

Status Report

2004 Vegetation Community Monitoring

Herbert Hoover National Historic Site



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1.0 Introduction

During the week of August 9, 2004, four long-term vegetation monitoring sites were established in the tallgrass areas of Herbert Hoover National Historic Site by the Heartland I&M Network and Prairie Cluster Prototype Monitoring Program (HTLN). Long-term ecological monitoring, while contributing to our empirical understanding of prairie communities, is integral to the proper management and protection of the lands entrusted to the National Park Service. Resource managers of the parks require effective plant community monitoring to assess their management strategies in maintaining and/or restoring prairie plant community composition, structure, and diversity.

2.0 Methods

Site Selection

Because of extensive prairie monitoring already occurring by Dr. Paul Christiansen, the decision was made to not use the established HTLN method for site selection, but to crosswalk our sites with established sites of Dr. Christiansen. Four HTLN sample sites were overlaid on four of Dr. Christiansen's permanent plots numbered 1, 2, 7 and 8. Two sites occur in PMU 6, one in PMU 4 and one in PMU 2. Additionally all Dr. Christiansen's permanent plots were GPSed for future HTLN site installations. Due the larger size of the HTLN sites compared to the single 20 meter transect of Dr. Christiansen's, only a portion of the HTLN site contains the original permanent plot of Dr. Christiansen.

Sampling

The HTLN vegetation community monitoring sample design is based on the National Science Foundation's Konza Prairie Long-Term Ecological Research Program. For the HTLN, the primary sample unit consists of two permanent, parallel 50m transects with five sets of nested plots systematically spaced along each transect. Additional information on the HTLN vegetation monitoring protocol is available at:

http://www1.nature.nps.gov/im/units/htln/monitoring/projects/plant_communities.htm.

Establishment included installation and GPSing of rebar at the each transect end. Permanent marking of sample sites aids in relocation for long-term monitoring. Each rebar is capped with a plastic yellow cap for safety and is marked with tags for the HTLN program. Vegetation was sampled in early August.

3.0 Results

On the four HTLN sample sites, 60 ground flora species were found. Eighty-seven percent of the species are native in origin and account for over 95% of the foliar cover. Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*) and the goldenrod (*Solidago canadensis*) are the community dominants. Warm season grasses and summer/fall flowering forbs accounted for over 95% of the relative foliar cover per site. Kentucky bluegrass (*Poa pratensis*) and Reed canary grass (*Phalaris arundinacea*) are the most common exotic grass species. Exotic forbs include wild parsnip (*Pastinaca sativa*), which occurred in 20% of the sample sites. Mean Shannon diversity is relatively low (1.28 ± 0.16), but total Shannon diversity (i.e. diversity across all four sampling sites) is slightly higher at 1.44.

As would be expected with the increased sample area of the HTLN sites, there were differences from Dr. Christiansen's plots. The large sites of the HTLN found on average 15 additional species per sample unit, mostly forb species. Sample site eight had the greatest difference with 24 additional species found.

4.0 Future Work

The second sample season will be collected during the growing season of 2005. In areas where there has been no management activity, the 2004-2005 sample seasons will provide information on naturally occurring variation in the vegetation community in response to factors such as climate. This is especially important to assess naturally occurring change in warm season grass cover. The two years of sampling will also serve as baseline period for comparison of any future management efforts such as additional prescribed fires. Sample events for 2005 have been tentatively scheduled for the weeks of June 20th and September 12th. Double sampling in early and late summer aids in identification of warm season grasses and late flowering forbs such as asters and goldenrods. An additional two sample sites will also be established this summer, bringing the total HTLN sample sites at HEHO to six.



Figure 1 Herbert Hoover National Historic Site showing the four long-term vegetation monitoring sites of the HTLN and Dr. Paul Christiansen's permanent plots.

APPENDIX A. HEHO Plant Community Summary 2004

Table 1a. Plant Community Composition: Species Richness and Shannon Diversity.

All Species:

Species Richness:	60	Total Shannon Evenness:	0.39
Total Shannon Diversity:	1.60	Mean Evenness (st dev):	0.42 (0.06)
Mean Diversity (st dev):	1.42 (0.25)		

Native Species Only:

Native Species Richness:	51	Total Shannon Evenness:	0.37
Total Shannon Diversity:	1.44	Mean Evenness (st dev):	0.40 (0.03)
Mean Diversity (st dev):	1.28 (0.16)		

Table 1b. Plant Community Summary: Relative Frequency and Cover of Exotic Species.

