Appendix L – 2023 Protected Butterfly Species Habitat Assessment

South Deuel Wind 2023 Protected Butterfly Species Habitat Assessment

DEUEL HARVEST WIND ENERGY SOUTH LLC

South Deuel Wind
6/15/2024

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prepared for

DEUEL HARVEST WIND ENERGY SOUTH LLC
South Deuel Wind
Deuel County, South Dakota

6/15/2024

prepared by
Burns & McDonnell
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
Assessment	2023 protected butterfly species habitat assessment
ESA	Endangered Species Act
FFA	Field Focus Area
GIS	Geographic Information System
MET	Meteorological
MW	Megawatt
NAIP	National Agriculture Imagery Program
NLCD	National Land Cover Data
NWI	National Wetland Inventory
PEM	Palustrine Emergent
Project	South Deuel Wind
Project Area	34,339-acre area around the Project
SDGFP	South Dakota Game, Fish and Parks
Survey Corridor	Project layout with associated South Deuel Wind-defined buffers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

Deuel Harvest Wind Energy South LLC (South Deuel Wind) plans to construct the South Deuel Wind Project (Project) in Deuel County, South Dakota. At the time of the assessment, the proposed Project included up to 86 proposed turbine locations (encompassing all 73 remaining proposed locations), a gen-tie line, associated access roads and underground collection circuits, a collector substation, an operations and maintenance facility, up to four meteorological (MET) towers (encompassing all three remaining proposed locations), laydown areas, and other appurtenant facilities. The Project is located approximately 3 miles south of Clear Lake, South Dakota (Figure 1-1).

The objective of the protected butterfly species habitat assessment (Assessment) was to evaluate habitat potentially capable of supporting the Dakota skipper (*Hesperia dacotae*), federally listed as threatened, and the Poweshiek skipperling (*Oarisma poweshiek*), federally listed as endangered; both are protected by and listed under the Endangered Species Act (ESA). South Deuel Wind coordinated with the U.S. Fish and Wildlife Service (USFWS) prior to the start of the Assessment (USFWS 2022), and the USFWS concurred with the study plan.

1.1 Project Area

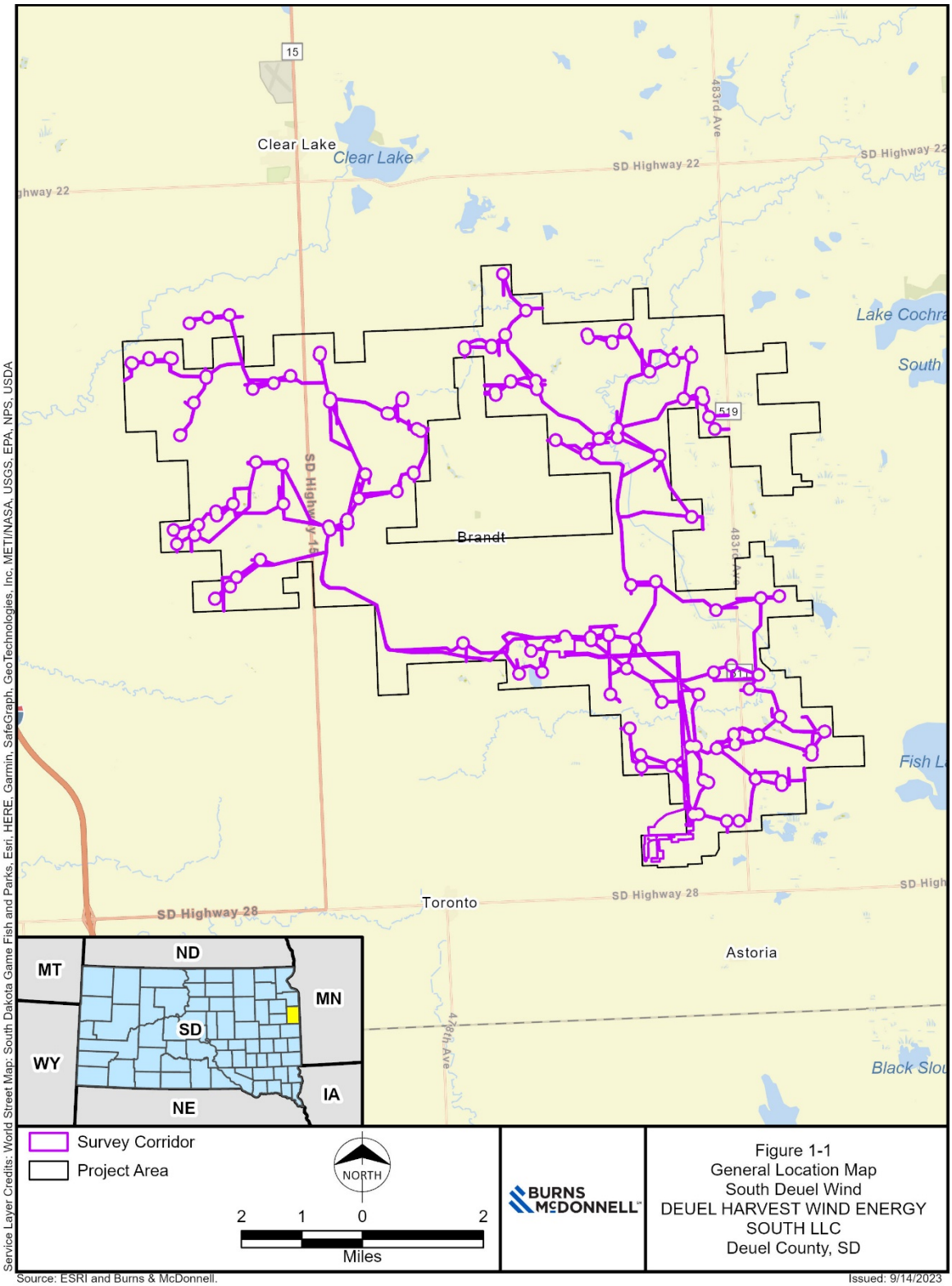
The Project Area included approximately 34,339 acres and is located within Ecoregion 46k, the Prairie Coteau region of the Northern Glaciated Plains, which spans across the eastern edge of South Dakota (U.S. Environmental Protection Agency 2016). This ecoregion has historically supported both tallgrass and shortgrass prairies. These native grasslands, however, have been predominantly converted to croplands (Bryce et al., 1996), with soybeans (*Glycine max*) and corn (*Zea mays*) as the dominant crops (Miller 1997).

Several named streams are present within the Project Area, including portions of Cobb Creek, Hidewood Creek, and North Branch Cobb Creek. Several unnamed bodies of water are located in or adjacent to the Project Area. The topography is generally flat to gently rolling hills.

Burns & McDonnell completed an assessment for the Dakota skipper and the Poweshiek skipperling in 2018 (Burns & McDonnell 2018). In 2023, South Deuel Wind revised the Project Area, and Burns & McDonnell conducted the Assessment within the proposed 2023 Project layout, including buffers, as determined by South Deuel Wind (Survey Corridor). The Survey Corridor included the locations of potential Project components as well as the South Deuel Wind-defined buffers, including potential turbine locations (250-foot radius), access roads (100-foot on either side of the centerline), collector circuits (50-foot on either side of the centerline), and crane paths (50-foot buffer on either side of the

centerline). Other potential Project components, such as the collector substation, interconnection switchyard, operations and maintenance facility, gen-tie line, and laydown areas were surveyed but did not have buffers applied. The Survey Corridor included for this Assessment totaled approximately 3,434 acres (Figure A-1).

Figure 1-1: General Location Map



2.0 SPECIES HABITAT AND LIFE HISTORIES

According to the USFWS and the South Dakota Game, Fish, and Parks the state listed threatened and federally listed threatened Dakota skipper and the state listed endangered and federally listed endangered Poweshiek skipperling have the potential to occur within Deuel County, South Dakota (USFWS 2023a). Dakota skippers and Poweshiek skipperlings are year-round residents of suitable remnant native prairie habitat in their ranges (USFWS 2018a, 2018b).

Critical habitat has been designated for both species in Deuel County, South Dakota (USFWS 2015a, 2015b, 2015c); however, there is no designated critical habitat within the Project Area. One SDGFP historical record for both the Poweshiek skipperling and Dakota skipper exists approximately 11 miles north of the Project (WEST 2017) (Figure 3-2). The Dakota skipper is believed to occur within Deuel County, however the closest observation is about six miles north of the Project Area (USFWS 2023b; Figure 2-1). The Poweshiek skipperling is not currently known to or believed to occur within South Dakota (USFWS 2023c), although historically it did which is why there is critical habitat designated for it.

The habitat preferences of the Dakota skipper and the Poweshiek skipperling are generally considered to be very similar. These protected butterflies require upland grassy areas with a high prevalence of warm season, clump grasses and native forbs with limited disturbance for them to complete their respective life cycles. Common disruptions to habitat capable of supporting the Dakota skipper or the Poweshiek skipperling occur from row-cropped agriculture, haying, and intensive grazing, or hay and grazing practices that minimize native forb species and reduce species diversity. Both protected butterfly species are believed to be highly susceptible to impacts from herbicide and pesticides used in row-crop agriculture and the drift of the applied chemical to grassland areas that may provide suitable habitat. Therefore, when non-native and woody plant species become dominant, populations decline due to insufficient sources of larval food and nectar for adults (USFWS 2018a, 2018b).

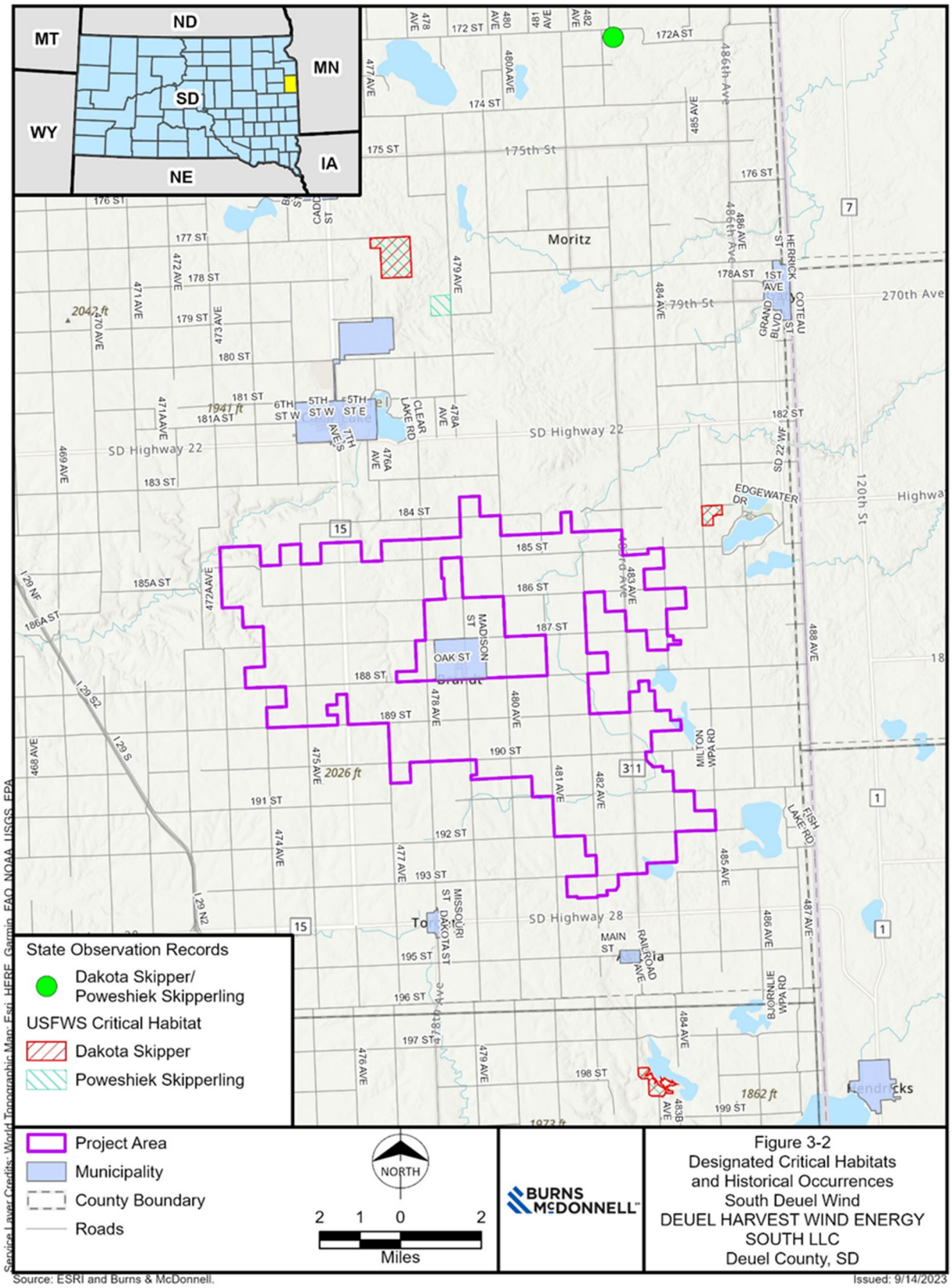
2.1 Dakota Skipper Habitat

Typical habitat for the Dakota skipper for all portions of its life cycle (i.e., it is not a migratory species) includes upland prairie that is relatively dry and often found on hillsides and ridges. Needle grasses (*Stipa* spp.), little bluestem (*Schizachyrium scoparium*), and other similar clump-forming native warm season grasses, as well as purple coneflower (*Echinacea angustifolia*), are typical of high-quality sites for the Dakota skipper. The Dakota skipper also uses other flowers for nectar, such as fleabanes (*Erigeron* spp.) and black-eye susans (*Rudbeckia* spp.), among others (USFWS 2018a).

2.2 Poweshiek Skipperling Habitat

Habitat capable of supporting Poweshiek skipperlings is generally considered to be similar to habitat that can support Dakota skippers. However, the Poweshiek skipperling lives in high quality tallgrass prairie in both low, moist areas with smooth camas (*Zygadenus elegans*) and wood lily (*Lilium philadephicum*), as well as dry, upland areas with big bluestem (*Andropogon gerardii*) and little bluestem (USFWS 2018b). This habitat is required for all portions of its life cycle (i.e., it is not a migratory species). The adult Poweshiek skipperlings feed on nectar from prairie flowers such as black-eyed susan, palespike lobelia (*Lobelia spicata*), and purple coneflower.

Figure 2-1: Designated Critical Habitat and Historical Records



3.0 METHODS

The following sections identify the methods used to complete the initial desktop analysis and field surveys. These steps for evaluation and methodology were discussed with the USFWS (USFWS 2018e, 2022).

3.1 Desktop Analysis

Based on USFWS guidance and guidelines (USFWS 2016a, 2016b, 2018c, 2018d, 2018e, 2022), a 2023 desktop analysis was completed, to identify areas of native tallgrass prairie within the Survey Corridor that have the potential of containing suitable protected butterfly species habitat. Digital information included locations of potentially undisturbed native grasslands obtained from South Dakota State University (South Dakota State University 2016), National Land Cover Data (NLCD) (U.S. Department of Agriculture [USDA] Natural Resource Conservation Service 2018), National Agriculture Imagery Program (NAIP) aerial photography (USDA 2015), USFWS National Wetland Inventory (NWI) maps (USFWS 1981), multiple years of Google Earth imagery (Google Earth 2018), and USFWS conservation, grassland, and wetland easement locations obtained from South Deuel Wind.

The following USFWS guidelines were used to determine habitat and survey parameters to conduct the Assessment.

- *Guidance for Interagency Cooperation under Section 7(a)(2) of the Endangered Species Act for the Dakota Skipper, Dakota Skipper Critical Habitat, and Poweshiek Skipperling Critical Habitat: Version 1.1, May 2016* (USFWS 2016a)

- *Dakota Skipper Conservation Guidelines 2016* (USFWS 2016b)

- *2018 Dakota Skipper (Hesperia dacotae) North Dakota Survey Protocol* (USFWS 2018c)

- *Project Communication Regarding the Deuel Harvest Wind Project: USFWS, South Dakota Game, Fish and Parks (SDGFP), Invenergy, and Burns & McDonnell. February 13, 2018* (USFWS, 2018d), *August 1, 2018* (USFWS 2018e), *and May 12th, 2022* (USFWS 2022)

Using a Geographic Information System (GIS), Burns & McDonnell combined digital data layers to evaluate potential grassland areas within the Survey Corridor. This involved overlaying the digital data that identified NWI data, existing development and cultivated crop fields, and potential native grasslands, remnant prairie, and undisturbed grasslands onto aerial imagery. Ponds, wetlands with low

plant diversity that are dominated by reed canarygrass (*Phalaris arundinacea*) and cattails (*Typha* spp.), and areas showing evidence of previous disturbance, such as agriculture crop fields, and developed areas, were eliminated from further consideration, as they would not contain the vegetation needed to support the Dakota skipper or the Poweshiek skipperling. Areas appearing to contain intact grasslands were field evaluated through a separate grassland assessment conducted from October 10 to 12, 2022 and July 31 through August 1, 2023 (Burns & McDonnell 2023b). Areas which were found to include medium to high quality grassland habitat during the grassland assessment field evaluation were designated as "Field Focus Areas" (FFA) for suitable protected butterfly species habitat. Only locational points were developed for the FFAs as a starting point for field evaluations; boundaries were not developed based on desktop efforts due to variability in the digital data layers and need for field verification.

3.2 Field Survey

Field surveys of 69 FFAs were completed from November 2 to 4, 2022 and July 31 to August 1, 2023. A flowchart that was developed by Skadsen (2017), a USFWS-permitted surveyor for Dakota skippers and Poweshiek skipperlings (USFWS Permit TE65611B-0), was used in the field for identifying potential habitat suitable for supporting Dakota skippers and Poweshiek skipperlings (Appendix B), as discussed with the USFWS (USFWS, 2018d, 2018e, 2022). During the field surveys, FFAs identified in the desktop analysis were evaluated by documenting current land usage (pasture range, hay prairie, agriculture field), level of impact (estimated frequency and seasonal timing that a hay prairie or pasture range is being harvested), topography (native forb species used as nectar sources, with *Echinacea* species as an indicator species, are often not grazed as intensively on relatively steeper hillsides), presence of introduced/non-native cool season grasses, and presence of native grasses. All areas that contained potential suitable habitat included *Echinacea* species and/or species of native prairie grasses such as little bluestem, needle grasses, big bluestem (*Andropogon gerardii*), sideoats grama (*Bouteloua curtipendula*), prairie cordgrass (*Spartina pectinata*), Indian grass (*Sorghastrum nutans*), and wild rye (*Elymus canadensis*). Each FFA was evaluated in the field to identify the current dominant vegetation and land usage.

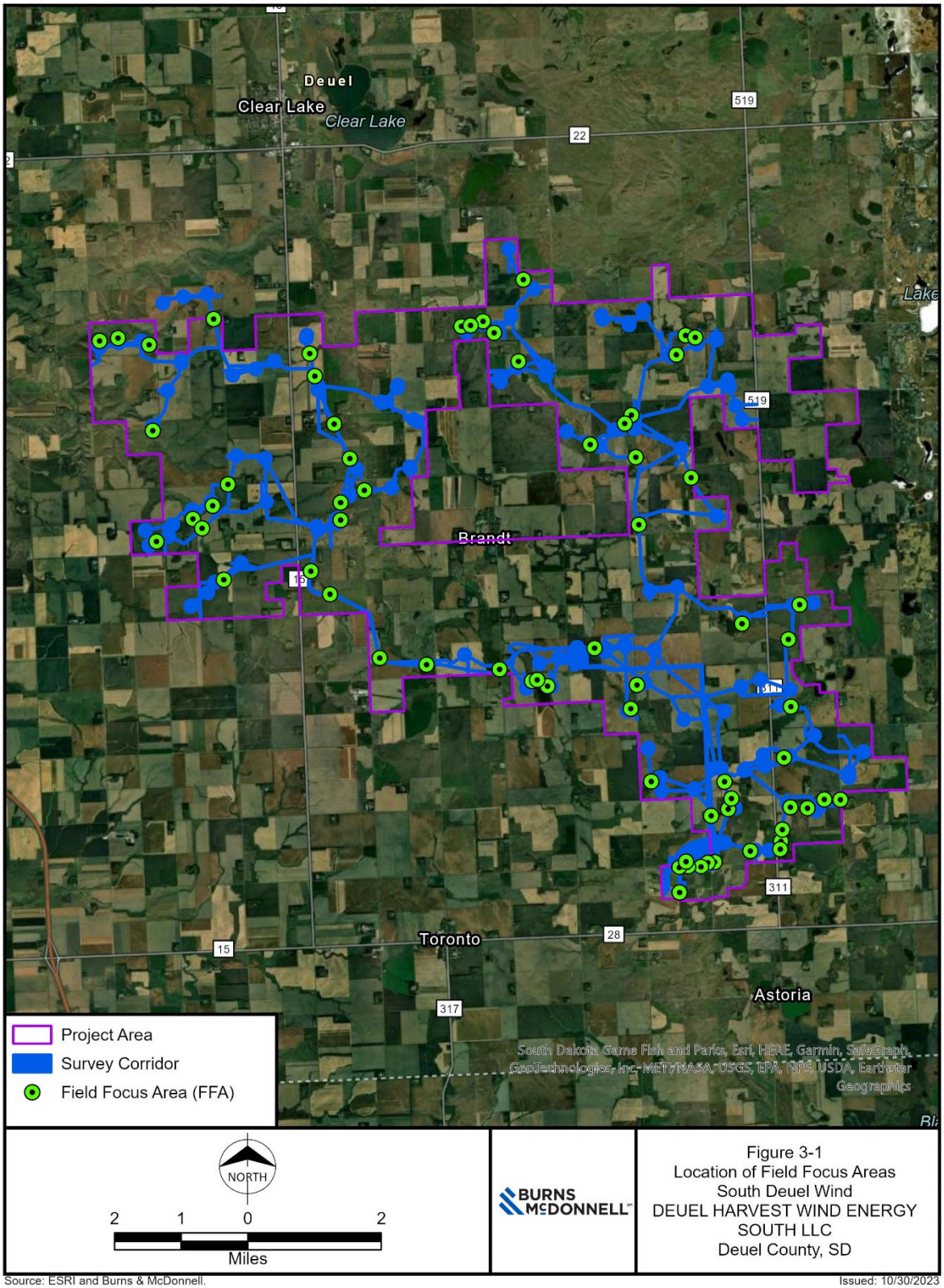
The flowchart for both the Poweshiek skipperling and Dakota skipper was used in the field as a guide to help identify whether the habitat and terrain within the FFAs could be considered potential suitable habitat or not. Survey efforts focused on grazed pasture/range and hay prairie fields (Skadsen, 2017) that included intact grasslands and potential native tallgrass prairie remnants based on the desktop survey. At each FFA, a data form consisting of the flowchart was filled out to document the findings (Appendix C). Habitats within the FFAs were qualitatively evaluated based on vegetation, land use, and topography for

the estimated extent of habitat that was determined to be potentially suitable for supporting protected butterfly species.

Those areas that were determined to be potential suitable habitat for supporting the Dakota skipper and/or the Poweshiek skipperling were then categorized as “High probability of DKS,” “High to moderate probability of DKS,” “Moderate probability of DKS,” or “Low probability of DKS” as depicted on the flowchart (Skadsen 2017, USFWS 2018e). Low probability areas contained either hay prairies that are mowed, few native forbs and grasses, and scattered *Echinacea* species or grazed/pasture rangeland that receive light to moderate grazing pressure, visible native forbs and grasses, both hilly or flat terrain with few scattered *Echinacea* species. The moderate areas contained hay prairies mowed once in late summer, included diverse and abundant native forbs and grasses, and contained scattered *Echinacea* species across the site. The moderate to high areas contained grazed/pasture rangeland that receive light to moderate grazing pressure, visible native forbs and grasses, both hilly or flat terrain, and have an abundance of *Echinacea* species throughout the site. The high probability areas contained hay prairies that are mowed once late in the summer, included diverse and abundant native forbs and grasses, and contained *Echinacea* species throughout the site.

FFAs were developed based on a transition away from warm season grasses, a marked decrease in warm grass species, or a change in topography. For FFAs where the area may have extended beyond the survey corridor, areas were surveyed beyond the survey corridor to the extent practical using aerial imagery. Only features that originated within the survey corridor were extended; grasslands may be present adjacent to the Survey Corridor, but those areas were not included in this study. The extent that the features were mapped beyond the Survey Corridor are indicated in Appendix A.

Figure 3-1: Location of Field Focus Areas



4.0 RESULTS

The survey corridor acreage evaluated in this study totaled approximately 3,434 acres. The desktop analysis completed by Burns & McDonnell biologists identified 69 FFAs within the survey corridor with the potential for suitable habitat occurrence (Figure 3-1). The 69 FFAs included potential native tallgrass prairie remnants based on a desktop survey and the grassland assessment (Burns & McDonnell 2023b). Although there were 84 'medium' and 'high' grasslands from the grassland assessment, only 69 were located within the survey corridor, and these were included as FFAs. The remaining 15 were outside of the survey corridor and not used for this study.

Based on habitat characteristics observed during the field surveys, 63 of the 69 surveyed FFAs were determined to be unsuitable for supporting the Dakota skipper and/or the Poweshiek skipperling due to the lack of suitable habitat. The grazed pasture/range land at the unsuitable FFAs lacked potential habitat due to flat terrain that was intensively hayed or grazed and either lacked native host plant species, were dominated by introduced cool-season grasses, or overrun by invasive upland and/or wetland species such as *Festuca* sp., *Typha* spp., and *Phalaris arundinacea*. These FFAs did not support native tallgrass prairie species and were not suitable to support potential Dakota skipper and/or the Poweshiek skipperling habitat.

A total of six FFAs, totaling 7.65 acres, were identified as having potential suitable habitat for the Dakota skipper and/or the Poweshiek skipperling (Table 4-1; Figure A-1, Appendix A). The six areas are shown as "potential suitable habitat" (PSH) in Figure A-1 in Appendix A, and photo sheets included in Appendix D. Those areas that were determined to provide suitable habitat are the "Low probability of DKS," "Moderate probability of DKS," "High to moderate probability of DKS," or "High probability of DKS" areas. Out of the six FFAs identified as having suitable habitat for the Dakota skipper and Poweshiek skipperling, four areas were low probability, one was moderate probability, and one was high to moderate probability.

The grazed pasture/range land at the six FFAs that contained potential suitable habitat included generally hilly terrain with slopes of 10-30% that allowed the *Echinacea* species purple coneflower to grow without substantial grazing pressure. Additionally, all six FFAs that contained potential suitable habitat included either *Echinacea* species or species of native prairie grasses such as little bluestem, needle grasses, big bluestem, sideoats grama, prairie cordgrass, Indian grass, and wild rye. Abundance of *Echinacea* species (purple coneflower) within and between potential suitable habitat locations varied due to the amount of disturbance between sites. Roadsides where there was little to no disturbance from

grazing/haying and infrequent vegetation maintenance also contained a higher abundance of purple coneflowers. Three of the six potential suitable habitat areas were hay prairie fields that had not been cut and harvested at the time of the survey, allowing the purple coneflower and/or native forbs to thrive in certain areas. Each of the six areas are discussed in detail below.

4.1 Potential Suitable Habitat-1 South

PSH-1S, which is located within FFA-38S, is located within a grazed pasture. This area contains light to moderate rotational grazing, native forbs and grasses, and hilly terrain with 25-45% slopes with thin gravely upland soils. *Echinacea* species are scattered throughout the site and native prairie grasses such as big bluestem (*Andropogon gerardii*) and sideoats grama (*Bouteloua curtipendula*) are prevalent. This area was determined to contain a low probability of Dakota skipper and Poweshiek skipperling habitat. PSH-1S resulted in a total area of 0.25 acre within the Survey Corridor. An additional 0.14 acre of potential habitat was identified adjacent to and outside of the Survey Corridor based on aerial photography interpretation.

4.2 Potential Suitable Habitat-2 South

PSH-2S, which is located within FFA-8S, is located within a grazed pasture/range. This area contains light to moderate rotational grazing, native forbs and grasses, and hilly terrain with 25-45% slopes with thin gravely upland soils. *Echinacea* species are abundant and widespread throughout the site. This area is considered to contain a high to moderate probability of Dakota skipper and Poweshiek skipperling habitat. PSH-2S resulted in a total area of 0.87 acre within the Survey Corridor. An additional 4.36 acres of potential habitat was identified adjacent to and outside of the Survey Corridor based on aerial photography interpretation.

4.3 Potential Suitable Habitat-3 South

PSH-3S, which is located within FFA-23S, is located within a field that appears undisturbed and. This area included an abundance of native forbs and grasses but no *Echinacea* species. This area is considered to contain a low probability of Dakota skipper and Poweshiek skipperling habitat due to the absence of *Echinacea* species. PSH-3S included a total area of 0.61 acre within the Survey Corridor. An additional 10.84 acres of potential habitat was identified adjacent to and outside of the Survey Corridor based on aerial photography interpretation.

4.4 Potential Suitable Habitat-4 South

PSH-4S, which is located within FFA-56S, is located within a hay prairie field and was mowed/hayed during the period of mid-August through September and included an abundance of native forbs and grasses but no *Echinacea* species. This area is considered to contain a low probability of Dakota skipper and Poweshiek skipperling habitat due to the absence of *Echinacea* species. PSH-4S resulted in a total area of 1.49 acres occurring within the Survey Corridor. An additional 3.84 acres of potential habitat was identified adjacent to and outside of the Survey Corridor based on aerial photography interpretation.

4.5 Potential Suitable Habitat-5 South

PSH-5S, which is located within FFA-55S, is located within a hay prairie field. This area was mowed/hayed during the period of mid-August through September and included an abundance of native forbs and grasses but no *Echinacea* species. This area is considered to contain a low probability of Dakota skipper and Poweshiek skipperling habitat due to the absence of *Echinacea* species. PSH-5S resulted in a total area of 1.71 acres within the Survey Corridor. An additional 11.95 acres of potential habitat was identified adjacent to and outside of the Survey Corridor based on aerial photography interpretation.

4.6 Potential Suitable Habitat-6 South

PSH-6S, which is located within FA-65S, is located within a hay prairie field. This area was not mowed/hayed during the period of mid-August through September and included an abundance of native forbs and grasses with few *Echinacea* species. This area is considered to contain a moderate probability of Dakota Skipper and Poweshiek skipperling habitat due to the presence of *Echinacea* species. PSH-6S resulted in a total area of 2.72 acres within the Survey Corridor. An additional 1.62 acres of potential habitat was identified adjacent to and outside of the Survey Corridor based on aerial photography interpretation.

Table 4-1: FFAs Assessed for Potential Habitat for Dakota Skipper and Poweshiek Skipperling

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
1S	Hay Prairie	0	0	No	Hay prairie, low plant diversity dominated by brome, *Echinacea* species not prevalent	1
2S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	1
3S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	1
4S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	1
5S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	3
6S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and fescue, low plant diversity, *Echinacea* species not prevalent	2

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
7S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	2
8S	Grazed Pasture/Range	5.23	0.87	Yes	PSH-2, grazed pasture with abundance of native grasses and forbs and scattered *Echinacea* species	4
9S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	4
10S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	4
11S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	10
12S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	4

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
13S	Dominated by Invasive Species	0	0	No	Drainage Area, low plant diversity dominated by invasive fescue, *Echinacea* species not prevalent	4,6
14S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	5
15S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	6
16S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	5
17S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	5

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
18S	Dominated by Invasive Species	0	0	No	Dominated by invasive fescue, low plant diversity, *Echinacea* species not prevalent	5
19S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	5
20S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	3,5
21S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	6
22S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	8
23S	Undisturbed	11.45	0.61	Yes	PSH-3, native prairie grassland with an abundance of *Schizachyrium scoparium* and *Panicum virgatum*	8

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
24S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	9
25S	Agriculture Field	0	0	No	Active agricultural field, low plant diversity, *Echinacea* species not prevalent	9
26S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and fescue, low plant diversity, *Echinacea* species not prevalent	9,10
27S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	14
28S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	15
29S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	15

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
30S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	15
31S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	15
32S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	17
33S	Hay Prairie	0	0	No	Hay prairie, low plant diversity dominated by brome, *Echinacea* species not prevalent	17
34S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea*, low plant diversity, *Echinacea* species not prevalent	17

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
35S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea*, low plant diversity, *Echinacea* species not prevalent	17
36S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and *Typha* spp., low plant diversity, *Echinacea* species not prevalent	17
37S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	18
38S	Grazed Pasture/Range	0.39	0.25	Yes	PSH-1 grazed pasture with abundance of native grasses and forbs and scattered *Echinacea* species	18
39S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	18

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
40S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	16
41S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and *Typha* spp., low plant diversity, *Echinacea* species not prevalent	10
42S	Dominated by Invasive Species	0	0	No	Dominated by invasive fescue, low plant diversity, *Echinacea* species not prevalent	10
43S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	11
44S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and *Typha* spp., low plant diversity, *Echinacea* species not prevalent	10,11

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
45S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	11
46S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	11
47S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and *Typha* spp., low plant diversity, *Echinacea* species not prevalent	11
48S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	11
49S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	11
50S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	11

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
51S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	11
52S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	11
53S	Grazed Pasture/Range	0	0	No	Overgrazed pasture, low plant diversity, *Echinacea* species not prevalent	11
54S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and *Typha* spp., low plant diversity, *Echinacea* species not prevalent	11
55S	Hay Prairie	0	0	Yes	PSH-5 hay prairie grassland with an abundance of native grasses and forbs	11
56S	Hay Prairie	0	0	Yes	PSH-4 hay prairie grassland with an abundance of native grasses and forbs	11

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
57S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea*, low plant diversity, *Echinacea* species not prevalent	11
58S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea*, low plant diversity, *Echinacea* species not prevalent	11
59S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and fescue, low plant diversity, *Echinacea* species not prevalent	11,12
60S	Grazed Pasture/Range	0	0	No	Grazed pasture/range with rotational grazing, flat terrain, and few *Echinacea* species scattered about	19

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
61S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and fescue, low plant diversity, *Echinacea* species not prevalent	13
62S	Cool Season Grassland	0	0	No	Dominated by cool season grasses, low plant diversity, *Echinacea* species not prevalent	13,14
63S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and fescue, low plant diversity, *Echinacea* species not prevalent	13
64S	Hay Prairie	1.62	2.72	No	Un-mowed hay prairie with good diversity of native forbs and grasses but doesn't have any *Echinacea* species present	9

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
65S	Hay Prairie	0	0	Yes	Hay prairie mowed in mid-August through September with a good diversity of native forbs and grasses. *Echinacea* species were present but not in large numbers and were scattered through site.	9,12
66S	Hay Prairie	0	0	No	Hay prairie, low plant diversity dominated by brome, *Echinacea* species not prevalent	10
67S	Dominated by Invasive Species	0	0	No	Dominated by invasive *Phalaris arundinacea* and fescue, low plant diversity, *Echinacea* species not prevalent	11,12
68S	Hay Prairie	0	0	No	Hay prairie mowed regularly with portions of the corridor being used for planting corn	9

FFAs	Type of Habitat	Total Area of Potential Suitable Habitat (Acre)	Area of Potential Suitable Habitat Within Survey Corridor (Acre)	Potential Suitable Habitat (Yes/No)	Notes	Figure A-1 Page Number
69S	Hay Prairie	0	0	No	Hay prairie mowed once in mid-August through September with good diversity of native forbs and grasses, however no *Echinacea* species were observed	9

5.0 REFERENCES

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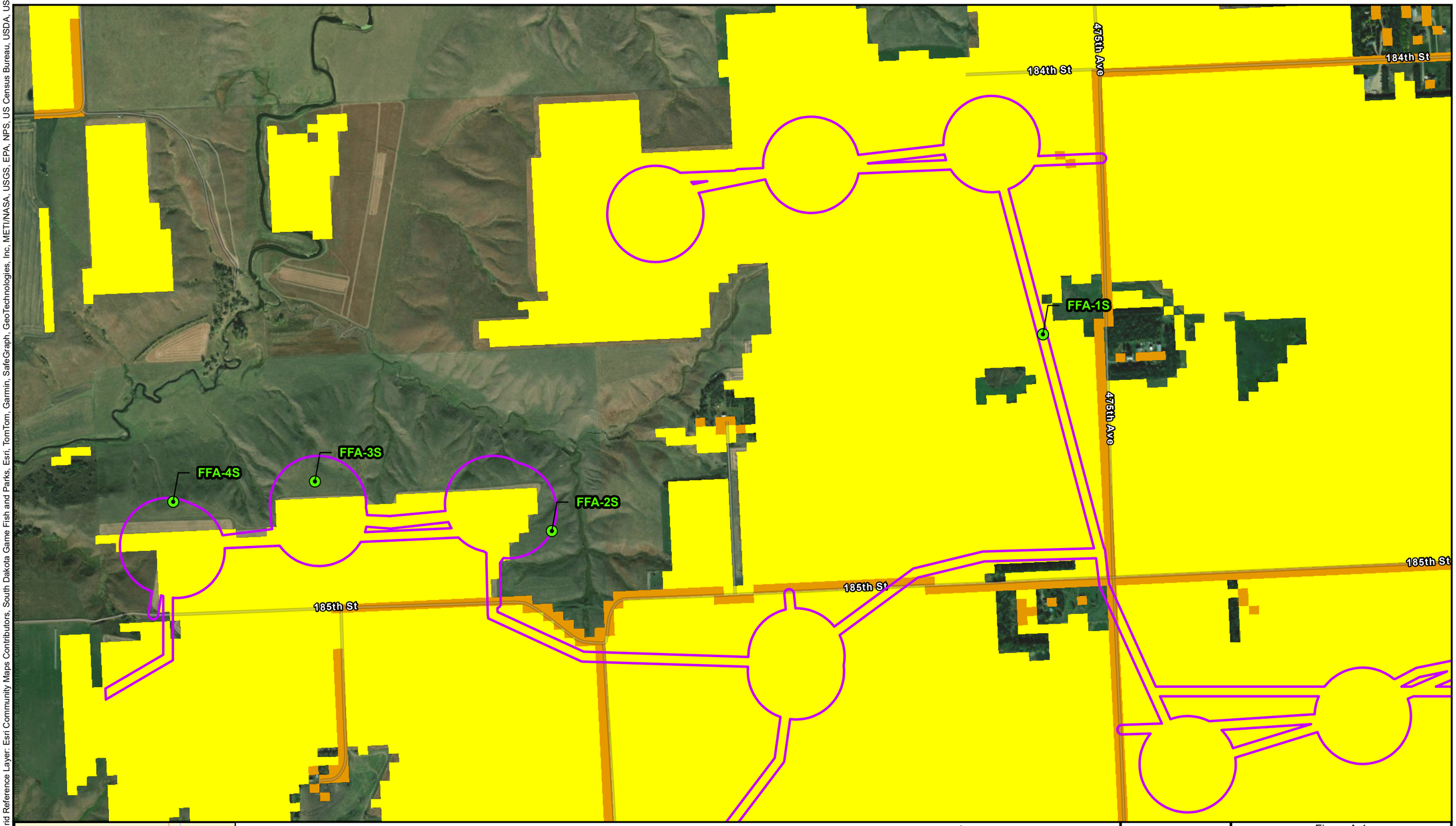
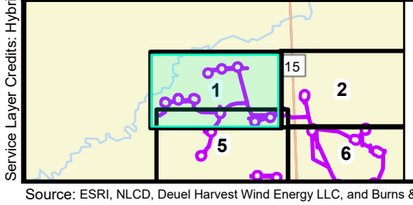
APPENDIX A – POTENTIAL HABITAT LOCATION MAP





Survey Corridor
Field Focus Area (FFA)
Potential Suitable Habitat Inside of Corridor
Potential Suitable Habitat Outside of Corridor
Existing Development
Cultivated Crops

NORTH

1,000 500 0 1,000

Scale in Feet

BURNS McDONNELL

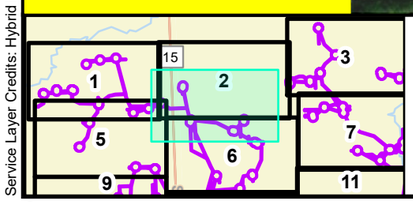
Figure A-1
Location Map of Field Focused Areas and Potential Suitable Protected Butterfly Habitat
Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD

Source: ESRI, NLCD, Deuel Harvest Wind Energy LLC, and Burns & McDonnell Engineering Company, Inc.

