

Forest damage assessment at Mt. Mansfield and the Lye Brook Wilderness Area 1997

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Abstract

Annual monitoring of pest population trends and tree damage is conducted on a statewide basis to understand trends in stress agent occurrence in relation to forest health. More recently, concerns about the role of air pollutants in forest health have prompted monitoring of plants sensitive to ground level ozone.

Monitoring efforts on Mount Mansfield include conducting aerial surveys to detect areas of defoliation or decline, ground plot evaluations of tree damages, and monitoring of forest pest population trends. At the Lye Brook Wilderness Area (LBW) aerial surveys and ground plot evaluations are used to detect defoliation and declines.

The objective of this monitoring effort is to detect trends in the populations of major insect pests, and to document the occurrence, location and severity of damage to the forests on Mount Mansfield and the LBW.

At Mount Mansfield, populations of major forest insect pests were relatively low, with significant defoliation occurring only to birch trees in localized areas from birch leaf miner defoliation. Forest tent caterpillar populations remain below detection limits. Spruce budworm populations seem to be increasing, but no defoliation has resulted. Pear thrips defoliation was light on sugar maple regeneration, and light on scattered trees. A patch of birch defoliation and browning was detected in the Browns River drainage from aerial surveys. In the Lye Brook Wilderness Area site, areas of spruce browning and hardwood decline were detected from aerial surveys. Surveys of ozone sensitive bioindicator plants in both northern and southern Vermont continue to detect plants with symptoms of ozone injury.

Introduction

Damage to forest trees from insects, diseases and weather has played a major role in widespread tree declines in the past. Monitoring pest population trends and tree damage is conducted annually on a statewide basis to understand trends in stress agent occurrence in relation to forest health. More recently, concerns about the role of air pollutants in forest health have prompted monitoring of plants sensitive to ground level ozone.

Monitoring efforts on Mount Mansfield include conducting aerial surveys to detect areas of defoliation or decline, ground plot evaluations of tree damages, and monitoring of forest pest population trends. At the Lye Brook Wilderness Area (LBW) aerial surveys and ground plot evaluations are used to detect defoliation and declines.

The objective of this monitoring effort is to detect trends in the populations of major insect pests, and to document the occurrence, location, and severity of damage to the forests on Mount Mansfield and the LBW from detectable stress agents.

Mount Mansfield Monitoring Methods

There are many different methods for measuring forest pest populations. Some forest pests do not yet have reliable, meaningful survey methods developed. In 1997, the forest pests monitored on Mount Mansfield included: pear thrips (PT), forest tent caterpillar (FTC), and spruce budworm (SBW). Defoliation and declines are monitored on ground plots and from the aerial survey.

FOREST TENT CATERPILLAR AND SPRUCE BUDWORM

These pests are monitored using pheromone traps (multipher traps with a biolure and a vaportape insecticide), which attract male moths during their flight period, indicating relative population levels in the area. FTC trapping is done using a 5 trap cluster in northern hardwood stands. SBW trapping uses a 3 trap cluster placed in spruce and fir stands. Protocols for these surveys are consistent with those of other statewide surveys for these pests making results comparable across the state (Teillon et al, 1997).

Each trap type is deployed during the adult moth flight period. FTC traps are active between June 10 and August 16. SBW traps are deployed between June 18 and August 16. Trap catches are returned to the Vermont Department of Forests, Parks & Recreation (FPR) Forest Biology Laboratory in Waterbury for identification and counting of target and non-target species.

PEAR THRIPS

Pear thrips are a relatively new pest to Vermont sugar maple trees, and therefore lack the depth of understanding in relating trap catches to population densities and subsequent damage. At present 2 different population assessment methods are in use for monitoring this pest: soil samples for fall and winter population estimates, and yellow sticky traps for adult population estimates and flight period. Both methods are used at the Proctor Maple Research Center [1360 ft. (415 m) elevation]. Additional soil sample plots were established in 1995 at 3 elevations in the Stevensville Brook

watershed as part of the planned Forest Management Study. Here, the sampling transects are located at 1500, 2000 and 2500' elevations off the Butler Lodge Trail.

Soil samples are collected annually in the fall to estimate the overwintering pear thrips population. Field and laboratory protocols previously established for statewide and regional PT surveys are used (Parker et al, 1990). Basically, 5 sugar maple trees at each sampling site are used as reference points for soil sampling, using a bulb planter collecting tool, and in the following spring are assessed for defoliation.

