

**FOREST HEALTH CONDITIONS
IN THE
NORTHWEST REGION OF ONTARIO
2001**

*Forest Districts: Dryden, Fort Frances,
Kenora, Nipigon, Red Lake,
Sioux Lookout, and Thunder Bay*

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OVERVIEW

The following report deals with the forest health conditions in the Northwest Region of Ontario, as defined by the Ontario Ministry of Natural Resources (OMNR) administrative boundaries for 2001. The report is divided into three sections: 1) major forest disturbances, 2) forest health plot monitoring, and 3) quarantine pests. The Forest Health Monitoring Unit (FHMU) of the Canadian Forest Service (CFS), Natural Resources Canada has taken the lead role in procuring information for this report.

Forest health information is obtained primarily through the monitoring of a variety of established plots. In the northwest these plots include jack pine health plots and spruce/fir health plots.

Exotic pests are monitored under a Memorandum of Understanding (MOU) with the Canadian Food Inspection Agency and trapping and surveys were conducted for gypsy moth in the region. Single male gypsy moth adults were captured in two parks in the Nipigon District this year.

A recent agreement between the OMNR and the CFS provided for six contract OMNR Field Technicians to work in partnership with the six Forest Health Officers of the FHMU for 6 months of the year centering around the summer field season. This co-operative work on monitoring the state of health of Ontario forests through forest health plots, major forest disturbance surveys and exotic pest investigations has resulted in an enhanced forest health monitoring effort and report.

The gross area of the forest tent caterpillar infestation almost doubled in size in 2001. It now covers a very large part of the western half of the region. The aspen webworm gained momentum with moderate to severe defoliation found in three districts. Damage caused by the gray willow leaf beetle was widespread across the western portion of the region. Two diseases were prevalent this year, spruce needle rust and shoot blight on trembling aspen. Blowdown and snow/wind damage were the two major climatic related types of damage detected in 2001. The jack pine and spruce/fir health plots were tallied again this year.

The CFS personnel working in the Northwest Region for the summer of 2001 were Bill Biggs based in Sioux Lookout and Doug Lawrence out of Thunder Bay. However, after a 33 year career with the federal government Doug Lawrence retired in the fall. Mike Lesperance was the only OMNR employee for this season and he was based out of Nipigon.

The cooperation and assistance provided by the staff of OMNR, various forest industries, and other CFS staff are gratefully acknowledged.

If further information is required about data collected in the Northwest Region, please contact one of the report authors or get in touch with: G.M. Howse (ghowse@NRCan.gc.ca), Leader, Forest Health Monitoring Unit, Canadian Forest Service, Great Lakes Forestry Centre, 1219 Queen Street East, Sault Ste. Marie, Ontario, P6A 2E5. Visit our home page on the World Wide Web at: <http://www.glfc.forestry.ca>

W.D. Biggs

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MAJOR FOREST DISTURBANCES

Insects

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Spruce budworm populations remained low across the Northwest Region in 2001. There was no defoliation found during aerial or ground surveys. Some standing dead balsam fir (*Abies balsamea* [L.] Mill.), a result of the last infestation, can still be seen in many stands. Pheromone trapping of spruce budworm moths was again carried out. Three reusable multi-pher pheromone traps were deployed at 17 of the Spruce/Fir Health Plots across the region. Table 1 summarizes the results of trapping for the past 4 years. This year there were some increased numbers of male moths captured in the western part of the region, in the Kenora and Fort Frances districts.

Table 1. Results of spruce budworm pheromone trapping at 17 locations in the Northwest Region of Ontario from 1998 to 2001. (Three traps were used at each location.)

Location	Total number of moths captured			
	1998	1999	2000	2001
<i>Dryden District</i>				
Langton Township	149	93	63	39
<i>Fort Frances District</i>				
Calm Lake	57	39	19	49
Claxton Township	165	63	7 ^a	23
French Lake (Quetico Park)	0	5	12	26
<i>Kenora District</i>				
Haycock Township	187	131	45	83
<i>Nipigon District</i>				
Catlonite Road	7	9	20	38
Grain Township	22	18	8	11 ^b
Parent Township	37	15	16	1
Windigokan Lake	9 ^b	11	8	15
<i>Sioux Lookout District</i>				
Burma Lake Road	37	32	14	19

Table 1. Results of spruce budworm pheromone trapping at 17 locations in the Northwest Region of Ontario from 1998 to 2001. (Three traps were used at each location.) (concl.)

Location	Total number of moths captured			
	1998	1999	2000	2001
<i>Sioux Lookout District (concl.)</i>				
Foley Lake	8	17	15	10 ^b
Lomond Township	19	34	17	10
Pape Lake	46	24	44	17
<i>Thunder Bay District</i>				
Buzzer Lake	13	0	3	5
Fallis Township	13	2	5	5 ^b
Fowler Township	6	3	2	5 ^b
Milkshake Lake	5	0	0	7 ^b

^a Two traps missing

^b One trap missing

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

There was no defoliation by the jack pine budworm detected in the region in 2001. Egg mass sampling was carried out at Jack Pine Health Plots to check for signs of an insect population for the next year. The sampling was carried out in the intermediate and mature age class jack pine (*Pinus banksiana* Lamb.) stands. Branches were sampled from a total of 32 sites, six in each of Dryden, Fort Frances, and Kenora districts; and seven in each of Red Lake and Sioux Lookout districts. No defoliation or egg masses were found at any of the locations.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

In 2001 the forest tent caterpillar infestation almost doubled in size. The gross area of moderate to severe defoliation now covers 10 487 276 ha (Fig. 1). All of the western half of the region and a large area in the southern Thunder Bay District are now infested. With the exception of the Nipigon District all have infestations totalling over a million hectares (Table 2). Defoliation levels were particularly severe throughout the Kenora and Fort Frances districts. Many trembling aspen (*Populus tremuloides* Michx.) and white birch (*Betula papyrifera* Marsh.) stands were completely defoliated by early June. Whereas, damage levels were more variable in the Red Lake,

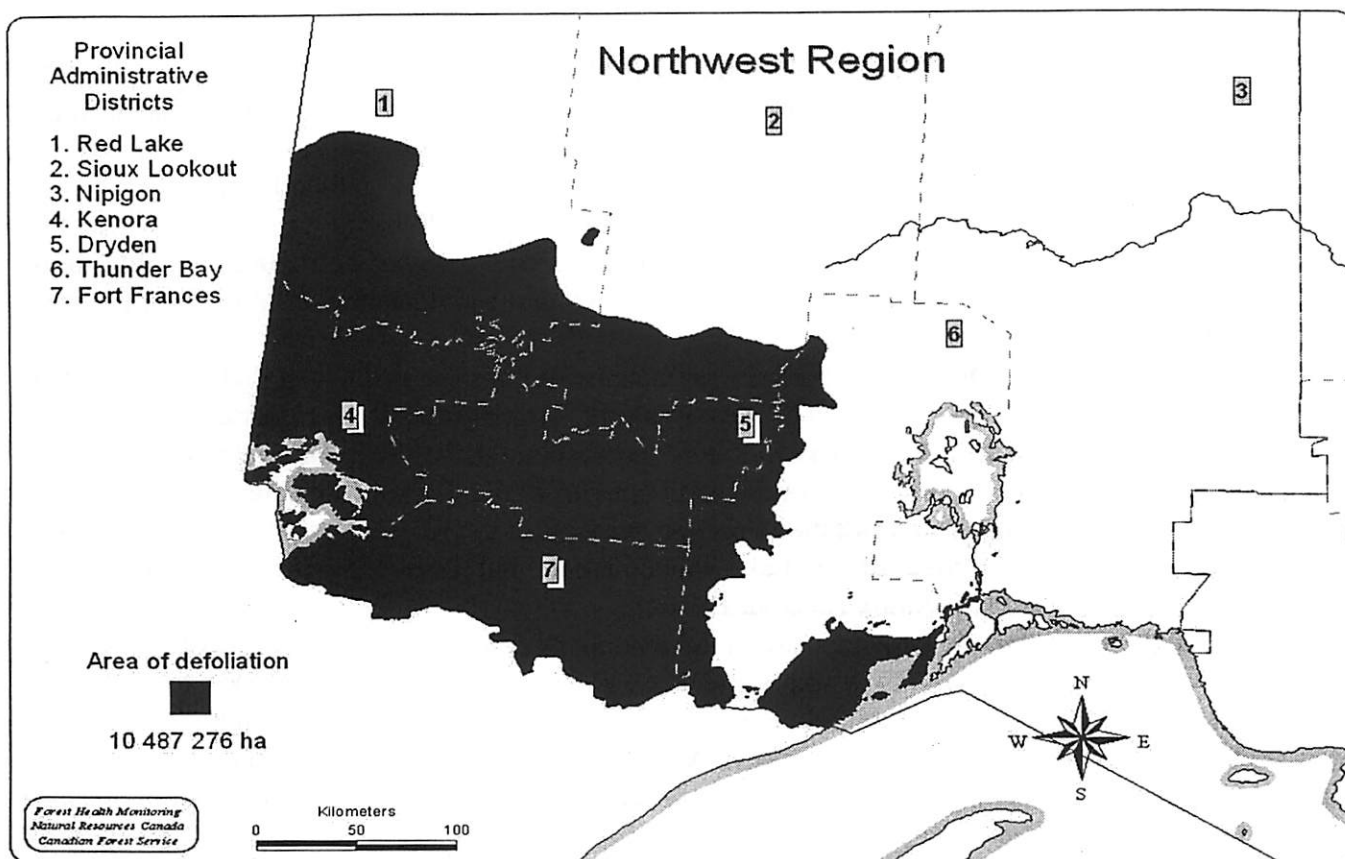


Figure 1. Area within which moderate to severe defoliation caused by the forest tent caterpillar (*Malacosoma disstria* Hbn.) occurred in 2001.

Table 2. Total area of moderate to severe defoliation caused by the forest tent caterpillar in the Northwest Region of Ontario from 1997 to 2001.

District	Area of moderate to severe defoliation (ha)				
	1997	1998	1999	2000	2001
Dryden	9 639	68 911	661 302	1 655 278	2 053 529
Fort Frances	0	0	93 339	1 832 570	2 351 938
Kenora	273	20 548	189 795	1 222 642	1 657 053
Nipigon	0	0	0	717	10 755
Red Lake	987	18 749	171 569	530 163	1 940 113
Sioux Lookout	0	8 181	122 727	421 986	1 166 290
Thunder Bay	0	1 834	242 392	307 422	1 307 598
Annual Totals	10 899	118 223	1 481 124	5 970 778	10 487 276

Dryden and Sioux Lookout districts. In some areas of the Fort Frances and Thunder Bay districts late instar caterpillars consumed the hardwood foliage and then proceeded to devour the needles on the current shoots of white spruce (*Picea glauca* [Moench] Voss).

The gross area within which moderate to severe defoliation was found now covers all of the Kenora, Fort Frances, and Dryden districts, a total of 6 062 520 ha. In the Kenora District the remainder of the northern area of the district has now become infested as of 2001. The infestation boundary expanded to the east encompassing the previously unaffected areas of the Fort Frances and Dryden districts.

The Red Lake District had the greatest increase in the total area of defoliation. There was almost 2 million hectares of mapped damage this year. This represents an increase of 1 409 950 ha compared with 2000. All of the pockets of defoliation found in 2000 coalesced this year resulting in a large infestation covering much of the southern half of the district. The infestation boundary in the north runs along a line from the Manitoba border east to the village of Pikangikum. It then swept south towards the town of Red Lake, dipped around the south end of Trout and Birch lakes then headed south into the Sioux Lookout District.

There was a noteworthy increase in the amount of defoliation in the southeastern portion of the Sioux Lookout District. An additional 744 340 hectares was mapped in 2001 compared with last year. The infestation boundary runs along an east-west line from March Lake in the east to the north end of Savant Lake in the west. Along the leading edge of the infestation in the northeast much of the damage was made up of scattered pockets of moderate defoliation of aspen and birch.

In the Thunder Bay District the area of moderate to severe defoliation increased significantly along the western edge of the district. The main body of the infestation has now overflowed into the district from North Lake on the Minnesota border in the south to the Wabakimi Lake area in the north. The infestation around the city of Thunder Bay had a moderate amount of expansion to the west and north. On the west side the infestation border runs from Shabaqua Corners southwest to the east side of Arrow Lake. The north boundary runs from the south part of Dog Lake east to Quimet on Highway 11/17, crossing Highway 527 on the south side of Whitelily Lake. There are a couple of pockets north of this area and low numbers of larvae were common as far north as DeCoursey Lake. On the northeast side of the infestation there were scattered pockets around Dorion and they continue into the Nipigon District. All of the Sibley Peninsula and Pie Island were infested this year.

Sizeable pockets of moderate to severe defoliation were present adjacent to Highway 11/17 in the Nipigon District from the district boundary along the shoreline to the town of Red Rock. Scattered small pockets were mapped north of this area as far up as the village of Beardmore. Larvae were found at many other locations in the district but not at damaging levels.

In an effort to forecast population levels of the forest tent caterpillar for 2002 a number of sites were checked for the presence of egg bands (Table 3). It appears that the main body of the infestation will join-up with the Thunder Bay infestation. There also appears to be a good chance that higher populations will spread to the area south of Lake Nipigon (Fig. 2). Some reduction in population levels may occur in the older areas of the infestation.

Table 3. Summary of forest tent caterpillar egg-band counts on trembling aspen (5-15 cm DBH^a) at 35 locations in the Northwest Region of Ontario in 2001, with defoliation forecasts for 2002.

