

**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

U.S. Fish & Wildlife Service, Regions 3 and 6

May 2016



Dakota Skipper

USFWS Photo

Contents

Background and Purpose	1
Current Versions of this Guidance.....	1
Range of Dakota Skipper	1
Section 7 of the Endangered Species Act and the Dakota Skipper	3
Section 7(a)(2) Consultation	3
Dakota Skipper Conservation – In Brief.....	8
Determining Presence/Absence of Dakota Skipper for an Action Area	9
Dakota Skipper Habitat Descriptions.....	10
‘Type A’ Habitats	10
‘Type B’ Habitats.....	12
Potential Threats and Impacts to Dakota Skipper	14
Consulting on Actions that May Affect Critical Habitat	15
Additional Information	16
List of Appendices	16
Literature Cited	17

Background and Purpose

On October 23, 2014, U.S. Fish and Wildlife Service (FWS) added the Dakota skipper (*Hesperia dacotae*) to the list of threatened species under the Endangered Species Act (ESA) (U.S. Fish and Wildlife Service 2014) and on October 1, 2015, FWS finalized its designation of critical habitat for the species. In accordance with ESA section 7(a)(2), federal agencies must consult with FWS on any proposed or ongoing action that may affect the species or its designated critical habitat.

The purpose of this guidance is to help action agencies determine whether section 7(a)(2) consultation with regard to the Dakota skipper and its critical habitat is required for any federal action that is proposed or ongoing within the species' range.

Current Versions of this Guidance

Check to make sure that you have the most recent version by comparing to the guidance version number at the following website –

http://www.fws.gov/midwest/endangered/section7/s7process/s7guid_cons.html#dask.

Range of Dakota Skipper

The Dakota skipper inhabits remnants of native prairie grassland in north-central United States and southern Canada (Fig. 1). In the United States, the species occurs in Minnesota, North Dakota, and South Dakota; in Canada it occurs in Manitoba and Saskatchewan (Fig. 1). The species may have once been distributed widely in the northern tallgrass prairie region, but is now extirpated from Illinois and Iowa and from many sites in the states and provinces where it still occurs. The Dakota skipper occurs primarily in fragmented patches of habitat within its current range. See the section, **Determining Presence/Absence of Dakota Skipper in an Action Area**, below, for guidance on determining whether or not the Dakota skipper may inhabit any specific area within its range.

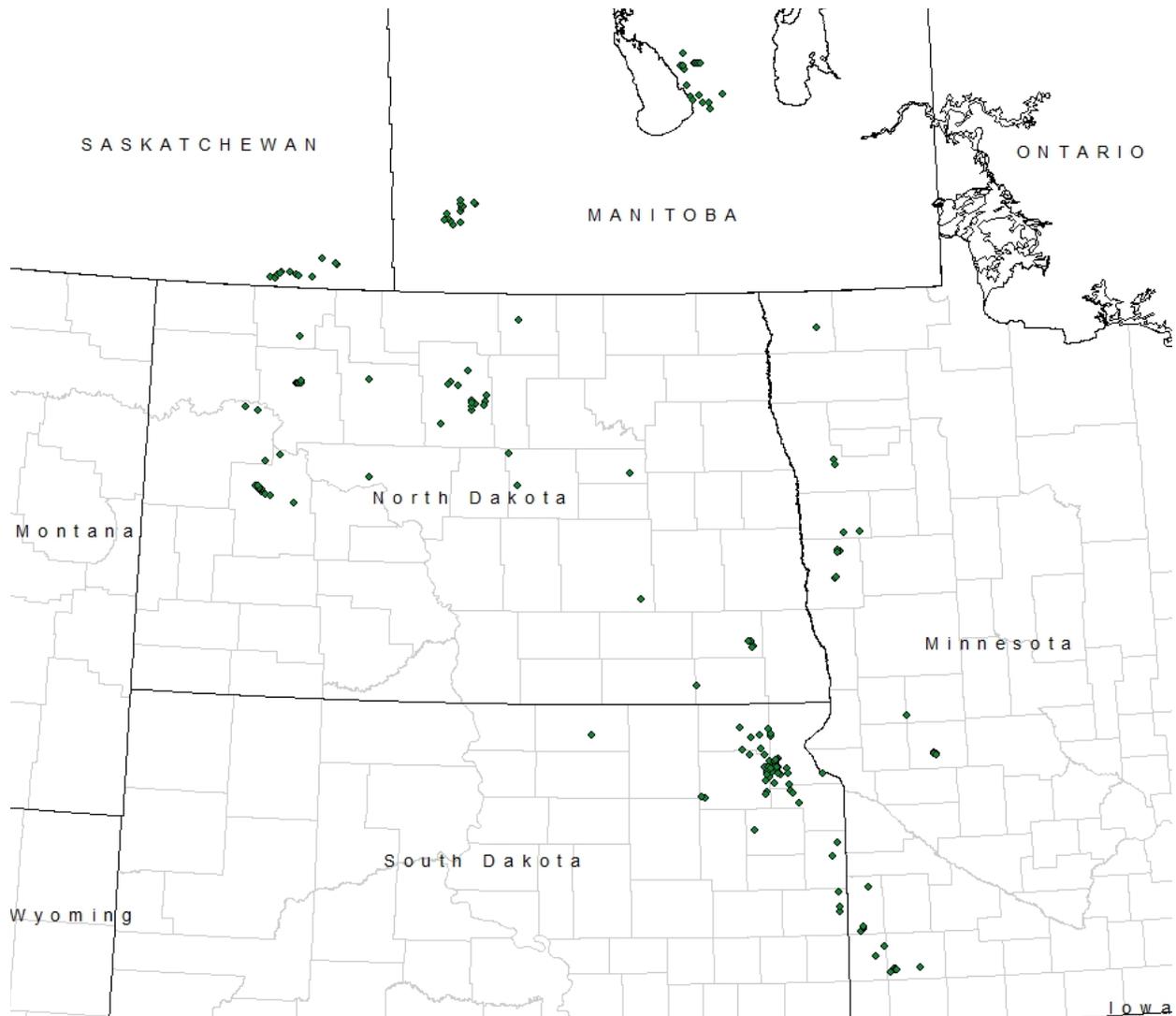


Figure 1. Locations of Dakota skipper records where the species may still be present based on data collected through 2015 (U.S. Fish and Wildlife Service Dakota skipper unpublished geodatabase). Points indicate locations where the species has been recorded at least once since 1993 and may still be present based on the best available information. Not shown are locations where Dakota skipper has been recorded, but is now likely extirpated based on known destruction of habitat or at least three sequential years of negative surveys.

Section 7 of the Endangered Species Act and the Dakota Skipper

Section 7(a)(2) Consultation

Under section 7(a)(2) of the ESA, federal agencies or their designated non-federal representatives must consult with FWS on any action that may affect any species listed as threatened or endangered or its critical habitat. Below we provide guidelines for meeting this requirement.

Step 1. Delineate the action area – the area that the action will affect directly or indirectly – and determine which of the following is true:

- The action area overlaps with one or more counties in which Dakota skipper is likely to be present (Table 1) and all or part of the action area may meet the description of Dakota skipper ‘Type A’ or ‘Type B’ habitat¹, which is described below in the section, **Dakota Skipper Habitat Descriptions**; if this is true, go to Step 2.
- The action area overlaps with one or more counties in which the Dakota skipper is likely to be present (Table 1), but habitat in the action area does not meet the description of Dakota skipper ‘Type A’ or ‘Type B’ habitat, which is described below in the section, **Dakota Skipper Habitat Descriptions**; if this is true, go to Step 3. (Note: Some areas designated as critical habitat for the Dakota skipper were intended to support dispersal among core habitat areas and may not meet the description of ‘Type A’ or ‘Type B’ Dakota skipper habitat. Therefore, you should still check to see if the action area contains critical habitat for the species.)
- The action area does not overlap with any of the counties in which Dakota skipper has been recorded and where one or more populations are likely extant (Table 1). The species is not likely to be present in the action area; if this is true, go to Step 3.

¹ For descriptions of Dakota skipper ‘Type A’ and ‘Type B’ habitat types, see the section, **Dakota Skipper Habitat Descriptions**, below.

Table 1. Counties in which Dakota skipper may be present. The following counties contain sites where the Dakota skipper has been recorded and where the species may still be present based on the best available information.

