

COMPLETION OF STATUS SURVEYS FOR THE
DAKOTA SKIPPER (Hesperia dacotae)
AND THE
POWESHIEK SKIPPER (Orisma poweshiek)
IN MINNESOTA

with data on the Regal Fritillary (Speyeria idalia)

Final Report
submitted to the Minnesota Nongame Wildlife Program
December 28, 1993

Dennis Schlicht
Iowa Lepidoptera Project
Center Point, Iowa

Mike Saunders
Iowa State University
Ames, Iowa

TABLE OF CONTENTS

ABSTRACT

ACKNOWLEDGEMENTS

INTRODUCTION..... 1

METHODS..... 2

RESULTS..... 3

 Table 1...Target Species Summary..... 5

 Table 2...Site Summary..... 7

DISCUSSION..... 9

RECOMMENDATIONS..... 12

SITE RECOMMENDATIONS..... 13

LITERATURE CITED..... 22

SITE ACCOUNTS..... 23

APPENDIX. A

 Selected Species Disrribution Maps..... A2

 Species Records..... A21

 Site Records..... A27

APPENDIX. B

 Condition Scale

 Preliminary Report, Status Survey

 Budget and Expenses

COMPLETION OF STATUS SURVEYS FOR THE
DAKOTA SKIPPER (*Hesperia dacotae*)
AND THE
POWESHIEK SKIPPER (*Oarisma poweshiek*)
IN MINNESOTA
(with additional data on the Regal Fritillary (*Speyeria idalia*))

by

Dennis Schlicht, Iowa Lepidoptera Project, Center Point, IA
and
Michael Saunders, Iowa State University, Ames, IA

A FINAL REPORT SUBMITTED TO THE
U.S. FISH AND WILDLIFE SERVICE
MINNESOTA FIELD OFFICE

by

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
SECTION OF WILDLIFE
NATURAL HERITAGE AND NONGAME RESEARCH PROGRAM

in completion of
Amendment #15 to FWS Agreement No. 14-16-0003-89-909

JULY 29, 1994

ABSTRACT

During late June and July of 1993, a survey of 60 prairie areas in Minnesota was conducted for three prairie obligate butterfly species. These species were: Hesperia dacotae (Skinner), the Dakota Skipper; Carisma poweshiek (Parker), the Poweshiek Skipperling; and Speyeria idalia (Drury), the Regal Fritillary. The Dakota Skipper is a candidate for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service and is listed as Threatened in Minnesota.

Fieldwork should begin at the time of the emergence of H. dacotae. Records were consulted to determine that date, and reconnaissance surveys were made beginning June 24 (175) on known population sites until it emerged. Both H. dacotae and Q. poweshiek were found on July 5 (186) and S. idalia was first seen on July 8 (189). Weather and flooding permitting, surveying continued through July 18, 1993 (199). Fifty four of the 60 listed prairies were visited, but because several prairies had multiple parts and weather created less than ideal conditions, 69 visits were accomplished.

The sites were prioritized by previous records for these butterflies and by prairie quality. H. dacotae was found in 4 of 19 sites on which it had previously been recorded and in 2 new sites for a total of 6 of 54 prairies. Q. poweshiek was found in 9 of 19 sites on which it had been recorded and in 7 new sites for a total of 16 of 54 prairies. S. idalia was found in 8 of the 54 prairies.

Due to unusual weather and extensive flooding, both butterfly and human activities were not normal. Populations, when found, were very small and often very restricted on the site. Caution should be used in drawing conclusions without doing followup surveys. It is clear, however, that possible trends suggested from the 1993 data are troubling.

ACKNOWLEDGEMENTS

Richard Baker of the Minnesota Nongame Wildlife Program was the coordinator of this research. His help and advice in making it run smoothly are appreciated. Robert Dana was instrumental in the identification and location of the sites as well as with help on logistics in this most unusual summer. Thanks also to David Cuthrell at North Dakota State University, Ed Brekke-Kramer of the Minnesota Department of Natural Resources, the staff at Blue Mounds State Park and Brian Winter of the Nature Conservancy for their assistance in getting this project off to a good start. We are also grateful for the assistance in editing provided by Jim Messina.

I would also like to acknowledge the support of the Minnesota Nongame Wildlife Tax Checkoff through the Minnesota Department of Natural Resources, Nongame Wildlife Program for their foresight in supporting this project.

INTRODUCTION

In the past 150 years the plight of the tallgrass prairie has been systematic destruction for agriculture and development. Today, it ceases to function as a biome with the interaction of species and genetics beyond relatively small sites. For the most part, the flora and fauna of the prairie still exist, albeit not to the same extent, and with less diversity. With the loss of most of the mammalian herbivores, the interaction of insects and plants on the tallgrass prairie are the primary ecological links. The dynamics of disturbance events is now radically different than it was on the primal tallgrass prairie. Attempts at man-made disturbance are arguably less effective and perhaps even destructive to the natural diversity of the prairie.

Prairie obligate butterflies have suffered the same fate as the rest of the prairie fauna and at the end of this century are at a watershed in their survival. Information is needed about where they live, how they live and what needs to be done (or not done) to insure their future. This project was undertaken in response to this challenge.

While the Dakota Skipper (Hesperia dacotae, Skinner) was named from Iowa material, it is assumed extirpated from that state, even though it was on a protected prairie. Isolated populations remain in the Dakotas, Manitoba and Minnesota on portions of both large and small prairies. It is listed as Threatened in Minnesota and is a ^{candidate species} ~~candidate~~ for Federal Category 2^e (Threatened). The Poweshiek Skipperling (Oarisma poweshiek, Parker) has about the same range but shifted south into Iowa (17 sites in 1993). It also seems to be subject to losses even though it is on protected sites. It is a Special Concern species in Minnesota and is attracting attention at the federal level. The Regal Fritillary (Speyeria idalia, Drury) has suffered severe losses in the eastern part of the country in the last few years. It has become clear to many of us that Minnesota's populations will be crucial to its longterm survival. It too has attracted some federal inquiries.

Objectives

The broad goal of this project ^{was} ~~is~~ to gather the information necessary to determine the present distribution of the Dakota Skipper and the Poweshiek Skipperling in Minnesota. This goal was pursued through the following objectives:

1. Identify locations needing initial or updated surveys and prepare maps.
2. Survey priority sites for presence of these species.
3. Collect voucher specimens of the target species at each location.
4. Prepare a final report with documentation of site conditions.
5. Provide recommendations regarding appropriate federal status and management needs.

(excerpted in part from this projects proposal)

METHODS

This survey of Minnesota Prairies was conducted during June and July of 1993. Organizational work with site selection was accomplished by the Nongame Wildlife Program of the Minnesota Department of Natural Resources. The principal surveyor was Dennis Schlicht of the Iowa Lepidoptera Project in Center Point, Iowa, and the co-surveyor was Micheal Saunders, a student at Iowa State University in Ames, Iowa.

The first task accomplished by the Minnesota DNR staff was to identify locations that needed initial or updated surveys. A review of historical records of butterflies from prairie sites that were older than four years. It was then necessary to identify high-quality and low-quality prairies for which there are no butterfly records. Regional, local and site maps were provided, in most cases, for each prairie. Site maps were marked with loop transects placed to sample the highest quality habitat.

Sites were prioritized in three groups. The first priority sites (sites 1-19) had skipper records for one or the other species. The second priority sites (20-45) had no skipper records but are high quality habitat. Third priority sites (46-60) had no records and were thought to be of lesser quality.

Due to cool, wet conditions, and therefore a late season, determination of an emergence date was a problem. Past records indicated that June 23 (174) would have been a likely emergence date for H. dacotae. Reconnaissance surveys were conducted at Hole-in-the-Mountain Prairie in Lincoln County and Prairie Couteau Prairie in Pipestone County on both June 24 (175) and July 1 (182). No target species were found on either date. Purple coneflowers (Echinacea sp.) were also not open. A third trip on July 5 (186) yielded H. dacotae at Hole-in-the-Mountain but not at Prairie Couteau. The survey was started in earnest on July 6 (187) and concluded on July 18 (199).

