

Final Report

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2010 Butterfly and Plant Surveys at the Chariton Prairie/Savannah Restoration Area

Submitted
to

Nels Christensen, City Manager
City of Chariton
115 South Main Street
Chariton, Iowa 50049

Principal Investigator

Gerald Selby
Ecological and GIS Services
807 North W Street
Indianola, Iowa 50125
515-961-0718, phone
jsselby@mchsi.com, email

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Summary

Butterfly and plant surveys were conducted at the Chariton Prairie/Savannah Restoration Area (T72N, R21W, Sec 26 and 27, Lucas County, Iowa) in July and September 2010. An initial planning survey was conducted with Andy Asell on 5 July, 2010 to define the survey protocols and the areas to be surveyed. The primary purpose of the butterfly surveys was to document the distribution and abundance of the state threatened Byssus skipper (*Problema byssus*) and the state special concern Zabulon skipper (*Poanes zabulon*). Both of these species were documented during the 2008 surveys and, due to differences in their habitat requirements, might be expected to respond differently to the restoration efforts at the site. Replicated surveys of the entire site were done during each of their flights (mid and late July) and those surveys were augmented with more focused surveys of their habitat and butterfly observations during the plant surveys. Byssus skippers were found in each of the areas where gama grass (*Tripsacum dactyloides*), their larval host plant, occurs. One skipper was seen in the recently cleared opening east of Lake Ellis and two were seen in the area west of the lake. Their numbers appear to be low and a cautious approach to management – especially prescribed fire – should be used in the areas where their host plant occurs. In 2008, Zabulon skippers were fairly abundant along the access trail in the East Unit, but none were seen during this year’s surveys. Based on degree-day data, the timing of the 2010 surveys should have been similar to the 2008 surveys. Recent clearing along the trail may have had a negative impacted on them, but it is also possible that the flight was missed.

A total of 55 species have been documented at the Chariton Prairie/Savannah Restoration Area during the 2008 and 2010 surveys. Forty-one confirmed species were seen in 2008, including nine that were not seen in 2010. Forty-six confirmed species were seen in 2010, including 14 new species. New state special concern species included Dion skipper (*Euphyes dion*) and an unconfirmed wild indigo duskywing (*Erynnis baptisiae*). Two nonresident strays were also seen. A single marine blue (*Leptotes marina*) was seen on the dam and funeral duskings (*Erynnis funeralis*) were seen on separate surveys at the east end of the dam and along the access trail. The project area has a diverse butterfly fauna, including several prairie obligate species, so it is

important that management activities minimize potential negative impacts on those species (e.g. entire habitat areas such as the gama grass openings or other isolated prairie opening should not be burned in their entirety in a given year).

The goal of the plant surveys was to compile a checklist for the plant species present at the Chariton prairie/savannah restoration area and to conduct floristic quality assessments for a representative sample of areas within the site that can serve as a baseline for future assessments. Plant surveys focused on two time periods – mid-late July and early-late September – to capture as many species as possible. The surveys were focused on the prairie/savannah openings east of the Lake, but additional less complete data were collected for the dam and access trail and from a sample of areas west of the lake. A total of 214 plant species, including 175 native species, were identified for the entire site. The number of species for each of the regular survey areas east of the lake ranged from 65-109 total species and from 56-95 native species. Average Coefficient of Conservation (C) and Floristic Quality Index (FQI) values for those areas were fairly low (Iowa C values from 2.68 to 3.06; Iowa FQI values from 20.38 to 29.78). These values reflect the large number of exotic and weedy species that are to be expected in the early stages of a restoration project such as this. As the restoration areas mature, average C values and FQI values would be expected to increase (e.g. C > 5.00; FQI > 30).

Preliminary data suggest that there is good potential for quality prairie in the openings. There is a representative number of prairie species, including many conservative and in some cases rare ones. State listed species include the state threatened round-stemmed false foxglove (*Agalinis gattingeri*) and state special concern eared false foxglove (*Tomanthera auriculata*). Additional quality prairie species include tall green milkweed (*Asclepias hirtella*), prairie Indian plaintain (*Cacalia plantaginea*), purple prairie clover (*Dalea purpurea*), pale coneflower (*Echinacea pallida*), bottle gentian (*Gentiana andrewsii*), blazing star (*Liatris aspera*), compass plant (*Silphium laciniatum*), and nodding ladies'-tresses (*Spiranthes cernua*).

