

**Monitoring Question**

*To what extent is SNF management minimizing undesirable occurrences of fire, insect and disease outbreaks?*

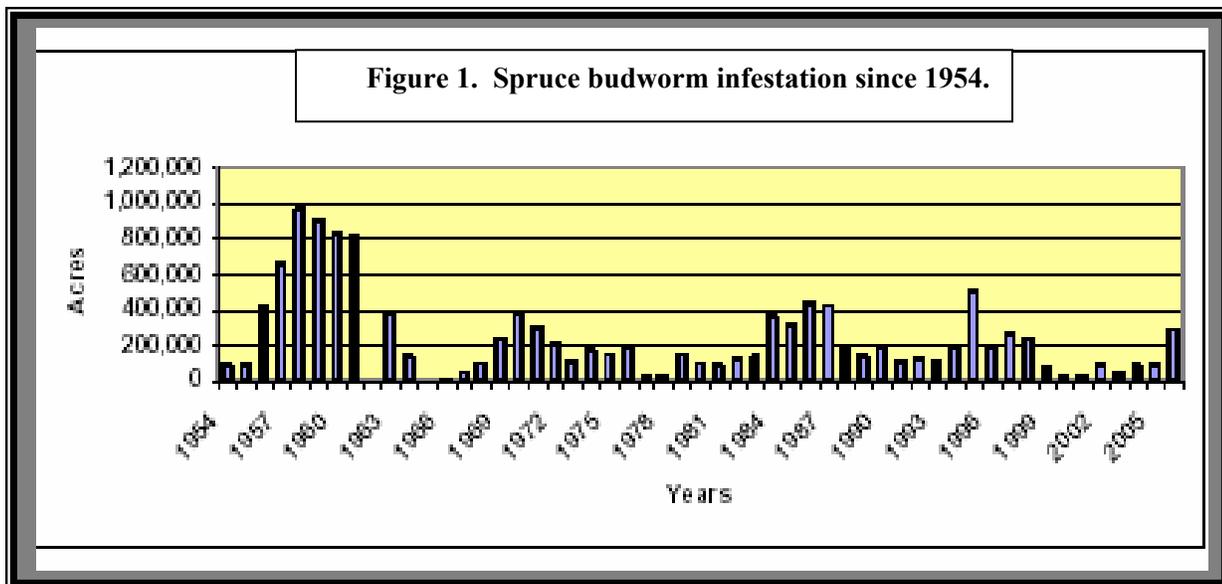
**Monitoring Conducted**

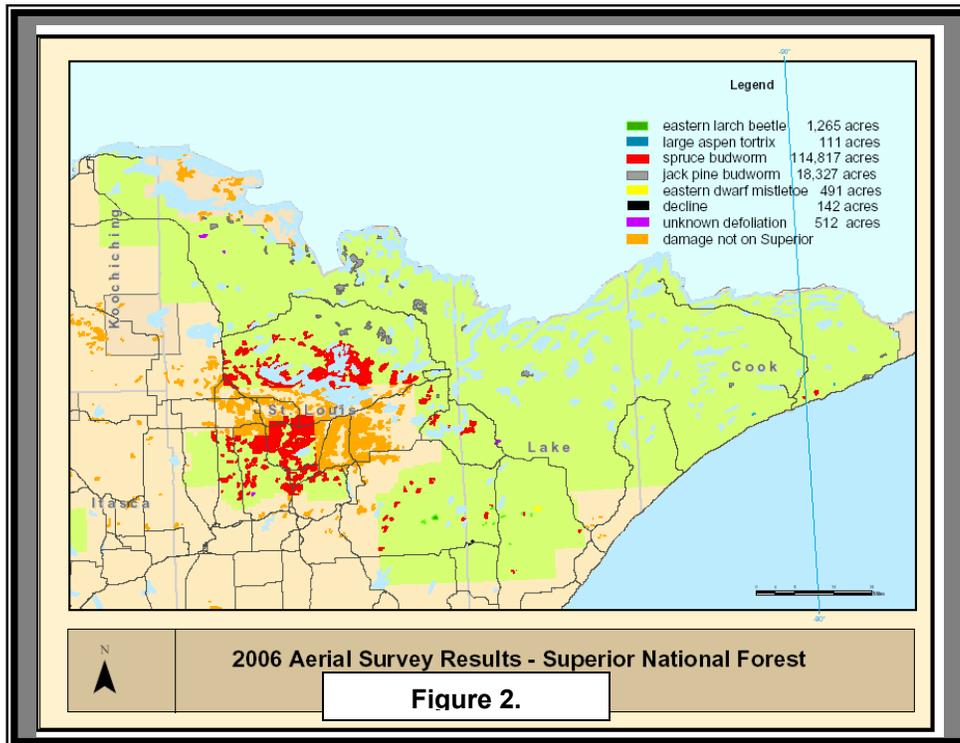
Managing Insect and Disease Populations

**36 CFR 219.12 (k)(5)(iv).** *Destructive insects and disease organisms do not increase to potentially damaging levels following management activities.*

