PRAIRIE INVENTORY

HERBERT HOOVER NATIONAL HISTORIC SITE

1985

SUBMITTED BY:

PAUL CHRISTIANSEN
CORNELL COLLEGE
MT. VERNON, IOWA 52314
5 OCTOBER, 1985

PURCHASE ORDER NUMBER:
PX 6470-5-0122

INTRODUCTION

This report includes data and analysis of the vegetation of the prairie at the Herbert Hoover National Historic Site for the summer of 1985. Comparisons are made with data from 1982 and 1984 and implications and recommendations for future management are discussed. Tables and maps in the Appendix give locations and results of cover determinations for the five walking transects and ten permanent plots.

METHODS AND MATERIALS

Field work was carried out on 1 and 2 August, 1985. Walking transects were sampled with a 20x50 cm quadrat every 10 paces (about 4 rods)(see figure A1). Coverage of each species within the quadrat was determined by the use of Daubenmire's method [1]. Total percent cover, percent relative cover (percentage of the total cover furnished by each species) and percent frequency (percent of the plots with each species present) were determined. Ten 20 m permanent plots reestablished in 1984 (see figure A2) were relocated and similar determinations of total percent cover, percent relative cover and percent frequency were made for each plot. In the permanent plots the 20x50 cm quadrat was placed on the transect with the short side of the quadrat between 0.8 and 1.0 m on the left side of the transect at 1 m intervals. Locations of the permanent plots are given in the Appendix.

RESULTS

WALKING TRANSECTS

All walking transect results were combined into two categories, those plots reseeded in 1984 (reseeded) and plots not reseeded (intact).

In intact portions of the transects the prairie grasses furnished more than 70% of the relative cover (cover) [3]. Big bluestem (*Andropogon gerardi*) [2] at 32.84%, Switchgrass (*Panicum virgatum*) at 29.62% and Indiangrass (*Sorghastrum nutans*) at 7.23% furnished most of the cover on the intact prairie (see table 1). Several other prairie grasses were present with very little cover. They were Little bluestem (*Andropogon scoparius*) at 0.61%, Canada wildrye (*Elymus canadensis*) at 0.17% and Side-oats grama (*Bouteloua curtipendula*) at 0.03%.

Canada thistle (*Cirsium arvense*) had the most cover of the forbs (non-grassy herbaceous plants) at 8.23% cover. Other forbs with more than 1% cover were Goldenrod (*Solidago spp.*) at 5.92%, Sweetclover (*Melilotus spp.*) at 3.14% and Field thistle (*Cirsium discolor*) at 2.47%. Twenty-three other species were encountered but each furnished less than 1% cover.

In reseeded areas Foxtail species (*Setaria leutescens and S. viridis*) were most important at 54.55% cover (see table 2). Switchgrass and Big bluestem combined for 20.72% cover. Canada thistle at 6.81%, Field pennycress (*Thaspium arvense*) at 6.74%, Common milkweed (*Asclepias syriaca*) at 4.00%, Sedge (*Carex sp.*) at 1.11%, Common blue violet (*Viola papilionacea*) at 1.11% and smartweed (*Polygonum spp.*) at 1.04% also furnished significant cover. Fourteen other species were present with cover below 1%.

Over both intact and seeded areas 102 quadrats were sampled and 41 species were observed in the plots. Data for each of the 5 walking transects for 1985 is given in the Appendix.

Table 1.

Cover and Frequency of Intact Walking Transect Plots*

Species	Tot Cov	Rel Cov	Per Freq
Prairie Grasses			
Big bluestem	46.13	32.84	84.38
Switchgrass	41.60	29.62	75.00
Indiangrass	10.16	7.23	32.81
Little bluestem	0.59	0.61	4.69
Side-oats grama	0.04	0.03	1.56
Canada wildrye	0.23	0.17	1.56
Weedy Grasses			
Kentucky bluegrass	0.59	0.42	1.56
Smooth bromegrass	1.25	0.89	4.69
Foxtail species	0.90	0.64	6.25
Prairie Forbs			
Many-flowered aster	0.78	0.56	7.81
Goldenrod	8.32	5.92	20.31
Clammy groundcherry	0.59	0.42	1.56
Common horsetail	0.51	0.36	4.69
Wild lettuce	0.23	0.17	1.56
Common milkweed	0.70	0.50	4.69
Ragwort	0.82	0.58	3.13
Showy sunflower	0.59	0.42	1.56
Field thistle	3.48	2.47	12.50
Weedy Forbs			
Field bindweed	0.12	0.08	4.69
Dandelion	1.05	0.75	18.75
Canada thistle	11.56	8.23	37.50
Yellow wood-sorrel	0.16	0.11	6.25
Weedy Annuals/Biennials			
Alsike clover	0.51	0.36	4.69
Fireweed	0.43	0.31	9.38
Meadow parsnip	0.90	0.64	6.25
Pellitory	0.23	0.17	1.56
Field pennycress	0.23	0.17	1.56
Giant ragweed	0.59	0.42	1.56
Little ragweed	0.82	0.58	9.38
Smartweed	0.51	0.36	12.50
Sweetclover	4.41	3.14	6.25
Woody Species			
Gray dogwood	0.59	0.42	1.56
Siberian elm	0.59	0.42	1.56
Total	140.47	100.00	

* Seventy-five plots

Table 2.

Cover and Frequency of Walking Transect Plots Seeded in 1984*

Species	Tot Cov	Rel Cov	Per Freq
Prairie grasses			
Big bluestem	9.82	8.14	17.86
Switchgrass	15.18	12.55	28.57
Indiangrass	0.54	0.44	3.57
Weedy Grasses			
Barnyard grass	0.09	0.07	3.57
Foxtail species	65.80	54.55	92.86
Sedge	1.34	1.11	3.57
Prairie Forbs			
Goldenrod	0.54	0.44	3.57
Wild lettuce	0.63	0.52	7.14
Common milkweed	4.82	4.00	21.43
Field thistle	0.09	0.07	3.57
Tick trefoil	0.09	0.07	3.57
Common blue violet	1.34	1.11	3.57
Weedy Forbs			
Field bindweed	0.09	0.07	3.57
Nightshade bittersweet	1.07	0.89	7.14
Horse-nettle	0.09	0.07	3.57
Canada thistle	8.21	6.81	39.29
Yellow wood-sorrel	0.09	0.07	3.57
Weedy Annuals/Biennials			
Buttonweed	0.09	0.07	3.57
Clover species	0.18	0.15	7.14
Horseweed	1.07	0.89	7.14
Field pennycress	8.13	6.63	21.43
Little ragweed	0.09	0.07	3.57
Smartweed	1.25	1.04	14.29
Total	120.62	100.00	