Yellow sticky traps are used to monitor the timing and duration of adult PT activity above ground, as well as to monitor trends in adult populations over time. Standard protocols were developed under the CAPS program (Cooperative Agricultural Pest Survey Program) and consisted of placement of 4 yellow sticky traps at a 1-m height off the ground in the vicinity of 8 sugar maple trees to be used for monitoring bud phenology and PT damage. Weekly trap collections are made from April 1 through June 13, with trap catch counts conducted at the VT FPR Forest Biology Laboratory.

Mount Mansfield and Lye Brook Wilderness Area Methods

AERIAL SURVEY OF FOREST DAMAGE

Aerial surveys conducted by trained FPR staff during the summer months are used to detect areas of defoliation, discoloration, heavy dieback or mortality, and determine the cause of this injury, if possible. Two observers sketch damaged areas onto topographic maps, indicate a possible cause, then later conduct ground surveys to verify location, extent, severity and possible cause of injury. Procedures are standardized statewide and remeasurement is conducted on 10% of the area evaluated (Teillon et al, 1997). Information is later digitized into a Geographic Information System.

OZONE BIOINDICATOR PLANTS

Plants sensitive to ground level ozone are surveyed as part of the National Forest Health Monitoring Program (NFHM)(Tallent-Halsell 1994). During the period of maximum exposure, August 7-23, 30 individuals of each sensitive species growing naturally in large openings are examined for symptoms of ozone injury. These include milkweed, black cherry, blackberry, white ash and dogbane. Symptoms are verified by a regional expert in ozone injury identification as part of the NFHM. For Mount Mansfield, plant evaluations are conducted at the Proctor Maple Research Center in an open field where the state ozone monitor is located. The availability of large (>3 acres) opening containing plants sensitive to ozone have not been possible at LBW. A location in Rupert (Bennington County) is used to represent exposure and injury for the southern Vermont site. Ozone exposure data are provided by the Vermont Air Pollution Control Division for the two Vermont sites: Bennington and Underhill.

Mount Mansfield Results And Discussion

Insect populations of forest tent caterpillar remain below detection limits, as has been the case for the past 6 years, with no moths trapped. Spruce budworm populations at the 3800' elevation were the highest of all statewide monitoring sites, but was not associated with noticeable defoliation (Figure 1). The statewide average was 2.8 moths per trap. Pear thrips populations increased in 1997, but remain relatively low (Figure 2). A total of 621 thrips were caught on sticky traps, spanning a period from April 11 through June 13 (Figure 3). At the time of budbreak, 60% of thrips adults were trapped. Only light defoliation was observed on scattered regeneration and trees this year.

Mount Mansfield and Lye Brook Wilderness Area Results And Discussion

Ozone symptoms on sensitive bioindicator plants were confirmed at both northern and southern Vermont sites. Although southern Vermont received higher cumulative ozone levels, injury symptoms at the both sites showed moderate injury from ozone (Figure 4). Although symptoms are visible on susceptible plants, the extent and severity of ozone injury to forests is not well understood.

Results from aerial surveys to map areas of defoliation and decline at the Lye Brook Site detected an area of spruce decline on the west slope of the wilderness area (Figure 5). This is likely the result of freezing and thawing events occurring over the past winter. Also detected was an area of hardwood decline towards the southern end of the wilderness area.

The aerial survey at Mount Mansfield detected an area of persistent birch leaf miner damage on the north slope of the Browns River headwaters (Figure 6). No damage was detected in the Stevensville Brook or Ranch Brook headwaters.

Acknowledgments

Aerial survey and ground plot data collection was conducted by dedicated Forest Resource Protection staff. GIS maps of aerial survey information were provided by Tom Luther of the USDA Forest Service, Northeastern Area State & Private Forestry in Durham, NH. Ozone concentration data was provided by the Vermont Air Pollution Control Division.

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Teillon, H.B., B.S. Burns and R.S. Kelley. 1997. Forest Insect and Disease Conditions in Vermont - 1997. Agency of Natural Resources, Dept. of Forests, Parks and Recreation, 103 So. Main St., Waterbury, VT 05671-0602. 137 pp.