Minnesota	North Dakota	South Dakota
Clay	Burke	Brookings
Douglas	Dunn	Codington
Kittson	Eddy	Day
Lincoln	McHenry	Deuel
Murray	McKenzie	Grant
Norman	McLean	Marshall
Pipestone	Mountrail	McPherson
Polk	Ransom	Roberts
Pope	Rolette	
	Sargent	
	Stutsman	
	Ward	
	Wells	

Step 2. Contact FWS-ES (**Appendix A**) to determine whether the action area has been surveyed for Dakota skipper and whether the species is likely to be present. To determine whether the species is likely to be present in the action area, FWS-ES will review the survey history for the action area in its Dakota skipper geodatabase. If survey data indicate that the species is likely to be present in the action area or within one kilometer of the action area, then the Service will recommend that the action agency assume that Dakota skipper is present. The action agency should review its proposed or ongoing action to determine whether it may affect Dakota skipper (Fig. 2). FWS-ES may provide technical assistance to make this determination. If survey data are unavailable or inconclusive² for the Dakota skipper within a one kilometer radius of the action area, go to Step 4. If data and habitat information are conclusive and indicate that Dakota skipper is not likely to be present in the action area, go to Step 3.

Step 3. Determine whether the action area contains critical habitat for the Dakota skipper or the Poweshiek skipperling (*Oarisma poweshiek*).³ If the action area overlaps partially or entirely with a county that contains critical habitat for the Dakota skipper or the Poweshiek skipperling

² The status of the Dakota skipper may be considered inconclusive for areas that meet the description of ‘Type A’ or ‘Type B’ habitats (see **Dakota Skipper Habitat Descriptions**) and where the Dakota skipper was detected previously, but where less than three consecutive negative surveys have been conducted during the species’ flight period. In the FWS Dakota skipper geodatabase, the status of these sites is described as ‘unknown.’

³ FWS designated critical habitat for the Dakota skipper and the Poweshiek skipperling in a few counties from which the species have been extirpated. Therefore, an action area could overlap with critical habitat for one or both species even if the Dakota skipper is not likely to be present. Although the two species’ distributions overlapped extensively until recently, the Poweshiek skipperling may no longer occur in any area currently inhabited by the Dakota skipper.

(Table 2) contact FWS-ES (**Appendix B**) or use the USFWS Information for Planning and Conservation (IPAC) website (<https://ecos.fws.gov/ipac/>) to determine if the action area contains critical habitat for either species. If the action area does contain critical habitat for either species, we recommend coordinating with FWS-ES to determine whether the proposed or ongoing action may affect the critical habitat and whether the effects are likely to be adverse (Fig. 2).

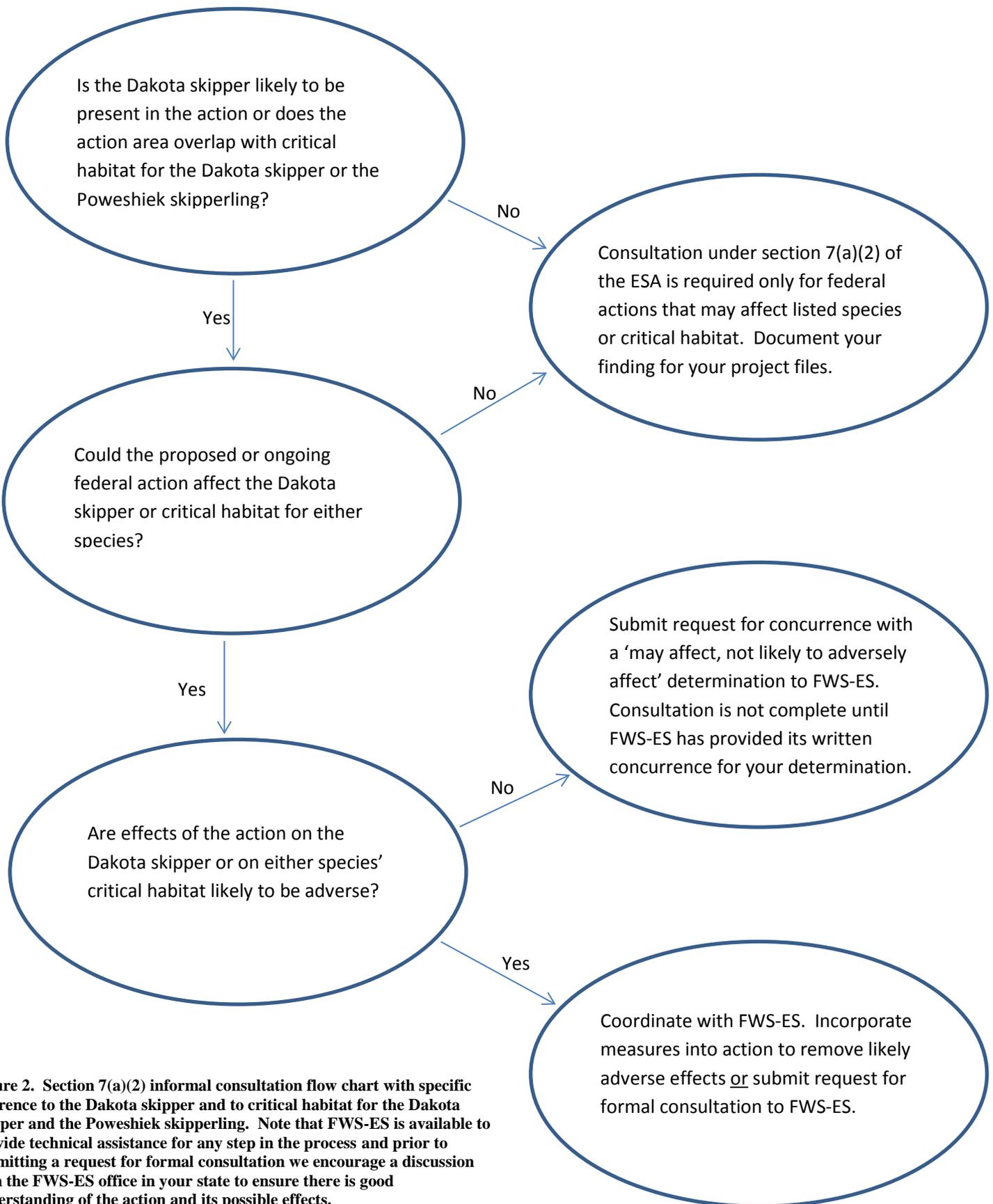


Figure 2. Section 7(a)(2) informal consultation flow chart with specific reference to the Dakota skipper and to critical habitat for the Dakota skipper and the Poweshiek skipperling. Note that FWS-ES is available to provide technical assistance for any step in the process and prior to submitting a request for formal consultation we encourage a discussion with the FWS-ES office in your state to ensure there is good understanding of the action and its possible effects.

Table 2. Counties that contain critical habitat for Dakota skipper or Poweshiek skipperling in Minnesota, North Dakota, and South Dakota. Note that some counties where the Dakota skipper is present do not contain critical habitat.

Minnesota	North Dakota	South Dakota
Chippewa	McHenry	Brookings
Clay	McKenzie	Day
Cottonwood	Ransom	Deuel
Douglas	Richland	Grant
Jackson	Rolette	Marshall
Kittson		Moody
Lac Qui Parle		Roberts
Lincoln		
Lyon		
Mahnomen		
Murray		
Norman		
Pipestone		
Polk		
Pope		
Swift		
Wilkin		

Step 4. If the action area may contain Dakota skipper ‘Type A’ or ‘Type B’ habitat that has not been surveyed or for which survey results are inconclusive, contact FWS-ES for technical assistance to determine whether the species may be present in the action area. If the best available information indicates that the action area contains Dakota skipper ‘Type A’ or ‘Type B’ habitat, the action agency should then review its proposed or ongoing action to determine whether it may affect the Dakota skipper (Fig. 2). All relevant information should be considered to determine where surveys for the species may be prudent.

Dakota Skipper Conservation – In Brief

Recovery of the Dakota skipper will be closely tied to the extent and condition of its native grassland habitat. The species is endemic to North American tallgrass and mixed grass prairie and does not inhabit non-native grasslands, weedy roadsides, tame hayland, or other habitats that are not remnant native prairie. In addition, Dakota skippers have not been recorded in reconstructed prairie – e.g., former cropland that has been replanted to native prairie. Therefore, conservation of the Dakota skipper is likely to rely on actions by conservation agencies, other state and federal agencies, tribal governments, non-governmental organizations, and private landowners to protect, restore, and maintain high-quality prairie remnants within the species' range (Fig. 1).