General management issue will include clearing downed woody debris, controlling invasive woody species, and controlling other invasive exotic species. Silky bush clover (*Lespedeza cuneata*) is already a major problem at the site and in some of the recently cleared prairie openings. It is very aggressive and will actually respond positively to the recent clearing and prescribed fire. If it is not controlled, it could negate all the positive results from the work that is being done. Researching and implementing the best possible control strategies should be a top priority for this project! Prescribed fire will be an important management tool, but it can have a negative impact on prairie invertebrates. It is important to resist the temptation to burn too much too frequently in an attempt to get quick, large scale results or to simplify doing the burns.

Future monitoring of the butterflies and plants should be done to provide ongoing feedback for evaluating the results of the management activities at the site.

Methods

Butterfly Surveys:

Surveys consisted of a directed search of optimal habitat throughout each prairie/savannah opening in the eastern portion of the site (NW4 Sec26 and NE4 Sec 27) and the more open hillsides with prairie remnants in the western portion of the site (E2 NW4 Sec 27). They also included the access routes to those areas (dam and woodland trail in the east; road and trail around lake in the west). Areas east and west of the boat ramp were treated as separate survey units (East Unit; West Unit). The 2008 survey routes were expanded to include recently cleared openings east of the access trail in the southeast portion of the East Unit and the gama grass hill further southwest in the West Unit. Routes were also expanded within recently cleared openings where more limited surveys were done in 2008.

Surveys were conducted under suitable conditions for butterfly activity (e.g. at least partly clear skies, >70°F, moderate-calm winds, and generally between 10 a.m. and 5 p.m.). Data were collected using a Pocket PC (PDA) setup with an attached GPS receiver and ArcPad software. For each survey the date, time period, weather data, and a track log showing the route surveyed were recorded. Each butterfly observation was recorded using the PDA/GPS setup, so data were collected for the distribution and abundance of each species for each area surveyed during each survey.

Plant Surveys:

The goal of the plant surveys was to compile a checklist for the plant species present at the Chariton prairie/savannah restoration area and to collect Floristic Quality Assessment (FQA) data from a representative sample of areas within the site that can serve as a baseline for future assessments. Plant survey areas included in the project, as well as additional potential plant survey areas, are illustrated in **Appendix 3, Figure 1** (East Unit) and **Appendix 3, Figure 2** (West Unit). Coefficient of Conservatism values (range = 0 to 10) have been assigned to each plant species for Iowa and Missouri. For this project, values from both states and their averages were used. Floristic Quality Index (FQI) values were calculated using the following formula:

$$\text{FQI} = (\text{C}/\text{N}) * (\sqrt{\text{Nat}})$$

FQI = Floristic Quality Index **C** = Coefficient of Conservatism
N = Number of Species **Nat** = Number of Native Species

Surveys were conducted during each of two time periods (mid-late and late season). Additional early and early-mid season surveys would help to assure a more complete representation of the species, but were not included in this project. Recently cleared prairie opening east of Lake Ellis were the focus of the surveys, but limited data were also collected for the Dam, access trail, and the remnant prairie areas west of the lake. One set of surveys was completed in mid-late July and a second set of surveys was completed in early September. An extra set of surveys was also completed in mid-late September focused a few key late blooming species (e.g. gentians and orchids). Checklists for the plant species present were compiled during both the FQA surveys and the butterfly surveys, and were used to generate FQI values for the individual survey areas and for the site. Methodology included presence/absence surveys of plant species observed along meandering routes throughout each plant survey area. Distribution data for selected plant species were also collected.

For this report, butterfly nomenclature follows Opler and Warren (2003) for scientific names and the North American Butterfly Association (2001) for common names. Plant nomenclature follows Zales (2008).

Results

Butterfly Surveys:

Quantitative butterfly surveys were completed during the Byssus and Zabulon skipper flights in 2010. Additional butterfly data (species observed; quantitative data for targets) were collected during the plant surveys. Maps showing the routes surveyed and the distribution of butterfly observations per species during each survey are included in [Appendix 1](#). Survey summary information and butterfly data tables are included in [Appendix 2](#). Quantitative data for the surveys conducted during the Byssus and Zabulon flights in 2008 and 2010 are included in [Table 1](#) (Byssus skipper flight) and in [Table 2](#) (Zabulon skipper flight).

