

Annual Assessment of Forest Health in the Lye Brook Wilderness Area 1997

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Cooperators

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Introduction

Annual assessments of crown condition, mortality, and damages are conducted on permanent plots located at two elevations, 1400 and 2200 feet. The purpose of these plots is to document changes in tree health over time and to aid in the identification of causes for declines, if they occur.

Materials and Methods

Five long-term monitoring plots using the design and measurement variables of the National Forest Health Monitoring Program (NFHM) (Tallent-Halsell, N.G. 1994) are used to represent forest health in the Lye Brook Wilderness Area. Data collected to assess forest health includes mensuration, crown condition and tree damages. In 1990, one plot was established at 2300' as part of the NFHM Program grid. One additional plot at the same elevation and 2 plots at 1400' were established in 1994. An additional high elevation plot was added in 1995 to improve the hardwood sample size. These elevations were chosen for comparison with plots on Mt. Mansfield, the northern Vermont VMC study site.

Results and Discussion

Many tree health indicators improved in 1997. At 1400 foot plots, overstory trees had lower dieback and slightly denser foliage than in 1996 (Tables 1-4). Compared to the 4 year baseline of tree health on 1400 foot elevation plots, trees had significantly less dieback in 1997 (Figures 1-3). There was a significant improvement in black cherry health over previous years, with lower average dieback (6.0%), higher crown density (48.5%), lower foliage transparency (25.5 %) and more healthy trees (100%). Other species at this elevation also showed improved tree health, especially lower average dieback ratings.

At 2200 foot plots overstory trees had lower dieback than the previous year. Although crown density and foliage transparency was worse than in 1996, foliage density was significantly better than the 4 year average (Figures 1-3). All species at this elevation showed improvement in average dieback. In 1997, good tree health can be attributed to good growing conditions (plenty of precipitation) and low incidence of major insect and disease problems.

Many damages are persistent on trees, and may result in long-term tree health problems. Detecting and recording those damages that are significant to tree health and survival provides information that can explain unexpected tree declines in the future. Injury and damages present on tree boles, exposed roots, crown stem, branches and foliage are recorded when above a threshold established as "significant to tree health".

In 1997, 44% of trees on 1400 foot plots and 32% of trees on 2200 foot plots had damages that could be important to future health (Table 5). Paper birch had the most damages. Indicators of internal decay on tree boles was the most common type of damage.

Table 1. Trend in average crown dieback measurements for overstory trees growing on monitoring plots at different elevations in the Lye Brook Wilderness Area, 1994 - 1997.

Species	Elevation	1994	1995	1996	1997
Balsam Fir	2200	1.0	1.8	2.9	2.2
Black Cherry	1400	6.5	12.5	12.5	6.0
Paper Birch	1400	*	*	4.5	1.5
Red Maple	1400	3.8	5.4	5.4	2.9
	2200	6.0	6.4	6.9	4.1
Red Spruce	2200	1.0	2.6	4.3	1.9
All Species	1400	5.2	7.1	6.7	3.5
	2200	3.4	4.2	5.1	3.2

* Sample size <10 trees.

Table 2. Trend in average crown density measurements for overstory trees growing on monitoring plots at different elevations in the Lye Brook Wilderness Area, 1994 - 1997.

Species	Elevation	1994	1995	1996	1997
Balsam Fir	2200	48.3	44.2	50.6	51.8
Black Cherry	1400	45.5	42.5	38	48.5
Paper Birch	1400	*	*	54	51.5
Red Maple	1400	55.2	52.3	51.5	51.0
	2200	46.7	50.2	56.4	54.5
Red Spruce	2200	51.0	51.4	58.6	56.2
All Species	1400	53.0	52.4	50.3	51.8
	2200	48.3	48.7	55.2	53.7

Table 3. Trend in average foliage transparency measurements for overstory trees growing on monitoring plots at different elevations in the Lye Brook Wilderness Area, 1994 - 1997. *indicates < 10 trees

