

Survey of the Woody Vegetation of the Kankakee Sand Area Section of Indiana and Illinois

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Introduction

The Kankakee Sand Area Section of the Grand Prairie Division (Schwegman, 1973) is located in northeastern Illinois and northwestern Indiana, with its best floristic development in Kankakee and Iroquois Counties, Illinois, and Newton County, Indiana. Sand prairies, marshes, and sand flatwoods were the predominant habitats of the poorly drained sites of this section before the land was drained for cultivation, while sand savannas were common on the drier sites.

All forest communities studied are located in the Iroquois County Conservation Area, Iroquois Co., Illinois, and the Willow Slough Fish and Wildlife Area, Newton Co., Indiana. The sand savanna communities are located on Plainfield fine sand (Wascher, Smith, and Odell, 1951). This fine sand is a light-colored soil derived from wind blown deposits. The sand sediment from which they were derived was deposited in Lake Watseka and Lake Wauponsee during the Kankakee Torrest which occurred during a major readvance of the Wisconsin Glacier about 13,000 years ago. Presently the sand savanna communities occur on the slopes and ridges of these dunes. The sand flatwood communities occur in depressions between the dunes on Iroquois fine sandy loam (Wascher, Smith, and Odell, 1951). This soil type usually consists of 1 meter or more of acid, peaty sand over thin layers of silt or clay (White, 1978). The present study was undertaken to determine the floristic composition of these forest communities.

Materials and Methods

The forested areas studied varied from one to two hectares in size. Each area was divided into quadrats 25 m on a side (0.15 acres), and the species, number, and size was recorded for each tree above 4 inches d.b.h. (10 cm). All living and dead-standing trees were identified and measured to the nearest 1/10 inch. The Importance Value (IV) was then calculated for each species in each of the forests sampled. As used here, the IV determination follows the procedure developed by McIntosh (1957) in which the IV is the sum of the relative density, relative dominance, and relative frequency. Also, the extent of coppice growth (multiple stemmed trees) in each area was determined, as well as the number of individuals and basal area (square feet) in broad diameter classes.

In each of the quadrats one 1/10,000 and one 1/100 hectare nested, circular plots were randomly located. The saplings (1-4 inches d.b.h.) were tallied on the larger plot, and the seedlings (less than 1 inch d.b.h.) on the smaller. Density and frequency of seedlings and saplings were calculated from these data. The nomenclature used in this paper follows Mohlenbrock (1975).

Results and Discussion

A total of eight forest areas were studied, four dry sand savanna communities, two dry-mesic sand savanna communities, and two sand flatwood communities. All tree species encountered in each area with their relative values, average diameters, and number and basal area per hectare in broad diameter classes, are included in Tables 1, 2, and 3. An additional listing of seedling and sapling density and frequency for

TABLE 1. Number of trees and basal area per hectare by diameter classes, average diameters, relative values, and Importance Values of the woody vegetation in four dry sand savanna communities in the Kankakee Sand Area Section of northern Indiana and Illinois.

	Number of Trees and Basal Area per Hectare										Relative Values				Av. Diam. in.		
	4-6		7-12		13-18		19+		Totals		Rel. Freq.	Rel. Den.	Rel. Dom.	I. V.			
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.					
SITE 1. Willow Slough Fish and Wildlife Area, Newton Co., Indiana (Sec 5 T29N R9W).																	
<i>Quercus velutina</i>	5	1.0	175	102.3	48	57.5	2	4.8	230	165.6	100.0	100.0	100.0	100.0	300.0	11.2	
SITE 2. Iroquois County Conservation Area, Iroquois Co., Illinois (Sec 24 T29N R11W).																	
<i>Quercus velutina</i>	25	4.3	61	33.7	50	67.7	12	27.6	148	133.3	94.1	98.3	99.1	291.5	12.0		
<i>Quercus alba</i>	—	—	3	1.2	—	—	—	—	3	1.2	5.9	1.7	.9	8.5	9.1		
Totals	25	4.3	64	34.9	50	67.7	12	27.6	151	134.5	100.0	100.0	100.0	300.0			
SITE 3. Willow Slough Fish and Wildlife Area, Newton Co., Indiana (Sec 18 T29N R9W).																	
<i>Quercus velutina</i>	45	6.6	98	58.7	68	84.1	16	38.2	227	187.6	80.0	97.8	97.0	274.8	11.5		
<i>Quercus alba</i>	1	.1	2	.8	—	—	2	5.0	5	5.9	20.0	2.2	3.0	25.2	12.8		
Totals	46	6.7	100	59.5	68	84.1	18	43.2	232	193.5	100.0	100.0	100.0	300.0			
SITE 4. Iroquois County Conservation Area, Iroquois Co., Illinois (Sec 24 T29N R11W).																	
<i>Quercus velutina</i>	17	2.3	35	19.6	45	63.7	15	36.7	112	122.3	66.7	77.8	82.7	227.2	13.1		
<i>Quercus alba</i>	10	1.7	10	6.3	10	13.0	2	4.6	32	25.6	33.3	22.2	17.3	72.8	11.1		
Totals	27	4.0	45	25.9	55	76.7	17	41.3	144	147.9	100.0	100.0	100.0	300.0			

TABLE 2. Number of trees and basal area per hectare by diameter classes, average diameters, relative values, and Important Values of the woody vegetation in two dry-mesic sand savanna communities in the Kankakee Sand Area Section of northern Indiana and Illinois.

