

1954

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Recommended Citation

Dimit, James E. and Russell, Norman H. (1954) "A Sampling Study of the Blue Point Woods, Poweshiek, Co., Iowa," *Proceedings of the Iowa Academy of Science*: Vol. 61: No. 1, Article 11.
Available at: <https://scholarworks.uni.edu/pias/vol61/iss1/11>

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A Sampling Study of the Blue Point Woods, Poweshiek, Co., Iowa

By JAMES E. DIMIT AND NORMAN H. RUSSELL

During the fall of 1953 a study was made of the Blue Point Woods, an area located approximately nine miles southeast of Grinnell, in Section 14 of Washington Township, Poweshiek County, Iowa.

The Blue Point forest is clearly divided into three stands, two of which are approximately the same age and older than the last. These stands are oriented in a north-south direction. From north to south, respectively, we find an old, grazed stand; a younger, cut-over stand; and a very old, undisturbed stand. The old, grazed stand is fairly open with little in the way of herbaceous and frutescent layers other than blue grass (*Poa pratensis*) and *Ribes* spp. The younger, cut-over stand is densely populated with trees, shrubs, and herbs. The undisturbed stand is made up of many large trees forming a dense canopy. The herbaceous and frutescent layers are also well developed and include many transgressives and tree seedlings. The investigation occurred so late in the year that no attempt was made to sample the herbaceous flora.

HISTORY

Prior to 1850 all except the northeast corner of Section 14, of which the Blue Point forest is a part, was timbered. The area under discussion was taken over by the Beeler family in 1850 and remained in that family until 1938. Since then several other farmers in the vicinity have purchased various parts of it, notably Mr. Henry Koger, who now owns the greater part of the sampled area.

The undisturbed stand has been neither grazed nor cut for at least twenty years. It is entirely possible that it has never been unduly disturbed, except for the southwest corner, which was cut in 1932. This stand (#I) is composed of twenty acres.

The younger stand (#II) was cut over during the winter of 1932. It never has been grazed intensively, and has not been grazed at all the past two years. It is about ten acres in area.

The old, grazed stand (#III) is approximately the same area as the undisturbed stand. However, it has been grazed intensively

by cattle for many years. It is the same size as the undisturbed stand, twenty acres.

GEOLGY, SOILS, AND CLIMATE

Almost the entire surface of the area is covered by the Kansan drift. Over a considerable part of the area this is covered by a thin coat of loess. The Kansas drift is underlain by the Des Moines Stage of the Pennsylvanian Series in this area (Stookey, 1910). There were no outcroppings of these rocks in the Blue Point forest, however.

The soil covering the greater part of the area studied is Tama silt loam. Two other loess soils of approximately equal area occurring in the studied region are the Muscatine silt loam and Clinton silt loam, and the Shelby loam, a drift soil, is found on the eastern edge of the area (Brown, et al, 1935). The Blue Point woods are in the Skunk River drainage system.

The length of the growing season in the Grinnell area is approximately 165 days, slightly greater than that for the state as a whole, which is 158 days, from May 2nd to October 7th. The maximum temperature recorded at Grinnell is 110° F., the minimum temperatures -31° F. The average annual precipitation for Poweshiek County is 33.5" (U.S.D.A., 1941).

METHODS

The random pairs method of sampling (Cottam and Curtis, 1949) was used in the present study. In the field studies the authors undoubtedly deviated somewhat from the original method, so some discussion is deemed necessary.

The investigator establishes several lines, approximately equidistant from each other, through the area to be sampled. He will then move along the first line and when several yards inside the stand insert a stake in the ground. The first member of the randomly selected pair is now chosen. It is the nearest tree, 5" DBH or greater, to the stake. Now the second member of the random pair is sought. It is that tree, 5" DBH or more, which is outside an angle of 160° (with the first tree in its center) and nearest the first member of the random pair. The distance between the two trees is measured and their diameter at breast height determined. A plot three feet wide between the two trees is then surveyed for shrub presence and tree reproduction. The investigator next follows the established line to a distance ten paces (or more, depending upon relative tree density) from the original position of the stake and again inserts the stake in the

ground. He now establishes the position of the first member of the second random pair and continues as he did in the case of the first random pair. The minimum number of points necessary for statistically significant results depends upon the homogeneity of the sampled stand and also its total size. Using this method one may obtain frequency percent, density, basal area, size class, and other kinds of sociological data.