A checklist of the butterfly species observed during the 2008 and 2010 surveys for each survey unit (East and West) and for the site is included in [Table 3](#). Unconfirmed species observations for each year are included in [Table 4](#). A total of 55 species have been documented during the 2008 and 2010 surveys. Forty-one confirmed species were seen in 2008, including nine that were not seen in 2010. Forty-six confirmed species were seen in 2010, including 14 that were new. New state special concern species included the Dion skipper and an unconfirmed wild indigo duskywing. Two nonresident stray species were also seen. A single marine blue was seen on the dam. This was one two seen in Iowa this year and one of five total observations in the state. Funeral duskwings were seen on separate surveys at the east end of the dam and along the access trail. There was one additional record for this species in Iowa but there are few, if any, other records for it in Iowa that I am aware of. The project area has a diverse butterfly fauna, including several prairie obligate species, so it is important that management activities minimize potential negative impacts on those species (e.g. entire habitat areas such as the gama grass openings or other isolated prairie openings should not be burned in their entirety in any given year). Significant butterfly observations are listed below.

State Listed Butterflies Observed:

State Special Concern

Erynnis baptisiae (wild indigo duskywing) – 2010 (East Unit; not confirmed)

Euphyes dion (Dion skipper) – 2010 (West Unit)

Poanes zabulon (Zabulon skipper) – 2008 (East Unit)

State Threatened

Problema byssus (Byssus skipper) – 2008(East Unit); 2010 (East & West Units)

Non-resident Stray Butterflies Observed:

Erynnis funeralis (funeral duskywing)

Leptotes marina (marine blue)

Table 1. 2008 and 2010 butterfly surveys at the Chariton Prairie/Savannah Restoration Area during the Byssus skipper flight: observations per species per unit during each survey.

Date (Degree-Days)	23 Jul 2008 (881)			14 & 15 Jul 2010 (887 & 902)			16 Jul 2010 (916)		
	East	West	Total	East	West	Total	East	West	Total
<i>Ancyloxypha numitor</i>	2		2	1		1			
Blue sp.	1		1	1		1			
<i>Boloria bellona</i>		5	5	17	53	70	12	50	62
<i>Callophrys gryneus</i>							1		1
<i>Celastrina neglecta</i>	56	16	72	5	10	15	7	5	12
<i>Cercyonis pegala</i>	9	10	19	9	3	12	14	4	18
<i>Colias eurytheme</i>				1		1			
<i>Colias philodice</i>				1		1		1	1
<i>Colias</i> sp.	5	5	10	50	48	98	38	45	83
<i>Cupido comyntas</i>	27	3	30	12	1	13	8	3	11
<i>Danaus plexippus</i>	1		1	2	2	4	1	3	4
<i>Epargyreus clarus</i>	7		7	4		4	3		3
<i>Erynnis baptisiae?</i>							1		1
<i>Erynnis juvenalis?</i>	3		3						
<i>Euphyes dion</i>					1	1			
<i>Euphyes vestris</i>	1		1	1		1			
<i>Euphyes vestries?</i>	1	2	3						
<i>Junonia coenia</i>				14	2	16	6	1	7
<i>Limenitis archippus</i>	1		1	1		1	x		x
<i>Limenitis arthemis astyanax</i>				4	1	5	3	1	4
<i>Megisto cymela?</i>	1		1	1		1			
<i>Papilio cresphontes</i>	6		6	2		2	4		4
<i>Papilio polyxenes</i>	6		6	1	3	4	6	2	8
<i>Phyciodes tharos</i>	29		29	23	22	45	17	10	27
<i>Pieris rapae</i>	12	4	16	103	48	151	62	63	125
<i>Polygona comma</i>					x	x			
<i>Polygona interrogationis</i>	1		1	4		4	1		1
<i>Polygona progne</i>		1	1				1		1
<i>Polygona</i> sp.	1	1	2	2	1	3	1		1
<i>Problema byssus</i>	1		1	1		1			
<i>Problema byssus?</i>	1		1						
<i>Pyrisita lisa</i>				2	3	5	5	6	11
<i>Satyrium titus</i>				8		8	2		2
Skipper sp.		2	2	1		1	1		1
<i>Speyeria cybele</i>	2		2	5		5	1	1	2
<i>Staphylus hayhurstii?</i>				1		1			
<i>Strymon melinus</i>							1		1
<i>Vanessa atalanta</i>		1	1						
<i>Vanessa virgininiensis</i>	1		1	3		3	1		1
<i>Vanessa</i> sp.	1		1						
<i>Zerene cesonia</i>								1	1
Total Count:	177	50	127	280	199	479	197	196	393
Observations/Hour:	59	55	58	62	70	65	58	94	71
Total Species:	21	9	22	25	16	28	23	13	23

Other surveys during Byssus skipper flight while doing plant surveys:

19 July (East Unit; NW-N Area = gama grass opening) – None observed

20 July (West Unit; focused search in SW Area = gama grass location) – 2 observed

Table 2. 2008 and 2010 butterfly surveys at the Chariton Prairie/Savannah Restoration Area during the Zabulon skipper flight: observations per species per unit during each survey.