Figure Spruce budworm population trends on Mount Mansfield at 3 elevations

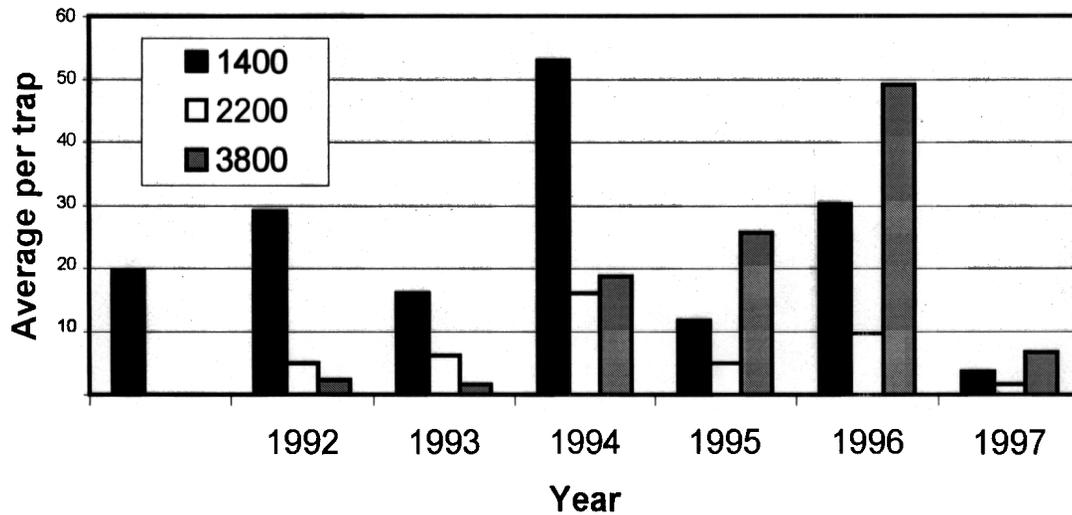


Figure 2. Trends in pear thrips populations at the Proctor Maple Research Center at 1400 feet on Mount Mansfield, as measured in the soil and emerging in the spring.

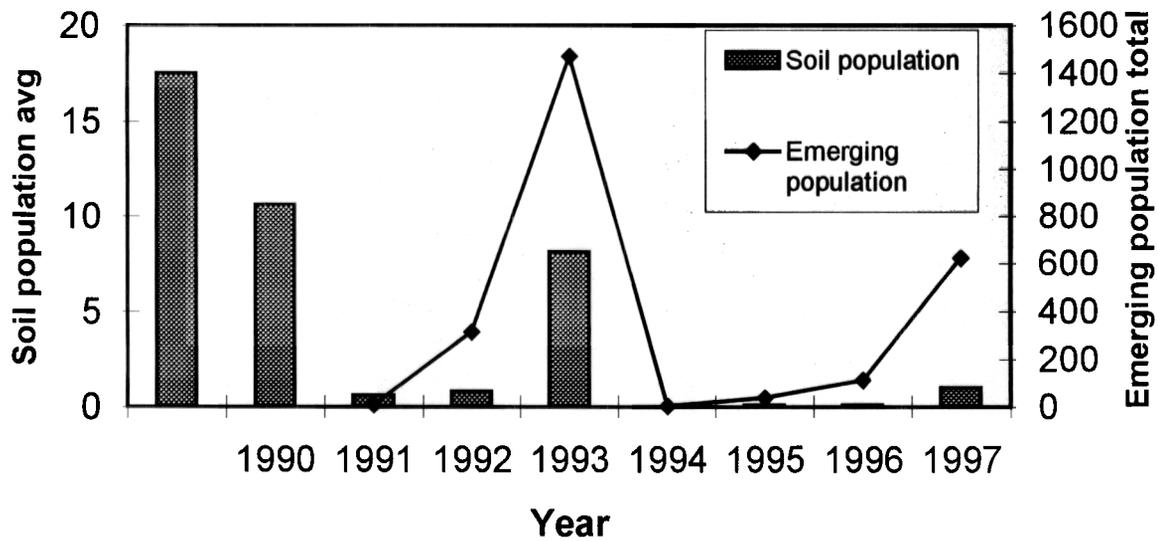


Figure 3. Timing of pear thrips adult emergence, sugar maple budbreak and temperature expressed as growing degree days, at the Proctor Maple Research Center, 1400 feet on Mount Mansfield.