Issued: 2/16/2024

Service Layer Credits: Hybrid Reference Layer: Esri Community Maps Contributors, South Dakota Game Fish and Parks, Esri, TomTom, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS

SD Highway 15
477th Ave
478th Ave
185th St
185th St
185th St
FFA-6S
FFA-7S
S Dakota Highway 15
186th St
186th St
186th St
478th Ave



Survey Corridor
Field Focus Area (FFA)
Potential Suitable Habitat Inside of Corridor
Potential Suitable Habitat Outside of Corridor
Existing Development
Cultivated Crops

NORTH

1,000 500 0 1,000

Scale in Feet

BURNS McDONNELL

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Page 2 of 19

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474th Ave

475th Ave

186th St

186th St

FFA-5S

473rd Ave

475th Ave

FFA-20S

187th St

1 2 5 6 9 10

Survey Corridor

Field Focus Area (FFA)

Potential Suitable Habitat Inside of Corridor

Potential Suitable Habitat Outside of Corridor

Existing Development

Cultivated Crops

NORTH

1,000 500 0 1,000

Scale in Feet

BURNS McDONNELL

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Deuel County, SD
Page 3 of 19

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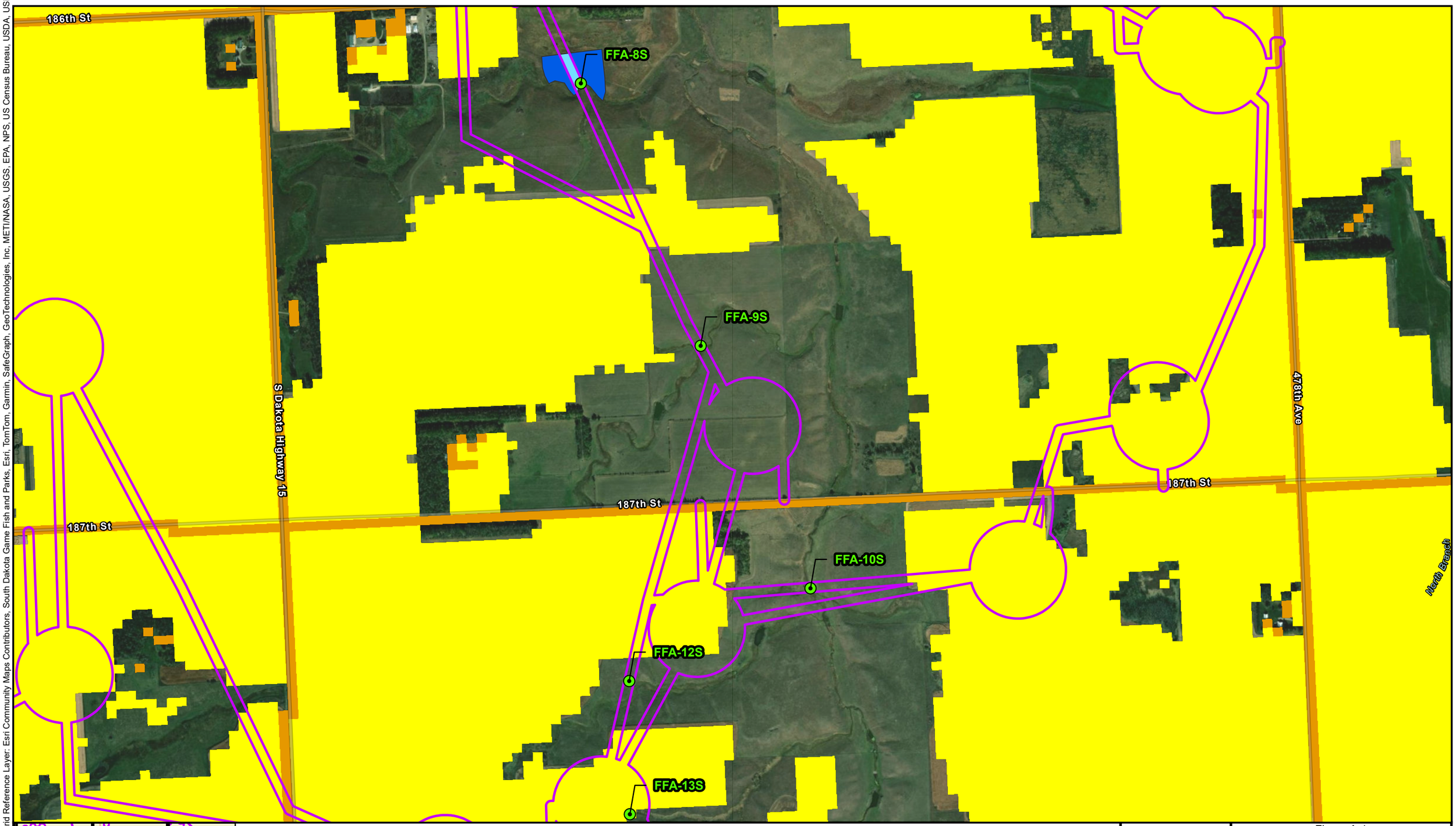

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BURNS McDONNELL

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Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 4 of 19

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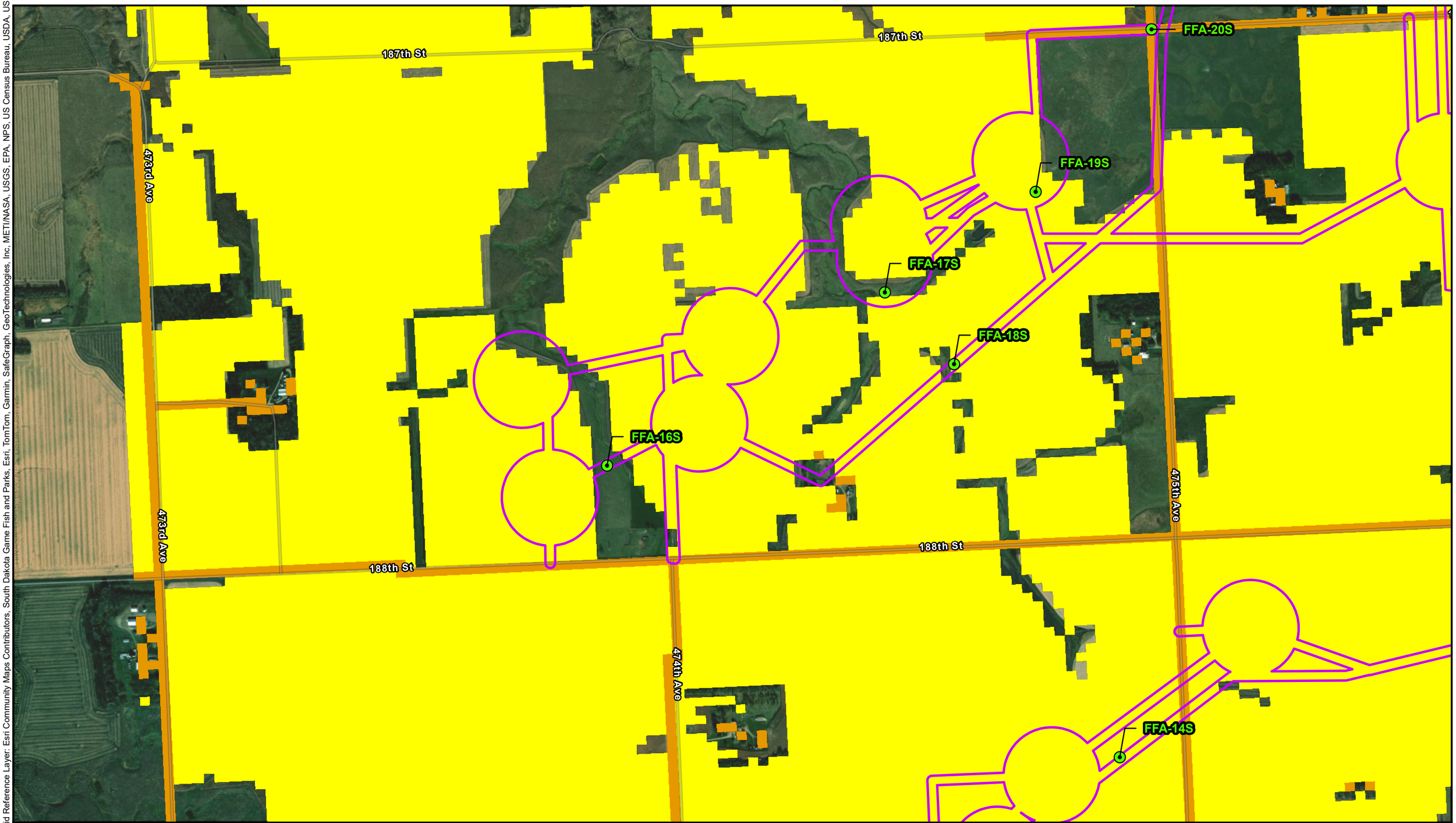

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Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 5 of 19

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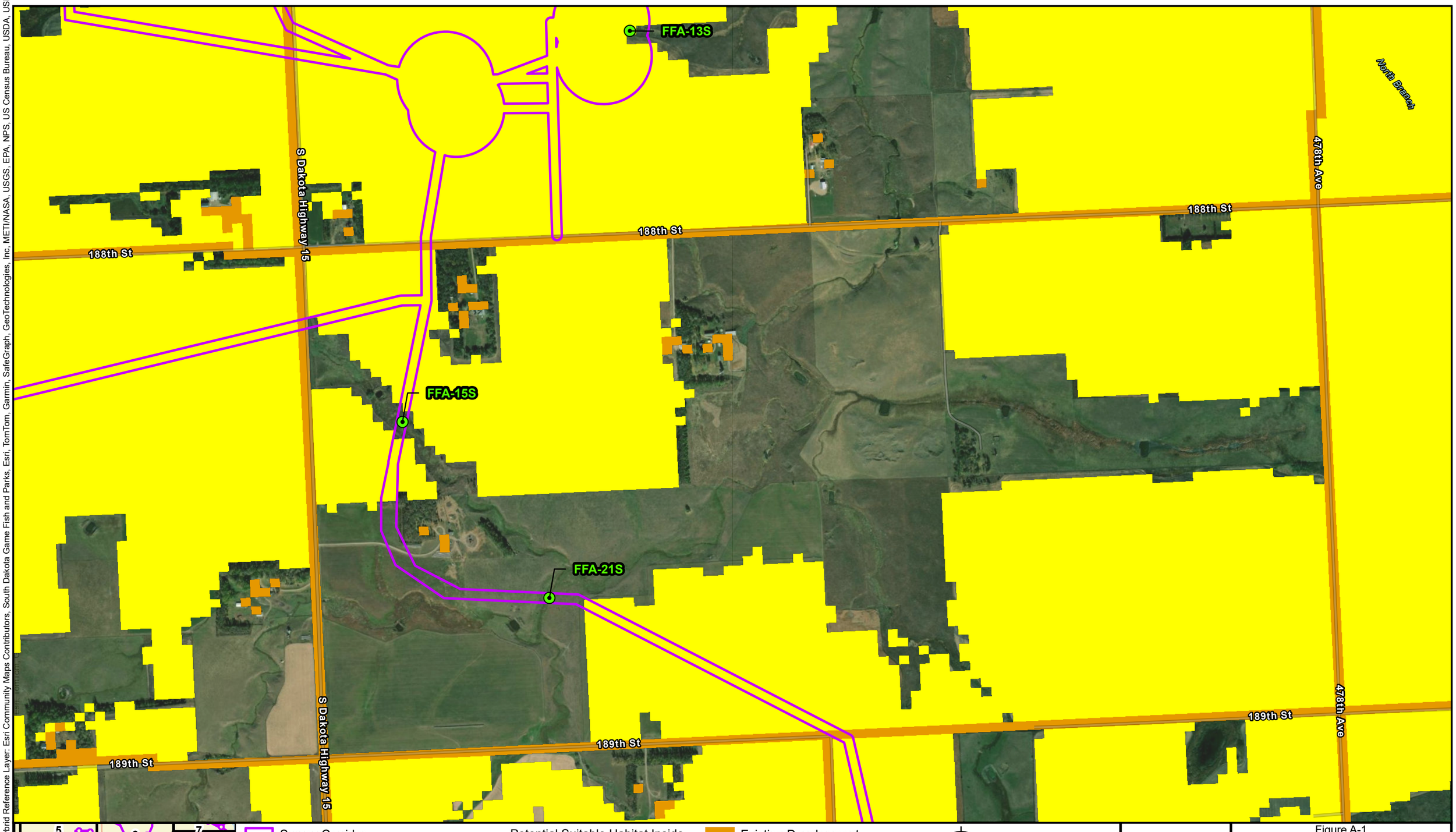

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Deuel Harvest Wind Energy South LLC
Deuel County, SD
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473rd Ave
189th St
474th Ave
189th St
475th Ave
190th St
190th St
475th A

9
10
13
14
Highway 15

Survey Corridor
Field Focus Area (FFA)
Potential Suitable Habitat Inside of Corridor
Potential Suitable Habitat Outside of Corridor
Existing Development
Cultivated Crops

NORTH
1,000 500 0 1,000
Scale in Feet

BURNS McDONNELL

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Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 7 of 19

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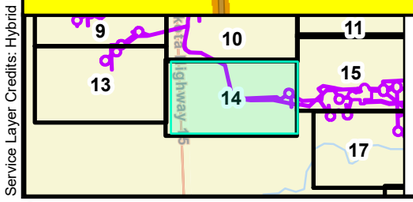

Survey Corridor

Field Focus Area (FFA)

Potential Suitable Habitat Inside of Corridor

Potential Suitable Habitat Outside of Corridor

Existing Development

Cultivated Crops

NORTH

1,000 500 0 1,000

Scale in Feet

BURNS McDONNELL

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Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 8 of 19

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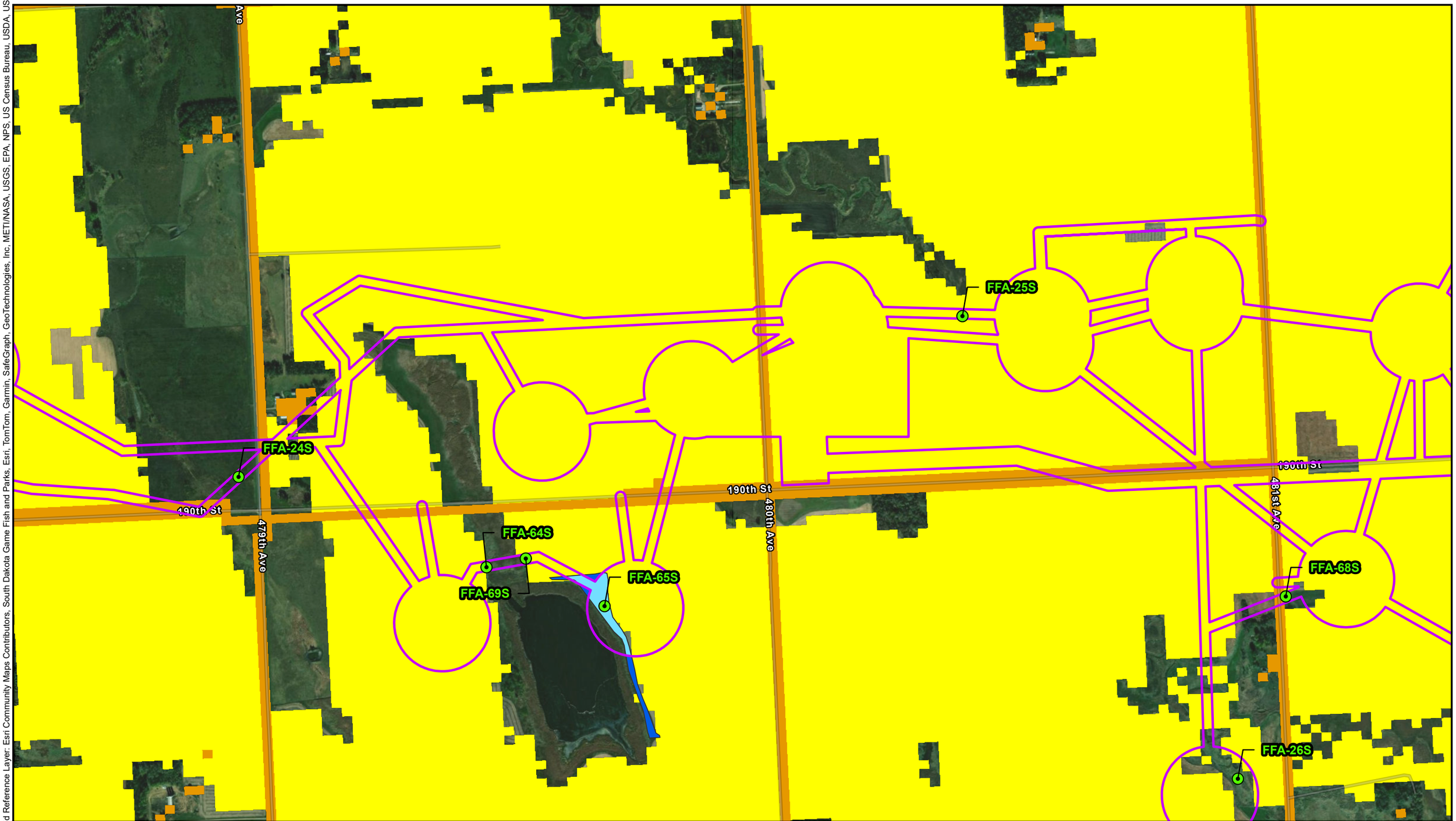

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Deuel County, SD

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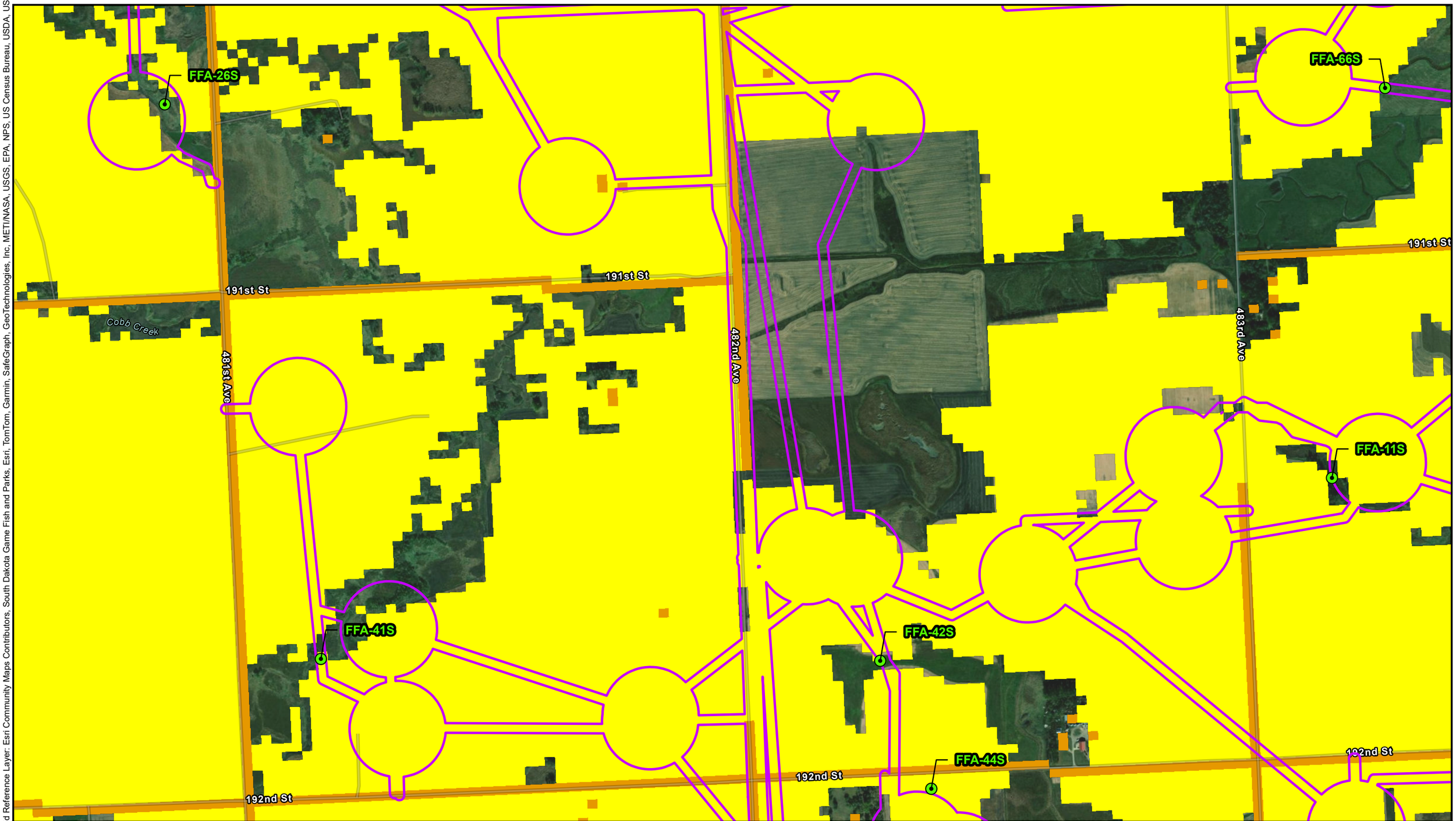

Figure A-1
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Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 10 of 19

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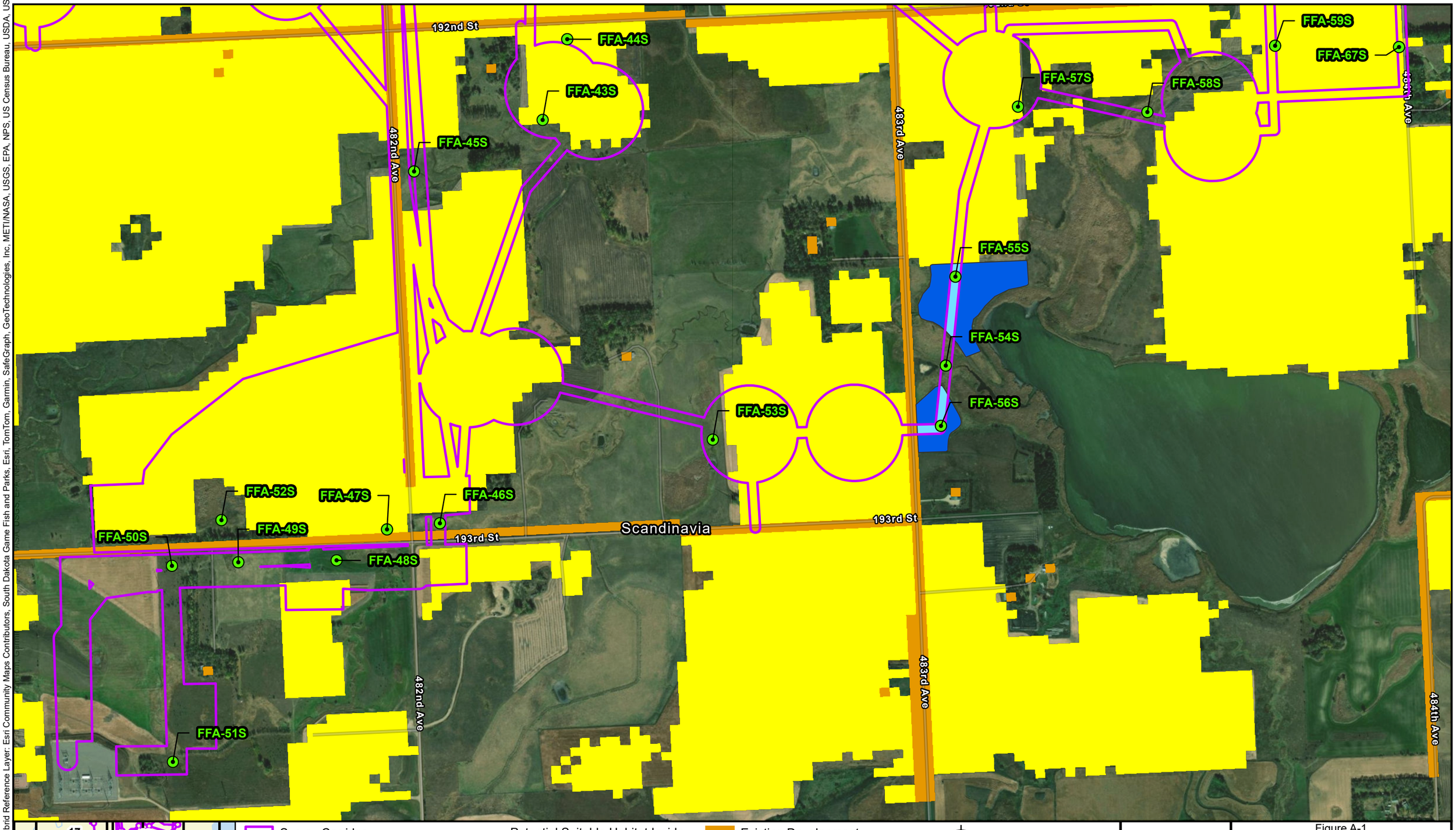

Survey Corridor

Field Focus Area (FFA)

Potential Suitable Habitat Inside of Corridor

Potential Suitable Habitat Outside of Corridor

Existing Development

Cultivated Crops

NORTH

1,000 500 0 1,000

Scale in Feet

BURNS McDONNELL

Figure A-1
Location Map of Field Focused Areas and Potential Suitable Protected Butterfly Habitat
Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 11 of 19

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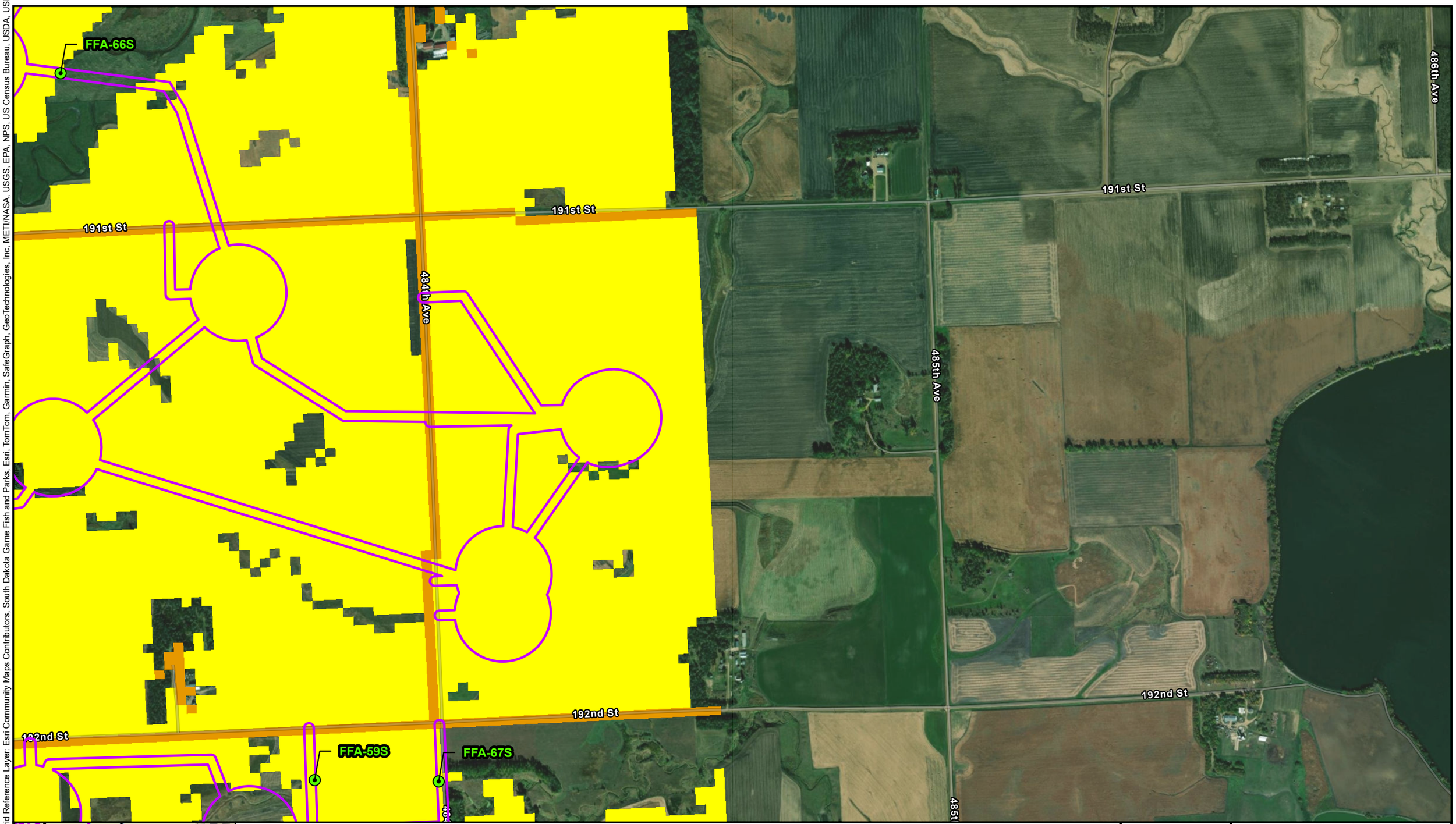

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BURNS McDONNELL

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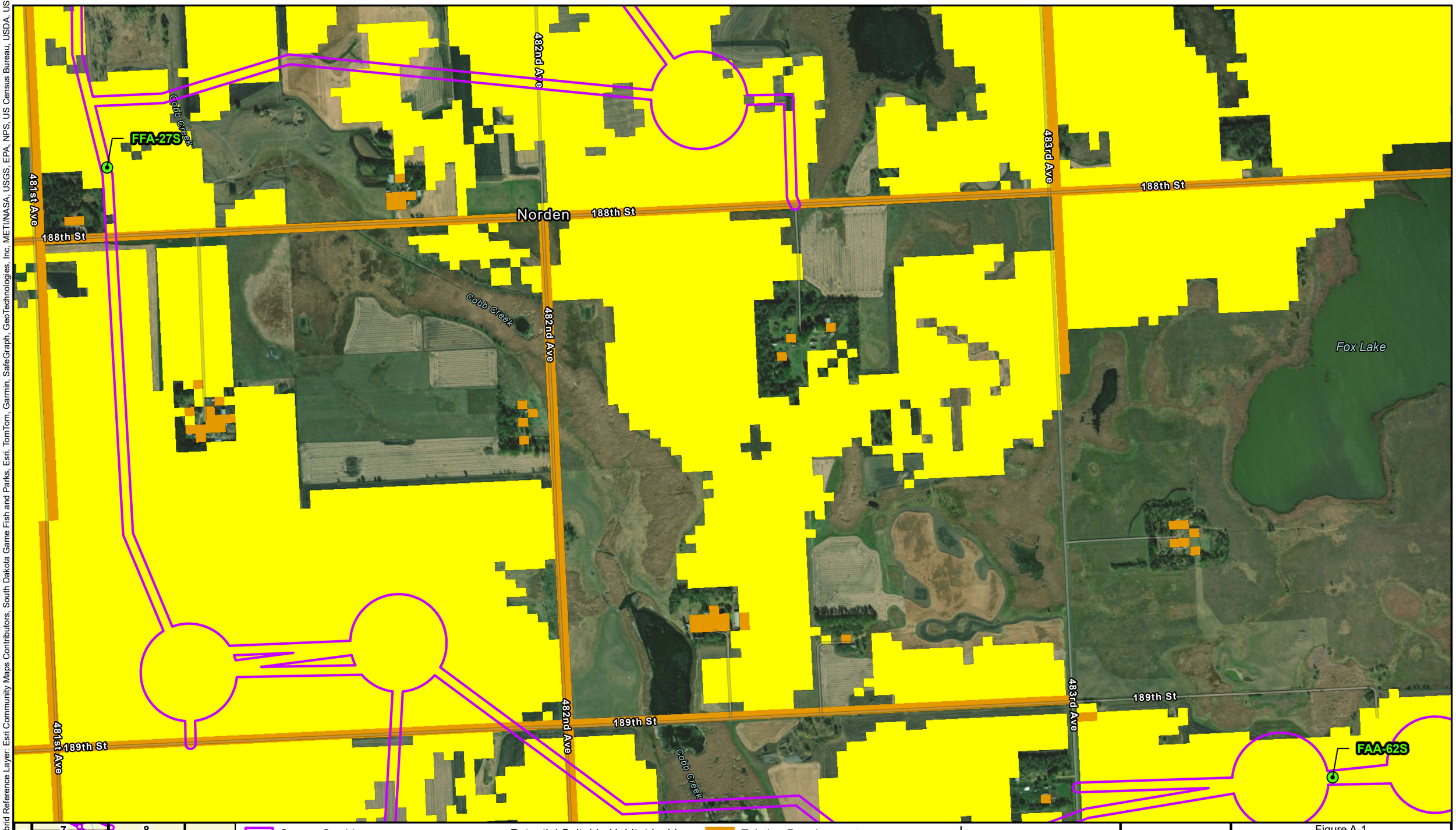

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186th St
480th Ave
481st Ave
FFA-30S
FFA-31S
FFA-29S
North Branch
FFA-28S
187th St
Cobb Creek

Brandt
2
4
6
7
8
10
11
12
15
16

Survey Corridor
Field Focus Area (FFA)
Potential Suitable Habitat Inside of Corridor
Potential Suitable Habitat Outside of Corridor
Existing Development
Cultivated Crops

NORTH
1,000 500 0 1,000
Scale in Feet

BURNS McDONNELL

Figure A-1
Location Map of Field Focused Areas and Potential Suitable Protected Butterfly Habitat
Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD

Source: ESRI, NLCD, Deuel Harvest Wind Energy LLC, and Burns & McDonnell Engineering Company, Inc.

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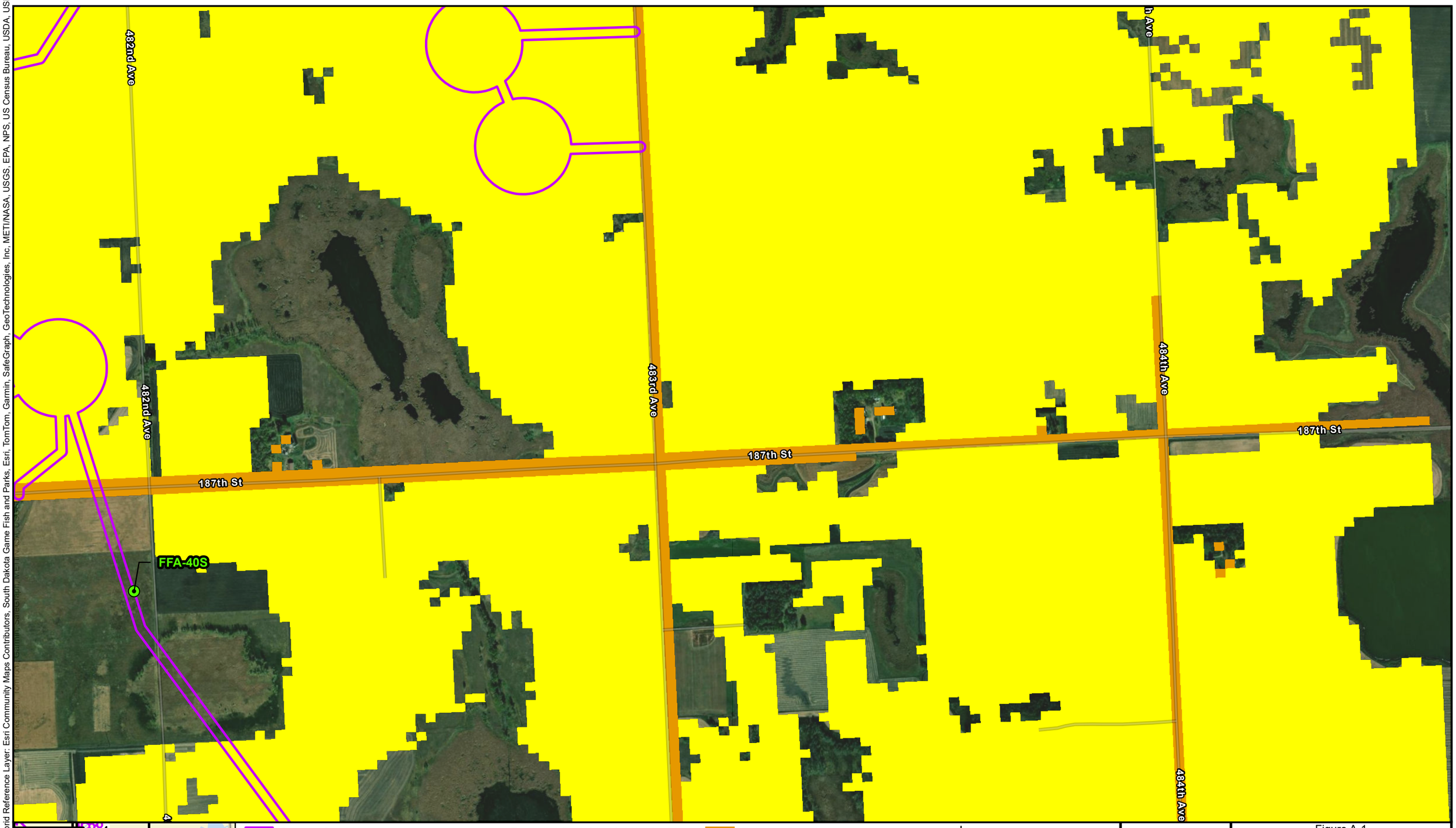

Figure A-1
Location Map of Field Focused Areas and Potential Suitable Protected Butterfly Habitat
Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 16 of 19

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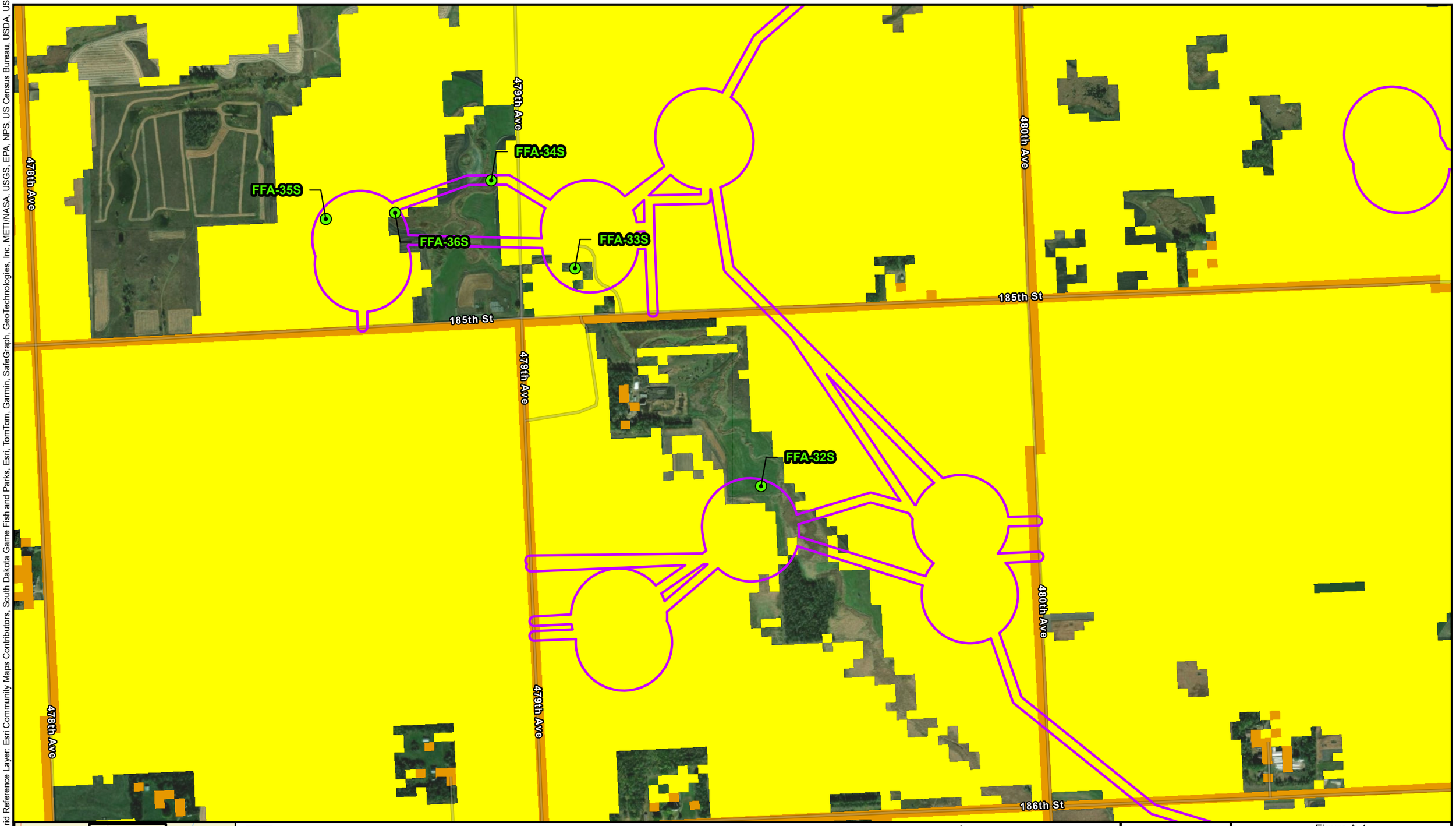

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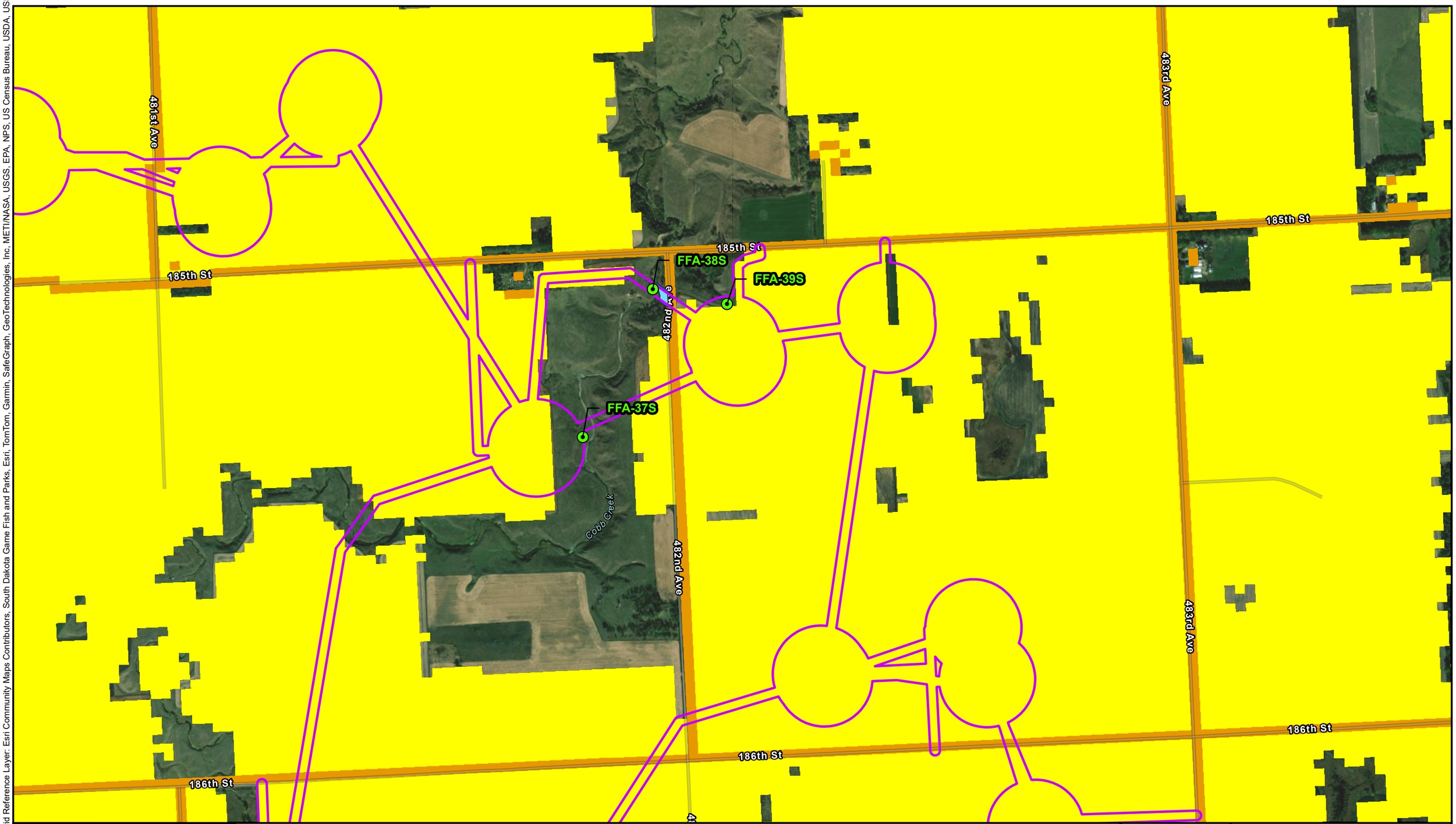
Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 17 of 19

Issued: 2/16/2024



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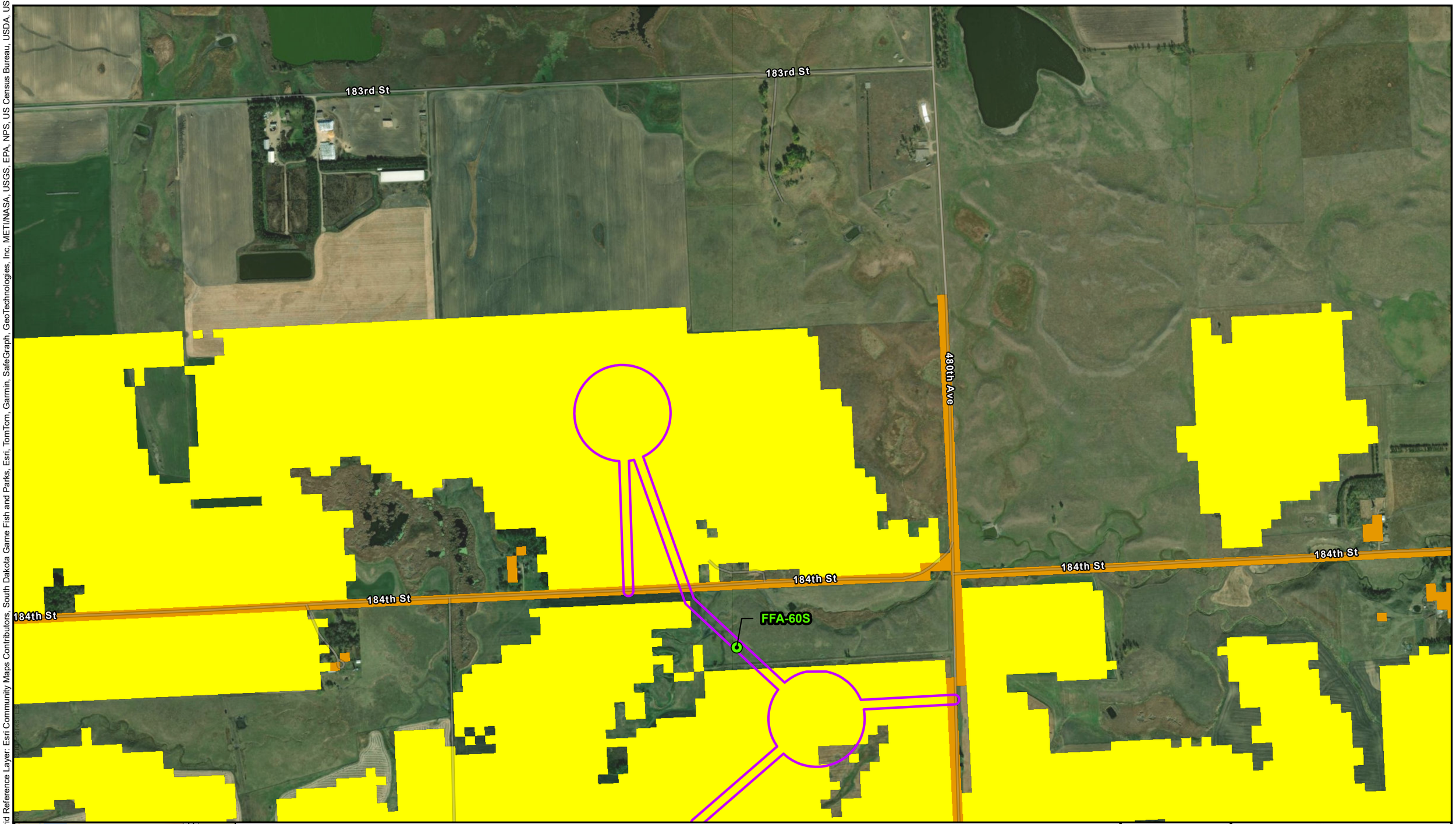
Deuel County, SD

Issued: 2/16/2024



BURNS McDONNELL

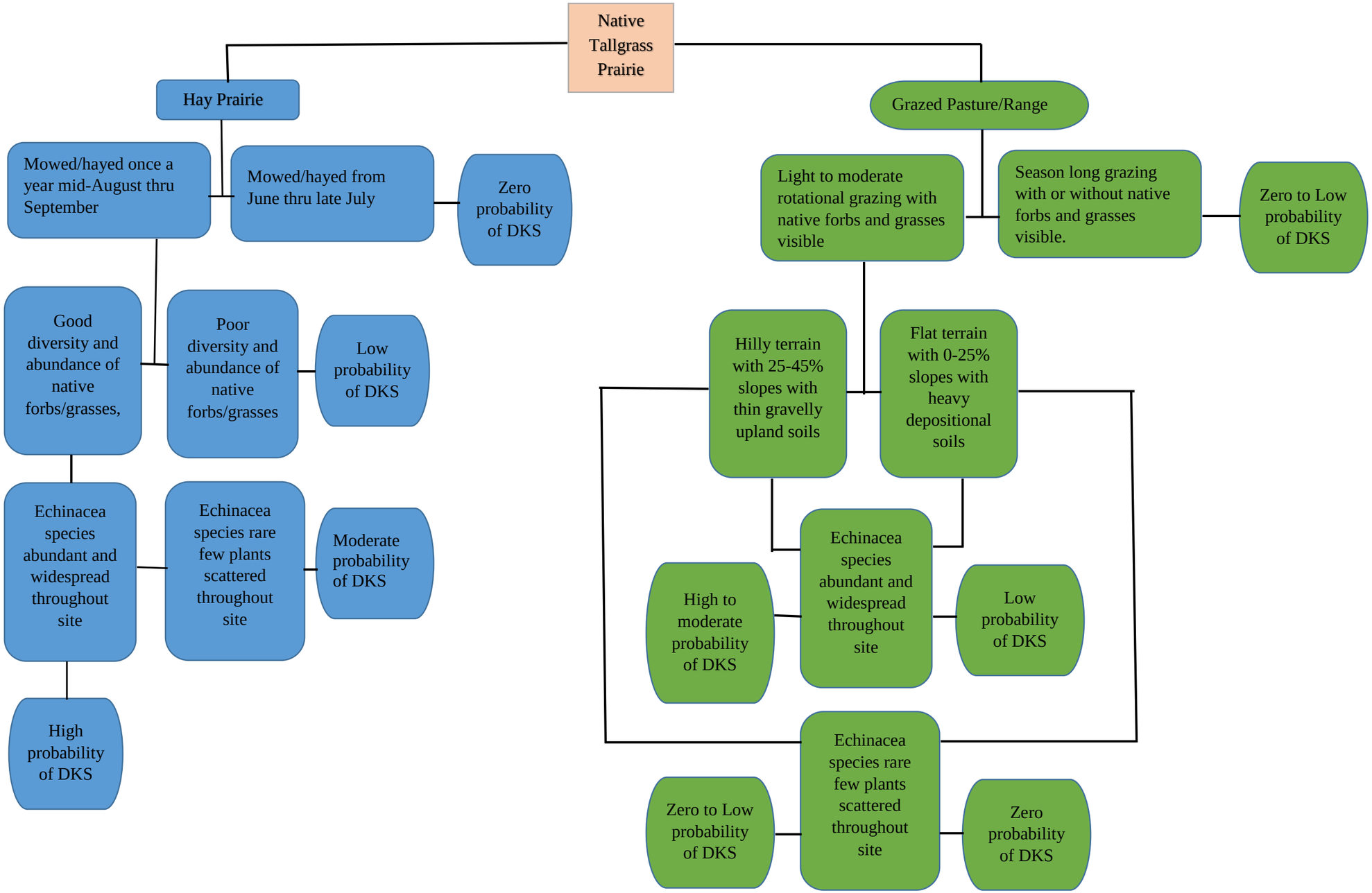
Figure A-1
Location Map of Field Focused Areas and Potential Suitable Protected Butterfly Habitat
Deuel Harvest South Wind
Deuel Harvest Wind Energy South LLC
Deuel County, SD
Page 19 of 19

Source: ESRI, NLCD, Deuel Harvest Wind Energy LLC, and Burns & McDonnell Engineering Company, Inc.