Location	Number of trees sampled	Average number of egg-bands/tree	Defoliation forecasts for 2002 ^b
<i>Dryden District</i>			
Highway 622, 10 km south of Hwy 17	3	12	S
Highway 642 and 599, Silver Dollar	1	45	S
Ilseley Township	3	11	S
McNevin Township	1	37	S
Wabigoon Township	3	7	S
<i>Fort Frances District</i>			
Alberton Township	3	8	S
Highway 11, 1 km from district boundary	1	42	S
Menary Township	3	<1	L
<i>Kenora District</i>			
Highway 105 near Perrault Falls	3	<1	L
Highway 71, south of Rushing River Prov. Park	3	2	M
<i>Nipigon District</i>			
Ashmere Township	3	1	L
Clavet Township	3	1	L
Coldwell Township	3	0	N
Daley Township	3	1	L
Highway 11, northeast of Pagwachuan Lake	3	0	N
Highway 11, Klotz Lake	3	0	N
Highway 17, Terrace Bay	3	0	N
Highway 585, Pine Portage	3	8	S

Table 3. Summary of forest tent caterpillar egg-band counts on trembling aspen (5-15 cm DBH^a) at 35 locations in the Northwest Region of Ontario in 2001, with defoliation forecasts for 2002.

Location	Number of trees sampled	Average number of egg-bands/tree	Defoliation forecasts for 2002 ^b
<i>Nipigon District (concl.)</i>			
Leduc Township	3	0	N
Lahontan Township	3	1	L
Patience Township	3	2	M
Pic Township	3	0	N
Purdom Township	3	11	S
Summers Township	3	5	M
Syine Township	3	0	N
<i>Red Lake District</i>			
Snake Falls Road, km 10	2	17	S
<i>Sioux Lookout District</i>			
Jordan Township	1	27	S
<i>Thunder Bay District</i>			
Conacher Township	1	19	S
Highway 61 at Larson Road	3	5	M
Joynt Township	3	4	M
Kashabowie, Highway 11	3	12	S
Robson Township	3	6	S
Shuniah Township	1	20	S
Stedman Township	1	23	S
Ware Township	1	21	S

^a DBH = diameter at breast height

^b N = nil, L = light, M = moderate, S = severe

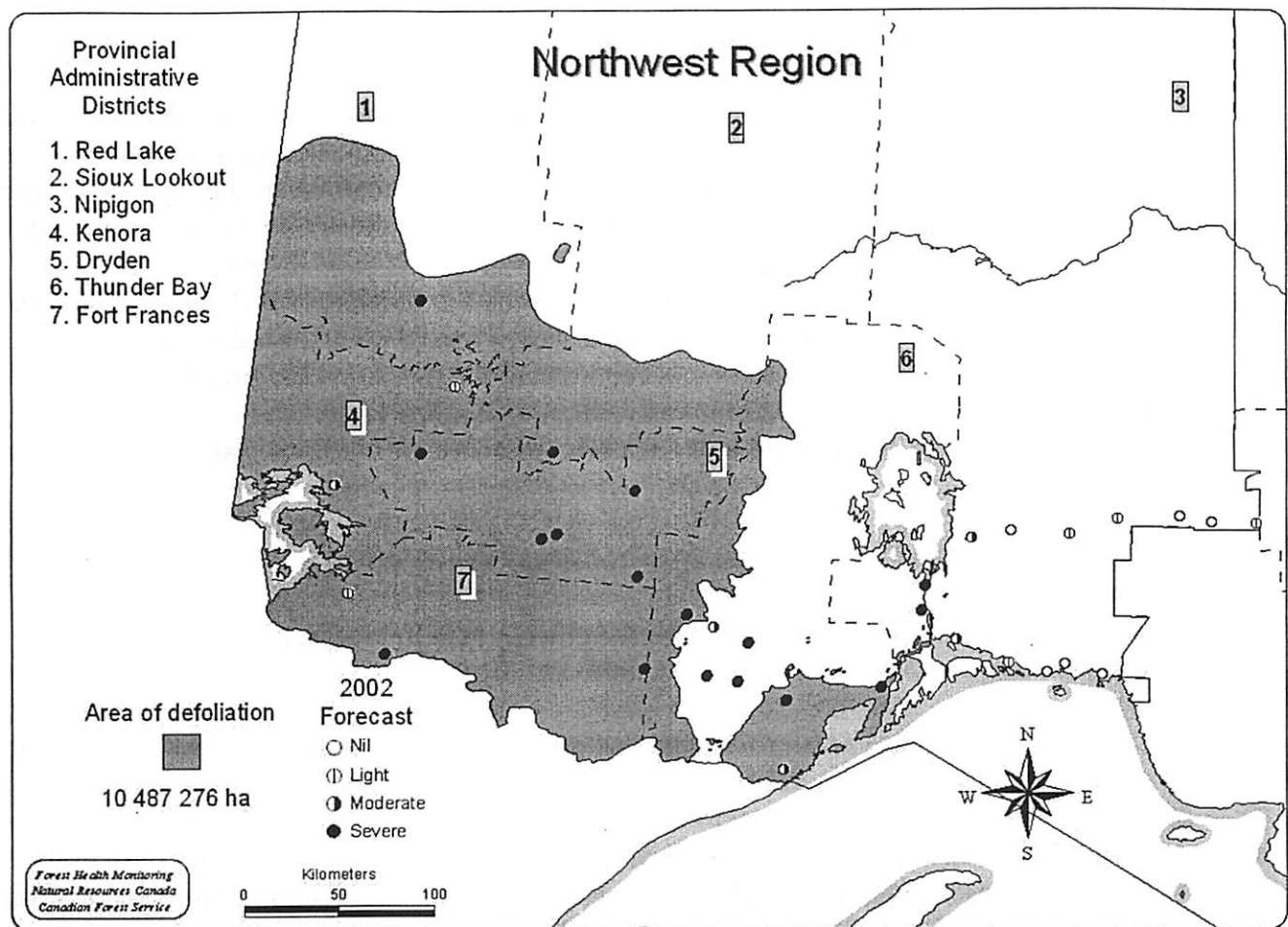


Figure 2. Infestation forecasts for 2002 for the forest tent caterpillar (*Malacosoma disstria* Hbn.) overlaid on the 2001 infestation map.

Aspen Webworm, *Pococera applastella* (Hulst)

Once again this year aspen webworm populations somewhat mirrored that of the forest tent caterpillar. Consequently, because of the tent caterpillar being considerably more widespread so was the aspen webworm. This insect attacked trembling aspen that had set another crop of leaves after being defoliated by the forest tent caterpillar earlier in the summer.

Moderate to severe defoliation was present by late August over large areas in the Thunder Bay, Sioux Lookout, and Dryden districts and in addition to some northern portions of the Fort Frances District. The degree to which stands of trees were damaged varied across other parts of the region. Many of the ones in Fort Frances, Red Lake, Kenora, and Nipigon districts had only light levels of defoliation with some moderate pockets mixed in.

Gray Willow Leaf Beetle, *Tricholochmaea d. decora* (Say)

There was a population explosion of this insect across the western portion of the region in 2001. Numerous willow (*Salix* sp.) shrubs, the ones found growing along roadways and in wet areas, were completely brown by mid summer. This beetle overwinters as an adult and there is one generation per year. Adults emerge from their hibernation sites in the spring and feed until mid-June. Eggs are laid in late June and early July usually on the rough bark at the base of willow shrubs. The larvae move up to feed on the underside of leaves, which they skeletonize. The bulk of the damage is done by the larval stage. However, heavy adult feeding on willow and poplar late in the summer also contributed to the overall condition of the trees. Foliar browning of 100 percent was present throughout most of the Dryden and Sioux Lookout districts. Heavy damage was more scattered in the Kenora and Red Lake districts and seemed to diminish further north in a latter district.

Diseases

Spruce Needle Rust, *Chrysomyxa ledi* (Alb. & Schwein.) De Bary var. *ledi* and *C. ledicola* Lagerh.

High infection levels of spruce needle rust were observed in numerous locations in the Red Lake and Kenora districts, and at some scattered sites in the Nipigon District. In the forest, young black spruce (*Picea mariana* [Mill.] BSP) were the main host and in some cases pockets of trees ranging in size from 1 to 3 m sustained 75 to 100 percent needle damage. Typically this type of damage was observed along major highways between the village of Vermilion Bay and the towns of Red Lake and Kenora in the Red Lake and Kenora districts, respectively. It was also observed in the area east of the town of Terrace Bay in Strey and Syine townships, Nipigon District. In the Thunder Bay District damage was quite noticeable along Highway 527 from the Hicks Lake area north to the Eaglehead River area. The rust occurred on all ages of white spruce, but heavy infection occurred on less than 5 percent of the trees.

There were also some cases where older age class black spruce were affected. Numerous scattered stands with semi-mature trees having infection levels up to 50 percent were seen in the northeast corner of the Kenora District and southern parts of the Red Lake District. Lower infection levels were observed at numerous other areas across the remainder of the region.

This late season foliage disease was likewise very prevalent on ornamental blue spruce (*P. pungens* Engelm.) and white spruce. Some occurrences of almost 100 percent infection on trees from 2 to 10 m tall were encountered in various communities across the western half of the region.

Shoot Blight, *Venturia macularis* (Fr.:Fr.) E. Müll. & Arx

The incidence of shoot blight disease on trembling aspen was high in the western half of the region in 2001. The symptoms of this disease are present in the spring and are found on the tips of branches mainly on young regeneration trees (less than 3 m tall). Tips of infected shoots

are black and brittle, resembling a “shepherd’s crook,” and the blackened leaves and tips often remain on the branch throughout the summer. The death of terminal and lateral shoots deforms young aspen and reduces growth. Small trees may be killed from repeated attacks. Shoot damage was very common in cutovers and other open areas in the Dryden, Sioux Lookout, Red Lake and Kenora districts. In many of these sites 100 percent of the trees were affected with infection levels ranging from 25 to 75 percent, with some trees having all of their shoots killed. This disease does not usually affect older age classes of aspen. However, this year some pockets of 10 m tall trees were observed having 75 to 100 percent shoot infection in the Red Lake and Kenora districts.

Abiotic Damage

Blowdown

Three distinct areas of blowdown damage were present in the Northwest Region in 2001. The largest was in the Red Lake District where 2 433 ha of flattened trees were mapped north and northwest of the town of Red Lake. The damage was the result of two storms, one in early summer and the other in the latter half of the summer. Pockets of damage were mapped along an east/west line from the north central part of Woodland Caribou Provincial Park east as far as Nungesser Lake (Fig. 3). The heaviest concentration of damage was present just north of Simeon Lake in the park and all around Valhalla Lake to the east. The resulting damage at the latter site was to mature black spruce with some mixed type and was the aftermath of high winds from the two storms.

Two other small areas of blowdown damage were discovered by Abitibi-Consolidated in the Whiskey Jack Forest in the Kenora District (Fig. 4). Damage that resulted from late season storms in 2000 and winter storms in 2001 was found west of Ball Lake. Also, high winds on July 31, 2001 caused damage near Berry Lake northeast of the village of Sioux Narrows. Both of these sites were mapped by the company and totaled 488 ha. Scattered areas with individual trees uprooted or broken from the severe July storm were present in the southern Kenora District and the western area of Dryden District.

Snow/Wind Damage

On the 24th and 25th of October 2001 heavy wet snow followed by high winds was reported to have caused extensive damage across a large area of the Northwest Region. Forest industry and OMNR personnel reported damage from the Churchill Lake area, Sioux Lookout District in the west to Percy Lake, Nipigon District in the east; north as far as Fort Hope and south to Kopka Lake in Nipigon and Thunder Bay districts, respectively.

A preliminary investigation of some of the area in December revealed that damage levels were extremely variable. Only the conifer species were affected, specifically spruce, balsam fir, and jack pine. Damage was in the form of snapped off, bent over, and completely flattened trees. Typically, mature spruce had the top one third of their crowns snapped off and younger trees growing in lower stocked stands were often bent over. The heaviest hit areas were found in small isolated pockets where a large proportion of the trees were completely down or the main stems

were broken, usually below the live crown. Patches of flattened trees were observed within a couple of areas of jack pine regeneration south of the town of Armstrong in Thunder Bay District.

The full extent of the damage will be mapped after the snow has melted sometime in 2002.

Observations of Other Forest Pests

Pine False Webworm, *Acantholyda erythrocephala* (L.)

Damage by the pine false webworm was quite noticeable in and around the city of Thunder Bay in the Thunder Bay District. Most of the defoliation occurred on red pine (*Pinus resinosa* Ait.), however, some damage was also found on eastern white pine (*P. strobus* L.) and jack pine. The most significant areas were on a 3 m red pine wind break along Highway 130 south of the Kaministiquia River and in the jack pine breeding orchard at the OMNR Resource Centre. Varying levels of damage were observed on individual ornamentals at numerous locations across the city of Thunder Bay.

