

## 2000 Minnesota Forest Health Highlights

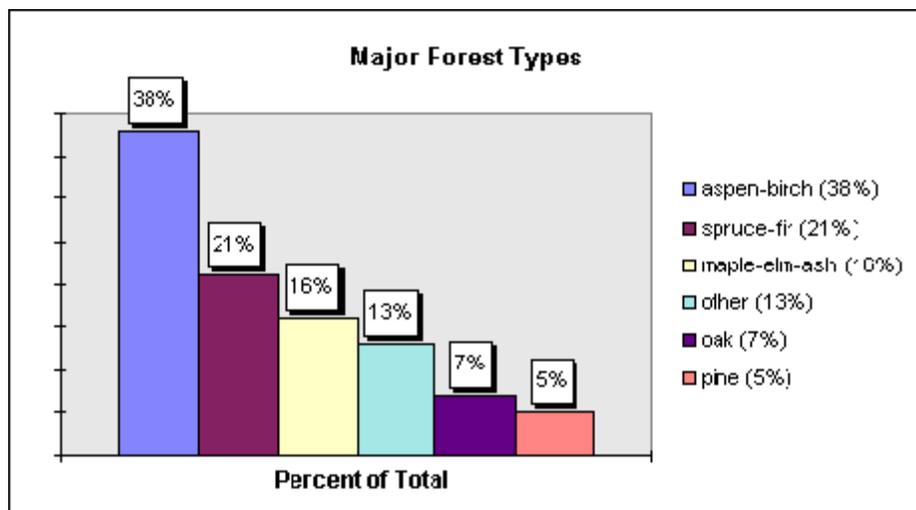
### The Resources

Minnesota's trees are a valuable resource. Forests account for 33% of Minnesota's land area, or about 16.7 million acres. The area of all forest land in the State has increased by 0.7 percent since 1977. Private land owners control 48.5% of the timberland; state, county, and municipal governments administer 37.8%, and the National Forest comprises 12.4%.

These forests are important to both the wood products and tourist industry. Forestry related industries and manufacturing employ about 60,000 people. The value of wood products annually exceeds \$8 billion. A total of 4 million cords of wood were cut in 1993, pulp and paper and oriented strand board accounts for 34% of the cut. Window frames make up 20% of all the value of products produced. Other products include sawlogs, veneer, post and poles, wood chips for landscaping, and fuelwood, although wood for energy accounts for only 4% of the volume cut, down from 12% in 1990. The Christmas tree industry annually produces more than 3 million trees worth over \$25 million.

Trees are also important components in wilderness and urban settings. The Boundary Waters Canoe Area (over 1 million acres) has more visitors than any other wilderness in the United States. Forests in the state are home to the largest wolf and bald eagle populations in the lower 48 states. Annually, millions of people visit to camp, canoe, fish, hike and hunt.

Urban trees increase property values and enhance the beauty of open spaces. More than half of the population of Minnesota lives in the Twin Cities Metro Region. The developed areas of the Metro Region have a dense tree canopy cover of over 50%. At least 10% of the urban area is kept in natural open space including lakes, wetlands, prairie, and forests. No community has planted more than 10-15% of any one species, a lesson learned from the widespread mortality from Dutch elm disease in the 1970's.



2000 TOTAL FORESTED ACRES WITH DAMAGE OR MORTALITY	
ACRES	PERCENT of MINNESOTA FOREST LANDS WITH DAMAGE or MORTALITY
2,268,815	13.4% (39% increase in acreage)

SURVEY RESULTS - SIGNIFICANT CAUSAL AGENTS				
		ACRES		
		2000	1999	% change
Forest tent caterpillar	Defoliation	2,039,919	488,889	317%
Large aspen tortrix <sup>1</sup>	Defoliation & dieback	63,942	336,170	- 81%
Flooding/high water	Mortality/dieback/dicoloration	30,697	45,393	- 33%
Spruce budworm	Defoliation	28,481	69,620	- 59%
Oak tatters	Discoloration	20,000	-----	-----
Frost	Defoliation	7,507	-----	-----
Larch casebearer	Defoliation	6,363	-----	-----
Oak decline <sup>2</sup>	Mortality & defoliation	6,061	-----	-----
Wind	Broken/uprooted	1,740	465,882	-99.6%

<sup>1</sup> Forest tent caterpillar was found mixed with large aspen tortrix on the acres reported for the large aspen tortrix causal agent.

<sup>2</sup> Oak decline included oak wilt, twolined chestnut borer, and environmental stress.

