

Federal Forest Health Highlights for 2008

Minnesota Department of Natural Resources,
Forestry – Forest Health Unit

Topics:

Aerial Survey Results

Spruce budworm
Jack pine budworm
Larch beetle
Bark beetles of pine

Symptomatic aspen: Causes unknown
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Poplar borer
Ash decline
Symptomatic hardwoods: Causes unknown
Two-lined chestnut borer
Tubakia leaf disease

Historic Minnesota Annual Reports on-line

Gypsy moth (from MN Dept. of Agriculture)

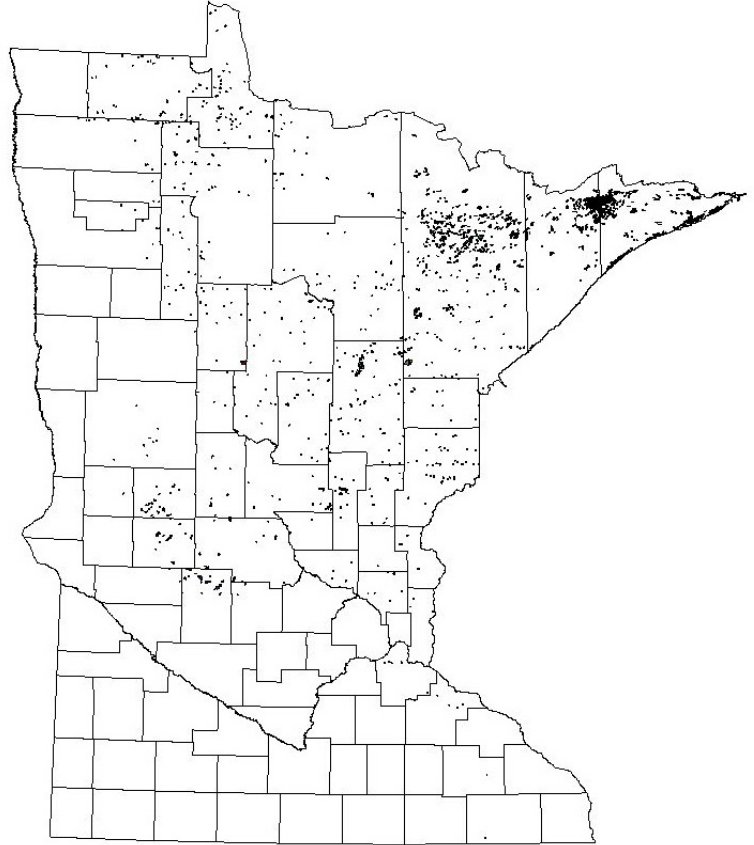
December 1, 2008



Aerial Survey Results

Since the early 1950's, aerial survey has been a valuable tool for monitoring the activities of forest insects and pathogens across the 16 million acres of forested land in Minnesota. For the past fourteen years, these surveys have been accomplished through the collaboration of DNR Forest Health and Resource Assessment Units and USFS, State and Private Forestry. The Forest Health staff plans the scope, timing and intensity of the surveys, trains Resource Assessment staff, provides ground-truthing, analysis and dissemination of survey data. Resource Assessment staff conducts the aerial sketch-mapping, digitizes the data and produces digital shape files. In addition to being used in Minnesota, the survey results are incorporated into the USFS national database since our procedures and products comply with national standards.

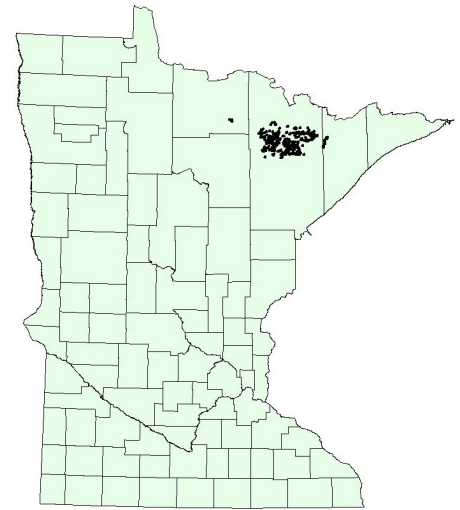
This year, a new era in mapping was ushered in. Computers aided sketch-mappers in labeling polygons during the flights and streamlined post-flight digitization. Thanks to Mike Hoppus and Pat Churak, Resource Assessment's new sketch-mappers, and to Larry Hoyt, an experienced pro, who accomplished this year's aerial survey. Thanks also to Marc Roberts, USFS, for mapping the federal lands and post-flight map rectification, as usual, and for providing training in aerial detection and the use of the new computers this year.