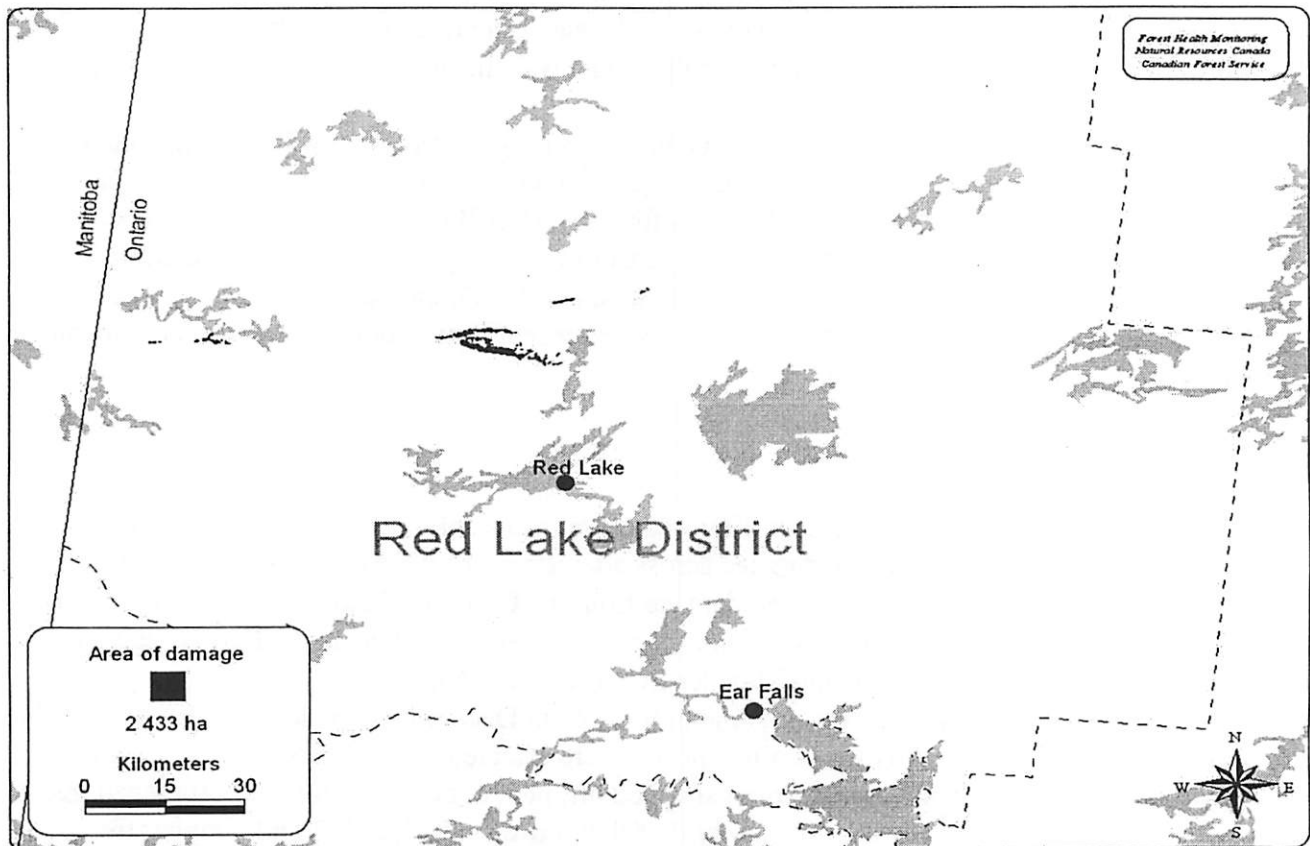


Figure 3. Area within which blowdown damage occurred in the Red Lake District in 2001.

Fall Cankerworm, *Alsophila pometaria* (Harr.)

High insect populations have returned to some of the towns in the Northwest Region. Defoliations levels ranging from 30 to 100 percent were present on ornamental Manitoba maple (*Acer negundo* L.) in the towns of Sioux Lookout in the Sioux Lookout District, and in the towns of Dryden and Kenora in the Dryden and Kenora districts, respectively. The larger boxelder leafroller (*Archips negundana* [Dyar]) was also present and helped contributed to the damage.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

As the name implies this tiny caterpillar skeletonizes the leaves of white birch causing them to turn a yellowish brown shade. Observations of damage caused by this late season pest were again made in the Nipigon District. Foliar browning levels ranging from 25 to 100 percent were present in numerous stands across the district.

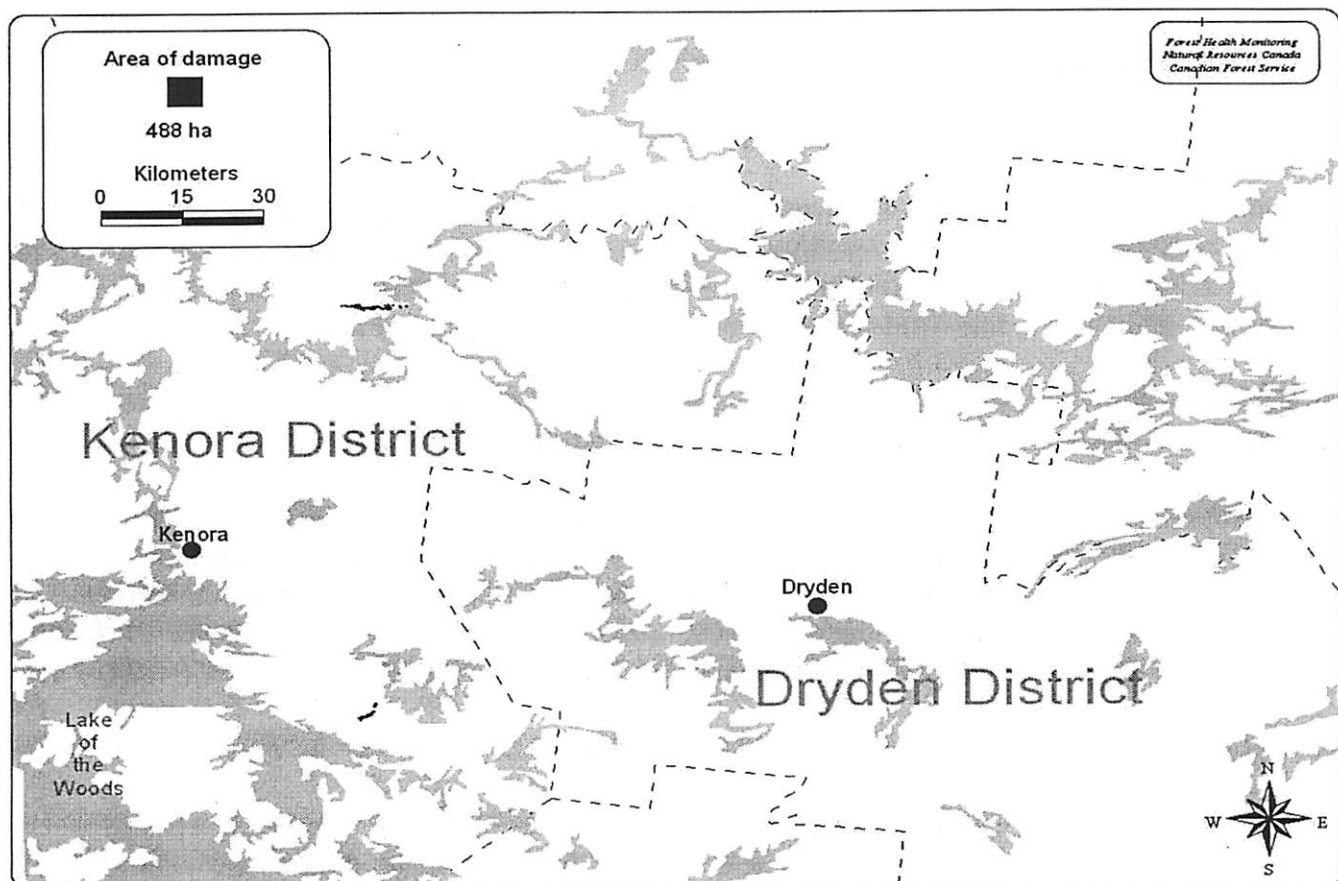


Figure 4. Area within which blowdown damage occurred in the Kenora District in 2001.

Jack Pine Resin Midge, *Cecidomyia resinicola* (O.S.)

The jack pine resin midge caused widespread damage to young jack pine on the fringes of stands in the Dryden District. Branch tip mortality levels ranging from 75 to 100 percent were present along Highway 17 in the eastern half of the district.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)

The large aspen tortrix caused defoliation at various locations in the Thunder Bay District in 2001. High numbers of this leafroller were present on trembling aspen along Highway 593 from Pigeon River to Silver Mountain. However, in all cases the forest tent caterpillar was also present in high numbers, therefore delineating the areas damaged only by the large aspen tortrix was impossible.

Dook's Needle Blight, *Lophophacidium dooksii* Corlett & Shoemaker

Noticeable levels of foliar browning (50-75%) was present on a few scattered eastern white pine trees in and around the town of Sioux Lookout in the Sioux Lookout District. This represents a reduction in the incidence of damage seen over the past few years.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

High populations of the yellowheaded spruce sawfly were present on roadside regeneration black and white spruce along many roadways in the Dryden, Kenora, Nipigon, Red Lake, and Sioux Lookout districts. In addition this insect caused varying levels of defoliation to ornamental white and blue spruce in many communities across the region.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr. and White Pine Weevil, *Pissodes strobi* (Peck)

Population levels of both insects appeared to be higher this year in some of the districts across the region. It was common to see young roadside spruce that had been attacked by the white pine weevil in Dryden and Sioux Lookout districts. The combination of both the eastern pine shoot borer and the white pine weevil was often found doing noteworthy damage in jack pine plantations at many sites in the Sioux Lookout and Thunder Bay districts.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.)

There was a reduction in the population levels of this insect compared with previous years. Predominately light foliar damage (<25 percent) was the norm in 2001. This damage was observed on many young trembling aspen, usually on trees found regenerating cutovers in the Dryden, Sioux Lookout, and Thunder Bay districts. Moderate levels of damage were occasionally seen within some of these same areas.

Balsam Poplar Foliar Browning

By the middle of August the young balsam poplar (*Populus balsamifera* L.) found growing in cutovers and along the fringes of stands were starting to turn brown. This condition was mainly observed in the western part of the region. There were a number of causal agents that were contributing to this damage of the foliage. Feeding by gray willow leaf beetle adults and the balsam poplar leafblotch miner (*Phyllonorycter nipigon* [Free.]) were two of them. Also two foliage diseases were found affecting the trees. Septoria leaf spot (*Mycosphaerella populicola* G.E. Thomps.) and Linospora leaf blight (*Linospora tetraspora* G.E. Thomps.) incidence levels were high, particularly in parts of the Thunder Bay and Fort Frances districts.

Drought

Drought symptoms were observed at various locations along the north shore of Lake Superior in Nipigon District. Foliage turned yellow and prematurely dropped on scattered white birch found growing on hill tops and shallow soils. In addition to the drought white birch was also affected throughout this area by birch skeletonizer and the leaf spot (*Septoria betulae* Pass.).

FOREST HEALTH MONITORING

Jack Pine Health Plots

One of the tools used to monitor tree health is a system of plots where the same trees are examined over a period of years to track changes in their health. This is the case with the jack pine health plots located in the western half of the Northwest Region (Fig. 5). A summary of the crown condition, tree mortality, and top condition for the 32 plots can be found in appendix 1. The general condition of the trees in 2001 was a little poorer compared with last year. The most noteworthy damage encountered was in the plot located at Straw Lake in the Fort Frances District where 17 trees were blown down by high winds. Armillaria root rot, *Armillaria ostoyae* (Romagn.) Herink was found in six of the plots. A total of ten dead trees were recorded. Once again this year the pest found most often was the western gall rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats. Fourteen percent of the trees had varying levels of infection. There were no major insect defoliators found causing damage in the plot trees this year.

Spruce/Fir Health Plots

The spruce/fir health plots were tallied again in 2001 (Fig. 6). The plots were established in 1993 to develop a hazard rating for spruce budworm. They were converted to generic boreal health plots which meant including the hardwoods present in the plots. A standardized evaluation system was introduced in 1996. A summary of the crown condition, tree mortality, and top condition of the balsam fir, white spruce, and black spruce can be found in appendix 2. Generally there was very little change in the condition of the three tree species. There were two known causes of tree mortality this year. Armillaria root rot was found in three balsam fir, in two white