The Dakota skipper needs native prairie habitats that are diverse in flowering herbaceous plants and native grasses.⁴ Nectar is a critical as a source of water and nutrients for adult Dakota skippers during their flight period, which ranges from late June to early or mid-July. Flowering herbaceous plants (forbs) must be present in sufficient quantity and in proximity to suitable larval habitats to provide reliable sources of nectar for adults during their summer flight period. Plant species that are documented nectar sources for Dakota skipper are described below in the section, **Dakota Skipper Habitat Descriptions**.

Larvae rely for growth and survival on native grasses, such as prairie dropseed (*Sporobolus heterolepis*), little bluestem (*Schizachyrium scoparium*), and sideoats grama (*Bouteloua curtipendula*). These grass species typify the species' habitat along with other flowering herbaceous species (see **Dakota Skipper Habitat Descriptions**, below). Some important threats to the species may originate from areas outside of the prairie remnants that they inhabit. Nevertheless, the protection of high-quality remnant prairies that are well distributed throughout the species' range (Fig. 1) will be fundamental to the species' recovery.

The intensity, timing, duration, and extent of land management activities play critical roles in determining the species' persistence within habitat patches. Haying, grazing, and fire are essential management tools to maintain native prairie and the essential features of the Dakota skipper's grassland habitats. Due to fragmentation of the species' habitat, however, it is essential that these practices are carried out in ways that minimize adverse impacts to early life stages and that facilitate reproduction during the summer flight period. For recommendations on managing Dakota skipper habitat, see **Dakota Skipper Conservation**, below and **Appendix B – Dakota Skipper Conservation Guidelines**.

⁴ For a more thorough description of important features of Dakota skipper habitat, see **Dakota Skipper Habitat Descriptions**, below, and the list of Primary Constituent Elements for the species' critical habitat (**Appendix C**).

Determining Presence/Absence of Dakota Skipper for an Action Area

To determine whether section 7 consultation may be required, action agencies should first provide the FWS Ecological Services field office (FWS-ES) with a description of the area that would be affected, directly or indirectly, by the action.⁵ This area is referred to as the *action area*. FWS-ES will assist the action agency by reviewing the FWS Dakota Skipper geodatabase⁶ for any survey data that may be available for the action area and will also review the area to determine if it overlaps with critical habitat for the Dakota skipper or the Poweshiek skipperling. You may use the IPAC website (<https://ecos.fws.gov/ipac/>) to draw a polygon of the action area.

FWS-ES will use the best available information to determine whether the Dakota skipper is likely to be present in any action area. Where Dakota skipper survey data are available for the action area – or within one kilometer of the action area – FWS will assume that the species is likely to be present in an action area if both of the following are true:

- the action area may contain Dakota skipper habitat; and,
- the Dakota skipper was detected in the action area – or within one kilometer of the action area (a) during the most recent survey or (b) during at least one of the two or three most recent surveys conducted at the site in 1993 or more recently.⁷

Also see **Section 7(a)(2) Consultation Guidelines**, below, for additional guidance.

FWS will consider all relevant information to determine whether the Dakota skipper is likely to be present at any site, but will typically consider three consecutive negative surveys to be evidence that the species is absent from the area surveyed. To be informative with regard to the likelihood of the species' presence, surveys must be conducted within the Dakota skipper flight period and in accordance with standard methods for the species, as determined by FWS; sites must be surveyed effectively by persons with sufficient expertise and all Dakota skipper 'Type A' or 'Type B' habitat within the action area should be thoroughly searched. FWS is developing a survey protocol for the species to clarify these points. Until an official survey protocol is available, we recommend that suitable methods should resemble those as described by Royer et al. (2014, p. 2), which are summarized briefly below:

Survey methodology is based on "checklist" searching as defined by Royer et al. (1998). The process amounts to habitat-centered Pollard-style random walks. That is, Dakota skipper is searched for in patches of presumed habitat at each site. Searches are conducted according to the following parameters:

⁵ For a list of FWS-ES field offices, see **Appendix A**.

⁶ Dakota skipper survey data is contained in a geodatabase developed and maintained by the FWS Twin Cities Ecological Services Field Office. For each survey the database includes the date of the survey, whether or not Dakota skippers were observed, the name of the person who conducted the survey, the location of the survey, and other information.

⁷ The status of sites where the most recent survey was positive for the Dakota skipper will be described as 'present' in the FWS Dakota skipper geodatabase. The status of sites where the Dakota skipper was detected previously, but not during the most recent one or two surveys will be described as 'unknown' in the database.

- The sampling day generally begins after 9:00 am and ends no later than 5:00 pm local time;
- Survey walking pace is kept steady and regular at approximately 35 meters/minute;
- Only individual Dakota skippers identified within an estimated 5.0 meters on either side of the surveyor, within 5.0 meters of the ground, or 5.0 meters to the front are considered to be an “encounter;” and,
- Only confident identification (e.g., net and release, close-up [perched] examination, confirmed photograph) is considered a valid encounter.

In addition to survey data, information on the nature and condition of plant communities present in the action area should also be reviewed to determine whether Dakota skipper may be present in an action area. Plant community characteristics of Dakota skipper habitat are described in the following section. Information on land management may also be useful in some cases. For example, if an area was plowed and used for row crop agriculture it is unlikely to support Dakota skipper habitat.

Dakota Skipper Habitat Descriptions

‘Type A’ Habitats

In the United States, Dakota skipper occurs in two general habitat types. The first is a low wet-mesic prairie with little topographic relief that occurs on near-shore glacial lake deposits – Royer et al. (2008, p. 14-16) refer to this as ‘Type A’ Dakota skipper habitat (Fig. 3). In the United States, ‘Type A’ Dakota skipper habitat occurs primarily in North Dakota, but it may also comprise a small amount of the species’ habitat in northeastern South Dakota. ‘Type A’ habitat may be flooded in some years, but has “sufficient relief to provide segments of non-inundated habitat during the spring larval growth period within any single season” (Royer et al. 2008, p. 15; Royer et al. 2014, p. v).

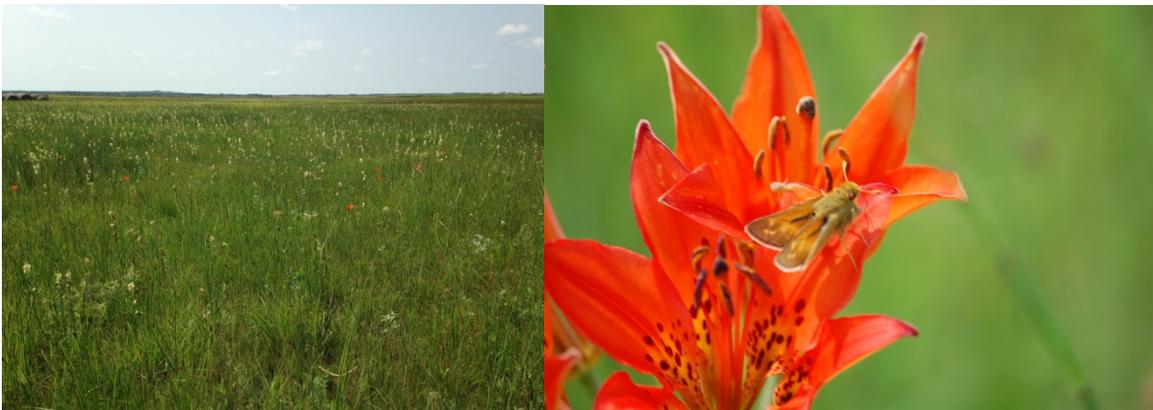


Figure 3. ‘Type A’ Dakota skipper habitat in McHenry County, North Dakota (Royer et al. 2014). Note the abundant mountain deathcamas (white flowers) and the scattered prairie lilies (orange flowers). A male Dakota skipper perched on a prairie lily in ‘Type A’ habitat in McHenry County, North Dakota is shown at right.

