

FOREST CANOPY HEALTH: DEVELOPMENT OF A STANDARD METHOD FOR LONG-TERM MONITORING AND EVALUATION

by
Luke Curtis, University of Vermont
Ronald Kelley, Vermont Department of Forests, Parks & Recreation

OBJECTIVES

Forest canopy assessments related to tree health have historically been obtained by visual

[REDACTED]

METHODS

Using a 35mm camera with a 17mm wide angle lens, Ektachrome slides (ISO200) were taken

[REDACTED]

1. North American Maple Project (NAMP) 014, Proctor Maple Research Center (PMRC) in Underhill - 45 points
2. Forest Health Monitoring (FHM) 2 at PMRC - 32 points.
3. Forest Health Monitoring 4 at Underhill State Park - 32 points.

Photo points were arrayed 10 m apart on the NAMP grid for each subplot and were at a

[REDACTED]

In order to evaluate the performance of this system for characterizing softwood canopies a

[REDACTED]

Photography:

[REDACTED]

No weather criterion was applied, except to avoid rain and excessive breeze. The objective has been to keep the process downy and friendly and not restricted by narrow time windows. The objective was to have a system that was simple and easy to use and that could be used by a wide range of people.

The camera was mounted on the tripod with the lens oriented toward the zenith. For



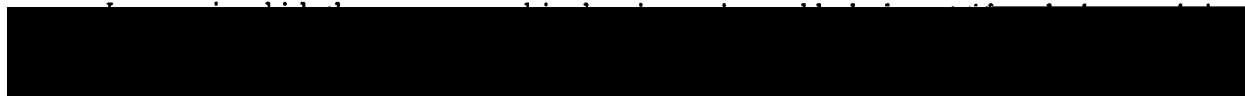
Camera height was 1 m from the base of the stake to the optical center of the lens (about 2 cm from the lens front). A meter stick was carried for this purpose. The camera was leveled with

The camera was equipped with a right-angle viewfinder and a cable release.

All foliage up to 1 m from the camera lens was removed in an arc containing the image. This



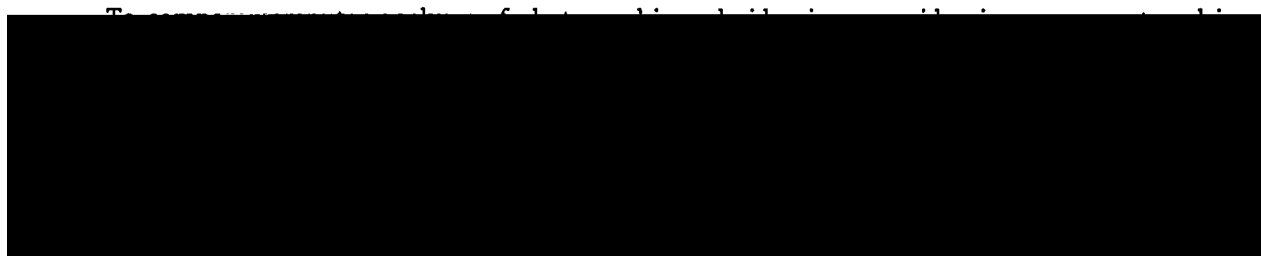
After set-up was complete, three exposures were taken: one at the camera meter's setting, one



Complete notes were taken for each set of exposures, including photo point ID, time of day, an



Video:



Techniques described for setup and placement of the 35mm camera above each point were also



Image Analysis

In order to develop a scoring procedure for canopy cover on the slides, we compared a

Slide Grid Projection:

A radial grid was drawn on white paper to include 144 intersections formed by 12 concentric

Each slide was read with a set routine, scoring intersections on successive circles beginning

with the innermost. The number of grid intersections fully covered by the crown of a tree at that intersection was recorded. The number of grid intersections fully covered by the crown of a tree at that intersection was recorded. However, we were unable to get a true canopy cover

Scoring time with the manual/visual system varies according to crown density, with the less