Spruce budworm

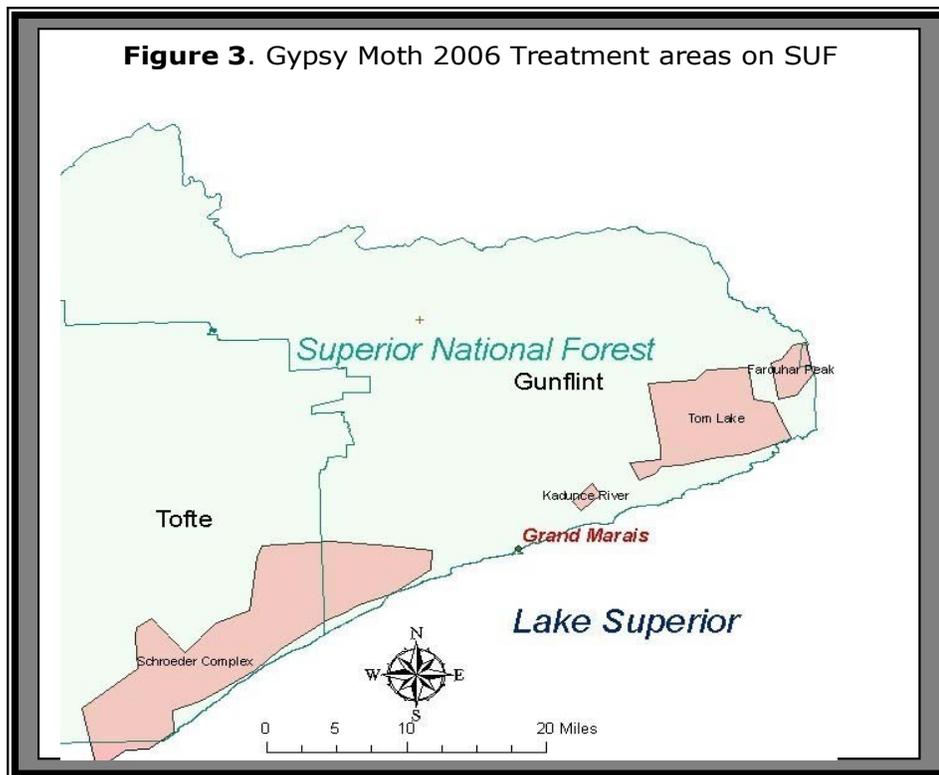
Spruce budworm continues to be a chronic pest in northeast Minnesota where it has been continuously mapped since 1954. Over this 53-year period, an annual average of 220,000 acres of defoliation has occurred (see Figure 1). While remaining relatively static between 2001 and 2005, a significant increase was observed in 2006 with infestations on the Superior National Forest (SNF) concentrated in central St. Louis County on the Laurentian and LaCroix Ranger Districts. Spruce budworm prefers multi-storied stands of balsam fir and white and black spruce which are widespread across the SNF. Scattered infestations also were found on the Kawishiwi, Gunflint and Tofte Ranger Districts, with much of the infestation occurring within the Boundary Waters Canoe Area Wilderness (BWCAW) north of Vermillion Lake. In all, spruce budworm defoliated trees on 114,817 acres of National Forest land during 2006. This is an increase from the 92,500 acres defoliated in 2005. Direct treatment of spruce budworm infestation continues to be limited due to the presence of the insect in mixed ownership patterns and within the BWCAW. Figure 2 displays the extent of noticeable (defoliation, mortality, etc.) spruce budworm and other insect and disease populations during 2006.