Date (Degree-Days)	05 Aug 2008 (1061)			25 Jul 2010 (1050)			29 Jul 2010 (1108)		
	East	West	Total	East	West	Total	East	West	Total
<i>Anatrytone logan</i>	1		1				1		1
<i>Ancyloxypha numitor</i>	1		1				1	1	2
<i>Asterocampa celtis</i>					3	3		3	3
Blue sp.	11		11						
<i>Boloria bellona</i>				7	12	19	2	5	7
<i>Celastrina neglecta</i>	9	2	11	1	x	1	6		6
<i>Cercyonis pegala</i>	2	4	6	8	10	18	9	7	16
<i>Chlosyne nycteis</i>	6		6		2	2	4		4
<i>Colias eurytheme</i>	1	1	2	5	x	5			
<i>Colias philodice</i>				1		1			
<i>Colias</i> sp.	2		2	22	44	66	21	45	66
<i>Cupido comyntas</i>	32	7	39	21	6	27	53	13	66
<i>Danaus plexippus</i>	2	3	5	4	3	7	3	4	7
<i>Enodia anthedon</i>	3		3	1	x	1	3		3
<i>Epargyreus clarus</i>	17		17	3		3	6	1	7
<i>Euphyes vestris</i>				1	1	2	2		2
<i>Feniseca tarquinius</i>								2	2
<i>Hylephila phyleus</i>					1	1			
<i>Junonia coenia</i>	1		1	17	16	33	35	15	50
<i>Limenitis archippus</i>				1		1			
<i>Limenitis arthemis astyanax</i>	3	1	4		x	x	4	2	6
<i>Papilio cresphontes</i>	14		14				3		3
<i>Papilio glaucus</i>	2		2	1	2	3	2	1	3
<i>Papilio polyxenes</i>	2	2	4	5	5	10	7	2	9
<i>Phyciodes tharos</i>	27	4	31	8	19	27	8	69	77
<i>Phyciodes tharos?</i>		1	1						
<i>Pieris rapae</i>	1		1	19	34	53	20	35	55
<i>Poanes zabulon</i>	10		10						
<i>Polites peckius</i>	1		1		2	2			
<i>Polites themistocles</i>								1	1
<i>Polygonia comma</i>	1		1	3		3		1	1
<i>Polygonia interrogationis</i>				2	1	3	8		8
<i>Polygonia progne</i>	2		2						
<i>Polygonia</i> sp.	2		2				2		2
<i>Pyrisita lisa</i>				6	9	15	67	10	77
Skipper sp.	1		1	1	1	2	1	3	4
<i>Speyeria cybele</i>				1	1	2	1	1	2
<i>Strymon melinus</i>							1	1	2
<i>Thorybes bathyllus</i>								1	1
<i>Vanessa atalanta</i>					5	5	2		2
<i>Vanessa cardui</i>					1	1	1		1
<i>Vanessa virginiensis</i>							1		1
<i>Zerene cesonia</i>		1	1	1	1	2	1	1	2
Total Count:	154	26	180	140	179	319	277	224	501
Observations/Hour:	68	39	62	48	77	61	74	81	77
Total Species:	22	9	21	22	25	29	27	22	32

Other surveys during Zabulon skipper flight:

28 July (East Unit; partial butterfly survey; ended early due to heat but entire area along trail where 2008 observations occurred was surveyed) – None observed

Table 3. 2008 and 2010 butterfly surveys at the Chariton Prairie/Savannah Restoration Area: checklist of butterfly species observed in the East and West Units.