* Twenty-seven plots

PERMANENT PLOTS

In permanent plots much the same pattern of vegetation composition is evident. The prairie grasses provide more than one-half of the cover (about 55%) (see table 3). Foxtail species were important at 12.30% cover (seeded and intact prairie plots were not separated). Among prairie forbs Goldenrod at 3.70%, Common milkweed at 2.41% and Wild lettuce (*Lactuca spp*) at 1.62 were important. Canada thistle was the only important weedy perennial at 5.22% cover. Smartweed, Giant ragweed (*Ambrosia trifida*) and Fireweed (*Erechtites hieracifolia*) were the leading annuals at 2.81%, 1.70% and 1.29% cover respectively. Thirty-five species were present in the 200 quadrats of the 10 permanent plots. Data for each of the 10 permanent plots is given in the Appendix.

DISCUSSION

BURNING

In both 1984 and 1985 portions of the prairie were burned in the spring to stimulate the prairie species and for the control of Canada thistle. Comparisons of the cover of various species in walking transects in 1982, 1984 and 1985 gives some indication of the effect of burning management on the prairie. Portions of walking transects 3 and 4 (27 to 28 plots) were first burned in 1985. Portions of walking transects 1 and 2 (15 to 16 plots) were burned in 1984 but not 1982 or 1984. Finally portions of walking transect 5 (10 plots) were burned in 1984 and 1985 but not 1982.

Among the prairie grasses Big bluestem responds vigorously to burning, Switchgrass is not greatly affected and Indiangrass often declines in importance. This pattern is generally evident in table 4.

Table 3.

Composite of all Permanent Plots, 1985*

Species	Rel Cov
Prairie grasses	
Big bluestem	15.88
Little bluestem	0.19
Indiangrass	4.73
Switchgrass	34.21
Canada wildrye	0.07
Weedy Grasses	
Kentucky bluegrass	0.01
Japanese bromegrass	0.96
Foxtail species	12.30
Quackgrass	0.57
Prairie Forbs	
Many-flowered aster	0.06
Goldenrod	3.70
Clammy groundcherry	0.55
Virginia groundcherry	0.08
Field horsetail	0.69
Wild lettuce	1.62
Common milkweed	2.41
Ragwort	0.07
Bigtooth sunflower	0.16
Weedy Forbs	
Field bindweed	0.07
Dandelion	0.06
Horse-nettle	0.07
Canada thistle	5.22
Yellow wood-sorrel	0.13
Weedy Annuals/Biennials	
Alsike clover	0.02
Fireweed	1.29
Horseweed	0.21
Meadow parsnip	1.01
Pellitory	0.50
Field pennycress	0.64
Giant ragweed	1.70
Little ragweed	0.25
Smartweed	2.81
Woody Species	
Blackberry	0.64
Gray dogwood	0.06
Siberian elm	0.50

---

* Two-hundred 20x50 cm quadrats.

Table 4.
Comparison of Portions of 1982, 1984 and 1985 Walking Transects in Prairie Grass Cover.

	Walking Transects 3 & 4		
Species	1982	1984	1985
	Unburn	Unburn	Burn
Big bluestem	25.02	12.56	28.81
Switchgrass	45.42	38.26	30.97
Indiangrass	7.46	11.69	9.31

	Walking Transects 1 & 2		
Species	1982	1984	1985
	Unburn	Burn	Unburn
Big bluestem	32.09	46.44	46.87
Switchgrass	30.08	29.08	8.59
Indiangrass	25.27	9.50	7.49

	Walking Transect 5		
Species	1982	1984	1985
	Unburn	Burn	Burn
Big bluestem	33.77	38.44	46.32
Switchgrass	41.70	26.18	32.15
Indiangrass	13.02	27.12	15.26
Little bluestem	2.83	3.07	4.36

In almost all cases Big bluestem increased in cover in the year of burning and decreased if unburned. Switchgrass decreased or held steady in the year of burning. The drastic drop in the 1985 unburned transects #1 & 2 was probably partially due to a sampling error. In almost all cases Indiangrass decreased following a burn and increased if unburned.

The response of some perennial prairie forbs, weedy forbs and biennial forbs is given in table 5.

Table 5.
Comparison of Portions of 1982, 1984 and 1985 Walking Transects in Forb Cover.

	Walking Transects 3 & 4		
	1982	1984	1985
Species	Unburn	Unburn	Burn
Prairie Forbs			
Goldenrod	4.34	8.02	10.54
Many-flowered aster	0.57	3.57	0.58
Ragwort	0.57	3.00	1.52

Table 5 (cont.).

Weedy Forbs			
Canada thistle	4.82	9.66	6.21
Weedy Biennials			
Meadow parsnip	1.51	5.70	1.59
Sweetclover	0.0	0.10	0.07

	Walking Transects 1 & 2		
	1982	1984	1985
	Unburn	Burn	Unburn
Prairie Forbs			
Goldenrod	0.00	0.15	1.66
Many-flowered aster	0.16	1.93	0.83
Weedy Forbs			
Canada thistle	0.00	3.12	2.09
Weedy Biennials			
Meadow parsnip	0.16	0.89	0.14
Sweetclover	6.98	2.97	15.53

In transects 3 & 4, except for goldenrod in 1985, all forbs decreased in cover after burning and increased or remained steady if not burned. In transects 1 & 2 Sweetclover and Canada thistle show this pattern very distinctly. Both Goldenrod and Many-flowered aster were at low levels of cover which makes response difficult to detect. The dramatic increase of Sweetclover cover in 1985 in transects 1 & 2 is largely due to sampling error. Two quadrats were located in areas completely dominated by Sweetclover and the overall cover of the transect was therefore misrepresented.

