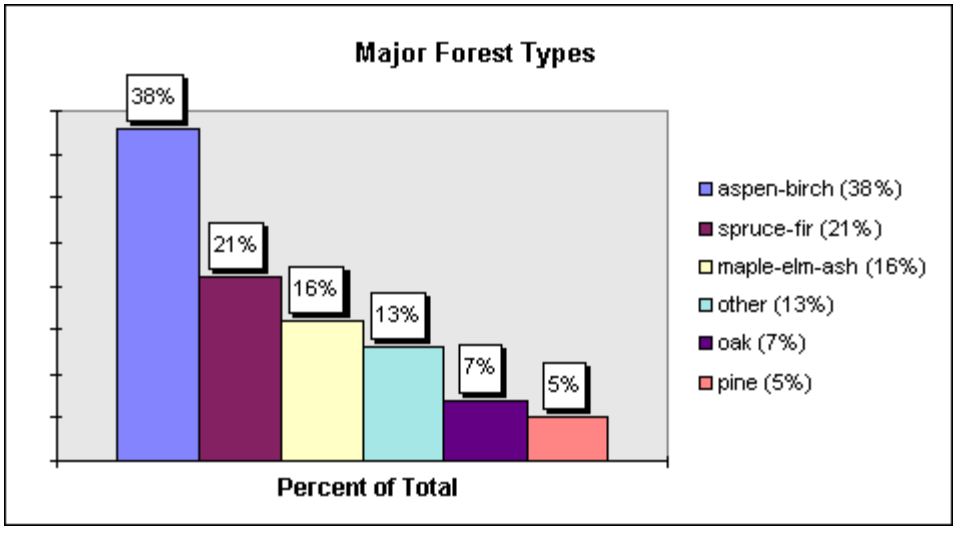
The Resource

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.



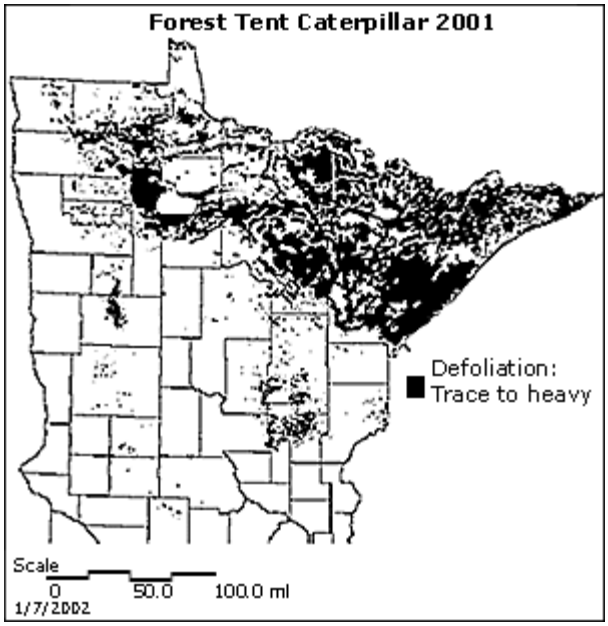
Aerial survey results

7.8 million acres of forest land was affected by insects, diseases and abiotic agents in 2001. See table below. Contributing to that total was 7.7 million acres of forest tent caterpillar defoliation; the largest acreage of FTC defoliation ever documented in Minnesota.

Comparison of Aerial Survey Results for 2000 and 2001		
Agent	**Acres for Year 2000**	**Acres for Year 2001**
Forest tent caterpillar	2,039,919	7,759,807
Large aspen tortrix	63,942	0
Flooding	30,697	17,909
Spruce budworm	28,481	18,893
Oak tatters	20,000	2300
Frost	7,507	0
Larch casebearer	6,363	18,816
Oak mortality (drought, two-lined chestnut borer and some oak wilt)	6,061	16,778
Dutch elm disease	365	1,052
Bark beetles	86	2122
Winter injury	0	2,424
Total acreage	**2,203,421**	**7,838,101**

Special Issues

Forest tent caterpillar Anyone who was outdoors in northern Minnesota last summer knows that populations of forest tent caterpillar were very high. Trees and shrubs on 7.7 million acres were defoliated. The majority of the defoliation occurred in the northern third of the state, but significant areas of defoliation were detected near Mille Lacs Lake and scattered areas of defoliation were observed near lakes in west central counties.