Binomial (Common Name)	East Unit			West Unit			Site	
	2008	2010	All	2008	2010	All	2008	2010
<i>Anatrytone logan</i> (Delaware Skipper)	x	x	x				x	x
<i>Ancyloxypha numitor</i> (Least Skipper)	x	x	x		x	x	x	x
<i>Asterocampa celtis</i> (Hackberry Emperor)					x	x		x
<i>Atalopedes campestris</i> (Sachem)	x		x				x	
<i>Boloria bellona</i> (Meadow Fritillary)		x	x	x	x	x	x	x
<i>Callophrys gryneus</i> ('Olive' Juniper Hairstreak)		x	x					x
<i>Celastrina ladon</i> (Spring Azure)	x		x				x	
<i>Celastrina neglecta</i> (Summer Azure)	x	x	x	x	x	x	x	x
<i>Cercyonis pegala</i> (Common Wood-Nymph)	x	x	x	x	x	x	x	x
<i>Chlosyne nycteis</i> (Silvery Checkerspot)	x	x	x	x	x	x	x	x
<i>Colias eurytheme</i> (Orange Sulfur)	x	x	x	x	x	x	x	x
<i>Colias philodice</i> (Clouded Sulfur)	x	x	x	x	x	x	x	x
<i>Cupido comyntas</i> (Eastern Tailed-Blue)	x	x	x	x	x	x	x	x
<i>Danaus plexippus</i> (Monarch)	x	x	x	x	x	x	x	x
<i>Enodia anthedon</i> (Northern Pearly-eye)	x	x	x		x	x	x	x
<i>Epargyreus clarus</i> (Silver-spotted Skipper)	x	x	x	x	x	x	x	x
<i>Erynnis funeralis</i> (Funeral Duskywing)		x	x					x
<i>Euphyes dion</i> (Dion Skipper)					x	x		x
<i>Euphyes vestris</i> (Dun Skipper)	x	x	x	x	x	x	x	x
<i>Euptoieta claudia</i> (Variegated Fritillary)		x	x					x
<i>Feniseca tarquinius</i> (Harvester)					x	x		x
<i>Hylephila phyleus</i> (Fiery Skipper)		x	x		x	x		x
<i>Junonia coenia</i> (Common Buckeye)	x	x	x	x	x	x	x	x
<i>Leptotes marina</i> (Marine Blue)		x	x					x
<i>Libytheana carinenta</i> (American Snout)		x	x					x
<i>Limenitis archippus</i> (Viceroy)	x	x	x		x	x	x	x
<i>Limenitis arthemis astyanax</i> (Red-spotted Purple)	x	x	x	x	x	x	x	x
<i>Lycaena dione</i> (Gray Copper)	x						x	
<i>Lycaena hylus</i> (Bronze Copper)	x						x	
<i>Megisto cymela</i> (Little Wood-Satyr)	x		x	x		x	x	
<i>Papilio cressphontes</i> (Giant Swallowtail)		x	x				x	x
<i>Papilio glaucus</i> (Eastern Tiger Swallowtail)	x	x	x		x	x	x	x
<i>Papilio polyxenes</i> (Black Swallowtail)	x	x	x	x	x	x	x	x
<i>Phyciodes tharos</i> (Pearl Crescent)	x	x	x	x	x	x	x	x
<i>Pieris rapae</i> (Cabbage White)	x	x	x	x	x	x	x	x
<i>Poanes hobomok</i> (Hobomok Skipper)	x		x				x	
<i>Poanes zabulon</i> (Zabulon Skipper)	x		x				x	
<i>Polites peckius</i> (Peck's Skipper)	x	x	x		x	x	x	x
<i>Polites themistocles</i> (Tawny-edged Skipper)					x	x		x
<i>Polygonia comma</i> (Eastern Comma)	x	x	x		x	x	x	x
<i>Polygonia interrogationis</i> (Question Mark)	x	x	x		x	x	x	x
<i>Polygonia progne</i> (Gray Comma)	x	x	x	x		x	x	x
<i>Problema byssus</i> (Byssus Skipper)	x	x	x		x	x	x	x
<i>Pyrgus communis</i> (Common Checkered-Skipper)		x	x					x
<i>Pyrisita lisa</i> (Little Yellow)		x	x		x	x		x
<i>Satyrium calanus</i> (Banded Hairstreak)				x		x	x	
<i>Satyrium titus</i> (Coral Hairstreak)	x	x	x	x		x	x	x
<i>Speyeria cybele</i> (Great Spangled Fritillary)	x	x	x	x	x	x	x	x
<i>Strymon melinus</i> (Gray Hairstreak)		x	x		x	x		x
<i>Thorybes bathyllus</i> (Southern Cloudywing)					x	x		x
<i>Thymelicus lineola</i> (European Skipper)				x		x	x	
<i>Vanessa atalanta</i> (Red Admiral)	x	x	x	x	x	x	x	x
<i>Vanessa cardui</i> (Painted Lady)		x	x	x	x	x	x	x
<i>Vanessa virginiensis</i> (American Lady)	x	x	x		x	x	x	x
<i>Zerene cesonia</i> (Southern Dogface)		x	x	x	x	x	x	x
Number Species Observed (site total = 55)	35	41	46	23	35	41	41	46

Table 4. 2008 and 2010 butterfly surveys at the Chariton Prairie/Savannah Restoration Area: checklist of unconfirmed butterfly species observed in the East and West Units.