An analysis of results for permanent plots is somewhat more reliable because larger numbers of samples are available and the placement of each quadrat is within one or two centimeters of its placement in the previous sampling. However, three permanent plots were reseeded or partially reseeded in 1984 which over-represents disturbance on the prairie. Therefore these data represent trends but do not furnish an unbiased sample of the vegetation of the prairie.

Prairie grasses responded predictably except in the unburn-burn

sequence where all three declined (see table 6). In this case several weedy species increased relatively greater in cover in the burn year. Forbs responded less predictably. Canada thistle declined under all conditions. This may be due partially to relatively dry conditions throughout most of the summer and to an intensive program of handcutting of thistles during the summer. Other factors may have been the response of seeded plots in their second year of succession taking advantage of open niches.

PRAIRIE GRASSES

Prairie grasses continue to dominate the prairie contributing from 50% to 85% of the cover. Big bluestem and Switchgrass dominate with Indiangrass more important in unburned areas. Indiangrass pioneers into non-prairie areas and might be expected to colonize weedy areas ahead of Big bluestem and Switchgrass. Little bluestem and Side-oats grama are present at very low levels of cover but continue to persist in the prairie. Canada wildrye, a volunteer in the prairie, also continues to be present at very low levels. Non-prairie grasses have not made significant inroads into intact prairie.

PRAIRIE FORBS

Goldenrod, Common milkweed, and Field thistle are the most common prairie forbs with cover no greater than about 5% in any transect or plot. Many-flowered aster is present with low cover but is found in about 8% of all quadrats taken. Ragwort is locally common as it grows in patches and Clammy groundcherry is more abundant on disturbed sites.

WEEDY FORBS

Canada thistle is the most abundant weedy perennial forb at about 6.1%

cover for the prairie over 300 quadrats. This is a considerable drop from 1984 when the overall cover for Canada thistle was about 9.5% over all quadrats. Other perennial forbs contribute insignificant cover.

WEEDY ANNUALS/BIENNIALS

Smartweed, Field pennycress, Sweetclover and Meadow parsnip are the most important short-lived species on the prairie. In the Walking Transects on intact prairie only Sweetclover contributed more than 1% cover (see table 1) and that was due largely to sampling error. In seeded portions of the Walking Transects and in Permanent Plots 8 and 9, Field pennycress and Smartweed are important with cover from 5% to 17% (see tables 2, A14 and A15). Several other species are present but with cover less than 1%.

SEEDED AREAS

In areas seeded in 1984 Foxtail species are dominant. Yellow and Green foxtail have replaced Giant foxtail which was dominant in 1984, the year of the seeding. As noted above, Smartweed and Field pennycress as well as Canada thistle, Common milkweed, Wild lettuce and Goldenrod furnish most of the forb cover. Switchgrass and Big bluestem furnish considerable cover, 21%, on the Walking Transects. This is largely due to plants which were not killed by the cultivation prior to seeding in 1884. In Permanent Plots 8 and 9 Switchgrass cover is not above 5.3% and cover of other prairie grasses in insignificant. It is still too early to make a judgement that the 1984 seeding is a failure but evidence of prairie grass seedlings in low. Plants established in 1984 may have been dormant this year and will come back next year. Also, ungerminated seeds may

still be present in the soil and will furnish new seedlings in the near future. The earliest a judgement on the success of the seeding could be made would be 1986 and should be delayed until 1987.

PRAIRIE MANAGEMENT

Over the past two years all areas of the prairie have been burned once and some areas both years. At the same time an intensive program of hand cutting of Canada thistle along with some spraying has been carried out. Evaluating the response of the prairie to these two procedures is difficult because control areas are not available to compare one against the other. Overall, the management has been successful in controlling and lowering cover of Canada thistle and invigorating the prairie.

Several factors must be weighed in developing the course of future management. Frequent burns, such as two out of three years which I recommended in 1982 [4], probably will lead to a prairie largely dominated by grasses. Portions of Walking Transect 5 and Permanent Plot 3 were burned in both 1984 and 1985. Transect 5 was dominated by Big bluestem and Switchgrass since 1982 and has remained so. Permanent Plot 3, first sampled in 1984 showed a considerable drop in species diversity after two annual burns. Coverage by prairie grasses increased from 83% to 89% and the total number of species sampled decreased from 17 to 7 (see table 6). Reevaluation of frequent burning should be continued, especially using data from permanent plots. My personal experience with established prairies similar to the Herbert Hoover site is that weediness can be easily controlled by burning but that species diversity develops very slowly and perhaps never will be high. If a grass-dominated prairie

with low diversity is satisfactory then burning management is the most cost-effective management technique.

Expeditiously carrying out controlled burns develops only with experience. As burning becomes a routine part of the staff's duties it will become a less traumatic event although there is always an element of uncertainty because of unpredictable weather conditions. Several measures can be carried out to decrease the element of risk. I continue to advocate the frequent mowing of firelanes during the summer to provide a green firebreak with very little fuel as a means of expediting controlled burns [5].

Burning as much of the area as possible with a head fire speeds the burning process and alleviates some of the smoke problem by producing a hotter fire which carries the smoke higher into the air. As a result less smoke, for a shorter amount of time, should result in fewer complaints from the public.

Keeping the dependence upon heavy equipment such as fire trucks and water wagons on the prairie to a minimum will help in making the management of a controlled burn more predictable. If the fire is being managed with heavy dependence upon a piece of equipment and that equipment then becomes mired or otherwise incapacitated, a controlled burn can quickly be turned into an uncontrolled burn.

The timing of prairie burns is coming into question across Iowa and the tall grass prairie region. We should watch developments in the area as research and experience accumulates. Summer burns are known to be more effective against woody species and Sweetclover. Evidence for effects on the prairie flora is not yet great but in some cases

does not seem to be obviously detrimental. It may be that staggering burns in place and time will be more effective in controlling problem species and at the same time encourage more biotic diversity.

CONCLUSIONS AND RECOMMENDATIONS

1) The evidence gathered in this study indicates that the reconstructed prairie at the Herbert Hoover National Historic Site continues to improve in dominance of prairie species and that weedy species such as Canada thistle continue to decrease in importance.

2) The areas seeded in 1984 should be monitored for at least two more years before making a decision on the success of that seeding.

3) Monitoring of permanent plots should be done on an annual basis to assess management techniques.