The plant species that are most useful for identifying Dakota skipper ‘Type A’ habitats vary throughout the growing season (Rigney 2013). During Dakota skipper’s flight period in ‘Type A’ habitats three plant species are almost always present and blooming: prairie lily (*Lilium philadelphicum*), bluebell bellflower

(*Campanula rotundifolia*), and mountain deathcamas (smooth camas; *Zigadenus elegans*) – the latter appears to be an especially strong indicator of Dakota skipper ‘Type A’ habitat in North Dakota (McCabe 1981, p. 190; Royer et al. 2014, p. 1). Later in the season, common forbs in bloom in ‘Type A’ habitat include Rocky Mountain blazing star (*Liatris ligulistylis*), Canada goldenrod (*Solidago canadensis*), strict blue-eyed grass (*Sisyrinchium montanum*), common goldstar (yellow star grass; *Hypoxis hirsuta*), and blackeyed Susan (Lenz 1999, p. 6). ‘Type A’ habitats also contain small patches of dry-mesic prairie inhabited by Dakota skippers. Stiff sunflower (*Helianthus pauciflorus* Nutt. ssp. *pauciflorus*) and candle anemone (*Anemone cylindrica*) are typical in these dry-mesic habitats; purple coneflower (*Echinacea angustifolia*), an indicator of ‘Type B’ habitats (see below) may be present, but is rare in these dry-mesic ‘inclusions’ (Lenz 1999, p. 6-11).

Plants that are important as nectar sources for Dakota skipper ‘Type A’ habitats appear to vary geographically, but blackeyed Susan (*Rudbeckia hirta* L. var. *pulcherrima*) is significant throughout the range of this habitat type. In Manitoba most nectaring observed was on blackeyed Susan among 12 species documented as nectar sources (Rigney 2013, p. 59-62; Table 3). McCabe (1981, p. 187) also reported more sightings of nectaring on blackeyed Susan than on any other species in North Dakota ‘Type A’ habitats. He also reported the use of bluebell bellflower as a nectar source for the Dakota skipper in North Dakota (McCabe 1981, p. 187). Rigney (2013, p. 143) did not report nectaring on bluebell bellflower or prairie lily – two of the three primary indicators of ‘Type A’ habitat in North Dakota – and she reported only one incidence of nectaring on mountain deathcamas (Table 3). McCabe had earlier reported that “At no stage is the skipper dependent on camas...” (McCabe 1981, p. 190). Habitat value for Dakota skippers may be greater where a variety of species that serve as nectar sources are present because plant species likely vary in their value as nectar sources due to the amount of nectar available during the adult flight period (Dana 1991, p. 48).

Table 3. Plant species reported as nectar sources for Dakota skipper in ‘Type A’ habitats by Rigney (2013) in Manitoba.

Species	Common Name ⁸	No. Nectaring Observations in Manitoba (Rigney 2013, p. 59-62)	Nectar Use Reported by McCabe (1981) in North Dakota?	Notes
<i>Rudbeckia hirta</i>	blackeyed Susan	≈112	Yes	
<i>Dalea candida</i>	white prairie clover	7	“Available at most sites, but not used”	
<i>Melilotus officinalis</i>	sweetclover	6	No	Exotic species
<i>Gaillardia aristata</i>	blanketflower	6	Yes	
<i>Lobelia spicata</i>	palespike lobelia	5	No	Described as nectar source for some North Dakota sites by McCabe (1979)
<i>Cirsium flodmanii</i>	Flodman’s thistle	3	No	
<i>Crepis runcinata</i>	fiddleleaf hawkbeard	2	No	
<i>Oligoneuron album</i>	prairie goldenrod	2	No	Formerly <i>Solidago ptarmicoides</i> ; documented in North Dakota ‘Type A’ habitats (Lenz 1999)
<i>Zigadenus elegans</i>	mountain deathcamas	1	“At no stage is the skipper dependent on camas...” (McCabe 1981, p. 190)	Strong indicator of Dakota skipper ‘Type A’ habitat in North Dakota (McCabe 1981, p. 190)
<i>Dalea purpurea</i>	purple prairie clover	1	No	
<i>Oenothera biennis</i>	common evening primrose	1	No	
<i>Agoseris glauca</i>	pale agoseris	1	No	

⁸ Source for common names and taxonomy – U.S. Department of Agriculture, Natural Resources Conservation Service, PLANTS Database – <http://plants.usda.gov/java/>.

Big bluestem (*Andropogon gerardii*) and little bluestem are typically the dominant grasses in North Dakota ‘Type A’ habitats and indiagrass (*Sorghastrum nutans*) may also be present (Royer et al. 2014, p. 1). Dakota skipper adults are typically encountered in “pre-floral stands” of these grass species where they are associated with the forb species described above and in the following paragraph (Royer et al. 2014, p. 1).

In northeastern South Dakota, Dakota skippers inhabit primarily ‘Type B’ habitats with abundant purple coneflower (see below), but have also been observed in wet-mesic prairie that is dominated by big bluestem (Skadsen 1997, p. 4). Where Dakota skipper have been reported from wet-mesic prairie in South Dakota, typical ‘Type B’ (see below) habitats managed with fall haying were always nearby (Skadsen 2006, p. 2).

‘Type B’ Habitats

The second Dakota skipper habitat type, referred to as ‘Type B’ by Royer *et al.* (2008, p. 14), occurs primarily on rolling terrain over gravelly glacial moraine deposits and is dominated by big bluestem, little bluestem, and needle or porcupine grasses (*Hesperostipa spp.*) (Fig. 4). As in ‘Type A’ habitats, bluebell, bellflower and prairie lily are present in ‘Type B’ habitats, but they support more extensive stands of purple coneflower, upright prairie coneflower (*Ratibida columnifera*), and common gaillardia (blanketflower; *Gaillardia aristata*) (Royer et al. 2014, p. 1-2). Each of these is a documented nectar source for the Dakota skipper in ‘Type B’ habitats (McCabe 1981; Dana 1991). Little bluestem and porcupine grass (*Hesperostipa spartea*) are the predominant grass species in South Dakota ‘Type B’ habitats, but side oats grama, needle-and-thread grass (*H. comata*), and prairie dropseed are also typical (Skadsen 2006, p. 1-2). In a variant of ‘Type B’ habitats found in western North Dakota (Fig. 5), western wheatgrass (*Pascopyrum smithii*) is also typical (Royer et al. 2014, p. 1).



Figure 4. ‘Type B’ Dakota skipper habitats in Minnesota (left) and South Dakota (right). USFWS photos.



Figure 5. Primarily in the foreground, a variant of Dakota skipper ‘Type B’ habitat in McKenzie County, ND (Royer et al. 2014).

Dakota skipper ‘Type B’ habitats typically support a high diversity and abundance of native forbs, including purple coneflower, purple prairie clover (*Dalea purpurea*), white prairie clover (*D. candida*), yellow sundrops (*Calylophus serrulatus*), prairie groundsel (*Packera plattensis*), groundplum milkvetch (*Astragalus crassicaarpus*), eastern pasqueflower (*Pulsatilla patens*), old man’s whiskers (prairie smoke, *Geum triflorum*), western silver aster (*Symphyotrichum sericeum*), dotted blazing star (*Liatris punctata*), tall blazing star (*L. aspera*), meadow zizia (heartleaf golden alexanders; *Zizia aptera*), blanket flower (*Gaillardia sp.*), prairie sagewort (*Artemisia frigida*), and leadplant (*Amorpha canescens*) (Skadsen 2006, p. 1-2). Prairie milkvetch (*Astragalus laxmannii* Jacq. var. *robustior*) also occurs in ‘Type B’ habitats in Minnesota (Dana 1997, p. 8).

In the rolling terrain of river valleys and the Missouri Coteau of North Dakota, on the western edge of the species’ known range, Dakota skippers inhabit a variant of ‘Type B’ habitats (Fig. 5). These habitats typically contain an association of little bluestem, big bluestem, and needlegrasses that is often invaded by Kentucky bluegrass (*Poa pratensis*) (Royer and Marrone 1992, p. 22). These prairies, also typically contain prairie lily, bluebell bellflower, coneflowers, and other asters as nectar sources; in some areas, mountain deathcamas also occurs (Royer and Marrone 1992, p. 22).