Gypsy moth

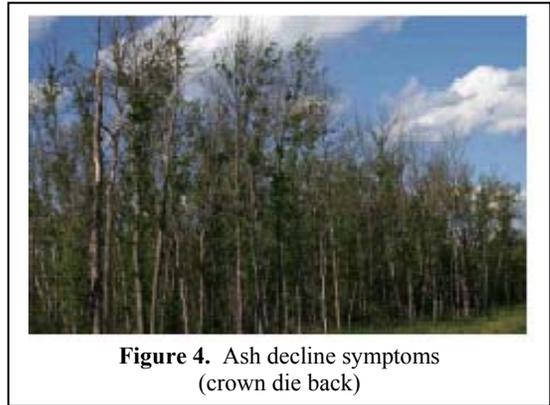
Approximately 640 acres of reproducing gypsy moth populations near Tower, MN on the SNF were treated and eradicated in 2006. In addition, approximately 133,000 acres in the Schroeder, Kadunce, Farquhar Peak and Tom Lake areas along the North Shore (see Figure 3) were treated with the pheromone *Disparlure*. This pheromone, specific to gypsy moth, is designed to confuse the insects and thus limit mating opportunities.



*Emerald ash borer*

Emerald ash borer is another invasive insect with the potential to cause extensive, if not complete, mortality of the ash forest type. The invasive insect has been responsible for essentially 100% mortality of ash in areas where it has become established. Presently, the 'front' for that insect is in Michigan and Wisconsin and is thought to be actively spread through the transportation of infected wood, primarily firewood. While no insects have been found on the SNF (or in Minnesota), monitoring through 'trap trees' in high use recreation areas is actively being implemented by the state.

Ash decline and mortality in northeastern Minnesota, primarily from drought but also human impacts, continues to be of concern. Through reduction in tree vigor and health, these conditions cause stress in the trees and make them more susceptible to attack by insects and disease. Ash provides valuable native diversity on the SNF. An example of decline in ash is shown in Figure 4.

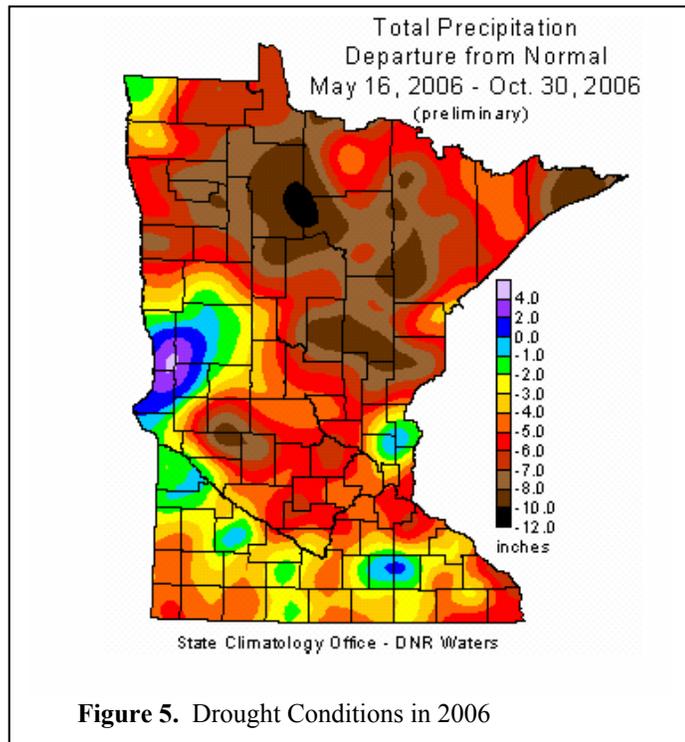


**Figure 4.** Ash decline symptoms (crown die back)

*Weather Influence*

Weather related conditions can exacerbate conditions that favor adverse insect and disease activity. A surplus of moisture in May 2006 turned into a deficit (averaging 5-6" of precipitation) by the end of July. Several portions of the SNF were considered to be in moderate to severe drought conditions (see Figure 5). Limited precipitation, coupled with continuous hot temperatures, caused trees to be stressed and limited in their natural abilities to successfully combat insects and diseases.

Monitoring for insect and disease conditions on the SNF is critical to recognizing or anticipating insect outbreaks. This activity is accomplished annually through cooperation with other Federal and State natural resource agencies. Methods include annual aerial surveys, increased trapping to determine the presence and reproduction of invasive insects such as gypsy moth and emerald ash borer, and public education programs. Results generally are available in late summer to early Fall.



**Figure 5.** Drought Conditions in 2006

## Forest Managed Towards Healthy Condition

**O-ID-1.** Increase the amount of forest restored to or maintained in a healthy condition to reduce risk and damage from fires, insects and diseases and **D-ID-2,** Integrated pest management approaches are used to avoid epidemics and infestation of undesirable native or non-native invasive species.