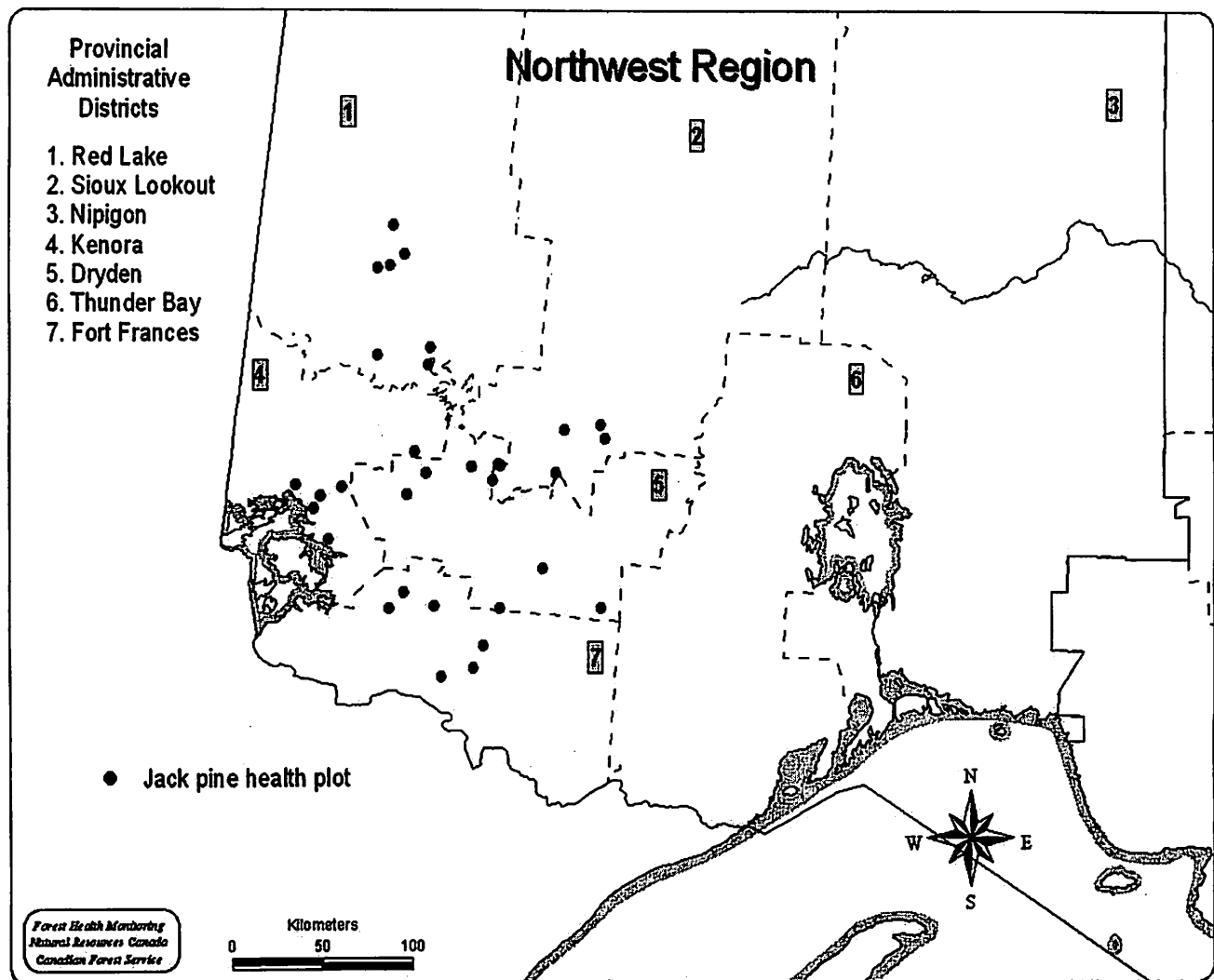


Figure 5. Locations of the jack pine health plots in 2001.

spruce, and in one black spruce. High winds caused the death of two each of white and black spruce and it also knocked down one balsam fir. There were no other noteworthy pest causing stress to the conifers in these plots.

Appendix 3 summarizes the crown condition and tree mortality of the trembling aspen and white birch. The overall tree condition of these two species did not change much compared with last year. The forest tent caterpillar was found causing varying levels of defoliation in many of the plots, but also most of the trees had refoliated by the time the plots were checked. The fruiting structures of the poplar false tinder fungus, *Phellinus tremulae* (Bondartsev) Bondartsev & Borissov were found on a low number of trembling aspen.

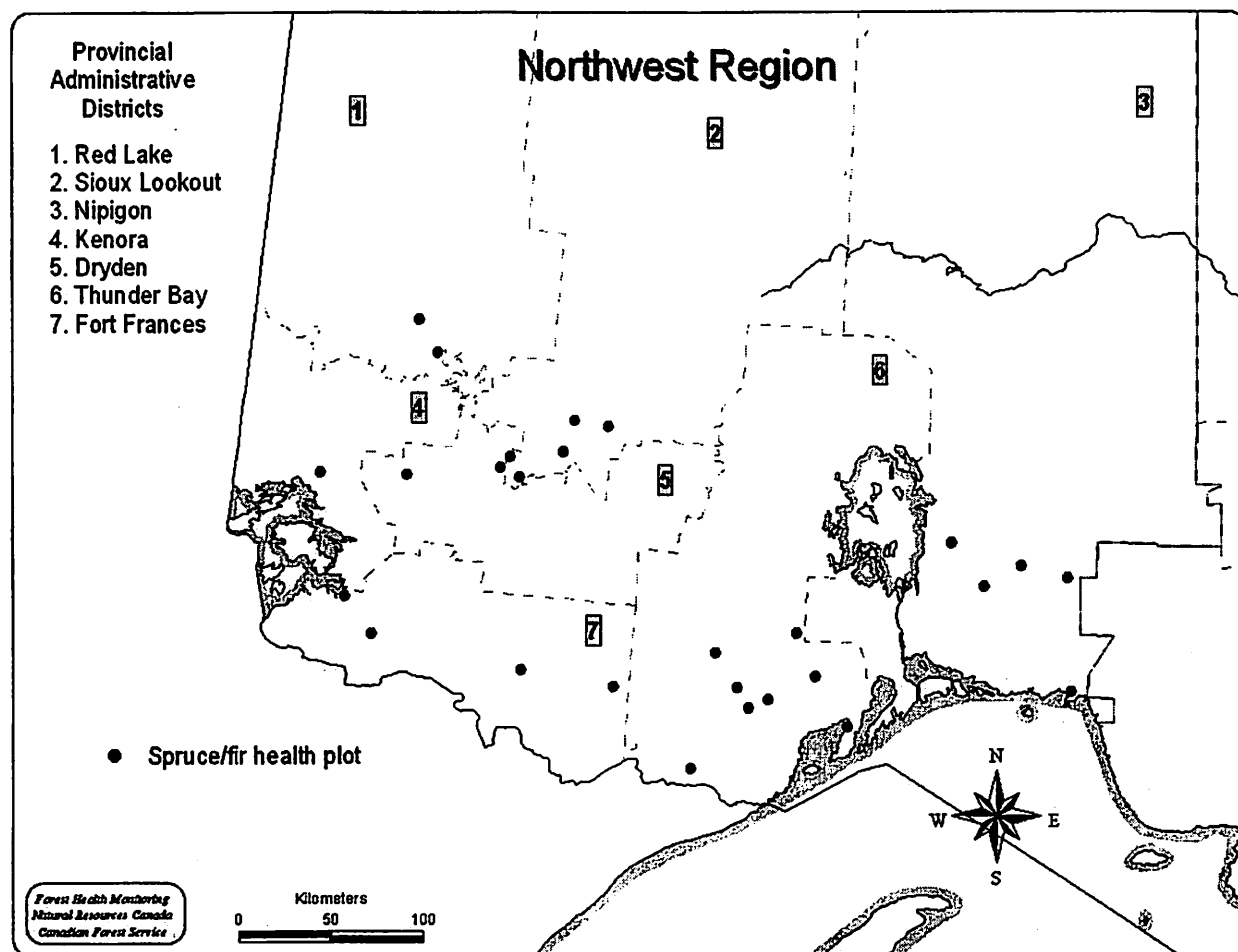


Figure 6. Locations of the spruce/fir health plots in 2001.

QUARANTINE PESTS

Gypsy Moth, *Lymantria dispar* (L.)

Trapping for gypsy moth has been carried out in the Northwest Region for a number of years. Two baited, deltoid-type, sticky pheromone traps were placed at 20 locations frequented by tourists such as parks, campgrounds, lodges, and fly-in outfitters. Over the years there have been single catches of male moths at various locations (Table 4). This year in the Nipigon District one moth was caught at both Neys and Rossport provincial parks (Fig. 7). This does not indicate the start of an infestation. A discovery of another life stage of the insect or greater numbers of male moths may indicate the start of something happening.

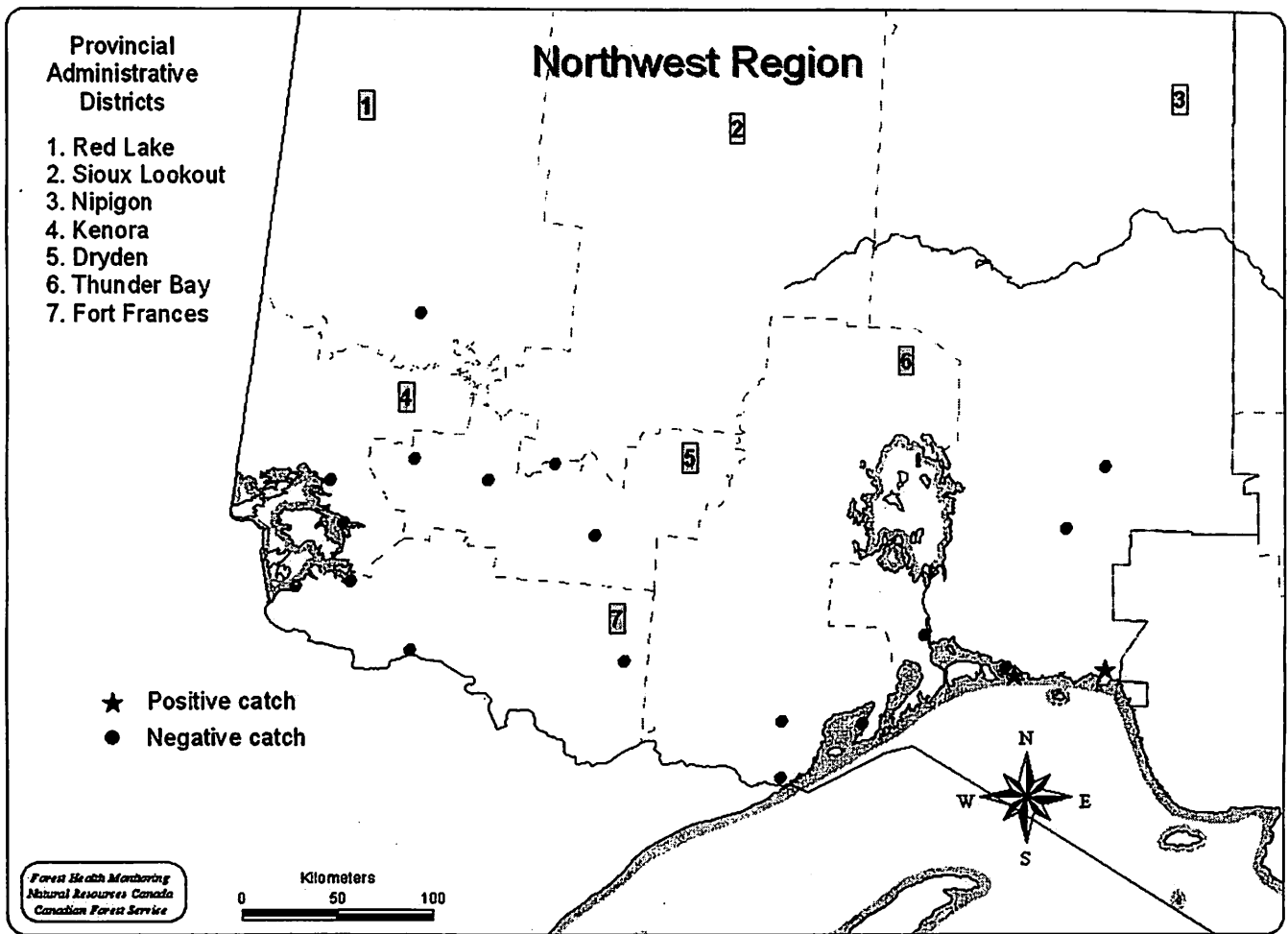
Table 4. Summary of gypsy moth trapping at 20 locations in the Northwest Region of Ontario from 1997 to 2001. (Two deltoid-type traps were used at each location)

Location	Number of male moths captured				
	1997	1998	1999	2000	2001
<i>Dryden District</i>					
Aaron Provincial Park	0	0	0	0	0
Blue Lake Provincial Park	1	0	0	0	0
Sandbar Lake Provincial Park	0	0	0	0	0
<i>Fort Frances District</i>					
Assabaska Ojibway Heritage Park (formerly Lake of the Woods Provincial Park)	0	0	0	0	0
Caliper Lake Provincial Park	0	0	0	0	0
Dawson Trail Campground - Quetico Prov. Park	0	0	1	0	0
Noden Causeway	-	-	-	0	0
<i>Kenora District</i>					
Rushing River Provincial Park	0	0	0	0	0
Sioux Narrows Provincial Park	0	0	0	0	0
<i>Nipigon District</i>					
Leunenburger's - Nakina	1	0	0	0	0
MacLeod Park	0	0	0	0	0
Neys Provincial Park	0	0	0	0	1
Nipigon Tourist Information Centre	-	-	-	0	0
Rainbow Falls Provincial Park	0	0	0	0	0 ^a
Rosspport Provincial Park	0	0	0	0	1
<i>Red Lake District</i>					
Pakwash Provincial Park	0	0	0	0	0
<i>Sioux Lookout District</i>					
Ojibway Provincial Park	0	0	0	0	0

Table 4. Summary of gypsy moth trapping at 20 locations in the Northwest Region of Ontario from 1997 to 2001. (Two deltoid-type traps were used at each location) (concl.)