	Number of Trees and Basal Area per Hectare										Relative Values				Av. Diam. in.
	4-6		7-12		13-18		19+		Totals		Rel. Freq.	Rel. Den.	Rel. Dom.	I. V.	
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.					
SITE 5. Iroquois County Conservation Area, Iroquois Co., Illinois (Sec. 24 T29N R11W).															
<i>Quercus velutina</i>	29	4.6	71	43.0	20	26.8	12	30.1	132	104.5	53.3	67.3	72.2	192.8	11.1
<i>Quercus alba</i>	24	3.4	21	11.1	16	20.6	2	4.8	63	39.9	43.3	32.2	27.6	103.1	9.7
<i>Prunus serotina</i>	1	.2	—	—	—	—	—	—	1	.2	3.4	.5	.2	4.1	5.9
Totals	54	8.2	92	54.1	36	47.4	14	34.9	196	144.6	100.0	100.0	100.0	300.0	
Site 6. Willow Slough Fish and Wildlife Area, Newton Co., Indiana (Sec 5 T29N R9W).															
<i>Quercus alba</i>	54	9.1	63	34.9	32	39.5	3	8.3	152	91.8	48.5	51.7	44.6	144.8	9.6
<i>Quercus velutina</i>	9	1.6	79	45.3	42	54.0	3	7.2	133	108.1	45.5	45.2	52.6	143.3	11.2
<i>Quercus coccinea</i>	—	—	6	2.6	3	3.1	—	—	9	5.7	6.0	3.1	2.8	11.9	10.5
Totals	63	10.7	148	82.8	77	96.6	6	15.5	294	205.6	100.0	100.0	100.0	300.0	

TABLE 3. Number of trees and basal area per hectare by diameter classes, average diameters, relative values, and Important Values of the woody vegetation in two sand flatwood communities in the Kankakee Sand Area Section of northern Indiana and Illinois.

	Number of Trees and Basal Area per Hectare										Relative Values					I. V.	Av. Diam. in.
	4-6		7-12		13-18		19+		Totals		Rel. Freq.	Rel. Den.	Rel. Dom.				
No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.						
SITE 7. Willow Slough Fish and Wildlife Area, Newton Co., Indiana (Sec 18 T29N R9W).																	
<i>Quercus palustris</i>	25	4.0	114	65.6	57	75.7	8	19.9	204	165.2	45.7	65.4	69.9	181.0	11.5		
<i>Quercus alba</i>	23	3.8	26	12.7	10	14.2	12	35.2	71	65.9	28.6	22.8	27.9	79.3	11.3		
<i>Nyssa sylvatica</i>	35	4.3	2	.8	—	—	—	—	37	5.1	25.7	11.8	2.2	39.7	4.9		
Totals	83	12.1	142	79.1	67	89.9	20	55.1	312	236.2	100.0	100.0	100.0	300.0			
SITE 8. Iroquois County Conservation Area, Iroquois Co., Illinois (Sec 24 T29N R11W).																	
<i>Quercus palustris</i>	159	27.1	275	126.5	19	24.0	3	7.7	456	185.3	60.0	91.8	92.8	244.6	8.2		
<i>Quercus alba</i>	22	3.8	14	5.2	3	5.0	—	—	39	14.0	30.0	7.6	7.0	44.6	7.5		
<i>Nyssa sylvatica</i>	3	.3	—	—	—	—	—	—	3	.3	10.0	.6	.2	10.8	4.3		
Totals	184	31.2	289	131.7	22	29.0	3	7.7	498	199.6	100.0	100.0	100.0	300.0			

TABLE 4. Frequency and density of seedlings and saplings in six sand savanna communities and two sand flatwood communities in the Kankakee Sand Area Section of northern Indiana and Illinois.