Issued: 2/16/2024

APPENDIX B – HABITAT FLOW CHART

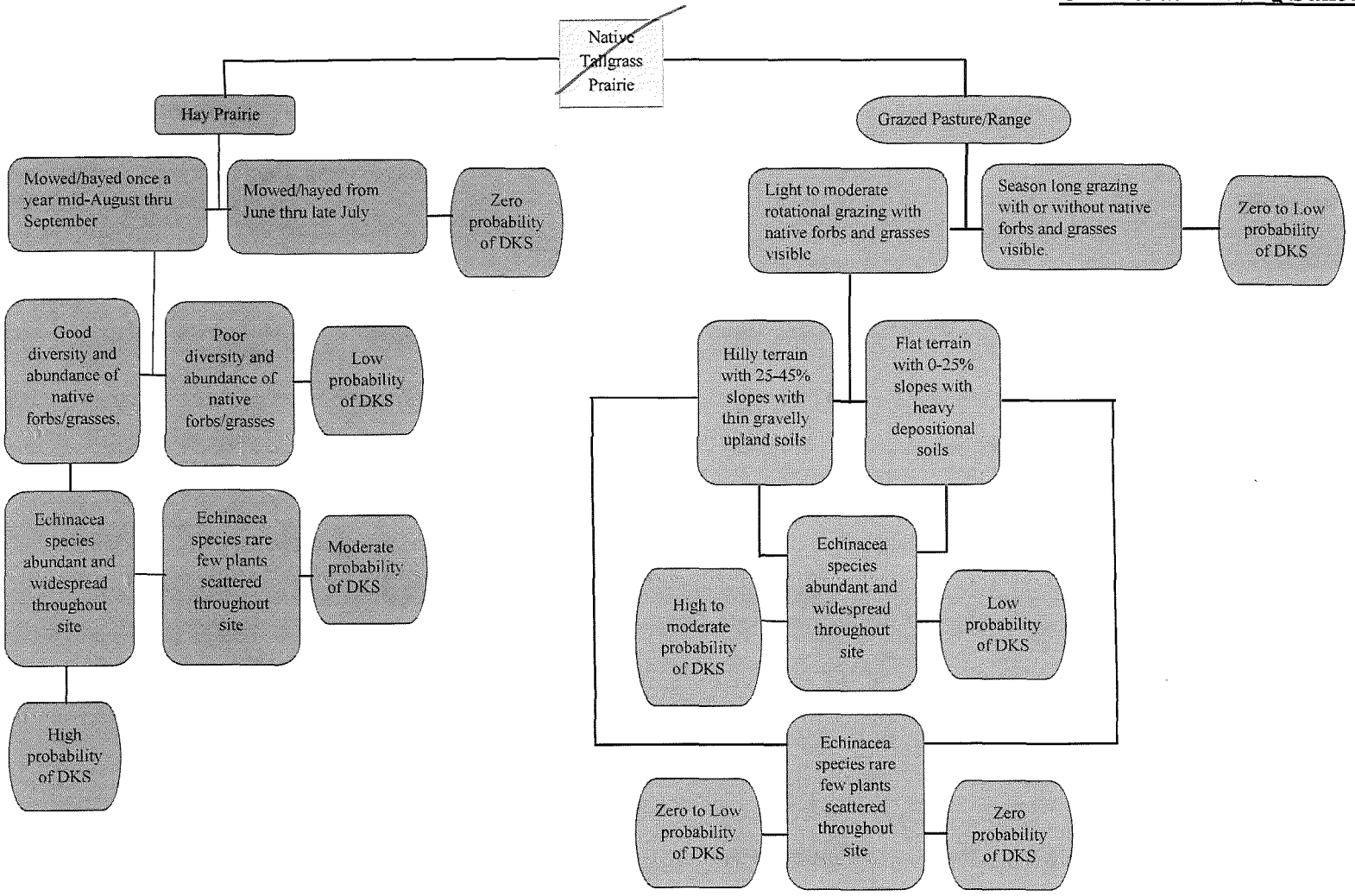
Guide to Identifying Dakota Skipper Habitat



APPENDIX C – DATAFORMS

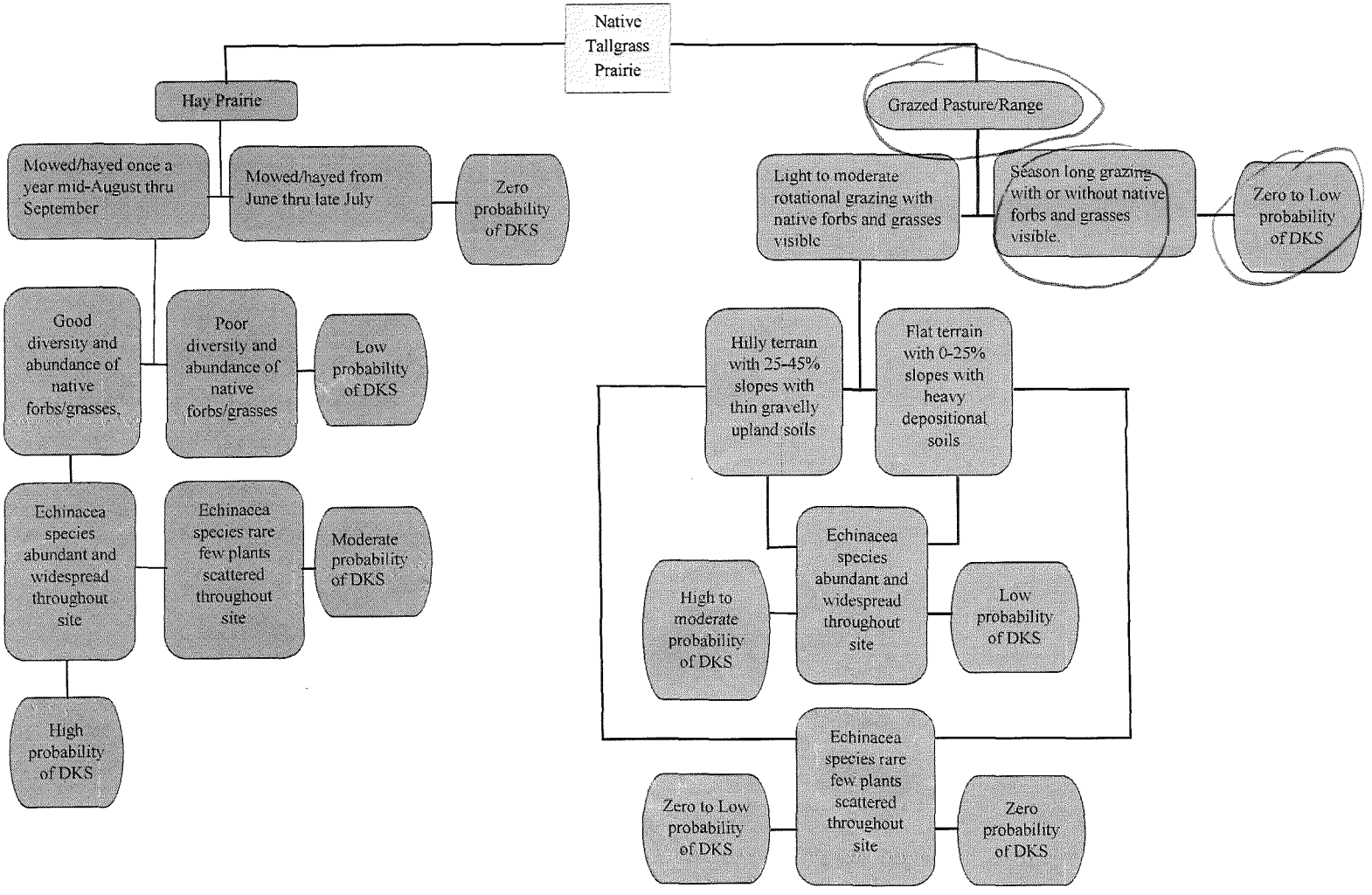
1
J. Maine
Mowed grass next to crop field
Fescue, no forbs

Guide to Identifying Dakota Skipper Habitat



02
J. Maine
Intensively grazed brome

Guide to Identifying Dakota Skipper Habitat



3
J. Maine
Intensively grazed
Fescue and big bluestem

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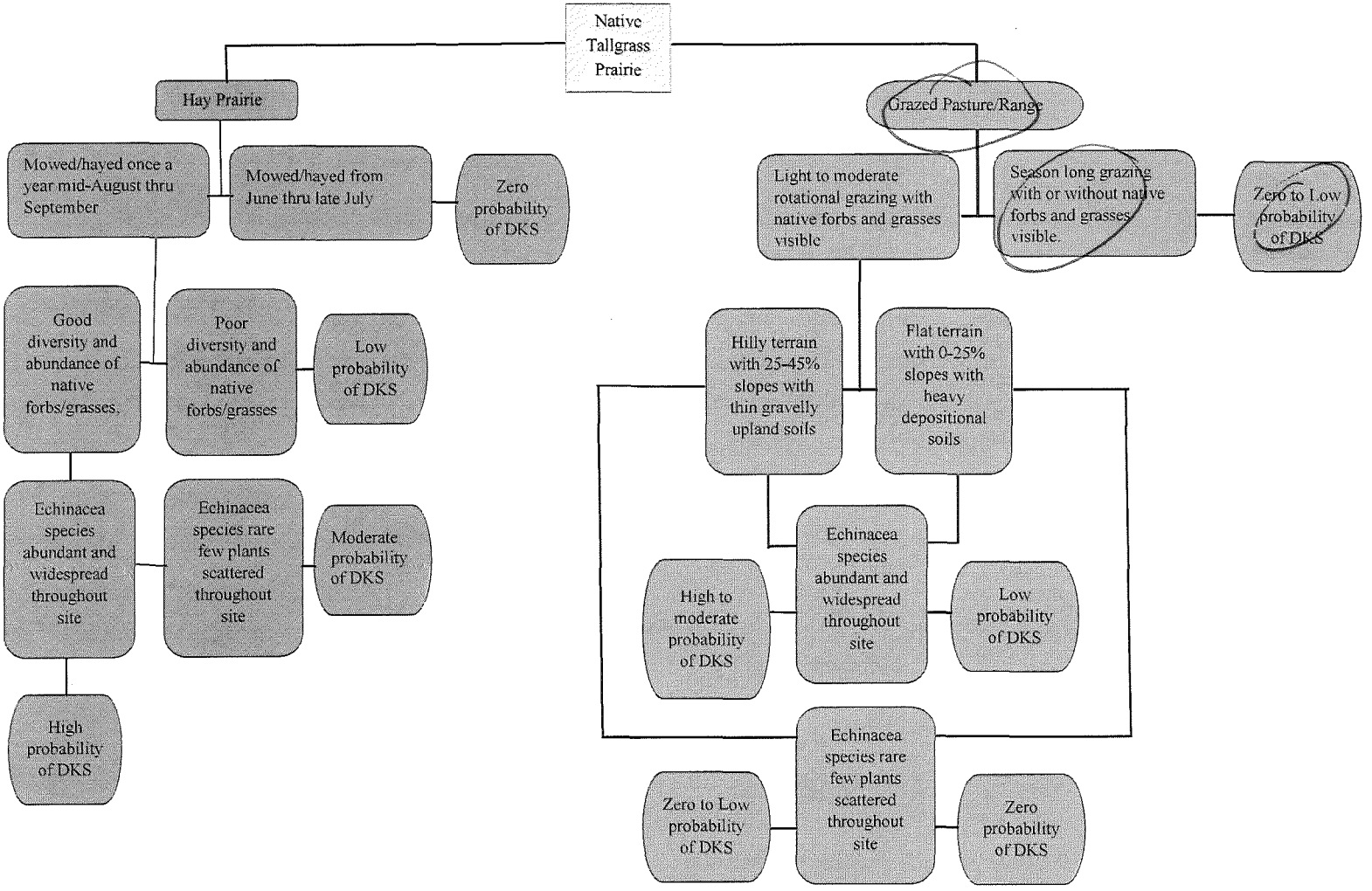
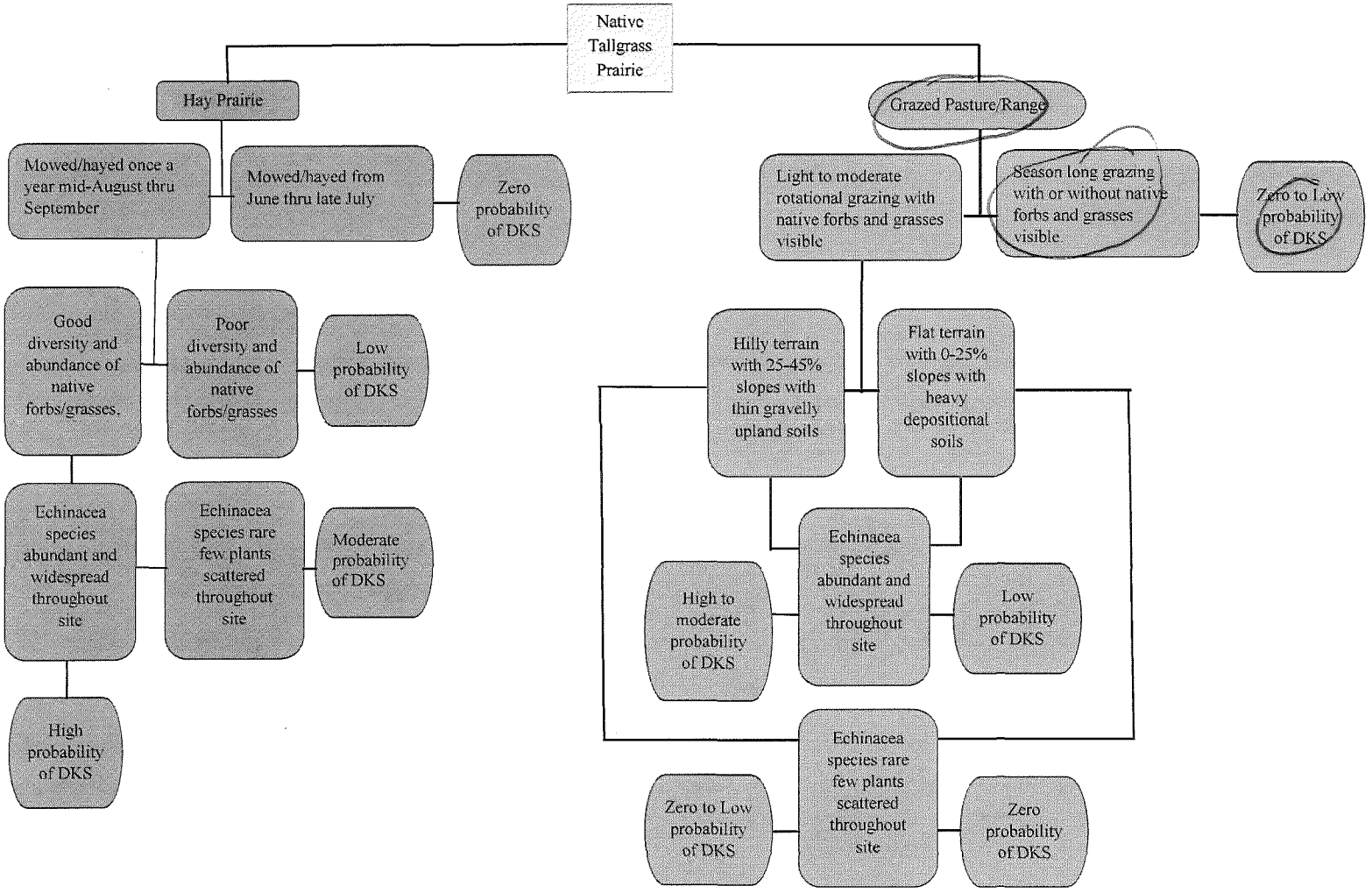


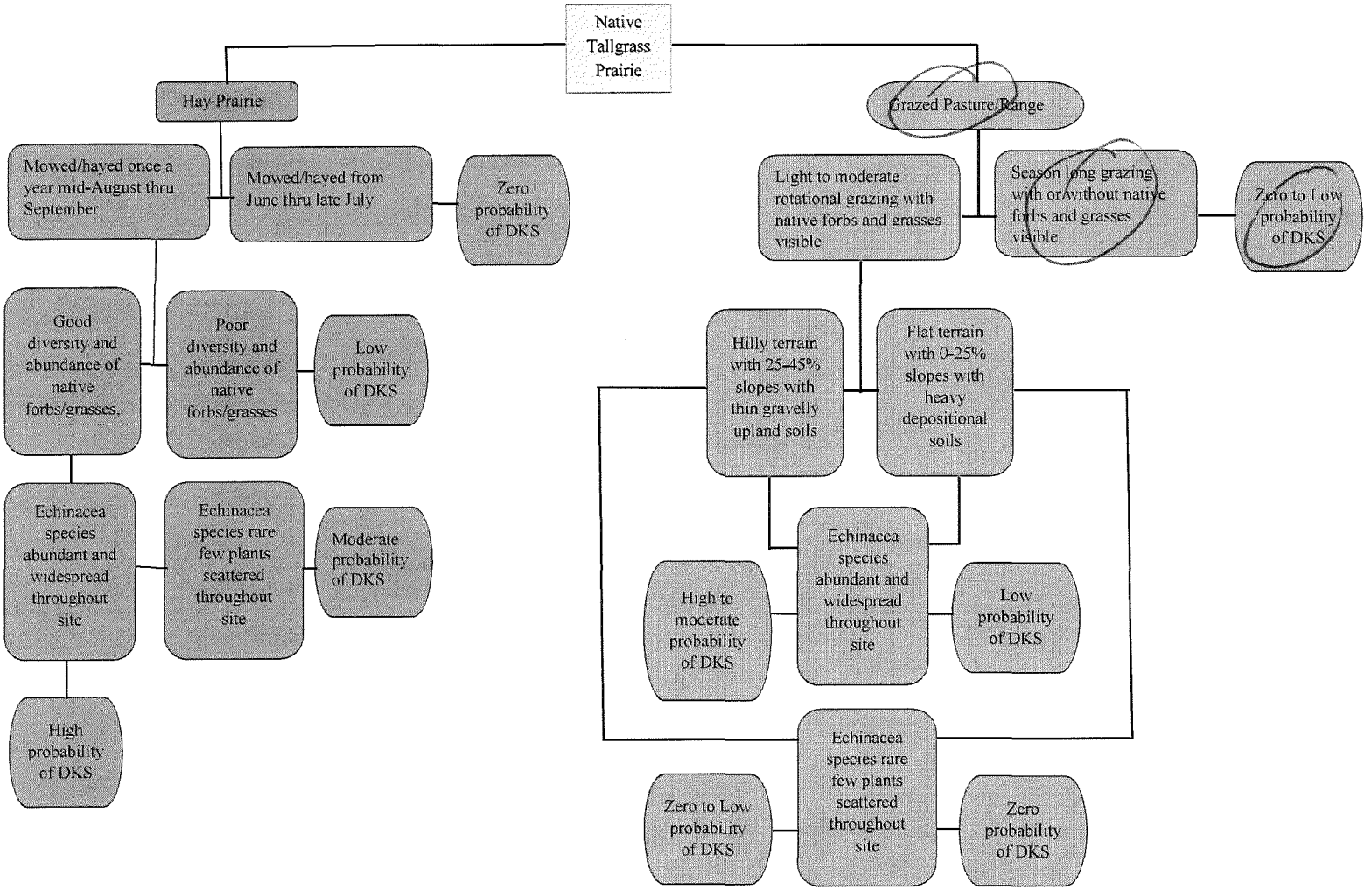
4
J. Maine
Invasively grazed
fescue + big bluestem

Guide to Identifying Dakota Skipper Habitat



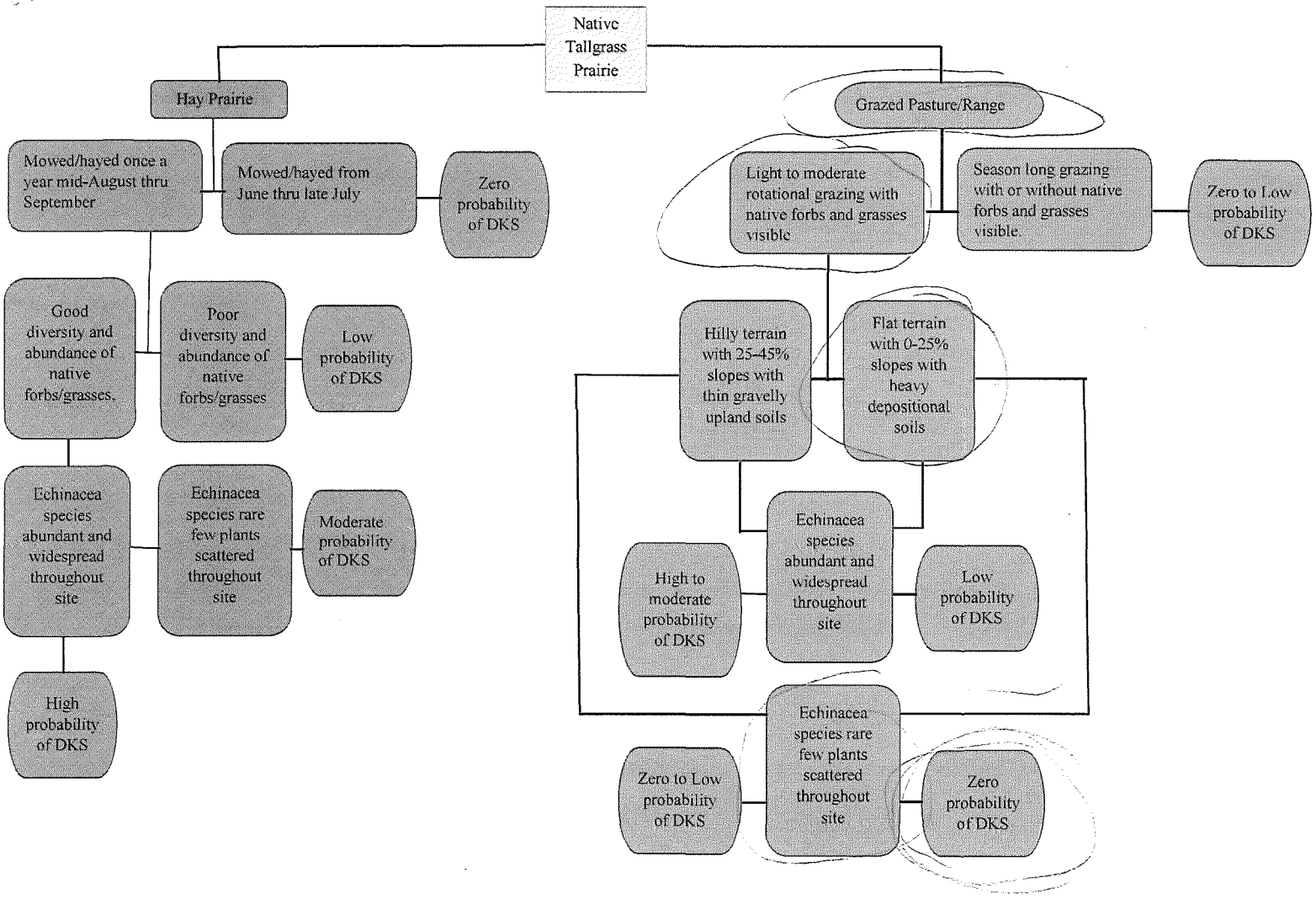
5
J. Maine
Intensively grazed brome

Guide to Identifying Dakota Skipper Habitat



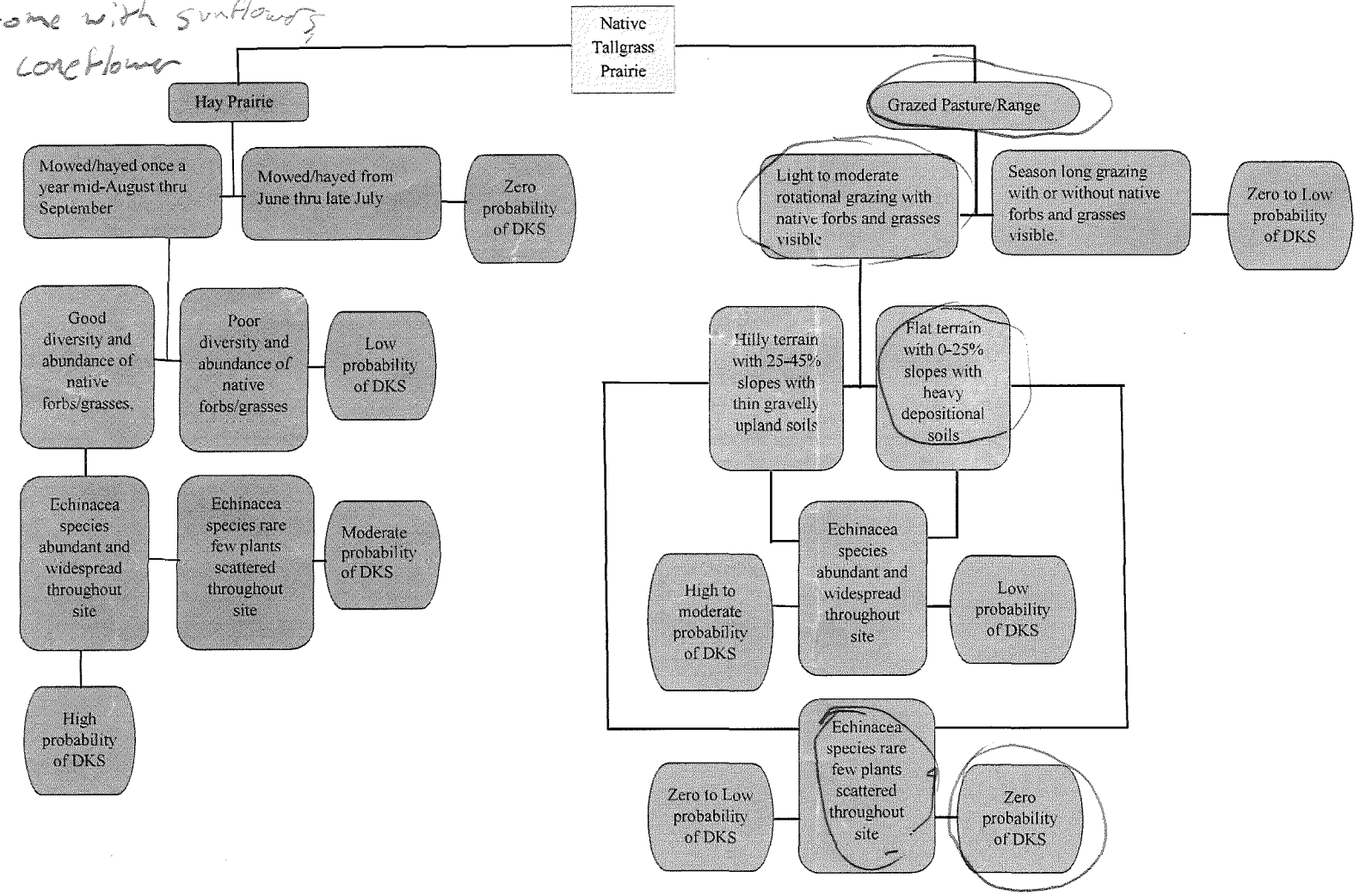
EFA-65
Arden Brewer

Guide to Identifying Dakota Skipper Habitat



FFA-75
Josiah Maine
Drainage b/w crop fields
grazed after harvest
Brome with sunflowers
No coneflower

Guide to Identifying Dakota Skipper Habitat



Site 8
Josiah Maine
Steep hillside N of stream
little bluestem with sunflower
and coneflower

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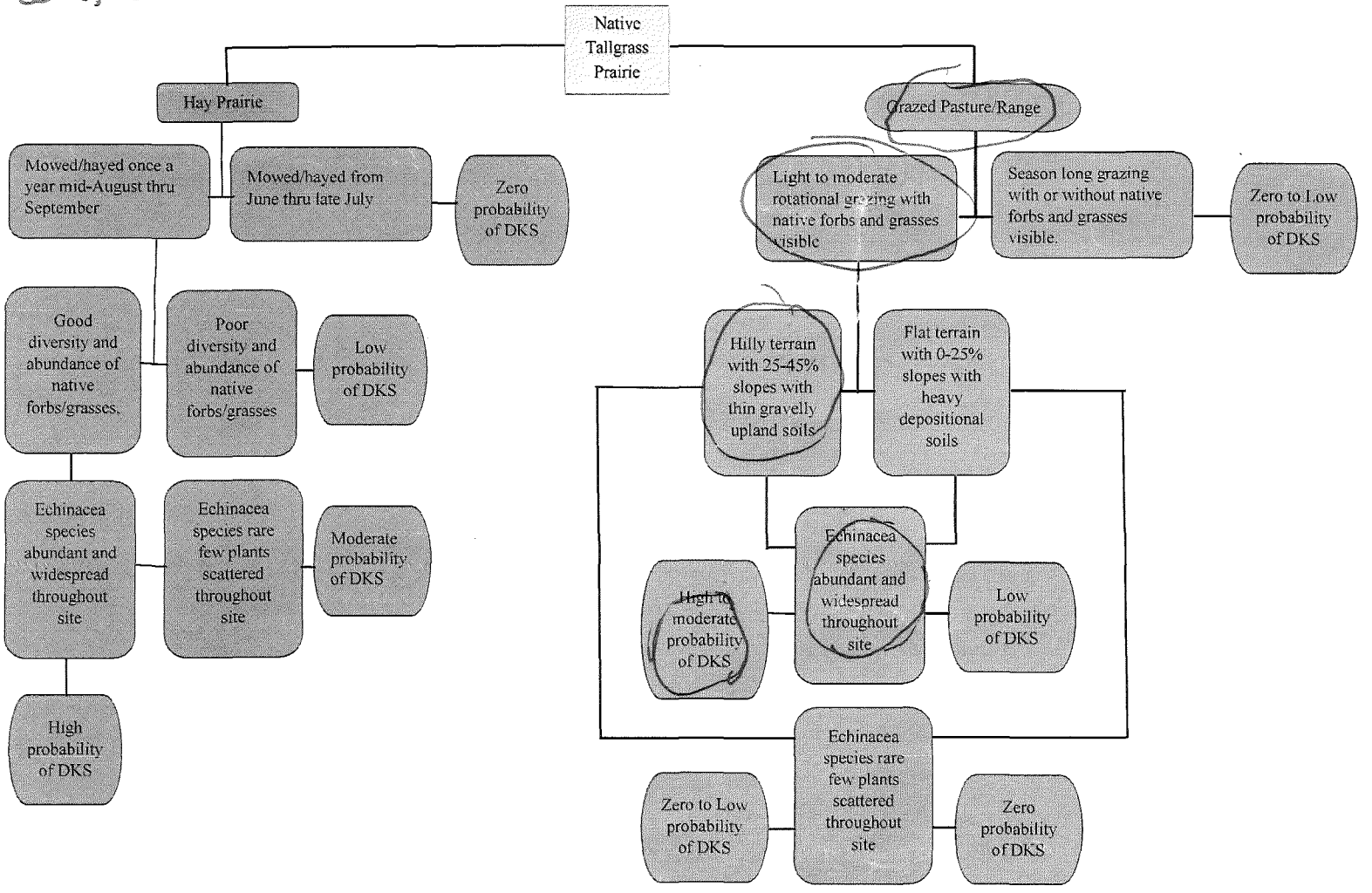

9
J. Maine
Intensively grazed brome
Sedges along stream

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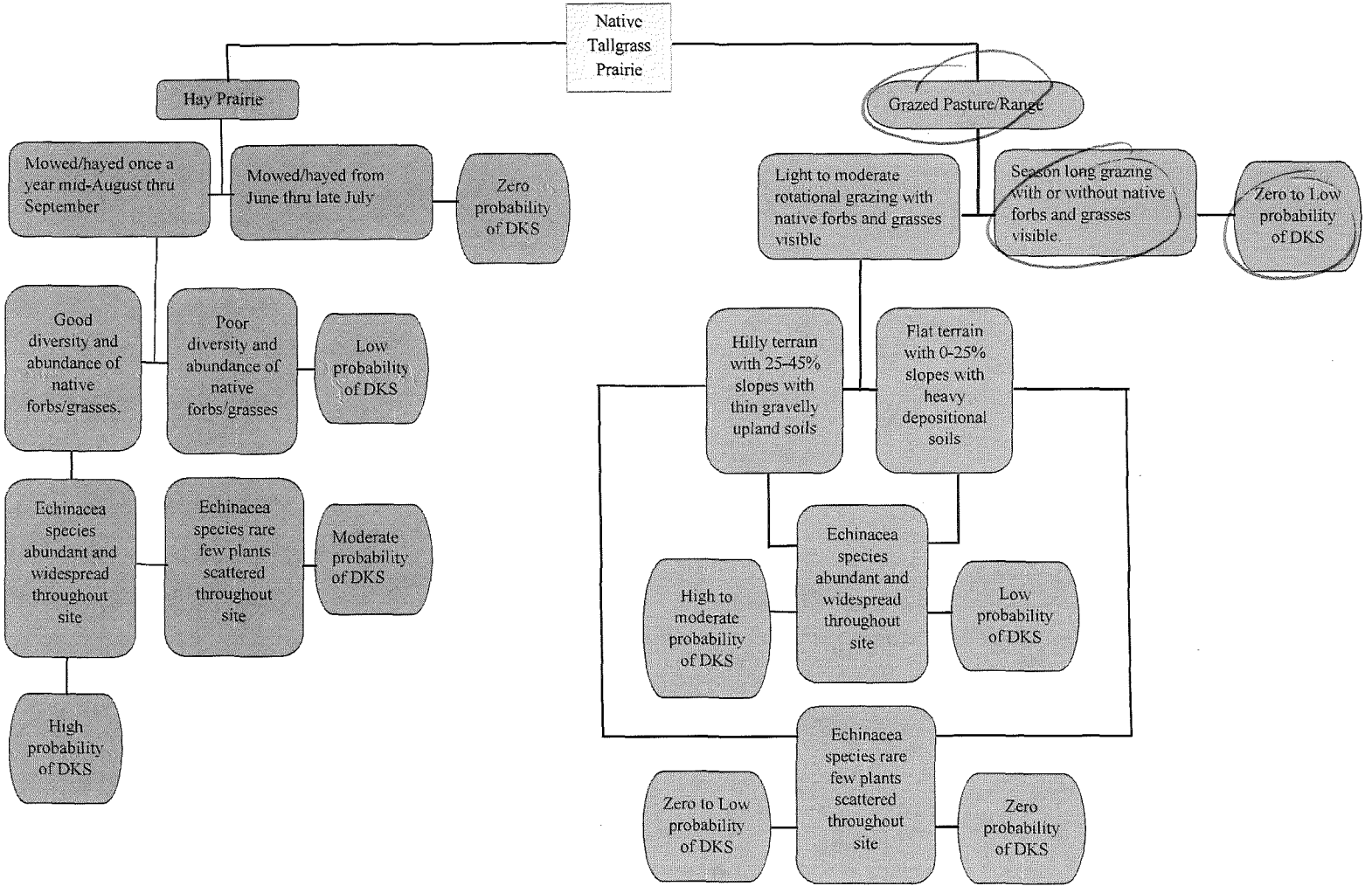

10

J. Maine

Inversely grazed brome

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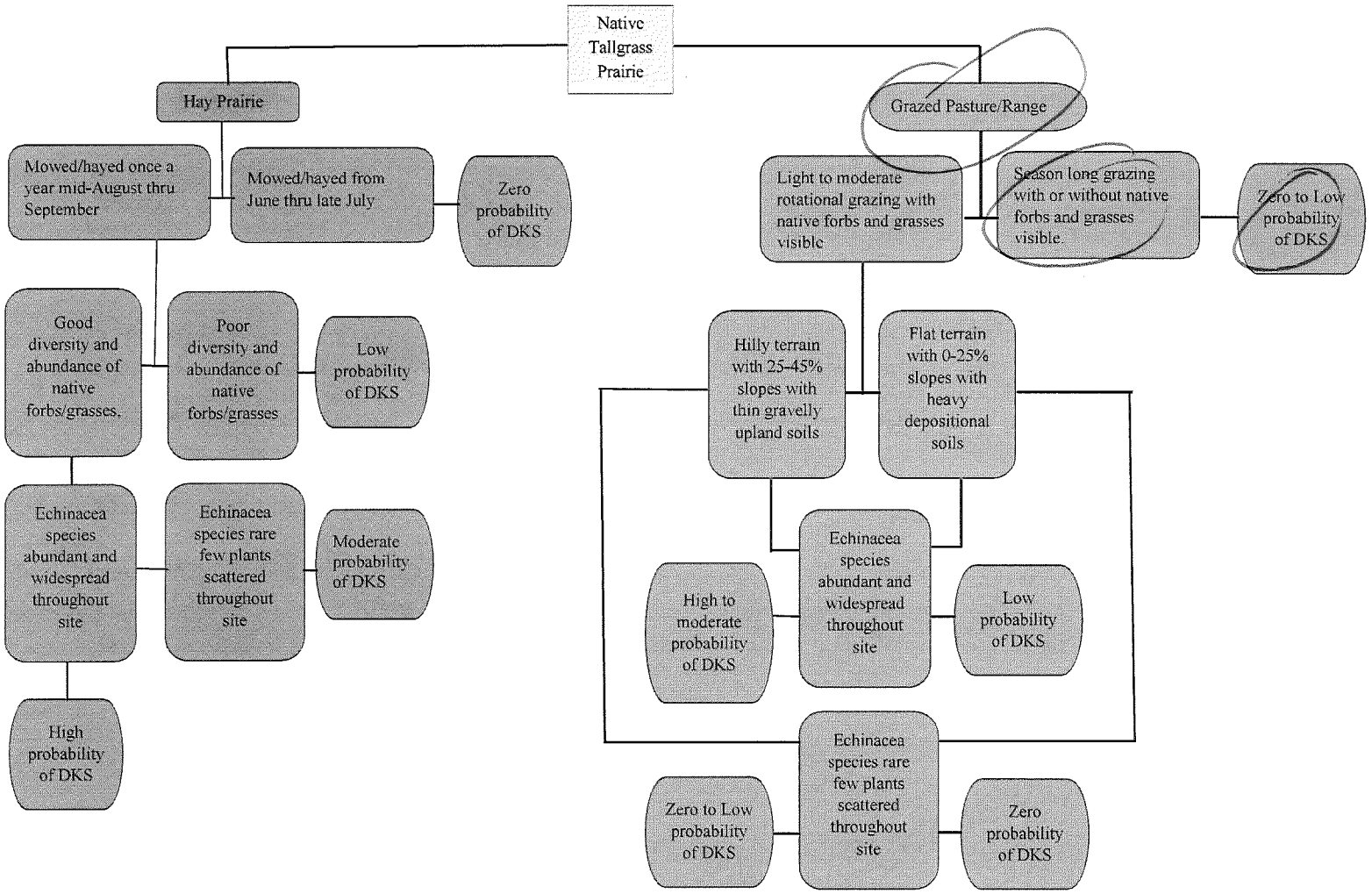

12
J. Maine
Intensively grazed brome

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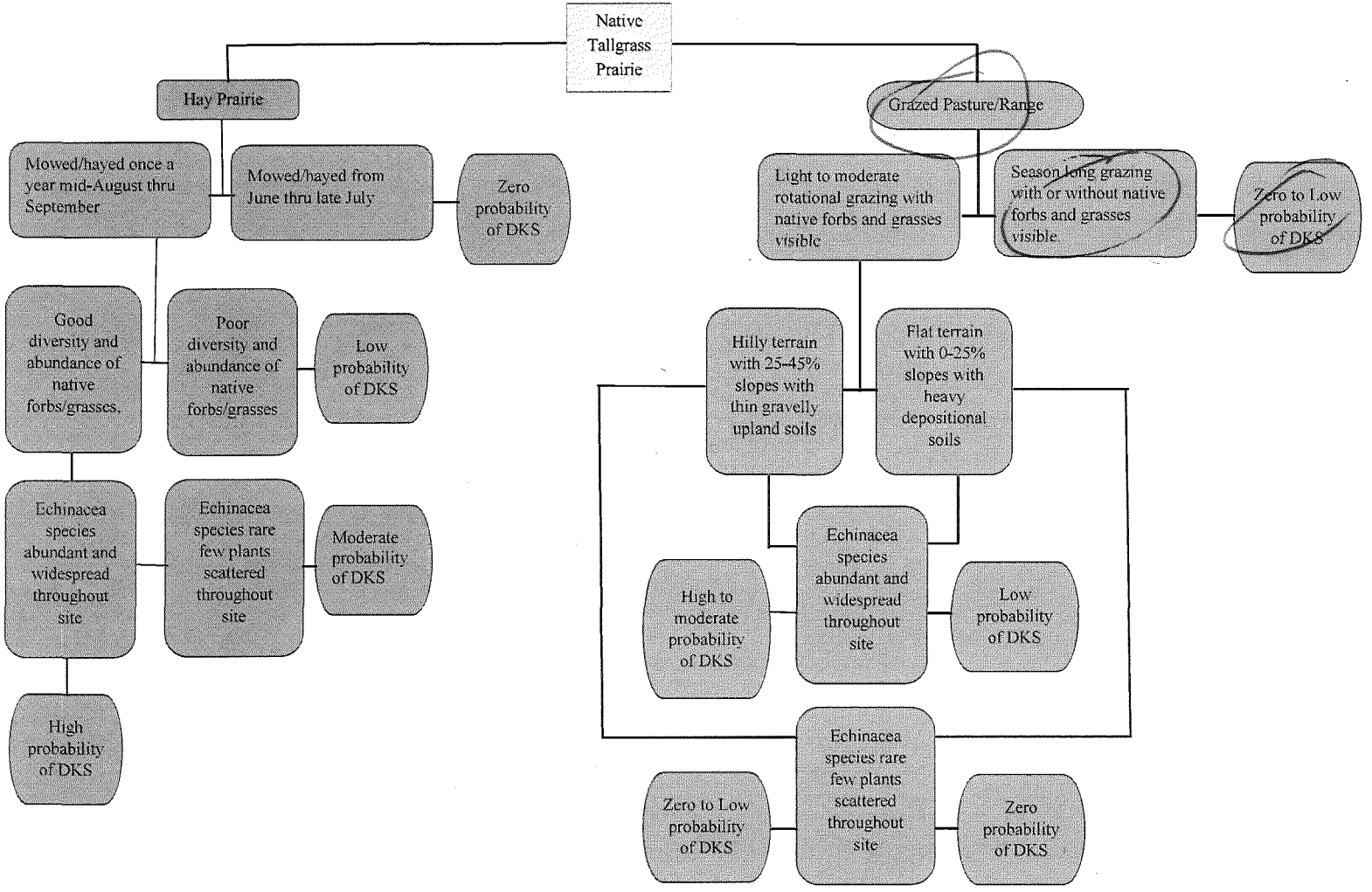
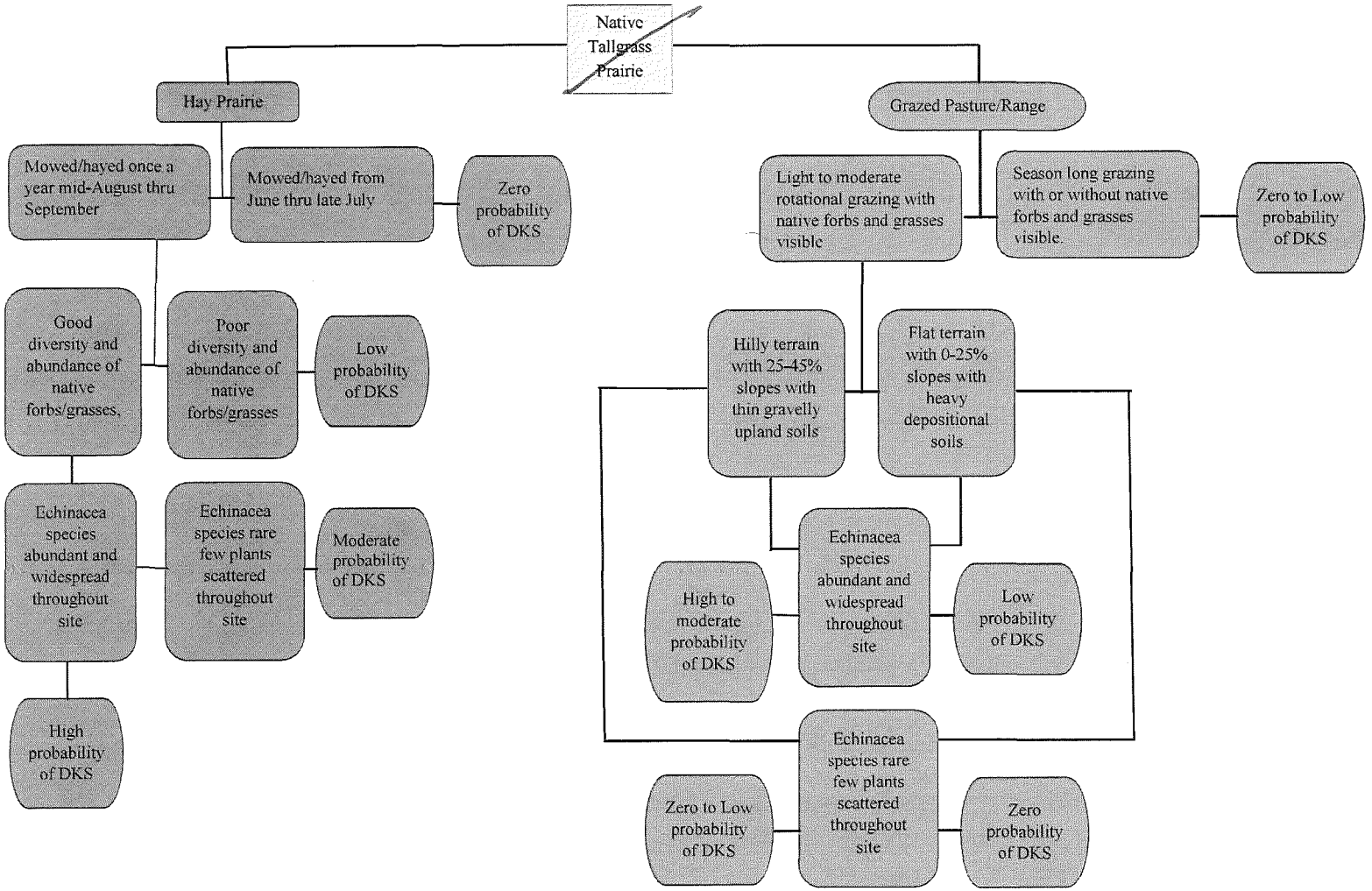


13
J. Maine
Reed canary grass wetland
Some Sunflower

Guide to Identifying Dakota Skipper Habitat



FFA-145

N/A → not tallgrass prairie habitat → drainage swale.