Potential Threats and Impacts to Dakota Skipper

Loss of native prairie and the degradation of remaining patches of habitat have led to the decline of Dakota skipper and pose continuing threats to the species' continued existence. Factors responsible for habitat loss and degradation include conversion of native prairie to cropland or for development; ecological succession to habitats dominated by brush or trees; invasive species; flooding; and, grazing, fire, or haying that degrades or destroys the species habitat. In some cases, habitat management that is too intense, widespread, and persistent removes essential habitat features (e.g., nectar plants) and may impede reproduction or cause unsustainable levels of mortality.

Other factors that may have played a role in the decline of the Dakota skipper include adverse impacts of herbicides and, pesticides; and weather patterns, such as drought.

Conservation of the Dakota skipper will rely on effective partnerships between private, tribal, and public landowners who manage the species' habitat and agencies working to recover the species. In the absence of grazing, fire, or haying, Dakota skipper habitat is likely to become too brushy or wooded to support the species (e.g., Rigney 2013, p. 151). Nevertheless, management of Dakota skipper habitat must be implemented carefully to avoid excessive mortality or significant depletion of important nectar and larval food sources. Minimizing adverse effects of management by engaging landowners in conservation is especially important for populations that inhabit small and isolated habitat patches.

Multiple factors require managers to carefully plan and implement habitat management activities to conserve remaining Dakota skipper populations. The litter-dwelling habits of Dakota skipper larvae; the single annual flight period; and, habitat fragmentation all reduce the species' resiliency to the effects of intense management practices. During the vast majority of their annual life cycle Dakota skippers are larvae that occur at the bases of their food plants (Fig. 6). Fire is likely to kill some portion of larvae in the burned area and under certain conditions mortality may be high (Dana 1991). Fuel loads, soil temperatures, weather and other factors all likely play a role in the proportion of the larvae that are killed by fire (Dana 1991). Post-fire recovery in the burned area may take years, depending on the proportion of the local population that was killed and the effect of immigration from nearby unburned areas. Immigration may only be effective if a stable or growing population of Dakota skipper is left unburned near the burned area – perhaps less than a kilometer away.

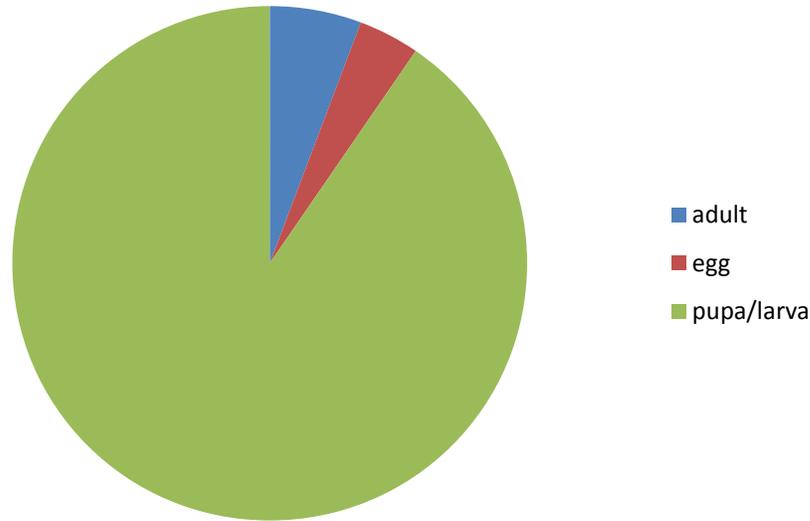


Figure 6. The vast majority of Dakota skipper’s life is spent as a larva, on or near the ground surface.

When Dakota skipper larvae metamorphose into adults in late June or early July, habitats must provide nectar sources that are sufficient in quality and quantity to meet the butterflies’ water and nutritional requirements. Although brief, the adult flight period is crucial – failure to reproduce during this period may result in the species’ local extirpation. Extirpation of Dakota skipper from a habitat patch may be permanent if it is not near another population. Therefore, it is essential that managers consider the likely impacts on both larvae and adults within the management area when planning and implementing management actions. An initial assessment of the site and its Dakota skipper population conducted by a species expert and frequent reevaluation of the population are essential.

When proposing or carrying out actions that affect areas where Dakota skipper may be present, there is a variety of ways to avoid or minimize impacts to the species. Please see **Appendix B** of this document for a list of conservation measures for Dakota skipper.

Consulting on Actions that May Affect Critical Habitat

As with effects to species, federal agencies must consult with the Service under section 7(a)(2) of the ESA on any action that may affect critical habitat. Any analysis of effects to critical habitat should consider the potential effects to the essential physical and biological features – also called primary constituent elements – that comprise critical habitat. We recommend that federal agencies analyze effects of any action on each of the primary constituent elements individually (see **Appendix C** for the primary constituent elements of critical habitat for the Dakota skipper and for the Poweshiek skipperling). If implementation of a proposed or ongoing federal action is likely to result in adverse effects to any primary constituent element, formal consultation with FWS is required unless the agency incorporates conservation measures into the action that remove the likelihood of adverse effects.

Additional Information

For any questions or comments related to this guidance or in relation to the requirements and processes for consulting or conferring on actions and their potential effects to Dakota skipper and its critical habitat, respectively, see the contacts listed in **Appendix A**.

List of Appendices

Appendix A – Ecological Services Field Offices

Appendix B – Dakota Skipper Conservation Guidelines

Appendix C – Primary Constituent Elements for Dakota Skipper Critical Habitat and Poweshiek Skipperling Critical Habitat

Literature Cited

- Dana, R. 1997. Characterization of three Dakota skipper sites in Minnesota. Minnesota Department of Natural Resources, Natural Heritage and Nongame Research Program, St. Paul, MN. 17 p.
- Dana, R. P. 1991. Conservation management of the prairie skippers *Hesperia dacotae* and *Hesperia ottoe*. Minnesota Agricultural Experiment Station, University of Minnesota, St. Paul, Minnesota. 63 p.
- Lenz, D. 1999. Characterization of Dakota skipper habitat in the Towner-Karlsruhe prairie complex. Natural Heritage Inventory, Nature Preserves Program, North Dakota Parks and Recreation Department, Bismarck, North Dakota. 23 p.
- McCabe, T. L. 1979. Dakota skipper (Lepidoptera: Hesperiiidae; *Hesperia dacotae* (Skinner)) within the Garrison Diversion Unit, North Dakota. 46 p.
- McCabe, T. L. 1981. The Dakota skipper, *Hesperia dacotae* (Skinner): Range and biology, with special reference to North Dakota. *Journal of the Lepidopterists' Society* **35**:179-193.
- Rigney, C. L. 2013. Habitat characterization and biology of the threatened Dakota skipper (*Hesperia dacotae*) in Manitoba. Masters of Science. The University of Winnipeg, Winnipeg, Manitoba, Canada. 259 p.
- Royer, R. A., J. E. Austin, and W. E. Newton. 1998. Checklist and "Pollard Walk" Butterfly Survey Methods on Public Lands. *American Midland Naturalist* **140**:358-371.
- Royer, R. A. and G. M. Marrone. 1992. Conservation status of the Dakota skipper (*Hesperia dacotae*) in North and South Dakota. U.S. Department of the Interior, Denver, CO. 44 p.
- Royer, R. A., R. A. McKenney, and W. E. Newton. 2008. A characterization of non-biotic environmental features of prairies hosting the Dakota skipper (*Hesperia dacotae*, Hesperiiidae) across its remaining U.S. range. *Journal of the Lepidopterists Society* **62**:1-17.
- Royer, R. A., M. R. Royer, and E. A. Royer. 2014. Dakota skipper field survey and habitat assessment at twelve North Dakota sites during the 2014 season. A final report submitted to Twin Cities Field Office, U.S. Fish and Wildlife Service, Bloomington, MN. Minot State University, Minot, ND. 53 p.
- Skadsen, D. R. 1997. A report on the results of a survey for Dakota skipper [*Hesperia dacotae* (Skinner, 1911)] in northeast South Dakota during the 1996 and 1997 flights. South Dakota Department of Game, Fish, and Parks, Pierre, SD. 34 p.
- Skadsen, D. R. 2006. Surveys for Butterflies Listed as Endangered, Threatened or Species of Tribal Concern on the Sisseton-Wahpeton Oyate Lake Traverse Reservation. Natural History Investigations and Biological Services, Inc., Webster, SD. 18 p.
- U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Threatened Species Status for Dakota Skipper and Endangered Species Status for Poweshiek Skipperling; Final Rule Federal Register **79**:63672-63748.