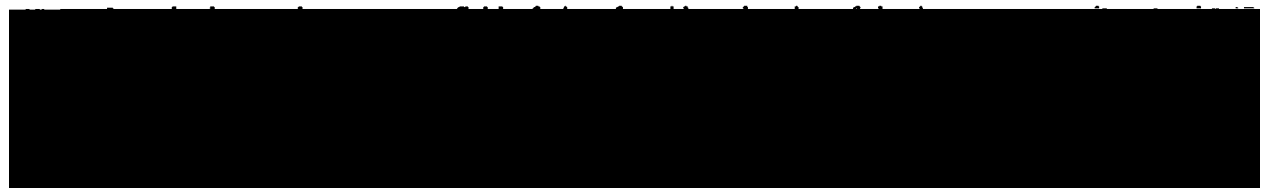
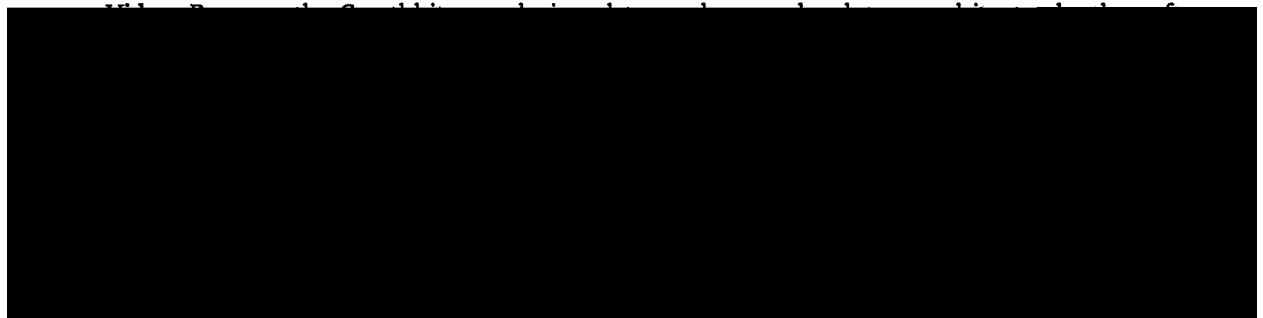
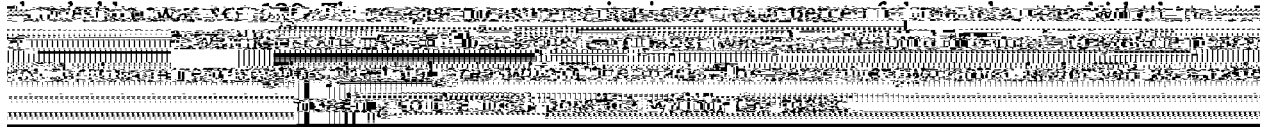
Swathkit:

The Swathkit is a device that can be used to measure the width of a tree's crown

Photography: it was desirable to remove the B&W video camera from the Swathkit "blue box" and mount on a separate stand for several reasons. Its focal length and position within the box were not



Using the striped test pattern, which is slightly less than 50 percent black on white, the



STONY RESULTS ANALYSIS

Photography:

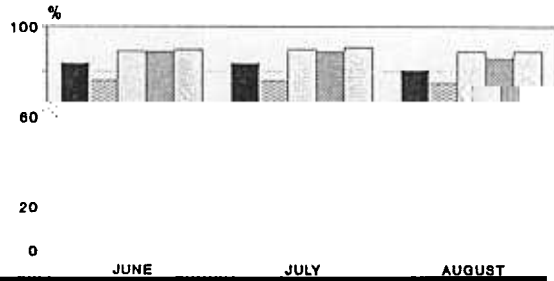
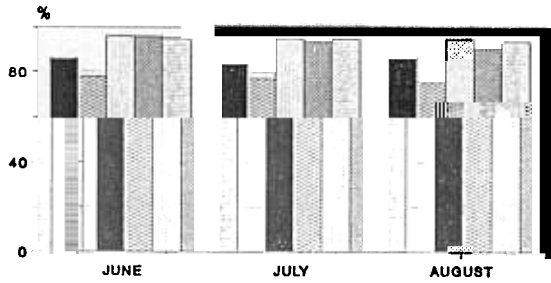
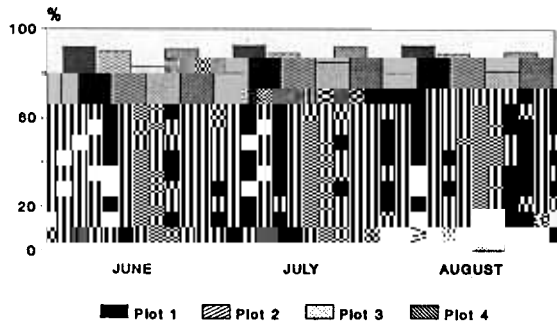
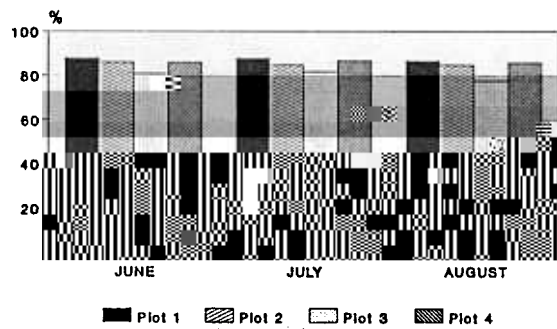