Species	Elevation	1994	1995	1996	1997
Balsam Fir	2200	18.3	24.4	16.7	19.3
Black Cherry	1400	25	*	26.5	25.5
Paper Birch	1400	*	*	20.5	17.5
Red Maple	1400	14.2	19.6	15	16.5
	2200	20.9	24.8	16.0	16.0
Red Spruce	2200	16.6	22.1	12.9	15.6
All Species	1400	17.0	23.1	18.2	17.9
	2200	18.9	24.1	15.3	17.0

Table 4. Trend in percent of trees healthy for overstory trees growing on monitoring plots at different elevations in the Lye Brook Wilderness Area, 1994 - 1997. *indicates < 10 trees

Species	Elevation	1994	1995	1996	1997
Balsam Fir	2200	100	100	91.7	100
Black Cherry	1400	100	*	80	100
Paper Birch	1400	*	*	100	100
Red Maple	1400	100	100	100	95.8
	2200	93.1	96.8	90	100
Red Spruce	2200	100	100	100	100
All Species	1400	98.1	92.2	94.0	94.6
	2200	98.6	97.6	92.7	100

Figure 1-3. Overstory tree health in 1997 compared to 4 year averages (baseline) for survey plots at 2 elevations in the Lye Brook Wilderness Area. Tree health indicators include: crown density (Figure 1), crown dieback (figure 2), and foliage transparency (Figure 3). Letters show statistically significant differences between elevations, “*” shows significant differences between baseline and 1997 averages.