Butterfly nomenclature follows Miller and Brown (1981) and Ferris (1989). One exception is for the Northern Pearly Crescent where each current author lists a different name. I have here resurrected the old name selenis (W. Kirby) to distinguish this subspecific entity. Photographs were taken of many sites, often to document the effects of particular management regimes. Current weather as well as the nature of the season were documented. The time on site often varied due to weather and flooding. It rained some time or other on 9 of the days out and many areas were standing in water. Sometimes butterflies were still flying on flooded prairies.

Travel routes were plotted to hit the most high priority sites with the least driving. We were also conscious of the possibility of the season being more advanced in the north, so some more southerly sites were picked up later in the survey. At each site the marked transect was followed if it was deemed appropriate (it usually was). Different habitat types were explored when present. Special efforts were made to identify and survey Dakota Skipper habitat. All species seen were recorded. Voucher specimens for each of the target species were collected when possible. They have been curated either during the survey or later at the Iowa Lepidoptera project collection in Center Point, Iowa. They will be deposited in an appropriate museum at the discretion of Nongame DNR staff.

Dakota Skipper

Of the 19 first priority sites, the Dakota Skipper (Hesperia dacotae, Skinner) was found on 4. These included 3 parts of the Felton complex (#3), the Sanke property along Chanarambie Creek (#11), Lundblad Prairie (#12) and Glacial Lakes State Park (#16). It was also found on 2 prairies in the second priority group. These were Chippewa Prairie (#22) and Tympanuchus Wildlife Management Area (#37).

There is nearly continuous Dakota habitat on sections 31, 6, and 5 of the Felton complex of prairies (#3) and I'm sure they are found throughout. Five searches were made in these sections. The site on the NW 1/4 of Section 36 was bordered on the west and north by a drainage ditch (moat) and was inaccessible with recent heavy rains. I did not get onto the B bar B property and did not find the proper Section 18 site, as I was in a fen. Several days need to be appropriated to this complex and the preserves to the east. This summer had too many days lost to bad weather to afford that time.

Only one ridge had Dakota on the Sanke property near Chanarambie Creek (#11). The ridge is just north of the 1650 foot elevation as printed on the topographic map in Section 3. It was not found on the first hill north of the house on the east side of the section, where it had been found before.

One female Dakota was seen on the northeast corner of Lundblad Prairie (#12). The habitat was not consistent with typical Dakota habitat on other sites and the quality was lower than expected. This site was not as seasonally advanced as the hill prairies surveyed on the same day.

Glacial Lakes State Park (#16) has vast areas of grasslands but little quality prairie. H. dacotae was found on only part of one ridge that had an old road cut around it. The transect was enlarged to cover more of the ridge to the east.

Chippewa Prairie (#22) had healthy populations of Dakota as well as many other butterfly species. It was the only prairie with all three target species. On Tympanuchus Wildlife Management Area (#37), there is a slight rise that snakes through the center of the tract. This rise had the only purple coneflowers in the area and they attracted a precarious population of the Dakota Skipper.

Poweshiek Skipperling

Oarisma poweshiek (Parker) was found on 9 of the first priority sites. It was not found within the top 4 sites on the list, however. Three sites had significant numbers of Poweshiek: Staffanson Prairie (#5), Roscoe Prairie (#17) and Glynn Prairie (#51). These were also normal as far as numbers of other butterfly species. However, most other sites with Poweshiek had very small populations of the species. One exception was Glynn Prairie (#51) is full of red clover and brome but had normal numbers of butterflies. At Chippewa Prairie (#22) there is an unimproved roadway that acts to separate the butterfly communities in terms of composition and abundance. For example all of the Poweshieks were found on the north side of the road. Storden 21 Hill Prairie (#25) is also in highly degraded but it had more Poweshiek individuals than many of the much better prairies.

Regal Fritillary

The first Speyeria idalia (Drury) was seen on July 8 at Jeffers Petroglyphs (#1). It was seen in far less numbers than that H. dacotae, with the only healthy population found at Chippewa Prairie (#22)(Table 1). Only 8 prairies, 5 of which are First Priority, held the Regal Fritillary.

TABLE 1

TARGET SPECIES SUMMARY
1993 POWESHIEK AND DAKOTA SKIPPER SURVEY

#	Site	<u>H. dacotae</u>	<u>O. poweshiek</u>	<u>S. idalia</u>
First Priority				
1	Jeffers Petroglyphs			1
2	Audubon Prairie			
3	Felton Complex	10		4
4	Iron Horse Prairie			
5	Staffanson Prairie		100+	1
6	Sangl WMA		1?	
7	Regal Meadow		3	
8	Salt Lake WMA			
9	Prairie Marshes WMA		1	
10	Shaefer Prairie		3	
11	Chanarambie Creek, Sanke	2	1	
12	Lundblad Prairie	1		
13	Agassiz Dunes			
14	Ordway Prairie		10	3
15	Pembina Trail			
16	Glacial Lakes Park	4	2	
17	Roscoe Prairie		100+	1
18	Foxhome Prairie			
19	Sioux Nation WMA		6	
Second Priority				
20	Red Rock Ridge Prairie			
21	Tauer Prairie			
22	Chippewa Prairie	10	4	12
23	Expandere WMA		5	
24	Mountain Lake Prairie			
25	Storden 21 Hill Prairie		8	
26	Hythecker Prairie			
27	Kasota Prairie			
28	Rush Lake WMA		17	
29	Santee Prairie		7	
30	Cartney WMA			
31	Wild Indigo Prairie			
32	Sandpiper SNA			
33	Goose Lake			
34	Dugdale			
35	Pankratz Prairie Kertsonville WMA			
36	Malmburg Prairie			
37	Tympanuchus WMA	2		
38	Swedes Forest			
39	Blue Mounds Park			
40	Anna Gronseth Prairie			
41	Kettledrummer Prairie			
42	Town Hall Prairie			
43	Western Prairie North			
44	Cottonwood River			2
45	Miller Prairie			

	H. dacotae	O. poweshiek	S. idalia
Third Priority			
46 Prairie WMA/WPA			
47 Private Prairies			
48 Kilen Woods State Park			
49 Antelope Hills			
50 Yellow Bank Hills			1
51 Glynn Prairie		25	
52 Wapeton Prairie			
53 Wabun WMA		2	
54 Neal WMA			
55 Private Prairies			
56 Syre WMA			
57 Ottertail Prairie			
58 Crookston Prairie N			
59 Liberty WMA			
60 Ulen Prairie			
TOTAL	6	16	8

TABLE 2

SITE SUMMARY
1993 POWESHIEK AND DAKOTA SKIPPER SURVEY

#	Site	County	Status	Reason
First Priority				
1	Jeffers Petroglyphs	Cottonwood	done (see footnote)	
2	Audubon Prairie	Clay	done	data sheet copy missing*
3	Felton Complex	Clay	recheck	parts time
4	Iron Horse Prairie	Dodge	done	
5	Staffanson Prairie	Douglas	done	
6	Sangl WMA	Jackson	drop	condition
7	Regal Meadow	Kandiyohi	done	
8	Salt Lake WMA	Lac Qui Parle	drop	condition
9	Prairie Marshes WMA	Lyon	recheck	other species
10	Shaefer Prairie	McCloud	recheck	other species
11	Chanarambie Creek, Sanke	Murray	done	
12	Lundblad Prairie	Murray	recheck	status, other
13	Agassiz Dunes	Polk	recheck	condition *
14	Ordway Prairie	Pope	done	
15	Pembina Trail	Polk	recheck	condition *
16	Glacial Lakes Park	Pope	done	
17	Roscoe Prairie	Stearns	done	
18	Foxhome Prairie	Wilkin	drop	habitat
19	Sioux Nation WMA	Yellow Medicine	recheck	weather *
Second Priority				
20	Red Rock Ridge Prairie	Brown	done	
21	Tauer Prairie	Brown	drop	habitat
22	Chippewa Prairie	Chippewa	done	
23	Expandere WMA	Cottonwood	done	habitat
24	Mountain Lake Prairie	Cottonwood	done	*
25	Storden 21 Hill Prairie	Cottonwood	done	
26	Hythecker Prairie	Dodge	drop	condition
27	Kasota Prairie	Le Seur	recheck	other species
28	Rush Lake WMA	Mahnomen	done	
29	Santee Prairie	Mahnomen	recheck	other species
30	Cartney WMA	Mower	recheck	weather
31	Wild Indigo Prairie	Mower	drop	habitat
32	Sandpiper SNA	Norman	recheck	weather
33	Goose Lake	Pennington	recheck	other areas
34	Dugdale	Polk	drop	poor habitat
35	Pankratz Prairie	Polk	recheck	weather
	Kertsonville WMA	Polk	recheck	weather
36	Malmburg Prairie	Polk	drop ?	habitat
37	Tympanuchus WMA	Polk	recheck	status of pop.
38	Swedes Forest	Redwood	drop	poor habitat
39	Blue Mounds Park	Rock	drop	poor habitat
40	Anna Gronseth Prairie	Wilkin	recheck	weather
41	Kettledrummer Prairie	Wilkin	? recheck	habitat type
42	Town Hall Prairie	Wilkin	recheck	weather
43	Western Prairie North	Wilkin	recheck	time, weather
44	Cottonwood River	Brown	done	
45	Miller Prairie	Traverse	recheck	weather