Causal Agent	Number of sites	Acres
Unknown agent causing decline of aspen	391	157,275
Spruce budworm	285	41,263
Forest tent caterpillar	231	23,649
Unknown agent causing decline of hardwoods	326	23,378
Larch beetle	855	18,983
Larch casebearer	133	17,409
Ash decline	27	2,274
Jack pine budworm	28	2,326
Oak wilt	1800	1,895
Bark beetles	56	773
Birch decline	4	376
Two-lined chestnut borer	1	164
Combined weather & animal	51	1,734
Unknown agents	577	6,758
Totals	4,917	304,089

Spruce budworm

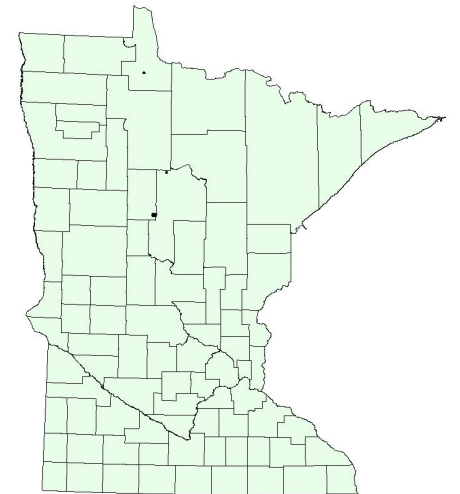
Since 1954, when annual aerial sketch-mapping began in Minnesota, spruce budworm populations have caused defoliation of balsam fir and white spruce every single year. This year, 41,263 acres of defoliation were observed in 285 polygons, primarily in the northeastern counties. In outbreak areas, budworm populations cause prolonged defoliation, sometimes as long as ten years. Widespread fir and spruce mortality result, but the host species are not locally eradicated. Instead, host trees are maintained at low densities as these mixed-wood stands mature. These trees serve as seed trees.



Jack pine budworm

Driving through northern forests this past summer, you witnessed the abundance of the dead and top-killed trees. Upon further consideration, one of the bright spots was that jack pine budworm defoliation was almost nil (2,236 acres) and that the population was collapsing.

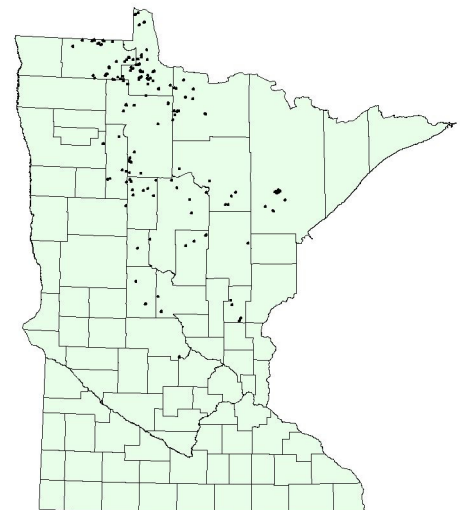
JPBW is such a perennial concern that larval counts are taken each spring and egg mass surveys are done each fall in the Northwest Region. Egg mass surveys were completed by October 1 in Becker, Beltrami, Hubbard, Lake of the Woods, Roseau and northern Wadena Counties. No egg masses were observed in any of the samples. So, that clinches it. The population has collapsed and the outbreak is over.



Larch beetle

An outbreak of larch beetle has been occurring the past eight years. Significant levels of mortality have occurred on over 65,000 acres of tamarack in Minnesota. No consistent stress factor contributing to the current mortality has been found; however, the droughts in 2002 - 2003 and 2006 - 2007 have undoubtedly been involved. Damage levels vary from scattered individual trees killed by the beetles to 80% of trees in stands being killed.