Methods of restoring or maintaining healthy forest conditions are, to a large extent, accomplished through vegetation manipulation. These treatments are designed and monitored to meet the Forest Plan goal of “promoting ecosystem health and conservation” (Forest Plan p. 2-5). Vegetation treatments can maintain or increase diversity of native tree species while providing densities that favor forest vigor on a landscape scale. During 2006, vegetation manipulation was used extensively to mitigate potential insect and disease impacts (and to achieve multiple additional goals identified in the Forest Plan). Several projects to improve forest composition and density approved prior to the Revised Forest Plan but implemented during 2006 included the Behind the Ridge, Sawbill Camp, and Holms/Chipmunk projects. Vegetation manipulation resulting from decisions approved under the Revised Forest Plan included the Dunka, Virginia, Tomahawk, and Inga South decisions. A more thorough discussion on treatment acres can be found in the *Timber* section of this report.

Other projects or practices implemented in 2006 that promote forest health included reforestation and timber stand improvement (TSI). Approximately 1,218,000 native conifer seedlings were planted on 2,318 acres, 57 acres were seeded to conifer species, and 4,970 acres improved through TSI treatments.

In 2006, the SNF actively treated 169 sites of Non-Native Invasive Species (NNIS). Important species treated included purple loosestrife (*Lythrum salicaria*), leafy spurge (*Euphorbia escula*), common tansy (*Tanacetum vulgare*) and Canada thistle (*Cirsium arvense*). Treatment sites ranged from 0.1 to 2 acres in size with an overall total of 30 acres being treated. Refer to the *NNIS* Section for more information.

## **Evaluation and Conclusions**

### Managing Insect and Disease Populations

#### *Spruce budworm*

The resurgence of spruce budworm on the SNF may indicate an increasing trend similar to the mid 1980's. Management activities, while designed to reduce habitat favorable to the spruce budworm, are inadequate in intensity and extent. However, this insect has been a chronic presence on the SNF for many years and could again decrease as its food source becomes more limited.

#### *Gypsy moth*

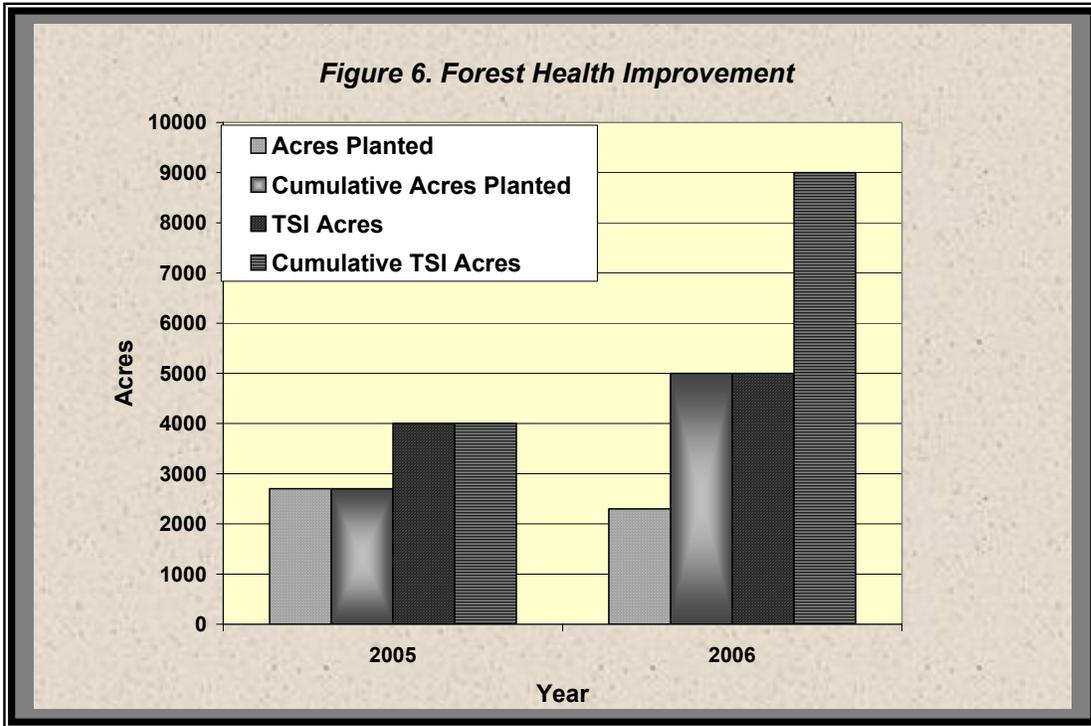
Currently, no successfully reproducing populations are known on the SNF. However, gypsy moth still poses a significant threat to the forested ecosystem on the SNF. The SNF, working with partners, has initiated prompt management actions once populations are detected. Reproducing populations near Tower, MN were treated and eradicated in 2006. The larger 133,000 acre non-reproducing infestation on the North Shore was also treated in 2006. While actual results of the 2006 treatment will not be known until 2007, preliminary trapping in 2006 resulted in relatively few “catches” of the insect immediately outside the treated areas.

