

# Replication of the Smiley- George Transect of 1971

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## Introduction

Mohonk Trust, renamed Mohonk Preserve in 1978, was the first land trust dedicated to the preservation of the Shawangunk Mountain Ridge and is one of the oldest land conservation organizations in the Hudson Valley<sup>1</sup>. The preserve serves to promote the protection and management of land for public enjoyment and conservation through four key program areas: land stewardship, land protection, education, and research<sup>1</sup>. The research center was founded by Daniel Smiley in 1980 and today continues to add to the over 80 years of natural and cultural history records and more than 110 years of weather data, which makes up the oldest and most extensive natural history record in the Hudson Valley Region<sup>1</sup>. Because of the Preserves extensive long-term records, this makes it a unique place to do research.

Currently, research at Mohonk Preserve focuses on studies that are extremely important to conduct in order to observe the impact of global climate change, monitor the changes of forest composition over time, see changes as a result of land use, examine change in biodiversity of forest, and to analyze species behavior based on forest change<sup>1</sup>.

In 1971 Daniel Smiley and Carl J. George conducted a detailed vegetational ecology study of the preserved land<sup>2</sup>.

## Methods



Figure 1: Map of Transect Line

In 1971 Daniel Smiley and Carl J. George established a 1.75 mile transect line (Figure 1), starting in the west and running directly east across the preserve<sup>2</sup>. The transect is comprised of 248 sample points which are spaced out evenly every 10 meters<sup>2</sup>. Eight metal pipes were fixed along the transect for further study<sup>2</sup>.

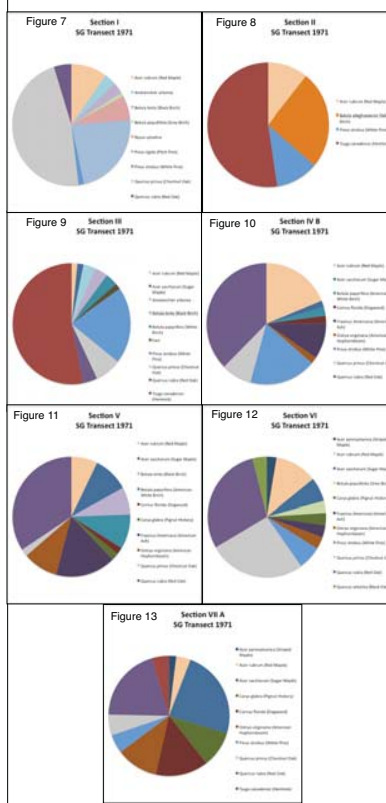


Figure 2: Random Pairs method<sup>2</sup>

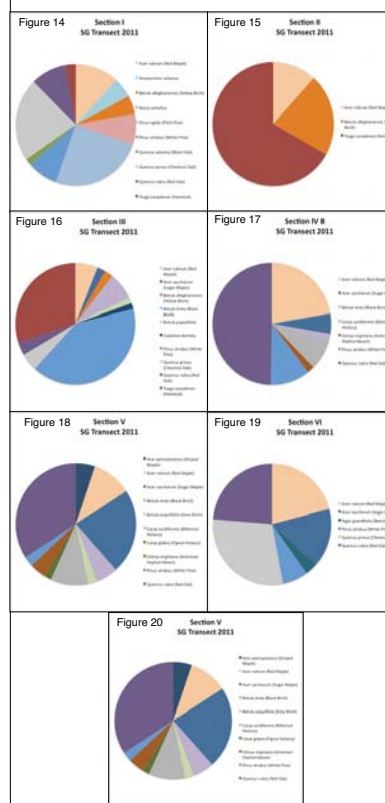
Originally in 1971 the transect was broken up into ten sections based on topography and vegetation<sup>2</sup>. In this replication only seven of the ten sections were analyzed (I, II, III, IV B, V, VI, and VII A).

The Random Pairs method (Figure 2) of data collection was used in both studies. Using this method, the  $D_{130}$  was measured for the front tree, if it was 4.77 cm or greater in diameter<sup>2</sup>. A second tree was identified by facing the front tree and visualizing a 180° exclusion angle<sup>2</sup>. Once identified, its diameter was measured and the distance between this tree, the rear tree, and the front tree was measured. The data collected was then analyzed and used to determine importance values for each of the tree species within each section.

## 1971 Results



## 2011 Results



## Conclusions

Table 2: Summary of changes in importance values across all sections. For the bases of this study, 5.00% change is considered noteworthy.

Section	Decrease in Importance Value	Increase in Importance Value
I	<i>Quercus prinus</i>	<i>Pinus strobus</i> , <i>Betula alleghaniensis</i> , <i>Quercus rubra</i>
II	<i>Pinus strobus</i>	<i>Tsuga canadensis</i>
III	<i>Tsuga canadensis</i>	<i>Pinus strobus</i>
IV B	<i>Pinus strobus</i> , <i>Quercus prinus</i> , <i>Fraxinus Americana</i>	<i>Quercus rubra</i> , <i>Carya cordiformis</i>
V	<i>Ostrya virginiana</i> , <i>Betula papyrifera</i> , <i>Fraxinus Americana</i>	<i>Acer saccharum</i> , <i>Carya cordiformis</i> , <i>Acer pennsylvanica</i>
VI	<i>Quercus rubra</i>	<i>Acer rubrum</i> , <i>Acer saccharum</i>
VII A	<i>Tsuga canadensis</i> , <i>Pinus strobus</i> , <i>Carya glabra</i> , <i>Cornus florida</i>	<i>Acer saccharum</i> , <i>Ostrya virginiana</i> , <i>Quercus rubra</i>

• In general, *Pinus Strobus* (White Pine) decreased in importance value by 5.00% in three out of the seven sections studied.

• In general, *Quercus rubra* (Red Oak) and *Acer Saccharum* (Sugar Maple) increased in importance value by 5.00% in three out of the seven sections studied.

• Overall in three out of the seven sections studied, it appears that diversity has increased.

• The Coefficient of Community (Similarity) Index ranged from 64.3- 82.0 throughout the seven sections.

• To better interpret these changes and find potential explanations, future studies may focus on:

- Weather events
- Anthropogenic causes
- Biological impacts

## Literature cited

- 1) Mohonk Preserve. Accessed September 10, 2011. <www.mohonkpreserve.org>
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- 4) Krebs, Charles J. Ecological methodology. Harper & Row, Publishers; New York, 1989.

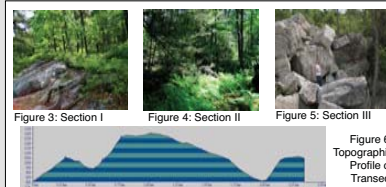


Figure 3: Section I Figure 4: Section II Figure 5: Section III

Figure 6: Topographic Profile of Transect

## Diversity Index and Coefficient of Community<sup>4</sup>

The Simpson's diversity Index takes into account both the richness and evenness of each species within a community<sup>4</sup>. A low diversity index indicates low species diversity<sup>4</sup>. Importance values are used to express this value.

The coefficient of community is a widely used index of similarity, this index ranges from 0 to 100 to indicate communities with no species in common to 100 to indicate two communities with identical species composition<sup>4</sup>. Importance values are used to express this value.

Section	Diversity Index 1971	Diversity Index 2011	Coefficient of Community
I	3.9	7.5	71.1
II	2.6	1.7	82.0
III	3.6	4.4	65.7
IV B	5.7	4.0	70.7
V	6.6	6.9	63.4
VI	9.2	5.5	74.4
VII A	6.9	3.6	64.4

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