4) Controlled burning should be continued as a management technique being supplemented by hand cutting when necessary and herbicide spraying only as a last resort. I recommend that all areas not burned in 1985 be burned in 1986 as well as about 2/3 of the remaining area.

ACKNOWLEDGEMENTS

I wish to thank the staff of the Herbert Hoover National Historic Site for their generous help in carrying out this study. I want to especially thank Bill Wilcox for his support of this project.

LITERATURE CITED

[1] Daubenmire, R. 1959. A canopy-coverage method of vegetation analysis. Northwest Science 33(1):43-64.

[2] Nomenclature mostly after Gleason, H. and A. Cronquist. 1963. Manual of vascular plants of northeastern United States and adjacent Canada. D. Von Nostrand Company, Inc., Princeton, NJ. Grasses after Pohl, R. 1966. The grasses of Iowa. Iowa State Journal of Science 40(4):341-566.

[3] Relative cover will be referred to as "cover" throughout this report unless otherwise noted.

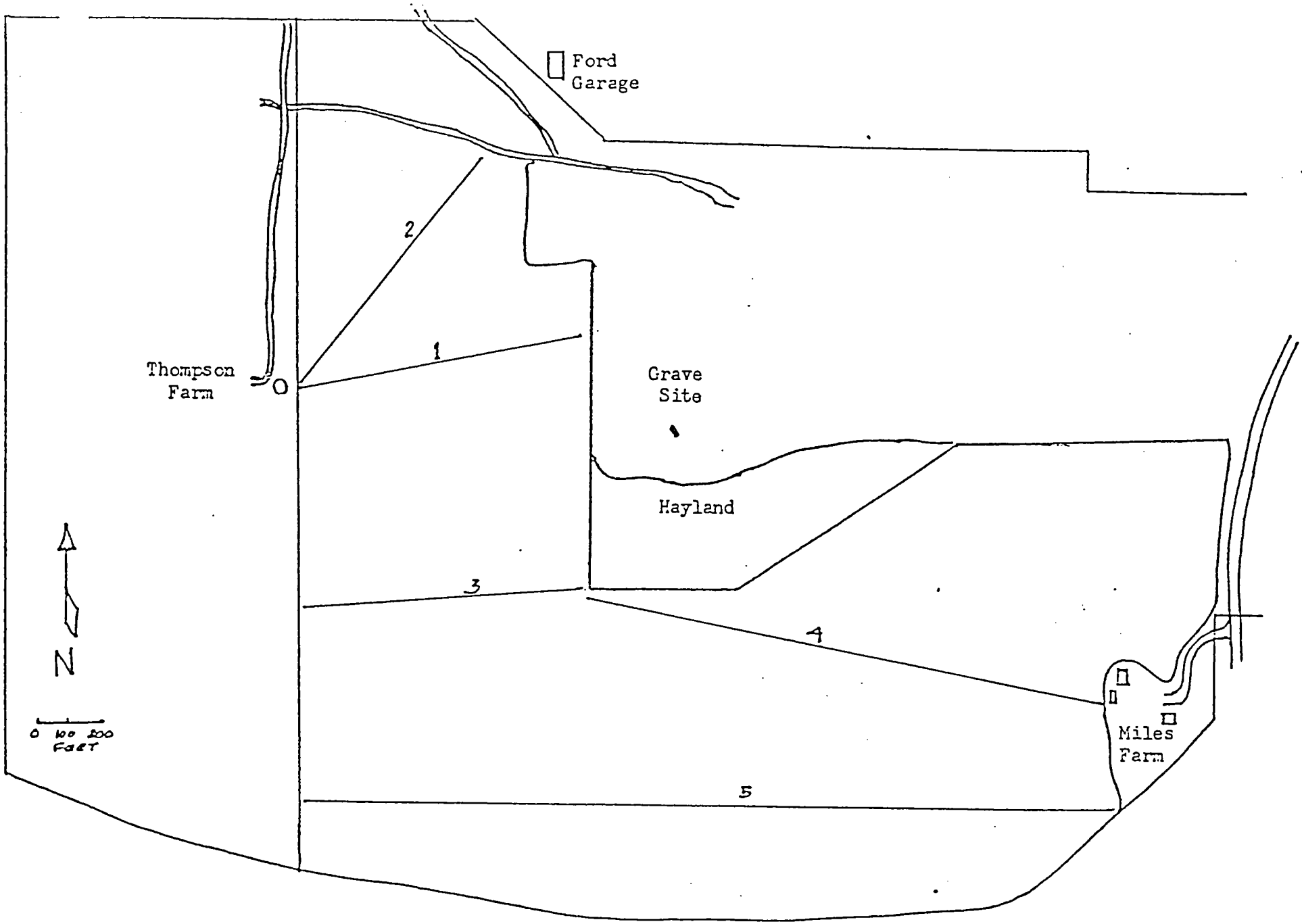
[4] Christiansen, Paul. 1982. Prairie Inventory: Herbert Hoover National Historic Site, 1982. Unpublished report. Herbert Hoover National Historic Site, West Branch, Iowa.

[5] Christiansen, Paul. 1984. Prairie Inventory: Herbert Hoover National Historic Site, 1984. Unpublished report. Herbert Hoover National Historic Site, West Branch, Iowa.

APPENDIX

TABLE OF CONTENTS

		Page
Figure A1	Walking Transect Locations	17
Table A1	Walking Transect #1	18
Table A2	Walking Transect #2	18
Table A3	Walking Transect #3	19
Table A4	Walking Transect #4	19
Table A5	Walking Transect #5	20
Figure A2	Permanent Plot Locations	21
Table A6	Permanent Plot Descriptions	22
Table A7	Permanent Plot #1, 1985	23
Table A8	Permanent Plot #2, 1985	23
Table A9	Permanent Plot #3, 1985	23
Table A10	Permanent Plot #4, 1985	24
Table A11	Permanent Plot #5, 1985	24
Table A12	Permanent Plot #6, 1985	24
Table A13	Permanent Plot #7, 1985	25
Table A14	Permanent Plot #8, 1985	25
Table A15	Permanent Plot #9, 1985	26
Table A16	Permanent Plot #10, 1985	26
Table A17	Plant Common Names with Scientific Equivalent	27
	Table A17 (cont.)	28