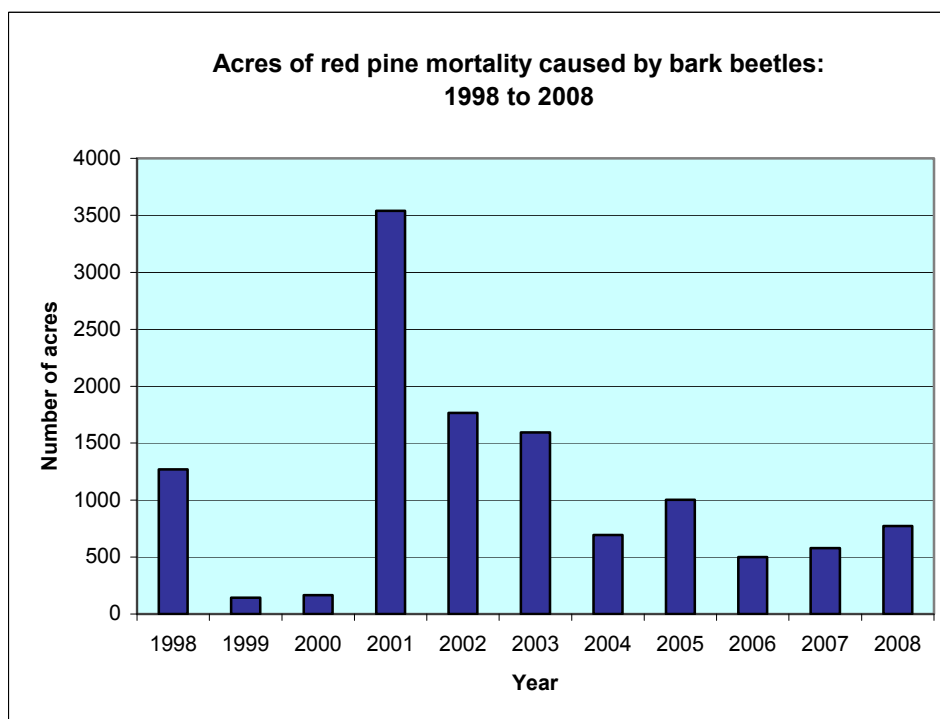
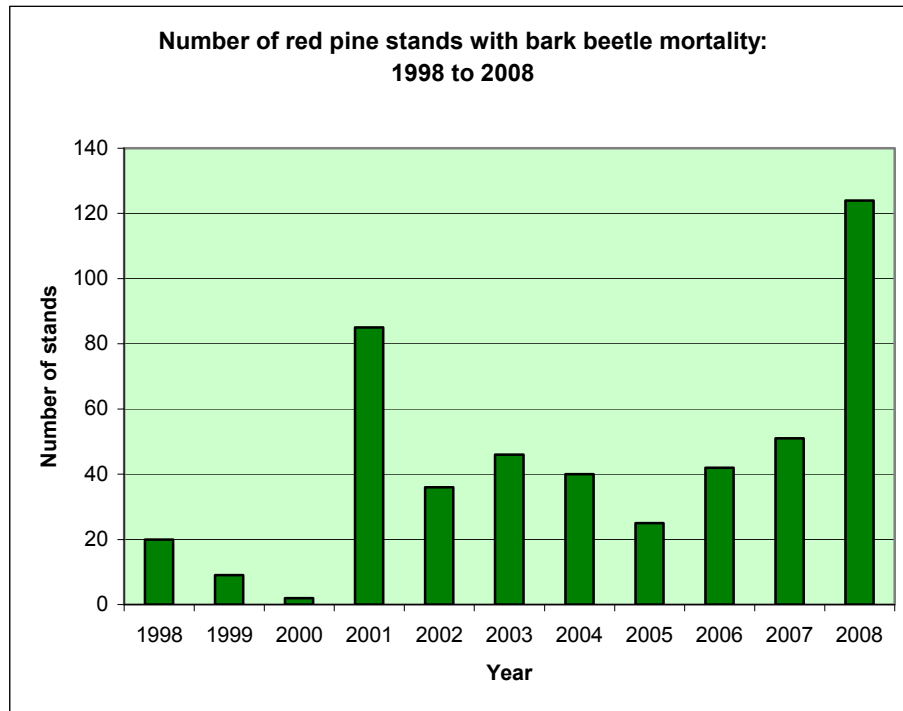
Because eastern larch beetles are currently so abundant and so widespread, attempts to control the beetles through management are unlikely to be successful in most situations. Salvage logging of stands with a lot of mortality is recommended to utilize the wood. Leaving 10 to 12 live tamarack per