The biomass of caterpillars and amount of defoliation observed this year in northern counties was unprecedented in recent time. Defoliation of tamarack, white spruce and, even, red and sugar maples were reported. Over 43,000 acres of tamarack were defoliated by FTC in Koochiching County.

For most of northern Minnesota, FTC finished forming cocoons during the last week of June. On June 27th, the first moths were observed in Nashwauk and June 28th in Grand Rapids, both in Itasca County. Sarcophagid flies (friendly flies) that parasitize the pupae in the cocoons were present in many locations especially in areas that have now had two or more years of defoliation. The numbers didn't appear to be high enough in most locations to significantly reduce next year's populations.

Headline from DNR Insect and Disease Newsletter (June 29) : *"FTC Season"*

Another caterpillar season is quickly coming to an end. Although many people reached their daily and possession limits long ago, local Forest Health Specialists are still busy supplying expert guide service. Although catch and release is practiced by some people, it is neither necessary nor recommended.

There was a lot of action on many area forests the second and third week of June with caterpillars hitting on just about every kind of leaf thrown at them. Lunkers were being taken in all kinds of habitat from weed beds near lake shores to the deep forest. Many were even congregating on gravel bars, often referred to by professionals as roads.

Some good runs were still expected along Lake Superior during the last week of June but action had already started to drop off in most other parts of the state as the caterpillars stop feeding in preparation for spawning. It's still too early to tell, but natural reproduction is expected to be excellent in many parts of northern Minnesota, so at this time no stocking of area forests is planned by the DNR. Studies later this year will give experts a better idea of reproduction success and will be used to set next years season as well as daily and possession limits.

Don't forget, due to this years huge caterpillar populations, a special fly season has been added to the end of regular season. No special license is required for fly season. Unlike caterpillars, catch and release of these flies is strongly recommended.

With caterpillar season drawing to a close, moth season can't be far behind. Be sure to read next month's issue for some "Tips on wing shooting".

Gypsy Moth

Under the leadership of MDA, approximately 15,000 pheromone traps were set across the state during 2001. Traps were set at a density of one trap per square mile in the five southeastern most counties of the state, the Twin Cities metropolitan area extending north to the city of St. Cloud, and along the North Shore of northeastern Minnesota, including the city of Duluth. In 2001 the northwest and central part of the state received one trap per four square miles, while towns, cities, and incorporated communities within this area were trapped at 1 trap per square mile.

For the first time, saw mills and pulp mills were added to the detection survey. The United States Department of Agriculture-APHIS, PPQ (USDA) oversaw this trapping due to the regulatory nature of these sites. Using information provided DNR, they focused primarily on mills producing more than 500 MBF. Outreach activities were coupled with an effort to enlist mills that import wood products across state lines in a voluntary compliance agreement.

If you take the number of positive moth catches at face value, it appears that after two years of steady decline, Minnesota took a turn for the worst (see map 1). In 1998, Minnesota had a total of 953 moths. In the following two years, numbers dropped to 296 moths and 182 moths respectively. In 2001, the moth totals rose to 429 positive catches. However, over 85% of the moths were found on only 7 sites (332 of the 429 moths). Each of these sites received delimit trapping due to a history of past catches. Standard detection traps had a total of only 62 moths, the lowest number in some time!!

The north shore situation improved for a second straight year. In 1999, an unprecedented 96 moths were caught over a three county region. In 2000 that number dropped to 32 and in 2001 the number dropped slightly lower with 29 moths found. The city of Two Harbors in Lake County, which in 1999 had 32 moths, came up empty after two years of heavy delimiting. The northern tip of Cook County faired the worst, for the second year in a row (see map 2). Catches remained high at 26 moths, slightly up from 2000's 22 moth finds. The relatively high number of moths scattered over a wide area with no obvious focal point, may be due to the ever-increasing populations of gypsy moth across the waters of Lake Superior. While conclusions at this time would be premature, the north shore now appears as much at risk of introductions as SE MN. This year, the entire upper peninsula of MI was quarantined and the Bayfield/Apostle Islands area of WI produced very high numbers of moth catches.