Figure 1. Percent Canopy Cover in 1991 for the NAMP Plot at Proctor Maple Research Center Based on Two Analysis Methods.



Based on slide grid projection



Based on Swathkit analysis



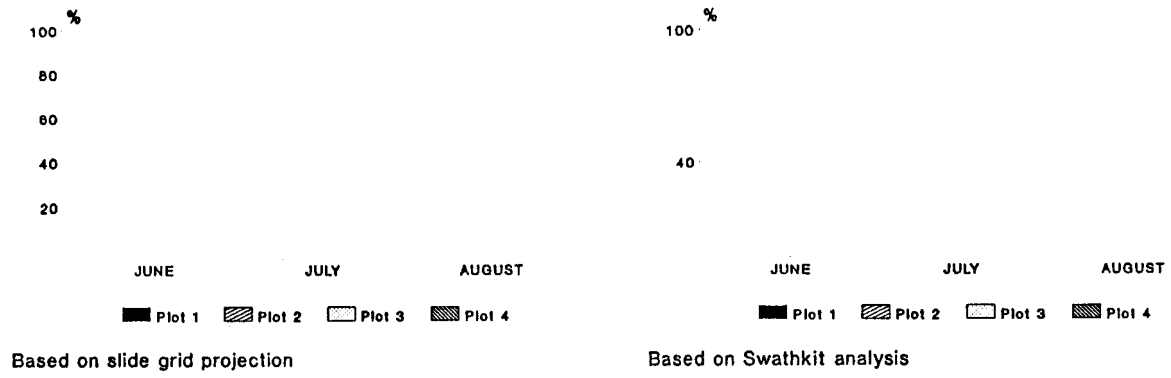


Figure 3. Percent Canopy Cover in 1991 for the EHM Plot at Underhill State

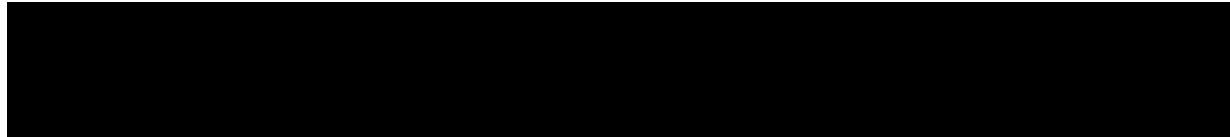
The trial in the red pine plantation, in which the pine photo point transect was trimmed from

The Swathkit analysis appears to be quite sensitive in detecting small changes in canopy cover due to light to moderate defoliation. Within the NAMF, the analysis detected a significant decrease in canopy cover in the 1990s and 2000s, which is consistent with the known history of defoliation in this region.



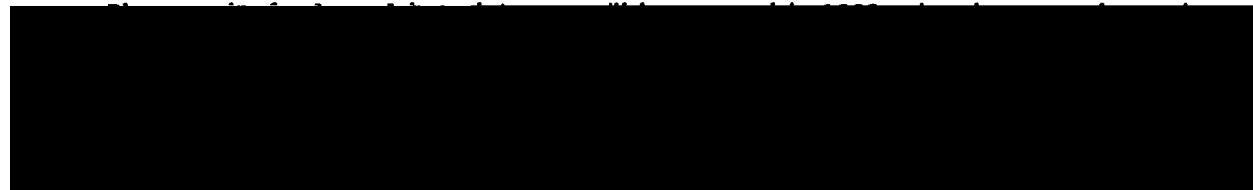
vantage of the grid projection system over image analysis is the ability to compare One adv

Video:



Photographic transparencies can be easily modified with filters, masks, etc. in the analysis

FUTURE PLANS



Light sensors such as the LiCor Plant Canopy Analyzer and Sunfleck PAR Ceptometer are now

FUNDING SOURCE

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REFERENCES

Eargione, Michael J. 1985. an estimation procedure for determining canopy densities from