Location	Number of male moths captured				
	1997	1998	1999	2000	2001
<i>Thunder Bay District</i>					
Kakabeka Falls Provincial Park	0	0	0	0	0
Pigeon River Provincial Park	-	-	-	0	0
Sleeping Giant Provincial Park	0	0	0	0	0

^a One trap missing



*Figure 7. Locations of the gypsy moth (*Lymantria dispar* [L.]) pheromone trapping.*

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
Dryden District															
Breithaupt Township (91)	16.9	1996	42	0	6	0	0	0	0	1	1	0	48	0	0
		1997	43	0	4	1	0	0	0	0	2	0	48	0	0
		1998	39	0	7	2	0	0	0	0	2	0	48	0	0
		1999	0	0	44	0	1	0	0	3	2	0	45	0	0
		2000	2	0	41	0	1	0	0	1	5	0	43	0	0
		2001	0	0	43	0	1	0	0	0	6	0	43	0	0
Bradshaw Township (94)	12.1	1996	44	0	5	0	0	0	0	1	0	0	49	0	0
		1997	43	0	3	3	0	0	0	0	1	0	49	0	0
		1998	38	0	7	1	0	1	0	2	1	0	47	0	0
		1999	0	0	43	2	1	0	0	1	3	0	45	0	1
		2000	0	0	39	5	1	0	0	1	4	0	44	0	1
		2001	0	0	33	8	4	0	0	0	5	0	42	0	3
Mafeking Township (100)	24.6	1996	24	0	24	1	0	0	0	0	1	0	49	0	0
		1997	37	0	12	0	0	0	0	0	1	0	49	0	0
		1998	19	0	30	0	0	0	0	0	1	0	49	0	0
		1999	0	0	48	1	0	0	0	0	1	0	49	0	0
		2000	0	0	49	0	0	0	0	0	1	0	49	0	0

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Dryden District (cont'd)</i>															
Mafeking Township (100)		2001	0	0	41	8	0	0	0	0	1	0	49	0	0
McNevin Township (101)	23.3	1996	45	0	5	0	0	0	0	0	0	0	50	0	0
		1997	33	0	15	1	0	0	0	1	0	0	48	0	1
		1998	22	0	25	1	0	0	0	1	1	0	47	0	1
		1999	0	0	45	2	0	0	0	1	2	0	46	0	1
		2000	0	0	40	6	0	0	0	1	3	0	46	0	0
		2001	0	0	35	9	2	0	0	0	4	0	46	0	0
Mutrie Township (102)	23.0	1996	38	0	11	0	0	0	0	0	1	0	49	0	0
		1997	38	0	10	0	0	0	0	1	1	0	48	0	0
		1998	27	0	21	0	0	0	0	0	2	0	48	0	0
		1999	0	0	47	0	0	0	0	1	2	0	47	0	0
		2000	0	0	44	2	0	0	0	1	3	0	46	0	0
		2001	0	0	44	2	0	0	0	0	4	0	46	0	0
Turtle River (106)	25.4	1996	17	0	32	1	0	0	0	0	0	0	50	0	0
		1997	26	0	23	0	0	0	0	1	0	0	49	0	0
		1998	12	0	37	0	0	0	0	0	1	0	49	0	0
		1999	0	0	48	0	0	0	0	1	1	0	47	0	1

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

[illegible]

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Fort Frances District (cont'd)</i>															
Heathcliff Lake (115)		1998	0	0	49	0	0	0	0	1	0	0	49	0	0
		1999	0	0	49	0	0	0	0	0	1	0	49	0	0
		2000	0	0	47	2	0	0	0	0	1	0	49	0	0
		2001	0	0	47	2	0	0	0	0	1	0	49	0	0
Hillyer Creek (116)	7.7	1996	49	0	0	0	0	0	0	0	0	1	48	0	1
		1997	30	0	19	0	0	0	0	0	0	1	49	0	0
		1998	0	0	49	0	0	0	0	0	0	1	49	0	0
		1999	0	0	48	1	0	0	0	0	0	1	49	0	0
		2000	0	0	42	6	0	0	0	1	0	1	48	0	0
		2001	0	0	48	0	0	0	0	0	1	1	48	0	0
Prince Road (118)	23.1	1996	46	0	0	1	0	0	0	3	0	0	47	0	0
		1997	0	0	42	4	1	0	0	0	3	0	47	0	0
		1998	0	0	44	2	0	0	0	1	3	0	46	0	0
		1999	0	0	42	1	0	0	0	3	4	0	43	0	0
		2000	0	0	27	14	1	0	0	1	7	0	42	0	0
		2001	0	0	26	15	0	0	0	1	8	0	41	0	0
Straw Lake (122)	23.4	1996	46	0	0	0	0	0	3	1	0	46	0	0	

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Fort Frances District (concl.)</i>															
Straw Lake (122)		1997	0	0	42	4	0	0	0	0	4	0	46	0	0
		1998	0	0	45	1	0	0	0	0	4	0	46	0	0
		1999	0	0	44	0	0	0	0	2	4	0	44	0	0
		2000	0	0	25	16	1	0	0	2	6	0	42	0	0
		2001	0	0	13	12	0	0	0	17	8	0	25	0	0
<i>Kenora District</i>															
April Lake (124)	18.1	1996	50	0	0	0	0	0	0	0	0	0	50	0	0
		1997	48	0	0	0	0	0	0	2	0	0	46	0	2
		1998	2	0	43	2	0	0	0	1	2	0	43	3	1
		1999	0	0	43	4	0	0	0	0	3	0	45	1	1
		2000	0	0	42	2	1	0	0	2	3	0	43	1	1
		2001	0	0	42	2	1	0	0	0	5	0	45	0	0
Kirkup Township (125)	19.9	1996	49	0	0	0	0	0	0	1	0	0	49	0	0
		1997	1	0	41	5	1	0	0	1	1	0	48	0	0
		1998	1	0	38	7	1	0	1	0	2	0	44	1	3
		1999	0	0	40	5	1	0	0	2	2	0	45	0	1
		2000	0	0	40	6	0	0	0	0	4	0	43	2	1

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario.
(Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Kenora District (cont'd)</i>															
Kirkup Township (125)		2001	0	0	38	8	0	0	0	0	4	0	44	0	2
Coyle Township (126)	15.6	1996	47	0	0	0	1	0	0	1	1	0	47	1	0
		1997	11	0	26	10	1	0	0	0	2	0	48	0	0
		1998	0	0	39	6	2	0	0	1	2	0	47	0	0
		1999	0	0	44	2	1	0	0	0	3	0	47	0	0
		2000	0	0	41	4	2	0	0	0	3	0	45	2	0
		2001	0	0	39	6	1	0	0	1	3	0	46	0	0
Devonshire Township (127)	16.9	1996	49	0	0	0	0	0	0	0	1	0	49	0	0
		1997	6	0	40	2	0	0	0	1	1	0	48	0	0
		1998	2	0	42	3	1	0	0	0	2	0	48	0	0
		1999	0	0	43	5	0	0	0	0	2	0	48	0	0
		2000	0	0	45	3	0	0	0	0	2	0	48	0	0
		2001	0	0	40	6	0	0	0	2	2	0	46	0	0
MacNicol Township (131)	21.1	1996	47	0	0	0	0	0	0	1	2	0	47	0	0
		1997	10	0	30	4	1	0	1	1	3	0	43	0	3
		1998	0	0	33	6	1	2	1	3	4	0	39	0	4
		1999	0	0	37	5	1	0	0	0	7	0	41	0	2

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Kenora District (concl.)</i>															
MacNicol Township (131)		2000	0	0	38	3	0	0	0	2	7	0	39	1	1
		2001	0	0	36	4	0	0	0	1	9	0	40	0	0
Jaffray Township (133)	18.0	1996	49	0	0	0	1	0	0	0	0	0	50	0	0
		1997	1	0	48	0	0	0	0	1	0	0	49	0	0
		1998	2	0	40	2	2	1	1	1	1	0	48	0	0
		1999	0	0	45	1	0	0	0	2	2	0	46	0	0
		2000	0	0	40	4	1	0	0	1	4	0	43	1	1
		2001	0	0	39	2	2	0	0	2	5	0	43	0	0
		<i>Red Lake District</i>													
Bateman Township (139)	7.6	1996	47	0	0	0	0	0	0	0	1	2	45	0	2
		1997	47	0	0	0	0	0	0	0	1	2	47	0	0
		1998	0	47	0	0	0	0	0	0	1	2	47	0	0
		1999	0	0	47	0	0	0	0	0	1	2	46	1	0
		2000	0	0	47	0	0	0	0	0	1	2	47	0	0
		2001	0	0	45	2	0	0	0	0	1	2	46	1	0
Coli Lake (140)	8.2	1996	47	0	0	0	0	0	0	0	0	3	44	0	3
		1997	44	0	2	0	0	0	0	1	0	3	46	0	0

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Red Lake District (cont'd)</i>															
Coli Lake (140)		1998	0	0	46	0	0	0	0	0	1	3	46	0	0
		1999	0	0	26	0	0	0	0	0	1	23	26	0	0
		2000	0	0	16	2	1	0	0	0	1	30	19	0	0
		2001	0	0	18	0	0	0	1	0	1	30	18	1	0
Ear Falls (142)	20.5	1996	48	0	0	0	0	0	0	0	2	0	46	1	1
		1997	44	0	0	0	0	0	0	2	2	2	42	2	0
		1998	0	0	42	2	0	0	0	0	4	2	41	3	0
		1999	0	0	41	3	0	0	0	0	4	2	41	3	0
		2000	0	0	40	3	0	0	1	0	4	2	41	3	0
		2001	0	0	40	2	0	0	2	0	4	2	40	3	1
McDonough Township (149)	15.3	1996	49	0	0	0	0	0	0	1	0	0	48	1	0
		1997	48	0	0	0	0	0	0	1	1	0	48	0	0
		1998	0	0	47	1	0	0	0	0	2	0	46	2	0
		1999	0	0	44	2	0	0	1	1	2	0	46	1	0
		2000	0	0	41	5	0	1	0	0	3	0	46	1	0
		2001	0	0	40	2	3	0	2	0	3	0	41	6	0
Nungesser River (156)	21.2	1996	45	0	0	0	0	0	0	1	4	0	38	1	6

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Red Lake District (concl.)</i>															
Nungesser River (156)		1997	43	0	0	0	0	0	0	2	5	0	39	2	2
		1998	0	0	41	2	0	0	0	0	7	0	37	6	0
		1999	0	0	42	1	0	0	0	0	7	0	38	5	0
		2000	0	0	34	9	0	0	0	0	7	0	37	4	2
		2001	0	0	40	3	0	0	0	0	7	0	38	5	0
Overnight Road (157)	22.8	1996	46	0	0	0	0	0	0	1	3	0	45	0	1
		1997	42	0	0	0	0	0	0	4	4	0	41	0	1
		1998	0	0	40	0	0	0	0	2	8	0	40	0	0
		1999	3	0	37	0	0	0	0	0	10	0	40	0	0
		2000	0	0	38	1	0	1	0	0	10	0	40	0	0
		2001	0	0	39	0	0	0	1	0	10	0	38	1	1
Wenesaga Lake (160)	18.4	1996	50	0	0	0	0	0	0	0	0	0	49	1	0
		1997	49	0	0	0	0	0	0	1	0	0	48	1	0
		1998	23	0	25	1	0	0	0	0	1	0	49	0	0
		1999	9	0	38	2	0	0	0	0	1	0	48	1	0
		2000	0	0	45	3	0	1	0	0	1	0	46	3	0
		2001	0	0	44	3	0	0	1	1	1	0	43	5	0

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Sioux Lookout District</i>															
Drayton Township (163)	10.5	1996	49	0	1	0	0	0	0	0	0	0	50	0	0
		1997	44	0	6	0	0	0	0	0	0	0	50	0	0
		1998	42	0	7	0	0	0	0	1	0	0	49	0	0
		1999	13	0	36	0	0	0	0	0	1	0	49	0	0
		2000	0	0	44	2	3	0	0	0	1	0	49	0	0
		2001	0	0	42	4	3	0	0	0	1	0	49	0	0
Elbow Lake Road (164)	11.8	1996	47	0	3	0	0	0	0	0	0	0	50	0	0
		1997	43	0	7	0	0	0	0	0	0	0	50	0	0
		1998	44	0	6	0	0	0	0	0	0	0	50	0	0
		1999	11	0	39	0	0	0	0	0	0	0	50	0	0
		2000	2	0	48	0	0	0	0	0	0	0	50	0	0
		2001	0	0	50	0	0	0	0	0	0	0	50	0	0
Goodie Lake (165)	16.1	1996	43	0	5	1	0	0	1	0	0	0	49	0	1
		1997	37	0	11	0	0	2	0	0	0	0	49	0	1
		1998	21	0	27	0	0	0	0	2	0	0	47	0	1
		1999	0	0	48	0	0	0	0	0	2	0	47	0	1
		2000	0	0	45	3	0	0	0	0	2	0	47	0	1

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario.
(Counts based on an examination of 50 jack pine trees at each location.) (cont'd)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
<i>Sioux Lookout District (cont'd)</i>															
Goodie Lake (165)		2001	0	0	44	4	0	0	0	0	2	0	47	0	1
Goodie Lake (166)	26.6	1996	42	0	5	0	0	0	0	1	2	0	47	0	0
		1997	36	0	11	0	0	0	0	0	3	0	47	0	0
		1998	18	0	28	1	0	0	0	0	3	0	47	0	0
		1999	0	0	46	0	0	0	0	1	3	0	46	0	0
		2000	0	0	42	4	0	0	0	0	4	0	45	0	1
		2001	0	0	40	6	0	0	0	0	4	0	46	0	0
Lomond Township (170)	9.3	1996	46	0	3	0	0	0	0	1	0	0	49	0	0
		1997	47	0	2	0	0	0	0	0	1	0	49	0	0
		1998	44	0	3	0	0	0	0	2	1	0	47	0	0
		1999	1	0	45	1	0	0	0	0	3	0	47	0	0
		2000	0	0	42	5	0	0	0	0	3	0	47	0	0
		2001	0	0	43	3	0	0	0	1	3	0	46	0	0
Moose Lake Road (173)	20.4	1996	18	0	27	3	0	0	0	0	2	0	47	0	1
		1997	25	0	19	3	0	0	0	1	2	0	47	0	0
		1998	10	0	34	3	0	0	0	0	3	0	47	0	0
		1999	0	0	40	6	1	0	0	0	3	0	47	0	0

Appendix 1. Summary of the crown condition, tree mortality, and top condition in the 32 jack pine health plots from 1996 to 2001 in the Northwest Region of Ontario. (Counts based on an examination of 50 jack pine trees at each location.) (concl.)