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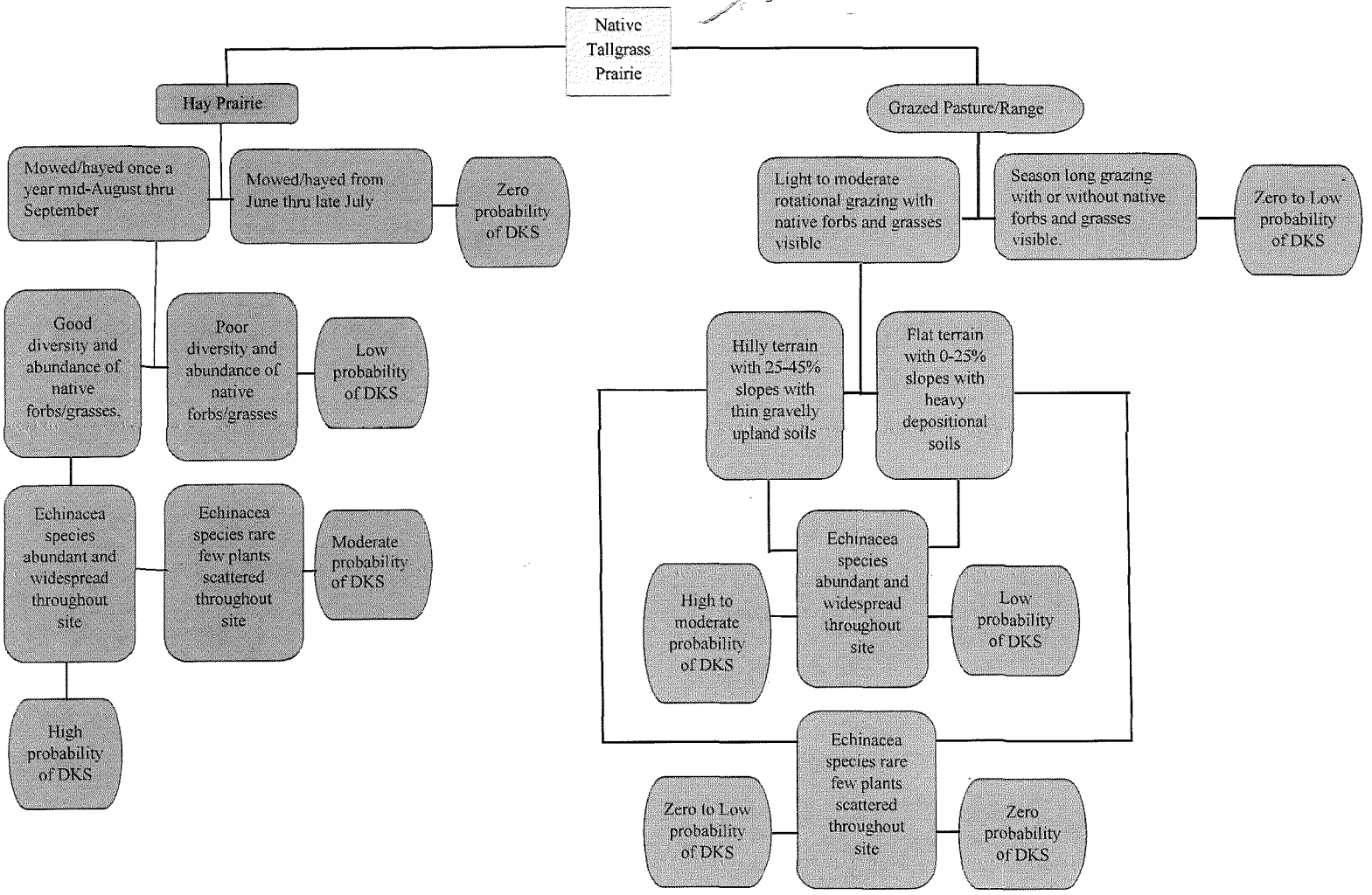

FFA-15 S

not native tallgrass prairie

– drainage Swale – dom by bgrass (upland) and forbs (lowland) Only warm season encountered on (1) clump of bgs blue

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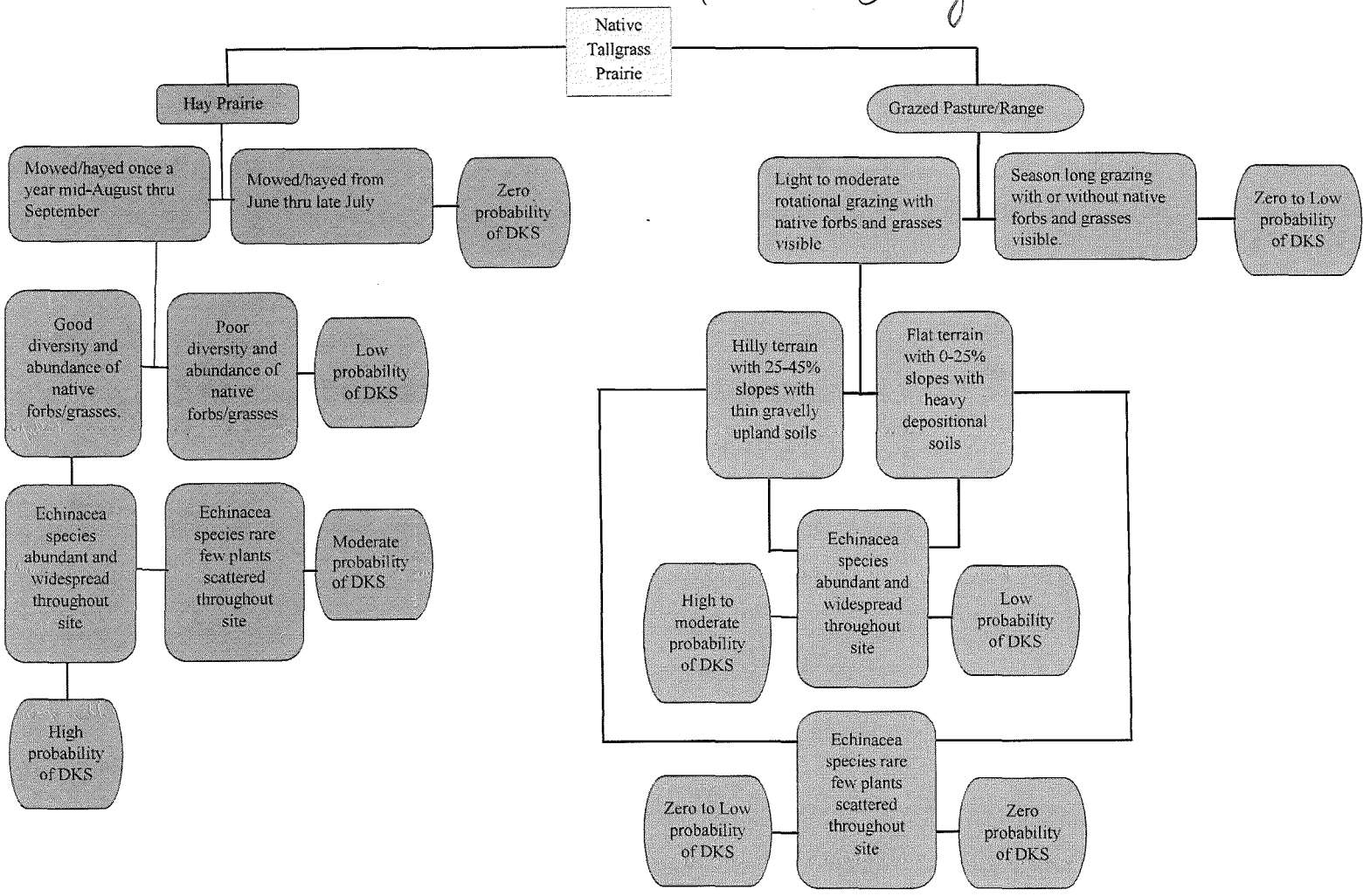

16

J. Maine

Intensively grazed brome with thistle

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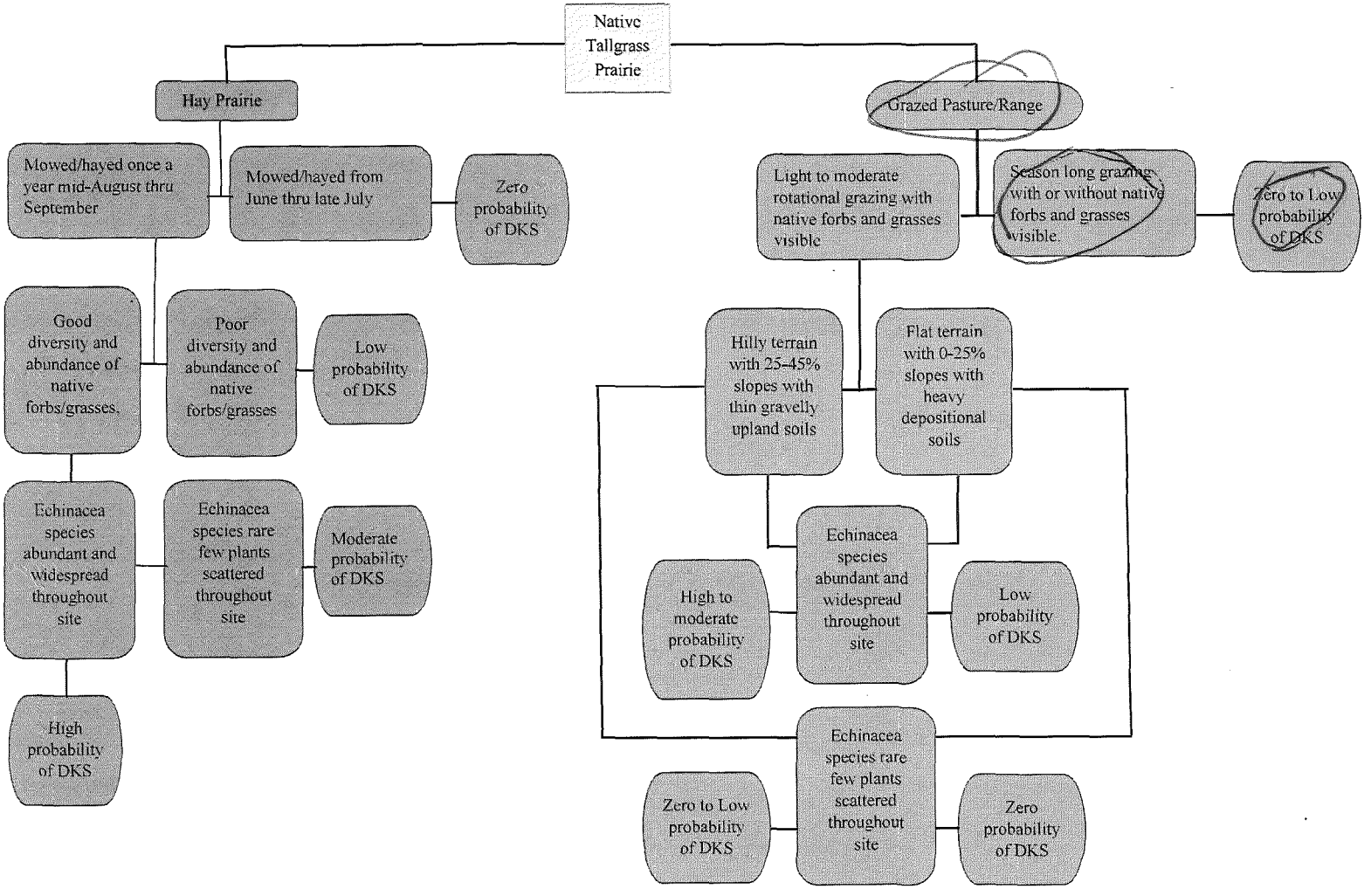

17 J. Maine
Intensively grazed Fescue

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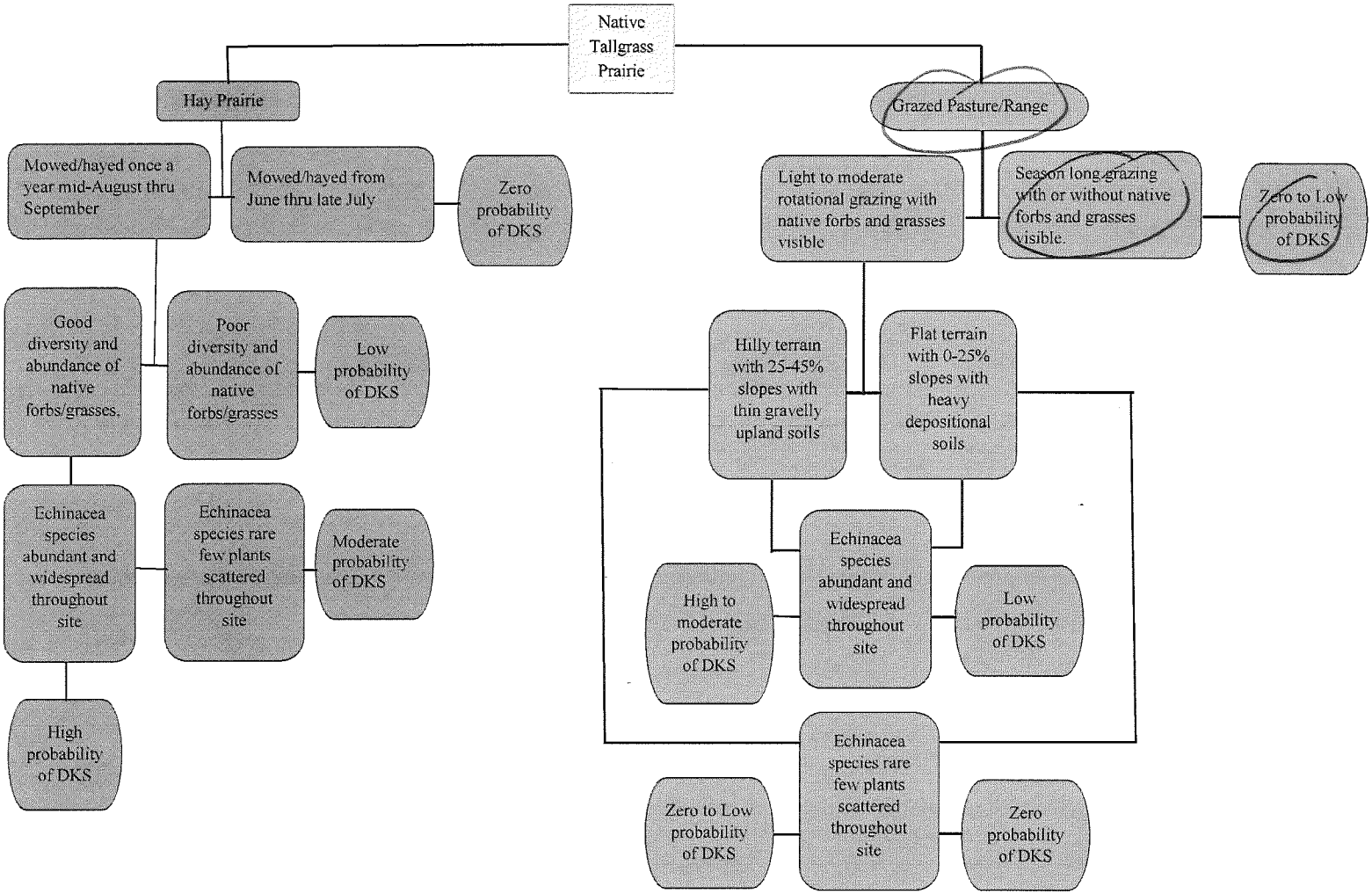

18

J. Maine

Reed canary grass drainage
Some sunflower and cocklebur
No coneflower

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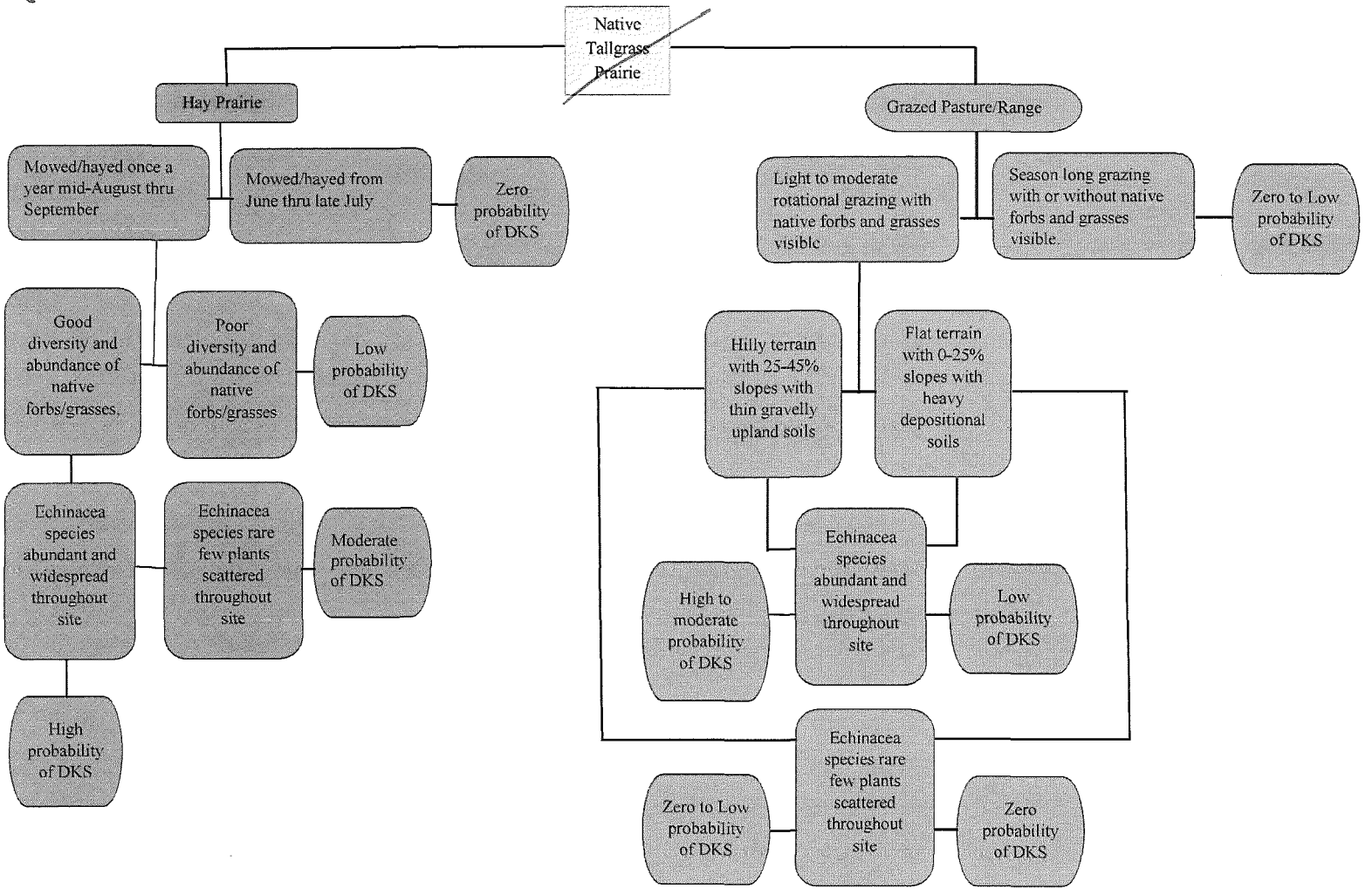
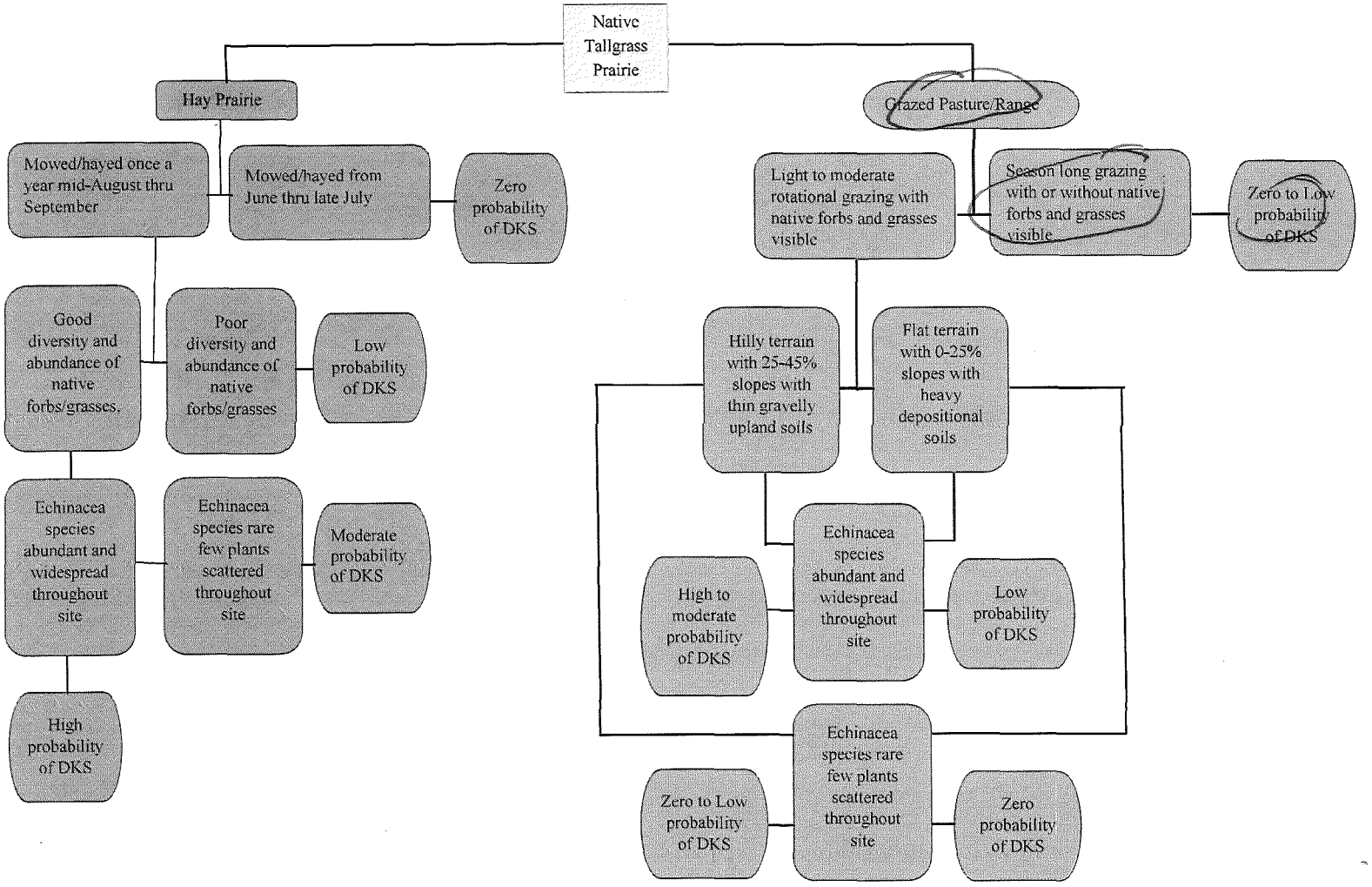


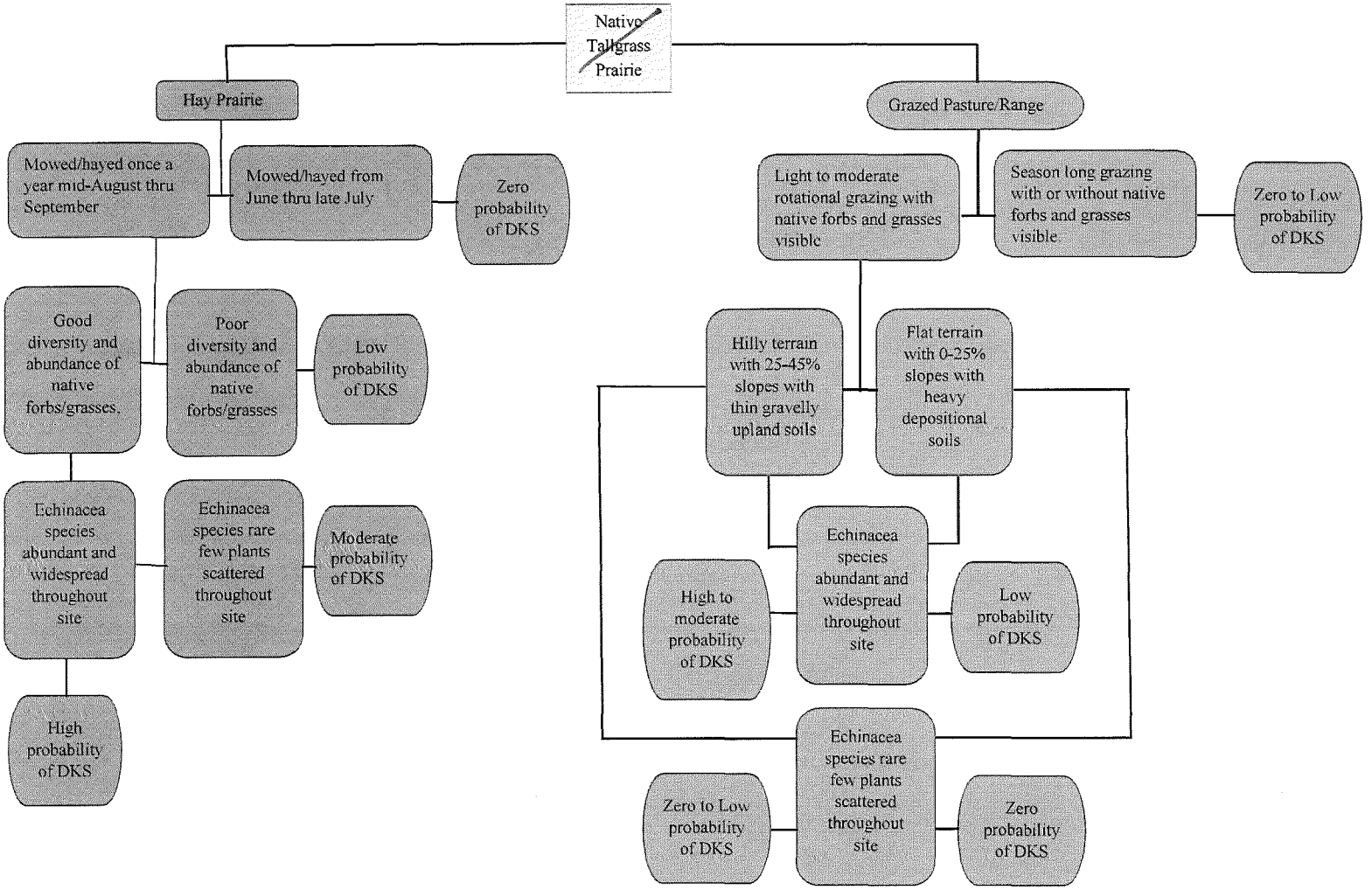
19
J. Maine
Intensively grazed fescue with some thistle

Guide to Identifying Dakota Skipper Habitat



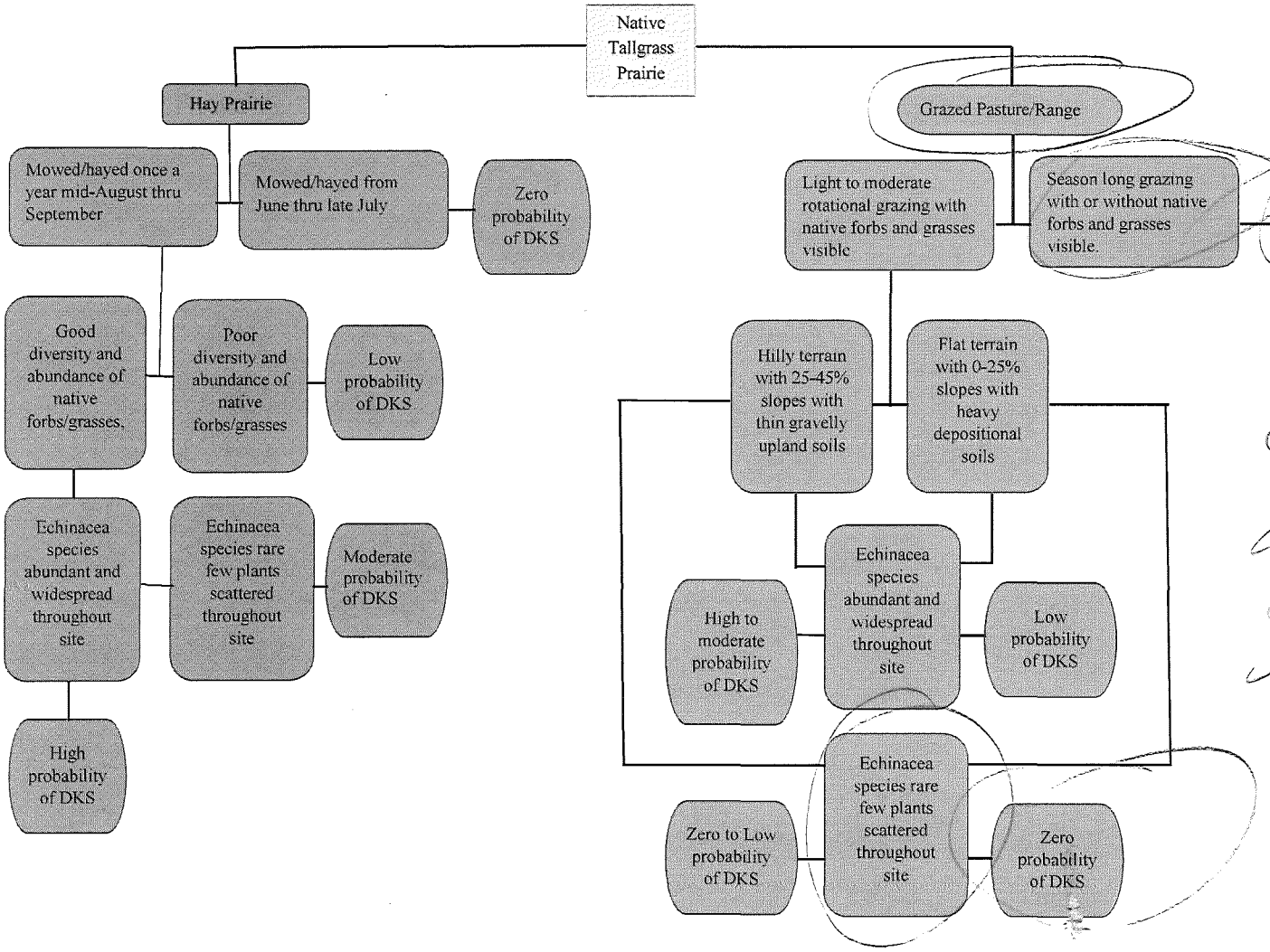
20
J. Maine
Brome and cocklebur, roadside ditch
Non native prairie

Guide to Identifying Dakota Skipper Habitat



FFA-215

Guide to Identifying Dakota Skipper Habitat



very heavy grazing — no presence of echinacea & warm season grasses

FEA - 225

Part fringe cool season grassland, part pasture

Pasture

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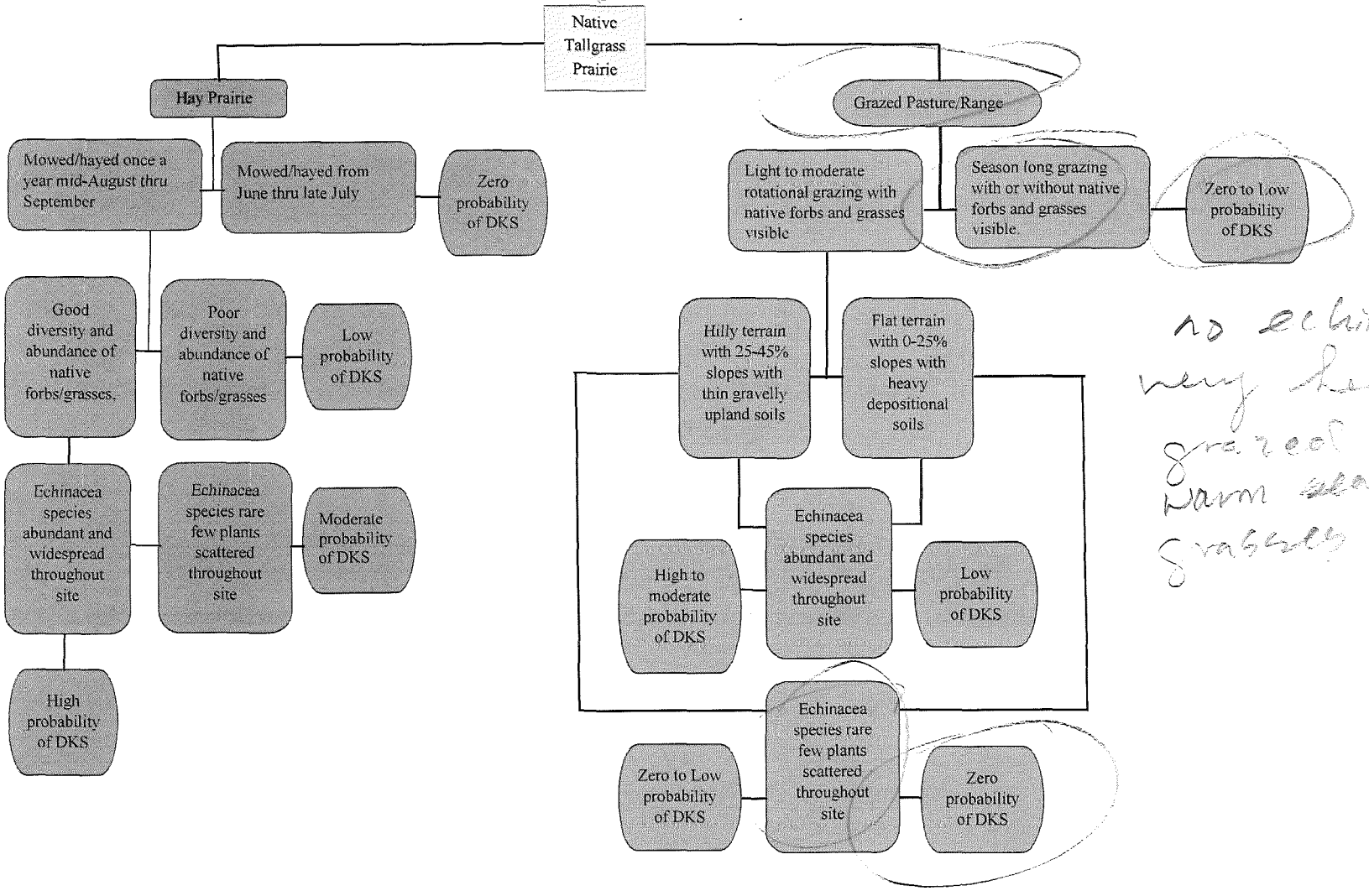

no echinacea — very heavily grazed — no warm season grasses visible.

EFA-235

Not grazed/not mowed

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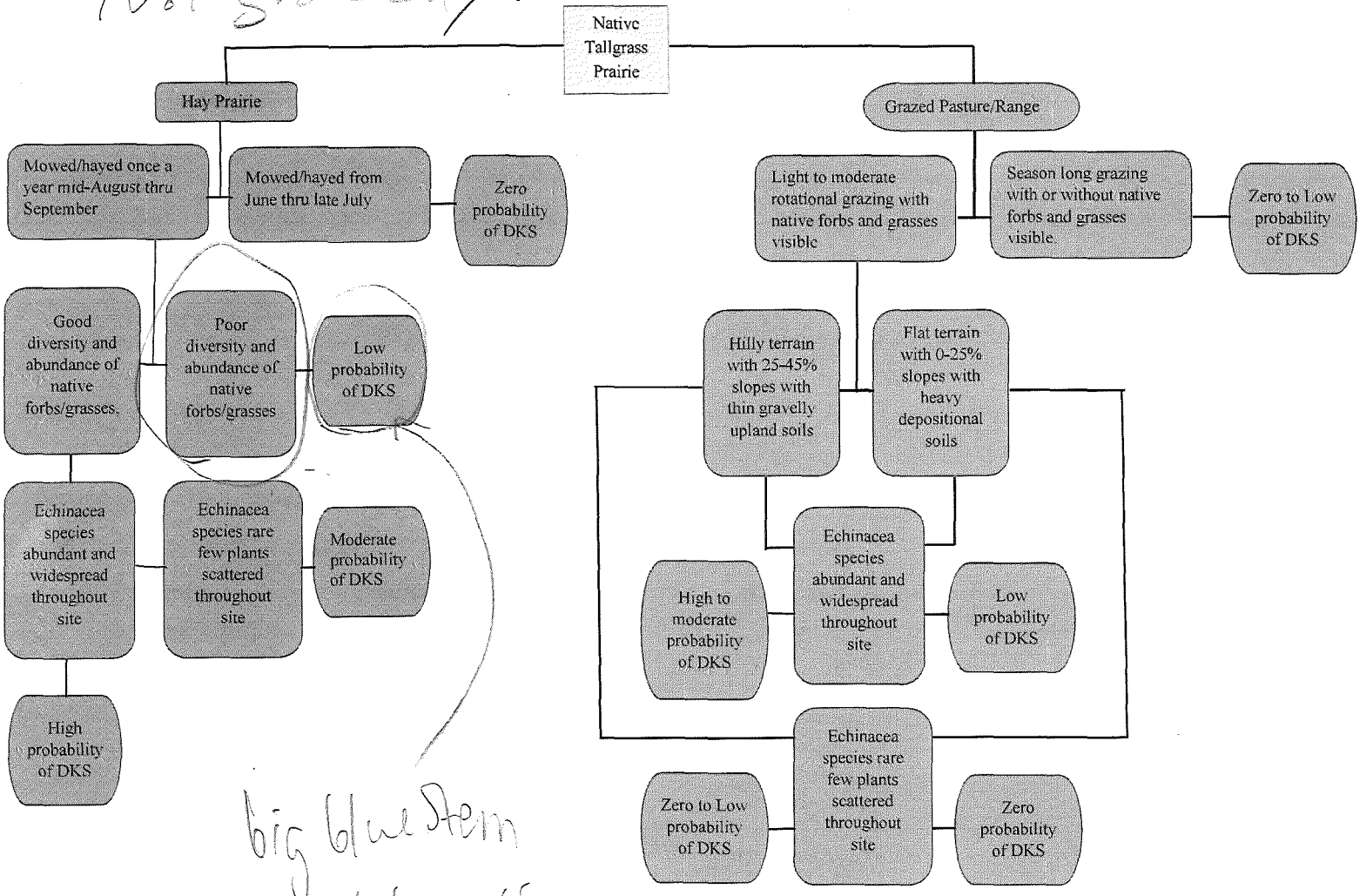

big bluestem
+ switchgrass
dom - flat
area, no echinacea
[illegible] of site.

EFA-245
AB

N/A → cool season brome, fescue, aster dom grassland.