## Significant Minnesota Forest Pests in 2000 - Occurrence and Predictions

### **Forest tent caterpillar.**

#### 2000 Highlights

- U 300+% Increase from 1999;
- U > 2,000,000 acres defoliated

#### 2001 Prediction

- U 4-5,000,000 acres of defoliation

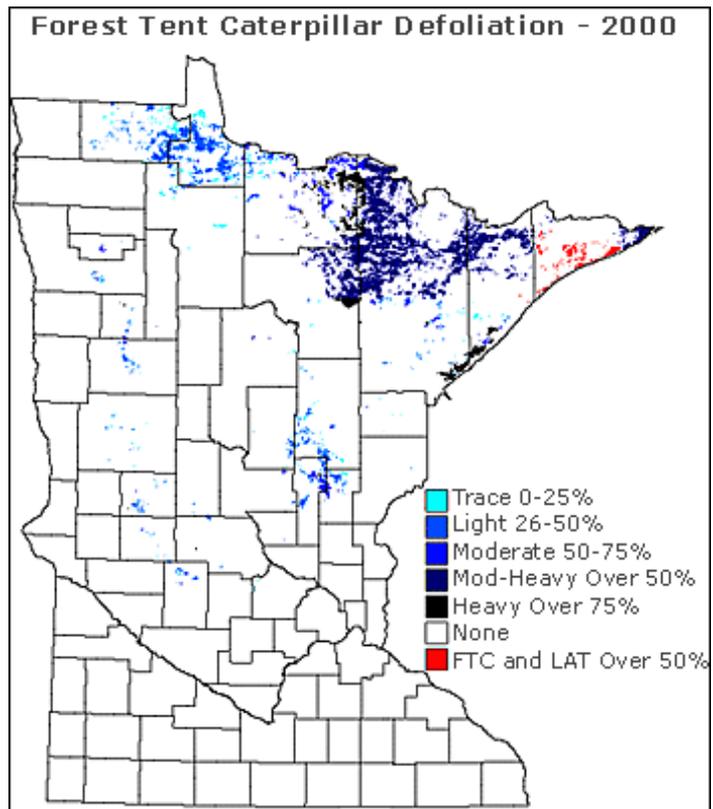
#### Discussion

The majority of the forest tent caterpillar (FTC) defoliation occurred in the northeastern and north central parts of the state. In 1999 defoliation in the northern part of the state was very widely scattered with the largest blocks of defoliation being several sections in size. In 2000, however, total acreage of defoliation increased dramatically. From Koochiching County eastward, defoliation was common in all counties except for Carlton County. (See map.)

In the central part of the state, the most seriously defoliated areas centered around lakes and rivers, notably, Mille Lacs Lake in Mille Lacs County, Big Birch Lake in Stearns County, Ann and Knife Lakes in Kanabec County, and the Rum River Watershed in Mille Lacs County. In these areas, defoliation intensified in 2000.

In west central Minnesota, FTC activity increased around lakes. A number of lake associations contracted with private sprayers to treat the FTC infested woodland bordering their lakes.

Residents of many northern Minnesota towns found their homes and businesses covered with forest tent caterpillar moths the morning of July 10<sup>th</sup>, especially if they had outside lights that stayed on all night. The moths are definitely attracted to lights. And, they can fly long distances in large masses. Some communities having little or no defoliation were suddenly swarming with moths. For example, there were no large areas of defoliation within fifteen miles of Grand Rapids, yet the morning of July 10<sup>th</sup>, buildings and sidewalks



were covered with thousands of moths. Business owners were scooping them up with shovels trying to keep customers from tracking squashed moths into their stores.

Of particular concern in northeastern Minnesota is the stress on aspen due to defoliation by forest tent caterpillar followed by aspen blotch miner damage. By late August aspen crowns turned brown in an area from Chisholm to Ray. Many of the aspen in this area suffered complete defoliation from FTC, re-foliated, and then were attacked by aspen blotch miner. In the Orr area rainfall was somewhat below normal during the growing season adding an additional stress on the trees.

### FTC Trivia

- ' Researchers at the DNR Wildlife Research Unit have found that black bears can consume up to 25,000 forest tent caterpillars in a single day.
- ' How much does one acre of forest tent caterpillars weigh? Approximately 537 of the late instar larvae of forest tent caterpillars weigh one pound. Assuming that there can be up to 4 million caterpillars per acre that makes 7448 lbs of caterpillars per acre.
- ' Information on radar entomology, which uses radar to track moth flights, can be found on the Internet at <http://www.ph.adfa.edu.au/a-drake/trews>.



### **Gypsy moth.**

#### 2000 Highlights

- U 182 moths caught
- U 30% reduction in catches from 1999
- U Egg masses found at one location in Houston County

#### 2001 Prediction

- U Continue use of pheromone traps to monitor populations
- U Likely increase in total numbers of moths caught

### Discussion

For the second year in a row, moth catches dropped dramatically from the previous season. At the same time trapping intensity remained constant or was substantially increased in areas of high concern. Personnel from the Minnesota Department of Agriculture, who is the lead agency for trapping gypsy moth in Minnesota, set, maintained, and retrieved nearly 16,500 traps from Canada to Iowa.