acre as seed trees on harvest areas is still recommended. These trees may be quickly attacked and killed by the beetle but hopefully some trees will produce seeds before they are killed. Leaving the seed trees is unlikely to cause any increased problems with the larch beetle.

Bark beetles of pine

The serious and prolonged drought from the summer of 2006 to the fall of 2007 created stress conditions favorable for bark beetle build-up and damage in 2007 and 2008. Aerial survey data bears this idea out. For the past eleven years, bark beetles have averaged 1,093 acres of mortality per year, and this year mortality occurred on 773 acres. Similarly, bark beetles have infested an average of 43 stands per year, and this year mortality was mapped on 124 stands (see tables below). Due to the timing of aerial survey, not all bark beetle infestations are mapped, especially small or incipient infestations. These are detected and informally reported by field foresters.

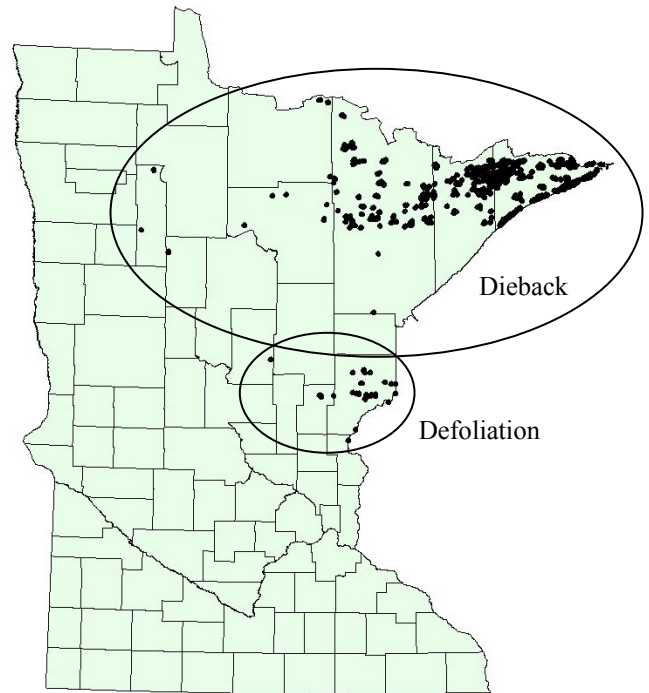


Symptomatic aspen: Cause(s) unknown

For the past several years, aerial survey crews have detected thousands of acres of defoliation, discoloration, dieback and mortality of aspen. Again this year, defoliation and dieback were mapped (see table below).

Acres of aspen damage by symptom, causal agents unknown. 2004 to 2008				
	Defoliation	Mortality	Discoloration	Dieback
2004	14,570	27730	0	24,356
2005	407,606	658	423	4,381
2006	2,217	635	0	1,309
2007	73,284	613	0	16,666
2008	5,598	85	570	151,022

Dieback is the most common symptom but tree mortality has also occurred. Mortality can vary from scattered trees throughout a stand to patches of 30 to 40 dead trees scattered through stands. Trees with dieback also exhibited small, off-color (yellowish) foliage in the live parts of the crown. Serpentine galleries were abundant under the bark on dead trees as well as on trees with extensive crown dieback. Buprestid larvae were common in serpentine galleries in recently dead trees and in trees with extensive dieback. These are assumed to be *Agrilus liragus* (bronze poplar borer), but further work is needed to confirm this. Poplar borer, *Saperda calcarata*, populations appear to have increased in some locations but are much less common than the *Agrilus*. So far, *Armillaria* has not been found in the root collar area of examined trees.