Location (Plot no.)	Average DBH ^a (cm)	Year	Crown condition ^b							Cumulative mortality			Condition of top		
			1	2	3	4	5	6	7	New dead ^c	Old dead ^c	Trees cut	Live	Bare	Dead
			Number of trees												
Sioux Lookout District (concl.)															
Moose Lake Road (173)		2000	0	0	23	21	1	0	2	0	3	0	46	0	1
		2001	0	0	37	8	0	0	0	2	3	0	45	0	0
Stanzhikimi Lake (177)	21.0	1996	21	0	25	1	0	0	0	0	3	0	47	0	0
		1997	28	0	19	0	0	0	0	0	3	0	47	0	0
		1998	6	0	41	0	0	0	0	0	3	0	46	0	1
		1999	0	0	44	3	0	0	0	0	3	0	46	0	1
		2000	0	0	32	15	0	0	0	0	3	0	47	0	0
		2001	0	0	36	10	1	0	0	0	3	0	46	0	1

^a Tree diameters re-measured in 2000 on remaining living trees.

^b 1 = no defoliation, 2 = only current foliage defoliated less than 25 percent, 3 = current and/or some older foliage defoliated less than 25 percent, 4 = 25–50 percent defoliation, 5 = 51–75 percent defoliation, 6 = 76–90 percent defoliation, 7 = more than 90 percent defoliation.

^c Tree mortality resulting from natural causes.

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario.

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
Dryden District																
Langton Township (120)	bF	14.5	1996	0	0	0	0	1	1	0	0	4	0	1	0	1
			1997	0	0	0	0	1	0	1	0	4	0	0	0	2
			1998	0	0	0	1	0	0	0	1	4	0	0	0	1
			1999	0	0	0	0	0	0	0	1	5	0	0	0	0
			2000	0	0	0	0	0	0	0	0	6	0	0	0	0
			2001	0	0	0	0	0	0	0	0	6	0	0	0	0
	wS	28.4	1996	0	0	0	10	1	0	0	1	7	0	11	0	0
			1997	0	0	9	2	0	0	0	0	8	0	11	0	0
			1998	1	0	8	2	0	0	0	0	8	0	11	0	0
			1999	0	0	10	0	0	0	0	1	8	0	10	0	0
			2000	0	0	4	6	0	0	0	0	9	0	10	0	0
			2001	0	0	4	5	0	0	0	1	9	0	9	0	0
	bS	19.8	1996	1	0	24	0	0	0	0	0	3	0	25	0	0
			1997	23	0	0	0	0	0	0	2	3	0	23	0	0
			1998	19	0	3	0	0	0	0	1	5	0	22	0	0
			1999	0	0	20	0	0	0	0	2	6	0	20	0	0
			2000	3	0	16	0	0	0	0	1	8	0	19	0	0
			2001	0	0	16	2	0	0	0	1	9	0	18	0	0
McIlraith Township (123)	bF	13.0	1996	0	0	0	4	0	0	0	0	3	0	4	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Dryden District (concl.)</i>																
McIlraith Township (123)	bF	10.9	1997	0	0	4	0	0	0	0	0	3	0	4	0	0
			1998	1	0	3	0	0	0	0	0	3	0	4	0	0
			1999	0	0	2	1	0	0	0	1	3	0	3	0	0
			2000	0	0	1	0	2	0	0	0	4	0	3	0	0
			2001	0	0	1	0	0	0	0	2	4	0	1	0	0
	bS		1996	18	0	26	1	0	0	0	0	0	0	44	0	1
			1997	44	0	1	0	0	0	0	0	0	0	45	0	0
			1998	44	0	1	0	0	0	0	0	0	0	45	0	0
			1999	0	0	45	0	0	0	0	0	0	0	45	0	0
			2000	5	0	39	1	0	0	0	0	0	0	45	0	0
			2001	0	0	44	1	0	0	0	0	0	0	45	0	0
<i>Fort Frances District</i>																
Calm Lake (132)	bF	13.3	1996	0	0	1	2	4	1	1	0	6	0	9	0	0
			1997	0	0	0	8	0	0	0	1	6	0	8	0	0
			1998	0	0	1	2	4	0	0	1	7	0	5	2	0
			1999	0	0	2	3	1	0	0	1	8	0	6	0	0
			2000	0	0	3	1	2	0	0	0	9	0	4	2	0
			2001	0	0	3	1	1	0	0	1	9	0	5	0	0
	wS		24.3	1996	0	0	1	1	1	0	0	0	0	3	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Fort Frances District (cont'd)</i>																
Calm Lake (132)	wS	16.4	1997	0	0	0	3	0	0	0	0	0	0	3	0	0
			1998	0	0	0	2	1	0	0	0	0	0	3	0	0
			1999	0	0	3	0	0	0	0	0	0	0	3	0	0
			2000	0	0	2	1	0	0	0	0	0	0	3	0	0
			2001	0	0	2	1	0	0	0	0	0	0	3	0	0
	bS		1996	6	0	1	3	0	0	0	0	0	0	10	0	0
			1997	5	0	0	5	0	0	0	0	0	0	10	0	0
			1998	0	7	2	1	0	0	0	0	0	0	10	0	0
			1999	0	0	10	0	0	0	0	0	0	0	10	0	0
			2000	0	0	10	0	0	0	0	0	0	0	10	0	0
			2001	0	0	9	1	0	0	0	0	0	0	10	0	0
Claxton Township (133)	bF	8.0	1996	0	0	0	2	7	2	0	10	7	0	11	0	0
			1997	0	0	0	6	4	0	0	1	17	0	9	1	0
			1998	0	0	0	5	1	0	0	4	18	0	2	4	0
			1999	0	0	3	1	0	0	0	2	22	0	3	1	0
			2000	0	0	1	2	1	0	0	0	24	0	3	1	0
			2001	0	0	1	3	0	0	0	0	24	0	3	0	1
	wS	38.1	1996	0	0	0	3	0	0	0	1	2	0	3	0	0
			1997	0	0	0	3	0	0	0	0	3	0	3	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

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Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Fort Frances District (concl.)</i>																
French Lake (134)	wS		1999	0	0	2	0	0	0	0	0	0	0	2	0	0
			2000	0	0	1	1	0	0	0	0	0	0	2	0	0
			2001	0	0	1	1	0	0	0	0	0	0	2	0	0
Lake Hope (135)	bF	8.1	1996	0	0	0	25	12	0	0	6	4	0	36	1	0
			1997	0	0	8	20	2	2	0	5	10	0	31	1	0
			1998	0	0	4	11	6	2	0	9	15	0	16	6	1
			1999	0	0	14	3	0	0	1	5	24	0	14	4	0
			2000	0	0	11	3	0	0	0	3	29	0	13	1	0
			2001	0	0	5	8	1	0	0	0	32	0	11	2	1
	wS	12.3	1996	0	0	0	3	0	0	0	0	0	0	3	0	0
			1997	0	0	1	2	0	0	0	0	0	0	3	0	0
			1998	0	0	0	2	1	0	0	0	0	0	2	1	0
			1999	0	0	2	1	0	0	0	0	0	0	2	1	0
			2000	0	0	2	0	1	0	0	0	0	0	2	1	0
			2001	0	0	0	2	1	0	0	0	0	0	2	0	1
<i>Kenora District</i>																
Haycock Township (146)	bF	11.8	1996	0	0	2	2	3	1	2	1	5	0	8	0	2
			1997	0	0	0	7	1	1	0	1	6	0	8	1	0
			1998	0	0	1	3	0	2	2	1	7	0	5	1	2

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top			
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead	
				Number of trees													
<i>Kenora District (concl.)</i>																	
Haycock Township (146)	bF	36.9	1999	0	0	4	1	2	0	0	1	8	0	5	1	1	
			2000	0	0	4	0	1	2	0	0	9	0	3	3	1	
			2001	0	0	4	1	1	1	0	0	9	0	5	0	2	
	wS		1996	0	0	0	1	0	0	0	0	0	0	0	1	0	0
			1997	0	0	0	1	0	0	0	0	0	0	0	1	0	0
			1998	0	1	0	0	0	0	0	0	0	0	0	1	0	0
			1999	0	0	1	0	0	0	0	0	0	0	0	1	0	0
			2000	0	0	1	0	0	0	0	0	0	0	0	1	0	0
			2001	0	0	0	0	0	0	0	0	1	0	0	0	0	0
<i>Nipigon District</i>																	
Catlonite Road (161)	bF	23.2	1996	6	0	0	0	0	0	0	14	18	0	4	2	0	
			1997	0	0	1	0	0	0	0	5	32	0	1	0	0	
			1998	0	0	1	0	0	0	0	0	37	0	1	0	0	
			1999	0	0	1	0	0	0	0	0	37	0	1	0	0	
			2000	0	0	1	0	0	0	0	0	37	0	1	0	0	
			2001	0	0	1	0	0	0	0	0	37	0	1	0	0	
	wS	15.8	1996	7	0	0	0	0	0	0	0	0	0	6	1	0	
			1997	7	0	0	0	0	0	0	0	0	0	7	0	0	
			1998	0	0	6	0	0	0	0	1	0	0	6	0	0	

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Nipigon District (cont'd)</i>																
Catlonite Road (161)	wS	18.3	1999	0	0	6	0	0	0	0	0	1	0	6	0	0
			2000	0	0	6	0	0	0	0	0	1	0	6	0	0
			2001	0	0	5	0	0	0	0	1	1	0	5	0	0
	bS		1996	12	0	0	0	0	0	0	0	1	0	12	0	0
			1997	12	0	0	0	0	0	0	0	1	0	12	0	0
			1998	0	0	11	0	0	0	0	1	1	0	11	0	0
			1999	2	0	9	0	0	0	0	0	2	0	11	0	0
			2000	0	0	11	0	0	0	0	0	2	0	11	0	0
			2001	0	0	9	1	0	0	0	1	2	0	10	0	0
Grain Township (167)	bF	13.1	1996	7	0	0	0	0	0	0	3	38	0	2	2	3
			1997	0	0	6	0	0	0	0	1	41	0	4	1	1
			1998	0	0	3	3	0	0	0	0	42	0	3	2	1
			1999	0	0	3	3	0	0	0	0	42	0	3	3	0
			2000	0	0	2	4	0	0	0	0	42	0	2	2	2
			2001	0	0	4	2	0	0	0	0	42	0	2	2	2
	wS	17.5	1996	1	0	0	0	0	0	0	0	0	0	1	0	0
			1997	0	0	1	0	0	0	0	0	0	0	1	0	0
			1998	0	0	1	0	0	0	0	0	0	0	1	0	0
1999			0	0	0	0	1	0	0	0	0	0	0	1	0	

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top			
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead	
				Number of trees													
<i>Nipigon District (cont'd)</i>																	
Grain Township (167)	wS	16.4	2000	0	0	1	0	0	0	0	0	0	0	0	0	1	
			2001	0	0	1	0	0	0	0	0	0	0	1	0	0	
	bS		1996	3	0	0	0	0	0	0	0	0	0	0	3	0	0
			1997	3	0	0	0	0	0	0	0	0	0	0	3	0	0
			1998	0	0	3	0	0	0	0	0	0	0	0	3	0	0
			1999	0	0	3	0	0	0	0	0	0	0	0	3	0	0
			2000	0	0	3	0	0	0	0	0	0	0	0	3	0	0
			2001	0	0	3	0	0	0	0	0	0	0	0	3	0	0
John Ahl Road (168)	bF	11.4	1996	1	0	0	0	0	0	0	7	27	0	0	1	0	
			1997	0	0	1	0	0	0	0	0	34	0	0	1	0	
			1998	0	0	1	0	0	0	0	0	34	0	0	1	0	
			1999	0	0	1	0	0	0	0	0	34	0	0	1	0	
			2000	0	0	1	0	0	0	0	0	34	0	0	1	0	
			2001	0	0	0	1	0	0	0	0	34	0	0	1	0	
	wS	22.4	1996	1	0	0	0	0	0	0	0	4	0	0	1	0	
			1997	0	0	1	0	0	0	0	0	4	0	0	1	0	
			1998	0	0	0	0	0	0	0	1	4	0	0	0		
			1999	0	0	0	0	0	0	0	0	5	0	0	0		
			2000	0	0	0	0	0	0	0	0	5	0	0	0		