The total number of moths caught this year was 182. In 1998, 953 moths were caught and in 1999, 286 moths were caught. Catching only 182 moths this year definitely constituted good news.

Overall the entry pressure into Minnesota appears to be steady. However, moth populations in eastern Wisconsin remain steady or continue to increase. This means that when a warm dry spring does come along (and it will), we can expect a sudden and dramatic increase in trap catches through the eastern half of Minnesota.



### **Spruce budworm.**

#### 2000 Highlights

- U 60% decrease in acreage defoliated
- U 28,500 acres

#### 2001 Predictions

- U Continued decline in acreage defoliated

#### Discussion

Spruce budworm populations continue to decline in Minnesota's historic spruce budworm outbreak areas in the northeastern part of the state. In this area there were 27,783 acres defoliated in 2000 compared to 68,024 acres defoliated in 1999. Egg mass surveys predict that defoliation will continue to decline in 2001.

In the northwestern part of the state there was little evidence of defoliation in white spruce plantation, and larval and egg mass plots also found only low level populations. However, in a plantation in Becker County significant larvae and egg masses were found, and this plantation will be monitored in 2001.

In the central part of the state, defoliation and egg mass surveys completed in July and August found very little evidence of current budworm activity. Most white spruce plantations are deemed vigorous and one is still recovering from heavy defoliation in 1997-98. The exception is a white spruce plantation in northeastern Aitkin County where light defoliation occurred but heavy defoliation is predicted for 2001 based on egg mass counts.

### **Bark beetles.**

#### 2000 Highlights

- U Populations did not materialize in the blowdown area in the BWCA
- U **Spruce beetle** (*Dendroctonus rufipennis*) found killing large spruce in two state parks and in the Grand Portage Indian Reservation

#### 2001 Predictions

- U Activity is not predictable; activity is dependent on drought conditions
- U Surveys will continue for **spruce beetle** extent and severity

## Discussion

Bark beetles did not develop into a serious problem in the area of the blowdown of July 4, 1999. Much of the pine blown down never was colonized in either 1999 or 2000. There seems to have been much more downed pines than the bark beetles could utilize. Also rainfall levels were adequate through most of the blowdown area so that standing live trees were generally not successfully attacked by bark beetles. The summer temperatures and length of the growing season appear also to have allowed only two generations of bark beetles to develop in 2000.

On the east end of the blowdown very little bark beetle activity was observed in the down pine in either 1999 or 2000. By mid-summer 2000 much of the pine in sunny locations was no longer suitable for bark beetles since the inner bark was turning color and had a fermented odor. However some of the more shaded material as well as downed trees with roots still attached were still suitable brood material. Bark beetles did move into some but not much of this material. However, populations did not build up enough for beetles to be able to move into standing live trees.

On the west end of the blowdown, around Lake Vermillion, bark beetles were much more obvious in the downed pines in the fall of 1999, and most of the downed pines were infested with bark beetles by the spring of 2000. The higher populations of bark beetles on the west end was likely the result of a drought in this area in 1997 and spring of 1998. This drought resulted in pockets of pine trees dying as a result of drought and bark beetle attack on rocky shallow soil sites. These pockets of bark beetles may have resulted in higher residual populations that were able to attack the blown down pine trees on the west end in 1999. Here also the bark beetles did not develop into a problem in standing live trees in 2000.

Spruce beetles were founding killing white spruce in Judge Magney State Park north east of Grand Marais. According to the park manager, white spruce trees have been dying since 1998. The majority of trees dying are mature white spruce that appear quite healthy although there probably is some soil compaction in the campground. Many of the trees also have root rot as evidenced by fruiting bodies at the root collar. Beetle infested trees were also found in Cascade River State Park and in the Grand Portage Reservation.

It is believed that these beetles are rare in Minnesota and have only been reported once or twice in the past. However, the spruce beetle is a bark beetle that occurs across North America. It is a serious problem in the western US with Alaska reporting an estimated 30 million trees killed per year by spruce beetle at the peak of the outbreak in the 1900's. It infests all species of spruce in its range.



### **Multicolored Asian Lady Beetles - *Harmonia axyridis* (Pallas)**

In the fall, many inquiries were received concerning the appearance of a large number of ladybugs in and near homes and buildings as well as out in the forests. The species that was being seen is the Asian lady beetle. This species is similar to our native species but is a little larger in size. The appearance of this lady beetle is highly variable. The 19 spots on its wing covers can distinguish it, though some beetles may have 2, 4, 6, 10 or no spots. The color of this lady beetle ranges from yellow-orange to dark red. This insect is often called the “Halloween Lady Beetle” due to large numbers of this bright orange colored beetle appearing in the fall.