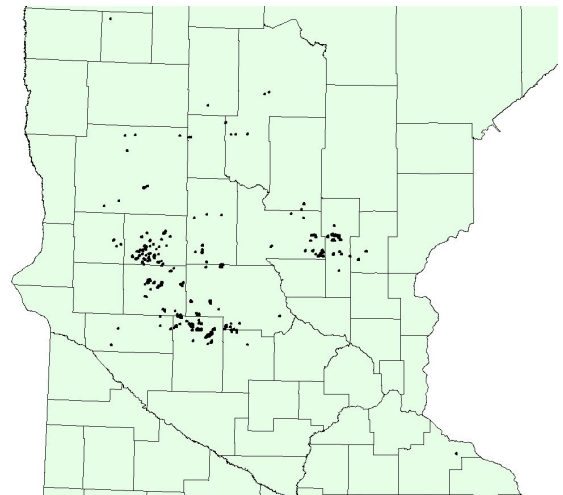


Most of the dieback and mortality was mapped in northern St Louis, Lake and Cook counties in northeastern Minnesota. Severe drought occurred in these areas in 2002 and 2003 and again in 2006 and 2007. Much of the aspen in these areas also experienced 2 to 3 years of heavy forest tent caterpillar defoliation in 2001-2003. It is likely the dead and dying aspen were stressed trees being attacked by secondary pests.

Further study will be required to look at causes, extent of damage and to determine whether the dieback and mortality continue to spread.

Forest tent caterpillar

FTC populations are building in central Minnesota. Compared to last year, the number of acres defoliated by FTC (23,649 ac) has doubled and the number of mapped locations has increased by 75%. These increases were mainly found in the west central counties. The number of additional sightings of individual caterpillars from the northern counties is also increasing. Taken together, these observations usually portend a northern outbreak in the near future.



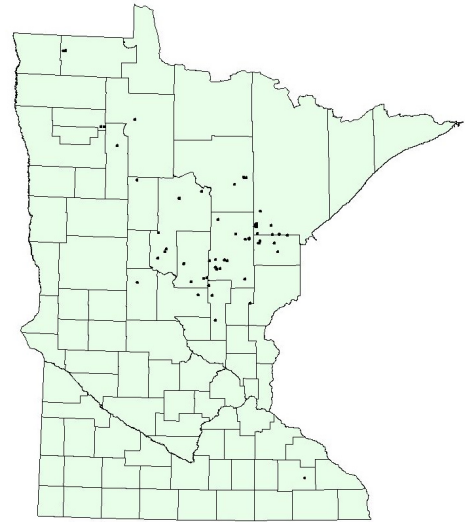
Poplar borer

Based upon casual observations, it seems like poplar borer, *Saperda calcarata*, has steadily been increasing in northern Minnesota over the past few years. Poplar borers prefer sapling-sized trees. Open-grown trees and trees around the edges of stands are most vulnerable to attack. Many larger saplings may be attacked when populations are high and conditions are favorable. Usually, woodpeckers expand the boring holes that provide an opportunity for wood-decaying fungi to develop. Trees are not usually killed by the borer, but are subject to breaking off during windstorms.



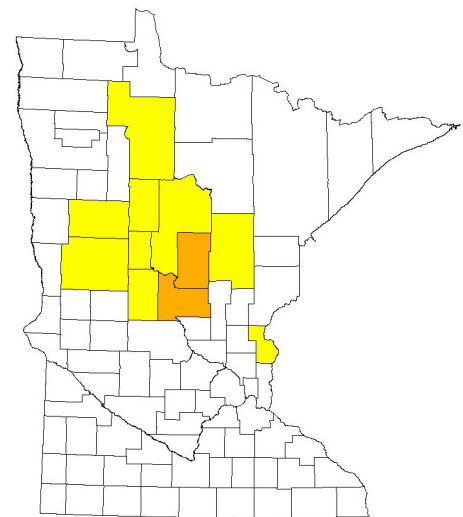
Ash decline

Fluctuating water tables during the last few years is thought to be playing a major role in ash decline in flood-plain plant communities. There are a number of other factors involved with some variation from site to site. Ash decline occurred on 2,274 acres, a four-fold decrease from last year's acreage.