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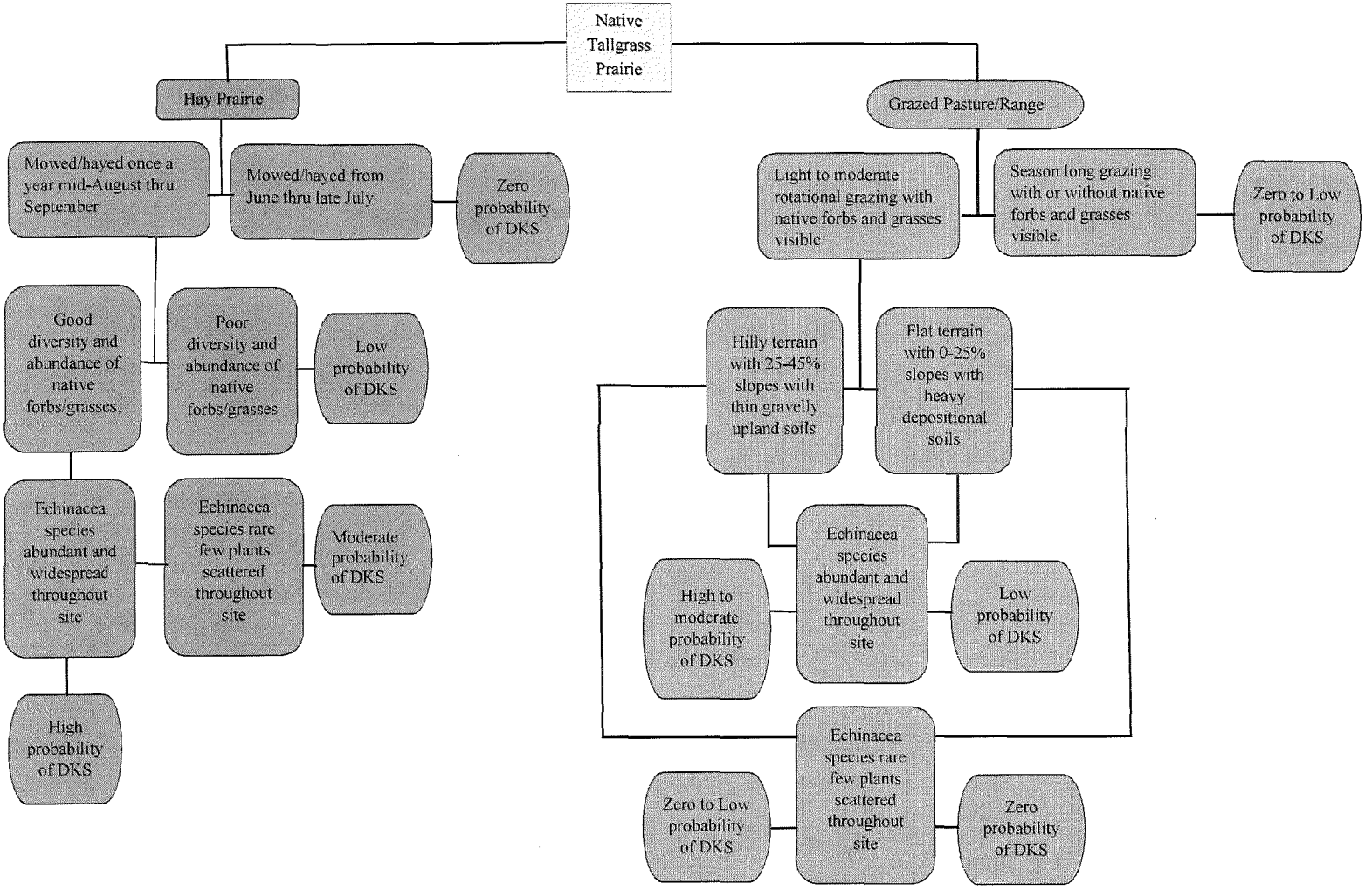

FFA - 25S

N/A → converted to ag land - limited brome in corridor

AB

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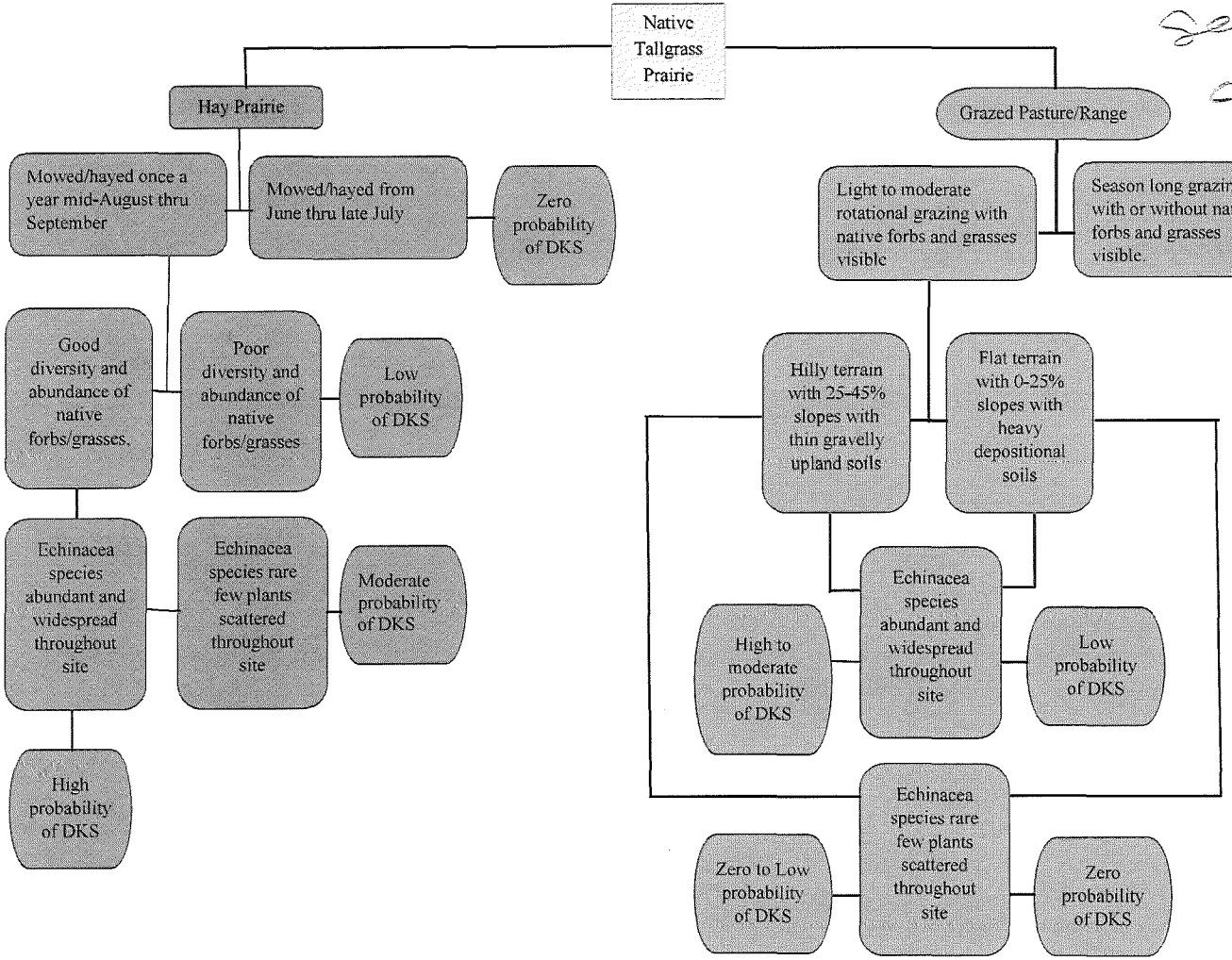
general area converted to row cropping



AFA-265

N/A → wetland area, dominated by prairie cordgrass, reed, cattails. upland areas dominated by smooth brome

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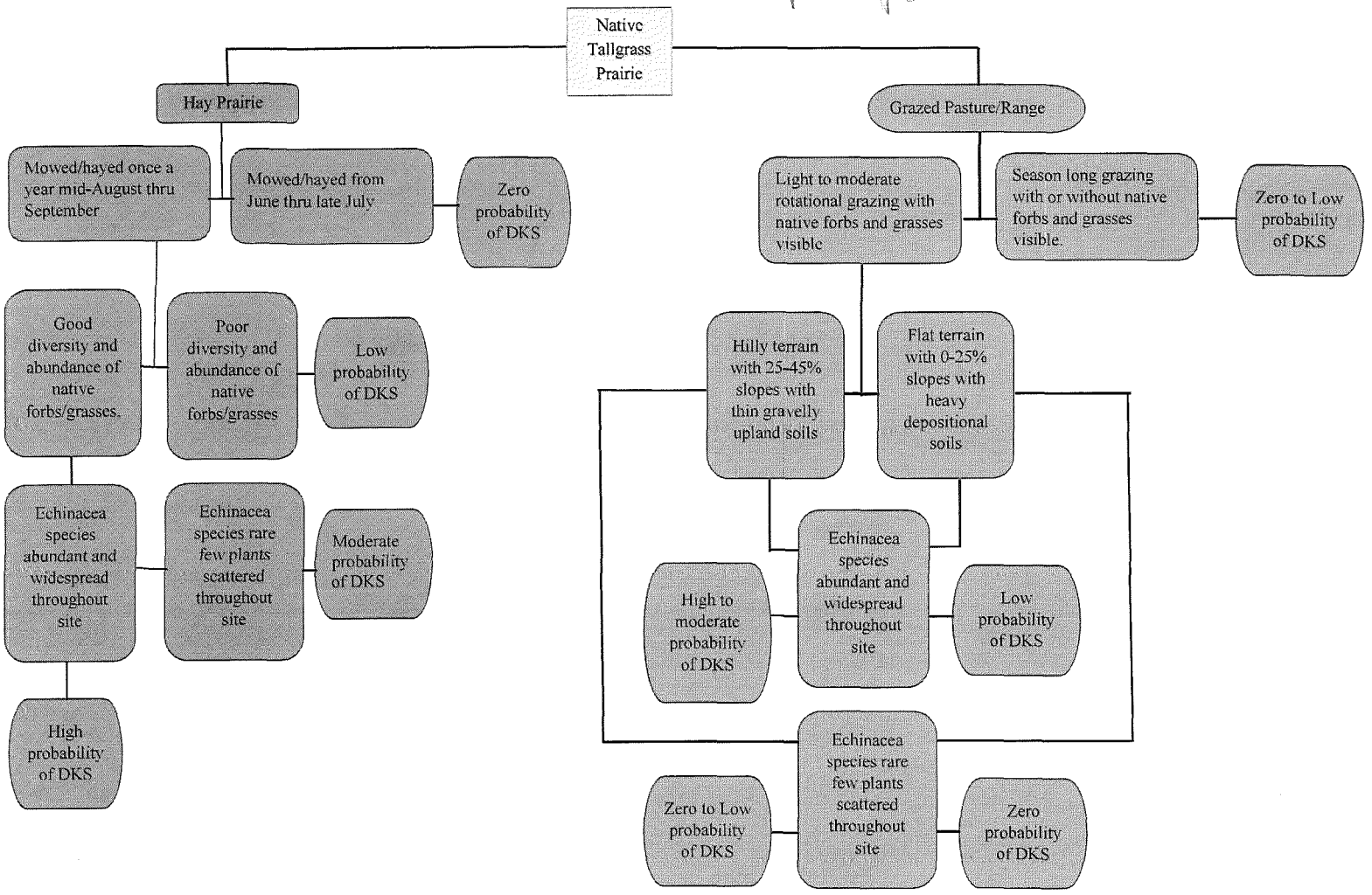
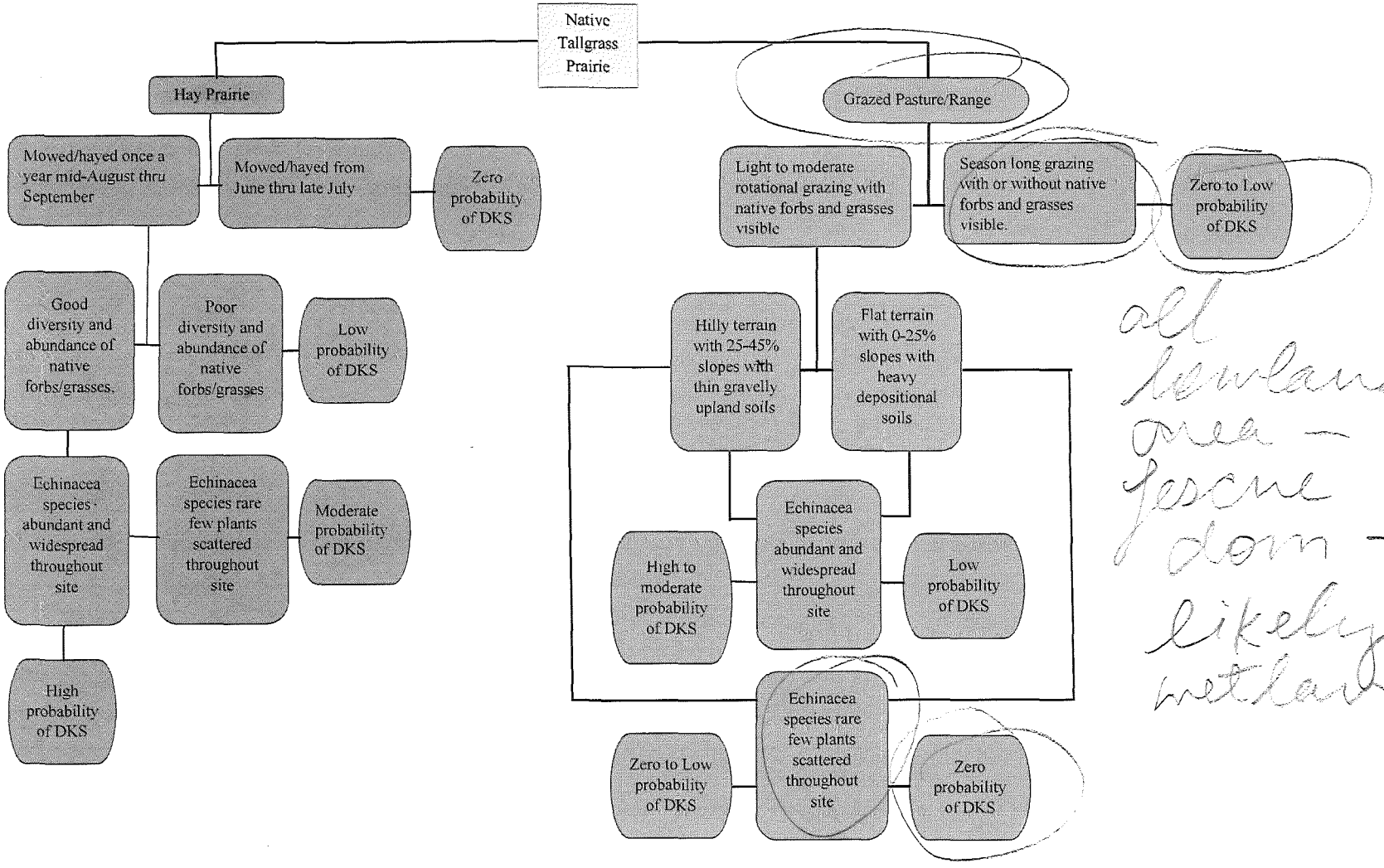


FFA-275
AB

Guide to Identifying Dakota Skipper Habitat

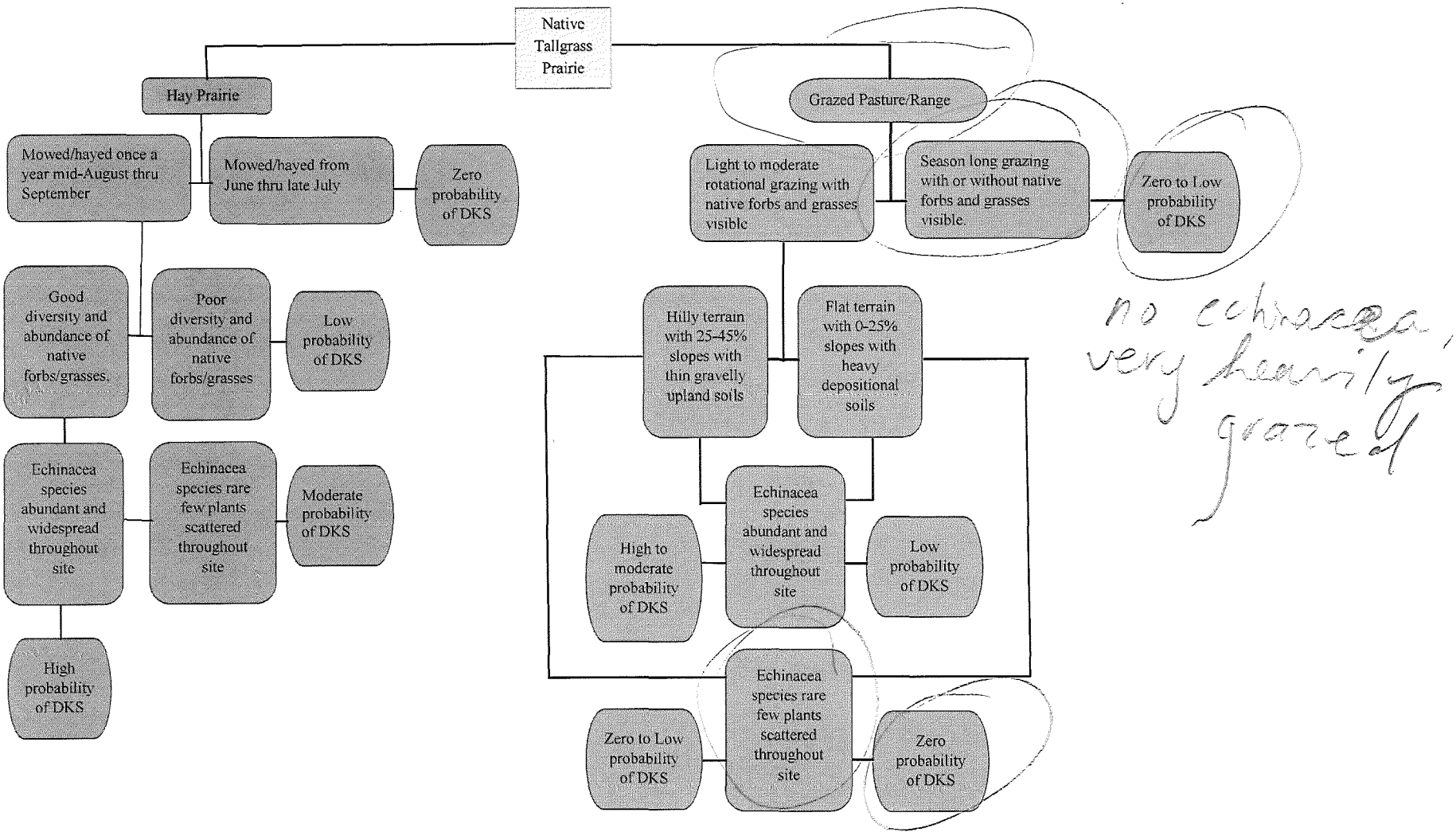


old lowland area — Jessene dom — likely wetland?

AEA-265

AB

Guide to Identifying Dakota Skipper Habitat



no echinacea, very heavily grazed

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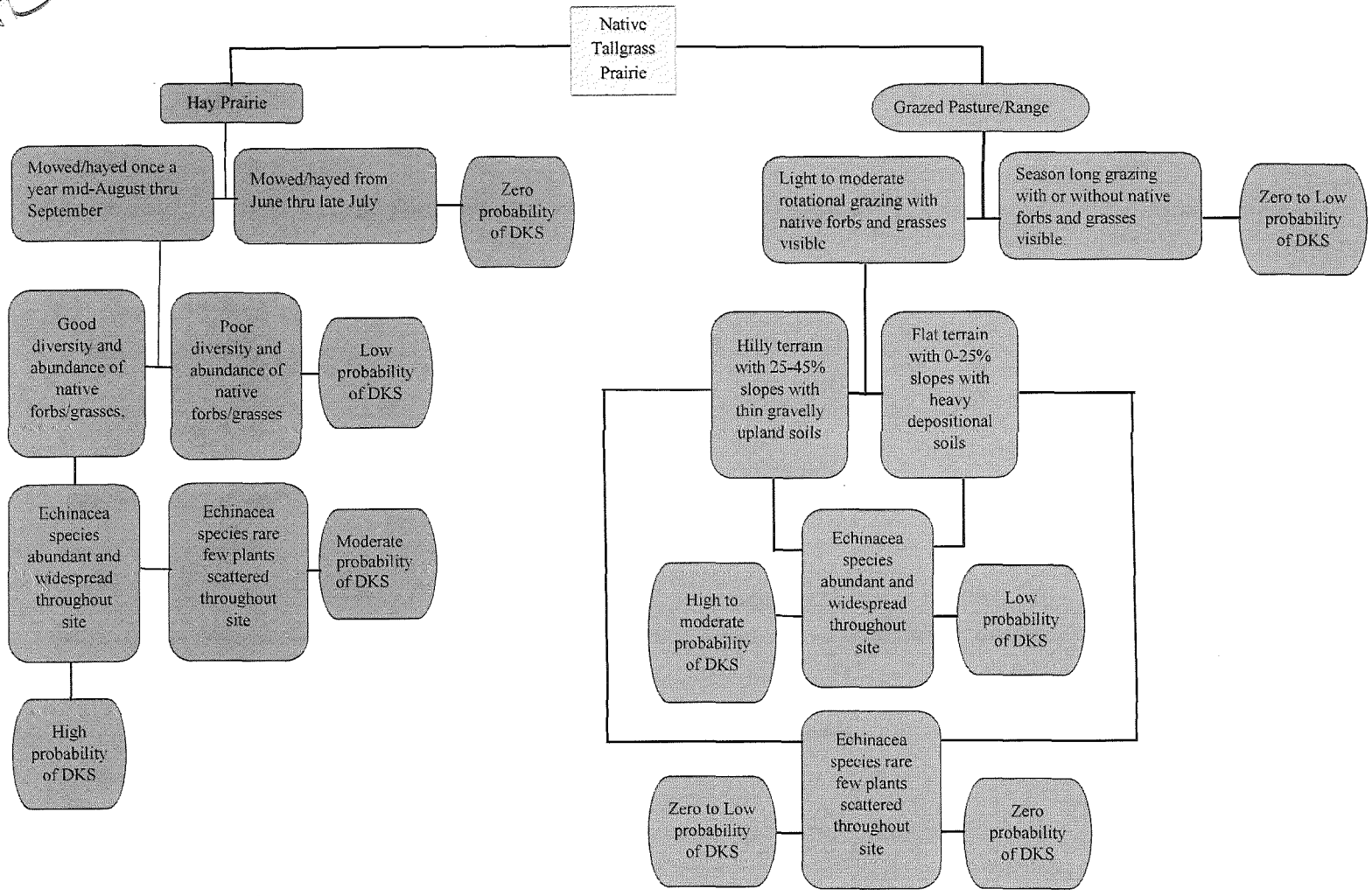

Arden Brewer
EFA-305 → N/A
prime - cool season

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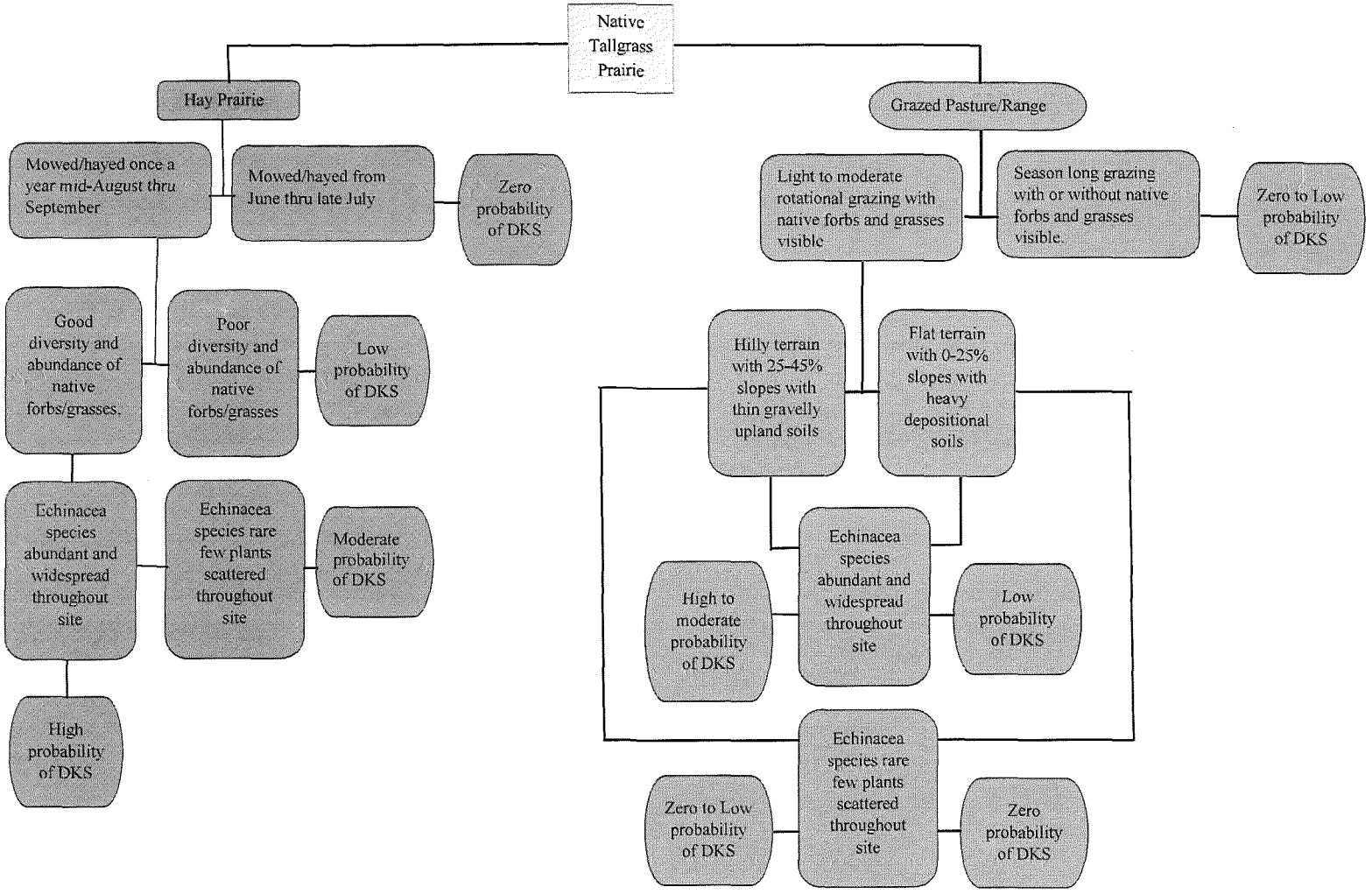

AFA
31-5
Arden Brewer

N/A ⇒ brome/fescue dom ⇒ cool season

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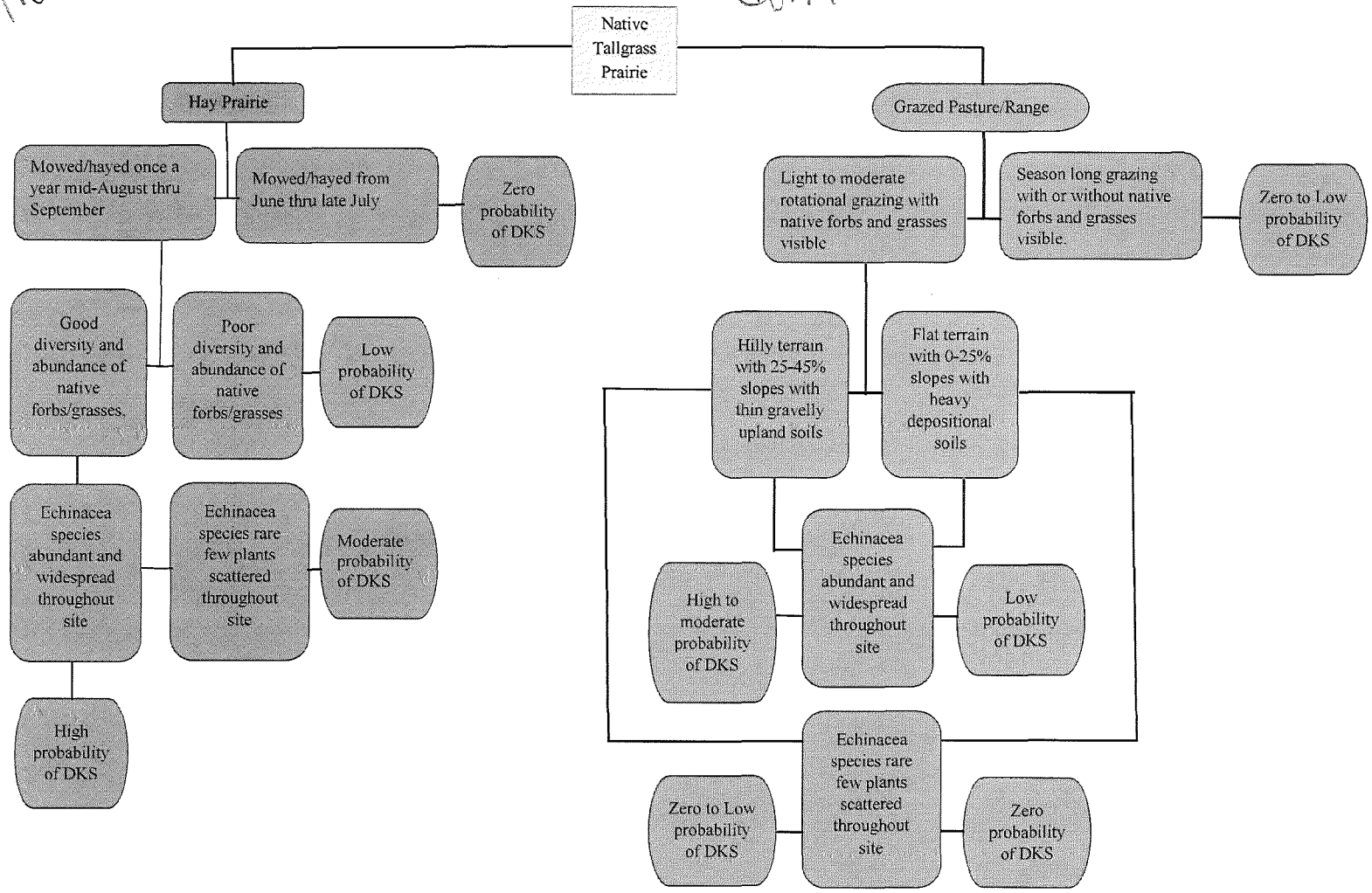

FFA-325

AB

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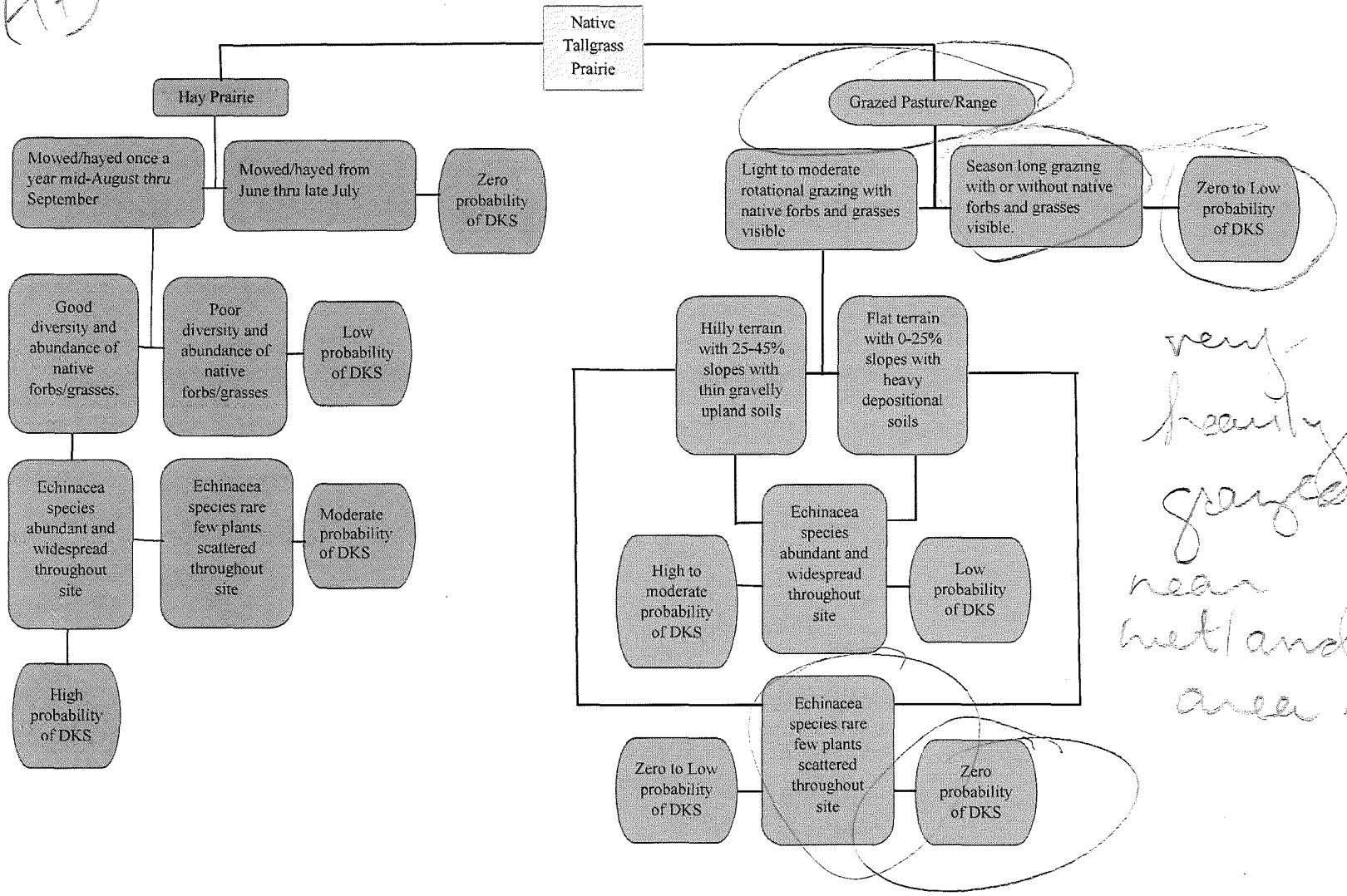

very heavily grazed — near wetland area.

FFA-335
AB

U/A → heavily disturbed no warm season grasses present. bromedom

dump in middle of pasture area.

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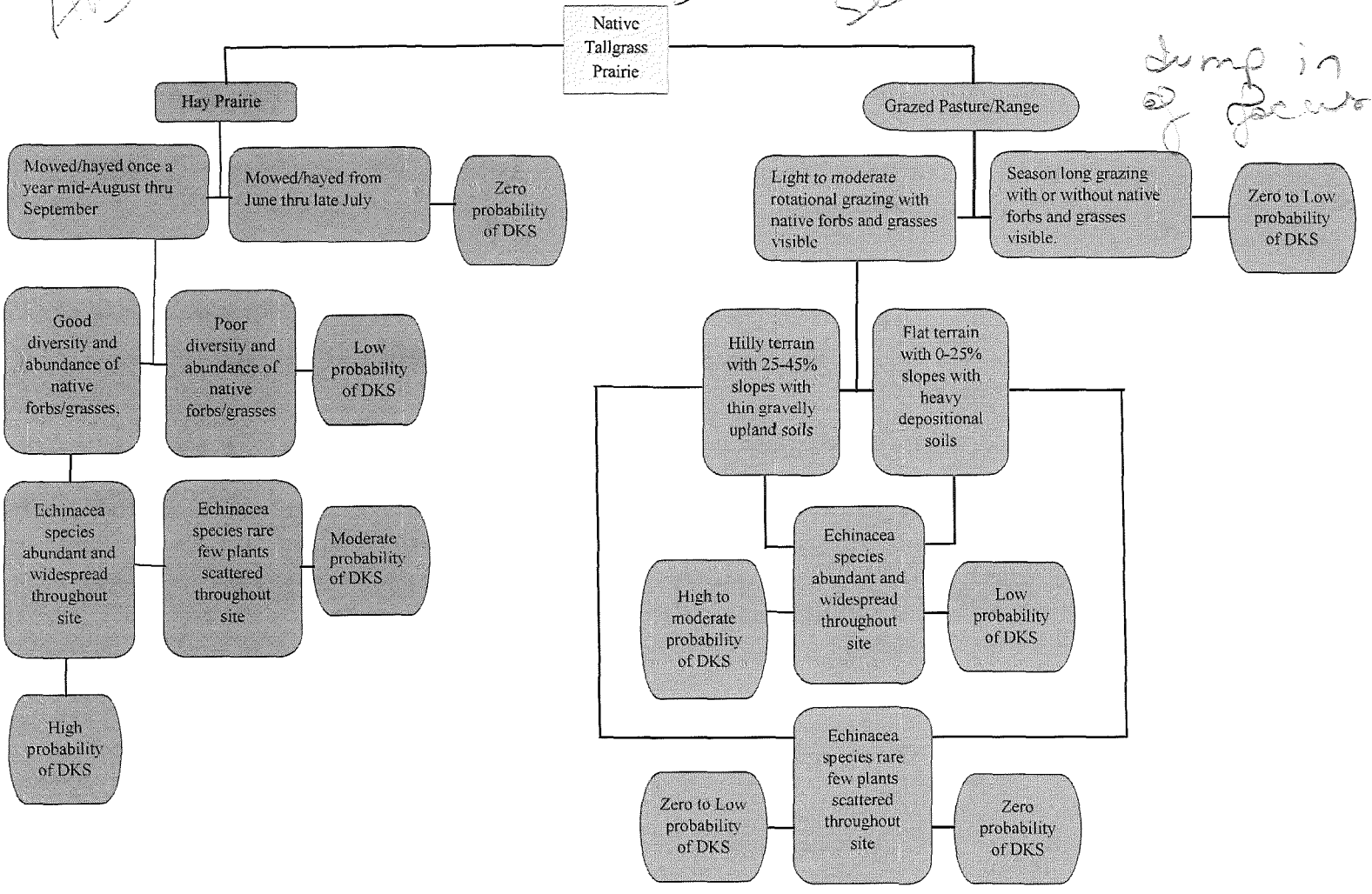

34
J. Mahr
Reed canary grass
wetland

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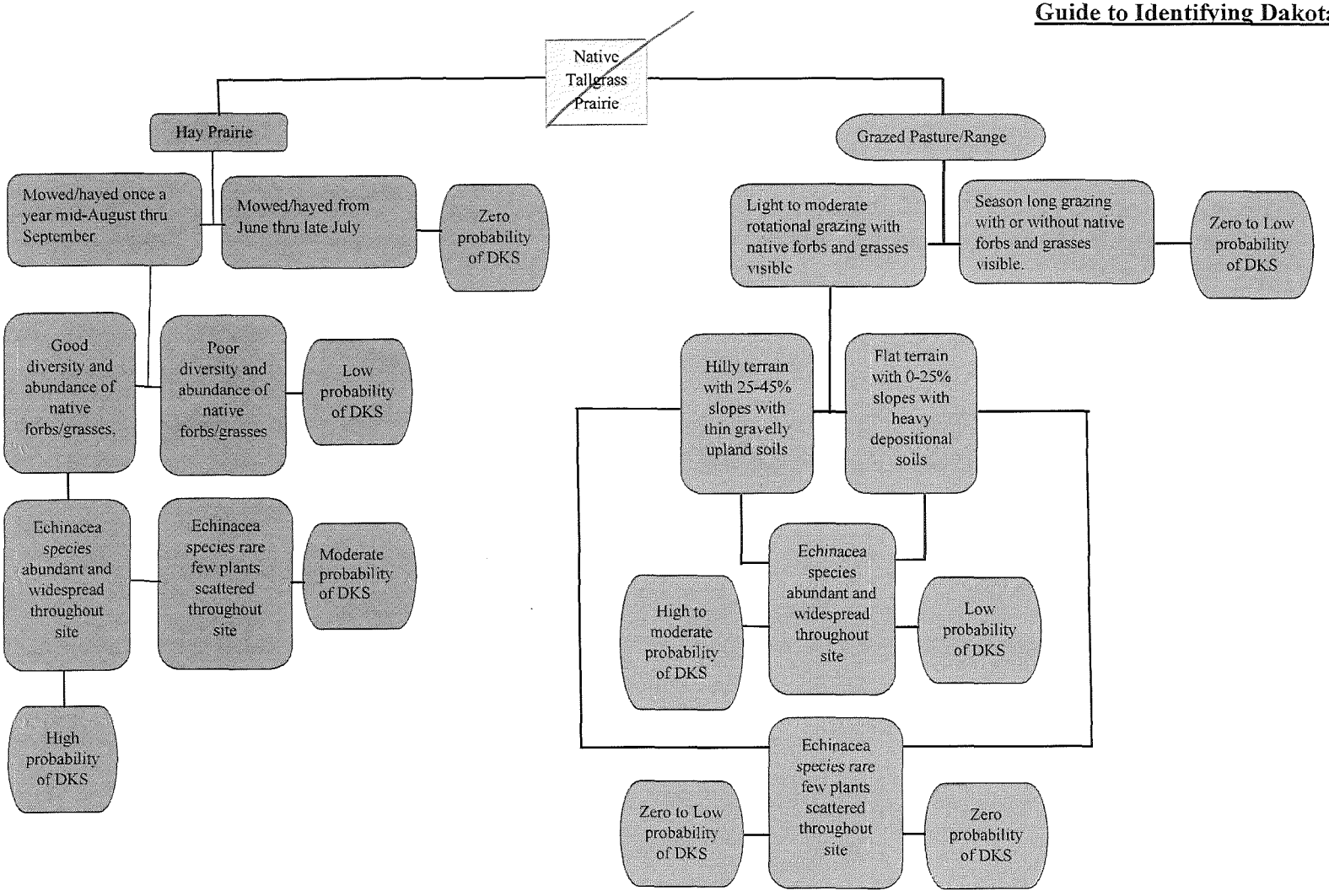

35
J. Maine
Reed canary grass wetland

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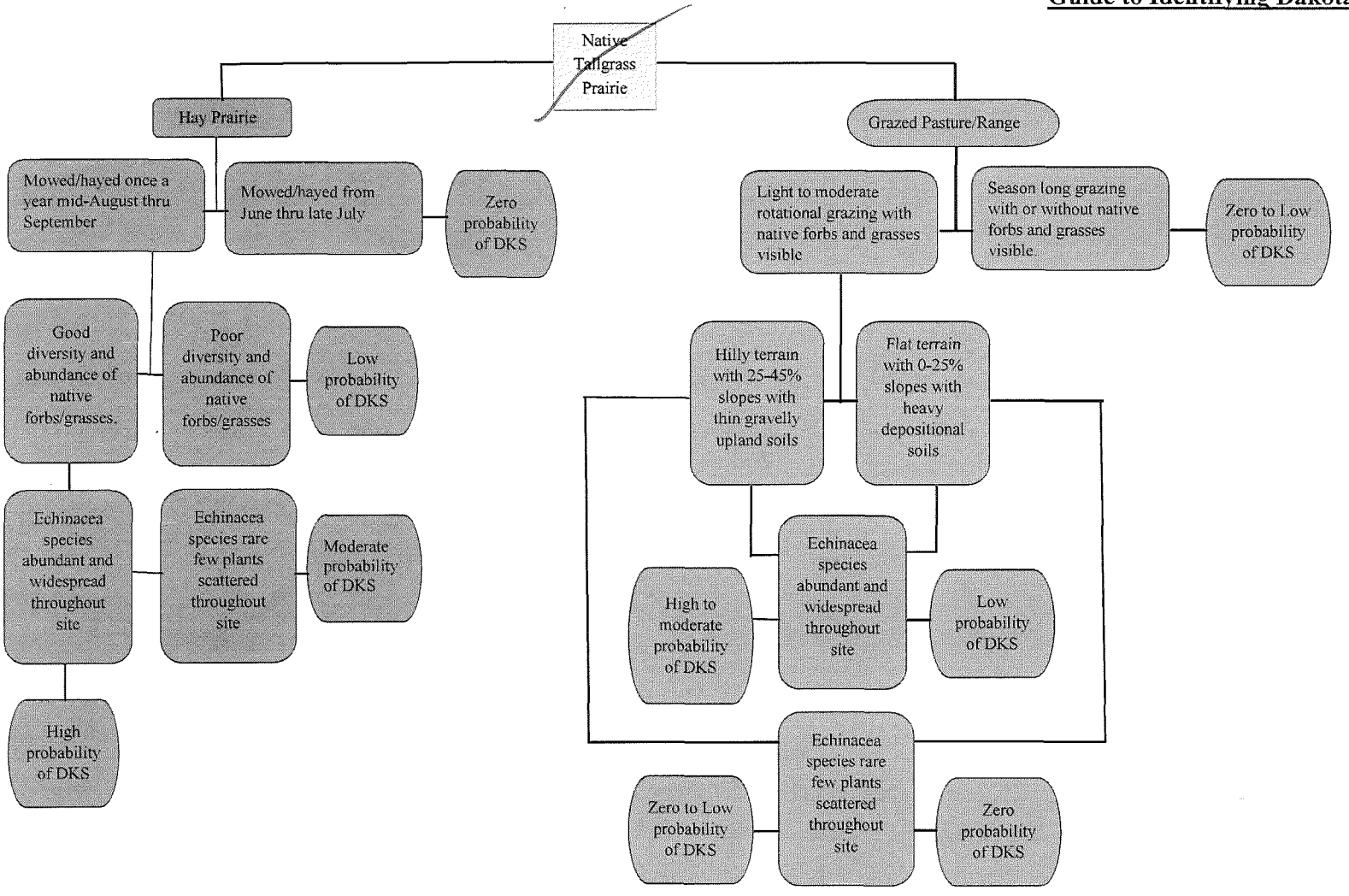
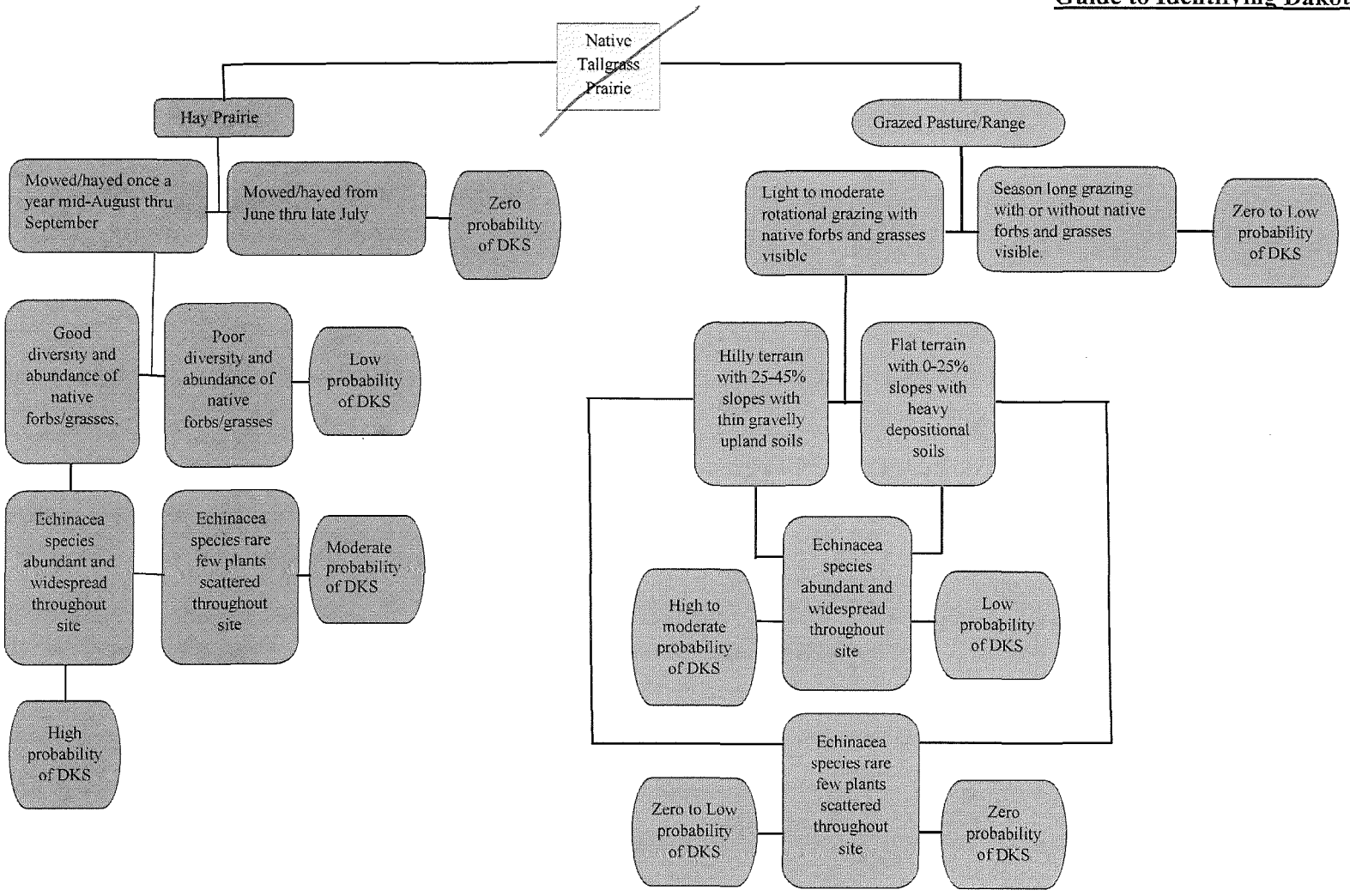