Third Priority

46	Prairie WMA/WPA	Big Stone	recheck	habitat types
47	Private Prairies	Clay	recheck	time
48	Kilen Woods State Park	Jackson	done	
49	Antelope Hills	Lac Qui Parle	drop	poor habitat
50	Yellow Bank Hills	Lac Qui Parle	done	
51	Glynn Prairie	Lyon	done	
52	Wapeton Prairie	Lyon	drop	poor habitat
53	Wabun WMA	Mahnomen	done	
54	Neal WMA	Norman	drop	poor habitat
55	Private Prairies	Norman	recheck	time
56	Syre WMA	Norman	recheck	weather
57	Ottertail Prairie	Ottertail	drop	poor habitat
58	Crookston Prairie N	Polk		with # 15
59	Liberty WMA	Polk	done	
60	Ulen Prairie	Clay	recheck	weather

* local conditions including this years management.

done= conditions and flight times were such that I have high confidence that species present were found.

DISCUSSION

The weather was a dominant force in this summer's efforts to complete this survey. Prior to the beginning of the survey, southwest Minnesota had above average rainfall and cool temperatures. The result was that the season was 10-15 days late as judged by emergence of butterflies and the maturity of nectar sources. The populations of most butterfly species were low. For example, the reconnaissance surveys at Prairie Couteau yielded very few butterflies of any species (see data sheets following # 60). At that site, rains had been so heavy that the ash from spring burns was washed to the bottom of the hills and piled into drifts with small unburned pieces of grass. The burned portions had no duff on site, only bare soil without the usual invertebrate community. Between the visits on June 24 (175), July 1 (182), and July 5 (186), more heavy rains occurred with extensive flooding in the region.

Central Minnesota was not as wet early in the season but large storms moved through during the survey period. The southern half of Chippewa Prairie (#22) had been flattened by a storm prior to July 18 (199). The prairie plants were flat and there were few insects in that portion. Chippewa was the only prairie with all three target species and it had good populations of other butterflies. Had the storm moved down the length of the prairie instead of across, the Dakota Skipper population would have been in jeopardy.

In the north region, there were also heavy rains between the 13th and the 15th of July. Many roads were flooded or washed out and many of the prairies were ponded in as much as 6 inches of water. It was noted that much of this water washed in from agricultural land and that aerial spraying was going on even over the standing water. Drainage ditches between the roadways and prairies were usually impassable. The phenology was not as far behind in the north.

Even though species diversity was low and populations were small on most prairies, there were prairies that were normal on both criteria. It seemed anomalous but in the midst of these low numbers, Chippewa Prairie (#22), Staffanson Prairie (#5), Roscoe Prairie (#17), Sandpiper SNA (#32) and Glynn Prairie (#51) seemed normal. At the other extreme, many prairies were ecologically non-functioning as far as prairie obligate butterflies were concerned. These included: Prairie Couteau, Sangl WMA (#6), Wapeton Prairie (#52), Mountain Lake Prairie (#24), Tauer Prairie (#21), Sioux Nation WMA (#19), Salt Lake WMA (#8), Foxhome Prairie (#18), Kettledrummer Prairie (#41), Agassiz Dunes (#13), Pankratz WMA (#35), Prairie Marshes WMA (#9) and Jeffers Petroglyphs (#1). It would seem that there is enough evidence to account for the low numbers by considering weather events, but the normal prairie counts were scattered across the region among the poor prairie counts. From this evidence we believe that many of the prairie obligate species are already stressed and this summer's weather (as well as 1991) only made it worse.

In light of the conditions during 1993, our challenge is clear. We must have prairie invertebrate populations that can not only withstand the effects of isolation, agricultural influences, management practices designed for plant communities alone and the lack of grazers but also the extremes of natural conditions. It is important to know how well the existing populations survive the extremes of this summer alone.

Prairies marked as "done" (Table 2), are sites where on the day and time of the survey, weather conditions were good enough that any emerged species should have been flying. Further surveys may be in order on these sites, but the species in question were not evident. Prairies marked "drop" are not appropriate habitat or are in such poor condition that the surveyors do not believe that the species will be found. Prairies marked "recheck" are sites that could not be surveyed, were not surveyed or where conditions were not good enough to conclude the absence of a species.

In the field, prairies were judged as to their apparent quality. High quality, refers to prairies dominated by native species and without signs of human impact. Low quality prairies were judged to be dominated by alien species and/or had signs of human impact. Medium quality sites were between high and low in character.

As stated in the methods section, in order to be sure the Dakota Skipper (Hesperia dacotae) flight had started, we did not begin the survey until they emerged on a prairie known to have them (July 5, (186) Hole-in-the-Mountain). On the last day of surveying, July 18, (199) Dakota was still flying at Chippewa Prairie (#22). The first Poweshiek Skipperling (Oarisma poweshiek) was captured on July 6, (187) and they were still flying on the 18th of July. The first Regal Fritillary (Speyeria idalia) was sighted on July 8, (189) and they were also still out on July 18 (199).

Isolation is the factor that makes the management of these species crucial. Mistakes or miscalculations of the effects of any form of management on any stage of the life cycle of prairie obligate invertebrates could be devastating to their survival in the prairie biome. Recolonization is the safety valve for this problem, but recolonization is probably possible only at the Felton complex of prairies, the prairies northeast of Mahanomen, the prairies between Crookston and Fertile, the prairies around Syre, and possibly Chanarambie Creek. In light of this isolation, each site must be managed as if it were the only prairie in the state or the last place, as it were, for each of these species.

With the Dakota Skipper not present in Illinois, Wisconsin, Iowa or Nebraska, but only limited to parts of the Dakotas and Minnesota on isolated prairies or groups of prairies its range does not represent much of the original tall-grass biome. Even more troubling is the poor showing of Dakota individuals in 1991 in Kittson County, Minnesota, with 3 isolated prairies (Cuthell, 1991) and only 6 prairies or complexes this year (of the 19 former records checked), plus the small list of site records that weren't on the list to be checked this year. Also during 1993 Swengel found it on only 7 prairies (counting the Felton complex as one) (Swengel, 1993).

Proposals for Future Research

1. In order to determine whether or not existing populations have survived the effects of this year's (1993) unusual weather, recheck all known populations of H. dacotae and/or O. poweshiek and S. idalia. That would include 22 sites from this study, plus some other sites that are not listed. Special emphasis should be put on mapping the species occurrence on each site to prevent management damage.
2. Considering the nature of the 1993 season, the isolation of populations on the most habitable portions of each prairie, and the shift of flight periods, recheck all "done" prairies, except Chippewa, for whichever of the species that were not recorded this year (20 sites).
3. Survey all "recheck" sites. The surveyors believe that conditions were not good enough to be confident in the results of the original survey on "recheck" sites. (25 sites).
4. Combine 1-2-3, (45 sites)
5. Research needs to be started on the possibility of re-establishing prairie and the Dakota Skipper on mine disturbance in the Felton complex of prairies.