Number of Exotic Species: **9**

Number of Native Species: **51**

Exotic Ratio: **0.150**

	<u>Mean Relative Frequency</u>	<u>Mean Relative Cover</u>
I	12.68%	4.04%
N	87.32%	95.96%

Table 1c. Plant Community Composition: Relative Frequency and Cover of Plant Guilds.

<u>Plant Guild</u>	<u>Mean Relative Cover (st dev)</u>	<u>Mean Relative Frequency (st dev)</u>
Annuals and Biennials	1.14% (0.007)	11.84% (0.058)
Cool-Season Grasses	0.51% (0.003)	4.75% (0.011)
Ephemeral Spring Forbs	0.02%	0.26%
Ferns	0.16% (0.003)	2.31% (0.050)
Grass-Like	0.04% (0.000)	0.47% (0.001)
Legumes	0.42% (0.003)	1.77% (0.014)
Spring Forbs	1.51% (0.020)	11.98% (0.095)
Summer/Fall Forbs	39.47% (0.171)	37.25% (0.038)
Warm-Season Grasses	55.64% (0.165)	25.62% (0.064)
Woody Species	0.81% (0.012)	2.14% (0.012)

Table 2a. Plant Community Structure: Ground Cover.

<u>Structural Component</u>	<u>Mean Percent Cover</u>
BARE SOIL	48.60
GRASS LITTER	40.29
WOODY DEBRIS	0.06
LEAF LITTER	0.05
UNVEGETATED SURFACE	85.69

Table 2b. Plant Community Structure: Vegetation Type Cover.

<u>Vegetation Type</u>	<u>Mean Percent Cover</u>
Ferns and Fern Allies	0.13
Grasses/Grass-Like	40.54
Herbs	29.23
Shrubs	0.23
Trees	0.41

Table 3a. Plant Community Composition: Herbaceous and Shrub Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
ANDROPOGON GERARDII	Big bluestem	97.50%	34.88	0.2816
SOLIDAGO CANADENSIS	Common goldenrod	100.00%	23.09	0.2083
SORGHASTRUM NUTANS	Indian grass	87.50%	3.80	0.0622
LACTUCA CANADENSIS	Tall lettuce	82.50%	0.65	0.0409
CALYSTEGIA SEPIUM	Hedge-bindweed	67.50%	0.50	0.0328
PANICUM VIRGATUM	Switchgrass	57.50%	0.93	0.0299
MONARDA FISTULOSA	Wild bergamot	30.00%	6.63	0.0269
POA PRATENSIS	Kentucky bluegrass	40.00%	3.41	0.0267
ELYMUS CANADENSIS	Canada wild rye	47.50%	0.76	0.0228
CIRSIIUM DISCOLOR	Tall or roadside thistle	45.00%	0.50	0.0213
TARAXACUM OFFICINALE	Common dandelion	45.00%	0.50	0.0209
SENECIO PLATTENSIS	Platte groundsel	42.50%	0.79	0.0209
PASTINACA SATIVA	Wild parsnip	22.50%	0.78	0.0126
ASTER PILOSUS	Awl wild aster	22.50%	0.50	0.0113
EQUISETUM ARVENSE	Field horsetail	25.00%	0.50	0.0111
AMBROSIA ARTEMISIIFOLIA	Common ragweed	20.00%	0.81	0.0107
HELIOPSIS HELIANTHOIDES	Sunflower-everlasting	22.50%	0.50	0.0101
PHYSALIS HETEROPHYLLA	Clammy ground cherry	22.50%	0.50	0.0101
OXALIS SPP	Wood-sorrel	17.50%	0.50	0.0088
ZIZIA AUREA	Common golden alexanders	17.50%	1.57	0.0084
PHALARIS ARUNDINACEA	Reed canary-grass	7.50%	10.17	0.0084
BAPTISIA ALBA VAR. MACROPHYLLA	Largeleaf wild indigo	15.00%	0.92	0.0071
RATIBIDA PINNATA	Globular coneflower	15.00%	1.33	0.0071
RUDBECKIA HIRTA	Black-eyed Susan	15.00%	0.50	0.0060
DESMODIUM CANADENSE	Canadian tick-trefoil	10.00%	1.75	0.0050
APOCYNUM CANNABINUM	Hemp dogbane	10.00%	0.50	0.0047
ANEMONE CANADENSIS	Canadian anemone	10.00%	1.13	0.0045
ASCLEPIAS SYRIACA	Common milkweed	10.00%	0.50	0.0045
PRUNUS VIRGINIANA	Choke-cherry	2.50%	15.00	0.0041
SETARIA VIRIDIS	Green foxtail-grass	7.50%	0.50	0.0038
SCHIZACHYRIUM SCOPARIUM	Little bluestem	7.50%	0.50	0.0038
MORUS ALBA	White mulberry	7.50%	0.50	0.0036
HYPERICUM ASCYRON	Great St. Johnswort	7.50%	1.33	0.0035
TRADESCANTIA OHIENSIS	Smooth spiderwort	7.50%	0.50	0.0034
CONYZA CANADENSIS	Horseweed	7.50%	0.50	0.0033
LEPESDEZA CAPITATA	Bush-clover	7.50%	0.50	0.0033
MELILOTUS OFFICINALIS	Yellow sweet clover	7.50%	0.50	0.0033
RHUS GLABRA	Smooth sumac	7.50%	0.50	0.0032
CORNUS SPP	Dogwood spp.	5.00%	1.75	0.0030
LACTUCA SERRIOLA	Prickly lettuce	5.00%	0.50	0.0027
ACALYPHA VIRGINICA	Virginia copperleaf	5.00%	0.50	0.0026
PHYSALIS VIRGINIANA	Virginia ground cherry	5.00%	0.50	0.0025
THALICTRUM DASYPARPUM	Purple meadow-rue	5.00%	1.75	0.0025
ANTENNARIA NEGLECTA	Field pussytoes	5.00%	0.50	0.0024
CAREX SPP	Sedge spp.	5.00%	0.50	0.0023
ERYNGIUM YUCCIFOLIUM	Rattlesnake-master	5.00%	0.50	0.0022