In the Twin Cities metro region, four delimiting sites in Hennepin County created some concern. These four sites alone produced 285 of the 429 (66%) total moths found in the state (see map 3). In early September, an egg mass survey was conducted at a SW Minneapolis delimiting site that yielded a record breaking 170 moths in a trapping grid of 36 traps per square mile. The site had little prior history of catches prior to 2000, but in 2000, a general detection trap yielded 10 moths. No eggmasses were found that year. This year, over 50 staff members from multiple city, county, state and federal agencies were on hand for an extensive search of the area and hundreds if not thousands of egg masses were found in a one-block area. The site was placed under a state quarantine that will be lifted after treatment this coming spring. A treatment area of 425 acres is being proposed. The public meeting was held December 18, 2001 at the Armatage Park Neighborhood Recreation Center.

A second egg mass survey was conducted at two delimit sites in Golden Valley which yielded a total of 100 moths combined, 76 at one site and 28 at the other. Both sites were delimited at 16 traps per square mile in 2001. After only one short hour of searching, 30-40 egg masses were found within a heavily wooded parcel of land adjacent to a commercial site within the 76 male moth delimit site. The second site which is composed of a residential neighborhood resulted in no egg masses found. Due to the proximity of the sites and the high number of male moths captured across the two sites, treatment is being considered for the entire block of approximately 2,000 acres. The suggested treatment block strattles Hwy 394 at approximately Theodore Wirth Parkway. The public meeting for this area has not yet been scheduled, but is planned for January.

A third egg mass survey was conducted in Plymouth, just south of Bass Lake. This site has a history of male moth capture dating back to 1997; however the site is approximately one block in size and the number of male moths remains low. In 2001, 15 male moths were found in 9 traps. No egg masses have been found. This site will receive heavy delimit traps in the 2002 trapping season.

Similar results occurred in the SE part of the state when compared to the Twin Cities metro area, with three delimiting sites making up 73% of the total moths found in the area. Two of the three sites received egg mass surveys and no egg masses were found (see map 4). One of the three sites, Crooked Creek in Houston county, is being proposed for a pheromone flake treatment due to the history of male moth capture, topography, cover type and difficulty of trapping the site as well as searching for egg masses. The site overlaps state land where timber sales are under way. SE DNR Forestry staff are working with the logger to inspect material coming off the site and APHIS will be working with the WI buyer to help monitor life stages that may have been moved offsite.

Nursery and Mill sites had a total of six positive moths. All were single catches in 5 different sites. One nursery had two traps with a single moth each. No treatment programs are scheduled.

Eradication Program:

In the spring of 2001, a single 28 acre site on the Winona/Houston county border received three treatments of Dipel DF using a helicopter. Dipel DF was used in order for the farm to maintain its organic certification. Subsequent trapping this year yielded no moths. The site will again be trapped at high density in 2002.

The Minnesota Department of Agriculture along with the USDA-APHIS,PPQ also monitored gypsy moth treatments of a Minnesota wholesale nursery in the spring of 2001. The site had been under compliance since 5 moths were caught in the summer of 2000. The Compliance Agreement was lifted after completion of two applications of Dimilin in May 2001. Follow-up delimit trapping in summer 2001 caught no moths. The MDA/USDA continue to recommend that all nurseries receiving stock from regulated areas should administer appropriately timed, annual treatments to their premises regardless of the previous season's survey results.

Bark beetles

Spruce beetles *(Dendroctonus rufipennis),* larch beetles *(Dentroctonus simplex)* and pine engraver beetles *(Ips pini)* were very active in Minnesota this year.

Spruce beetles Spruce beetles continue to attack and kill trees in northeastern Minnesota. They are only being found along the North Shore of Lake Superior, mostly within 5 or 6 miles of the shore. Spruce beetles have not been found away from Lake Superior except in one tree 25 miles up the Gunflint Trail. These were found last year. Several beetles tentatively identified as spruce beetles were caught in traps baited for larch beetle in Arbo Township in Itasca Co.