Appendix A – Ecological Services Field Offices

Minnesota

Phil Delphey
U.S. Fish and Wildlife Service
4101 American Blvd. E.
Bloomington, MN 55425
952.252-0092 x206
phil_delphey@fws.gov

North Dakota

Kevin Shelley
U.S. Fish and Wildlife Service
3425 Miriam Avenue
Bismarck, North Dakota 58501-7926
701.355-8503
heidi_riddle@fws.gov

South Dakota

Charlene Bessken
U.S. Fish and Wildlife Service
420 S. Garfield Avenue, Suite 400
Pierre, SD 57501-5408
605.224-8693 ext. 231
charlene_bessken@fws.gov

Appendix B – Dakota Skipper Conservation Guidelines

Background

Dakota skippers (*Hesperia dacotae*) occur only in remnants of the native grassland that once covered vast areas of the north-central United States and nearby Canada and are now listed as threatened under the Endangered Species Act (U.S. Fish and Wildlife Service 2014). To recover the species, its' remaining habitats must be managed with grazing, fire, or haying to maintain the diversity of native prairie plant species on which Dakota skipper relies. Unless implemented appropriately, however, these practices may also result in levels of mortality or adverse effects to reproduction that are too high to ensure the persistence of local populations. Land management may also degrade habitat conditions to the degree that the species is extirpated from the affected area.

Within a management area, effective conservation of Dakota skipper often relies on a thorough understanding of the species' distribution and the current condition of the species' habitat. In addition, it is important to consider the effects of management on Dakota skipper larvae (caterpillars) because the species remains in the larval stage for most of its life cycle – from about late July until the following June or July. The adult flight period, although short, is a critical period because failure to reproduce in any single year may result in the extirpation of local populations. Many Dakota skipper populations are isolated due to habitat fragmentation. As a result, the species is often unable to recolonize isolated habitat patches.

In the United States, Dakota skipper occurs in two general habitat types. The first is a low wet-mesic prairie with little topographic relief that occurs on near-shore glacial lake deposits – Royer et al. (2008, p. 14-16) refer to this as 'Type A' Dakota skipper habitat (Fig. 6). In the United States, 'Type A' Dakota skipper habitat occurs primarily in North Dakota, but it may also comprise a small amount of the species' habitat in northeastern South Dakota. 'Type A' habitat may be flooded in some years, but has "sufficient relief to provide segments of non-inundated habitat during the spring larval growth period within any single season" (Royer et al. 2008, p. 15; Royer et al. 2014, p. v).



Figure 1. ‘Type A’ Dakota skipper habitat in McHenry County, North Dakota (Royer et al. 2014). Note the abundant mountain deathcamas (white flowers) and the scattered prairie lilies (orange flowers).

Dakota skipper ‘Type B’ habitats typically support a high diversity and abundance of native forbs, including purple coneflower, purple prairie clover (*Dalea purpurea*), white prairie clover (*D. candida*), yellow sundrops (*Calylophus serrulatus*), prairie groundsel (*Packera plattensis*), groundplum milkvetch (*Astragalus crassicaarpus*), eastern pasqueflower (*Pulsatilla patens*), old man’s whiskers (prairie smoke, *Geum triflorum*), western silver aster (*Symphyotrichum sericeum*), dotted blazing star (*Liatris punctata*), tall blazing star (*L. aspera*), meadow zizia (heartleaf golden alexanders; *Zizia aptera*), blanket flower (*Gaillardia sp.*), prairie sagewort (*Artemisia frigida*), and leadplant (*Amorpha canescens*) (Skadsen 2006, p. 1-2). Prairie milkvetch (*Astragalus laxmannii* Jacq. var. *robustior*) also occurs in ‘Type B’ habitats in Minnesota (Dana 1997, p. 8).

In the rolling terrain of river valleys and the Missouri Coteau of North Dakota, on the western edge of the species’ known range, Dakota skippers inhabit a variant of ‘Type B’ habitats (Fig. 8). These habitats typically contain an association of little bluestem, big bluestem, and needlegrasses that is often invaded by Kentucky bluegrass (*Poa pratensis*) (Royer and Marrone 1992, p. 22). These prairies, also typically contain prairie lily, bluebell bellflower, coneflowers, and other asters as nectar sources; in some areas, mountain deathcamas also occurs (Royer and Marrone 1992, p. 22).

Recommended Conservation Measures

Develop Accurate and Up-to-Date Information for the Management Area

Conservation of the Dakota skipper relies on a thorough and accurate understanding of the species' distribution and status within a management area.¹ The species and its habitat are likely to be non-uniformly distributed within management areas (Rigney 2013, p. 140). Therefore, it is essential to map habitat and Dakota skipper distribution within management areas as frequently as is feasible to ensure that plans are based on information that is correct and up-to-date.

Prescribed Fire

Although it may lead to increases in the density of forb species that provide nectar and of the native grasses that provide food for larvae, fire may kill all or a substantial proportion of Dakota skipper larvae present in the burn area. It is essential to take this into account when planning and implementing prescribed burns. In addition, fire may not be needed to conserve a Dakota skipper population unless certain aspects of the plant community (low density of nectar or larval food plants) are currently limiting population growth.

- Divide Dakota skipper habitat at the site into as many burn units as is feasible – at least three – and burn no more than one unit in any single year. Units should contain approximately equal amounts of Dakota skipper habitat to ensure that the population is not disproportionately affected by any single burn. If it is not practicable to divide Dakota skipper habitat into at least three burn units within a management area, then we recommend managing the site with haying or carefully implemented grazing, if feasible. In cases where there are nearby local populations of Dakota skipper that will provide immigrants from outside of the management area it may also be feasible to conserve a Dakota skipper population with less than three burn units, but that would require close coordination with neighboring landowners to ensure that dispersal of adults is likely to be sufficient to reinforce numbers in the burned area (see **Coordinated Management**, below).
- Use the maximum length fire return interval that is adequate to maintain or restore high-quality native prairie habitat on each unit. Allow *at least* 3 years to elapse without fire (i.e., minimum 4-year rotations) before re-burning any area.
- If feasible to achieve management objectives, allow fires to burn in a patchy (“fingering”) pattern within units. Do not make a concerted effort to burn ‘every square inch’; leave fire “skips” unburned. Burning under cool or damp conditions may increase survival of insects present in the litter layer within the burned unit (Panzer 2003).
- Map the extent of each fire in Dakota skipper habitat to ensure that future fire planning is based on an accurate understanding of prior fire history.
- Consider the use of proactive techniques to increase the patchiness of fires, especially if habitats that would serve as sources of recolonizing adults are small or not contiguous with the burn unit.

¹ “Management area” and “site” are used interchangeably in these guidelines to refer to a distinct management area that is under a single jurisdiction – e.g., a wildlife management area, preserve, U.S. Fish and Wildlife Service Waterfowl Production Area, grazing unit, etc.

- Conduct pre-burn surveys and evaluate other applicable information to understand the distribution and relative abundance of Dakota skippers within and among burn units. Poor weather or other conditions (e.g., persistent high winds; limited availability of qualified surveyors) may reduce the likelihood of adequate survey conditions during the flight period in any given year. Therefore, it may be prudent to plan surveys for at least two consecutive years before a planned burn.
- If feasible to achieve management objectives, conduct spring burns as early as is feasible – this may limit larval mortality because larvae may still be in shelters at or below the ground surface. Late spring burns may also delay flowering of early and midsummer blooming forbs, which may limit nectar sources for Dakota skippers during their flight period (Dana 1991:56).
- Fall burns may result in higher soil temperatures than early spring burns and greater mortality of larvae, even after they have retreated for the season to shelters at or below the ground surface. In addition, the removal of plant material by fall burns may expose larvae to greater temperature extremes during winter.
- High fuel levels increase the likelihood that fires will kill Dakota skippers, even during early spring burns when larvae are still in their subsurface shelters. Therefore, consider reducing fuel levels (e.g., by haying the previous fall) before conducting burns where fuel levels seem to be high – if that would not interfere with the burn objectives.
- If fires may need to be conducted in late spring to address a particular management need (e.g., control of smooth brome, *Bromus inermis*), other precautionary measures will be especially important. These include the division of occupied Dakota skipper habitat into as many burn units as is practicable; ensuring that fires do not escape from burn units; maximizing the number of years between fires; and, reducing fuel loads (e.g., by haying or grazing) in Dakota skipper habitat in units where frequent or intense fire is not necessary.
- Be sure to consider any other rare, prairie-dependent species present on sites when designing burn plans. Other species of butterflies that rely on native prairie and are of significant conservation concern (e.g., Iowa skipper, *Atrytone arogos iowa*) may still be vulnerable to high fire mortality even during early spring fires because these species' diapausing (dormant) larvae are present above the ground surface (e.g., in the foliage). Moreover, subsurface temperatures may reach lethal levels where fuel loads are especially high (see below) reducing any mitigating effect of burning early in the spring.
- If you plan to change the configuration of burn units or make other changes to your prescribed fire plan, review the location and timing of recent burns to understand the potential effects of these previous fires on the current abundance and distribution of Dakota skippers on the management area.
- Plan for escape of fires out of burn units if that is a reasonable possibility. That is, plan for the contingency that a prescribed fire will escape a burn unit and burn one or more additional units that contain Dakota skipper habitat. If this is reasonably likely, determine how the Dakota skipper population would persist despite such a scenario.