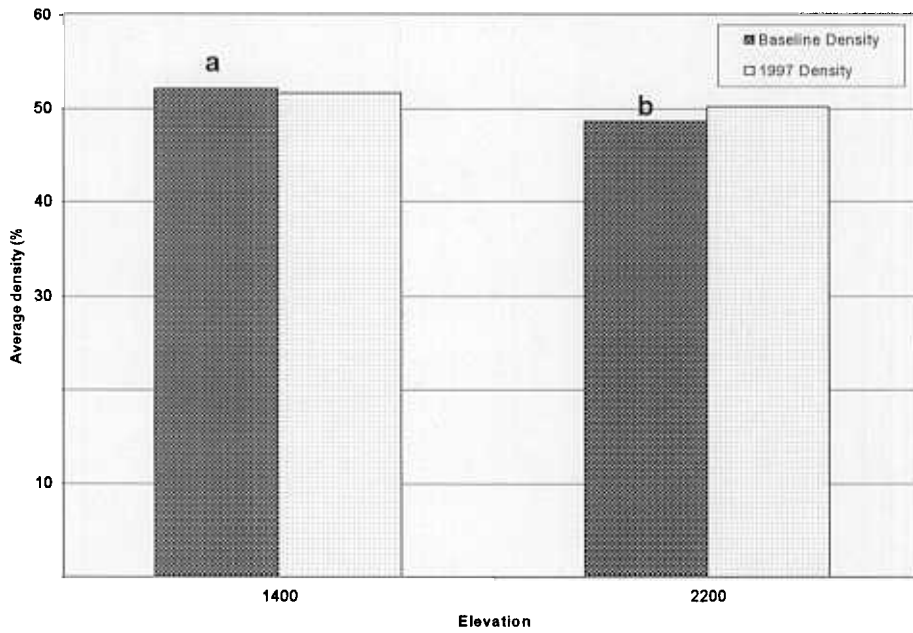


Figure Crown Density

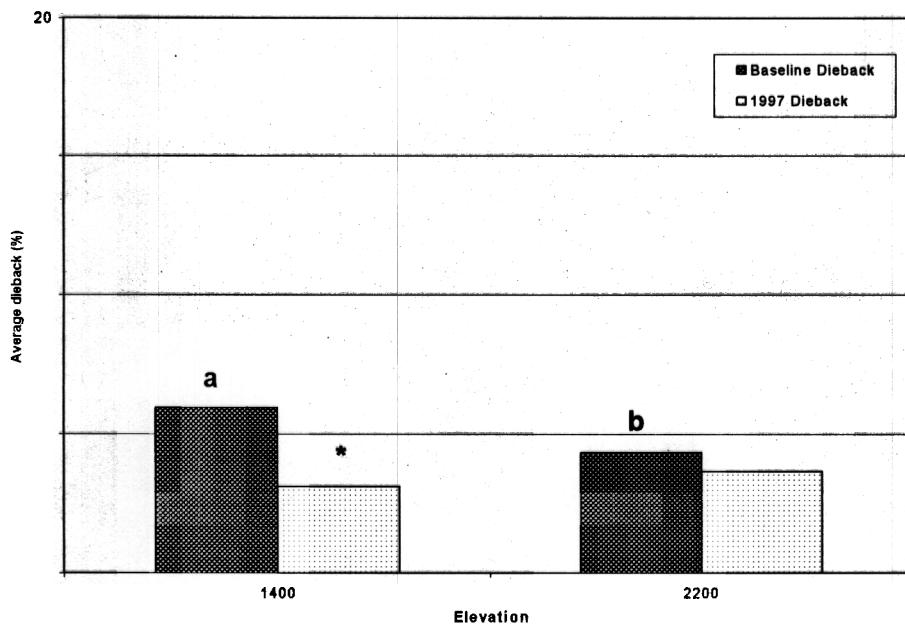


Figure 2. Crown Dieback

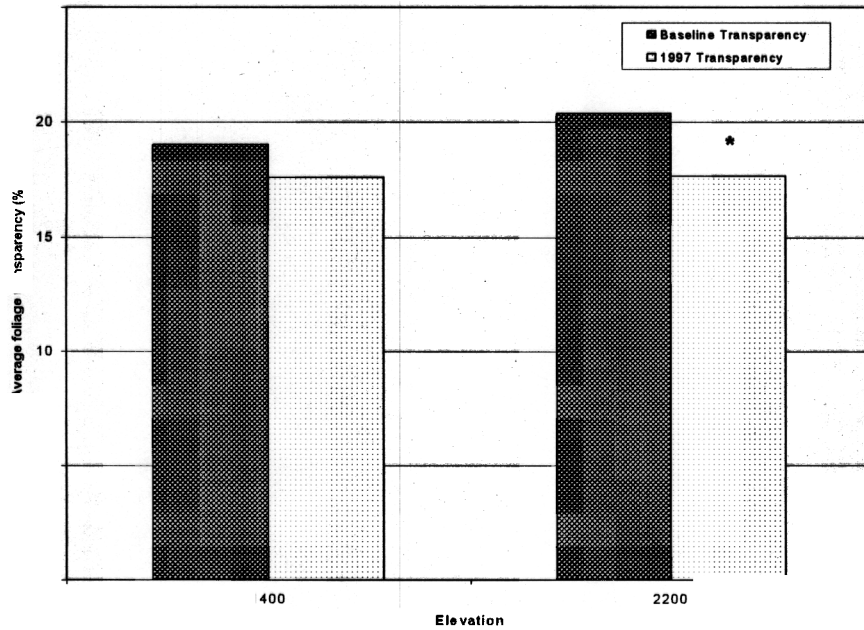


Figure 3. Foliage Transparency

Table 5. Percent of trees affected by different types of tree damages in 1997.

Species	Elevation	Percent of trees and type of damage
Balsam Fir	2200	7 % with indicators of decay
Black Cherry	1400	18 % with indicators of decay 9 % with broken/dead branches
Paper Birch	1400	30 % with indicators of decay 10 % with open wounds (size > 20% of circumference) 10 % with dead terminal
Red Maple	1400	28 % with indicators of decay 4 % with open wounds
	2200	4 % with cankers 21 % with indicators of decay 2 % with broken/dead branches
Red Spruce	2200	3 % with open wounds

References

Tallent-Halsell, N.G. (ed.). 1994. Forest Health Monitoring 1994 Field Methods Guide. EPA/620/R-94/027. U.S. Environmental Protection Agency, Washington, D.C. 1997 version.