Additional white spruce trees have been attacked in Cascade River State Park and in Judge Magney State Park as well as on private home sites along the shore of Lake Superior. Often the trees being attacked appear healthy and vigorous with full crowns.

A spruce beetle alert was developed by DNR to help identify spruce beetles and their damage. This was included in a Forest Insect and Disease Newsletter and distributed at a number of meetings and training sessions.

Larch beetles
Mortality of tamarack by eastern larch beetle was common across the north east and north central counties in 2001. Levels of mortality varied from scattered small pockets of mortality involving just a few trees to large areas with mortality of 30-50%. Infested trees became obvious by late winter of 2000-2001 because woodpeckers searching for overwintering larch beetle stripped bark off boles and large branches making the trees easy to see. Populations of beetles started to build up in many of the stands in 2000 or earlier. The level of mortality observed this year is much higher than normal. Larch beetle is always common in tamarack stands in Minnesota but usually is limited to scattered small pockets of trees stressed by beaver flooding, road construction etc.

Larch beetle is usually associated with trees that have been severely stressed by factors such as drought, flooding, defoliation, fire, etc. However it is felt that eastern larch beetle can sometimes act as a primary agent of mortality.

A consistent stress factor that may have contributed to the current mortality has not been identified. Trees from 40 years old to 160 years and older have been found killed by the beetle. Mortality occurred on upland as well as lowland sites, and in pure stands as well as mixed stands. In some stands recent logging may have allowed the beetle populations to buildup in slash and then attack the remaining portion of the stand.. Larch casebear has been common the past two years across the affected area. The level of defoliation by the casebearer however has been generally quite light.

Pheromone trapping for eastern larch beetles was done in cooperation with Dr Steve Seybold, U of MN. Results will appear in journal articles at a later time.

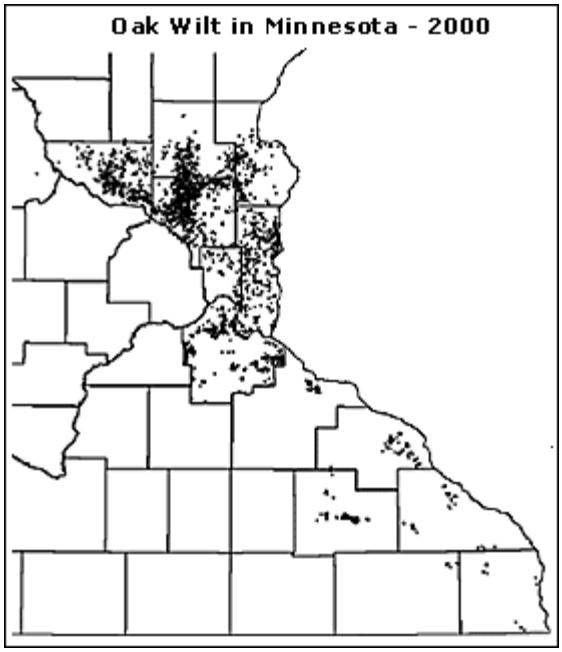
Pine bark beetles
2001 was the beginning of the fourth year of drought on portions of the Anoka Sand Plain, as measured by subsoil moisture. In some Sherburne County locations, soil moisture and water table levels have met or are lower than those during the drought in 1988. Some lake levels have dropped six feet below their normal levels. As a result, tree root systems were left high and dry and this puts all trees under stress. For the last two years, red pines have been indicating their level of drought stress in the form of winter injury. You can see it in pine plantations, windbreaks, roadside plantings and backyard trees. Even the small understory pines in pine plantations died from a lack of soil moisture.

With the deepening drought stress, red pines became vulnerable to insects and diseases which took advantage of their weakened state, causing the foliage and branches to die. In early June, a few pines with discolored foliage were felled in three red pine plantations in the Sand Dunes State Forest. Pine bark beetles (primarily Ips pini); Diplodia shoot blight *(Sphaeropsis sapinea)* ; and red turpentine beetles *(Dendroctonus valens),* were attacking and killing the trees. Apparently, a recent hail storm had induced the Diplodia epidemic in

the shoot tips and, in some cases, Diplodia was causing branch mortality.