Concerns for Prairie Obligate Insects

1. 1993 populations were very low, putting restricted species on the edge of extirpation for some sites.
2. 1993's weather has altered the phenology of these insects with unknown outcomes for the viability of these populations.
3. The true status of these species is still in question due to the above circumstances.
4. The number of sites on which these species were found in 1993 was much reduced from the historical record or expected outcomes.
5. Most populations for Hesperia dacotae were restricted to very small portions of the habitat available.
6. Oarisma poweshiek was found in 16 of 57 sites checked and was not found in a large number of apparently appropriate habitats.
7. Speyeria idalia was only found in 8 places and most of those were represented by a single individual.
8. On many sites the whole appropriate habitat was managed in a single unit, reducing the possible diversity to its simplest denominator.

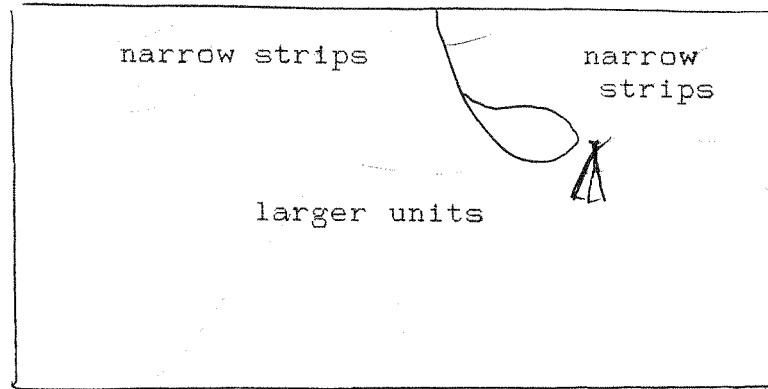
RECOMMENDATIONS

1. Identification and mapping of critical areas within each prairie site.
2. Due to this seasons unusual weather we propose a moratorium on any large scale management on Dakota habitat for 1994, and until populations can be proven to be stable.
3. Development of management practices to protect these rare animals rather than plants which are not rare on the site.
4. Manage small patches with critical problems such as thistles.
5. Manage on a scale that is smaller than the smallest critical habitat.
6. Plan so that plants will be available in all stages of their life cycle at any one time as invertebrates need all stages from new sprouts to dead standing stems.
7. Burn in 5-10 year cycles, no more than 3 year cycles. Use other management options as well as fire.
8. Manage with a compelling reason or objective.
9. Randomize your management as to type, time, and placement.
10. Do not burn or mow adjacent units in consecutive years. For one unit to re-establish populations in another unit, the populations need more than one year to recover.
11. Burn in long narrow strips across the prairie each year from different sides, depending on wind direction. This will maximize perimeter and patchiness.
12. Determine responsibility for the protection of rare animals on prairies and other native biomes, with regulatory agencies empowered to supervise and enforce that protection. Discourage independent, autonomous action by local managers by the creation of performance evaluation criteria that reward enhanced biodiversity and discourage reduction or loss of rare species.
13. Revise and repeat the survey for 1994 to determine the effects of 1993's weather on populations and with the goal of including and educating managers to this issue.
14. Calculate the actual area on which these species can be found within each prairie. For example the fact that Dakota at Glacial Lakes State Park, is on 10 acres of 1800 total, should not be construed to mean that this is an 1800 acre Dakota Skipper preserve.
15. Don't make up burns if they are missed because of weather or time. When accidental fires burn part of an area don't also burn the unit prescribed for that year.
16. Don't reburn patches that the fire misses, this is a natural characteristic of prairie fires.
17. If a fire is started and it burns poorly and covers only a portion of the unit, consider that to be the management for the year.
18. A management summary/history should be compiled for each site which documents management practices, problems, alien species, threatened or endangered species, exceptional climatic events and adjacent land uses. This management summary should include the goals and objectives of management, the techniques employed to accomplish these goals, and the results obtained in relation to the goals. This management summary should be updated semi-annually and collected for review, evaluation, and recommendation by a panel representing government, preservation organizations, academia and concerned private parties.
19. To fulfill the final objective of this project, and based on the evidence at hand, we recommend that these three species be moved up to provide more protection, on the both State and Federal lists.

SITE RECOMMENDATIONS

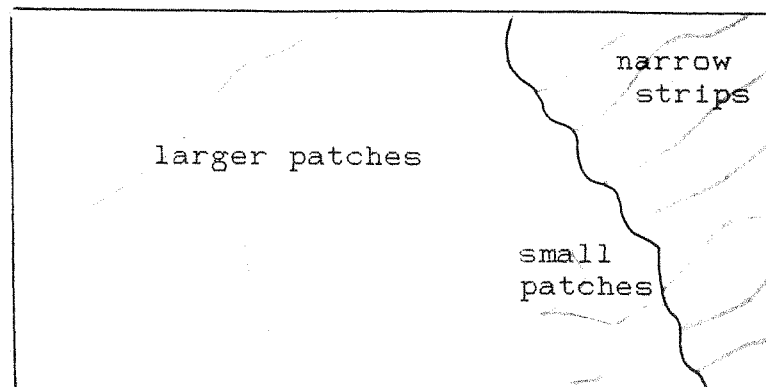
1. Jeffers Petroglyphs

Divide the northern part into more units without set borders and the south half into 2 or 3 units. Grazing is out of the question while the site is open to the public, but it would be a good site to showcase bison on the southern part of the property or on an expanded site. Hand remove woody growth; it wouldn't take long.



2. Audubon Prairie

The Dakota habitat is in the SE of Sec. 32 east of the creek. This area must be treated as if it were a single isolated Dakota site. It cannot all be in the same burn unit as it was this year. Whether or not a population survives, this parcel must be divided into at least 4 parts and treated diversely. Strip burns from the southwest to the northeast would be appropriate. This site is too sensitive to rely on only fire. Hand remove brush. Light grazing for a week or two each summer would add patch diversity to the site.

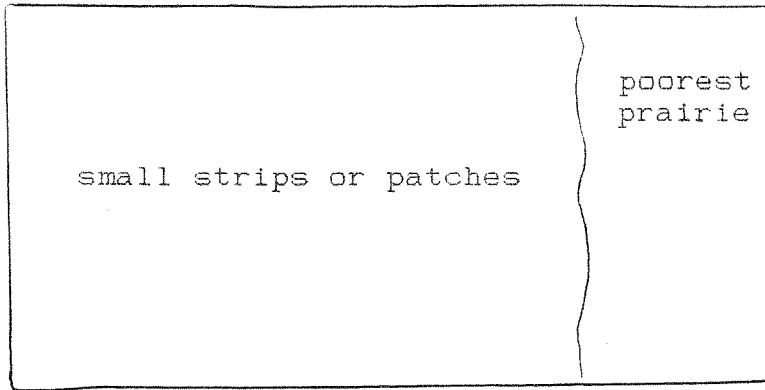


3. Felton complex

This site seems unusually homogeneous probably from haying. Mixed management would provide for more patchiness and more security for Dakota. Aspen should be managed without impacting a whole site. Problem areas lend themselves to mowing here. (See proposals)

5. Staffanson Prairie

One of the best in the state, very diverse. (How has it come down to us so with so much more insect diversity than many of the others?) Use narrow strip burns very infrequently; mow problem part occasionally and hand remove brush. It will be a challenge to see if we can preseve this diversity for another hundred years.



6. Sangl WMA

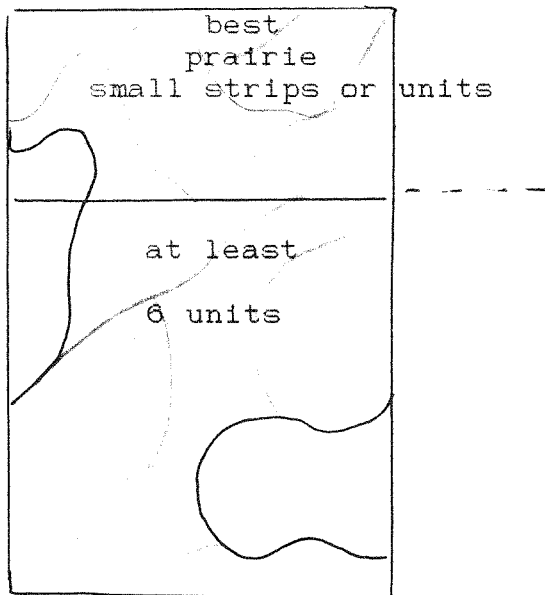
Reverse the management. Burn the old field and not the isolated prairie remnants. Keep the equipment for planting corn out of the prairies.

