# Comparison of Snag Dynamics in Four Forest Community Types of the Central Pine Barrens

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## ABSTRACT

The Long Island Central Pine Barrens (CPB) contains a variety of threatened forest communities that require active management. To determine future management practices the Foundation for Ecological Research in the Northeast (FERN) has initiated a forest health-monitoring project to evaluate potential forest health indicators (e.g. amount of available habitat) in the CPB. Snags (standing dead trees) provide suitable habitat for a variety of forest wildlife. The goal of this research was to quantify the abundance of snags in four of the forest community types in the CPB, to determine which contains a greater amount of available habitat. Field data was collected at forty random plots (16 x 25meters (m) 400m²), using the Monitoring Protocols for Central Pine Barrens Field Plots prepared by Michael S. Batcher. The field data collected at the forty plots was analyzed to estimate the abundance of snags in the targeted community types and establish the average diameter at breast height (dbh) of snags in each community type. Data analysis shows that the community type with the greatest incidence of snags/acre is coastal oak forest followed by oak-pine, pine-oak, and pitch pine, respectively. However more data is needed to increase the accuracy of the findings. The greatest average dbh exists in oak-pine forest, but when a standard deviation is applied to the data it shows there is no difference in the range of dbh's in each community type. This research is ongoing and when the data presented here are linked with future data, they can be used to determine the health of the forest.

## INTRODUCTION

The Central Pine Barrens (CPB) make up approximately 41,683 hectares (ha) of Long Island, New York, and comprise a mosaic of threatened ecological communities (e.g. Forests, Woodlands, Shrublands, and globally rare Dwarf Pine Plains) [1]. These different community types are home to a variety of rare damselflies, butterflies, and moths as well as other invertebrates, birds, small mammals, bats, and herpetofauna [2]. FERN began a forest health-monitoring program in the CPB, in collaboration with the Pine Barrens Commission, the Upton Ecological and Research Reserve, The Nature Conservancy, the New York State Department of Environmental Conservation, and Brookhaven National Laboratory, to determine future conservation management goals and practices. To accomplish this, the initial research began assessing forest health indicators to establish their thresholds (e.g. the optimal amount of available habitat/ha) [3].

Snags are an important component of forest ecosystems; they play an essential role in forests' food web and wildlife habitat. As a snag begins to decompose it is colonized by invertebrates that convert the snag into a food source for many wildlife species such as woodpeckers who have the unique ability to drill for food and excavate cavities. Cavities made, used, and eventually abandoned by woodpeckers become available habitat for secondary cavity nesters (e.g. birds, herpetofauna, small mammals, invertebrates), incorporating snags into the life cycles of a large diversity of wildlife (see Figure 1).

The goals of this research were to 1) Quantify the abundance of snags in four of the forest community types, coastal oak, oak-pine, pitch pine, and pine-oak, in the CPB then 2) Determine which community type contains a greater amount of available habitat, and 3) Establish the average diameter at breast height (4.5 feet above ground) of snags in each community type.

## METHODS

All methods used to collect data came from the CPB forest health monitoring protocols by M. Batcher [3].

Field data was collected at forty random 16 x 25m plots, shown in figure 2, generated in Geographic Information System (GIS) by The Nature Conservancy (TNC), in the targeted forest community types in the core preservation area of the Long Island Central Pine Barrens. Each plot was then located using Global Positioning System (GPS) units to navigate to the Universal Transverse Mercator (UTM) coordinates generated in GIS.

Once the plot was located the boundaries of the 16 x 25m plot were laid out using two 50-m tapes and chain pins. Then, using dbh tape all snags inside the plot were measured and their dbh was measured and recorded if it was >10cm at breast height. The reason data was only recorded for snags >10cm dbh is because they provide habitat for a more diverse amount of wildlife.

The field data collected at the fifty plots was entered into a Microsoft Access database created by M. Batcher. The data was then transferred to a Microsoft Excel spreadsheet for analysis.