An aerial survey the week of June 23rd found nearly fifty red pine plantations with discolored, dead and dying tree crowns in Sherburne and Isanti Counties. Most of the affected trees are located in plantation interiors, indicating a serious drought stress and likely bark beetle buildup. Pines in backyards, along roadsides and in windbreaks were also affected. During the summer, detection survey, 2100 acres of bark beetle damage was documented in Sherburne, Isanti, Chisago and Wright Counties.

Oak wilt



Oak wilt is responsible for killing thousands of oak trees annually in residential settings, woodlots and forests. By May of 2000, surveys had identified 15,359 acres of active oak wilt in Minnesota. Most of the infection centers are concentrated in the Twin Cites, counties immediately north of the Twin Cities and in scattered locations in the southeastern counties.

Oak wilt suppression - cost share programs have been extremely effective in controlling oak wilt in local communities. From 1991 to 1997, the federal Oak Wilt Suppression Cost-Share Program controlled nearly 60% of the identified oak wilt infection centers in areas of Anoka, Chisago, Dakota, Isanti, Ramsey, Sherburne and Washington Counties. Unfortunately, in 1995, 1997 and 1998, severe summer storms increased the spread of oak wilt, in some cases, tripling the acreage. In 1998, state funding replaced federal funding and the coverage was increased to include all areas and counties with oak wilt. The tally now stands at 6,976 acres controlled.

Oak wilt suppression programs have proven to be successful every year since 1991. During the last ten years, excellent cost-share programs developed at the community level that distributed the cost share monies and provided oak wilt inspections, homeowner assistance, program regulation and community education. Programs operated at the local level, blending in with other community services. Over 140 communities/ counties have participated in this program. In at least four communities, the incidence of oak wilt was lowered to a point where the community could control oak wilt without the aid of state cost-share monies.

Acres of oak wilt		
County	**Controlled**	**Active**
Anoka	3182	5712
Chisago	230	386
Dakota	1128	2639
Fillmore	3	41
Goodhue	12	114
Hennepin	0	47
Houston	7	9
Isanti	330	589
Mille Lacs	0	7
Olmsted	51	254
Pine	0	1
Ramsey	509	242
Scott	0	7
Sherburne	1324	3129

Stearns	3	41
Wabasha	20	150
Washington	175	1915
Winona	2	70
Wright	0	16
Total for state	6,976	15,359

Strategic plan for the cooperative management of gypsy moth in Minnesota
The cooperative strategic plan was completed, signed and distributed this year. The plan formalizes the Department's role in the gypsy moth program and outlines a process for outside input that will help address any concerns our clients might raise. It also outlines the transfer of leadership to take place once areas of the state become generally infested. While that will be some time from now, formalizing the agreement is an important step in gaining future support and funding for the job that needs to be done to protect our natural resources.

While finalizing the strategic plan is an accomplishment to be proud of, the real work has just begun. The advisory committee started work this fall to outline annual work plans and long term operational plans in a number of areas. The effort to develop the strategic plan has helped create a cooperative spirit, which has already improved the level of involvement for DNR representatives. That input can only improve the work done within the cooperative program and the public support behind it.

Task forces are working on silvicultural recommendations and work plans for treatment and survey efforts. All are to be completed this year. The scientific subcommittee has been activated and will be meeting soon to outline research issues. An education subcommittee will be activated this winter to address outreach efforts and education needs in the face of national concerns for public safety. The Executive Council made up of the Division Directors (or their equivalent) for each participating agency will be meeting in February to outline the key policy and legislative issues for the up-coming year.

For more information contact:

Mike Carroll
MN DNR - Division of Forestry
500 Lafayette Road
St. Paul, MN 55155-4044
651.296.5954
email:
mike.carroll@dnr.state.mn.us

Forest Health Protection
Northeastern Area
USDA Forest Service
1992 Folwell Avenue
St. Paul, MN 55108
651.649.5261

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