7. Regal Meadow

Treat the woody encroachment without losing diversity by not using large units.

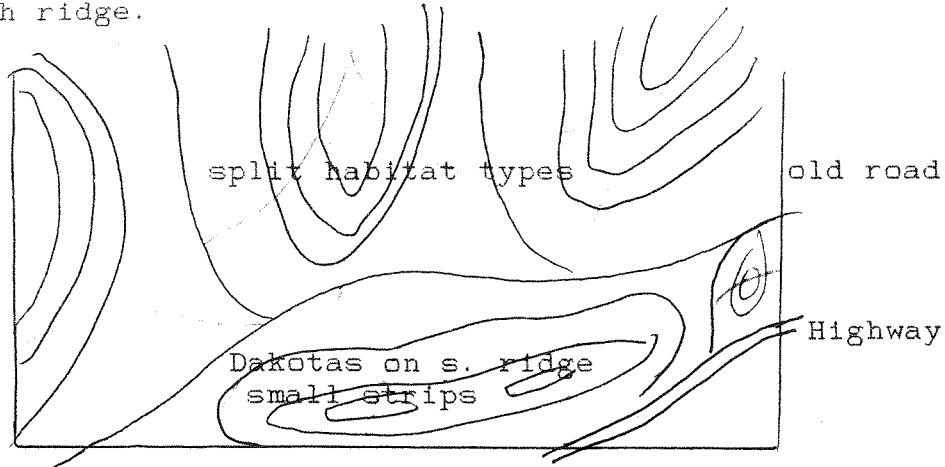
9 Prairie Marshes

With the diverse topography on this site, be sure that the management units are smaller than the habitat patches. There is not a woody problem, so don't manage the whole as though there was.



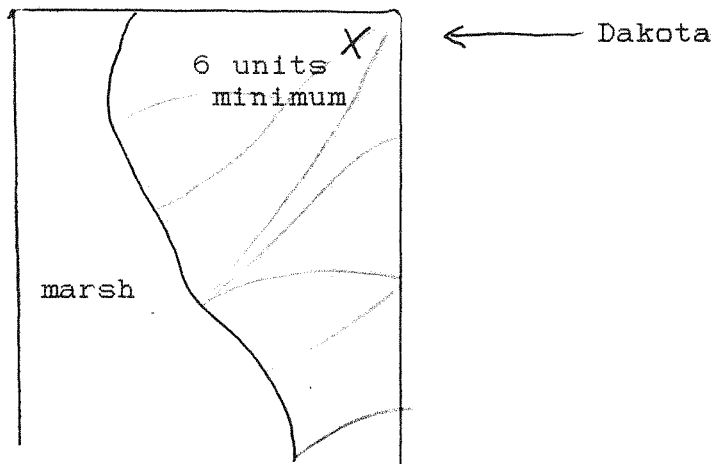
11. Chanarambie Creek, Sankey Bros.

A grazed prairie with good diversity, although it has not been grazed lately. All Dakotas were on one ridge. Manage using small patches on the south ridge.



12. Lundblad Prairie

Dakota was near the NE corner. The prairie at this site is homogenous. Make at least 6 units and don't burn adjacent units.



13. Agassiz Dunes

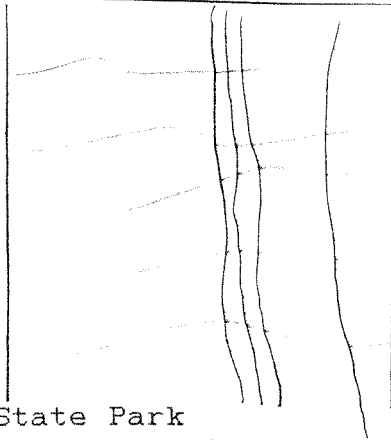
This site has been over simplified by the use of large fire units. Large patches of Prostrate Juniper have been damaged and are replaced by poison ivy and aspen. The aspen has been stimulated to resprout with excess fire. Fire is not killing the aspen. Use many strip fires that follow across the site. Don't burn the aspen or you will have a mini forest that will cover much of the site. Control aspen sprouts with hand application of herbicides and keep the large stands from spreading in that manner.

14. Ordway Prairie

This site has a lot of natural patchiness. Management units should not include whole patches. Randomize management times.

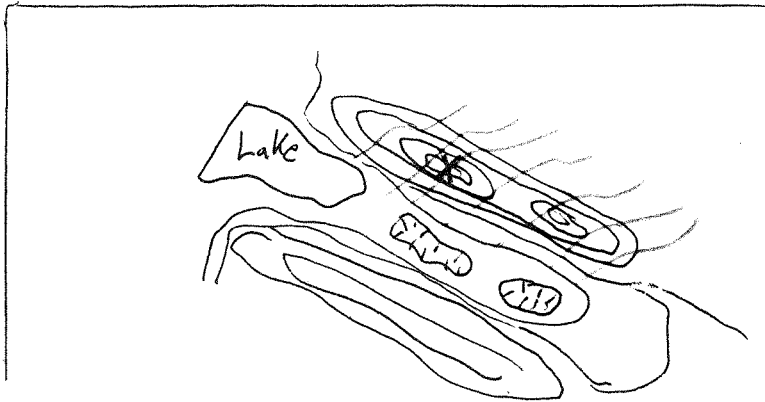
15. Pembina Trail, North Unit

This site was burned in a single unit with almost nothing left unburned. Use strips that cross habitat types.



16. Glacial Lakes State Park

The Dakotas are in a very small portion of the Park. That one ridgetop must be treated as though it is an isolated patch. Use very narrow strip burns and burn as early as possible.

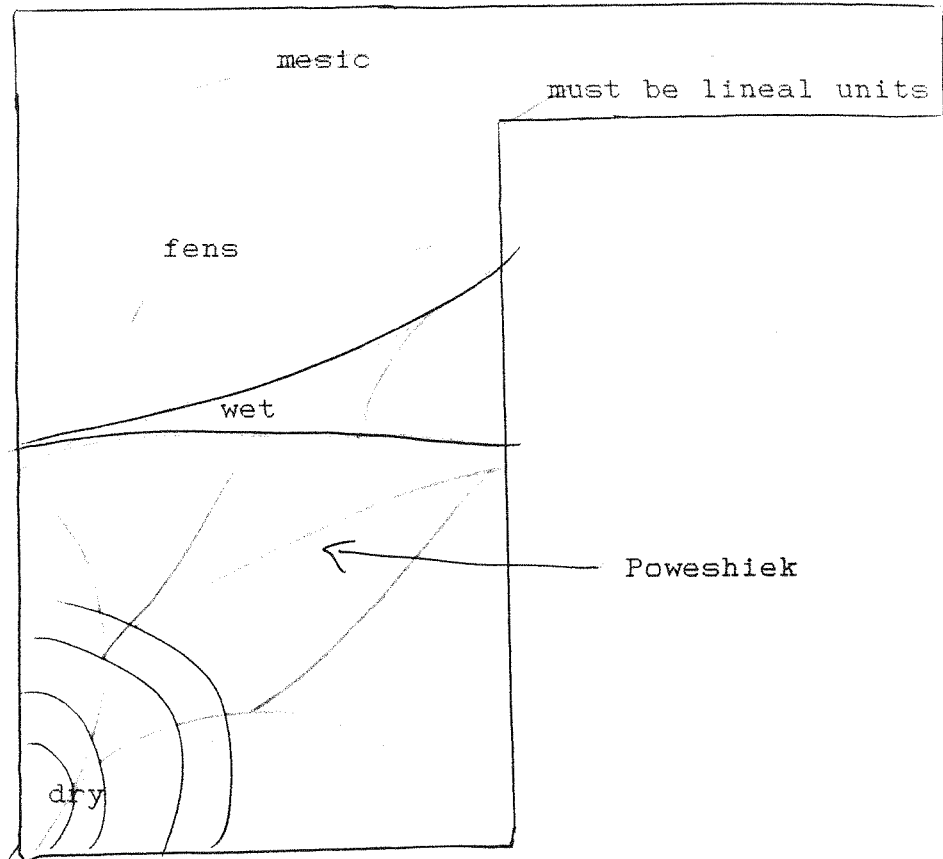


18. Foxhome and Kettledrummer Prairies

These prairies are very homogenous and could use more patchy management to increase heterogeneity.