HERBERT HOOVER NATIONAL
HISTORIC SITE

RECONSTRUCTED PRAIRIE

Figure A1
Walking Transects

Table A1.
Walking Tansect #1, 1 August, 1985

Species	Tot Cov	Rel Cov	Per Freq
Giant foxtail	34.11	31.31	42.86
Big bluestem	26.79	24.59	50.00
Field pennycress	9.29	8.52	28.57
Sweetclover	6.96	6.39	7.14
Indiangrass	5.89	5.41	28.57
Switchgrass	5.54	5.08	14.29
Canada thistle	3.21	2.95	21.43
Kentucky bluegrass	2.68	2.46	7.14
Common milkweed	2.68	2.46	7.14
Dandelion	2.50	2.30	28.57
Wild lettuce	1.25	1.15	14.29
Smartweed	1.25	1.15	14.29
Nightshade bittersweet	1.07	0.98	7.14
Little bluestem	1.07	0.98	7.14
Canada goldenrod	1.07	0.98	7.14
Field thistle	1.07	2.13	21.43
Unidentified seedling	0.36	0.38	14.29
Barnyard grass	0.18	0.16	7.14
Clover species	0.18	0.16	7.14
Meadow parsnip	0.18	0.16	7.14
Tick trefoil	0.18	0.16	7.14
Yellow wood-sorrel	0.18	0.16	7.14
Total	108.93	100.00	

Table A2.
Walking Tansect #2, 1 August, 1985

Species	Tot Cov	Rel Cov	Per Freq
Foxtail species	35.89	30.27	42.86
Big bluestem	33.57	28.31	50.00
Sweetclover	13.04	10.99	14.29
Switchgrass	6.61	5.57	21.43
Smooth bromegrass	5.71	4.82	21.43
Indiangrass	3.75	3.16	14.29
Field pennycress	2.68	2.26	7.14
Common blue violet	2.68	2.26	7.14
Field horsetail	2.32	1.96	21.43
Canada goldenrod	2.14	1.81	14.29
Common milkweed	2.14	1.81	14.29
Canada wildrye	2.14	1.81	14.29
Dandelion	1.79	1.51	35.71
Clover species	1.43	1.20	21.43
Many-flowered aster	1.07	0.90	7.14
Horseweed	1.07	0.90	7.14
Field bindweed	0.18	0.15	7.14
Giant ragweed	0.18	0.15	7.14
Canada thistle	0.18	0.15	7.14
Total	118.57	100.00	

Table A3.
Walking Tansect #3, 1 August, 1985

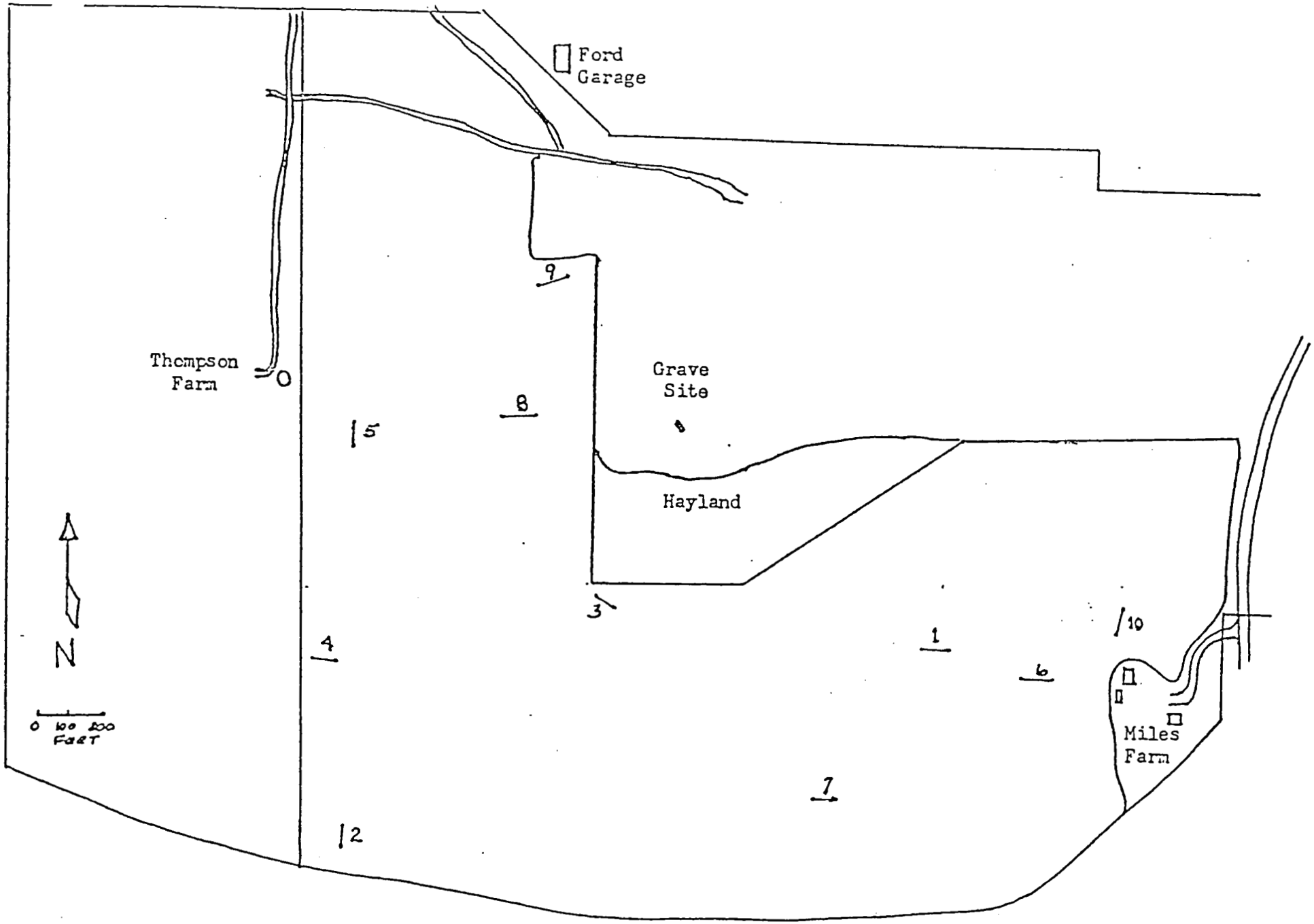
Species	Tot Cov	Rel Cov	Per Freq
Big bluestem	36.83	29.43	80.00
Switchgrass	29.67	23.70	73.33
Indiangrass	19.50	15.58	53.33
Canada goldenrod	13.67	10.92	40.00
Canadian thistle	7.50	5.99	40.00
Foxtail species	3.67	2.93	20.00
Meadow parsnip	3.50	2.80	13.33
Little ragweed	3.17	2.53	26.67
Ragwort	2.50	2.00	6.67
Smartweed	1.50	1.20	26.67
Gray dogwood	1.00	0.08	6.67
Pellitory	1.00	0.80	6.67
Field bindweed	0.33	0.27	13.33
Dandelion	0.33	0.27	13.33
Sweetclover	0.33	0.27	13.33
Field thistle	0.33	0.27	13.33
Many-flowered aster	0.17	0.13	6.67
Yellow wood-sorrel	0.17	0.13	6.67
Total	125.17	100.00	

