U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Hesperia dacotae*

COMMON NAME: Dakota Skipper

LEAD REGION: 3

INFORMATION CURRENT AS OF: June 1, 2011

STATUS/ACTION
___ Species assessment – determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
___ New candidate
X Continuing candidate
___ Non-petitioned
X Petitioned - Date petition received: May 12, 2003
__ 90-day positive - FR date:
__ 12-month warranted but precluded - FR date:
__ Did the petition request a reclassification of a listed species? No

FOR PETITIONED CANDIDATE SPECIES (also complete c and d for initial 12-month petition findings):

a. Is listing warranted? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. above is no, provide an explanation of why the action is precluded.

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken, see the discussion of "Progress on Revising the Lists," in the current CNOR, which can be viewed on our Internet website (http://endangered.fws.gov/).

___ Listing priority change

Former LP: ___
New LP: ___

Date when the species first became a Candidate (as currently defined): June 13, 2002

___ Candidate removal: Former LP: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

____U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insects***;*** Family Hesperiidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: 5 states: Illinois, Iowa, Minnesota, North Dakota, and South Dakota; also Canada (Manitoba and Saskatchewan)

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:

Minnesota: Big Stone, Chippewa, Clay, Cottonwood, Kittson, Lac Qui Parle, Lincoln, Murray, Norman, Pipestone, Polk, Pope, Swift, Traverse, and Yellow Medicine Counties.

North Dakota: Burke, Eddy, McHenry, McKenzie, McLean, Oliver, Ransom, Richland, Rolette, Sargent, Stutsman, and Ward Counties.

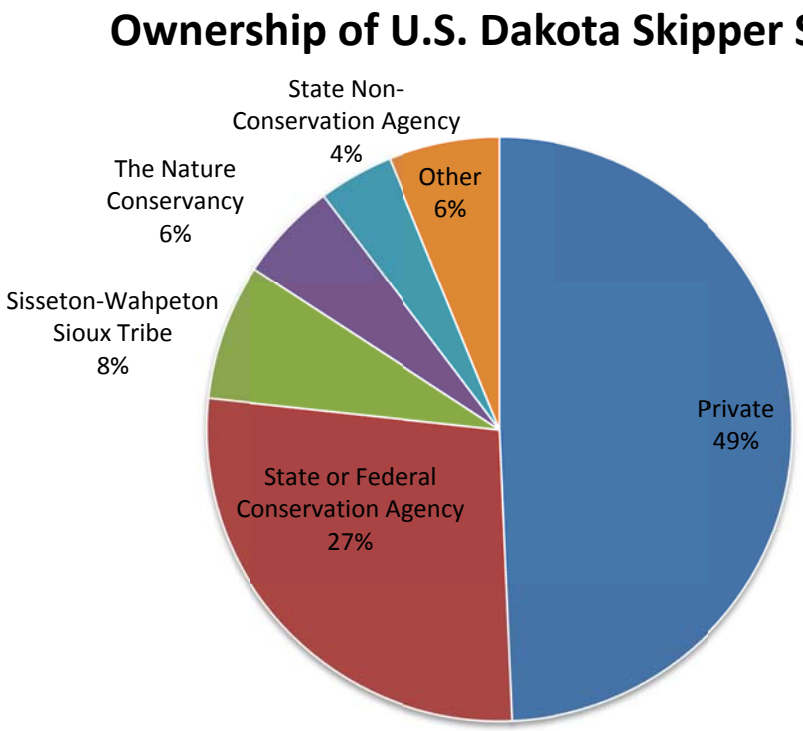
South Dakota: Brookings, Codington, Day, Deuel, Grant, Hamlin, Marshall, McPherson, and Roberts Counties.

Canada (Manitoba and Saskatchewan)

LAND OWNERSHIP

Table 1. Ownership of sites in the United States at which Dakota skippers are known or presumed extant. All sites owned by U.S. Forest Service are on Sheyenne National Grasslands. U.S. Fish and Wildlife Service (Service) has acquired grassland easements on fifteen of the Private sites (App. B), which protect these sites from outright conversion (e.g., plowing) to non-grassland. The species is known to occur at an additional 23 sites in Canada (19 in Manitoba and 4 in Saskatchewan). For details of publicly owned sites, see Appendix A.

Landowner	Total
Private	72
State Conservation Agency	23
U.S. Fish and Wildlife Service	13
Sisseton-Wahpeton Sioux Tribe	11
The Nature Conservancy	8
State Non-Conservation Agency	6
County	4
U.S. Forest Service	4
North Dakota National Guard	2
Unknown	2
South Dakota State University	1
Total	**146**



LEAD REGION CONTACT: Karl Tinsley, 612-713-5330, karl_tinsley@fws.gov

LEAD FIELD OFFICE CONTACT: Twin Cites (MN) Field Office, Phil Delphey, 612-725-3548, phil_delphey@fws.gov

BIOLOGICAL INFORMATION:

Species Description

Dakota skipper is a small to medium-sized butterfly with a wingspan of 2.4 - 3.2 centimeters (cm) (0.9 - 1.3 inches (in)) and hooked antennae (Royer & Marrone 1992). Like other Hesperiidae species, Dakota skippers have a faster and more powerful flight than most butterflies because of a thick, well-muscled thorax (Scott 1986, p. 415).

Adult Dakota skippers are variable in markings. The dorsal surface of adult male wings ranges in color from tawny-orange to brown and there is a prominent mark on the forewing; the ventral surface is dusty yellow-orange (Royer & Marrone 1992). The dorsal surface of adult females is darker brown with diffused tawny orange spots and a few diffused white spots restricted to the margin of the forewing; the ventral surfaces are dusty gray-brown with a faint white spotband across the middle of the wing (Royer & Marrone 1992). Adult Dakota skippers may be confused with the Ottoe skipper (*H. ottoe*), which is somewhat larger with slightly longer wings (Royer & Marrone 1992).

