A Study of Seedling and Sapling Numbers in Relation to Canopy Cover in Six Long Island Pine Barren Community Types

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ABSTRACT

Seedlings and saplings are important to forest health because they provide insight as to how the forest will develop and survive in the years to come. The canopy cover's density has much to do with how these seedlings and saplings will develop and survive. Canopy cover, density and the amount of seedlings were studied in different forest communities to help predict the future of these forests. Using a Geographic Information System (GIS) and Global Positioning System (GPS), points were selected at random and twenty five by sixteen meter plots were analyzed. By using a densitometer, the canopy cover was determined in each plot along ten transects at randomly determined intervals. Seedlings and saplings were counted in four belt transects as well as noted in the entire plot. The different communities that were compared include Pine Oak, Oak Pine, Pitch Pine, Coastal Oak areas, Dwarf Pine and Pitch Pine-Scrub Oak Woodland/Shrubland. In the Coastal Oak community, where the cover was found to be 96% hardwood cover and no pine cover, no seedlings or saplings found. On the other hand, in a Pitch Pine plot, with 72% pine cover and 1.5% hardwood cover, approximately 86 seedlings and 85 saplings were found. When this study is redone in ten years to determine the progress of the forest, the investigators will determine if human intervention is needed to aid in forest growth. If adolescent trees were found healthy and growing, this would show the progression of the Pine Barrens and would also prove that the forest is capable of recuperating without human aid.

Emily Efstration in Scrub Oak

INTRODUCTION

The Long Island Pine Barrens, the island's largest natural area, covers 100,000 acres in Suffolk County. It is thought to have covered a quarter of a million acres at one point.

The Foundation for Ecological Research in the Northeast (FERN) was founded to fund environmental and ecological research. The Central Pine Barrens Monitoring Program is a main program of FERN. This program determines how well the Pine Barrens is doing now and how they will be in the future. By comparing the present to future data in the same areas, the overall condition of the Pine Barrens can be determined over time. Depending on the condition, human intervention may be needed to aid in restoration.

A main factor in determining the health of the forest are the seedlings and saplings that are surviving and doing well. There needs to be enough mature trees to produce seeds for germination, however there also must be enough sunlight for the seedlings to grow to maturity. A forest or community that has a lot of cover, a lot of seedlings, but not many saplings shows that the seeds are being germinated, but not enough light is reaching the ground for seedling to sapling growth. An ideal condition would be to have a large number of seedlings and saplings to show that there is growth in the community. By conducting these experiments now and again in ten years, this will show whether the Pine Barrens are growing steadily or if human intervention is needed. Studying the amount of seedlings in comparison to sunlight reaching the Pine Barren floor is very important because it determines the future of the forest.

MATERIALS AND METHODS

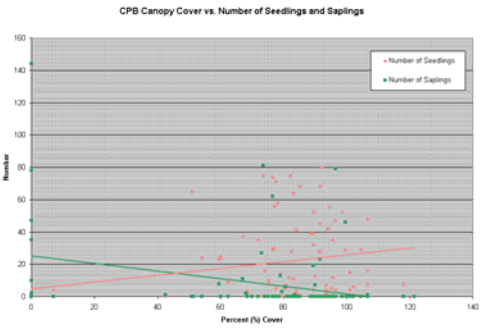
The methods were performed in accordance with the Monitoring Protocols for Central Pine Barrens Field Plots [3]. The randomly generated plots were in six different community types of the Pine Barrens Forest: Coastal Oak Forest, Oak-Pine Forest, Pine-Oak Forest, Scrub-Oak Forest, Dwarf Pine Forest and Pitch Pine Forest. The established plots are 16 by 25 meters, with the 25 meter side being parallel to the road. Ten line transects are established. The position at which the transects begin and the points where data is collected are both chosen at random. The investigator collects the data along the transects at one meter intervals for twenty meters. Once the investigator reaches each point, they record the flora observed and the density of the canopy, via a densitometer. The densitometer is an instrument used to look directly upwards. By looking through this, the observer can see exactly what kind of cover is above the point they are at in the transect. The cover will be hardwood, pine or sky.

Seedlings and saplings are recorded within the plot by forming four belt transects that are two by twenty-five meters long. Each of the four transects are sampled for seedlings and saplings of different species, hardwood and pine. Half of the plot, eight by 25 meters, is surveyed for seedlings and saplings. [3]

DISCUSSION AND CONCLUSION

All of the data collected in each of the community types (Coastal Oak, Oak-Pine, Pine-Oak, Pitch Pine, Dwarf Pine and Pitch Pine-Scrub Oak Woodland/Shrubland) supports the fact that seedlings need sunlight in order to grow into saplings. The seedlings are able to flourish under a thick canopy because the seeds are readily available for germination. By looking at the graphs, one can see that the amount of seedlings increases with the increase in canopy in all of the communities. The problem arises when the seedlings attempt to grow into saplings and the thick canopy does not allow much light to penetrate through. If the sunlight is not available, the seedlings die. This is why there are not as many saplings as seedlings under the more dense canopy.

Although the seedlings cannot grow into saplings under a dense canopy, the dense forest shows that it is thriving and doing well. It is crucial for the seedlings to develop into saplings when the forest has some sort of negative disturbance, such as a forest fire. In this case, the seedlings and saplings usually have enough sunlight to grow into adult trees and help the forest overcome the obstacle. [1,2]



RESULTS

The Figure to the left shows a direct relationship, with increasing seedling number corresponding with an increase in the density of the canopy. Saplings, on the other hand, decreased with an increased canopy cover density.

This trend was seen in all six communities (Coastal Oak, Oak-Pine, Pine-Oak, Pitch Pine, Dwarf Pine and Pitch Pine-Scrub Oak Woodland/Shrubland) studied.

Dana Tievsky looking closely for seedlings and saplings within the four belt transects, which make up 50% of the plot

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Kathryn Gutleber looking at the density of the canopy cover via densitometer.

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[2]Botanical and Ecological Characteristics. Unkn author. Aug 2006. <http://www.fs.fed.us/database/feis/plants/tree/pinrig/botanical_and_ecological_characteristics.html>.

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A map of the Central Long Island Pine Barrens indicating the core preservation area

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