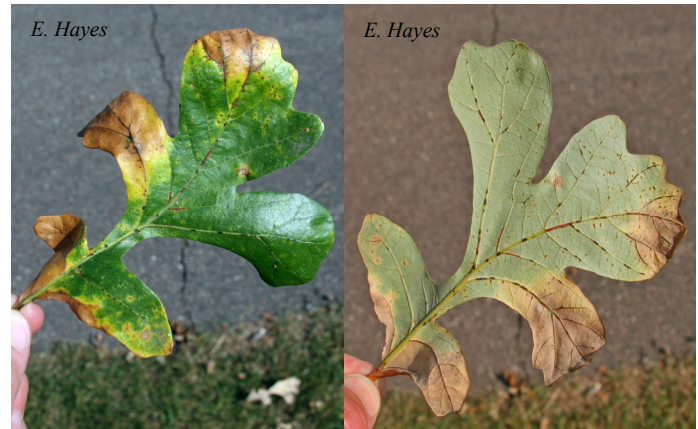
Two-lined chestnut borer

Since aerial survey is flown in early summer, damage due to two-lined chestnut borers (TLCB) is not sketch-mapped. However, in locations where oak can be found growing on sandier soils and ridge-tops, crown dieback due to TLCB was readily apparent this year. Thousands upon thousands of trees were symptomatic this year, continuing the upward population swing that began in 2006. The hardest-hit counties in 2008 were Morrison and Crow Wing (orange); several additional counties had pockets of mortality (yellow). The worst case observed this year was a privately owned, 40-acre tract of pure oak forest in Crow Wing County that was completely killed in a two-year period.



***Tubakia* leaf disease of oaks**

Tubakia leaf disease is a late-season leaf disease on native bur oaks. We have been seeing this disease across southern Minnesota since the 1990's. This year symptomatic trees were found from the southeast, west to Willmar and north to Sauk Centre. In most years this disease can be seen on individual bur oaks, usually after August 1. Previously it was known to be caused by the fungus *Actinopelte dryina*, and the name was changed to *Tubakia dryina*. More recently, Dr. Tom Harrington from Iowa State University at Ames has been studying the disease and has determined that the fungus is indeed in the group of fungi but is not *T. dryina*. The species remains undescribed at this time. *Tubakia dryina* is a well known but minor leaf spot fungus in eastern USA, though it is not clear if it is the same as a European species known by the same name. In Europe and Asia, *T. dryina* is mostly an endophyte, meaning that leaves are infected but no disease symptoms are produced.



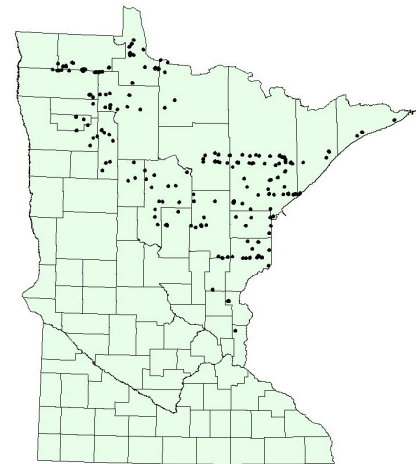
What's new and interesting in the Midwest is that our species is endophytic in our bur oaks! Dr. Harrington has been able to isolate this unnamed species from inside branch tissues and from inside leaf tissues in June before any symptoms on the leaves appear. The fungus may overwinter in branch tissue and move into new leaves each year. This may explain why we see the same oaks infected each year.