Species	Common Name	Frequency	Mean Cover	Importance Value
SILPHIUM PERFOLIATUM	Cup-plant	5.00%	0.50	0.0020
HELIANTHUS GROSSESERRATUS	Sawtooth sunflower	2.50%	3.00	0.0019
VIBURNUM SPP	Viburnum spp.	2.50%	3.00	0.0015
ASTRAGALUS CANADENSIS	Canada milk-vetch	2.50%	3.00	0.0015
BROMUS INERMIS	Smooth brome	2.50%	3.00	0.0015
SOLIDAGO RIGIDA	Stiff goldenrod	2.50%	3.00	0.0015
RUBUS SPP	Blackberry, dewberry	2.50%	0.50	0.0014
SYMPHORICARPOS ORBICULATUS	Coralberry	2.50%	0.50	0.0014
VIOLA SPP	Violet spp.	2.50%	0.50	0.0013
VERONICASTRUM VIRGINICUM	Culver's root	2.50%	0.50	0.0010
ASTER NOVAE-ANGLIAE	New England wild aster	2.50%	0.50	0.0010
SOLANUM CAROLINENSE	Horse-nettle	2.50%	0.50	0.0010
ECHINACEA PALLIDA	Pale purple coneflower	2.50%	0.50	0.0010
SOLIDAGO MISSOURIENSIS	Missouri goldenrod	2.50%	0.50	0.0010

Table 3b. Plant Community Composition: Exotic Species.

Species	Common Name	Frequency	Mean Cover	Importance Value
POA PRATENSIS	Kentucky bluegrass	40.00%	3.41%	0.0267
TARAXACUM OFFICINALE	Common dandelion	45.00%	0.50%	0.0209
PASTINACA SATIVA	Wild parsnip	22.50%	0.78%	0.0126
PHALARIS ARUNDINACEA	Reed canary-grass	7.50%	10.17%	0.0084
SETARIA VIRIDIS	Green foxtail-grass	7.50%	0.50%	0.0038
MORUS ALBA	White mulberry	7.50%	0.50%	0.0036
MELILOTUS OFFICINALIS	Yellow sweet clover	7.50%	0.50%	0.0033
LACTUCA SERRIOLA	Prickly lettuce	5.00%	0.50%	0.0027
BROMUS INERMIS	Smooth brome	2.50%	3.00%	0.0015