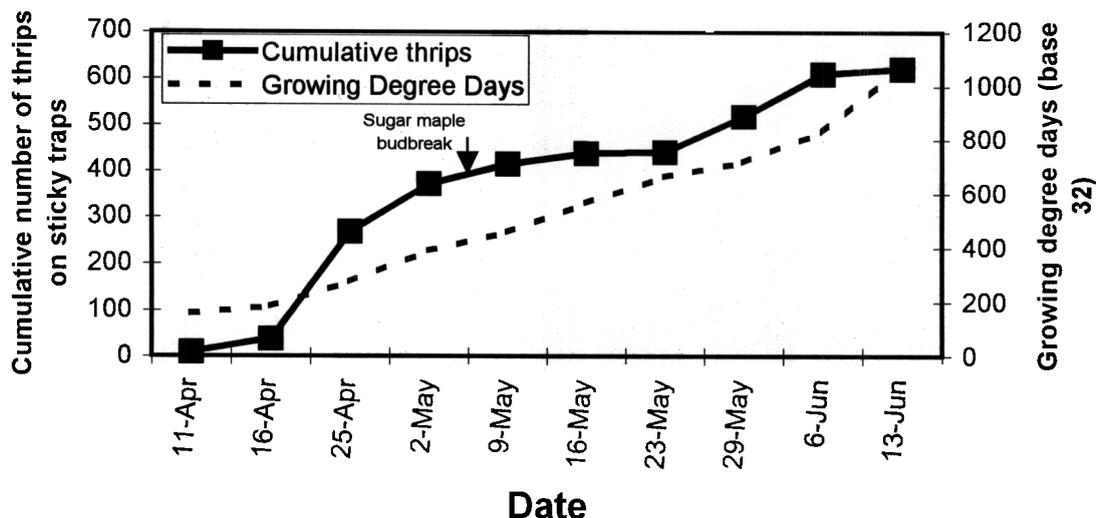


Figure 4. Weekly cumulative ozone exposures (expressed as cumulative sum60 ozone based on 24 hour period) representing the Mount Mansfield (Underhill) and Lye Brook (Bennington) study sites compared with injury to ozone sensitive bioindicator plants surveyed at Underhill and Rupert (Bennington County). Plant injury severity is based on a 0 - 5 rating system where 0=no injury, 1=1-6% of leaf area affected, 2=7-25%, 3=26-50%, 4=51-75%, and 5=>75%.

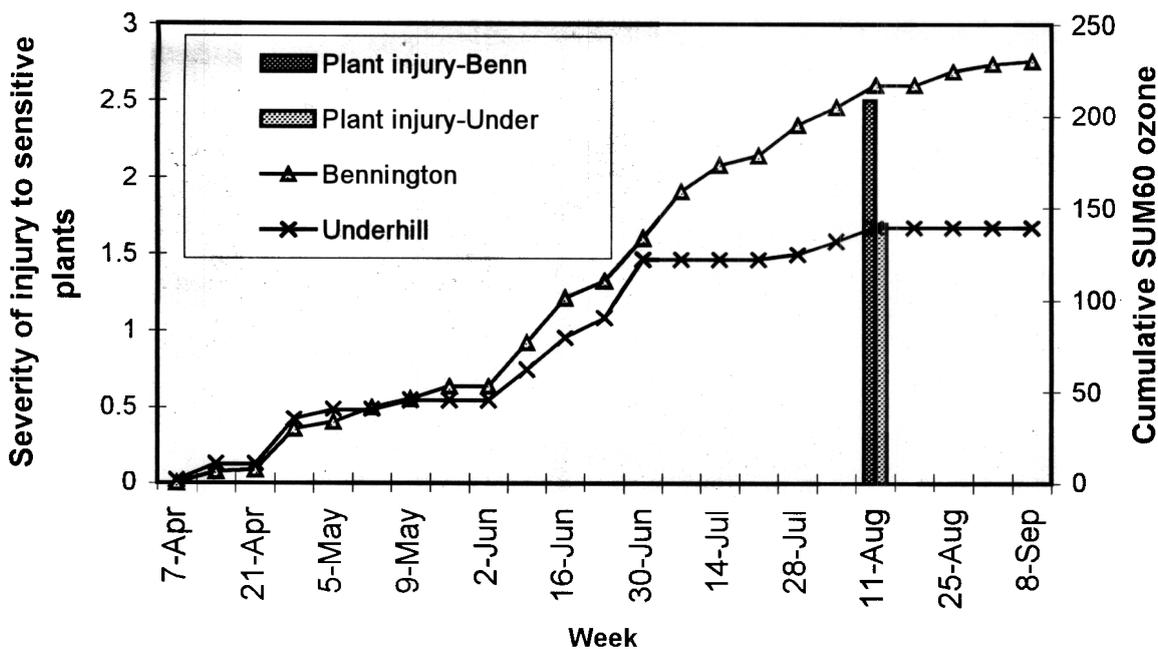


Figure 5. Forest damage mapped in Lye Brook Wilderness Area, 1997.