#### *Emerald ash borer*

The ash resource continues to be threatened by adverse weather conditions and the potential introduction of the emerald ash borer. The SNF is actively collecting ash seed to a) have the ability to reforest this species; and b) pursue opportunities to develop genetic traits enabling the species to withstand the emerald ash borer.

## Forest Managed Towards Healthy Condition

When the reforestation planting and TSI acres accomplished in 2006 are combined with 2005 accomplishments, the SNF to date has enhanced vigor & composition through TSI on approximately 9,000 acres and planted approximately 5,000 acres. Figure 6 displays these accomplishments.



## Necessary Follow-up Actions and Management Recommendations

After reviewing monitoring findings, the Forest Interdisciplinary Team identified six follow-up actions to carry forward during FY 2007 and beyond.

- \* Continue to conduct annual aerial insect and disease surveys to determine infestation levels and trends across multiple ownerships (conducted by Forest Service State and Private Forestry and in coordination with the Minnesota Department of Natural Resources and Department of Agriculture).
- \* Continue an effective working relationship with State, County and local governments in coordinating management actions to address current and anticipated insect and disease conditions. This activity would include public education and information efforts to insure a common message is provided by all participants.
- \* Continue to use “trapping” techniques to monitor introduction or progress of invasive insect and diseases, especially gypsy moth and emerald ash borer.
- \* Provide recurring training to appropriate resource management personnel in the identification and ecological roles of native insect and disease organisms and in the identification and mitigation of non-native insects and diseases.
- \* Insure integrated insect and disease management concepts are included in all analysis, planning and implementation of vegetation treatments.
- \* Proactively implement Forest Plan direction that provides for healthy, sustainable forest conditions.

## Collaborative Opportunities To Improve Efficiency And Quality Of Program

### *Partnerships*

The SNF was involved with numerous partners to monitor and treat insect and disease conditions. Their involvement is critical in successful management of invasive insects and diseases. These partners included other Federal governmental agencies such as the Animal and Plant Health Inspection Service (APHIS), USFS State and Private Forestry, National Park Service and Army Corps of Engineers. The partners also included State of Minnesota agencies such as the Department of Natural Resources, Department of Agriculture and Gypsy Moth Program Advisory Committee. Tribal Governments in northeastern Minnesota and local governmental agencies (such as St. Louis, Lake and Cook counties) also participated in the monitoring and treatment.

Coordination with these groups is essential for a successful program across multiple ownerships. Failure to achieve results in any one ownership, would result in failure of a program in its entirety.

### *Research*

The SNF completed a Participating Agreement with the University of Minnesota to conduct research into ways to improve resistance of eastern white pine to blister rust, a fungal disease. This disease, originally brought to the United States from Europe in the early 1900's, is an obstacle to the Forest Plan objective of successfully re-establishing white pine on the Forest. Four separate study sites, totaling 65 acres, were formally established on the Gunflint and Tofte Ranger Districts.

## Summary Conclusions

- \* A significant increase in spruce budworm population was observed with much of the infestation occurring within the BWCAW. This insect defoliated 114,817 acres during 2006 which is an increase from 92,500 acres defoliated in 2005.
- \* Approximately 640 acres of reproducing gypsy moth populations were treated and eradicated. In addition, approximately 133,000 acres were treated with the pheromone *Disparlure*.
- \* Vegetation manipulation was used extensively to mitigate potential insect and disease impacts. Practices implemented included the planting of 1,218,000 native conifer seedlings on 2,318 acres, seeding 57 acres to conifer species, and improving 4,970 acres through TSI treatments.
- \* Continue to conduct annual aerial insect and disease surveys and "trapping" techniques to monitor introduction or progress of invasive insect and diseases, especially gypsy moth and emerald ash borer.