The fungus will also overwinter on shed foliage. Observations over the last few years indicates that this leaf disease on our bur oaks has been increasing, suggesting that either the pathogen is new to this region, or the susceptibility of our oaks is increasing, or it takes a long time for the fungus to build up and become symptomatic. If the fungus is more closely related to fungi from other continents and if records suggest that it is new, then its recent arrival to the region would help explain the current amount of disease we are seeing.

Hardwood discoloration, defoliation and dieback: Cause(s) unknown

Discoloration and defoliation occurred on 2,937 and 1,349 acres, respectively. Neither insects nor pathogens were found to be causing symptoms during late summer site visits during ground-truthing of the aerial survey.

18,678 acres of hardwoods had dieback symptoms this year. Most foresters feel that drought over the past three growing seasons has played an important role in hardwood dieback by reducing tree vigor. Again this year, biotic agents were not found to be causing dieback during ground-truthing.



Historic Annual Reports on-line

For the first time, Minnesota Forest Health Annual Reports, from 1969 through 2007, are now available on the web. And, they are searchable. Go to http://www.dnr.state.mn.us/treecare/forest_health/annualreports.html .

Gypsy moth: 2008 State Summary Executive Report

By the Minnesota Department of Agriculture, Plant Protection Division, Gypsy Moth Unit

The Minnesota Department of Agriculture (MDA) is the lead agency undertaking the annual gypsy moth detection survey and treatments. Program activities are cooperative and include input and assistance from several state, federal and tribal partners. Together, 20,188 delta traps were set across the state and over 85,000 acres were treated.

Since 2004, Minnesota has been a formal member of the Gypsy Moth Slow the Spread (STS) Foundation. At this time, all or portions of ten counties are included in the Action Area. The STS Action Area is moved annually based on trap catch data and to cover the areas where moth populations are building. The Action Area has remained stable the last couple of years and even moved eastward in the southeast portion of the state in 2007. This year moth numbers are at an all time high with elevated catches being identified far west of the Action Area.

Survey Program

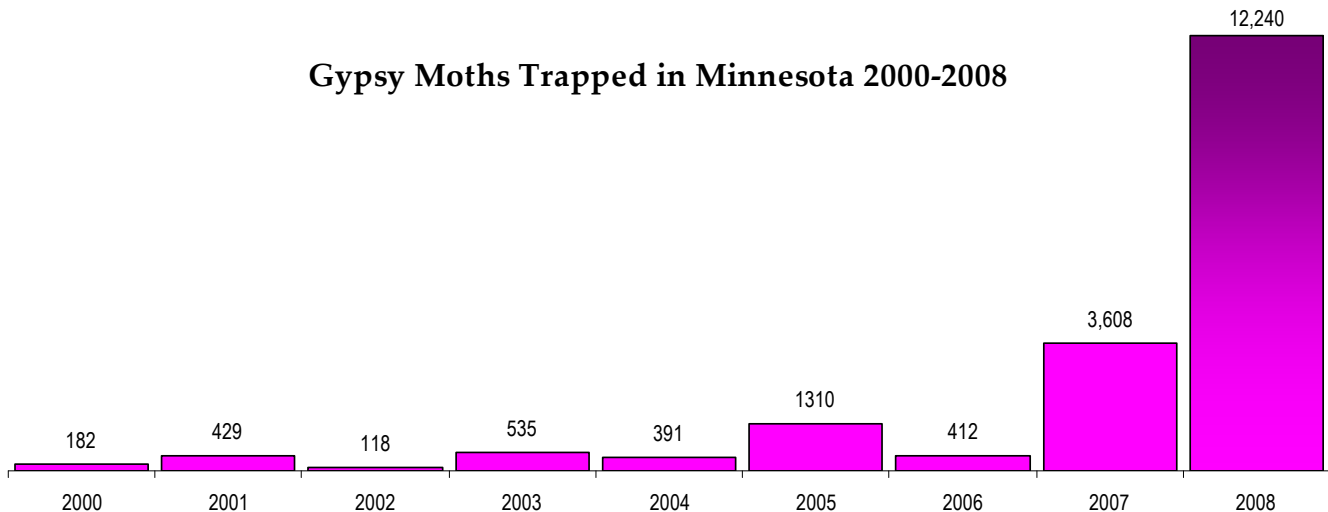
In 2008, MDA filled positions for 32 routes and 6 lead workers to oversee field operations. Trapping is typically done on a rotating basis throughout the western part of the state, but to maximize the effectiveness of the program this year, only the eastern border, Twin Cities metropolitan area and a portion of the St. Cloud/Brainerd corridor were trapped. Field staff was divided into two geographic regions, northern and southern, to account for the climatic range across the state. All traps were set and removed between June 10 and October 15.