Haying and Native Seed Harvest

Haying can be effective at precluding invasion of a site by trees (e.g., Rigney 2013, p. 162), but must be delayed until at least after the flight period is completed to minimize adverse effects to Dakota skipper populations.

- In at least most of the Dakota skipper habitat within a site, hay or collect seed as late as is practicable to reduce the likelihood of removing or destroying Dakota skipper eggs and to avoid removing nectar sources or killing adults during the flight period. Delay haying at least until the Dakota skipper flight has ended locally to avoid disturbance of adults during the critical reproduction (flight) period. Contact the Ecological Services Field Office in your state (see Appendix) if you are uncertain whether the Dakota skipper flight has ended. The flight period shifts slightly each year in response to annual weather patterns. In general, hay or mow as late as is feasible to reduce the likelihood of adverse effects to any life stage.
- Leave at least 20 cm (8 inches) of stubble to provide habitat for over-wintering larvae. The ideal time to mow may be after Dakota skipper larvae have entered diapause (i.e., have become dormant in preparation for winter). Although there is no convenient method to know when this has occurred, the senescence of native warm-season grasses may be a good indication that Dakota skippers have entered diapause.
- As with annual burning, annual haying may reduce plant diversity in tallgrass prairie. Therefore, rest hayed areas at least occasionally as suggested by Royer et al. (2014, p. 16). Resting hay units may also reduce any adverse effects that may occur from haying that is conducted early enough to adversely affect Dakota skippers or other species dependent on native prairie (e.g., Ottoe skipper, *H. ottoe*).

Grazing

It is difficult to describe generally the effects of grazing on Dakota skipper populations. Therefore, planning and implementation of grazing at sites inhabited by the species should include the combined skills and knowledge of persons with Dakota skipper expertise and persons with grazing expertise. Also critical is the input of the landowner or land manager who is familiar with the site's grazing history and characteristics.

The special rule for the Dakota skipper exempts incidental take of the species that may be caused by grazing on non-federal lands. (For a set of frequently asked questions regarding the special rule, see <http://www.fws.gov/midwest/endangered/insects/dask/DASKfinal4dRuleFAQs22Oct2014.html>). This provides an opportunity to experiment with grazing techniques that may result in some take of Dakota skippers, but that have the potential for long-term benefits to the species. Experimentation may be most appropriate and useful where habitats have been degraded due to prior management or other factors and are near existing populations of the Dakota skipper. At these sites, immigration and reestablishment or increase of the species at the site could provide evidence that grazing management has succeeded.

The following are recommendations that may apply generally or may help to develop a starting point for developing site specific plans.

- Beyond a certain level, grazing is likely to adversely affect Dakota skipper populations in proportion to its intensity due to a reduction in nectar resources and other factors. For example, overgrazing may result in an increased coverage of invasive species and a reduced density of nectar plants and larval food plants (Smart et al. 2011; Rigney 2013, p. 143 and 153). (See Tables 1 and 2 for lists of important nectar plants in the Dakota skipper’s two basic habitat types.)

Table 1. Four species used most as nectar sources by Dakota skippers in Minnesota ‘Type B’ habitats (Dana 1991). Number of nectaring observations by Dana: V = very common (many hundreds, not enumerated); C = common (about 35 visits); F = frequent (11-25); O = occasional (1-10); R = rare (2-4).

Species	Males	Females
Purple coneflower (<i>Echinacea angustifolia</i>)	V	V
Prairie milkvetch (<i>Astragalus laxmannii</i> Jacq. var. <i>robustior</i>)	C	F
Hoary vervain (<i>Verbena stricta</i>)	O	F
Purple locoweed (<i>Oxytropis lambertii</i> Pursh var. <i>lambertii</i>)	F	R

- Avoid or minimize the extent of grazing regimes that reduce the density or diversity of floral nectar resources during the flight period. To protect nectar resources and vegetation for egg deposition in South Dakota, for example, “it may only be feasible to graze dry-mesic prairie slopes in the spring (April – May) before the growth of warm season grasses and forbs begins, with a minimum one-year rest period between rotations” (Skadsen 2003). This is an example of a hypothesis that could be tested in the context of a site-specific grazing plan.
- Include at least one period of rest during the growing season and do not graze a site during the same time each year.
- Purple coneflower (*Echinacea angustifolia*) and other important nectar species *may* be good indicators of grazing effects. For example, declines in purple coneflower may be indicative of current or pending adverse effects to Dakota skippers due to reduction in nectar sources and general degradation of the prairie plant community.
- Adverse effects may occur at lower grazing intensities in the wet-mesic prairies that Dakota skippers inhabit in parts of North Dakota and Manitoba than in the dry-mesic habitat type. Virtually all of the sites with the wet-mesic habitat type at which Dakota skippers still occur are managed with fall or late-summer haying. To ensure the persistence of Dakota skippers at these sites, they should not be grazed unless grazing methods are carefully developed that are shown to not preserve essential features of this habitat type.

Habitat Preservation and Restoration

Successful restoration of Dakota skipper habitat has not been demonstrated and overall butterfly species diversity is lower on restored than on remnant prairies (Shepherd and Debinski 2005). There is no evidence to support a presumption that destroyed Dakota skipper habitat could be restored through planting or other means.

- Avoid any destruction or conversion of Dakota skipper habitats to other uses.
- Degraded Dakota skipper habitats *may* be recoverable, especially if the adverse management has not been especially intense or of long duration. A site-specific analysis would be necessary to determine appropriate measures to attempt restoration of the species and its habitat at degraded sites.
- Restoration of destroyed (e.g., plowed) or severely degraded Dakota skipper habitat should be considered experimental and would have to take place near a remnant prairie inhabited by Dakota skippers (e.g., 250 - 500 m away) to have a reasonable chance for colonization of the restored habitat. Sites adjacent to occupied habitats or connected to occupied habitats by suitable habitat corridors may be best for any restoration experiments.
- Techniques to attempt restoration could consist of a variety of activities (e.g., rest from grazing, tree or brush removal, planting native species, etc.), depending on the site conditions and land-use history. Restoration experiments that involve reintroduction of native plant species should be designed to mimic the floral diversity of Dakota skipper's native prairie habitats and should emphasize Dakota skipper nectar and larval food sources, as appropriate (see Cochrane and Delphey 2002). In addition, they may only be likely to succeed if the underlying site characteristics (e.g., soils) are conducive to the development or restoration of other key components of the species' habitat.
- Road rights-of-way containing native prairie habitat may serve as corridors for grassland butterflies (Ries and Debinski 2001), but the cooperation of the highway managers is very important to prevent untimely mowing or spraying of these areas.
- If Dakota skippers are extirpated from a site or once occurred there, manage it to favor the recolonization of the species. This is especially important if it has retained significant characteristics of Dakota skipper habitat and if a Dakota skipper population is nearby. Depending on the quality of the habitat, recolonization may be feasible if source sites are nearby or if artificial reintroduction becomes practicable. If recolonization is possible, monitor the site during the flight period to detect any Dakota skippers.

Weed/Invasive Species Control

- Avoid broadcast applications of pesticides or herbicides that may be harmful to Dakota skippers or their nectar plants in Dakota skipper habitat.
- Ensure that field crews recognize target weeds to avoid adverse effects to important native species.