Table A4.
Walking Tansect #4, 1 August, 1985

Species	Tot Cov	Rel Cov	Per Freq
Big bluestem	45.43	38.70	65.22
Switchgrass	33.59	28.61	65.22
Foxtail species	9.67	8.24	17.39
Canada goldenrod	6.96	5.93	8.70
Canadian thistle	4.35	3.70	30.43
Indiangrass	4.24	3.61	21.74
Common milkweed	2.39	2.04	13.04
Siberian elm	1.63	1.39	4.35
Clammy groundcherry	1.63	1.39	4.35
Giant ragweed	1.63	1.39	4.35
Showy sunflower	1.63	1.39	4.35
Fireweed	1.09	0.93	21.74
Many-flowered aster	0.76	0.65	8.70
Horseweed	0.65	0.56	4.35
Ragwort	0.65	0.56	4.35
Smartweed	0.33	0.28	13.04
Little ragweed	0.22	0.19	8.70
Yellow wood-sorrel	0.22	0.19	8.70
Dandelion	0.11	0.09	4.35
Meadow parsnip	0.11	0.09	4.35
Side-oats grama	0.11	0.09	4.35
Total	117.39	100.00	

Table A5.
Walking Tansect #5, 1 August, 1985

Species	Tot Cov	Rel Cov	Per Freq
Switchgrass	51.11	42.89	77.78
Big bluestem	22.43	18.82	50.00
Foxtail species	17.85	14.98	30.56
Canada thistle	7.92	6.64	27.78
Field thistle	5.21	4.37	11.11
Indiangrass	4.31	3.61	11.11
Canada goldenrod	3.82	3.21	8.33
Little bluestem	2.15	1.81	5.56
Common milkweed	1.25	1.05	8.33
Sedge	1.04	0.87	2.78
Smartweed	0.56	0.47	8.33
Many-flowered aster	0.42	0.35	2.78
Wild lettuce	0.42	0.35	2.78
Field pennycress	0.42	0.36	2.78
Field bindweed	0.07	0.06	2.78
Buttonweed	0.07	0.06	2.78
Fireweed	0.07	0.06	2.78
Horse-nettle	0.07	0.06	2.78
Total	119.17	100.00	



HERBERT HOOVER NATIONAL
HISTORIC SITE

RECONSTRUCTED PRAIRIE

Figure A2
Permanent Plots

Table A6

Permanent Plot Locations

Permanent Plot #1: 27.5 rods WNW of Miles Farm machine shed on line with south-most ash tree in hayland south of grave site; near bottom of draw; 090 degrees to NW corner of Miles Farm house. Plot runs east to west.

Permament Plot #2: 150 feet east of SW corner of prairie; 110 feet, 022 degrees north of small Elm tree in fence line. Plot runs south to north.

Permanent Plot #3: 65 feet south of ash tree in SW corner of hayland south of grave site; Plot runs NW to SE.

Permanent Plot #4: 30 feet east of Mulberry tree in fence line (about 40 rods north of SW corner of prairie). Plot runs ESE toward Miles Farmstead.

Permanent Plot #5: 10 rods east from west fence line at Silver maple (also due west from southern-most White pine SW of grave site). Plot runs NNE toward new city water tower.

Permanent Plot #6: 202 feet W of SW corner of Miles Farmstead barn. Plot runs east to west.

Permanent Plot #7: 435 feet north of south fence line from a point directly south of new water city water tower; bearing to Standard gasoline station sign bears 084 degrees from plot. Plot runs east to west.

Permanent Plot #8: 184 feet, bearing 250 degrees from north White pine west of the grave site; on a line to Silver maple described in #5 above. Plot runs west to east.

Permanent Plot #9: 60 feet west of center of three Scotch pines located north of the creek NW of the gravesite. Plot run east to west, bearing 250 degrees.

Permanent Plot #10: 145 feet, 023 degrees from NW corner of Miles Farmstead barn. Plot runs SSW to NNE.

Table A7.
Permanent Plot #1, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Giant foxtail	6*	3	3	5	5*	5*		2*	4		1										25.38	24.00	45
Little ragweed	2	2*	2	1														1			2.50	2.36	25
Clammy groundcherry	1																				0.13	0.12	5
Canada goldenrod		3	4	2														5	3		11.88	11.23	25
Giant ragweed		1																			0.13	0.12	5
Common milkweed				3	3	2	3											2	1		7.25	6.86	30
Canada thistle					2	1			1												1.00	0.95	15
Indiangrass					3*	3*		5*												2*	8.75	8.27	20
Big bluestem							6*										5*		2	2	10.63	10.05	20
Pellitory								2*	3*			1*									2.75	2.60	15
Switchgrass									2*	6*	5*	6*	6*	5*	6*	6*		3*	2*	2	34.38	32.51	45
Fireweed																		1			0.13	0.12	5
Ragwort																				2	0.75	0.71	5
Yellow wood-sorrel																				1	0.13	0.12	5
Total																					105.75	100.00	