A determination of risk for the introduction and establishment of gypsy moth is based on human activity levels, preferred habitat for gypsy moth, and the advancing gypsy moth front from the east. Special attention was paid to nurseries, mills, compliance sites, firewood dealers and campgrounds (both public and private) in the program area. Trappers also placed traps around municipalities and areas of high tourism and recreation to monitor for artificial gypsy moth introductions. APHIS coordinated the placement of 253 traps on national wildlife refuges, parks and monuments as well as several tribal reservations outside of the program area.

Trap Results

In recent years, moth numbers have been extremely low and the rapid increase seen this year is an indication that the main gypsy moth population is getting closer to Minnesota's borders. Specifically, the shoreline of St. Louis County, south to Carleton and Pine counties experienced an unprecedented number of moths, accounting for a 66-fold increase in some places. Moth numbers were much higher in the southeast part of the state where 3 counties (Houston, Winona, and Wabasha), accounted for a substantial 2,489 moths (20% of the statewide total and 78% of the southern total). Two sites in the metro area were identified as having evidence of reproducing gypsy moth populations. MDA will be working closely with the land stewards within these areas to align management strategies with increased moth populations. Many of the isolated positive traps will be further delimited and treatments will be proposed for these counties in 2009.

Gypsy Moths Trapped in Minnesota 2000-2008



General Treatment Program

The Minnesota Department of Agriculture coordinated the treatment of 85,038 acres within the STS Action Area. One regulatory site in Wright County was treated as a condition of a compliance agreement. As the gypsy moth front moves closer to Minnesota, treatment acreage is expected to increase to meet the statewide objective of decreasing spread rates from 15 miles per year to less than 6 miles per year.

2008 STS Treatments: (85,038 acres)

Six treatment blocks along the north shore were identified and treated based on historic trap catches in the area. Minnesota hosted the largest operational trial of SPLAT on nearly 12,000 acres of the Grand Portage Reservation. Treatments were in response to a record trapping year in 2007. Most of the high populations skirted the lakeshore so all treatment boundaries bordered the shoreline. One area of high moth concentrations appeared inland nearly overlapping a previous treatment in 2006.

Three separate Environmental Assessments were completed with three separate decision notices. One for both Btk and mating disruption treatments on the Grand Portage Reservation, one for mating disruption on 7,332 acres of the Superior National Forest, and a third to cover all other public and private lands.

Treatment Evaluation

One 4,959-acre treatment block on the Grand Portage Reservation was evaluated in 2008. The area was delimited at a 500 meter grid density. Sixty-seven delta traps were set, 11 positive traps caught 15 moths in the entire area. The STS Decision Algorithm calculated the treatment success at 98% and colony presence at 13%.

Egg mass surveys

Three surveys were planned in 2008. On August 5, 2008 a small informal search was conducted in Richfield. Staff were able to quickly identify and collect a dozen females and their egg masses. On September 12, several agencies responded to a high number of moths (72) trapped in a delimit in the Minneapolis suburb of Minnetonka. Five egg masses were found at the site. Both urban sites have been identified for treatment in 2009.

In addition to the egg mass surveys conducted in the Twin Cities metro area, sites surrounding high-find locations were surveyed along the north shore of Lake Superior. The third survey took place on October 15 in Lutsen along a .25 by 6-mile stretch between Highway 61 and the lakeshore. Several traps in this corridor caught over 50 moths. No egg masses or alternate life stages were identified.

Preliminary 2008 Gypsy Moth Trap Results by County

*Prepared by Minn. Dept. of Agriculture,
Plant Protection Division, Gypsy Moth Unit*