19. Sioux nation WMA

While this prairie is quite diverse and even has habitat regions, it is managed by burning only in two parts. The north half had been burned in total and had low insect numbers, whereas the south half had not been burned and had many more insects. Poweshiek was restricted to a rise in the center of the south unit. Manage in at least 6 parts per habitat unit. There is not a large woody problem. There are several fens which hold even more scarce elements and should never be burned in total.

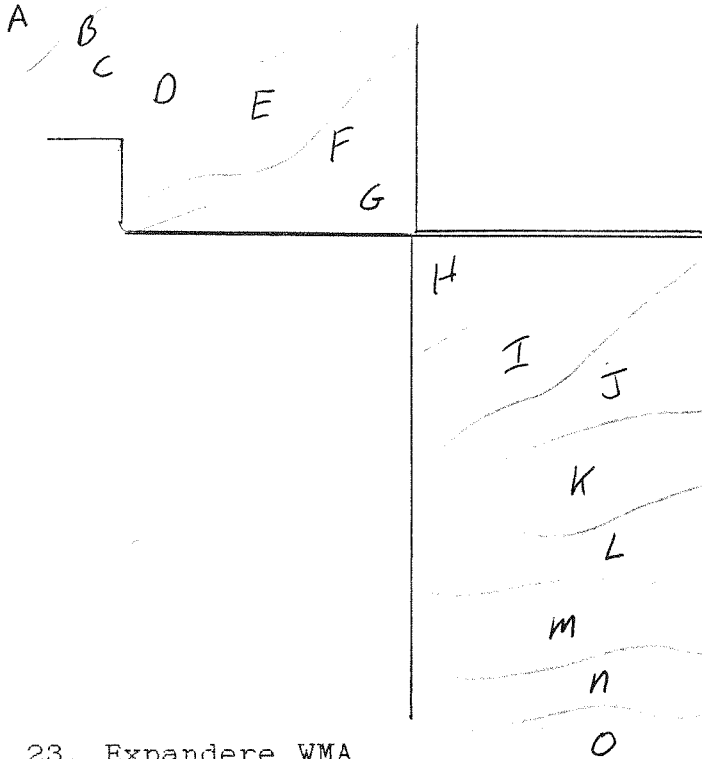


20. Red Rock Prairie

A homogeneous prairie, diversify management types, times and units to increase heterogeneity throughout the ridge.

22. Chippewa Prairie

Also a homogeneous prairie that would benefit from more patchy management. There was a big difference in the butterflies on either side of the road, which was probably caused by recent management. Use at least 6 units on either side of the road. Mowing could be used here but there was not a woody problem.



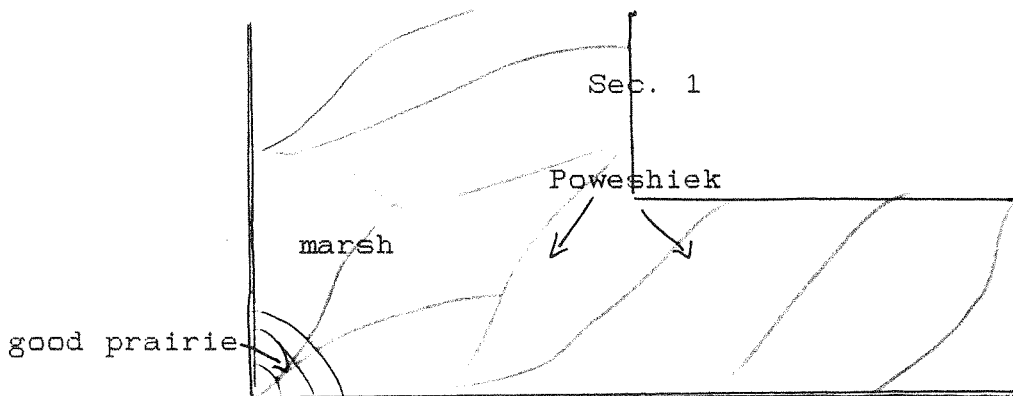
Never burn G and H the same year or in consecutive years.

Example:

- Year 1 burn or mow
A, D, G, J, M
- Year 2 no management
- Year 3 burn or mow
B, E, H, K, N
- Year 4 no management
- Year 5 burn or mow
C, F, I, L, O
- Year 6 no management
- Recycle

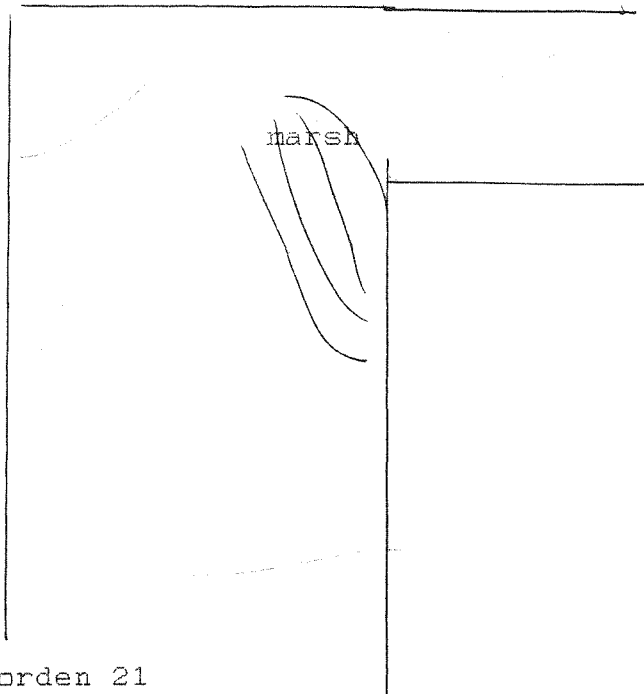
23. Expandere WMA

The north unit was diverse and had good numbers of butterflies. Spilt the main part into 5 parts. There is a good piece of prairie in the SW corner, split and burn one part ever three years.



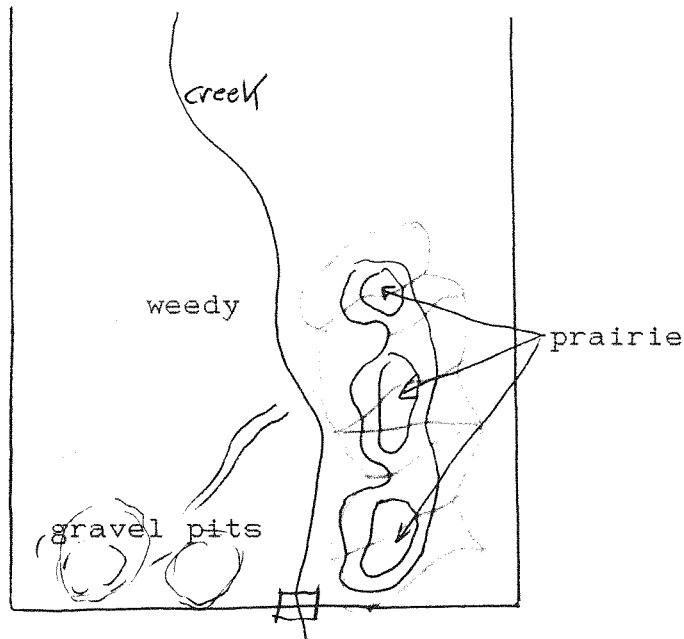
24. Mountain Lake Prairie

This prairie had no prairie obligates. Encourage them by dividing it into multiple units managed with mowing, grazing, hand removal of the woody plants and fire.