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality				Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead	
																	Number of trees
Nipigon District (cont'd)																	
John Ahl Road (168)	wS		2001	0	0	0	0	0	0	0	0	0	5	0	0	0	0
	bS	15.7	1996	10	0	0	0	0	0	0	0	0	2	0	0	10	0
			1997	8	0	2	0	0	0	0	0	0	2	0	0	10	0
			1998	0	0	7	0	0	0	0	0	3	2	0	0	7	0
			1999	0	0	7	0	0	0	0	0	0	5	0	0	7	0
			2000	0	0	7	0	0	0	0	0	0	5	0	0	7	0
			2001	0	0	6	1	0	0	0	0	0	5	0	0	7	0
			1996	23	0	0	0	0	0	0	0	13	13	0	20	2	1
			1997	19	0	0	0	0	0	0	0	4	26	0	18	0	1
			1998	0	0	12	0	1	0	0	0	6	30	0	13	0	0
Parent Township (176)			1999	0	0	11	1	0	0	0	1	36	0	10	2	0	0
			2000	0	0	11	1	0	0	0	0	37	0	11	1	0	0
			2001	0	0	8	3	0	0	0	1	37	0	7	3	1	1
	wS	33.1	1996	5	0	0	0	0	0	0	0	1	0	5	0	0	0
			1997	5	0	0	0	0	0	0	0	1	0	5	0	0	0
			1998	0	0	4	1	0	0	0	0	1	0	5	0	0	0
			1999	0	0	5	0	0	0	0	0	1	0	5	0	0	0
			2000	0	0	5	0	0	0	0	0	1	0	5	0	0	0
			2001	0	0	5	0	0	0	0	0	1	0	5	0	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top				
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead		
																	Number of trees	
Nipigon District (cont'd)																		
Parent Township (176)	bS	19.2	1996	11	0	0	0	0	0	0	0	0	1	0	11	0	0	
			1997	11	0	0	0	0	0	0	0	1	0	11	0	0		
			1998	0	0	11	0	0	0	0	0	1	0	11	0	0		
			1999	0	0	9	2	0	0	0	0	1	0	9	2	0		
			2000	0	0	10	1	0	0	0	0	1	0	10	1	0		
			2001	0	0	9	0	2	0	0	0	1	0	8	2	1		
Windigokan Lake (183)	bF	14.6	1996	7	0	0	0	0	0	1	7	33	0	5	2	1		
			1997	0	0	5	0	0	0	0	3	40	0	5	0	0		
			1998	0	0	3	1	0	0	0	1	43	0	4	0	0		
			1999	0	0	3	1	0	0	0	0	44	0	4	0	0		
			2000	0	0	3	1	0	0	0	0	44	0	4	0	0		
			2001	0	0	3	1	0	0	0	0	44	0	4	0	0		
	wS	11.2	1996	2	0	0	0	0	0	0	0	0	0	2	0	0		
			1997	0	0	2	0	0	0	0	0	0	0	2	0	0		
			1998	0	0	1	1	0	0	0	0	0	0	1	1	0		
			1999	0	0	2	0	0	0	0	0	0	0	1	1	0		
			2000	0	0	1	1	0	0	0	0	0	0	1	1	0		
			2001	0	0	1	0	0	0	0	1	0	0	1	0	0		
	bS	17.0	1996	1	0	0	0	0	0	0	0	0	1	0	0			

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

[illegible]

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Red Lake District (concl.)</i>																
Goldpine Road (186)	bS		1997	1	0	0	0	0	0	0	0	0	0	1	0	0
			1998	1	0	0	0	0	0	0	0	0	0	1	0	0
			1999	0	0	1	0	0	0	0	0	0	0	1	0	0
			2000	0	0	0	1	0	0	0	0	0	0	1	0	0
			2001	0	0	0	1	0	0	0	0	0	0	1	0	0
Snake Falls Road (189)	bF	15.0	1996	0	0	0	2	6	5	5	16	11	0	10	0	8
			1997	0	0	0	5	1	0	0	12	27	0	4	0	2
			1998	0	0	1	0	0	0	0	5	39	0	1	0	0
			1999	0	0	1	0	0	0	0	0	44	0	1	0	0
			2000	0	0	0	0	0	0	0	1	44	0	0	0	0
			2001	0	0	0	0	0	0	0	0	45	0	0	0	0
	wS	44.1	1996	0	0	2	7	4	0	0	0	0	0	13	0	0
			1997	0	0	11	2	0	0	0	0	0	0	13	0	0
			1998	7	0	5	0	0	0	0	1	0	0	12	0	0
			1999	0	0	12	0	0	0	0	0	1	0	12	0	0
			2000	0	0	11	0	0	0	0	1	1	0	11	0	0
			2001	0	0	11	0	0	0	0	0	2	0	11	0	0
<i>Sioux Lookout District</i>																
Burma Lake Road (191)	bF	31.2	1996	0	0	0	0	0	7	0	4	7	0	7	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality				Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead	
																	Number of trees
Sioux Lookout District (cont'd)																	
Burma Lake Road (191)	bF		1997	0	0	1	2	2	0	0	2	11	0	4	0	1	
			1998	0	0	2	1	0	0	2	13	0	3	0	0		
			1999	0	0	3	0	0	0	0	15	0	3	0	0		
			2000	0	0	1	0	0	0	2	15	0	1	0	0		
			2001	0	0	1	0	0	0	0	17	0	1	0	0		
	wS	22.7	1996	0	0	0	0	0	1	0	0	0	1	0	0		
			1997	0	0	0	0	0	1	0	0	0	1	0	0		
			1998	0	0	0	1	0	0	0	0	0	1	0	0		
			1999	0	0	0	1	0	0	0	0	0	1	0	0		
Foley Lake (195)	bS	22.3	2000	0	0	0	0	1	0	0	0	0	1	0	0		
			2001	0	0	0	1	0	0	0	0	0	1	0	0		
			1996	1	0	20	12	0	0	0	1	0	33	0	0		
			1997	26	0	4	0	0	0	3	1	0	30	0	0		
			1998	22	0	8	0	0	0	0	4	0	30	0	0		
	bF	14.5	1999	0	0	30	0	0	0	0	4	0	30	0	0		
			2000	5	0	20	4	0	0	1	4	0	29	0	0		
			2001	0	0	24	5	0	0	0	5	0	29	0	0		
			1996	0	0	0	5	15	6	0	2	0	24	1	1		
1997	0	0	7	12	4	0	0	3	4	0	21	1	1				

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top				
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead		
				Number of trees														
<i>Sioux Lookout District (cont'd.)</i>																		
Foley Lake (195)	bF	9.0	1998	0	0	18	2	0	0	0	3	7	0	19	0	1		
			1999	0	0	19	0	0	0	0	1	10	0	19	0	0		
			2000	0	0	13	6	0	0	0	0	11	0	19	0	0		
			2001	0	0	16	2	0	0	0	1	11	0	18	0	0		
	wS		1996	0	0	1	1	0	0	0	0	0	0	0	2	0	0	
			1997	1	1	0	0	0	0	0	0	0	0	0	2	0	0	
			1998	2	0	0	0	0	0	0	0	0	0	0	2	0	0	
			1999	0	0	1	0	0	0	0	1	0	0	1	0	0		
			2000	0	0	1	0	0	0	0	0	1	0	1	0	0		
			2001	0	0	1	0	0	0	0	0	1	0	1	0	0		
			bS	1996	0	0	6	12	0	0	0	1	0	0	18	0	0	
				1997	10	8	0	0	0	0	0	0	1	0	18	0	0	
	1998			14	0	3	0	0	0	0	1	1	0	17	0	0		
	1999			1	0	15	1	0	0	0	0	2	0	16	0	0		
	Lomond Township (196)		bF	16.9	2000	5	0	9	2	0	0	0	1	2	0	16	0	0
					2001	1	0	14	1	0	0	0	0	3	0	16	0	0
1996		0			0	0	4	4	4	0	3	16	0	11	1	0		
			1997	0	0	6	4	0	0	0	2	19	0	10	0	0		
			1998	7	0	2	1	0	0	0	0	21	0	10	0	0		

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Sioux Lookout District (cont'd.)</i>																
Lomond Township (196)	bF	30.2	1999	0	0	7	1	0	0	0	2	21	0	8	0	0
			2000	0	0	7	0	0	0	0	1	23	0	7	0	0
			2001	0	0	7	0	0	0	0	0	24	0	7	0	0
	wS		1996	0	0	0	5	0	0	0	1	0	0	5	0	0
			1997	2	0	3	0	0	0	0	0	1	0	5	0	0
			1998	4	0	1	0	0	0	0	0	1	0	5	0	0
			1999	0	0	5	0	0	0	0	0	1	0	5	0	0
			2000	0	0	2	3	0	0	0	0	1	0	5	0	0
			2001	0	0	5	0	0	0	0	0	1	0	5	0	0
	bS	1996	0	0	9	2	0	0	0	2	1	0	11	0	0	
		1997	9	0	1	0	0	0	0	1	3	0	10	0	0	
		1998	8	0	1	0	0	0	0	1	4	0	9	0	0	
		1999	0	0	9	0	0	0	0	0	5	0	9	0	0	
		2000	1	0	8	0	0	0	0	0	5	0	9	0	0	
		2001	0	0	9	0	0	0	0	0	5	0	9	0	0	
Pape Lake (198)	bF	12.9	1996	0	0	3	8	4	0	0	9	27	0	11	0	4
			1997	0	0	6	5	0	0	0	4	36	0	9	0	2
			1998	0	0	2	2	0	0	0	7	40	0	2	0	2
			1999	0	0	0	2	0	0	0	2	47	0	1	0	1

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top			
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead	
				Number of trees													
Sioux Lookout District (cont'd.)																	
Pape Lake (198)	bF	26.1	2000	0	0	0	1	0	0	0	1	49	0	1	0	0	
			2001	0	0	0	1	0	0	0	0	50	0	1	0	0	
	wS		1996	0	0	0	2	0	0	0	0	0	0	0	2	0	0
			1997	0	0	2	0	0	0	0	0	0	0	0	2	0	0
			1998	2	0	0	0	0	0	0	0	0	0	0	2	0	0
			1999	0	0	2	0	0	0	0	0	0	0	0	2	0	0
			2000	0	0	2	0	0	0	0	0	0	0	0	2	0	0
			2001	0	0	2	0	0	0	0	0	0	0	0	2	0	0
			bS	1996	0	0	4	0	0	0	0	0	0	0	0	4	0
	1997			1	0	3	0	0	0	0	0	0	0	0	4	0	0
	1998			2	0	2	0	0	0	0	0	0	0	0	4	0	0
	1999			0	0	4	0	0	0	0	0	0	0	0	4	0	0
	2000			0	0	4	0	0	0	0	0	0	0	0	4	0	0
	2001			0	0	4	0	0	0	0	0	0	0	0	4	0	0
Pickereel Township (199)	bF	10.7		1996	0	0	6	2	1	0	0	2	33	0	6	0	3
			1997	2	0	4	0	0	0	0	3	35	0	5	0	1	
			1998	1	0	4	1	0	0	0	0	38	0	4	0	2	
			1999	0	0	5	1	0	0	0	0	38	0	4	0	2	
			2000	0	0	3	3	0	0	0	0	38	0	5	0	1	

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Sioux Lookout District (concl.)</i>																
Pickerel Township (199)	bF		2001	0	0	5	1	0	0	0	0	38	0	5	0	1
	wS	38.0	1996	0	0	0	3	0	0	0	1	2	0	3	0	0
			1997	2	0	1	0	0	0	0	0	3	0	3	0	0
			1998	2	0	1	0	0	0	0	0	3	0	3	0	0
			1999	0	0	3	0	0	0	0	0	3	0	3	0	0
			2000	0	0	1	2	0	0	0	0	3	0	3	0	0
			2001	0	0	2	1	0	0	0	0	3	0	3	0	0
	bS	27.8	1996	0	0	5	1	0	0	0	0	0	0	6	0	0
			1997	3	0	1	1	0	0	0	1	0	0	5	0	0
			1998	3	0	2	0	0	0	0	0	1	0	5	0	0
			1999	0	0	5	0	0	0	0	0	1	0	5	0	0
			2000	0	0	1	1	0	0	1	2	1	0	2	0	1
			2001	0	0	1	1	0	0	0	1	3	0	2	0	0
<i>Thunder Bay District</i>																
Buzzer Lake Road (201)	bF	13.6	1996	0	0	0	0	6	7	7	5	4	0	15	3	3
			1997	0	0	0	10	6	0	0	4	9	0	14	2	0
			1998	0	0	6	4	0	0	0	6	13	0	10	0	0
			1999	0	0	9	1	0	0	0	0	19	0	9	1	0
			2000	0	0	6	3	1	0	0	0	19	0	10	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
<i>Thunder Bay District (cont'd.)</i>																
Buzzer Lake Road (201)	bF		2001	0	0	6	4	0	0	0	0	19	0	10	0	0
	wS	5.3	1996	0	0	0	1	2	0	0	0	0	0	2	1	0
			1998	0	0	2	1	0	0	0	0	0	0	3	0	0
			1999	0	0	3	0	0	0	0	0	0	0	3	0	0
			2000	0	0	1	1	0	0	0	1	0	0	1	1	0
			2001	0	0	1	1	0	0	0	0	1	0	2	0	0
	bS	13.1	1996	7	0	0	6	0	1	0	0	1	0	14	0	0
			1997	10	0	0	3	1	0	0	0	1	0	14	0	0
			1998	0	0	13	1	0	0	0	0	1	0	14	0	0
			1999	4	0	9	1	0	0	0	0	1	0	14	0	0
			2000	0	0	11	2	1	0	0	0	1	0	14	0	0
			2001	0	0	13	0	1	0	0	0	1	0	14	0	0
Fallis Township (207)	bF	21.9	1996	0	0	0	44	2	0	1	0	5	0	46	0	1
			1997	3	0	0	43	0	0	0	1	5	0	46	0	0
			1998	0	0	46	0	0	0	0	0	6	0	46	0	0
			1999	0	0	45	0	0	0	0	1	6	0	45	0	0
			2000	0	0	28	14	3	0	0	0	7	0	45	0	0
			2001	0	0	23	21	1	0	0	0	7	0	45	0	0
Forbes Township (208)	bF	20.0	1996	0	0	0	4	33	2	2	6	11	0	39	1	1