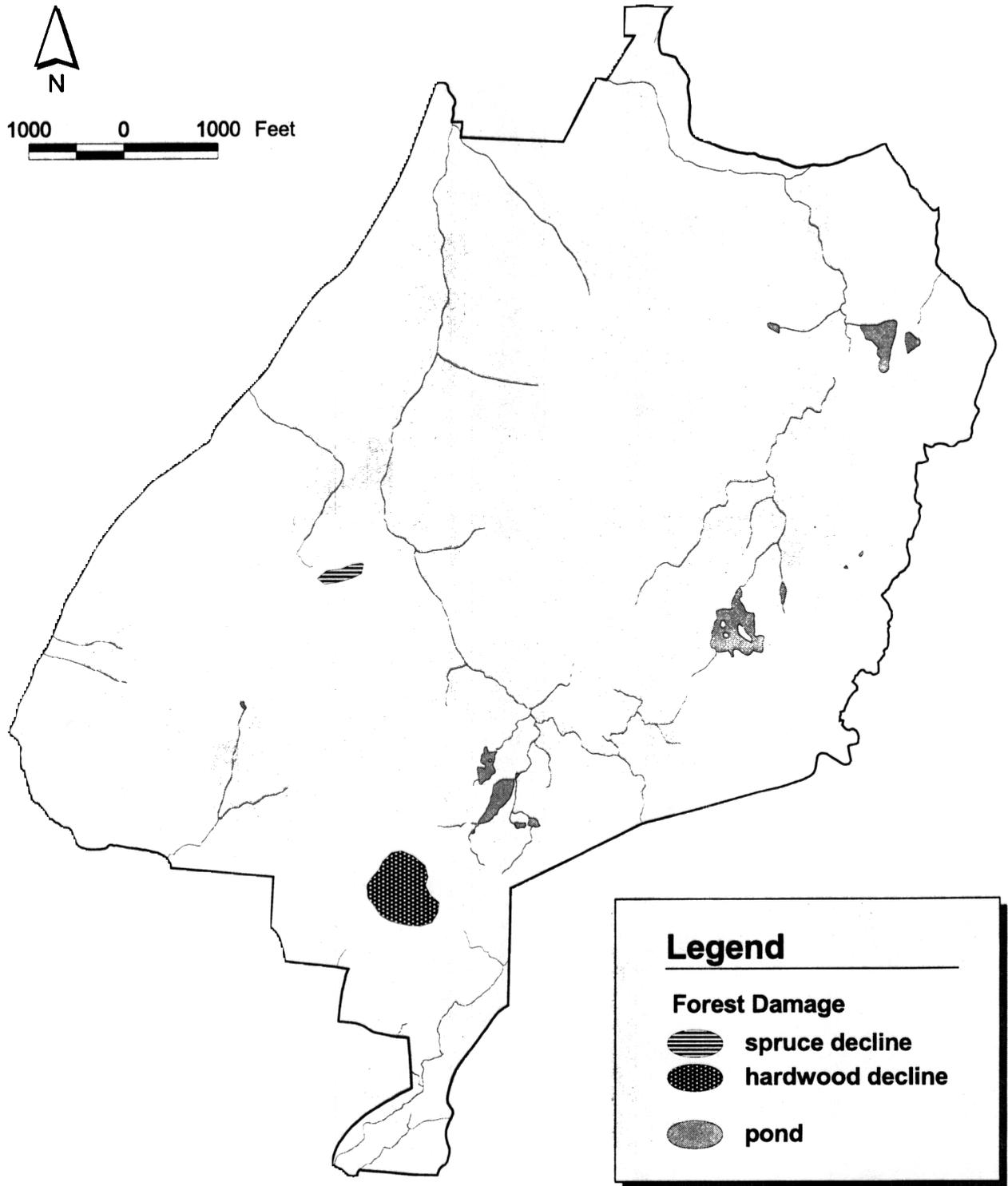


Figure 6. Forest damage mapped on Mount Mansfield, 1997.