25. Storden 21

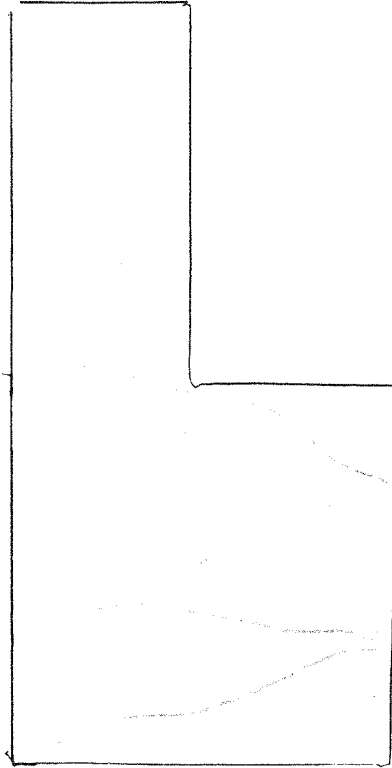
There are several good prairie hillsides on the east side of the stream. Manage in strips from west to east, with several strips per hillside patch. There is danger of fire getting into weeds and brush on private property to the east.



Manage the strips then the spaces between them 1 of 3 every other year.

28. Rush Lake WMA

Great prairie, keep it diverse by using multiple units and methods.
Mow where you can.



29. Santee and Wambach WMA

Manage as Rush Lake WMA above.

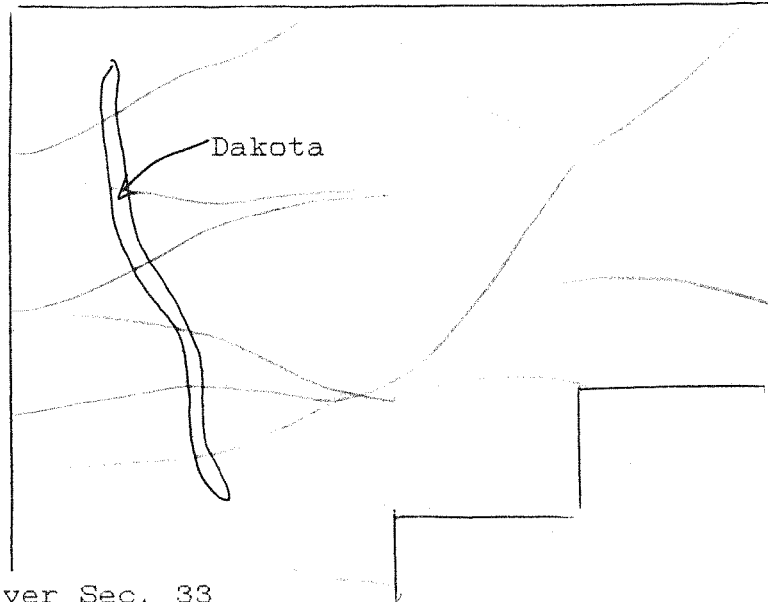
Grazing has kept most of the aspen in check, continue with mowing.

35. Kertsonville/Pankratz

These areas are generally diverse albeit on a larger scale than most prairies. Pankratz is the least diverse of the two. Attempt to use 5-6 units on each and mix management. Prairie chicken populations might be helped with diverse leafhopper populations sequencing through the season and the area.

37 Tympanuchus WMA

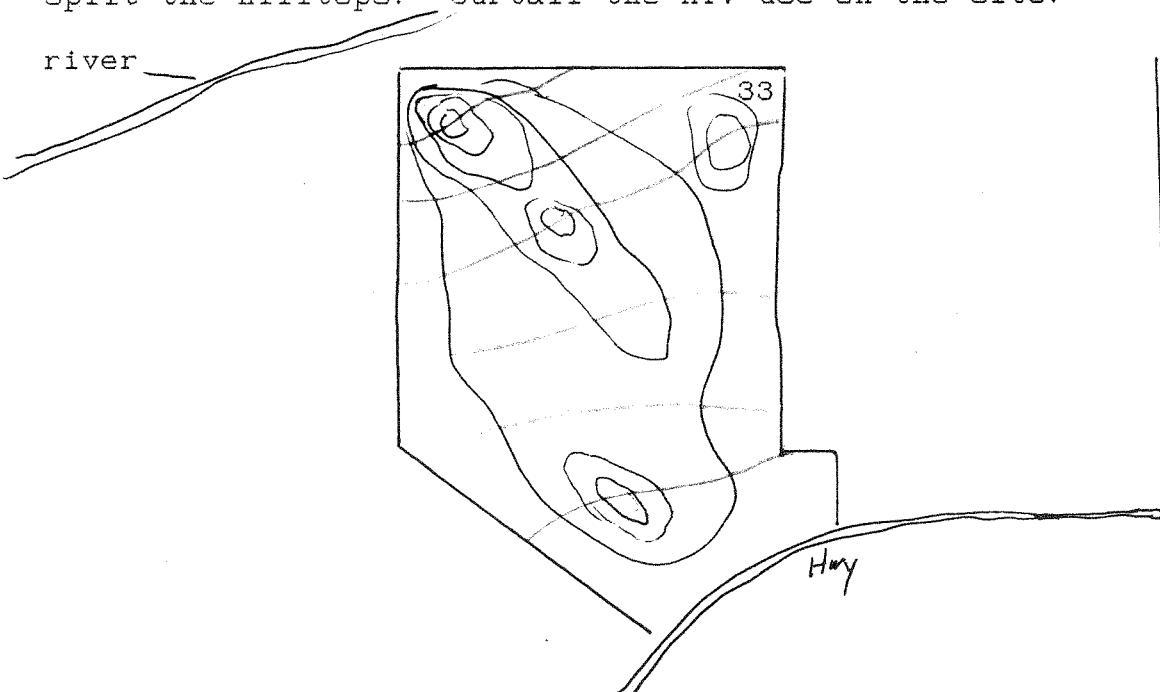
The slight rise in the center that runs north-south is the critical habitat. It must not be put in one burn unit and needs as many units crossing it as possible.



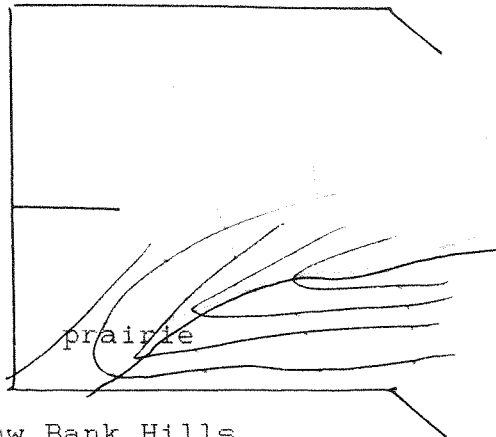
44. Cottonwood River Sec. 33

The SW 1/4 of Section 33 has both diverse topography and biota. There is isolation of habitat types within the site, so management needs to be conducted on a scale that is smaller than the natural patches. Use at least 8 units that cross most habitat types by running linearly from the SW to the NE. Split the SW facing slope several times and split the hilltops. Curtail the ATV use on the site.

river

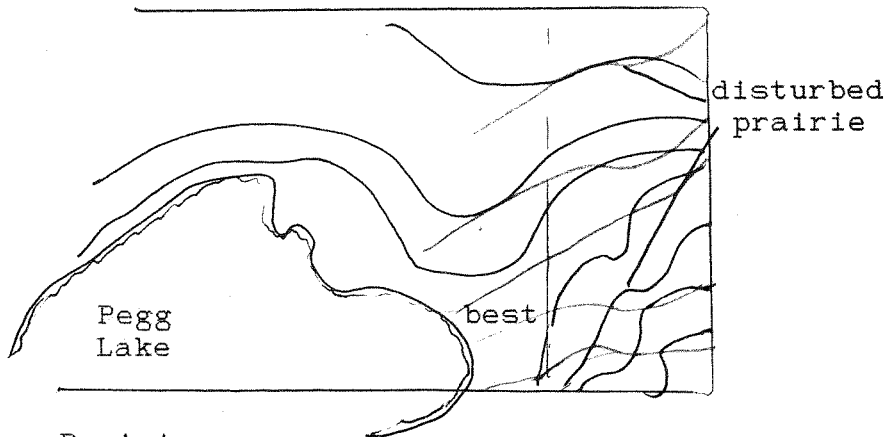


Diversify the area by running multiple units up the slopes in fan shapes.