This is the first year it has been observed in many parts of Minnesota. Large numbers of this beetle were reported in homes in other states beginning in the early nineties. The multicolored Asian lady beetle is an exotic insect introduced from China into this country to control pecan aphids. It is considered to be beneficial feeding on a variety of insects including aphids, scales, and psyllids.

The lady beetles in late summer and autumn may move to over-wintering sites in houses, sheds, and other buildings. During warm winter days and the spring they move out from their over-wintering sites and are attracted to sources of light. The large numbers of beetles searching for sheltered, overwintering sites become a nuisance to homeowners and then the calls begin.

### **Oak Wilt**

#### 2000 Highlights

- U Oak wilt increased in Sherburne and Wright counties due to previous years' storms
- U Cost sharing was provided to communities to treat 190 oak wilt infection centers
- U Pine County added to list of counties with oak wilt
- U No oak wilt detected in Hennepin County

## 2001 Predictions

U Continued increase in oak wilt

U Need to continue aggressively treating oak wilt infection centers

## Discussion

In 1997 and 1998, the forests in Sherburne and Wright Counties suffered very destructive wind storms, especially during June and early July. This was perfect timing for the spread of oak wilt by beetle vectors into storm-damaged oaks. Since then, oak wilt has spread out from the initially infected trees and formed discernable, but small, pockets of infection. Aerial photography done in the summer of 1999 was interpreted and digitized over the winter of 1999-2000 and the results were impressive. For the past three years, the number of active oak wilt pockets or "infection centers" in Sherburne County was holding steady around 650. Results from the aerial photography revealed that the number of infection centers jumped to more than 1900. Ground surveys and observations confirm the magnitude of this increase.

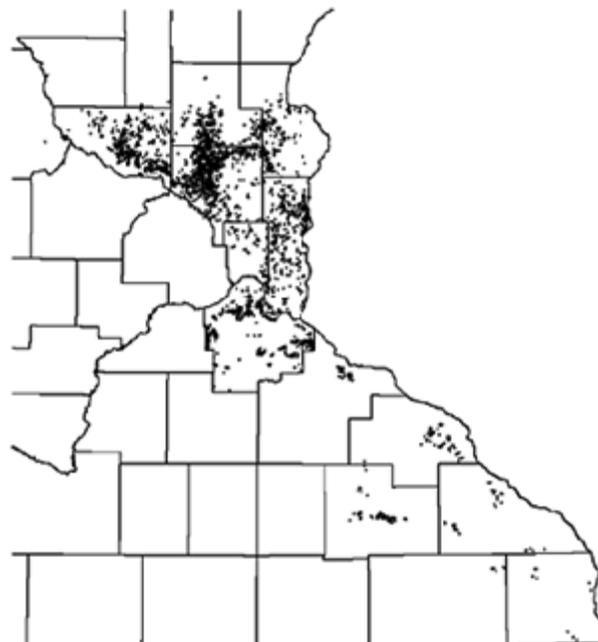
Five infection centers encompassing eleven acres were documented in Wright County. In 1990, Wright County had no oak wilt.

In Pine County, a pocket of dead and dying oaks was confirmed by lab analysis to be infected with oak wilt. The new site is more than 20 miles north of any other known infection centers and is a half mile from any public road. The infection center has been active for about five years according to the owner. It is less than two acres in size and occurs in veneer quality red oak. This find opens up yet another county to the threat of oak wilt.

In Hennepin County, aerial photography from three townships with heavy oak forests were inspected for oak wilt infection centers. No oak wilt was found.



Oak Wilt in Minnesota - 2000



## **Oak tatters**

### 2000 Highlights

U 20,000 acres of light to moderate discoloration in SE MN

### 2001 Prediction

U Unknown

### Discussion

Oak tatters symptoms were observed on bur oak in limited areas across southeastern Minnesota. Oak tatters is a newly described condition that affects emerging oak leaves, causing them to appear lacy or tattered. It is unknown what actually causes oak tatters. In the past it has been suspected that early season frost injury, oak anthracnose, or thrips may have caused the symptoms now known as "oak tatters." Both anthracnose and frost are common injuries occurrences in the area of oak tatters, but oak tatters may not involve any of these common sources of injury. It may be caused by something more complicated such as a virus or a bacterium. Clearly there is genetic variability from tree to tree. In past, the affected trees refoliated with what appeared to be little long term impact.



Multiple year early season defoliation can eventually have a long term impact. Some dieback may soon occur in bur oak showing oak tatters symptoms. If and when that begins to occurs it may be followed by attacks of the 2-lined chestnut borer and can lead to significant crown dieback and tree death.