands (POYS)

In 1961, Forestry Canada established a set of permanent growth and yield plots on 3000 ha of federal land just west of Watson Lake. In 1989, a FIDS survey of the area found top dieback to have affected 50% of the lodgepole pine. Sampling at the time found no primary insect or disease to be responsible, and the damage was thought to have been caused by environmental stresses such as severe winter cold. A followup POYS survey this year found 11% of the pine to display multiple tops, forks or crooks, as a direct result of the damage sustained previously. In addition, white spruce, which was a minor species in most plots, was found to have a higher (27%) incidence of similar damage (Table 1).

Multiple Host Pests

Winter Damage

For more than five years, white spruce decline and mortality has been an evident and expanding problem in roadside stands in the Yukon near Burwash Landing, between Stewart Crossing and Carmacks, between Whitehorse

and Carcross, and along Little Atlin Lake. Significantly increased discolouration was evident in all age classes of white spruce at the height-of-land along the Klondike Highway between Whitehorse and Carcross. All other areas where damage was reported in 1991, remained affected in 1992. However, little current damage was seen.

The decline has been slow and progressive with the browning and shedding of needles beginning in the upper crowns and branch tips. Repeated sampling has failed to find any insect or disease activity to which the damage could be attributed. The symptoms, however, have suggested that a combination of severe winter cold and prolonged drought could be responsible.

Physical damage to foliage resulting from extreme winter cold was much less common than in 1991. Moderate and severe discolouration of lodgepole pine foliage along the Atlin Road near the British Columbia-Yukon border, probably resulted from frost and wind following an unusually warm spell in February. Similar, but much lighter damage affected young pine along the Alcan Highway just south of Whitehorse.

Winter cold and wind desiccation are two of the most common and consistent agents of damage in Yukon forests. The damage can be expressed in many ways, from needle discolouration to top and branch dieback, and full tree mortality.

Mammal damage

Squirrels continued to cause damage to young lodgepole pine by stripping the immature cones from young trees during the winter and early spring. Most notable this year were intermittant occurrences of damage between Whitehorse and Carcross, especially near Spirit Lake, where up to 10 tips were killed on 10% of the trees. Similar levels of damage were seen at the south end of the Canol Road, increasing to as high as 15 tips (avg. 5) on 40% of the trees. Along Little Atlin Lake, up to five attacks per tree were seen in scattered roadside pockets.

The forced removal of immature cones by squirrels, tears the cambium layer and effectively girdles branches, killing the distal growth. The damage becomes apparent in the early summer when the branch tips turn red.

Feeding damage to the stems of lodgepole pine and trembling aspen caused by snowshoe hare feeding was much reduced in all areas affected in 1991, due to a significant reduction or collapse of the hare population.

Vole populations remained low following a collapse, in some areas two years ago, and in others three.

Deciduous Tree Pest

Large aspen tortrix, *Choristoneura conflictana*

Damage to trembling aspen caused by the large aspen tortrix increased significantly in the Tagish Lake area of the southwestern Yukon, causing widespread moderate and severe defoliation. Though the infestations were not aerially mapped, the defoliated area was estimated, based on ground observations, to be in excess of 10 000 ha. Infestations were, however, less widespread than last year. No defoliation occurred in the Whitehorse area or in areas to the west, where intermittant light damage was seen in 1991.

Approximately 5 km north of Carcross, light and moderate defoliation occurred on both sides of the Klondike Highway. Large patches of severe defoliation were visible to the southwest, just north of Bennett Lake. Proceeding east toward Tagish, large patches of severe defoliation bounded by light and moderate patches occurred on the lower south-facing slopes of Caribou Mountain. The largest observed continuous area of infestation spanned 8 km, along both sides of the road just east of Tagish, with continuous severe defoliation for 1 km, and light and moderate defoliation within the aspen type for a additional 7 km. This was the same, though somewhat enlarged area where infestations were reported in 1991.

Intermittent smaller patches of severe defoliation were also seen on south-facing

Table 2. Parasite and disease levels within large aspen tortrix populations at two locations, Yukon Territory, 1992

Location	Adults emerged (healthy %)	Dead (cause unknown %)	Diseased (virus %)	% Diptera	Parasitised % Hymenoptera
Carcross	13	13	12	21	42
Tagish	0	18	55	0	27

slopes for 10 km, along the Alcan Highway west of Jakes Corner, as far as km 1382. South of Carcross, defoliation, more than half of which was severe, covered more than 1000 ha above the northwest side of Tagish Lake along Windy Arm, and an additional 500 ha at the southeast end of the Arm.