## RESULTS

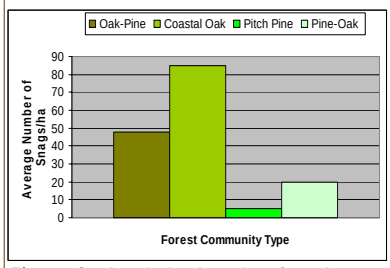


Figure 3: The calculated number of snag/ha extrapolated from the average number of snags per plot.

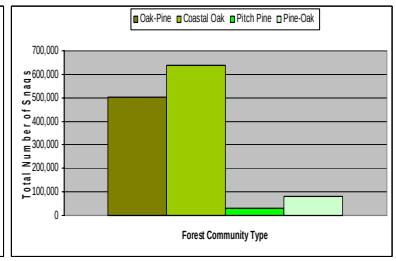


Figure 4: Estimated abundance of available wildlife habitat in each of the communities sampled.

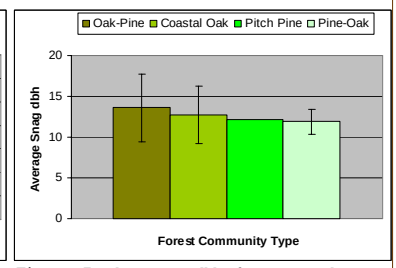


Figure 5: The average dbh of snags in each community type with their relative standard deviation.

## CONCLUSION AND DISCUSSION

The community types examined in this research follow a pattern of succession that generally starts with pitch pine forest, which is then succeeded by pine-oak forest, oak-pine forest, and finally reaches coastal oak, the climax community. In their natural state, the CPB communities are dependent on wildfires to convert them from a later stage, such as coastal oak forest, to an earlier stage, such as pine-oak forest [2]. Based on the fact that pitch pine forest exists as a result of disturbance by wildfires, and coastal oak forest exists as the result of a lack of disturbance by wildfires, we would expect to see the greatest abundance of snags in coastal oak forest. Consequently, we would expect that amount to decline in oak-pine forest, pine-oak forest and pitch pine forest, respectively.

The data clearly show that the coastal oak forest community in the CPB contains the greatest abundance of available habitat in the form of snags. As expected that amount declines in oak-pine forest, pine-oak forest, and pitch pine forest. However, statistical analysis should be conducted to determine if we have sampled enough plots in each community type for the data to be statistically significant, and if we haven't, further analysis is needed to determine the number of additional plots that need to be sampled in each community type to make the data statistically significant. Average dbh's show that the oak-pine forest community contains the largest average dbh, although, as seen in Figure 3, when the standard deviation is applied to the data it shows there is no difference in the range of dbh's in the different community types. Pitch pine forest and pine-oak forest, again, lack a sufficient number of plots to represent them in this research; there was only one snag in the five pitch pine forest plots, so a standard deviation could not be applied.

This research is the first step in an ongoing project to monitor the health of the CPB. The baseline data presented in this paper gives a general idea of the abundance and average densities of snags in the CPB, and when it is linked with data from future sampling it can be used as an indicator to help establish the health of the forest. When the data is complete research needs to be conducted on the cavity dependent species of the CPB to determine how snag/ha is optimal for each of those species to sustain a healthy population. Then, by overlapping the optimal amount snag/ha each species needs and comparing that to what's available to them in the different community types the diversity of wildlife populations in those community types can be estimated and that information can be used to aid in the development of future environmental management plans for the CPB. To enhance future data it is suggested that modifications be made to future sampling protocols to include the condition of the snags as in [4,5,6], the number of foraging/nesting cavities as in [6], what species of animal, if any, is using the snag and for what purpose as in [6].

**Figure 1:** A flying squirrel using a cavity in a 12.2dbh hardwood snag for habitat.

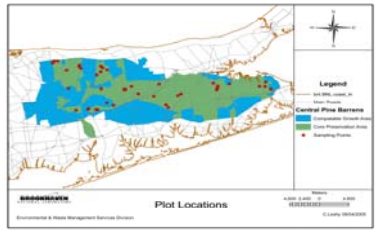


**Figure 2:** A map of the locations of the forty randomly located plots within the CPB.

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