36
J. Maine
Reed canary grass
wetland

Guide to Identifying Dakota Skipper Habitat



FFA-375
Arden Brower

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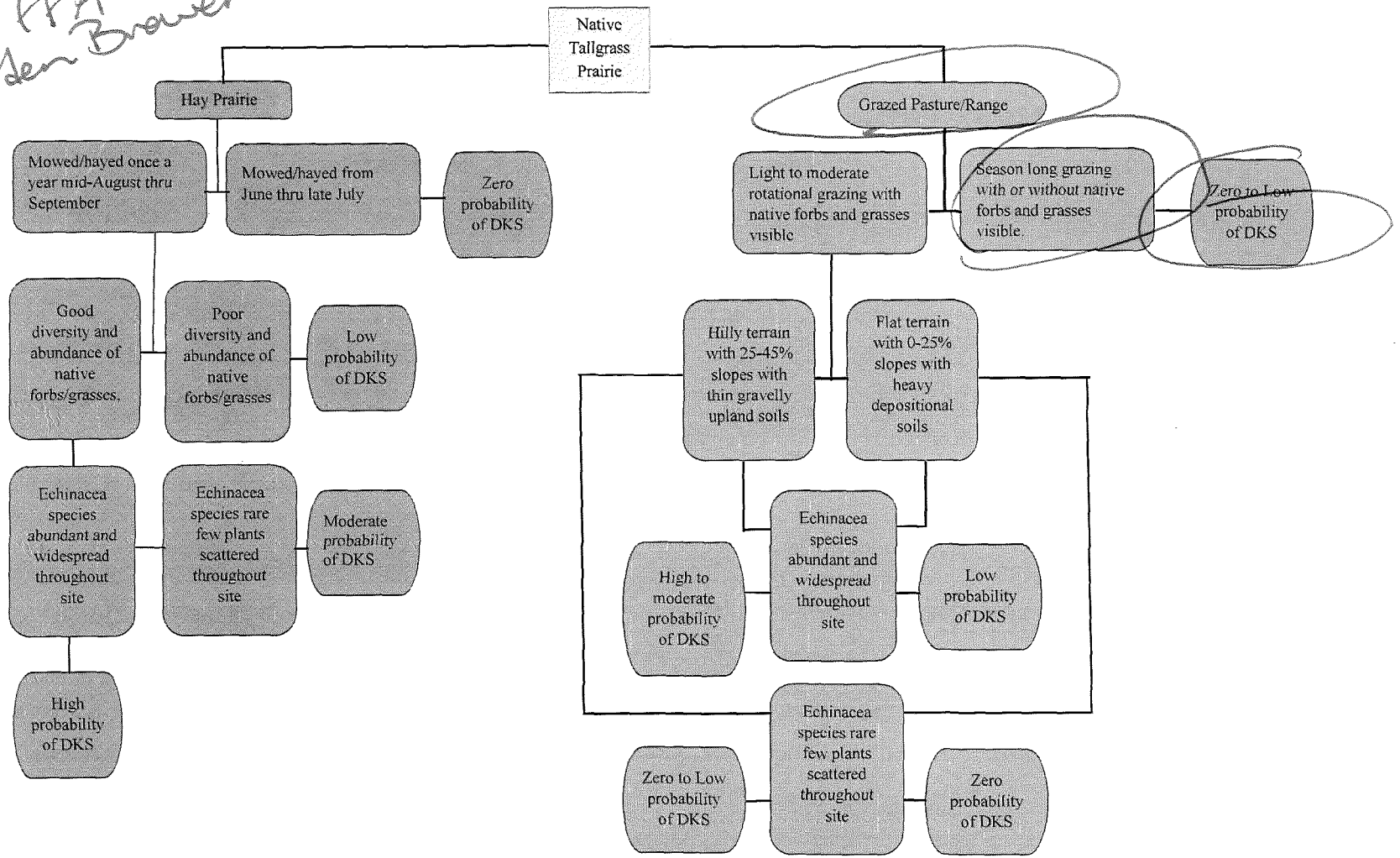

FFA - 385

Arden Brewer

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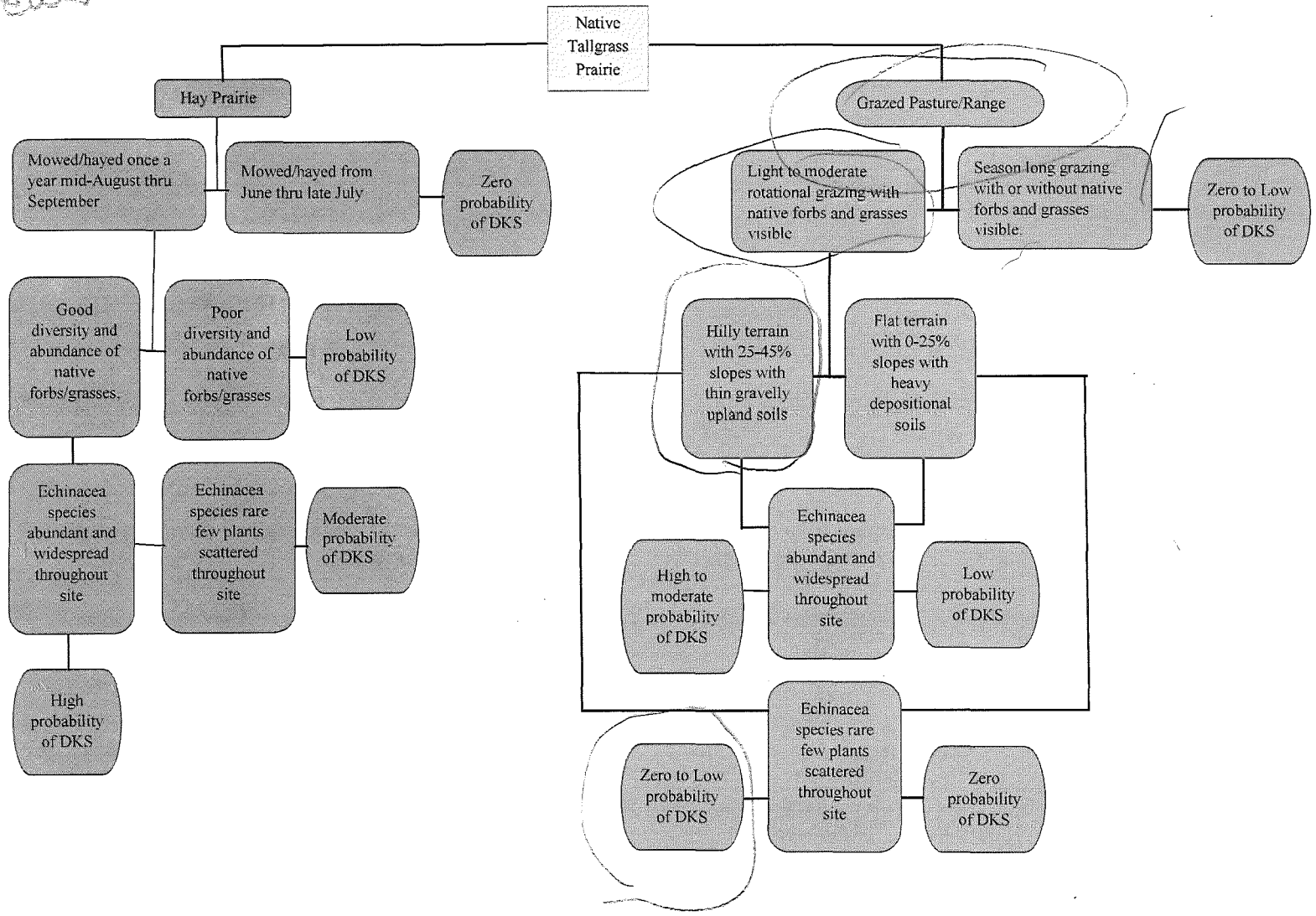
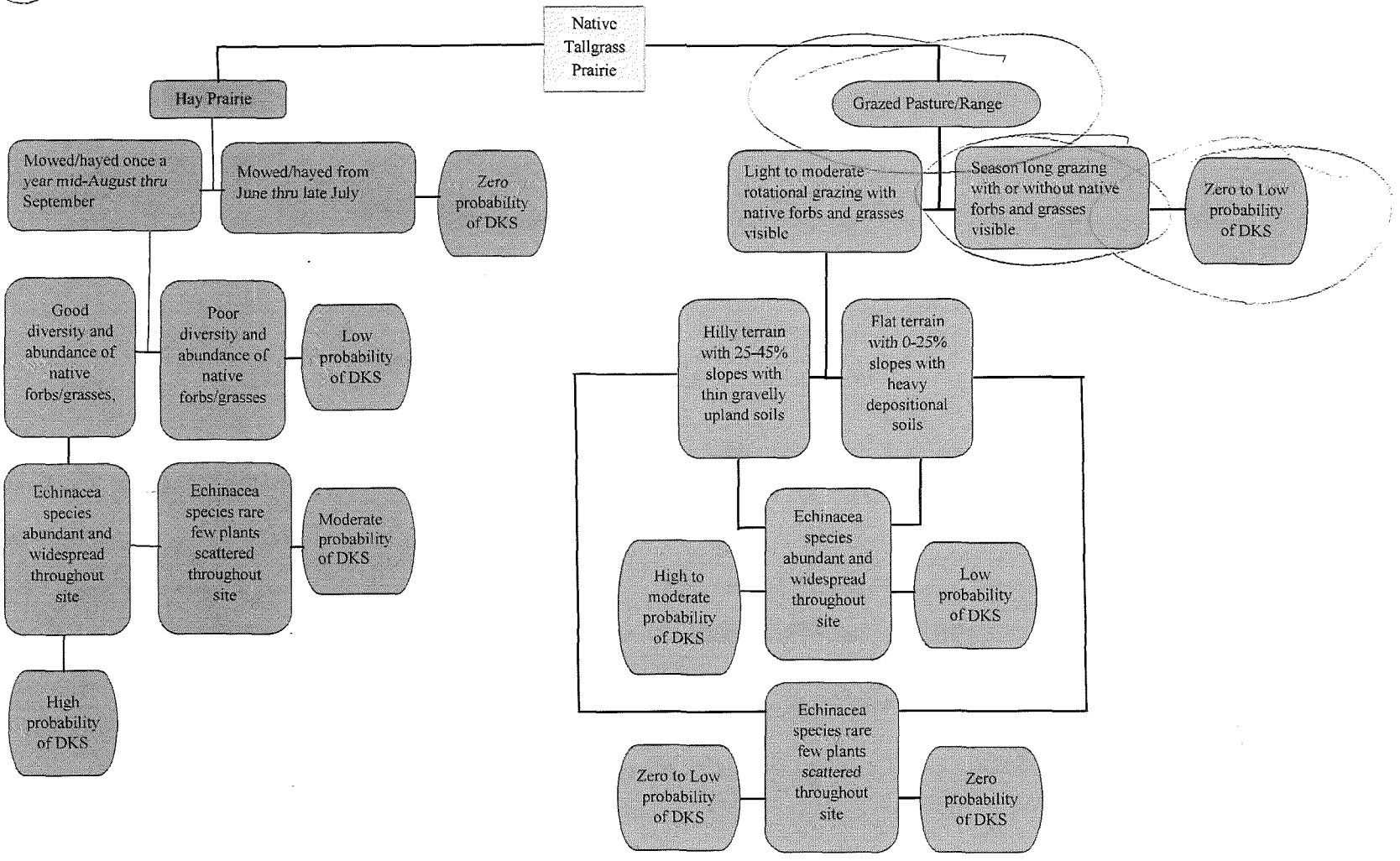


FFA-395

Arden Brewer

Guide to Identifying Dakota Skipper Habitat



AR-405
AR

N/A → majority unstocked cool season grass/forb dom. Switchgrass

not → present but no Echinacea

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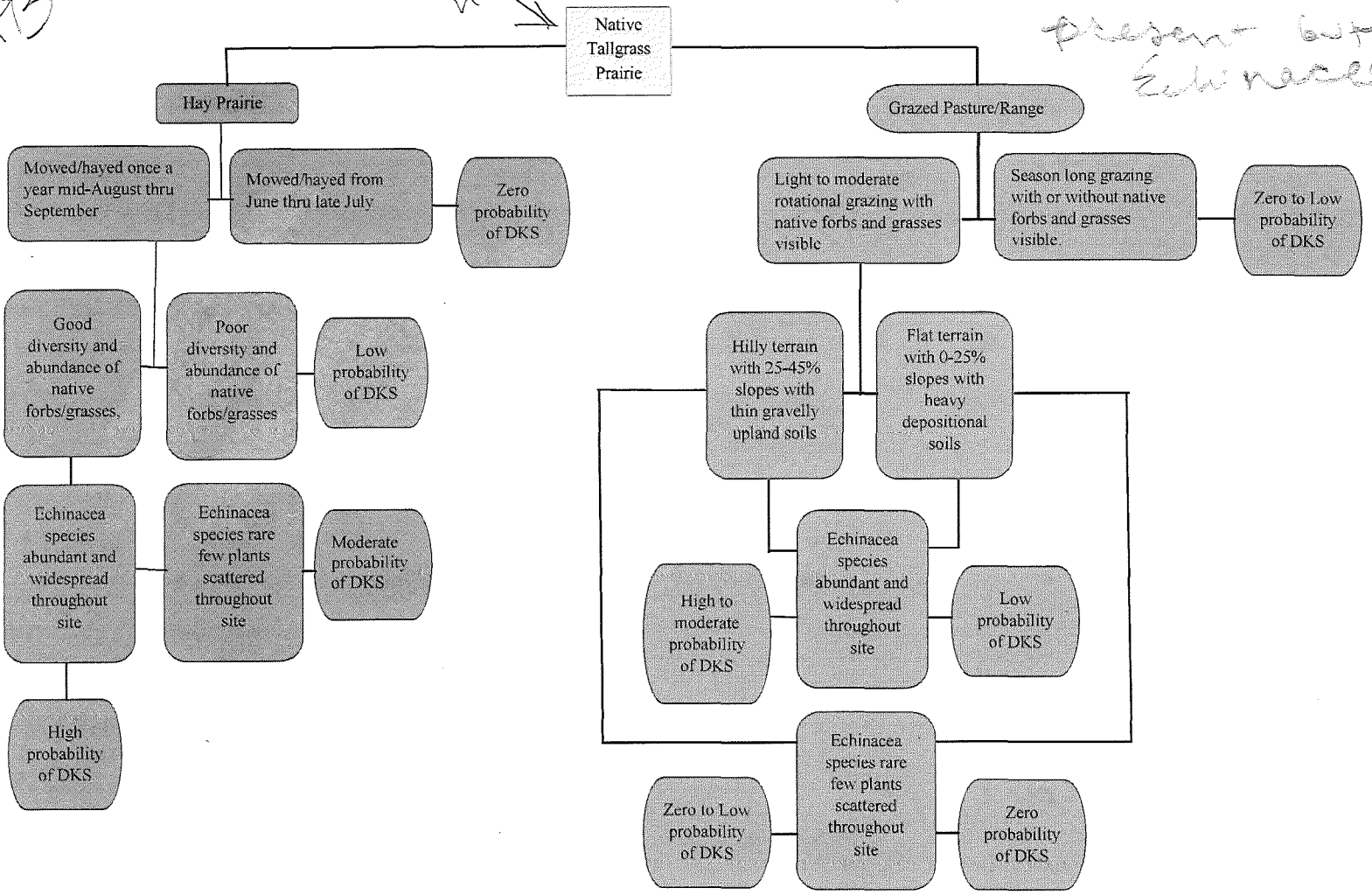

FCA-415
Arden Brewer

N/A → not suitable — wetland species + adjacent brome dom cool season grassland

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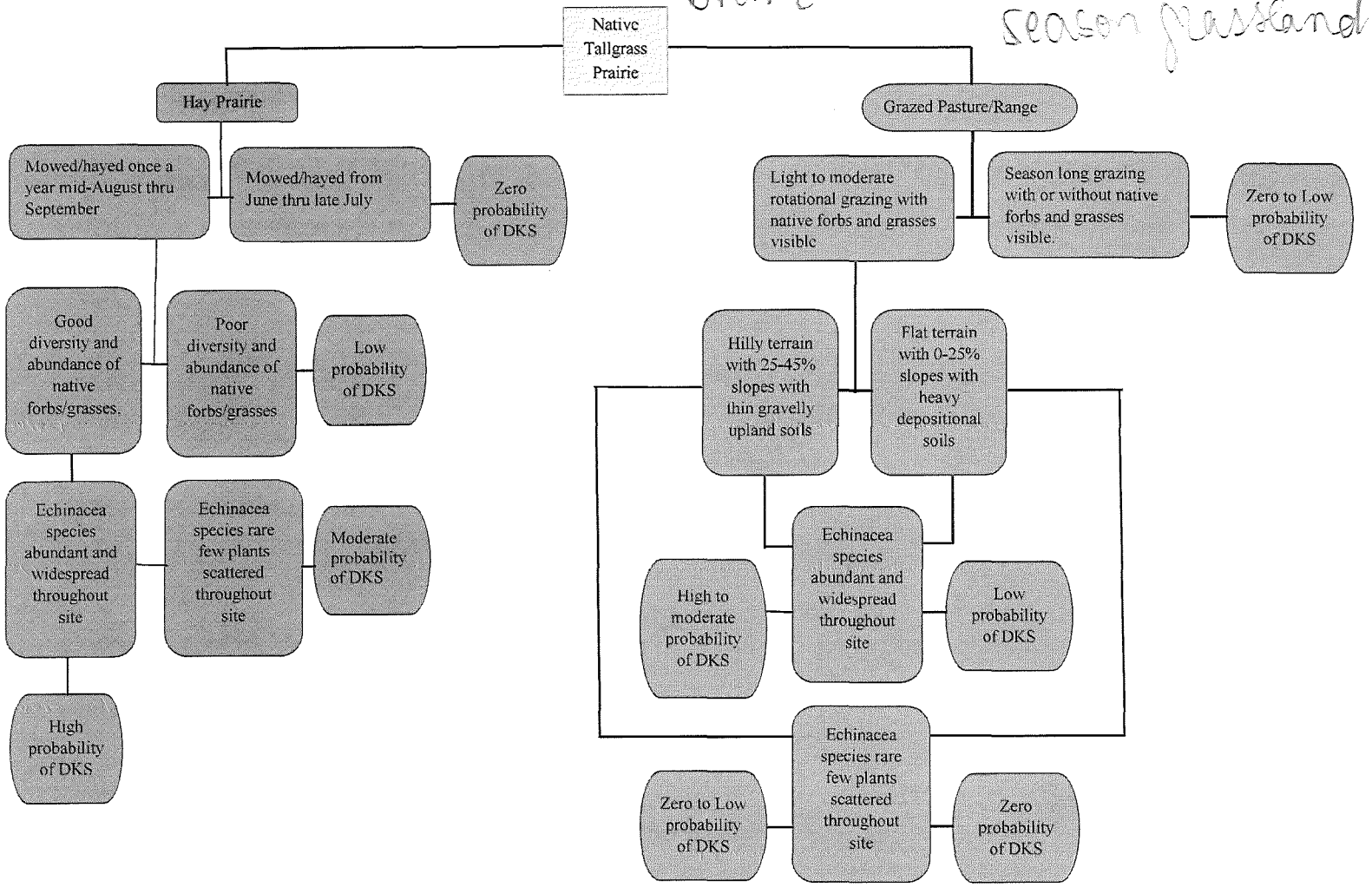
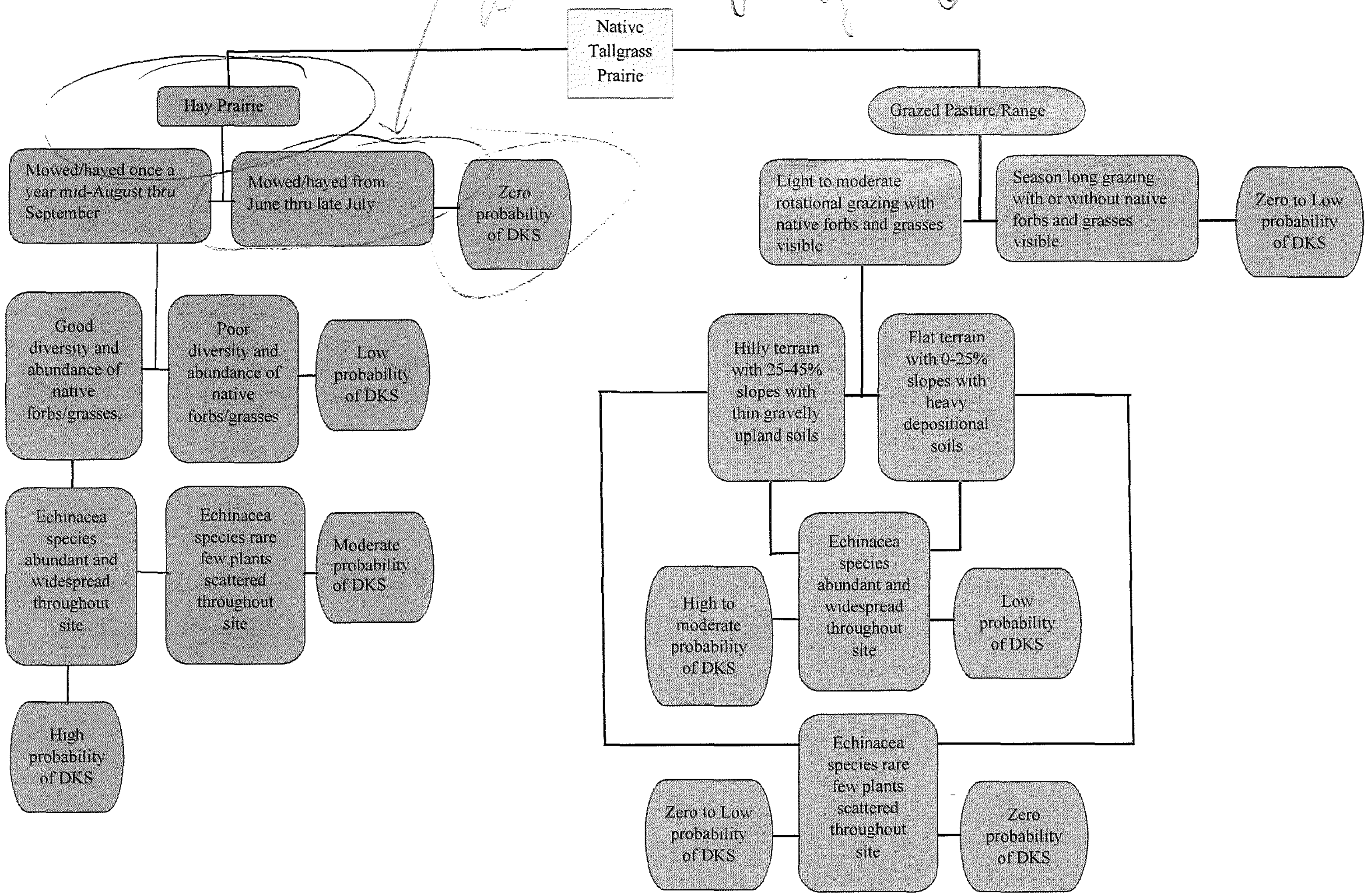


AFA - 42S.
Arden Brewer

Check this on actual presence of warm season — fescue/brome dom

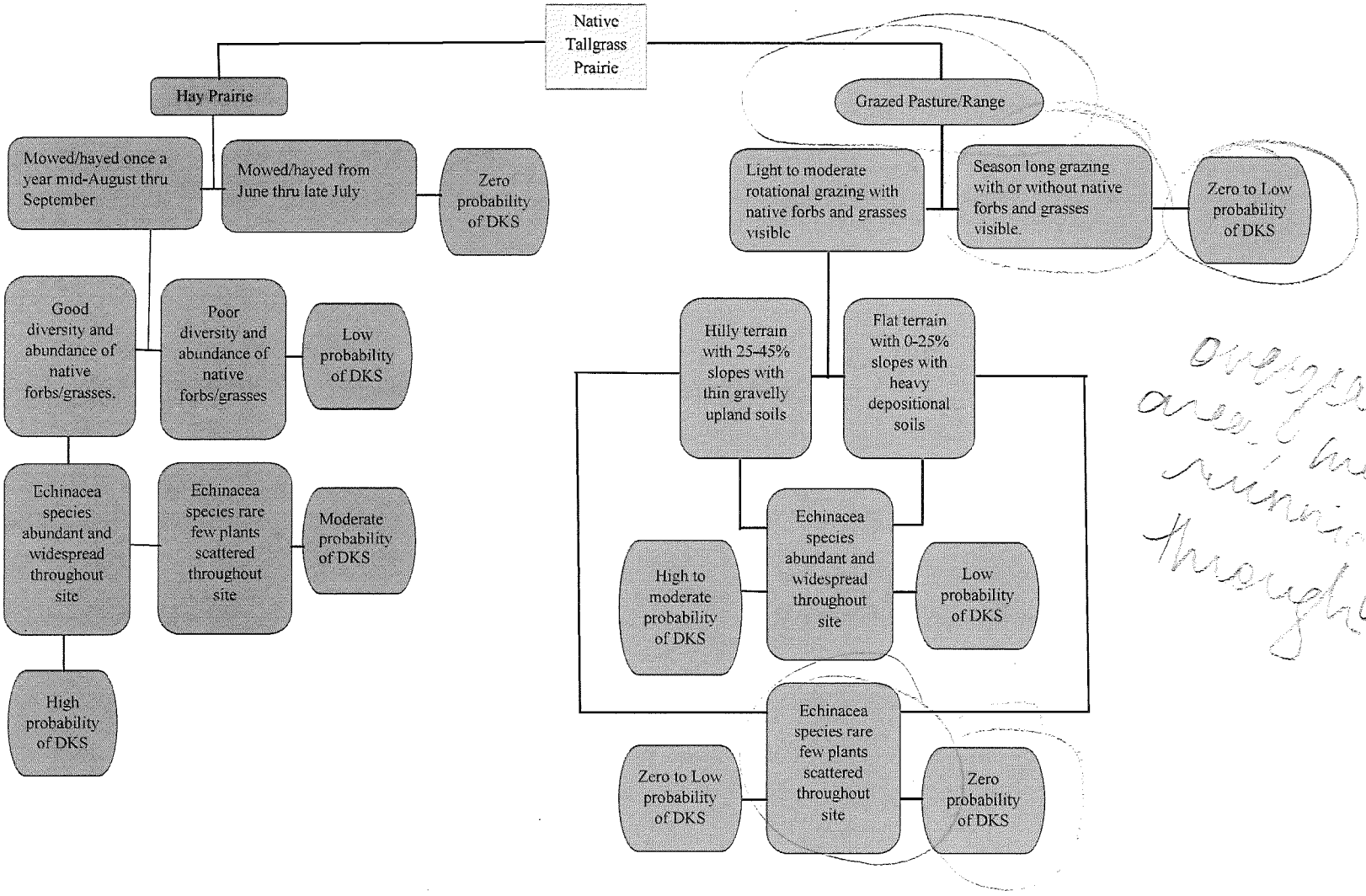
Guide to Identifying Dakota Skipper Habitat



FFA-435

AB

Guide to Identifying Dakota Skipper Habitat



overgrazed area, wetland running through

FFA-445

Amber Brewer

N/A → lowland area bordered by Grove — no warm season plants - host native tallgrass prairie

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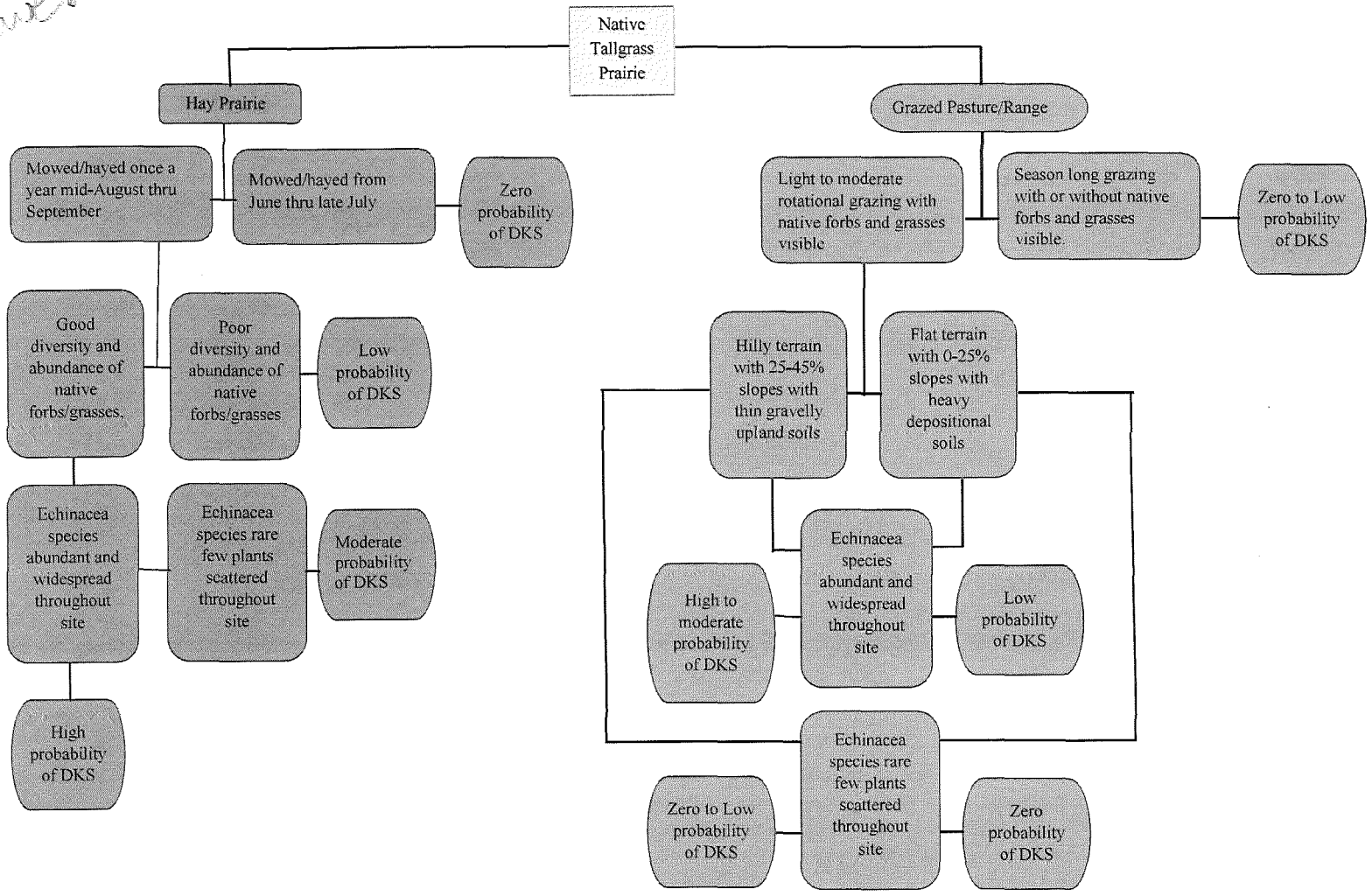
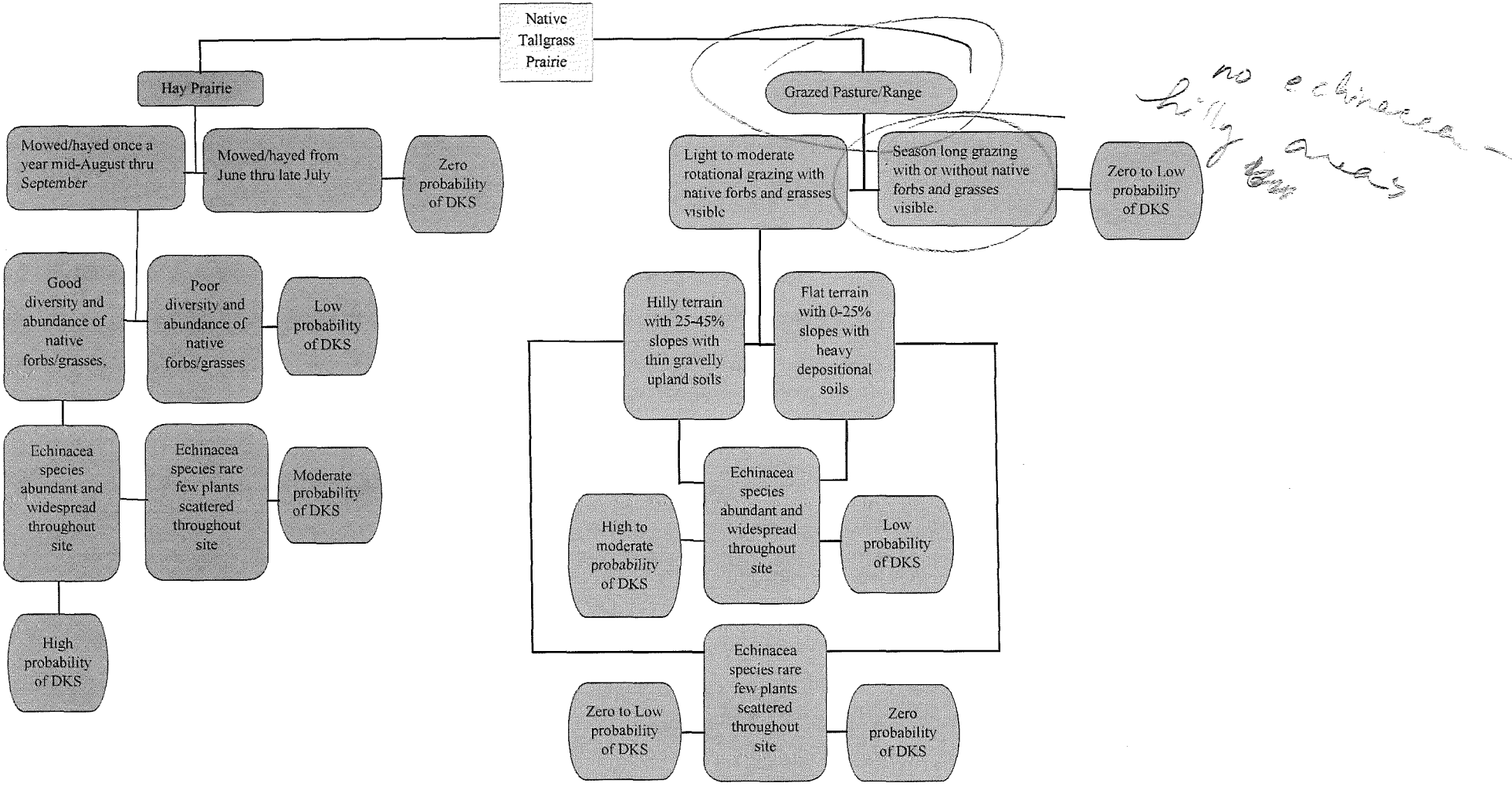


AA-455

AB

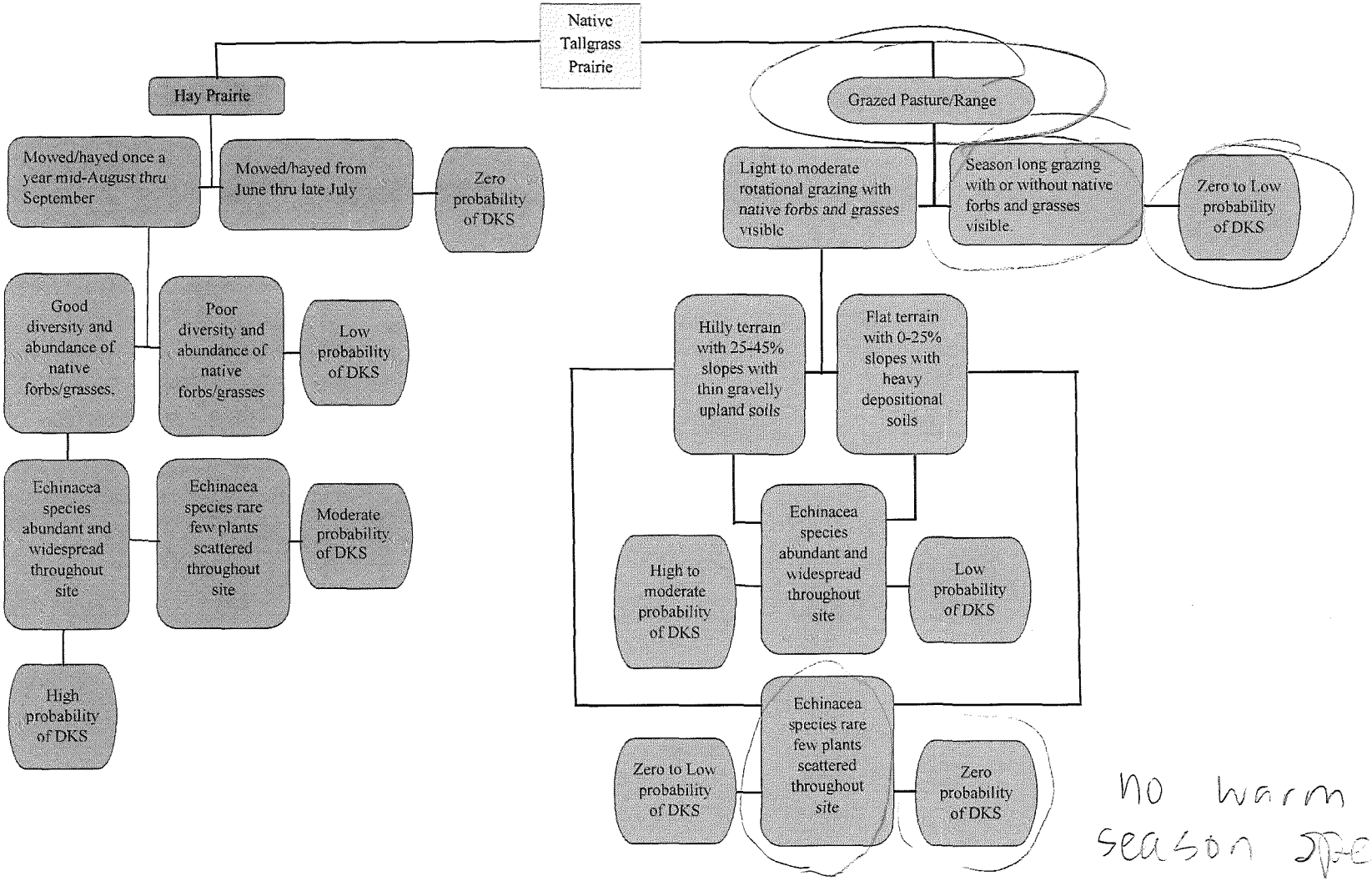
Guide to Identifying Dakota Skipper Habitat



FFA-465

AB

Guide to Identifying Dakota Skipper Habitat

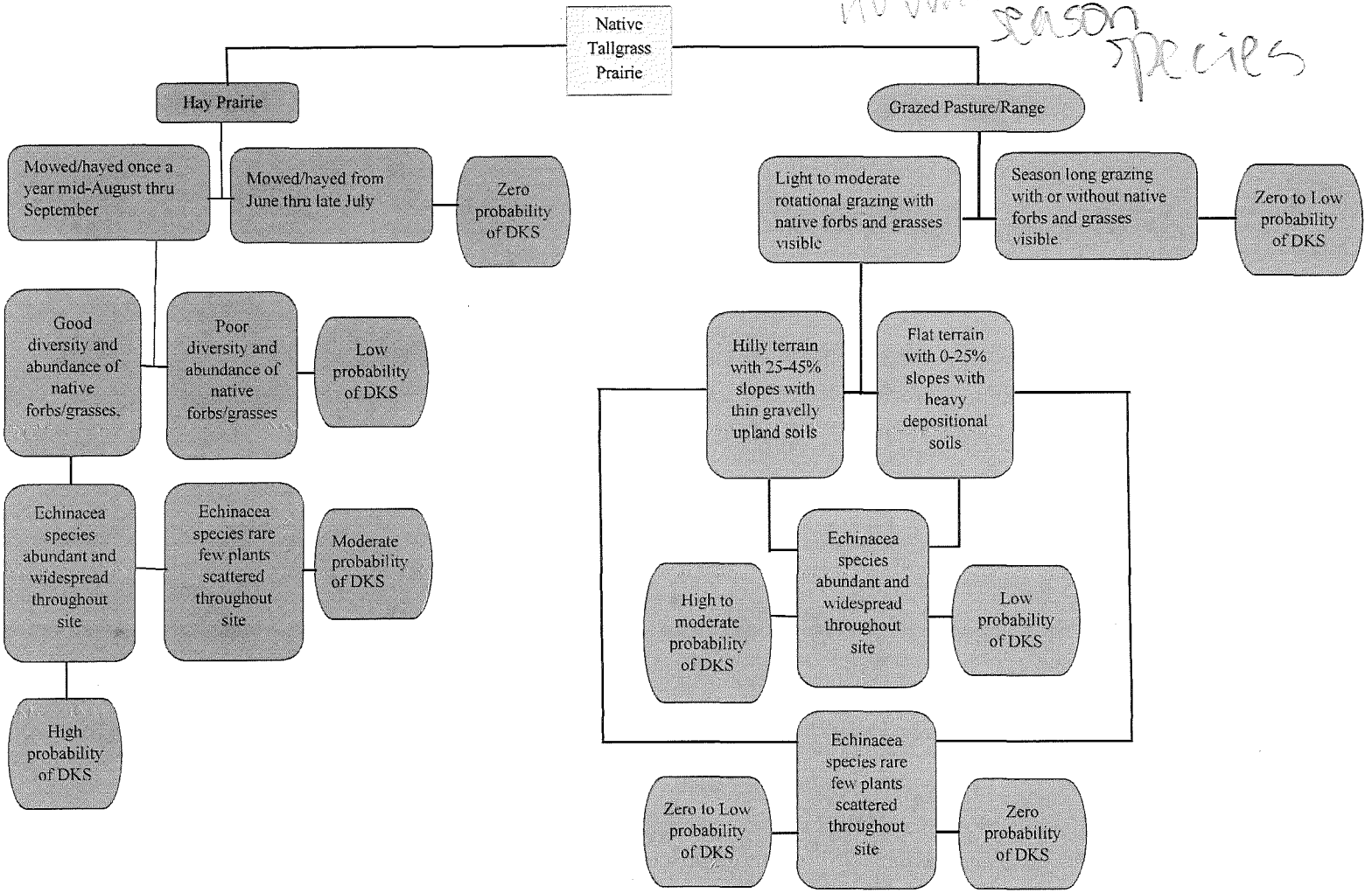


no warm season species.

FFA-475
AB

N/A → wetland species - lowland area - no warm season species

Guide to Identifying Dakota Skipper Habitat

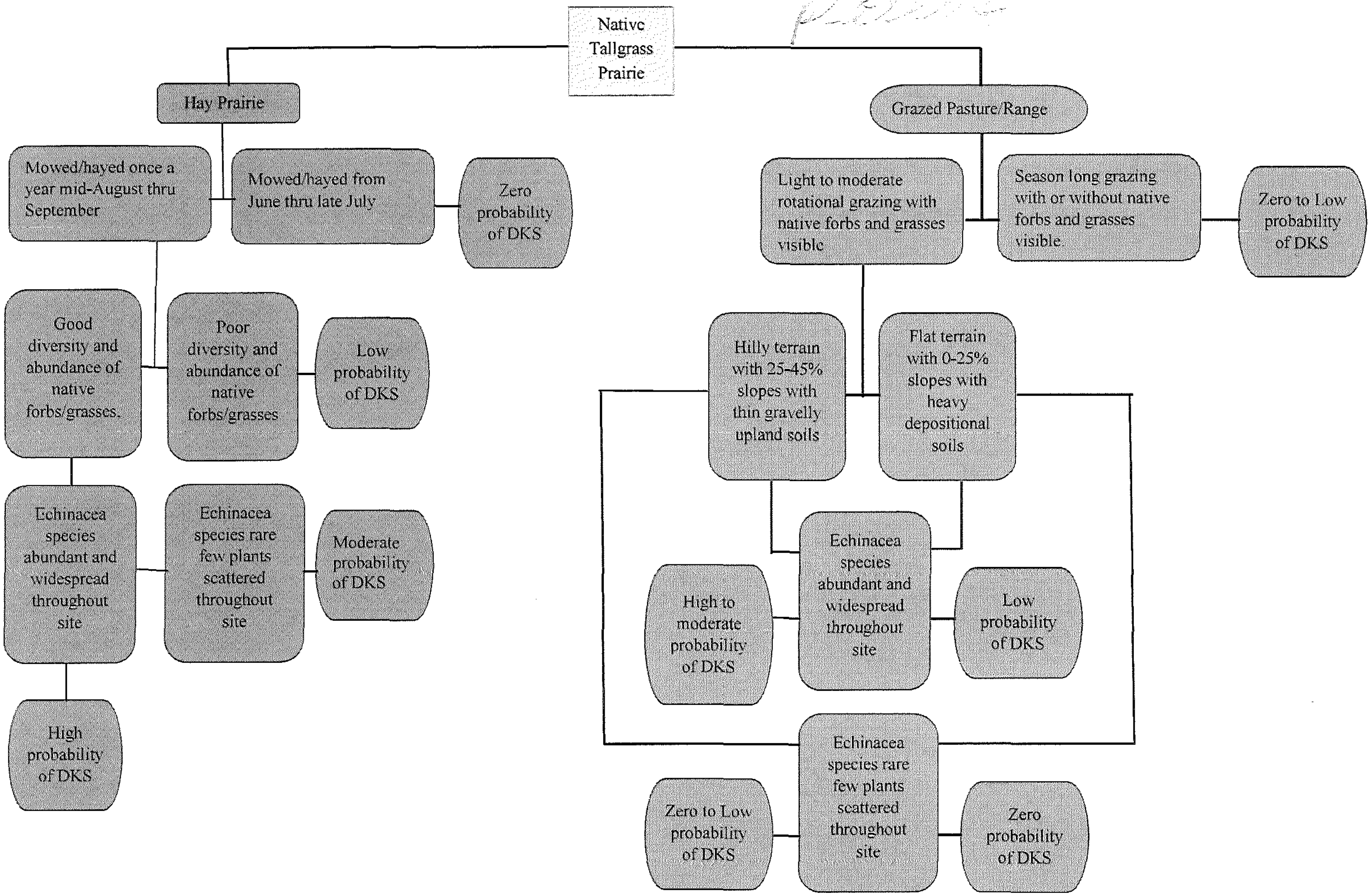


FFA-485
Arden Brewer

mowed/hayed

N/A fescue dom – no warm season grass present

Guide to Identifying Dakota Skipper Habitat

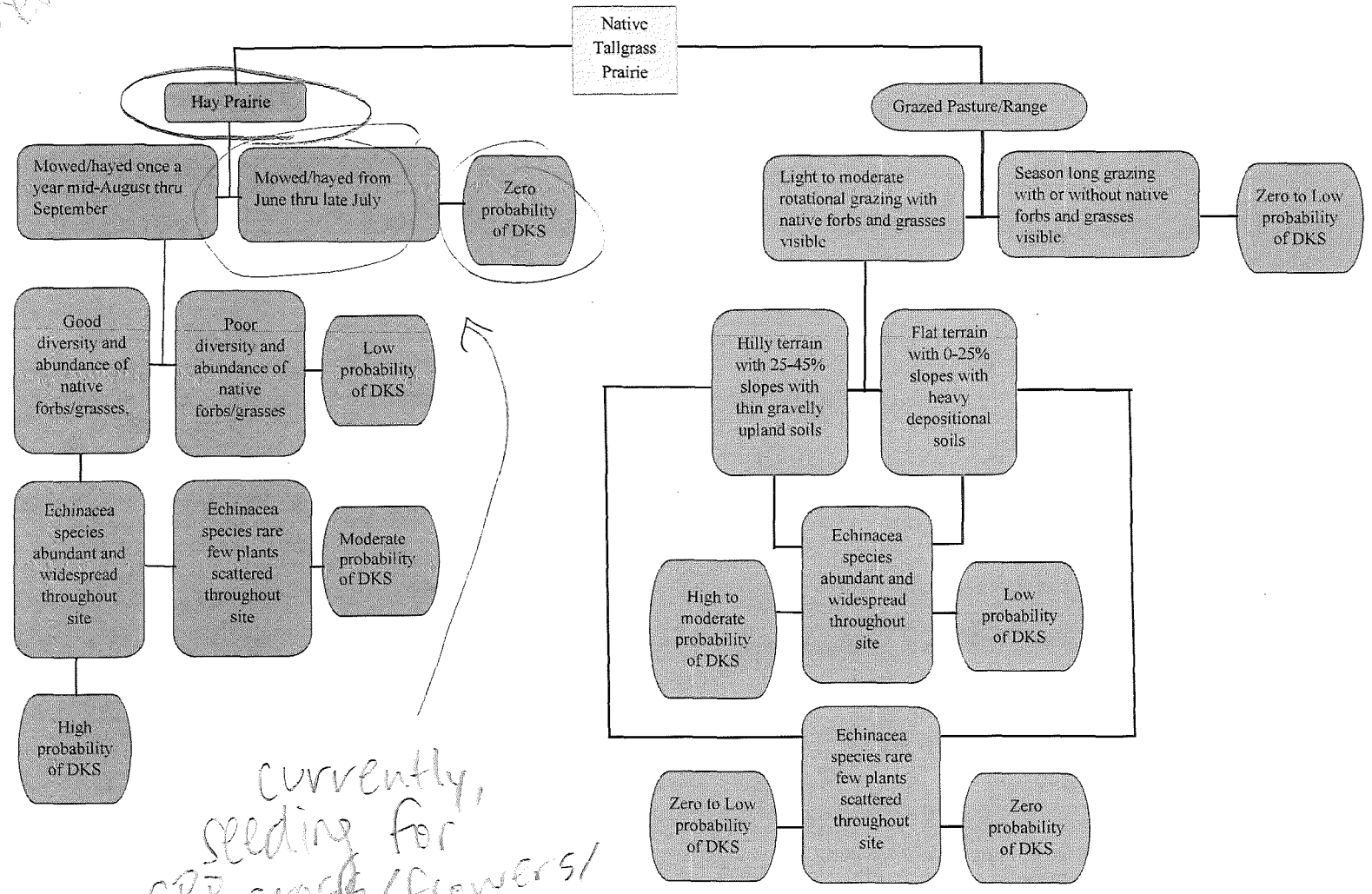


part of same land as FFA-495 → possibly potential CRP convert as well.