Table A8.
Permanent Plot #2, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Switchgrass	6*	6*	6*	6*	6*	5*	6*	6*	6*			1*	3*	4*							43.50	43.50	55
Canada thistle	1	2		1		1			2				2	1	2	1		1		2	3.75	3.75	50
Field bindweed	1																				0.13	0.13	5
Wild lettuce	3*		1				2														2.75	2.75	15
Indiangrass		2*																			0.75	0.75	5
Big bluestem								1				1*									0.25	0.25	10
Foxtail species									2*	6*	5	6	4*	3	3	6*	4	4	5	4	40.13	40.13	60
Smartweed										2*									2		1.50	1.50	10
Giant foxtail											2*				3					3	4.50	4.50	15
Common milkweed															3						1.88	1.88	5
Horsenettle																1					0.13	0.13	5
Virginia groundcherry																	2*				0.75	0.75	5
Total																					100.00	100.00	

Table A9.
Permanent Plot #3, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Big bluestem	4	6	5	5	3	4	3	5	3	3	3	4	4	5		4		3		2	49.50	40.95	85
Switchgrass	3*			3*	4*	4*	5	3*	5*	4	5*	4*	4*		4	4*	3	4*	6*	4*	53.25	44.05	85
Canada thistle			1				1							2		3	2	2	2	3	7.00	5.79	40
Bigtooth sunflower										3											1.88	1.55	5
Blackberry															4		4	2	2		7.75	6.41	20
Common milkweed																	2				0.75	0.62	5
Indiangrass																				2	0.75	0.62	5
Total																					120.88	100.00	

Table A10.
Permanent Plot #4, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Canada goldenrod	5	4	4					2	2	4	2	2	3	4	2	3	2		1	2	25.13	21.22	70
Switchgrass	3*	2*	3		5*	4*	2*	5*	3*	4*	3*	3*	4*		4*	3	5*	5*	5*	4*	49.63	41.92	90
Wild lettuce		2					1		1	1					2			1		2	2.75	2.32	35
Dandelion		2																			0.75	0.63	5
Many-flowered aster		2																			0.75	0.63	5
Big bluestem		2		3			3*			2*	4*	3*	3*	4*			2*	2*		3*	18.63	15.73	55
Canada thistle		2	1	2	3	2	2		1				1		2	2					6.75	5.70	50
Indiangrass				4			2		4*			2			3*						9.63	8.13	25
Meadow parsnip				1	1			3				1					1	2	1	2	4.00	3.38	40
Field bindweed								1													0.13	0.11	5
Giant ragweed															1				1		0.25	0.21	10
Total																					118.38	100.00	

Table A11.
Permanent Plot #5, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Giant ragweed	5*	2	2*	3*	*	3*	2	3	3*	2	3*					2*	2*	2*	3*		20.75	16.67	70
Switchgrass	3	5*	5*	5*	5*	6*	6*	5*	5*	6*	6*	2*		5	6*	3*	3*	6*		4*	68.50	55.02	90
Foxtail species	1*												2	1*							1.00	0.80	15
Horseweed		2*			3*																2.63	2.11	10
Canada thistle		2						2	2			1	1	2				1			3.38	2.71	35
Big bluestem				2		2		3				6*	4*			4*	4*		4	3*	22.63	18.17	45
Wild lettuce															3						1.88	1.51	5
Smartweed									2	2											1.50	1.20	10
Meadow parsnip												2*			2						1.50	1.20	10
Canada goldenrod																				2	0.75	0.60	5
Total																					124.50	100.00	

Table A12.
Permanent Plot #6, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Big bluestem	5*										3*		5*	3*	5*				2*		17.25	16.25	30
Switchgrass	2*	6*	4*	6*	5*	6*	4*	6*	5*	5*	6*	5*		4*		4*	4*	6*	5*	5*	71.13	67.02	90
Fireweed	2		2		2*		2*	1	2			1			1		1	1	2	2*	5.88	5.54	60
Indiangrass		2*																			0.75	0.71	5
Siberian elm			5				1	2													5.13	4.83	15
Canada thistle				1												2	2			2	2.38	2.24	20
Common horsetail						1															0.13	0.12	5
Clammy groundcherry						1				1											0.25	0.24	10
Smartweed									1							1*	1			1	0.50	0.47	20
Canada wildrye													2*								0.75	0.71	5
Sheep sorrel															1						0.13	0.12	5
Common milkweed																			3		1.88	1.77	5
Total																					106.13	100.00	

Table A13.
Permanent Plot #7, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Switchgrass	3*	4*	2*	5*		6*				4*	3*	5*	6*	3*		4*	3*			4*	39.00	33.37	65
Common milkweed	2*				2														2		2.25	1.93	15
Canada thistle	4	2	2	3*		2	3	2	2	3	2	2	3	1	2	2	2	2	2	2	20.50	17.54	95
Common horsetail	2	2		2	1	1			2	2	2	2		2	2	2			1		7.88	6.74	65
Meadow parsnip		1										3*					2	3*		3*	6.50	5.56	25
Big bluestem			5*			2	5*	4*							3*		1		4*		17.50	14.97	35
Field bindweed				1	1	1				1											0.50	0.43	20
Indiangrass					3*			2*			2*	2*			4*	2*	4*	4*	2*	2*	15.75	13.49	50
Foxtail species									3*	2	3			2				2			6.00	5.13	25
Fireweed											1										0.13	0.11	5
Wild lettuce																			1		0.13	0.11	5
Gray dogwood																				2	0.75	0.64	5
Total																					116.88	100.00	

Table A14.
Permanent Plot #8, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Switchgrass	3*							3*	4*	1*											7.00	5.30	20
Smartweed	2*	3*					1							2*	3			2	2		6.88	5.21	35
Canada thistle	4*		2	3	3	3		3		1		2									12.25	9.28	40
Foxtail species	4*	6*	6*	4*	5*	4*	5*	5*		5*	6*	6*	6*	5*	6*	6*	5*		4*	6*	72.13	54.64	85
Big bluestem		2*					1														0.88	0.66	10
Horseweed				3	2																2.63	1.99	10
Common milkweed						4		2	3	4*			3			2					11.50	8.71	30
Field pennycress									1*				2*	3*				4*	2*		6.63	5.02	25
Giant foxtail														2			3	5*	3		8.75	6.63	20
Wild lettuce															2						0.75	0.57	5
Japanese bromegrass																	3*				1.88	1.42	5
Horse-nettle																		2			0.75	0.57	5
Total																					132.00	100.00	