	Seedlings		Saplings	
	Freq. %	#Ind.	Freq. %	#Ind.
SITE 1: Dry Sand Savanna				
<i>Quercus velutina</i>	25	2500	19	50
SITE 2: Dry Sand Savanna				
<i>Quercus velutina</i>	53	8125	56	150
<i>Quercus alba</i>	—	—	13	16
<i>Prunus serotina</i>	—	—	13	25
Totals		8125		191
SITE 3: Dry Sand Savanna				
<i>Quercus velutina</i>	81	25625	69	206
<i>Quercus alba</i>	—	—	13	50
<i>Prunus serotina</i>	6	625	50	81
<i>Sassafras albidum</i>	15	5000	13	13
Totals		31250		350
SITE 4: Dry Sand Savanna				
<i>Quercus velutina</i>	63	15625	38	88
<i>Quercus alba</i>	6	125	44	63
<i>Prunus serotina</i>	—	—	13	25
<i>Sassafras albidum</i>	6	125	—	—
Totals		15875		176
SITE 5: Dry-mesic Sand Savanna				
<i>Quercus velutina</i>	38	4375	50	175
<i>Quercus alba</i>	—	—	44	113
<i>Prunus serotina</i>	6	625	13	19
Totals		5000		307
SITE 6: Dry-mesic Sand Savanna				
<i>Quercus alba</i>	50	7500	63	181
<i>Quercus velutina</i>	13	2500	25	106
<i>Sassafras albidum</i>	6	625	25	106
<i>Prunus serotina</i>	—	—	44	106
<i>Nyssa sylvatica</i>	—	—	6	13
Totals		10625		512
SITE 7: Sand Flatwood				
<i>Quercus palustris</i>	25	8750	13	38
<i>Quercus alba</i>	—	—	19	38
<i>Nyssa sylvatica</i>	—	—	38	256
Totals		8750		332
SITE 8: Sand Flatwood				
<i>Quercus palustris</i>	13	4375	19	25
<i>Quercus alba</i>	—	—	6	6
Totals		4375		31

all woody species encountered in each area is shown in Table 4, while the number of dead-standing trees, and the extent of coppice growth in each area is shown in Table 5.

TABLE 5. *Number and basal area of dead-standing trees, and the extent of coppice growth in six sand savanna communities and two sand flatwood communities in the Kankakee Sand Area Section of Indiana and Illinois.*

SITE	Dead-standing trees per hectare		Coppic growth per hectare	
	No.	B.A.	% stems	% B.A.
1	45	12.5	14	13
2	8	5.4	42	28
3	21	17.6	20	20
4	14	14.3	18	12
5	4	3.5	43	34
6	19	6.0	32	26
7	51	25.9	20	20
8	113	15.9	41	33

In the dry sand savanna communities studied (Sites 1 thru 4), which are common on the ridges and upper slopes of dunes, *Quercus velutina* Lam. is the dominant species, accounting for nearly all of the Importance Value. The only other tree species encountered is *Q. alba* L., which varies in Importance Value from 8.5 to 72.8 (Table 1). At sites 2 and 4, located at the Iroquois County Conservation Area, the number of stems per hectare varies from 144 to 151; while on sites 1 and 3, located at the Willow Slough Fish and Wildlife Area, the number varies from 230 to 232. This difference is due to the excessive number of individuals in the 7-12 inch diameter class, and indicates that the forests at the Willow Slough Fish and Wildlife Area have not been burned as often. At the Iroquois County Conservation Area most sites are burned every three years (site manager-personal communication), while at the Willow Slough Fish and Wildlife Area fire has just recently been used in forest management (John Bacone-personal communication). Except for site 1, which was burned during the spring, the number of seedlings found is relatively high (Table 4). Few of these survive, however, as indicated by the low density of saplings (50 to 350 per hectare).

The dry-mesic sand savanna communities studied (Sites 5 and 6) occur on the lower slopes of the dunes. In this community type both *Quercus velutina* and *Q. alba* are important stand components with each species accounting for about half of the Importance Value. At these sites the number of individuals per hectare varies from 196 to 294, while the basal area per hectare ranges from 144 to 205 square feet (Table 2). Seedling density is also relatively high in these communities (Table 4), although saplings are not very extensive (307 to 512 per hectare). The larger number of seedlings, saplings, and trees per hectare on the dry-mesic sand savanna at the Willow Slough Fish and Wildlife Area (Site 6) is probably due to fire suppression in the past.

The sand flatwood communities studied (Sites 7 and 8) occur in depressions between dunes. Here *Quercus palustris* Muenchh. is dominant, accounting for 60 to 80% of the Importance Value. *Quercus alba*, with an IV of 44 to 79 is also common, particularly at slightly higher elevations, while *Nyssa sylvatica* Marsh. is occasionally encountered (Table 3). These forests have the highest tree densities encountered during the present study (312 to 498 stems per hectare). Water availability and fire suppression at these sites probably account for these higher densities. The large number of individuals (nearly 500) at site 8, and the low average diameter indicate that this site was cut-over in the past, or that due to fire suppression has recently undergone succession from shrub prairie or wet-mesic sand prairie (White, 1978).

Dead-standing trees are relatively common in the sand flatwood communities (Sites

7 and 8), and one of the dry sand savanna communities (Site 1). On these sites the number of dead-standing trees varies from 45 to 113 stems per hectare with most of the individuals in the 4-6 and 7-12 inch diameter classes. In contrast, dead-standing individuals are not an important stand component in the remaining sand savanna communities (Table 5). In these communities between 4 and 21 dead-standing trees are found per hectare.

Coppice stems are relatively common in the forest areas studied (Table 5). Though these multiple stemmed trees could be the result of past cutting, it is more probable that they are due to fire which kills the above ground parts of saplings and small trees, with the resulting sprouts developing into forest trees.

Literature Cited

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