- Manage sites to minimize the likelihood of invasion by weeds. Control methods that are necessary after invasion may have unintended consequences to Dakota skipper or other native species.

Coordinated Management among Nearby Sites

- Conduct surveys or review available data to understand nearby local populations of Dakota skippers and habitats. This may facilitate coordination and management of populations that may cross between management units and ownerships.
- Coordinate management activities with property owners and managers of nearby Dakota skipper habitats. For example, plan burns and other temporarily adverse management activities during years when nearby habitats will not be burned.

Maintain Genetic Diversity within Populations

- Dakota skipper populations show signs of inbreeding (Britten and Glasford 2002). Manage Dakota skipper habitat to maximize genetically effective population sizes – i.e., the number of individuals reproducing each year. For example, do not disturb habitats during the Dakota skipper flight period, restore degraded habitat to connect isolated populations, expand suitable habitat patches, etc.
- Consider how various management practices may affect the number of breeding adults in both the short- and long-term. For example, activities that kill Dakota skippers during larval or pupal stages will also affect the number of breeding adults.

Literature Cited

- Britten, H. B. and J. W. Glasford. 2002. Genetic population structure of the Dakota skipper (Lepidoptera: *Hesperia dacotae*): A North American native prairie obligate. Conservation Genetics [Conserv. Genet.]. **3**:363-374.
- Cochrane, J. F. and P. Delphey. 2002. Status assessment and conservation guidelines: Dakota skipper [*Hesperia dacotae* (Skinner)], (Lepidoptera: Hesperiiidae): Iowa, Minnesota, North Dakota, South Dakota, Manitoba, and Saskatchewan. U.S. Fish and Wildlife Service, Bloomington, MN. 80 p.
- Dana, R. P. 1991. Conservation management of the prairie skippers *Hesperia dacotae* and *Hesperia ottoe*. Minnesota Agricultural Experiment Station, University of Minnesota, St. Paul, Minnesota. 63 p.
- Panzer, R. 2003. Importance of In Situ Survival, Recolonization, and Habitat Gaps in the Postfire Recovery of Fire-Sensitive Prairie Insect Species. Natural Areas Journal [Nat. Areas J.]. **23**:14-21.
- Ries, L. and D. M. Debinski. 2001. Butterfly responses to habitat edges in the highly fragmented prairies of Central Iowa. Journal of Animal Ecology **70**:840-852.
- Rigney, C. L. 2013. Habitat characterization and biology of the threatened Dakota skipper (*Hesperia dacotae*) in Manitoba. Masters of Science. The University of Winnipeg, Winnipeg, Manitoba, Canada. 259 p.
- Royer, R. A., R. A. McKenney, and W. E. Newton. 2008. A characterization of non-biotic environmental features of prairies hosting the Dakota skipper (*Hesperia dacotae*, Hesperiiidae) across its remaining U.S. range. Journal of the Lepidopterists Society **62**:1-17.
- Royer, R. A., M. R. Royer, and E. A. Royer. 2014. Dakota skipper field survey and habitat assessment at twelve North Dakota sites during the 2014 season. A final report submitted to Twin Cities Field Office, U.S. Fish and Wildlife Service, Bloomington, MN. Minot State University, Minot, ND. 53 p.
- Shepherd, S. and D. M. Debinski. 2005. Evaluation of isolated and integrated prairie reconstructions as habitat for prairie butterflies. Biological Conservation **126**:51-61.
- Skadsen, D. R. 2003. Dakota skipper population surveys for CCAA development in the State of South Dakota. Page 56. South Dakota Department of Game, Fish, and Parks, Pierre, SD.
- Smart, A. J., M. J. Nelson, P. J. Bauman, and G. E. Larson. 2011. Effects of herbicides and grazing on floristic quality of native tallgrass pastures in eastern South Dakota and southwestern Minnesota. Great Plains Research **21**:181-189.
- U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Threatened Species Status for Dakota Skipper and Endangered Species Status for Poweshiek Skipperling; Final Rule Federal Register **79**:63672-63748.

Appendix C – Primary Constituent Elements of Critical Habitat for the Dakota skipper and Poweshiek Skipperling

Source: Federal Register Vol. 80, pp. 59248-59384, October 1, 2015

Dakota Skipper

(1) Primary Constituent Element 1—Wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs on near-shore glacial lake soil deposits or high-quality dry-mesic remnant untilled prairie on rolling terrain consisting of gravelly glacial moraine soil deposits, containing:

- a. A predominance of native grasses and native flowering forbs,
- b. Glacial soils that provide the soil surface or near surface (between soil surface and 2 cm depth) micro-climate conditions conducive to Dakota skipper larval survival and native prairie vegetation,
- c. If present, trees or large shrub cover of less than 5 percent of area in dry prairies and less than 25 percent in wet mesic prairies; and
- d. If present, nonnative invasive plant species occurring in less than 5 percent of area.

(2) Primary Constituent Element 2—Native grasses and native flowering forbs for larval and adult food and shelter, specifically:

- a. At least one of the following native grasses to provide larval food and shelter sources during Dakota skipper larval stages: Prairie dropseed (*Sporobolus heterolepis*) or little bluestem (*Schizachyrium scoparium*); and
- b. One or more of the following forbs in bloom to provide nectar and water sources during the Dakota skipper flight period: Purple coneflower (*Echinacea angustifolia*), bluebell bellflower (*Campanula rotundifolia*), white prairie clover (*Dalea candida*), upright prairie coneflower (*Ratibida columnifera*), fleabane (*Erigeron* spp.), blanket flower (*Gaillardia* spp.), black-eyed Susan (*Rudbeckia hirta*), yellow sun drops (*Calylophus serrulatus*), prairie milkvetch (*Astragalus adsurgens*), or common gaillardia (*Gaillardia aristata*).

(3) Primary Constituent Element 3—Dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality remnant prairie (as defined in Primary Constituent Element 1) that connects high-quality wet-mesic to dry tallgrass prairies or moist meadow habitats. Dispersal grassland habitat consists of undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

Poweshiek Skipperling

(1) Primary Constituent Element 1—Wet-mesic to dry tallgrass remnant untilled prairies or remnant moist meadows containing:

- a. A predominance of native grasses and native flowering forbs;

- b. Undisturbed (untilled) glacial soil types including, but not limited to, loam, sandy loam, loamy sand, gravel, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek skipperling larval survival and native prairie vegetation;
- c. If present, depression wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire.
- d. If present, trees or large shrub cover less than 5 percent of area in dry prairies and less than 25 percent in wet mesic prairies and prairie fens; and,
- e. If present, nonnative invasive plant species occurring in less than 5 percent of the area.

(2) Primary Constituent Element 2—Prairie fen habitats containing:

- a. A predominance of native grasses and native flowering forbs;
- b. Undisturbed (untilled) glacial soil types including, but not limited to, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek skipperling larval survival and native prairie vegetation;
- c. Depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire;
- d. Hydraulic features necessary to maintain prairie fen groundwater flow and prairie fen plant communities;
- e. If present, trees or large shrub cover less than 25 percent of the unit; and,
- f. If present, nonnative invasive plant species occurring in less than 5 percent of area.

(3) Primary Constituent Element 3—Native grasses and native flowering forbs for larval and adult food and shelter, specifically:

- a. At least one of the following native grasses available to provide larval food and shelter sources during Poweshiek skipperling larval stages: Prairie dropseed (*Sporobolus heterolepis*), little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), or mat muhly (*Muhlenbergia richardsonis*); and,
- b. At least one of the following forbs in bloom to provide nectar and water sources during the Poweshiek skipperling flight period: Purple coneflower (*Echinacea angustifolia*), black-eyed Susan (*Rudbeckia hirta*), smooth ox-eye (*Heliopsis helianthoides*), stiff tickseed (*Coreopsis palmata*), palespike lobelia (*Lobelia spicata*), sticky tofieldia (*Triantha glutinosa*), or shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*).

(4) Primary Constituent Element 4—Dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality remnant prairie (as defined in Primary Constituent Element 1) that connects high quality wet-mesic to dry tallgrass prairies, moist meadows, or prairie fen habitats. Dispersal grassland habitat consists of the following physical characteristics appropriate for supporting Poweshiek skipperling dispersal: Undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal

including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.