DISCUSSION OF STANDS

Stand No. 1

The four dominants were *Ulmus americana*¹, *Quercus velutina*, *Carya ovata*, and *Quercus macrocarpa*, in the approximate order of their importance in the stand (Table 1). Only American elm and the hickory were found in all four size classes and seemed to be reproducing themselves successfully. This may indicate the future trend of this forest. This twenty acres has not been grazed in the past. There has been some cutting in the southwest corner of the stand over an area of approximately three acres, and immediately after the sampling was completed a number of trees were cut in the middle of the stand. It is doubted that this will change the composition of the stand greatly.

Conard (1952) does not describe this exact type of woodland, though his "Ulmetum" may include this. Actually there was enough variation in these few acres to include several of the described communities or "associations" of Conard. In the opinion of the present authors there is little to indicate that this stand will change appreciably in the future, unless, of course, disturbance by man increases.

Stand No. 2

In this stand, on the basis of .24 random pairs, we find the same four dominants, in the same order of importance, as in Stand No. 1. However, there are two accessory species, *Populus tremuloides* and *Morus rubra*, contributing to the canopy here which were not found in the other two stands (Table 2). In addition, the trees are much smaller and younger; the area was clearcut in 1932. The frutescent layer was very thick, consisting of *Crataegus* sp., dogwoods (*Cornus* spp.), *Ribes*, and *Rubus* spp. In addition, tree reproduction was more dense here than in either of the other two stands.

¹Fernald (1950) has been used as the authority for all scientific names.

Table 1
Sampling data for arborescent and frutescent layers of Stand #1.¹

Species	Freq. %	Density	% Dens.	Basal Area (sq.ft.)	Basal Area %	No. Size Classes ²	Reprod.	Reprod. %
ULMUS AMERICANA	80.0	72	55.8	27.945	30.1	4	148	49.8
QUERCUS VELUTINA	17.5	11	8.5	30.588	32.9	2	8	2.6
CARYA OVATA	40.0	25	19.4	21.625	23.1	4	10	3.3
QUERCUS MACROCARPA	17.5	14	10.8	11.665	12.5	3	5	1.7
PRUNUS SEROTINA	7.5	3	2.3	.485	.5	2	1	.3
QUERCUS ALBA	2.5	1	.9	.785	.8	1	—	—
CELTIS OCCIDENTALIS	2.5	3	2.3	.034	.04	1	—	—
CORNUS DRUMMONDI							62	21.2
RIBES spp.							39	13.1
XANTHOXYLUM AMERICANUM							15	5.0
ACER NEGUNDO							5	1.7
CORYLUS GORNUTA							3	1.0
CRATAEGUS sp.							1	.3
Totals.....		129		93.127			297	

¹Average distance between trees—27' 11".

²Size classes recognized. Seedling—0-3' high; Sapling—3' high or more and below 1" DBH; Transgressive—1" DBH—4" DBH; Adult—5" DBH or more.

Table 2
Sampling data for arborescent and frutescent layers of Stand #II.¹

Species	Freq. %	Den- sity	% Dens.	Basal Area (sq.ft.)	Basal Area %	No. Size Classes	Reprod.	Reprod. %
ULMUS AMERICANA	62.5	21	31.3	6.131	34.5	4	8	5.0
QUERCUS VELUTINA	45.8	14	23.2	6.076	34.2	3	2	1.3
CARYA OVATA	54.2	19	27.3	2.912	16.4	4	5	3.1
QUERCUS MACROCARPA	16.6	5	7.4	1.260	7.1	3	5	3.1
POPULUS TREMULOIDES	5.0	4	5.9	.719	4.1	3	3	1.9
MORUS RUBRA	4.2	1	1.6	.545	3.1	1	—	—
PRUNUS SEROTINA	4.2	1	1.6	.087	.5	2	1	.7
CRATAEGUS sp.	4.2	2	1.7	.012	.1	3	18	11.2
CORNUS DRUMMONDI							53	33.1
RIBES spp.							43	26.9
CORYLUS CORNUTA							22	13.7
Totals.....		67		17.742			160	