FFA-495

Arden Brewer

Guide to Identifying Dakota Skipper Habitat

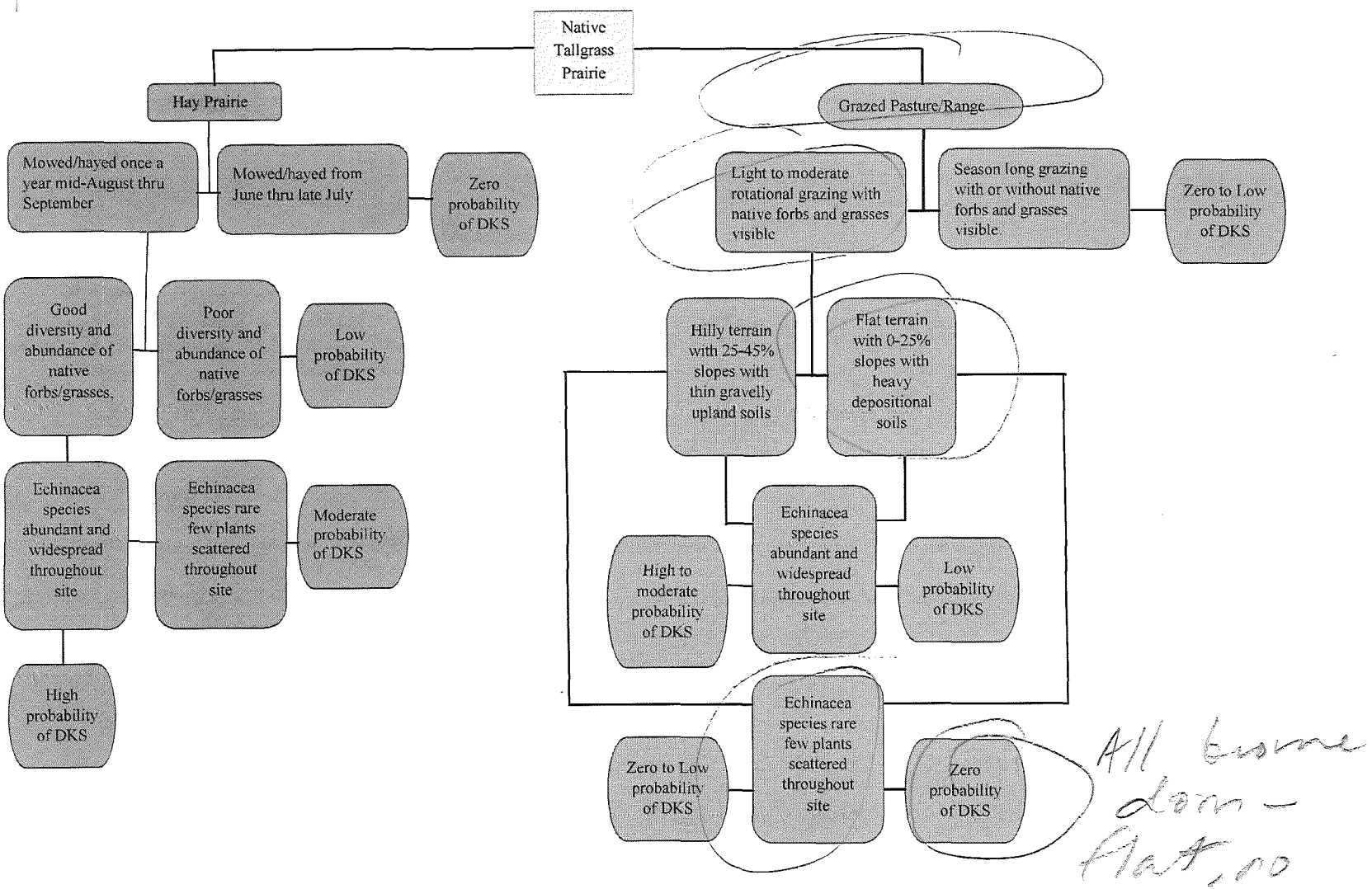


currently, seeding for CRP smack/flowers/ butterfly kala come spring

Becoming CRP Area, landowner planting CRP - spoke positively regarding possible cost-share

FTA - SDS
Adlin Bowser

Guide to Identifying Dakota Skipper Habitat



All known dam - flat, no Echinacea

SIS

N/A → cool season brome
Lawn — no echinacea / native grass forbs present

AB

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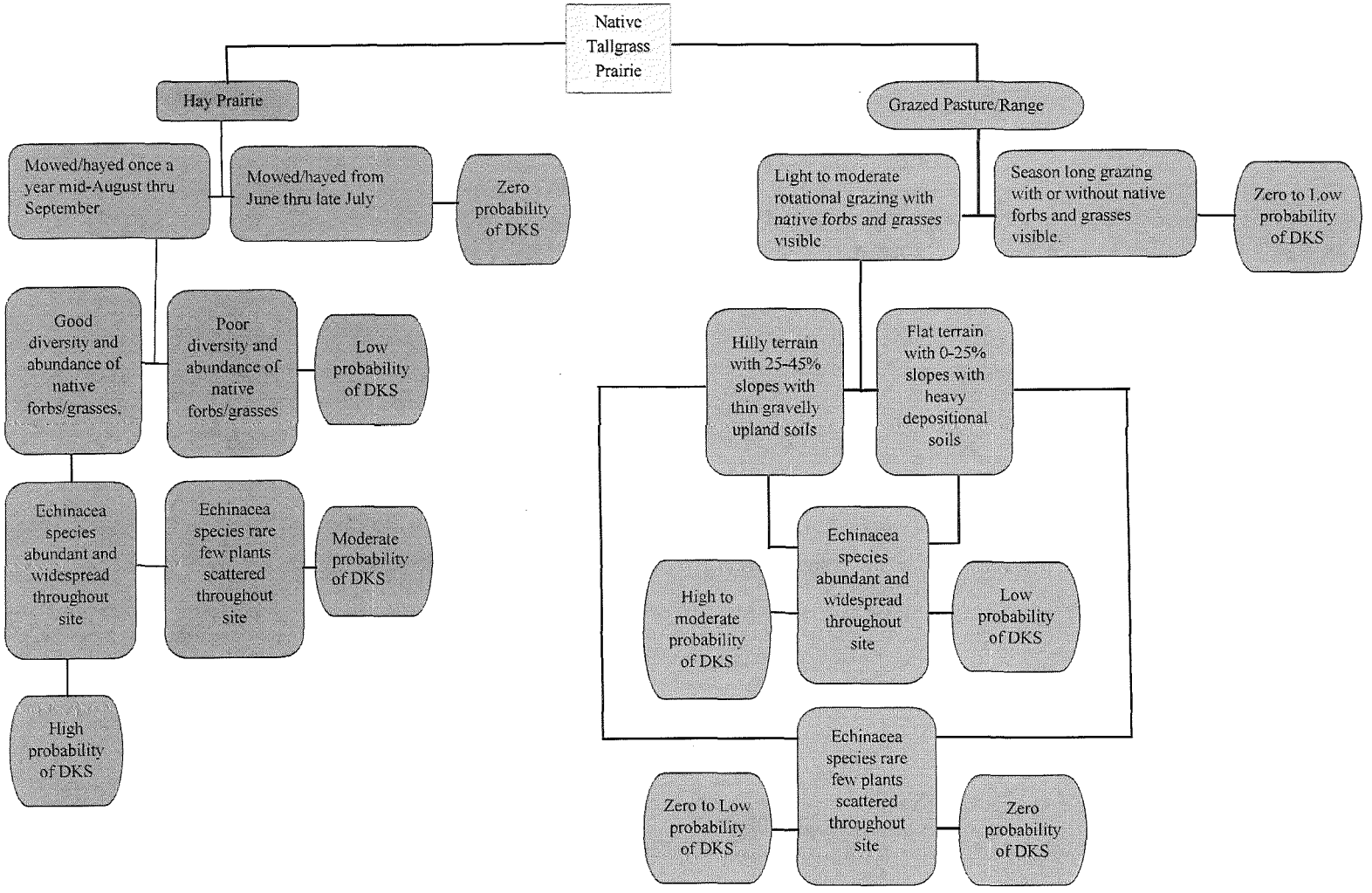

AFA-525
Andrea Brewer

N/A → cool season grassland - brome dom - Switchgrass present but no other warm season species - adjacent to wetland basin.

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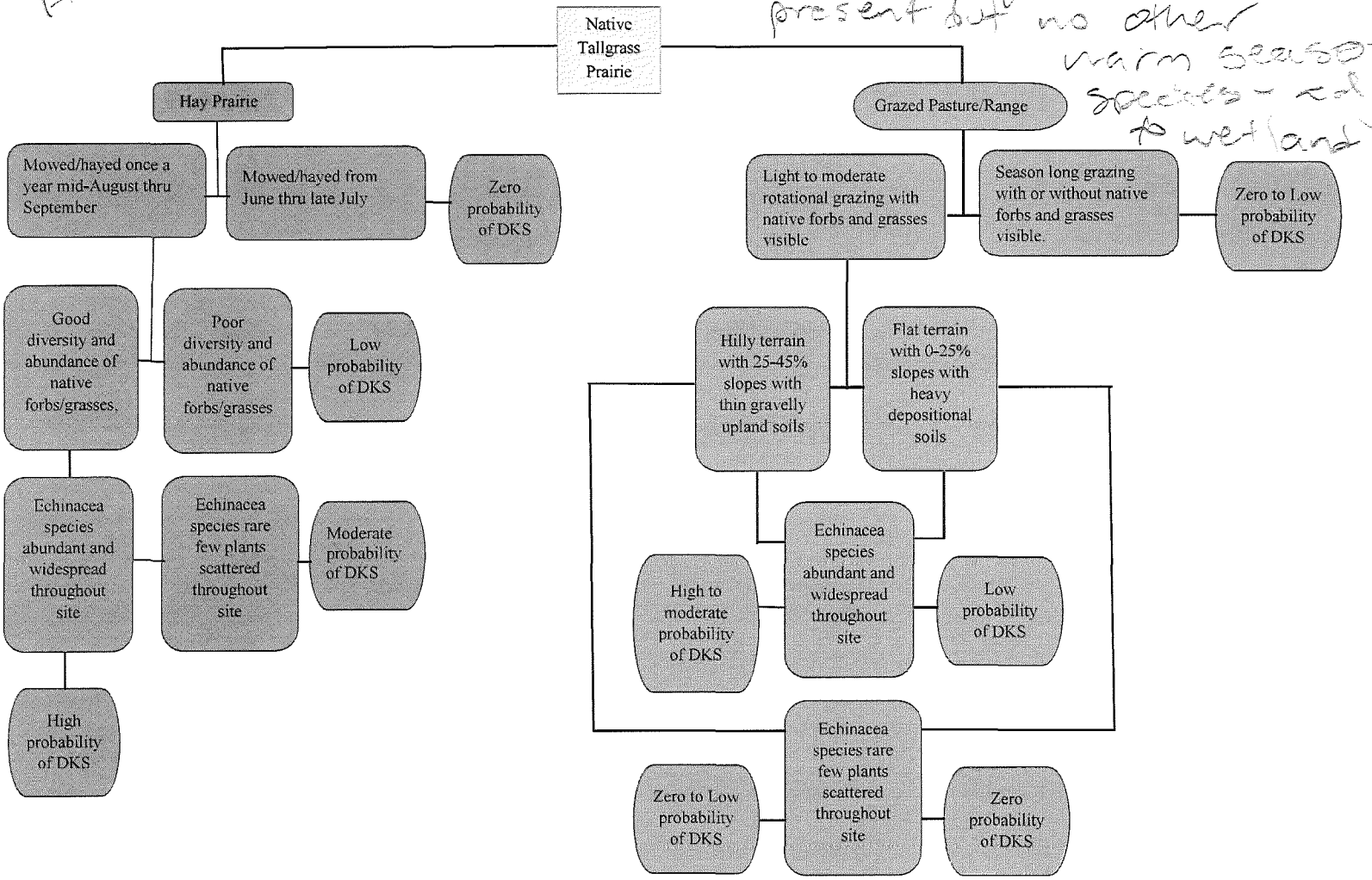

EFA-595
AB

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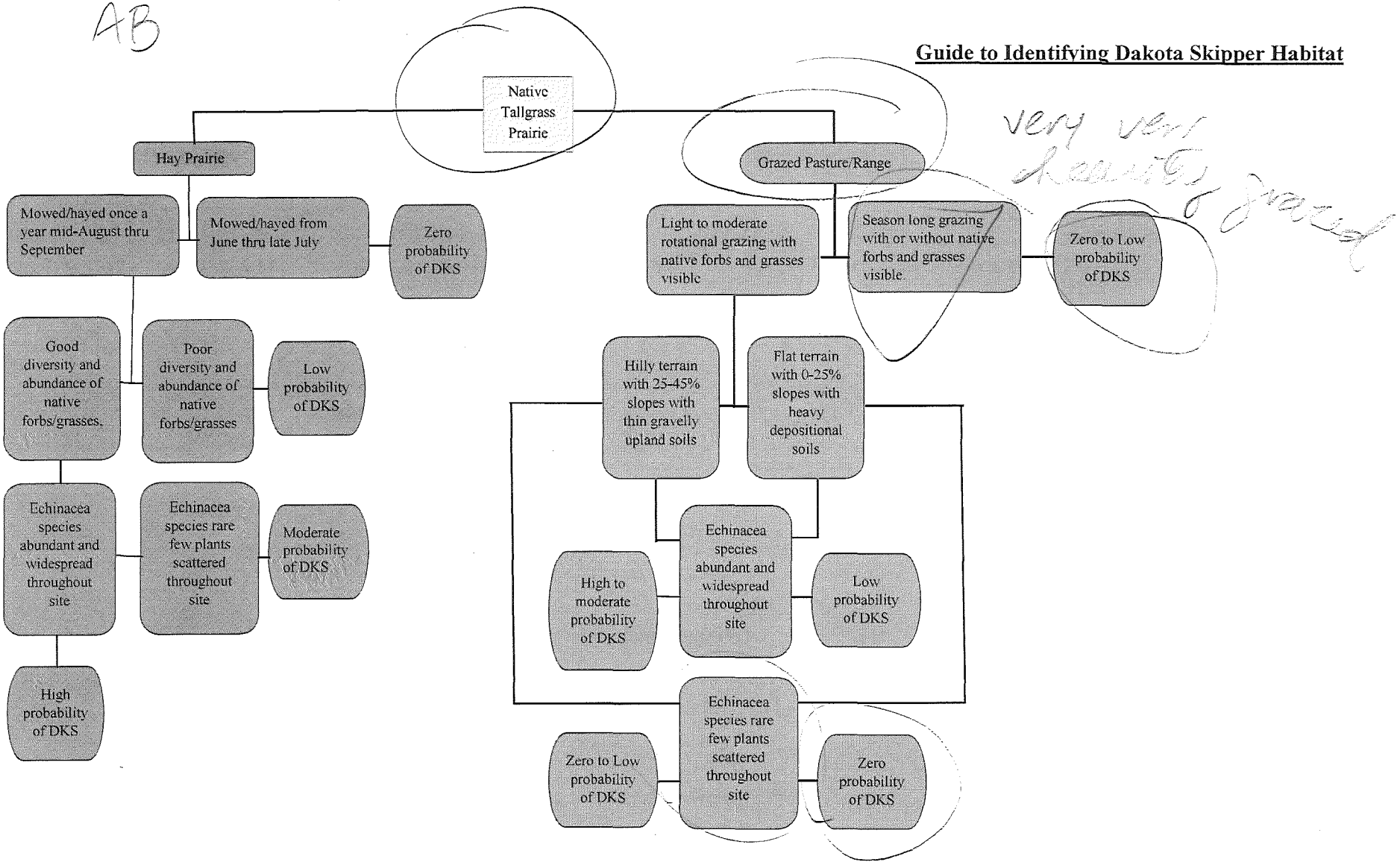

54
J. Maine
Cattail wetland next to brome hayfield
~~No Prairie~~

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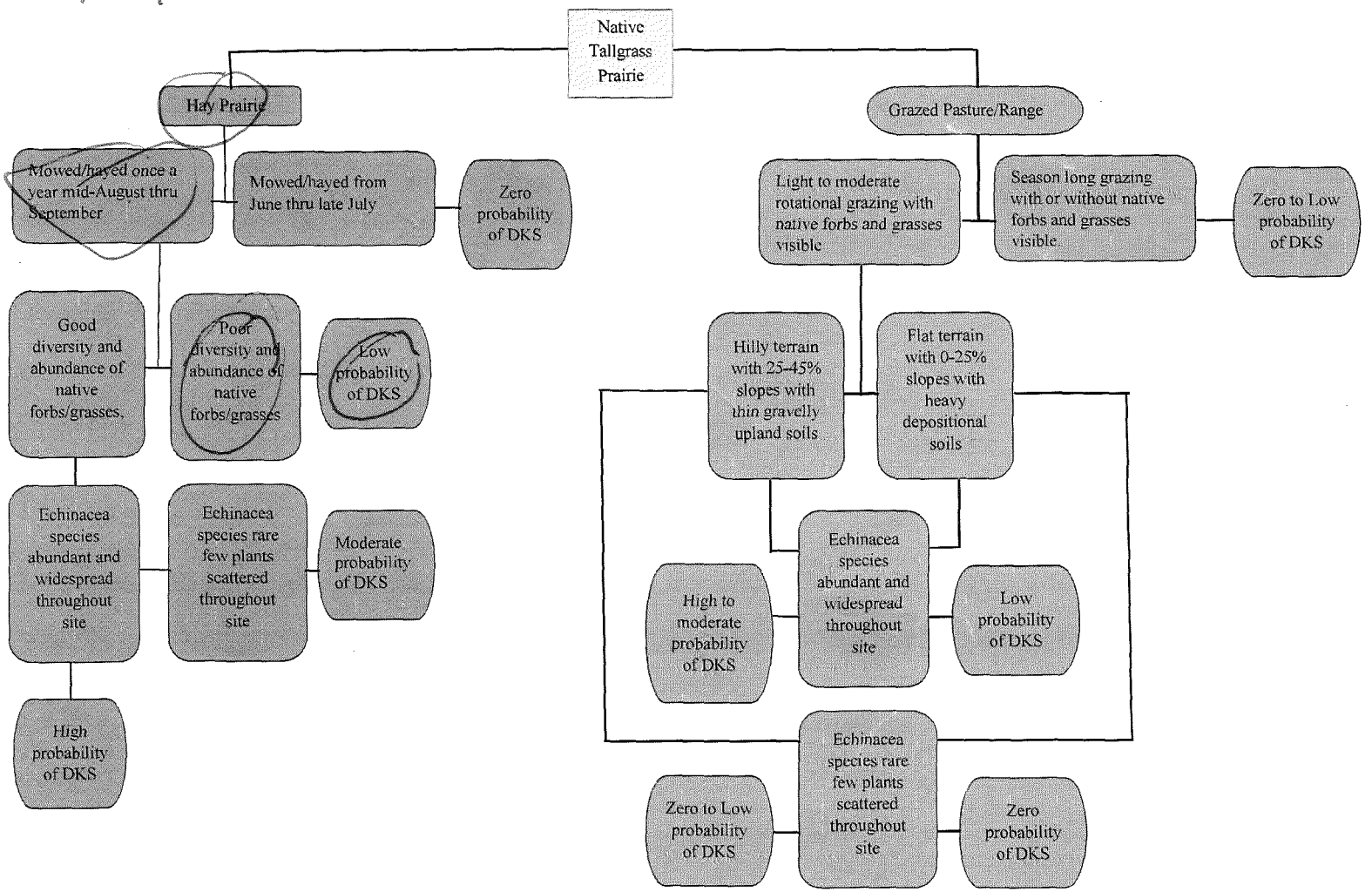

55
J. Maine
Big bluestem and brome
No coneflower
No grazing

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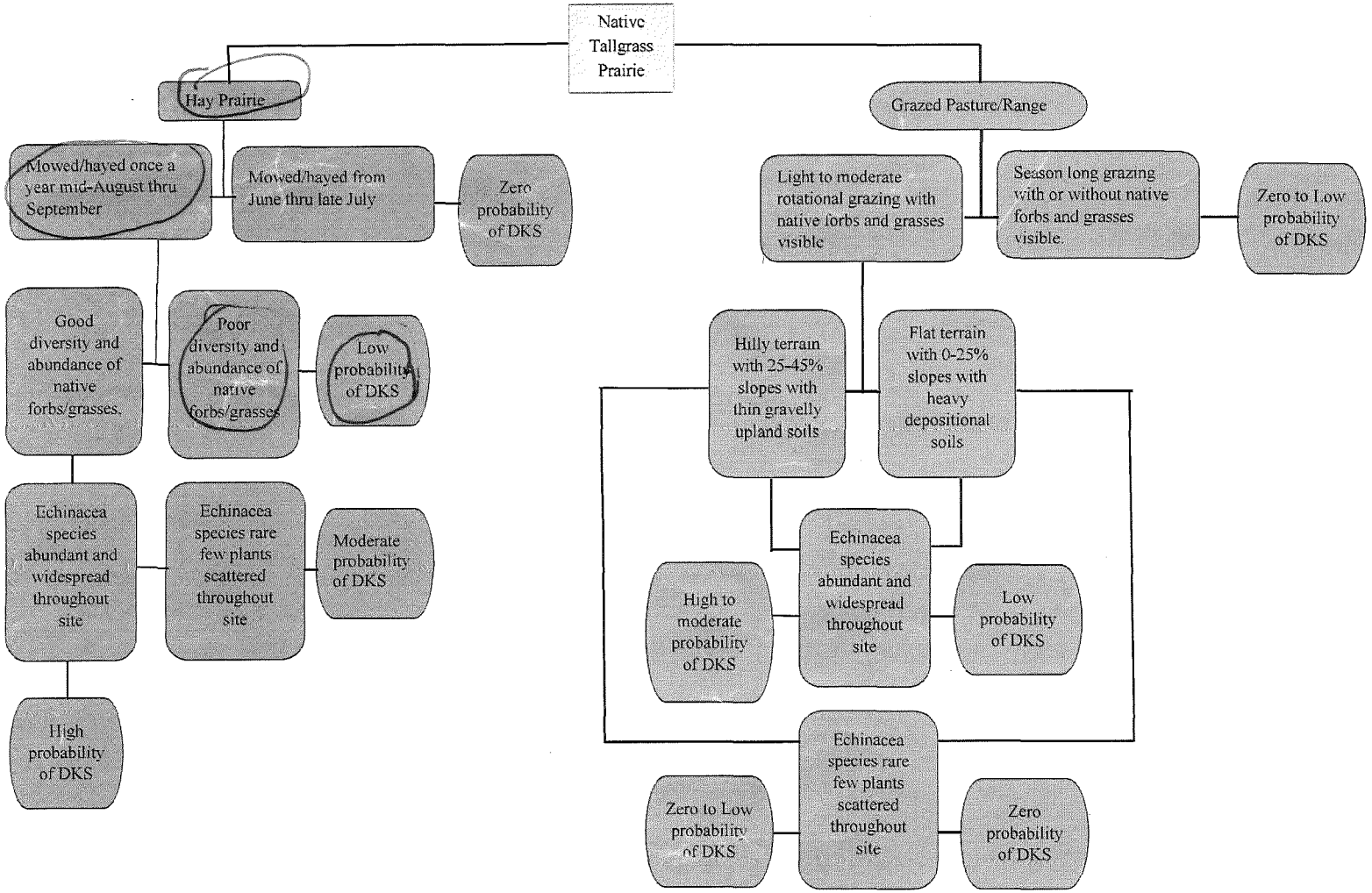

56
J. Maine
Brome & big bluestem, few forbs
No coneflower

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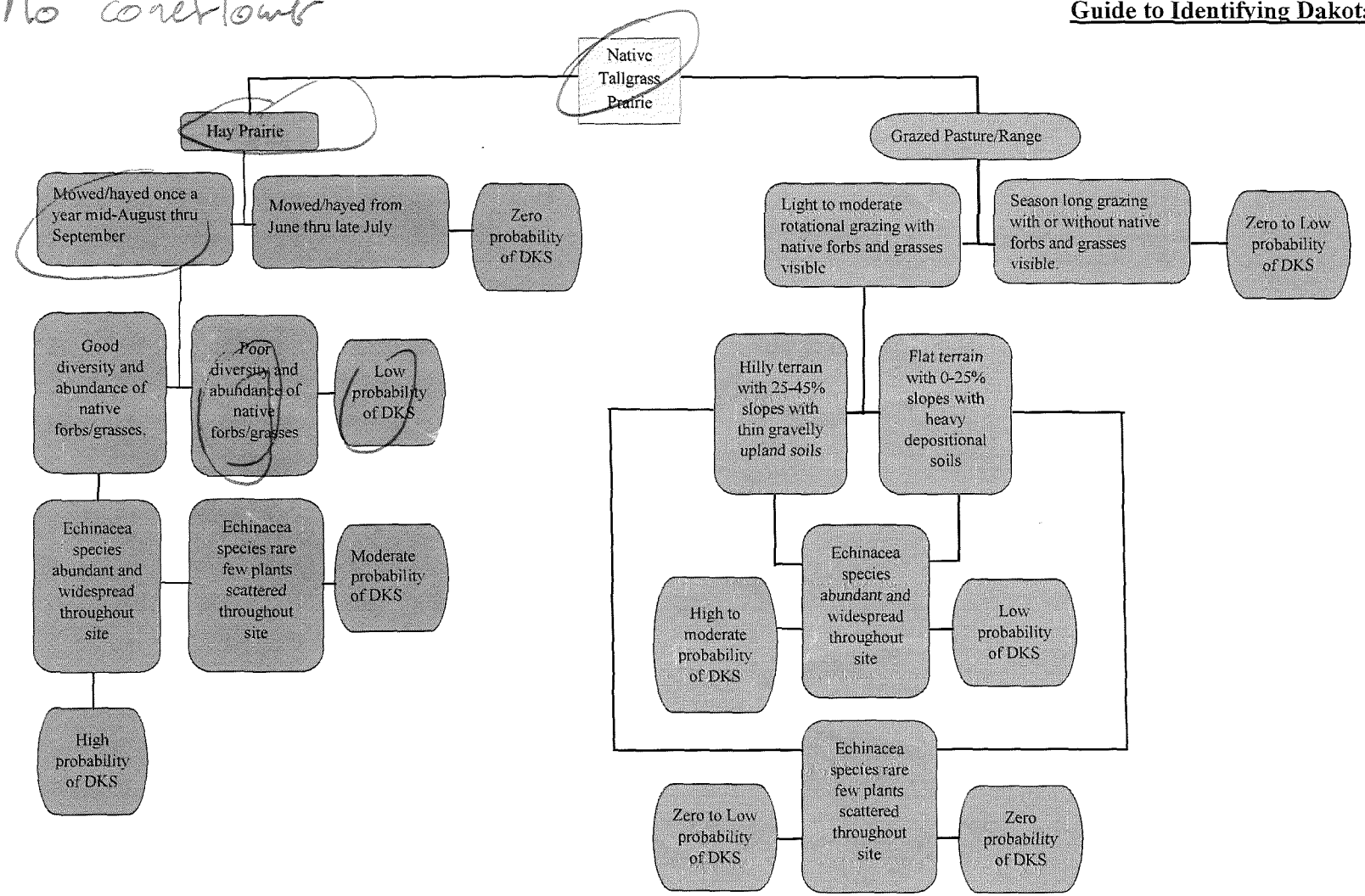

57
J. Mains
Reed Canary grass wetland

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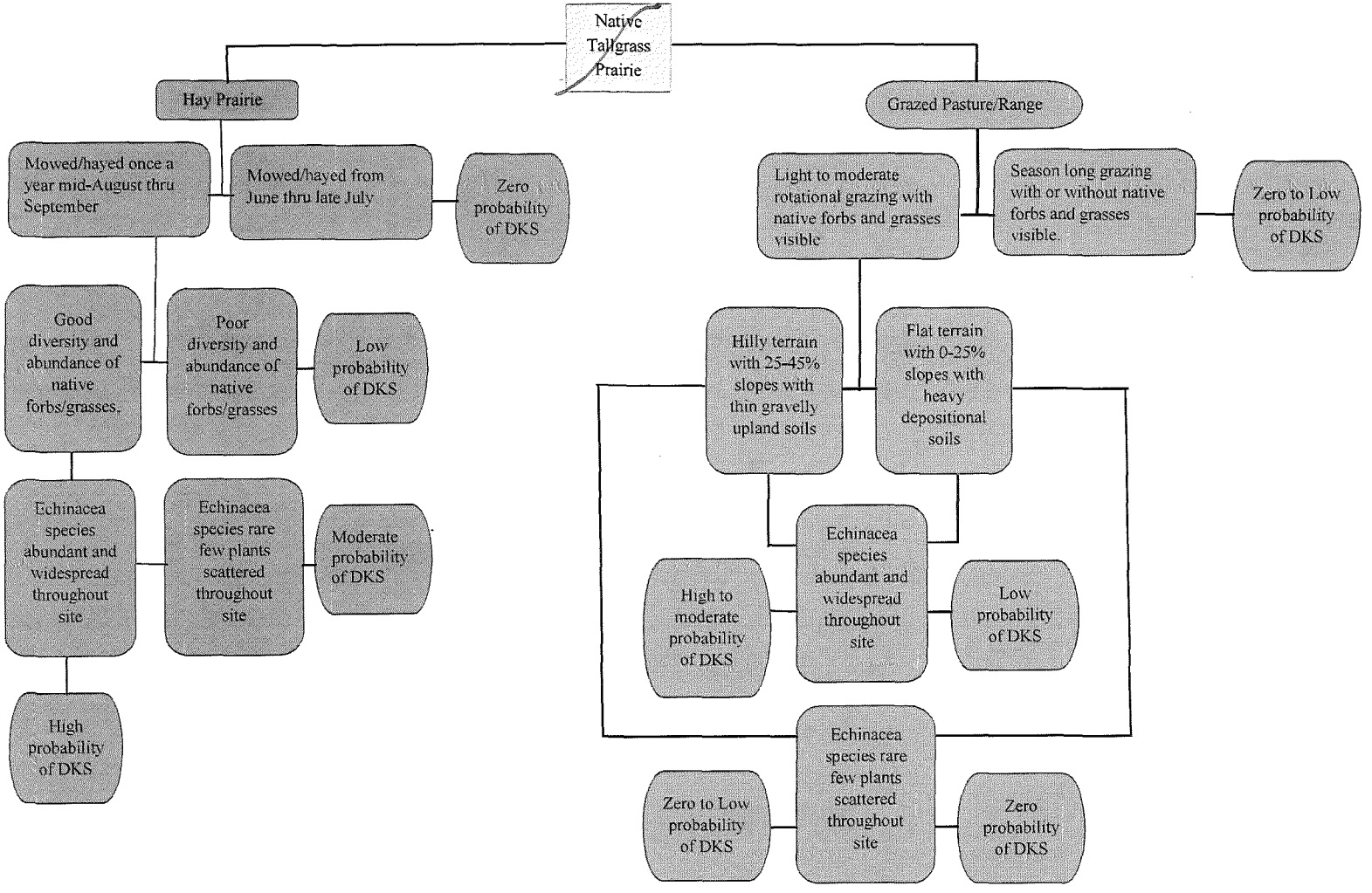

58

J. Maint

Reed canary grass wetland

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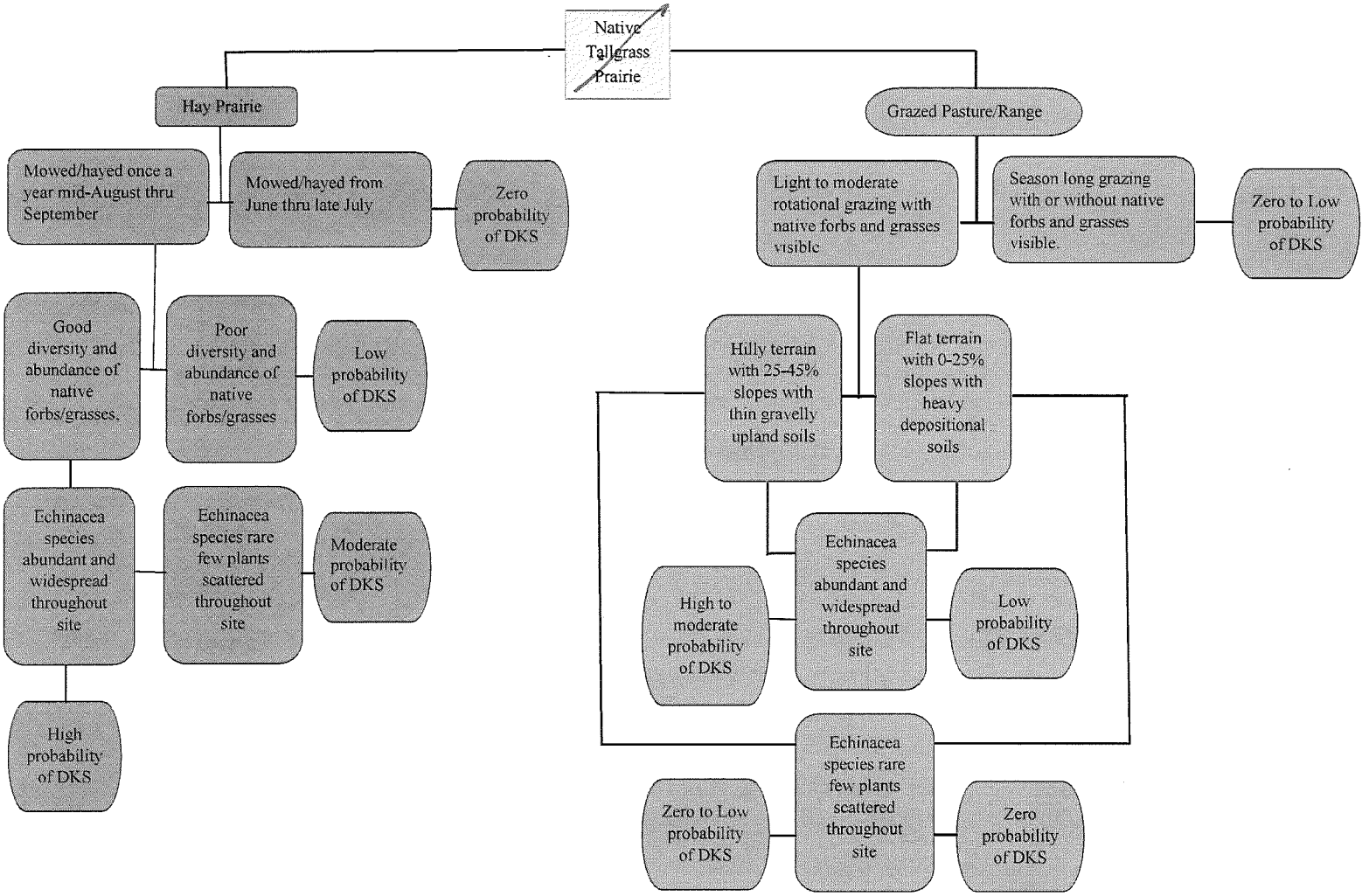

59
J. Maine
Reed canary grass wetland w/ cattail
No forbs

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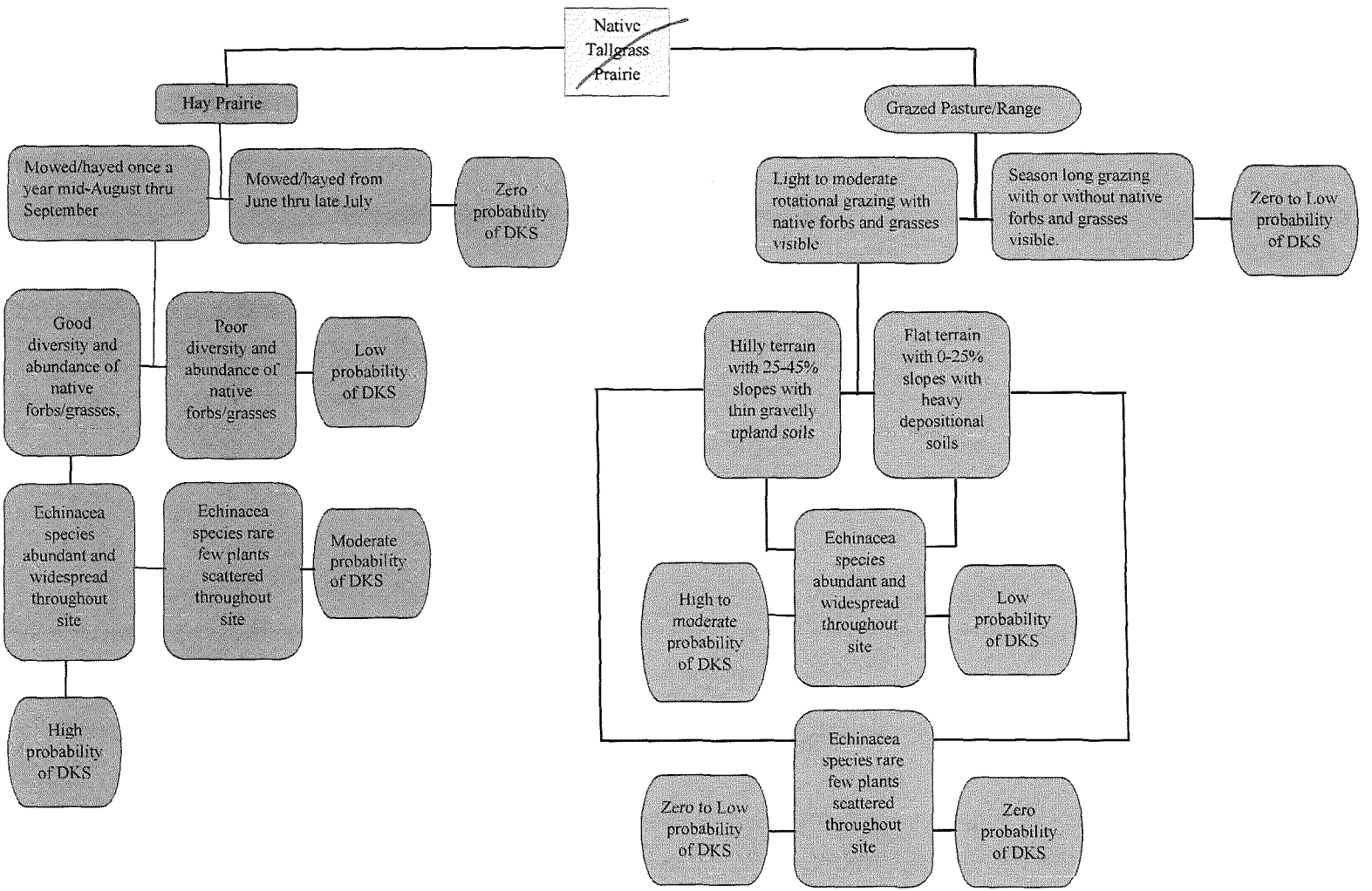

FFA-605
A3

N/A lowland wooded area adjacent to wetland

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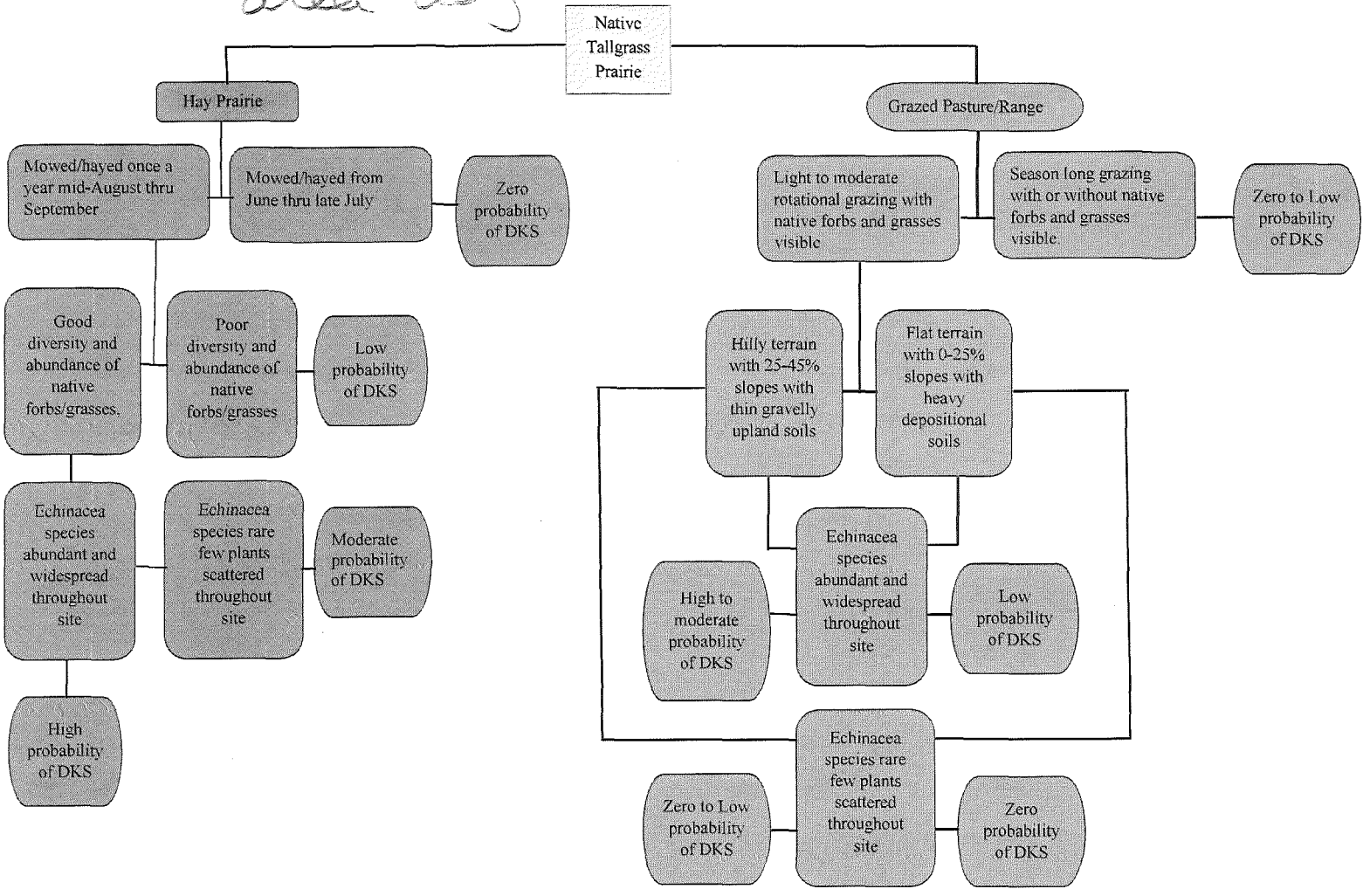
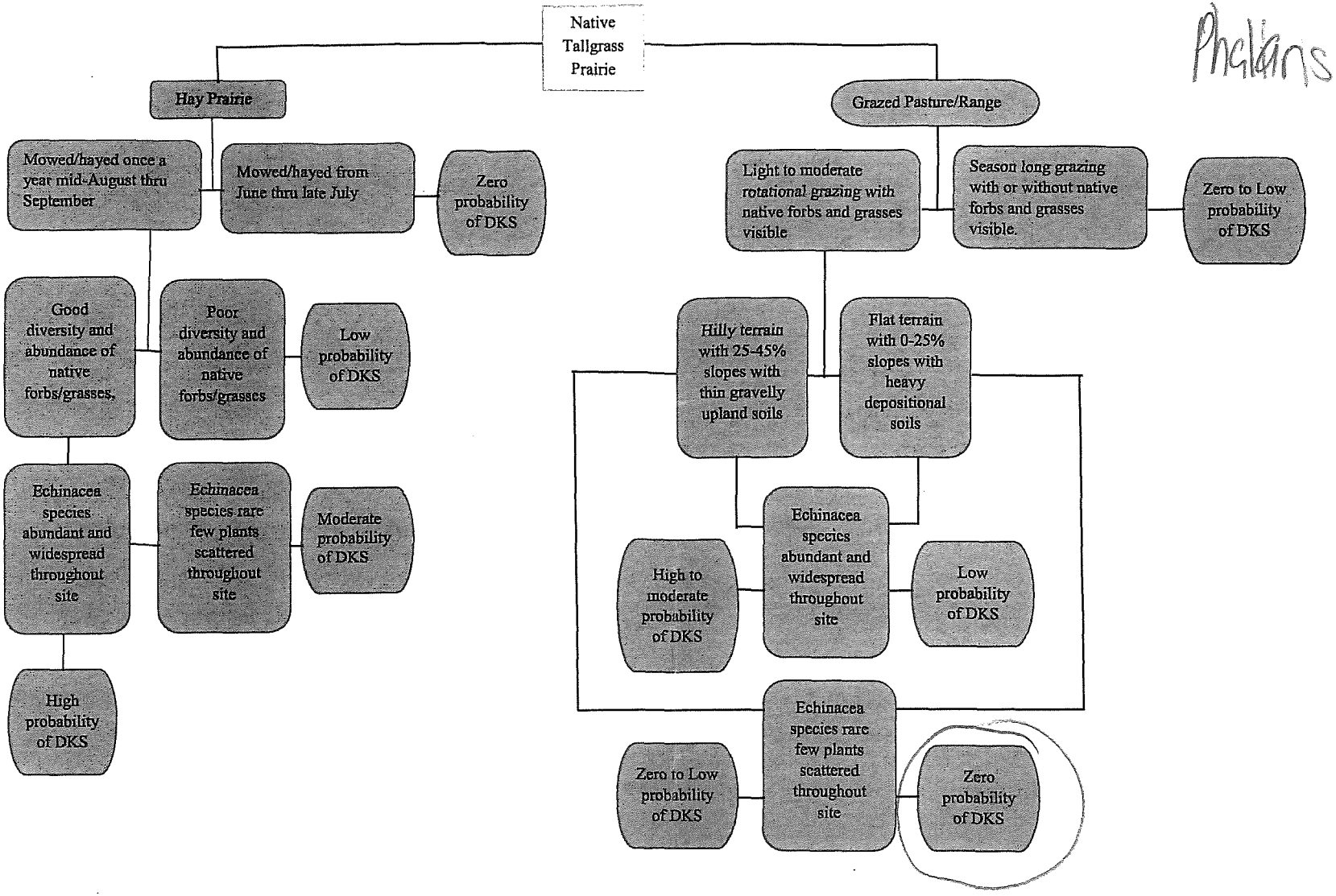


