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Plant Species Composition and Diversity

Stand 10, Inventory, 2017

This report is from understory data. Only live observations are included in the analysis. There are thirty four plot clusters in this stand.

Species Occurrence and Abundance

This table combines all height classes (if applicable) into a statistical summary for the understory, sorted by importance value.

Occurrence and Abundance

	Density	Rel Density	Frequency	Rel Frequency	Importance Value
swamp white oak	347.6	49.37	58.82	52.63	51.00
green ash	169.3	24.05	14.71	13.16	18.60
American elm	53.5	7.59	8.82	7.89	7.74
American sycamore	44.6	6.33	8.82	7.89	7.11
silver maple	35.7	5.06	5.88	5.26	5.16
common hackberry	26.7	3.80	5.88	5.26	4.53
pin oak	17.8	2.53	5.88	5.26	3.90
red mulberry	8.9	1.27	2.94	2.63	1.95
Totals	704.10	100.00	111.76	100.00	100.00

Description of Table Items:

- **Density** = Mean number of stems per acre, based on stems counted in each plot cluster.
- **Relative (Rel) Density** = Mean relative proportion or abundance of stems per acre by species. The mean number of stems of a particular species divided by total number of stems.
- **Frequency** = The percentage of plot clusters where this species was observed, based on the number of plot clusters where species occurred divided by total number of plot clusters.
- **Relative (Rel) Frequency** = Relative frequency of occurrence, based on individual species frequency divided by the total of all species frequencies.
- **Dominance** = No observations exist where Basal Area is greater than zero. Dominance calculations can not be made.
- **Importance Value** = A value computed by arbitrarily adding together the relative values and dividing by the number of non-zero relative values.

Species Statistics By Height Class

This table displays density (number of stems per acre) by species in each height class.

Density

Species	< 1.0	1.0 - 3.0	3.0 - 5.0	5.0 - 10.0	>= 10.0	Totals

swamp white oak	71.3	258.5	17.8			347.6
green ash	62.4	26.7	62.4	8.9	8.9	169.3
American elm		26.7		17.8	8.9	53.5
American sycamore		8.9	35.7			44.6
silver maple		17.8		17.8		35.7
common hackberry		8.9		8.9	8.9	26.7
pin oak		8.9	8.9			17.8
red mulberry	8.9					8.9
Totals	142.6	356.5	124.8	53.5	26.7	704.1

Species Diversity

Measures of diversity are important in management and in environmental monitoring. Diversity relates to the variety and abundance of species in different areas, and most measures of diversity are related to species richness, species evenness (pattern of distribution of species), or heterogeneity. Hence, there are a variety of ways to measure and interpret diversity. The selection of a particular measure of diversity depends on sample size, availability of abundance data, and whether one is interested in species richness, evenness, or both.

Species Observed in the Stand

There were nine species observed, based on a sample of thirty four clusters with a total of thirty four plots, each plot 0.0033 acres in size, representing a total of 0.1122 acres sampled (11.2200 percent of the total stand area).

Core Flora

The core flora are those species common to every plot cluster. For this stand, none of the species are found in all plot clusters.

Measures of Similarity (Beta-diversity)

These measures provide an idea of stand-level diversity by indicating how the set of samples vary in terms of the variety and/or abundance of species found among them. With the exception of Whittaker's measure, each sample is compared with all other samples, one at a time, until all possible sample-pairs are computed. The stand level value is the mean of all sample-pairs.

The following table shows each measure with sample mean and range.

Similarity Indexes

Measure	Index	Range
Sørensen's Similarity Coefficient	0.2590	0.0000 - 1.0000
Jaccard's Similarity Coefficient	0.2086	0.0000 - 1.0000
Whittaker's Similarity Coefficient	6.1579	N/A*
Renkonen's (Percent Similarity)	22.0737	0.0000 - 100.0000
Morisita-Horn Similarity Index	0.4905	0.0000 - 1.0000

*Whittaker's measure is computed on multiple samples simultaneously, and therefore no individual sample pair values are computed.

- **Sørensen's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that occur in both samples.
- **Jaccard's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that are unique to each sample.
- **Whittaker's Similarity Coefficient** - Based on presence-absence of species. Low values indicate stronger similarity, and higher values indicate little or no similarity. The fewer species that samples share, the higher the value of Whittaker's measure (higher diversity or conversely, lower similarity).
- **Renkonen's Index (Percent Similarity)** - Based on abundance data, specifically, the relative abundance of species. Values range from 0-100, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Stems Per Unit Area' was used in the calculation.
- **Morisita-Horn Similarity Index** - Based on abundance data and somewhat sensitive to the most highly abundant species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Stems Per Unit Area' was used in the calculation.

Vegetation and Site Quality

Vegetation is often used as an indicator of site quality. Some tree species have relatively narrow requirements and their presence is indicative of a particular site. Many tree species can occur on a wide variety of sites. Their presence offers little indicator value, but their relative abundance and size may be important. Herbaceous species often are more restricted in their requirements, and may be more useful than tree species as plant indicators. Care must be taken to account for factors that are unrelated to site quality, such as plant competition, herbivory, and past events in the history of a stand such as drought, insects, and human disturbance. Also, species may be absent purely by chance. In highly disturbed, well-lighted conditions, interpretation of ground-cover species can be problematic, as they may only indicate high light intensity. Furthermore, the indicator value of species can change regionally with changes in climate and physiography.

Suggested Reading

- *Barnes, B.V., Zak, D.R., Denton, S.R., and Spurr, S.H. 1998. Forest Ecology, ed. 4. John Wiley and Sons, Inc., New York. 774 pp.*
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- *Spies, T.A., and Barnes, B.V. 1985. Ecological species groups of upland northern hardwood-hemlock forest ecoystems of the Sylvania Recreation Area, Upper Peninsula of Michigan. Can. J. For. Res. 15:961-972.*