¹Average distance between trees—23' 2".

Table 3

Sampling data for arborescent and frutescent layers of Stand #III.¹

Species	Freq. %	Den- sity	% Dens.	Basal Area (sq.ft.)	Basal Area %	No. Size Classes	Reprod.	% Reprod.
QUERCUS MARCOCARPA	50.0	29	35.4	25.407	33.7	2	2	1.3
CARYA OVATA	55.0	25	30.5	24.460	32.4	4	1	.8
ULMUS AMERICANA	30.0	17	20.7	8.514	11.2	3	90	62.4
QUERCUS VELUTINA	7.5	3	3.6	7.608	10.1	3	6	4.2
ULMUS RUBRA	15.0	8	9.8	9.549	12.6	2	2	1.3
RIBES spp.							39	27.1
PRUNUS SEROTINA							2	1.3
CRATAEGUS sp.							1	.8
CORNUS DRUMMONDI							1	.8
Totals.....		82		75.538			144	

¹Average distance between trees—27' 4".

An interesting feature of this stand is the presence of the same dominants, in similar proportions, as in the undisturbed stand (#I). Clearcutting has apparently not disturbed the over-story, though it has very markedly changed both frutescent and herbaceous layers.

Stand No. 3

In this stand the four dominants remain the same as in the two stands previously discussed, but their order of importance is almost exactly reversed, bur oak and shagbark hickory now being the primary dominants (Table 3). In addition a new species, *Ulmus fulva*, is of some importance. The decrease of importance of American elm and appearance of slippery elm may be taken as an indication of somewhat drier soil in this stand (Conard, 1952, p. 16). As the topography is the same here as in the two previous stands, this increase in dryness is undoubtedly due to the influence of grazing. The twenty acres of Stand #III have been intensively grazed for many years. Both shrub and herb strata are poorly represented, and tree reproduction is low. Only the American Elm has many transgressives, and it is thought that the majority of these do not survive long.

If this area continues to be heavily grazed, it will, of course, mean the end of the forest. Already, most of the trees have disappeared in the northeast part of the area, and the forest has become very open elsewhere. Practically all the forest herbs have disappeared, and a sparse layer of bluegrass (*Poa pratensis*) is all that remains of much of the herb layer.

CONCLUSIONS

On the basis of the tabular data, acquired from forty random points in each of the twenty-acre tracts and twenty-four in the ten-acre stand, it may be seen that four species are dominant in each of the three stands. In Stands #I and #II, the undisturbed and clearcut stands respectively, these dominants are present in the same order of importance, indicating that cutting has only a temporary effect on the canopy trees in this particular region. If a good seed source of the dominants had not been nearby, this probably would not have been true, however.

Grazing does seem to markedly change the composition of the canopy though, as indicated by the sampling data for Stand #III. The importance of the four dominants was reversed, indicating drier conditions. *Quercus macrocarpa* and *Carya ovata* assumed primary dominance and *Ulmus fulva* appeared.

The Blue Point woods would represent a phase or phases of the Oak-hickory community, Mississippi Valley Section, Northern Division of the Oak-Hickory Forest Region, as Braun (1950), describes it. The differences among the three stands are due primarily to the operation of biotic factors. Though the future of these three stands cannot be accurately predicted, it may be speculated that Stand #I, at least, is very nearly climax at present, and that both Stands #II and #III would return to the conditions of Stand #I, if cutting and grazing were to cease.

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