North and west of Whitehorse no active feeding was seen, though light incidences of rolled and tied aspen leaves occurred near Takhini Hot Springs and near Champagne. In these areas it appeared that predators (many foraging ants were seen) had reduced the populations to such an extent that no living larvae could be found. Along the Haines Road, just east of the Takhanne River, balsam poplar, willow spp., and mountain alder were all lightly defoliated by tortrix. No aspen occurred in the area.

Mass collections of tortrix larvae were made both near Carcross and Tagish, to determine parasite and disease levels within the populations (Table 2.).

One third of the larvae collected from Carcross had parasite eggs attached to the outside of the body. The high incidence of viral mortality (probably caused by the nucleopolyhedrosis virus) from the Tagish site may have been related to the larval diet. Most of the larvae collected, having consumed all of the available aspen foliage, had dropped down and were feeding on non-host material such as undergrown white spruce saplings and fireweed. As a direct consequence, they were less vigorous and likely had little resistance to the proliferation of the virus.

The current tortrix defoliation will result primarily in the loss of current growth potential. However, some dieback and whole tree mortality may occur in the young stands near Tagish that have been severely defoliated for two successive years.

The very low number of healthy emerged totrix (13% and 0% for Carcross and Tagish respectively), indicates a significant reduction if not a collapse of large aspen tortrix populations in these areas for 1993.

Other Noteworthy Pests

Table 3. Other noteworthy pests, Yukon Territory, 1992

Host/pest	Location	Remarks
Conifers		
Lodgepole Pine		
Gouty pitch midge, *Cecidomyia piniinopis*	MacRae	light incidence of attacks to new shoots
Needle cast of pines, *Lophodermella montivaga*	km 144 Robert Campbell Highway	all trees over 2 ha lost all upper crown current growth
Hard pine adelgid, *Pineus coloradensis*	Marsh Lake	light attacks on scattered individual hosts
Pine needleminer, *Coleotechnites* sp.	MacRae	light needlemining damage to roadside trees
White Spruce		
Bud moths, *Zeiraphera* spp.	Haines Road	found in standard beating samples in low numbers
Pine leaf adelgid, *Pineus pinifoliae*	Mayo Road Carmacks	5% tips infested in scattered individual trees
Western blackheaded budworm, *Acleris gloverana*	Motherall Creek	40% current shoots infested
Alpine Fir		
Fir needle blight, *Isthmiella quadrispora*	km 10 South Canol Road	20% lower crown needles on a few trees
Tamarack Larch		
Larch-willow rust, *Melampsora paradoxa*	km 175 Robert Campbell Highway	Light incidence on new shoots of all trees in area
Deciduous		
Trembling Aspen		
A blotch miner, *Caloptilia* sp	Mayo Road	up to 30% of the leaves rolled
Flower flies, Syrphidae	Tagish	preying on Chrysomelid eggs
A gall mite, *Aceria dispar*	Champagne	some aborted leaves on young trees
A gall mite, *Eriophyes parapopuli*	Stewart Crossing	10% smaller trees killed by girdling
Leaf beetles, Chrysomelidae	Tagish	minor adult feeding damage

Host/pest	Location	Remarks
Paleheaded aspen leafroller, *Anacampsis niveopulvella*	Whitehorse to Takhini	average 30% leaves rolled
	Motherall Creek	average 10% leaves rolled
Poplar borer, *Saperda populnea*	Tatshun Lake Road	40% of young fringe aspen killed
Balsam Poplar		
A poplar leafroller, *Epinotia* Sp.	Takhanne River	10% of poplar leaves rolled, also infesting willow and mountain alder
A poplar shoot blight, *Venturia populina*	Tatshun Lake Road	nearly all shoots killed, 30% leaves infected
Dwarf Birch		
A gall mite, *Phytoptus* sp.	km 84 South Canol Road	20% lower crown leaves with small red galls
Mountain Alder		
Jumping plantlouse, *Psylla alni*	Takhanne River	light damage to new shoots

Appendix

The following related reports are available on request from FIDS

I. History of Important Forest Pests in the Yukon Territory 1952 - 1990.

II. Summary of Svenska Cellulose lodgepole pine trials in B.C. and the Yukon.

III. Summary of data from ARNEWS plot established in the Takhini Forest Reserve

Detailed copies of maps, pest reports, leaflets monographs and other reports in addition to those listed above are available from the Pacific Forestry Centre upon request.

Correspondence and inquiries with respect to forest pest problems in the Yukon can be directed to FIDS headquarters at:

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