Binomial (Common Name)	East Unit			West Unit		
	2008	2010	All	2008	2010	All
<i>Callophrys henrici</i> (Henry's Elfin)	x		x			
<i>Erynnis baptisiae</i> (Wild Indigo Duskywing)		x	x			
<i>Erynnis juvenalis</i> (Juvenal's Duskywing)	x		x			
<i>Erynnis</i> sp (Duskywing sp)		x	x			
<i>Megisto cymela</i> (Little Wood-Satyr)		x	x			
<i>Staphylus hayhurstii</i> (Hayhurst's Scallopwing)		x	x			
<i>Wallengrenia egeremet</i> (Northern Broken-Dash)		x	x			
<i>Zerene cesonia</i> (Southern Dogface)	x		x			
Number Unconfirmed Species Observed	3	5	8			

Plant Surveys:

Potential areas for the FQA surveys were defined and are illustrated in [Appendix 3, Figure 1](#) (East Unit) and [Appendix 3, Figure 2](#) (West Unit). Complete FQA surveys were conducted in each of the recently cleared prairie opening east of Ellis Lake. Less complete plant data were collected along the dam and access trail in the East Unit and along the access trail and the gamma grass prairie hill (southwest area) in the West Unit. Limited additional plant data were collected in those areas and in the other potential survey areas while conducting butterfly surveys. Plant species checklists for the site, survet units, and plant survey areas are included in [Appendix 3, Table 1](#) (East Unit) and [Appendix 4, Table 2](#) (West Unit). For the FQI calculations, C values for Iowa, Missouri, and the average of those two values were used. However, for exotic species, only Iowa definitions were used. An Excel spreadsheet with the original survey data and the processed data used to generate the FQI and other summary statistics is included in [Appendix 5](#) as an attached file. Data summaries for the plant surveys and output from the FQI calculations are summarized below in [Table 5](#). The distribution of selected high quality prairie plant species observations is illustrated in a series of maps for July observations in the East Unit ([Appendix 3, Figure 3](#)) and West Unit ([Appendix 3, Figure 4](#)) and for September observations in the East Unit ([Appendix 3, Figure 5](#)).

Areas that were included in the regular plant surveys included East-SE, East-EC, East-SW-S, East-SW-N, East-NW-S, East-NW-C, and East-NW-N ([Appendix 3, Figure 1](#)). A total of 214 plant species, including 175 native species, were identified for the entire site. The number of species for each of the regular survey areas ranged from 65-109 total species and from 56-95 native species ([Table 5](#)). Average C values were generally low, with Iowa values for the site and regular survey areas ranging from 2.68 to 3.06. These values reflect the large number of exotic and weedy species that are to be expected in the early stages of a restoration project such as this. The Iowa FQI value was the highest for the site (38.02), despite the fact that its average C value (2.87) was lower than many of the other areas. The higher FQI value reflects the larger total number of species, while the lower average C value reflects the inclusion of more species from disturbed habitats. Iowa FQI values ranged from 20.38 to 29.78 for the regular survey areas. These values are fairly low but would be expected to increase as the restoration areas mature. The East-Dam area provides an extreme example of an area with lower diversity (46 species) dominated by weedy species (average C value = 0.83; FQI = 4.13).

Table 5. 2010 plant surveys at the Chariton Prairie/Savannah Restoration Area: data summaries and floristic quality index (FQI) calculations for the site and plant survey areas.