Table A15.
Permanent Plot #9, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Foxtail spp.	6*	5*	6*	5*	4*	3*	4*	3*	5*	5*	4*	4*	3*	3*		4*	4*		3	5*	46.75	34.76	70
Canada thistle	2	2	3	3														1			5.38	4.00	25
Smartweed	2	2	1	3	3	3	4	4	4		2		2	3	2			3			22.63	16.82	70
Common milkweed	3																				1.88	1.39	5
Wild lettuce	1	2		2	2	2	2	1						2	3						6.63	4.93	45
Japanese bromegrass			2			3*				2*	3*		4*	2*			3*				11.00	8.18	35
Quackgrass					3*					3								4*	2*		7.63	5.67	20
Black nightshade					2*		2*	2*	1		1										2.50	1.86	25
Giant foxtail					2		3*	3*						3*	4*				2		9.50	7.06	25
Pellitory						2*															0.75	0.56	5
Sheep sorrel						1*			1*	1*				2*	1				2		1.25	0.93	25
Alsike clover							1					1									0.25	0.19	10
Switchgrass									2												0.75	0.56	5
Clammy groundcherry												4*	3		3						6.88	5.11	15
Horseweed														1							0.13	0.09	5
Squirrel-tail grass																3*					1.88	1.39	5
Timothy																1*					0.13	0.09	5
Indiangrass																1					0.13	0.09	5
Yellow nutsedge																		2	3		2.63	1.95	10
Yellow Rocket																			4*		3.13	2.32	5
Field pennycress																			3*		1.88	1.39	5
Mulberry																			2	1	0.88	0.65	10
Total																					134.50	100.00	

Table A16.
Permanent Plot #10, 1985 Cover and Frequency of Subplots

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot Cov	Rel Cov	Per Freq
Canada goldenrod	2	4																			3.88	3.97	10
Indiangrass	3	1	2		2	3	2	5	3	3*		2									14.88	15.24	50
Switchgrass	2		2	2							3*	6*	4*	5*	2*		6*	5*		3*	18.38	18.82	45
Kentucky bluegrass	1																				0.13	0.13	5
Big bluestem	1	3	5*	4	5	4	3	3	3*	3	4				6*					4*	40.75	41.74	70
Wild lettuce	2	1		1		1	1												2	3	3.88	3.97	35
Little ragweed		1																			0.13	0.13	5
Little bluestem							3														1.88	1.92	5
Fireweed											1	3	2	2	2	3	2	1		2	7.00	7.17	40
Siberian elm												1									0.13	0.13	5
Foxtail species													2*								0.75	0.77	5
Common milkweed															1					2*	0.88	0.90	10
Yellow wood-sorrel																1					0.13	0.13	5
Pellitory															2*			2	1*	1	1.75	1.79	20
Smartweed																1	1*	2*	3*	2	2.88	2.94	20
Canada thistle																	1			1	0.25	0.26	10
Total																					97.63	100.00	

Table A17
Plant Common Names with Scientific Equivalent

Common Name	Scientific Name
Grasses	
Barnyard grass	Echinochloa sp.
xKentucky bluegrass	Poa pratensis
Big bluestem	Andropogon gerardi
Little bluestem	Andropogon scoparius
xJapanese bromegrass	Bromus japonicus
xSmooth bromegrass	Bromus inermis
xFoxtail species	Setaria leutescens and S. viridis
xGiant foxtail	Setaria faberi
xGreen foxtail	Setaria viridis
xYellow foxtail	Setaria leutescens
Side-oats grama	Bouteloua curtipendula
Indiangrass	Sorghastrum nutans
Quackgrass	Agropyron repens
Squirreltail grass	Hordeum jubatum
Switchgrass	Panicum virgatum
	Panicum dichotomiflorum
xTimothy	Phleum pratense
Canada wildrye	Elymus canadensis
Sedge	Carex sp.
Yellow nutsedge	Cyperus esculentus
Composites	
Many-flowered Aster	Aster ericoides
xDandelion	Taraxacum officinalis
Fireweed	Erichitites hieracifloia
Canada goldenrod	Soldiago canadensis
Goldenrod	Solidago sp.
Horseweed	Conyza canadensis
Prickly lettuce	Lactuca scariola
Wild lettuce	Lactuca canadensis
Giant ragweed	Ambrosia trifida
Little ragweed	Ambrosia artemisiifolia
Ragwort	Senecio plattensis
Bigtooth sunflower	Helianthus grosseserratus
Showy sunflower	Helianthus laetiflorus
xCanada thistle	Cirsium arvense
Field thistle	Cirsium discolor

---

x Alien, not native to eastern Iowa.

Table A17 (cont.)

Common Name	Scientific Name
	Other Families
Field bindweed	Convolvulus sepium
Nightshade bittersweet	Solanum dulcamara
Blackberry	Rubus subgenus Eubatis
xButtonweed	Abutilon theophrastii
Rough cinquefoil	Potentilla norvegica
xClover species	Trifolium spp.
xAlsike clover	Trifolium hybridum
Virginia creeper	Parthenocissus quinquefolia
Dogbane	Apocynum sibiricum
Dogwood	Cornus sp.
Gray dogwood	Cornus racemosa
xSiberian elm	Ulmus pumila
xFlower-of-an-hour	Hibiscus trionum
Riverbank grape	Vitis riparia
Clammy ground-cherry	Physalis heterophylla
Virginia ground-cherry	Physalis virginiana
xHorse-nettle	Solanum carolinense
Field horsetail	Equisetum arvense
xKochia	Kochia scoparia
Lamb's quarters	Chenopodium album
Common mallow	Malva neglecta
Common milkweed	Asclepias syriaca
Mulberry	Morus sp.
xBlack nightshade	Solanum nigrum
xMeadow parsnip	Pastinaca sativa
Pellitory	Parietaria pensylvanica
xField pennycress	Thaspium arvense
Pigweed	Amaranthus retroflexus
Plantain	Plantago rugellii
xPurslane	Portulaca oleracea
Smartweed	Polygonum sp.
xSweetclover	Melilotus sp.
Tick trefoil	Desmodium sp.
White vervain	Verbena urticifolia
Common violet	Viola papiolinacea
xYellow rocket	Brassica campestris
Yellow wood-sorrel	Oxalis stricta