61-S

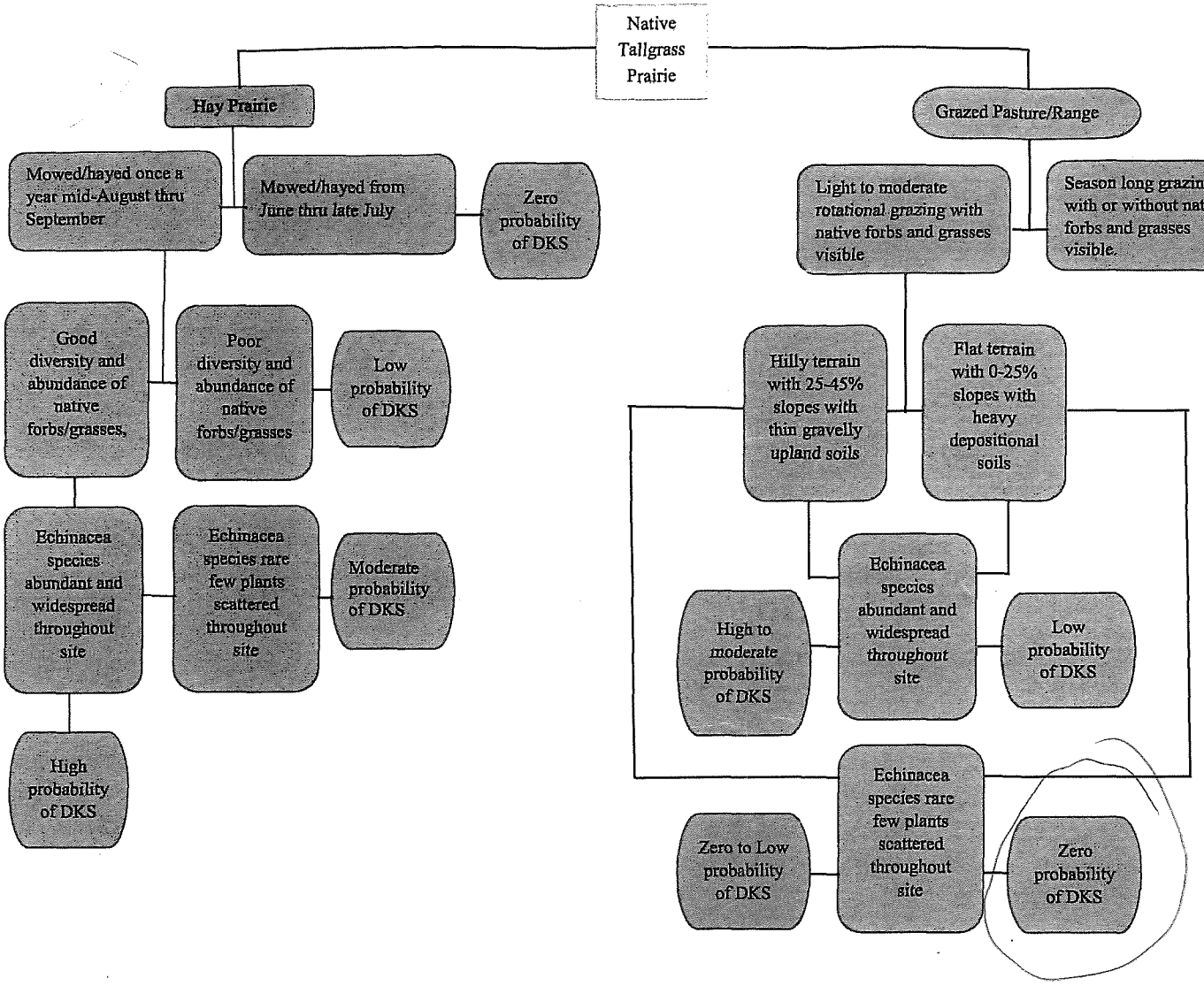
Guide to Identifying Dakota Skipper Habitat

Phalaris & typha



62-S

Guide to Identifying Dakota Skipper Habitat

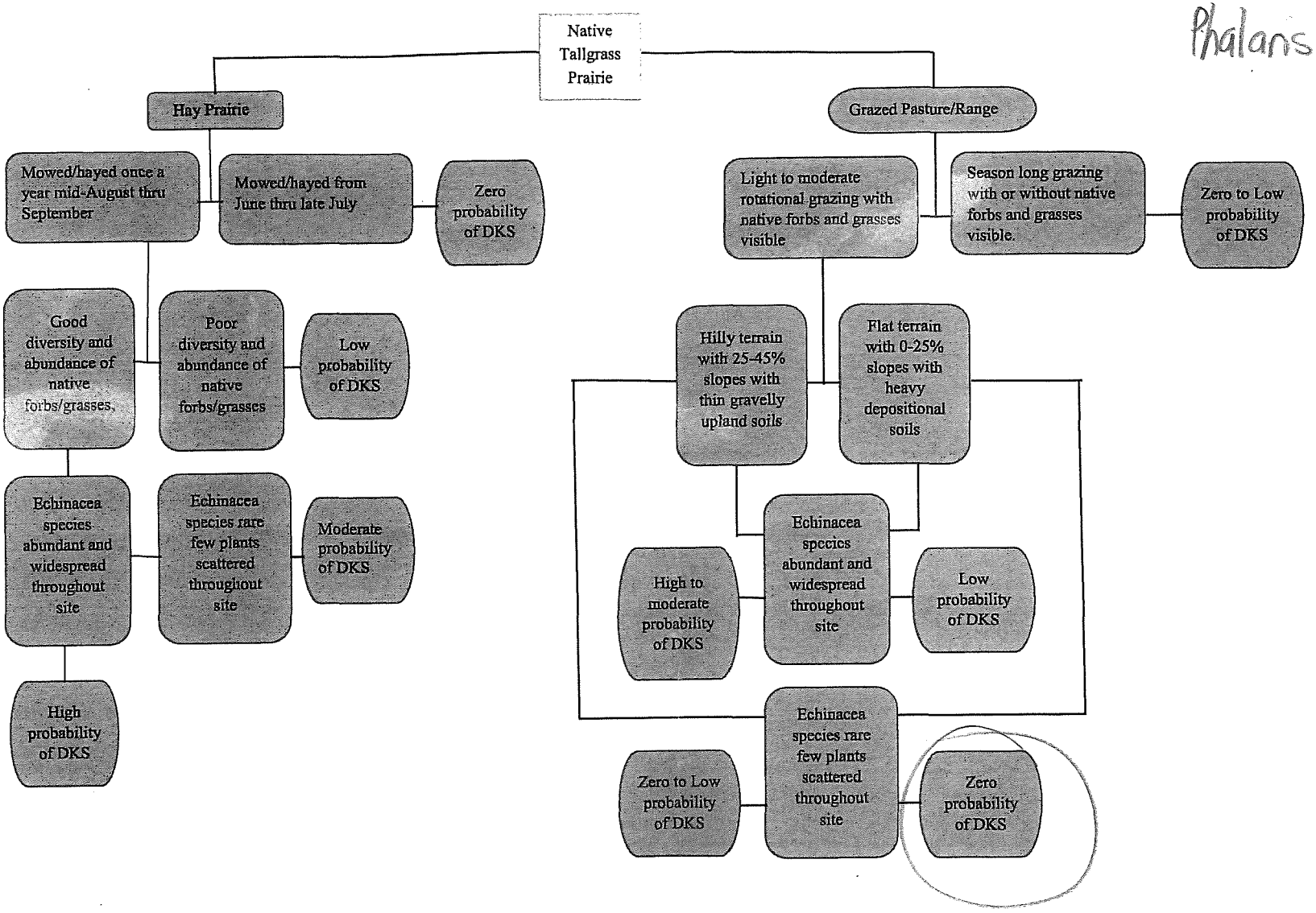


Brome
Canadian thistle
milkweed

63-S

Guide to Identifying Dakota Skipper Habitat

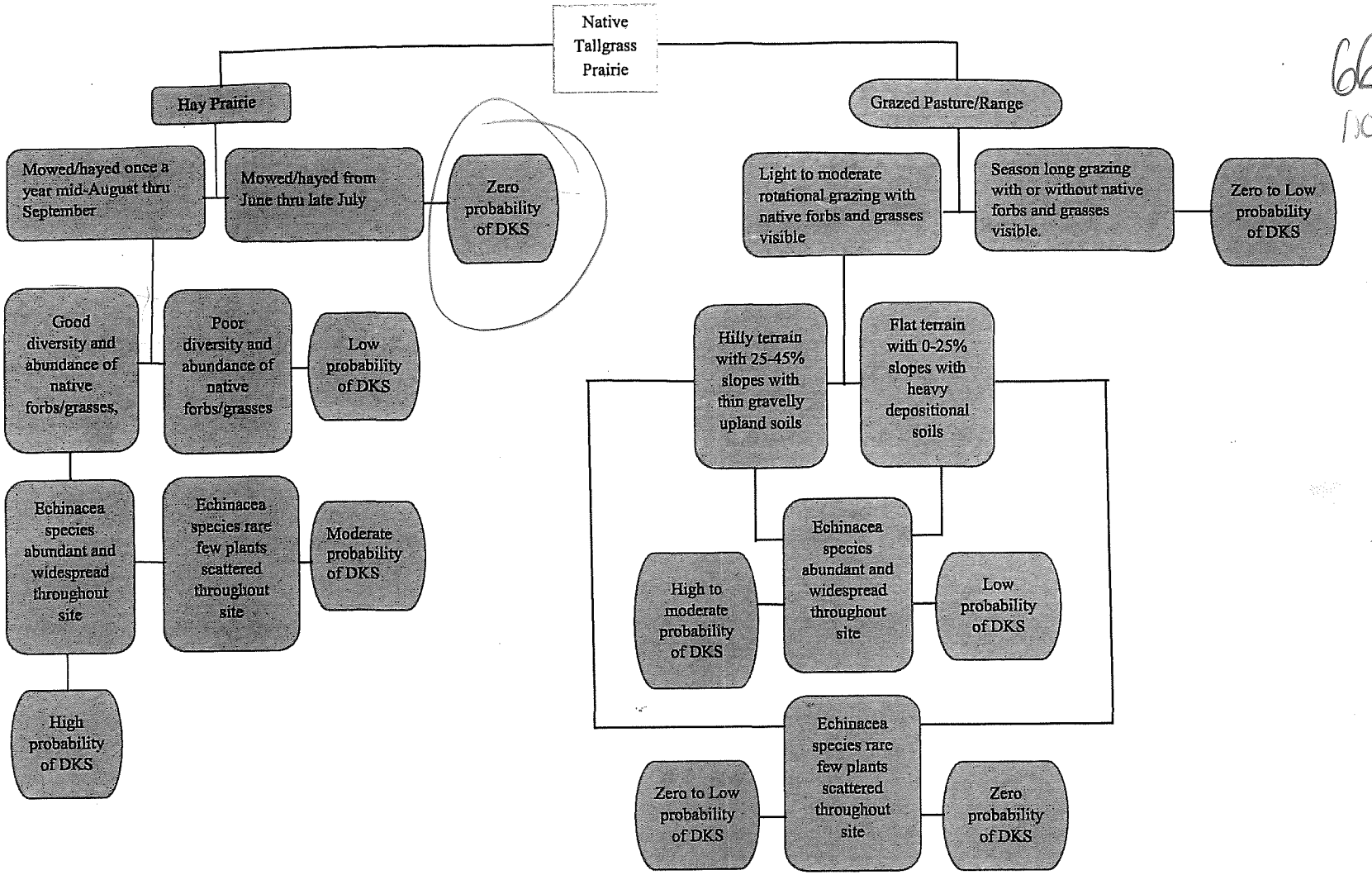
Phalaris & typha sp.



brome purpleclover N,E,S,W

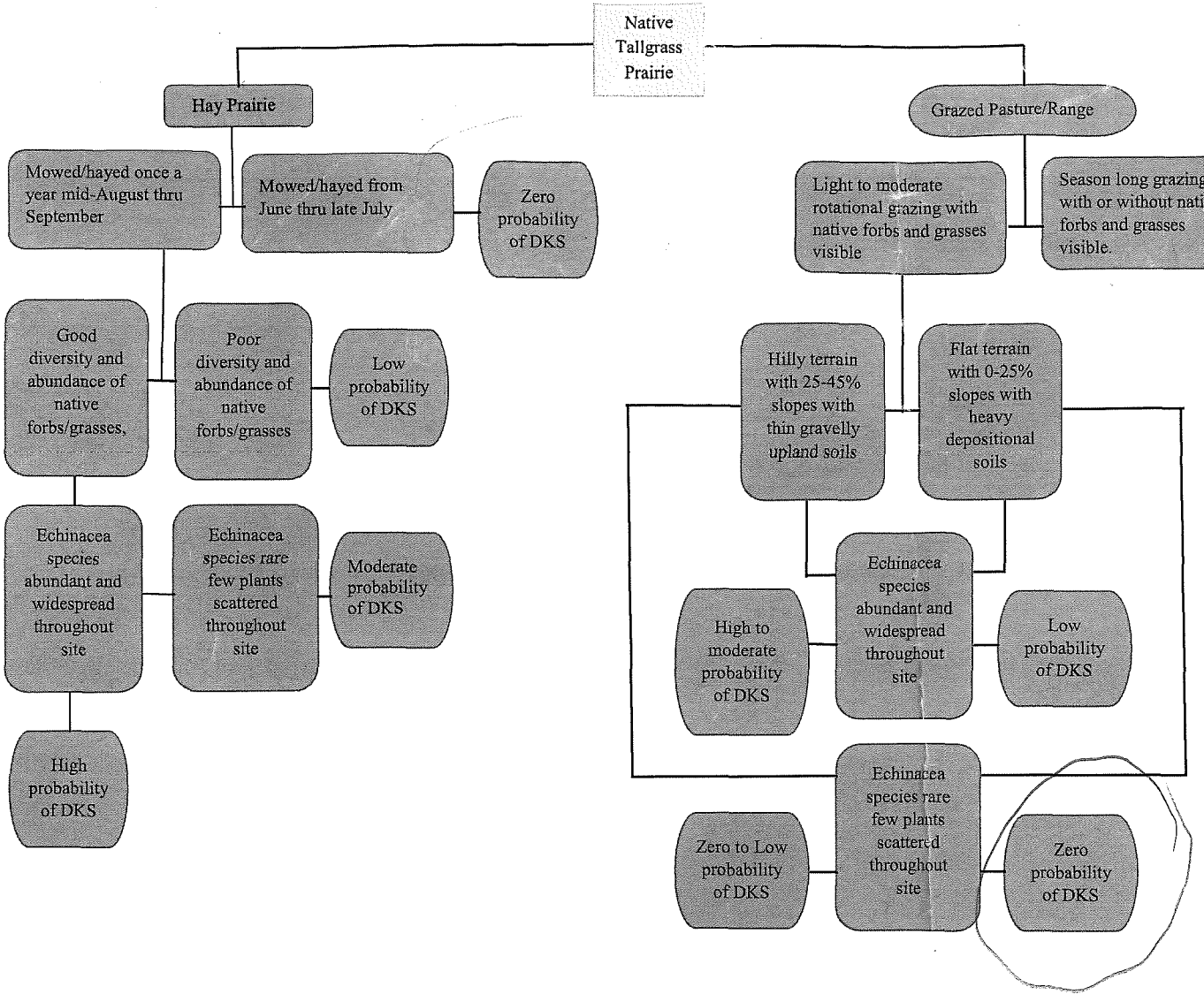
Guide to Identifying Dakota Skipper Habitat

66-S not suitable



675

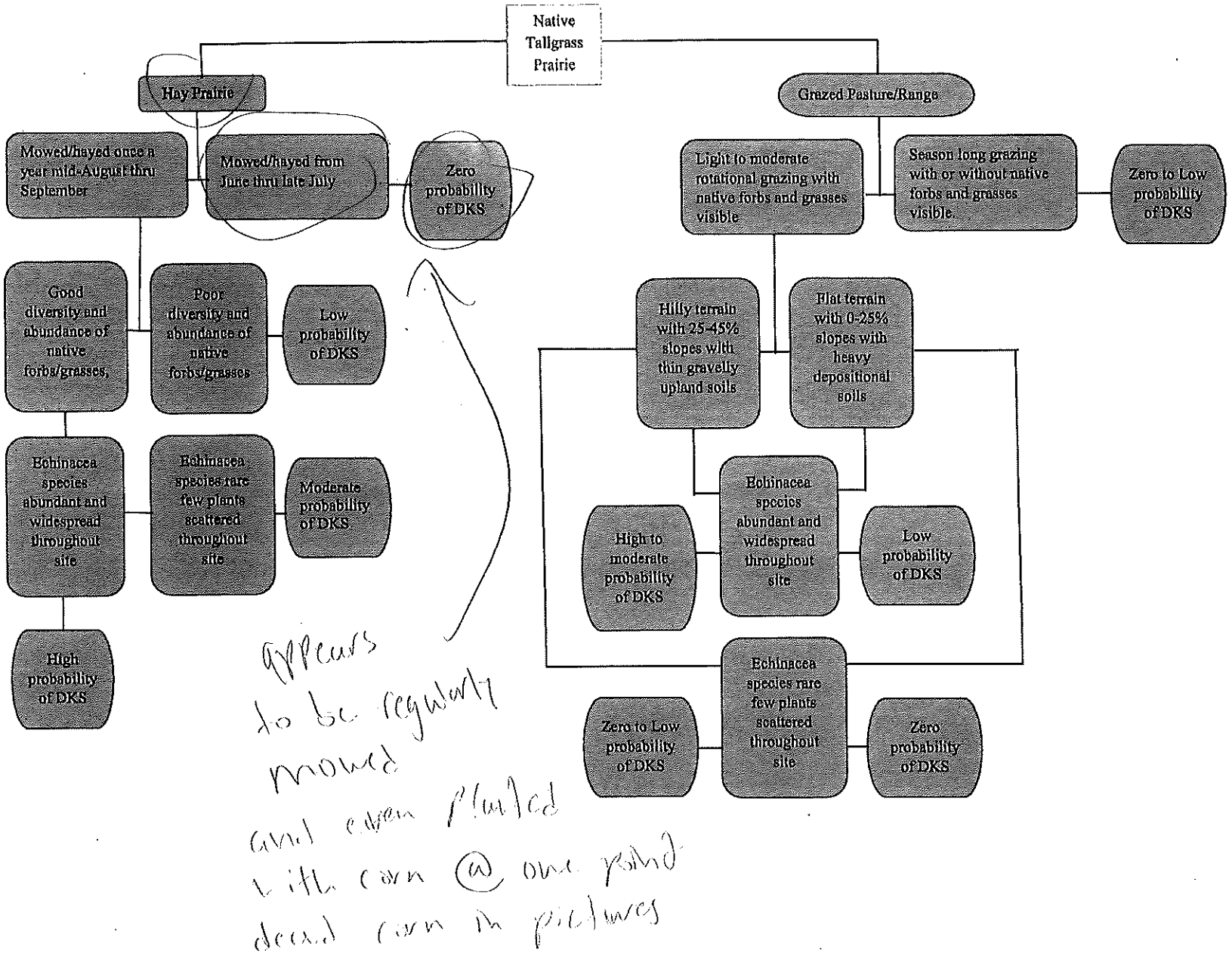
Guide to Identifying Dakota Skipper Habitat



Brom Js inermis
milkweed
canadian thistle
sage
Indian hemp
nettle
mint
thelaris

DKS Analysis 6

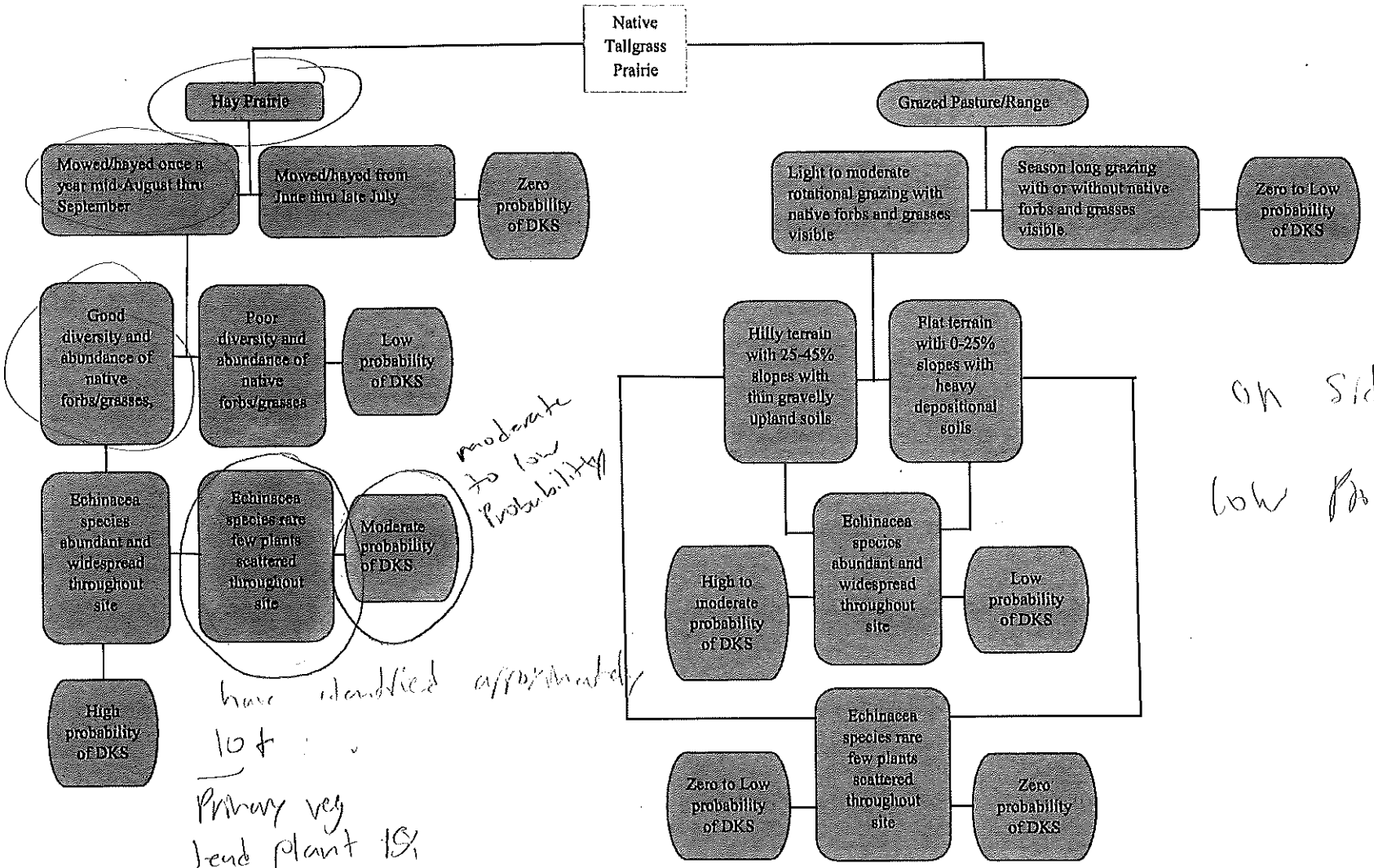
Guide to Identifying Dakota Skipper Habitat



appears to be regularly mowed and even plowed with corn @ one point dead corn in pictures

DKS Analysis 5

Guide to Identifying Dakota Skipper Habitat



moderate to low probability

On side slope low probability

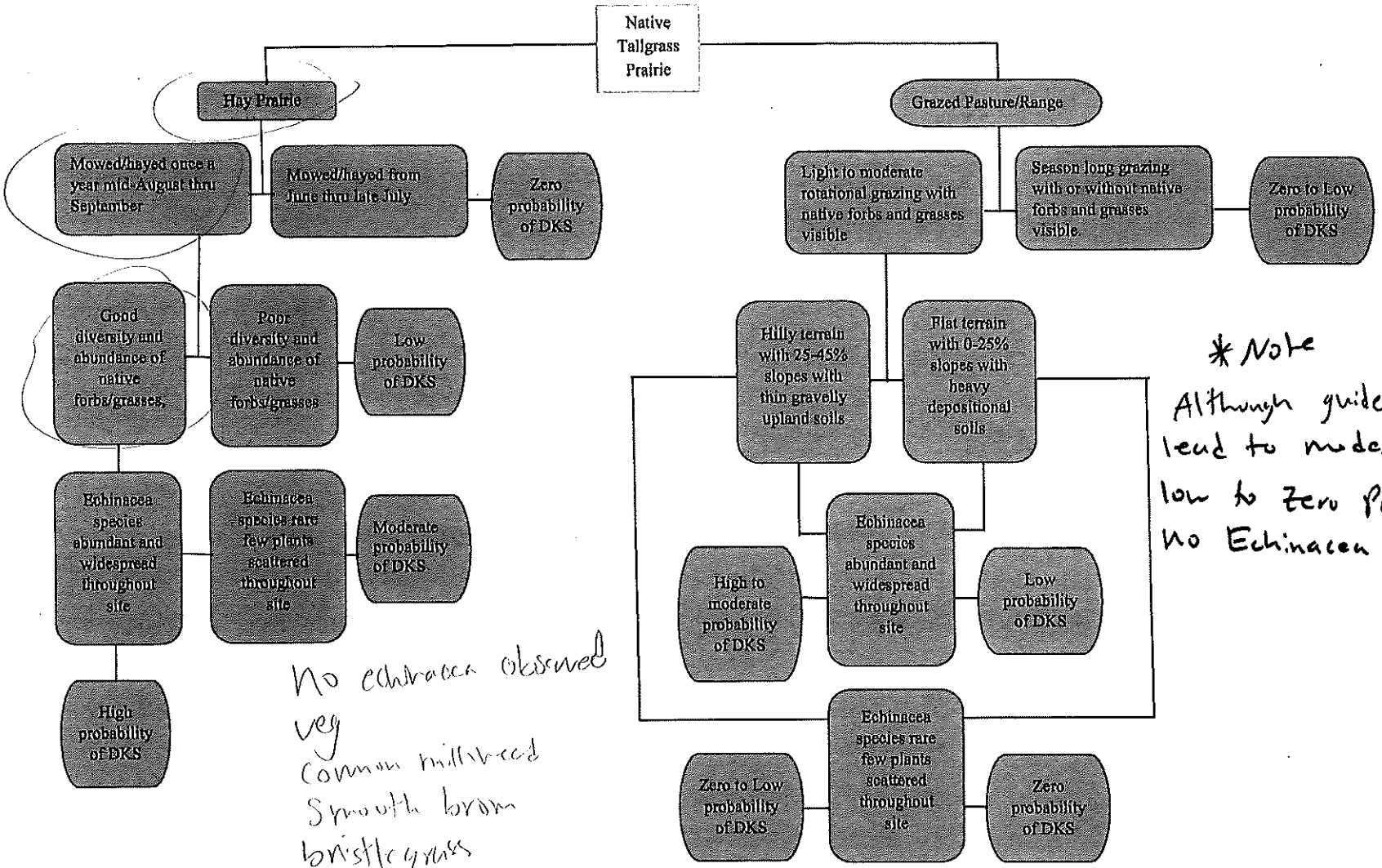
have identified approximately 10 +

Primary veg
Seed plant 15%
Smooth brome 80%.
echinacea 1%

Picture of 2 coneflowers in generic Point

DKS Analysis 4

Guide to Identifying Dakota Skipper Habitat



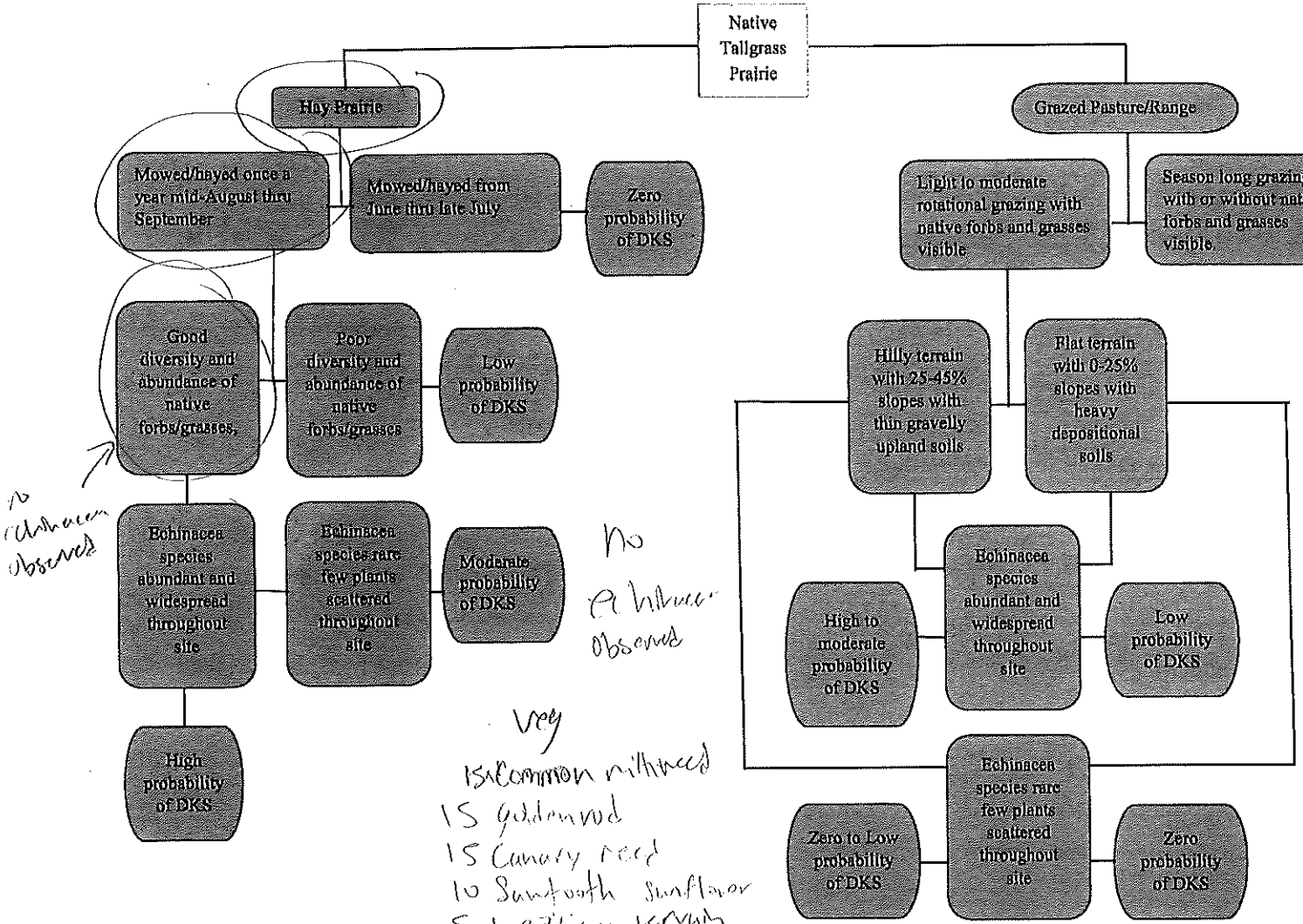
No echinacea observed
veg
Common milkweed
Smooth brom
bristlegrass
Palmer's Amaranth

*Note
Although guide says it may lead to moderate it is likely low to zero probability as no Echinacea was observed

See SPU-Cr-1110 for details

DKS Analysis 3

Guide to Identifying Dakota Skipper Habitat



No Echinacea Observed

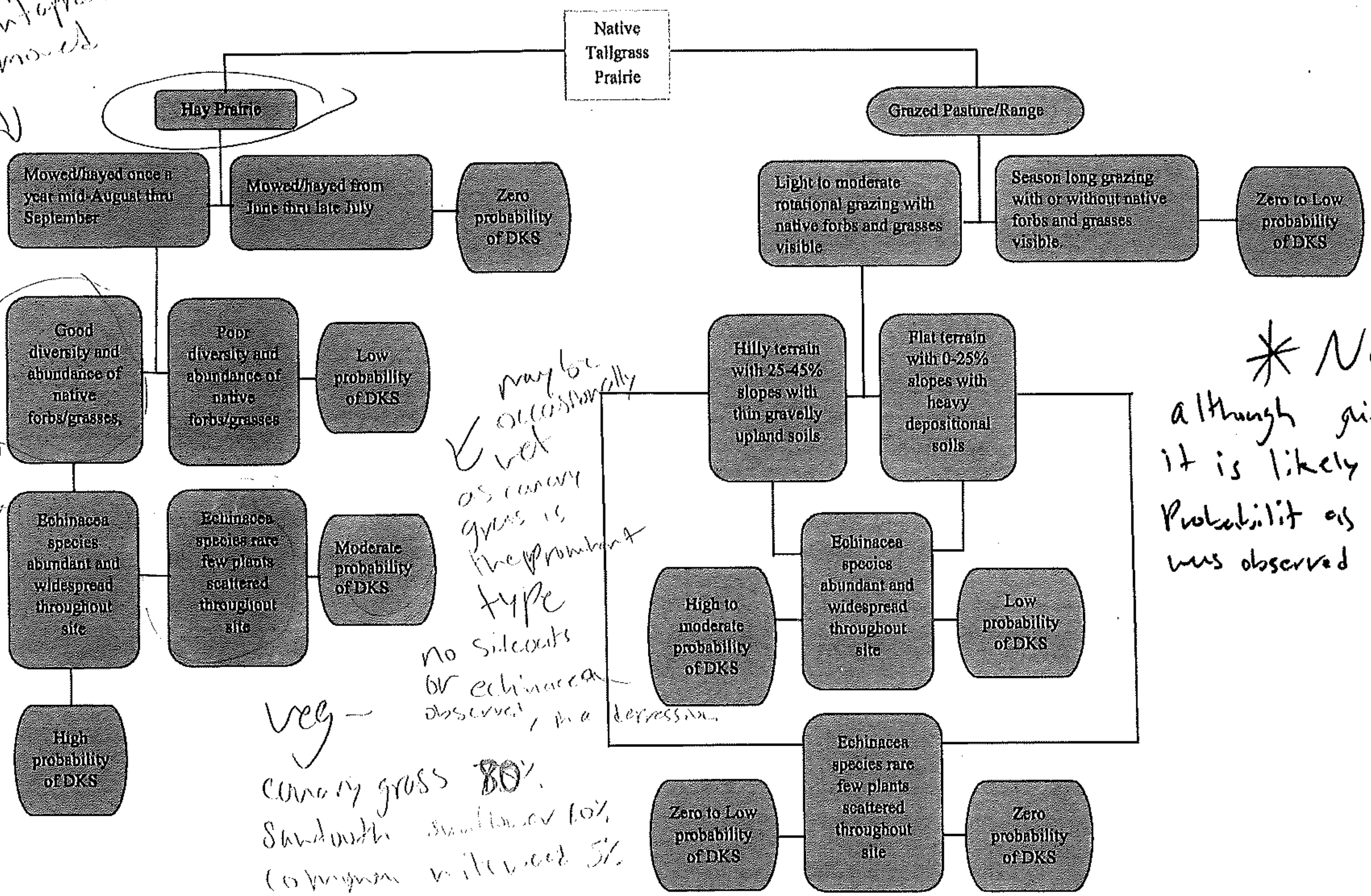
No Echinacea Observed

Very
IS Common milkweed
IS Goldenrod
IS Canary reed
10 Sawtooth Sunflower
5 Brazilian vervain
30% Indian hemp

*Note
Although guide says it may lead to moderate it is likely low or Zero Probability as no Echinacea was observed

DKS Analysis 2

Guide to Identifying Dakota Skipper Habitat



doesn't appear to be mowed

no echinacea observed

maybe occasionally wet as canary grass is the prominent type

no silecouts or echinacea observed, in a depression

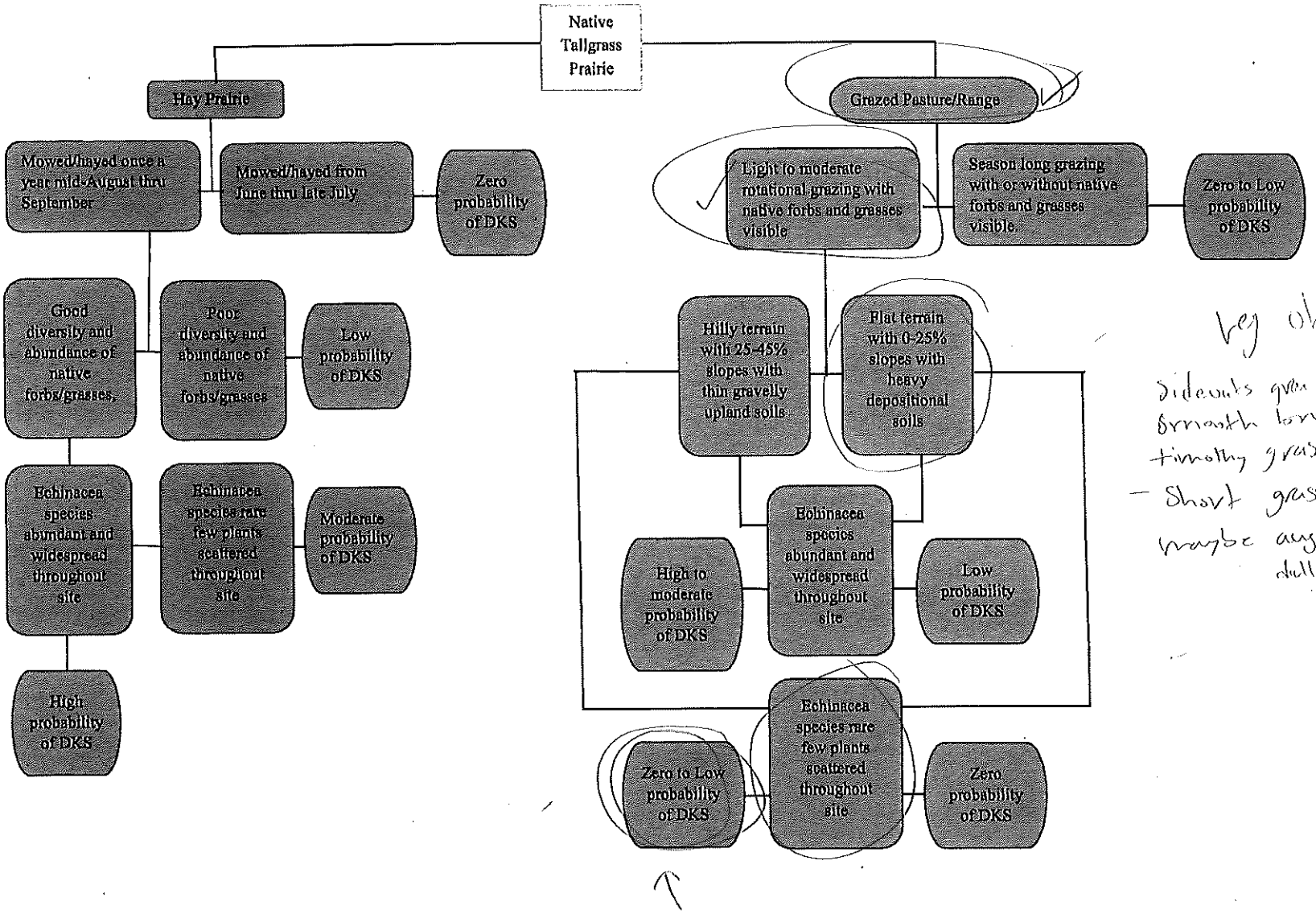
veg –
canary grass 80%
Sawtooth sunflower 10%
common milkweed 5%

area appears to be infrequently wet

*Note
although guide says it may be moderate it is likely low to no probability as no echinacea was observed

object ID 175 DKS - Analysis 1

Guide to Identifying Dakota Skipper Habitat



key observations
sideoats grama — 15%
smooth brome — 25%
timothy grass — 10%
- short grasses
maybe augustine or 50% dull is grass

APPENDIX D – PHOTOSHEETS

Photograph C-1: View of Field Focus Area (FFA)-1S, facing north.

Photograph C-2: View of FFA-2S, facing east.

Photograph C-3: View of FFA-3S, facing west.

Photograph C-4: View of FFA-4S, facing east.

Photograph C-5: View of FFA-5S, facing south.

Photograph C-6: View of FFA-6S, facing north.

Photograph C-7: View of FFA-7S, facing south.

Photograph C-8: View of FFA-8S, in high to moderate probability Potential Suitable Habitat (PSH)-2, facing east.

Photograph C-9: View of little bluestem and *Echinacea*, in high to moderate probability PSH-2, facing north.

Photograph C-10: View of FFA-9S, facing south.

Photograph C-11: View of FFA-10S, facing north.

Photograph C-12: View of FFA-11S, facing north.

Photograph C-13: View of FFA-12S, facing east.

Photograph C-14: View of FFA-13S, facing south.

Photograph C-15: View of FFA-14S, facing east.

Photograph C-16: View of FFA-15S, facing west.

Photograph C-17: View of FFA-16S, facing south.

Photograph C-18: View of FFA-17S, facing east.

Photograph C-19: View of FFA-18S, facing east.

Photograph C-20: View of FFA-19S, facing west.

Photograph C-21: View of FFA-20S, facing north.

Photograph C-22: View of FFA-21S, facing east.

Photograph C-23: View of FFA-22S, facing south.

Photograph C-24: View of FFA-23S, in low probability PSH-3, facing east.

Photograph C-25: View of big bluestem, in low probability PSH-3, facing east.

Photograph C-26: View of FFA-24S, facing west.

Photograph C-27: View of FFA-25S, facing east.

Photograph C-28: View of FFA-26S, facing east.

Photograph C-29: View of FFA-27S, facing east.

Photograph C-30: View of FFA-28S, facing north.

Photograph C-31: View of FFA-29S, facing east.

Photograph C-32: View of FFA-32S, facing north.

Photograph C-33: View of FFA-33S, facing north.

Photograph C-34: View of FFA-34S, facing north.

Photograph C-35: View of FFA-35S, facing east.

Photograph C-36: View of FFA-36S, facing east.

Photograph C-37: View of FFA-37S, facing west.

Photograph C-38: View of FFA-38S, in low probability PSH-1 facing west.

Photograph C-39: View of FFA-38S, in in low probability PSH-1 facing north.

Photograph C-40: View of FFA-39S, facing south.

Photograph C-41: View of FFA-40S, facing east.

Photograph C-42: View of FFA-41S, facing south.

Photograph C-43: View of FFA-42S, facing south.

Photograph C-44: View of FFA-43S, facing north.

Photograph C-45: View of FFA-44S, facing east.

Photograph C-46: View of FFA-45S, facing east.

Photograph C-47: View of FFA-46S, facing north.

Photograph C-48: View of FFA-47S, facing south.

Photograph C-49: View of FFA-48S, facing south.

Photograph C-50: View of FFA-49S, facing north.

Photograph C-51: View of FFA-50S, facing north.

Photograph C-52: View of FFA-51S, facing south.

Photograph C-53: View of FFA-52S, facing south.

Photograph C-54: View of FFA-53S, facing east.

Photograph C-55: View of FFA-54S, facing east.

Photograph C-56: View of FFA-55S, in low probability PSH-5, facing north.

Photograph C-57: View of FFA-56S, in low probability PSH-4, facing east.

Photograph C-58: View of big bluestem and switchgrass in low probability PSH-4, facing north.

Photograph C-59: View of FFA-57S, facing east.

Photograph C-60: View of FFA-58S, facing west.

Photograph C-61: View of FFA-59S, facing east.

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Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
O 816-333-9400
F 816-333-3690
www.burnsmcd.com