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
Thunder Bay District (cont'd.)																
Forbes Township (208)	bF		1997	0	0	0	37	1	1	0	2	17	0	38	0	1
			1998	0	0	36	0	1	0	0	2	19	0	36	0	1
			1999	0	0	30	2	0	1	1	3	21	0	32	0	2
			2000	0	0	12	14	3	0	1	4	24	0	29	0	1
			2001	0	0	18	10	1	1	0	1	27	0	28	1	1
Fowler Township (209)	bF	15.0	1996	0	0	0	8	2	1	0	1	2	0	11	0	0
			1997	0	0	9	0	0	0	0	2	3	0	9	0	0
			1998	0	0	8	0	0	0	0	1	5	0	8	0	0
			1999	0	0	7	0	0	0	0	0	6	0	7	0	0
			2000	0	0	5	2	1	0	0	0	6	0	8	0	0
			2001	0	0	2	5	1	0	0	0	6	0	8	0	0
	wS	27.9	1996	0	0	0	1	0	0	0	0	0	0	1	0	0
			1997	0	0	0	1	0	0	0	0	0	0	1	0	0
			1998	0	0	0	1	0	0	0	0	0	0	1	0	0
			1999	0	0	1	0	0	0	0	0	0	0	1	0	0
			2000	0	0	0	0	1	0	0	0	0	0	1	0	0
			2001	0	0	0	0	1	0	0	0	0	0	1	0	0
	bS	17.2	1996	45	0	0	0	0	0	0	1	4	0	45	0	0
			1997	33	0	12	0	0	0	0	0	5	0	45	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
Thunder Bay District (cont'd)																
Fowler Township (209)	bS		1998	0	0	45	0	0	0	0	0	5	0	43	0	0
			1999	7	0	38	0	0	0	0	0	5	0	44	0	0
			2000	0	0	40	5	0	0	0	0	5	0	45	0	0
			2001	0	0	35	9	0	0	0	1	5	0	44	0	0
Hicks Lake Road (212)	bF	12.3	1996	0	0	14	8	4	0	0	0	0	0	26	0	0
			1997	22	0	4	0	0	0	0	0	0	0	26	0	0
			1998	0	0	26	0	0	0	0	0	0	0	26	0	0
			1999	0	0	26	0	0	0	0	0	0	0	26	0	0
			2000	0	0	21	5	0	0	0	0	0	0	26	0	0
			2001	0	0	17	9	0	0	0	0	0	0	26	0	0
			wS	10.4	1996	1	0	2	0	0	0	0	0	0	0	3
	1997	3			0	0	0	0	0	0	0	0	0	3	0	0
	1998	0			0	3	0	0	0	0	0	0	0	3	0	0
	1999	0			0	3	0	0	0	0	0	0	0	3	0	0
	2000	0			0	3	0	0	0	0	0	0	0	3	0	0
	2001	0			0	3	0	0	0	0	0	0	0	2	1	0
	bS	9.8	1996	8	0	0	2	0	0	0	0	1	0	10	0	0
			1997	10	0	0	0	0	0	0	0	1	0	10	0	0
			1998	0	0	10	0	0	0	0	0	1	0	10	0	0

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality				Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead	
																	Number of trees
Thunder Bay District (cont'd)																	
Hicks Lake Road (212)	bS		1999	3	0	7	0	0	0	0	0	0	1	0	10	0	0
			2000	0	0	8	2	0	0	0	0	1	0	10	0	0	0
			2001	0	0	8	2	0	0	0	0	1	0	10	0	0	0
Milkshake Lake (218)	bF	14.1	1996	0	0	0	4	5	1	0	9	17	0	9	0	1	1
			1997	0	0	7	0	0	0	0	3	26	0	5	1	1	1
			1998	0	0	0	5	0	1	0	1	29	0	3	1	2	2
			1999	0	0	3	1	0	0	0	2	30	0	3	0	1	1
			2000	0	0	1	1	2	0	0	0	32	0	3	0	1	1
	wS	23.2	2001	0	0	0	3	1	0	0	0	32	0	3	0	1	1
			1996	0	0	0	6	3	0	1	1	4	0	10	0	0	0
			1997	0	0	10	0	0	0	0	0	5	0	9	0	1	1
			1998	0	0	3	3	2	0	0	2	5	0	8	0	0	0
			1999	0	0	6	1	0	0	0	1	7	0	7	0	0	0
			2000	0	0	0	5	1	0	0	1	8	0	6	0	0	0
			2001	0	0	0	6	0	0	0	0	9	0	6	0	0	0
			1996	0	0	29	11	2	1	0	1	4	0	43	0	0	0
			1997	0	0	40	0	0	0	0	3	5	0	40	0	0	0
			1998	0	0	37	0	0	0	0	3	8	0	37	0	0	0
			1999	0	0	37	0	0	0	0	11	0	37	0	0	0	

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c							Cumulative mortality			Condition of top		
				1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
Thunder Bay District (cont'd)																
Sandstone Lake (221)	bF	25.5	2000	0	0	25	12	0	0	0	0	11	0	37	0	0
			2001	0	0	19	18	0	0	0	0	11	0	37	0	0
	wS		1996	0	0	0	2	0	0	0	0	0	0	2	0	0
			1997	0	0	0	2	0	0	0	0	0	0	2	0	0
			1998	0	0	2	0	0	0	0	0	0	0	2	0	0
			1999	0	0	2	0	0	0	0	0	0	0	2	0	0
			2000	0	0	1	1	0	0	0	0	0	0	2	0	0
			2001	0	0	0	2	0	0	0	0	0	0	2	0	0
Soper Township (222)	bF	16.5	1996	0	0	1	5	14	6	1	0	0	0	21	6	0
			1997	0	0	19	8	0	0	0	0	0	0	26	1	0
			1998	0	0	20	3	1	0	0	3	0	0	24	0	0
			1999	0	19	4	1	0	0	0	0	3	0	24	0	0
			2000	0	1	13	5	2	0	1	2	3	0	21	1	0
			2001	0	0	11	10	0	1	0	0	5	0	21	1	0
	wS	58.0	1996	0	0	0	1	0	0	0	0	0	0	1	0	0
			1997	0	0	0	0	0	0	0	1	0	0	0	0	0
			1998	0	0	0	0	0	0	0	0	1	0	0	0	0
			1999	0	0	0	0	0	0	0	0	1	0	0	0	0
			2000	0	0	0	0	0	0	0	1	0	0	0	0	

Appendix 2. Summary of the crown condition, tree mortality, and top condition for three coniferous hosts in the 27 spruce/fir health plots from 1996 to 2001 in the Northwest Region of Ontario. (concl.)

			Crown condition ^c							Cumulative mortality			Condition of top			
Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	1	2	3	4	5	6	7	New dead ^d	Old dead ^d	Trees cut	Live	Bare	Dead
				Number of trees												
Thunder Bay District (concl.)																
Soper Township (222)	wS		2001	0	0	0	0	0	0	0	0	1	0	0	0	0
	bS	14.8	1996	18	0	0	4	1	0	0	0	0	0	23	0	0
			1997	12	0	0	11	0	0	0	0	0	0	23	0	0
			1998	0	0	23	0	0	0	0	0	0	0	23	0	0
			1999	3	0	20	0	0	0	0	0	0	0	23	0	0
			2000	0	0	18	5	0	0	0	0	0	0	23	0	0
2001	0	0	18	5	0	0	0	0	0	0	0	23	0	0		

^a bF = balsam fir, wS = white spruce, and bS = black spruce.

^b Tree diameters re-measured in 2000 on remaining living trees.

^c 1 = no defoliation, 2 = only current foliage defoliated less than 25 percent, 3 = current and/or some older foliage defoliated less than 25 percent, 4 = 25–50 percent defoliation, 5 = 51–75 percent defoliation, 6 = 76–90 percent defoliation, 7 = more than 90 percent defoliation.

^d Tree mortality resulting from natural causes, trees dead when plot installed are included with old dead.

Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario.

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Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario.

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c											Cumulative mortality			
				10	20	30	35	40	45	50	55	60	65	70	New dead	Old dead	Trees cut	
<i>Fort Frances District (concl.)</i>																		
French Lake (134)	wB	26.8	2000	0	0	13	0	0	1	0	0	0	0	0	0	0	0	
			2001	0	0	7	4	2	1	0	0	0	0	0	0	0	0	
	tA		1998	4	0	6	0	2	1	0	0	0	0	0	0	0	1	0
			1999	0	0	6	0	7	0	0	0	0	0	0	0	0	1	0
			2000	0	0	3	2	6	2	0	0	0	0	0	0	0	1	0
			2001	0	0	1	3	5	4	0	0	0	0	0	0	0	1	0
Lake Hope (135)	wB	17.3	1998	1	2	1	0	0	0	0	0	0	0	0	0	1	0	
			1999	0	0	1	2	0	1	0	0	0	0	0	0	0	1	0
			2000	0	0	1	1	0	1	1	0	0	0	0	0	0	1	0
			2001	0	0	1	0	1	1	1	0	0	0	0	0	0	1	0
	tA	18.9	1998	2	1	3	0	3	1	0	0	0	0	0	0	0	0	0
			1999	0	0	3	2	4	1	0	0	0	0	0	0	0	0	0
			2000	0	0	8	1	1	0	0	0	0	0	0	0	0	0	0
			2001	0	0	1	5	3	0	0	0	0	0	0	0	0	0	0
<i>Kenora District</i>																		
Haycock Township (146)	wB	15.2	1998	0	0	3	1	0	0	0	0	0	0	0	0	0	0	
			1999	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
			2000	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0

Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario. (cont'd)

[illegible]

Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario. (cont'd)

[illegible]

Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario. (cont'd)

[illegible]

Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario. (cont'd)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c											Cumulative mortality		
				10	20	30	35	40	45	50	55	60	65	70	New dead	Old dead	Trees cut
Thunder Bay District (cont'd)																	
Hicks Lake Road (212)	wB		2001	0	0	1	2	5	0	0	0	0	0	0	0	0	0
	tA	17.4	1998	13	0	10	0	1	2	0	0	0	0	1	1	2	0
			1999	1	0	17	0	6	2	0	0	0	0	1	0	3	0
			2000	0	0	9	6	8	1	2	0	0	0	0	1	3	0
			2001	0	0	0	1	15	5	3	0	1	0	0	1	4	0
Milkshake Lake (218)	wB	19.3	1998	14	6	5	1	3	1	2	0	0	0	0	1	4	0
			1999	1	0	24	1	3	0	0	0	1	0	0	1	5	0
			2000	0	0	24	3	2	0	0	0	0	0	0	2	6	0
			2001	0	0	11	11	6	0	1	0	0	0	0	0	8	0
		35.7	1998	0	7	1	1	0	0	0	0	0	0	0	0	2	0
			1999	0	0	3	0	6	0	0	0	0	0	0	0	2	0
			2000	0	0	3	2	3	0	0	0	1	0	0	0	2	0
			2001	0	0	0	2	5	1	0	0	1	0	0	0	2	0
			1998	2	0	3	0	0	0	0	0	0	0	0	0	0	0
Sandstone Lake (221)	wB	27.6	1999	0	0	3	0	2	0	0	0	0	0	0	0	0	0
			2000	0	0	4	0	1	0	0	0	0	0	0	0	0	0
			2001	0	0	1	1	3	0	0	0	0	0	0	0	0	0
			1998	11	0	10	0	5	0	0	0	1	0	0	2	0	0
	tA	29.6															

Appendix 3. Summary of the crown condition and tree mortality for two deciduous hosts in 25 spruce/fir health plots from 1998 to 2001 in the Northwest Region of Ontario. (concl.)

Location (Plot no.)	Host ^a	Average DBH ^b (cm)	Year	Crown condition ^c											Cumulative mortality		
				10	20	30	35	40	45	50	55	60	65	70	New dead	Old dead	Trees cut
<i>Thunder Bay District (concl.)</i>																	
Sandstone Lake (221)	tA		1999	0	0	18	0	8	0	0	0	0	0	0	1	2	0
			2000	0	0	6	3	15	0	1	0	0	0	0	1	3	0
			2001	0	0	0	3	16	5	0	1	0	0	0	0	4	0
Soper Township (222)	tA	24.4	1998	0	0	11	0	2	0	0	0	0	0	0	0	0	0
			1999	0	0	4	0	8	1	0	0	0	0	0	0	0	0
			2000	0	0	3	2	5	2	0	0	1	0	0	0	0	0
			2001	0	0	0	2	6	1	2	0	1	1	0	0	0	0

^a wB = white birch and tA = trembling aspen.

^b Tree diameters re-measured in 2000 on remaining living trees.

^c 10 = no damage; 20 = foliage thin, off-colour with no dead branches or bare twigs visible; 30 = no dead branches present and bare twigs present in up to 5 percent of the crown; 35 = no dead branches present and bare twigs present in more than 6 percent of the crown; 40 = dead branches and bare twigs present in up to 15 percent of the crown; 45 = dead branches and bare twigs present in 16 to 25 percent of the crown; 50 = dead branches and bare twigs present in 26 to 37 percent of the crown; 55 = dead branches and bare twigs present in 38 to 50 percent of the crown; 60 = dead branches and bare twigs present in 51 to 75 percent of the crown; 65 = dead branches and bare twigs present in 76 percent or more of the crown; and 70 = more than 50 percent of the crown dead with only small adventitious branches present, usually at the base of the crown or stem.