Plant Survey Area	Site			East-SE			East-EC		
Coefficient of Conservatism (State)	IA	MO	AVG	IA	MO	AVG	IA	MO	AVG
Coefficient of Conservatism (Total)	615	655	635	333	359	346	276	299	288
Number of Species (Total)	214	214	214	109	109	109	95	95	95
Coefficient of Conservatism (Avg)	2.87	3.06	2.97	3.06	3.29	3.17	2.91	3.15	3.03
Number of Native Species (Total)	175	175	175	95	95	95	84	84	84
Number of Native Species (Sqrt)	13.23	13.23	13.23	9.75	9.75	9.75	9.17	9.17	9.17
Floristic Quality Index	38.02	40.49	39.25	29.78	32.10	30.94	26.63	28.85	27.74
Plant Survey Area	East-SW-S			East-SW-N			East-NW-S		
Coefficient of Conservatism (State)	IA	MO	AVG	IA	MO	AVG	IA	MO	AVG
Coefficient of Conservatism (Total)	177	192	185	281	301	291	198	221	210
Number of Species (Total)	65	65	65	94	94	94	74	74	74
Coefficient of Conservatism (Avg)	2.72	2.95	2.84	2.99	3.20	3.10	2.68	2.99	2.83
Number of Native Species (Total)	56	56	56	78	78	78	62	62	62
Number of Native Species (Sqrt)	7.48	7.48	7.48	8.83	8.83	8.83	7.87	7.87	7.87
Floristic Quality Index	20.38	22.10	21.24	26.40	28.28	27.34	21.07	23.52	22.29
Plant Survey Area	East-NW-C			East-NW-N			East-Trail		
Coefficient of Conservatism (State)	IA	MO	AVG	IA	MO	AVG	IA	MO	AVG
Coefficient of Conservatism (Total)	227	248	238	261	295	278	206	218	212
Number of Species (Total)	83	83	83	94	94	94	86	86	86
Coefficient of Conservatism (Avg)	2.73	2.99	2.86	2.78	3.14	2.96	2.40	2.53	2.47
Number of Native Species (Total)	69	69	69	78	78	78	70	70	70
Number of Native Species (Sqrt)	8.31	8.31	8.31	8.83	8.83	8.83	8.37	8.37	8.37
Floristic Quality Index	22.72	24.82	23.77	24.52	27.72	26.12	20.04	21.21	20.62
Plant Survey Area	East-Dam			West-Trail			West-SW		
Coefficient of Conservatism (State)	IA	MO	AVG	IA	MO	AVG	IA	MO	AVG
Coefficient of Conservatism (Total)	38	52	45	114	135	125	161	182	172
Number of Species (Total)	46	46	46	62	62	62	56	56	56
Coefficient of Conservatism (Avg)	0.83	1.13	0.98	1.84	2.18	2.01	2.88	3.25	3.06
Number of Native Species (Total)	25	25	25	44	44	44	48	48	48
Number of Native Species (Sqrt)	5.00	5.00	5.00	6.63	6.63	6.63	6.93	6.93	6.93
Floristic Quality Index	4.13	5.65	4.89	12.20	14.44	13.32	19.92	22.52	21.22
Plant Survey Area	West-SC			West-NC			West-NE		
Coefficient of Conservatism (State)	IA	MO	AVG	IA	MO	AVG	IA	MO	AVG
Coefficient of Conservatism (Total)	4	7	6	15	15	15	12	10	11
Number of Species (Total)	3	3	3	6	6	6	7	7	7
Coefficient of Conservatism (Avg)	1.33	2.33	1.83	2.50	2.50	2.50	1.71	1.43	1.57
Number of Native Species (Total)	2	2	2	4	4	4	5	5	5
Number of Native Species (Sqrt)	1.41	1.41	1.41	2.00	2.00	2.00	2.24	2.24	2.24
Floristic Quality Index	1.89	3.30	2.59	5.00	5.00	5.00	3.83	3.19	3.51

Discussion

Butterfly Surveys:

The primary purpose of the butterfly surveys was to document the distribution and abundance of the state threatened Byssus skipper and the state special concern Zabulon skipper. Both of these species were documented during the 2008 surveys and, due to differences in their habitat requirements, might be expected to respond differently to the restoration efforts at the site. Byssus skippers were found in each of the areas where gama grass occurs, but their numbers appear to be low. A cautious approach to management – especially prescribed fire – should be used in the areas where their host plant occurs. In 2008, Zabulon skippers were fairly abundant along the access trail in the East Unit, but none were seen during this year's surveys. Based on degree-day data, the timing of the 2010 surveys should have been similar to the 2008 surveys. Recent clearing along the trail may have had a negative impacted on them, but it is also possible that the flight was missed.