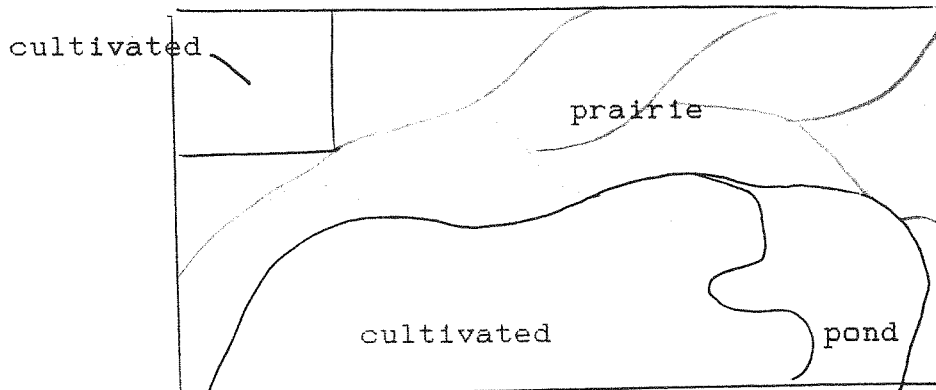
50. Yellow Bank Hills

This site has good diversity and patchiness. Management units should split ridges, hills, swails and the disturbed prairie on the east side.



51. Glynn Prairie

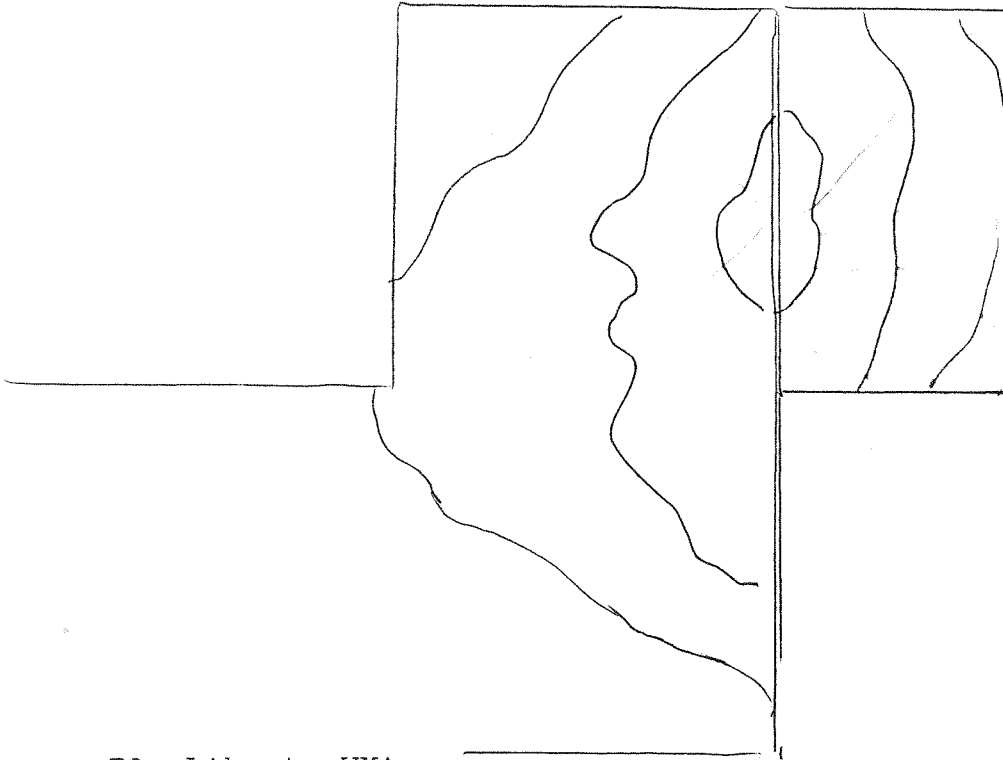
This site is very homogeneous but has good populations of butterflies. Increase diversity by using multiple management types on multiple units. This site lends itself to mowing and light grazing. It would be an excellent model prairie to attempt to increase diversity.



53. Waubun WMA

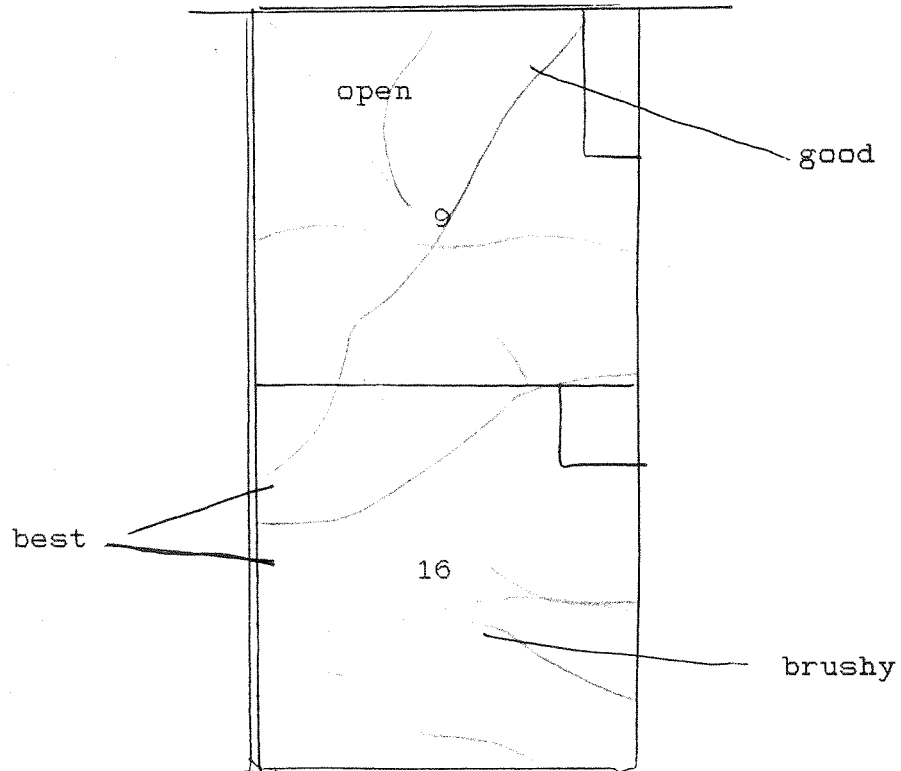
21

Good diversity, don't simplify by using large units. Use 8 units on the west part and 4 on the east side.



59. Liberty WMA

There is low diversity in Section 9, use multiple patches. Survey for wetland shrubs like sage willow and plan units to prevent their loss to management. Manage the west side of Section 16 with east-west units.



LITERATURE CITED

- Coffin, B. and L. Pfannmuller. 1988. Minnesota's Endangered Flora and Fauna. University of Minnesota Press, Minneapolis, 389pp.
- Dana, R. 1991. Conservation Management of the Prairie Skippers *Hesperia dacotae* and *Hesperia ottoe* (Basic Biology and Threat of Mortality During Prescribed Burning in Spring), University of Minnesota, St. Paul, Minnesota, 63pp..
- Ferris, C.D. 1989. Supplement to: A Catalogue/Checklist of the Butterflies of America North of Mexico. The Lepidopterists' Society Memior No. 3. 103 pp.
- Miller, L.D. and F. M. Brown. 1981. A Catalogue/Checklist of the Butterflies of America North of Mexico. The Lepidopterists' Society Memior No. 2. 280 pp.
- Opler, P.A. and G. Krizek. 1984. Butterflies East of the Great Plains, Johns Hopkins University Press, Baltimore, 294pp.
- Opler, P.A. and V. Malikul. 1992. A Field Guide to Eastern Butterflies. Houghton Mifflin, Boston, 396pp.
- Swengel, A.D. 1993. Research on the Community of Tallgrass Prairie Butterflies 1988-1993, Unpublished, Baraboo, Wisconsin, 137pp.
- Wendt, K.M. 1984. A Guide to Minnesota Prairies. Natural Heritage Program. Minnesota Department of Natural Resources, 71pp.