The Chariton Prairie/Savannah Restoration Area includes a variety of habitats and therefore also supports a diverse butterfly fauna. The eastern portion includes non-native grassland and aquatic edge habitats associated with the dam, woodland/woodland edge habitat along the trail, and the prairie/savannah openings. In the western portion, there are non-native grassland and aquatic habitats along the road/trail that follows the edge of the lake and some fairly open native prairie hillsides. A total of 55 species have been documented at the site, including one state threatened species (Byssus skipper) and two, possibly three state special concern species (Dion skipper, Zabulon skipper, and wild indigo duskywing?). Many of the butterflies are generalist grassland, wetland, and woodland species, but the presence of several habitat specialists suggests that the area could support other prairie/savannah species. Therefore, it is important that management activities minimize potential negative impacts on those species (e.g. entire habitat areas should not be burned in their entirety in a given year).

Plant Surveys:

Results of the plant surveys in the recently cleared prairie openings reflect the early state of the restoration process. Average C values and FQI values were generally low (Iowa C values from 2.68 to 3.06; Iowa FQI values from 20.38 to 29.78). These values reflect the large number of exotic and weedy species that are to be expected in the early stages of a restoration project such as this. As the restoration areas mature, average C values and FQI values would be expected to increase (e.g. C > 5.00; FQI > 30).

Management Comments/Recommendations:

The presence of a representative number of prairie species, including conservative and in some cases rare ones, suggests that there is good potential for restoring a high quality prairie/savannah community at this site. Most of the weedy species can be expected to decline as the restoration matures. However, there are some aggressive weedy species that will pose a serious threat to the success of the project unless aggressive control measures are implemented. Management issues and possible strategies to address them include:

- **Downed debris from tree clearing process.** In addition to making life miserable for butterfly surveyor, the downed woody debris is covering and/or shading areas with prairie

species. It also makes future management activities such as mowing more difficult. Fire can be a quick solution for small-medium size woody debris, but is less effective for getting rid of larger downed or standing tree trunks. The charred remains can be harder to get rid of and if they do burn up, may sterilize the areas where they were lying. If possible, it would be good to clean those areas up prior to burning. Mowing with heavy duty mulching equipment, or cutting and piling the brush in areas where there is no prairie vegetation would be good.

- **Standing dead trees.** Girdling is an efficient and effective tool for killing standing trees without stimulating suckering and those trees can also provide good habitat. However, they are also a significant hazard for anyone walking through the area or for managers trying to cut them down. As mentioned above, fire is not likely to eliminate them.
- **Invasive woody species.** Again, prescribed fire is a quick way to top-kill invasive woody vegetation, but it does not eliminate it due to subsequent suckering. Cutting and treating the woody vegetation is more labor intensive but will also be more effective at achieving control. Prescribed fire can then be used more effectively as a maintenance tool.
- **Silky bush clover (*Lespedeza cuneata*).** This species is already a major problem at the site and in some of the recently cleared prairie openings. It is very aggressive and it will respond positively to most standard prairie management practices (e.g. removing woody vegetation to open up the area; prescribed fire; etc.). If it is not controlled, it could negate all the positive results from the work that is being done. Researching and implementing the best possible control strategies should be a top priority for this project!
- **Other exotic species.** Other species will need to be addressed using standard management practices (e.g. mechanical and/or chemical control; timed mowing and/or burning).
- **Prescribed fire and invertebrate conservation.** As has already been mentioned, prescribed fire can be one of the most efficient tools for cleaning up after mechanically clearing woody vegetation in an area. It is also an effective tool for stimulating the growth of prairie plants. However, it can have a significant negative impact on invertebrate species. Therefore, it is important to include adequate unburned habitat from which recolonization can occur. Larval food sources for the Byssus skipper have only been documented in two of the vegetation survey areas (East-NW-N and West-SW). During the 2010 surveys, they were found in each of these areas, but in low numbers. These areas should **not** be burned in their entirety during any given year. If possible, fire breaks should bisect these habitat areas to maximize the potential for post-burn recovery of invertebrate populations. As the site is opened up and as habitat becomes more contiguous, adjustment to the breaks could be made. A draft option for management areas in the East Unit is presented in **Appendix 3, Figure 6**. The entire northern portion of the area could be burned as a single unit. It would include the northern portions of the NW-N Area (gama grass opening west of the access trail) and the EC Area (east of access trail), where the woody vegetation problems are the worst. The southern portion of the area could be burned using a similar approach (**Appendix 3, Figure 7**). The primary challenge would be getting fire breaks through the prairie opening where there are a lot tree stumps and downed woody debris. Heavy duty tree mulching equipment and/or hand clearing would need to be done before standard mowing equipment could be used.