Dakota skipper pupae are reddish-brown and the larvae are light brown with black collar and dark brown head (McCabe 1981). These larvae differ from most other Hesperia in that the head capsule is pitted all over, including the lower part (ventrally) (McCabe 1981).

Taxonomy

Class - Insecta (insects)
Order - Lepidoptera (butterflies and moths)
Family - Hesperiidae (skippers)
Subfamily – Hesperiinae (grass or branded skippers)
Genus - Hesperia
Specific Name – dacotae
Species – *Hesperia dacotae*
Common Name - Dakota skipper
Controversial or Unresolved Taxonomy - none

The available taxonomic information on *H. dacotae* has been carefully reviewed and we conclude that this species is a valid taxon. Dakota skipper was first described in 1911 from collections taken at Volga, South Dakota, and Grinnell, Iowa (Skinner 1911 in Royer & Marrone 1992). The family Hesperiidae includes three other subfamilies and the genus *Hesperia* contains 18 species (Miller & Brown 1981; Ferris 1989 in Royer & Marrone 1992)

Habitat/Life History

Life History: The annual, single generation of adult Dakota skippers emerges from mid-June to early July, depending on the weather, with flights starting earlier farther west in the range (Dana 1991; McCabe 1979, 1981; Royer & Marrone 1992; Skadsen 1997; Swengel & Swengel 1999). Males emerge as adults about five days earlier than females, although observed overall sex ratios do not differ (Dana 1991). The flight period in a locality lasts two to four weeks and mating occurs throughout this period (Dana 1991; McCabe 1979, 1981). Dakota skippers lay eggs on broadleaf plants (McCabe 1981) and grasses (Dana 1991) although larvae feed only grasses. Potential lifetime fecundity is between 180 and 250 eggs per female; realized fecundity depends upon longevity (Dana 1991). Females lay eggs daily in diminishing numbers as they age. A female living a week after emergence will lay about half the potential number of eggs (Robert Dana, Minnesota Department of Natural Resources, in litt. 1994). Dana (1991) estimated potential adult life span at three weeks and average life span (or residence on site before death or emigration) at three to 10 days on one Minnesota prairie.

Dakota skippers overwinter as larvae and complete one generation per year. Eggs hatch after incubating for 7-20 days – therefore, hatching is likely completed before the end of July. After hatching, larvae crawl to the bases of grass plants where they form shelters at or below the ground surface with silk, fastened together with plant tissue (Dana 1991). In contrast, some prairie butterflies (e.g., Iowa skipper, *Atrytone arogos iowa*) construct

larval shelters at or near the tips of grass leaves. Dakota skipper larvae emerge at night they from their shelters to forage (McCabe 1979, 1981; Royer & Marrone 1992) and construct 2-3 successively larger shelters as they grow (Dana 1991). Little bluestem (*Schizachyrium scoparium*) is a frequent food source, but larvae feed on several native grass species (Dana 1991; Royer & Marrone 1992). Seasonal senescence patterns of grass species relative to the larval period of Dakota skippers are likely important in determining the suitability of grass species as larval host plants, in addition to other factors . Exotic cool season grass species that invade tallgrass prairie under inappropriate management [e.g., smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*)], therefore, may reduce food availability for larval Dakota skippers.

Dakota skippers have six or seven larval stages (Dana 1991; McCabe 1981) and overwinter (diapause) in their ground level or subsurface shelters during either the fourth or fifth instar (Dana 1991; McCabe 1979, 1981; Royer & Marrone 1992). In the spring, larvae resume feeding and undergo two additional molts before they pupate. During the last two instars, larvae shift from buried shelters to horizontal shelters at the soil surface (Dana 1991). Therefore, fire may be more likely to kill Dakota skipper larvae as spring progress and they are more likely to be present above the soil surface.

Royer and Marrone (1992) concluded that Dakota skippers are not inclined to dispersal, although they did not describe individual ranges or dispersal distances. McCabe (1979; 1981) found that concentrated activity areas for Dakota skippers shift annually in response to local nectar sources and disturbance. Marked adults in Dana's (1991) study moved across <200 meters (m) (656 feet (ft)) of unsuitable habitat between two prairie patches and moved along ridges more frequently than across valleys. Average adult movements were <300 m (984 ft) over 3-7 days. Dana (1997) later observed reduced movement rates across a small valley with roads and crop fields compared with movements in adjacent widespread prairie habitat. The five Dakota skipper experts that we interviewed in 2001 indicated that it was unlikely that Dakota skippers were capable of moving greater than 1 kilometer (km) (0.62 miles (mi)) between patches of prairie habitat separated by structurally similar habitats (e.g., crop fields or pasture, but not native prairie) (Cochrane & Delphey 2002). Skadsen (1999b, p. 2) reported possible movement of unmarked Dakota skippers in 1998 from a known population at least 800 m (2625 ft) away to a site with an unusually heavy growth of blacksamson echinacea (*Echinacea angustifolia*); he had not found Dakota skippers in three previous years when coneflower production was sparse. The two sites were connected by "native vegetation of varying quality" with a few asphalt and gravel roads interspersed (Dennis Skadsen, Natural History Investigations, Grenville, South Dakota in litt. 2001).

Habitat: Nectar sources for adults vary regionally and include blacksamson echinacea, bluebell bellflower (*Campanula rotundifolia*), white prairie clover (*Dalea candida*), upright prairie coneflower (*Ratibida columnifera*), fleabanes (*Erigeron spp.*), blanketflowers (*Gaillardia spp.*), blackeyed susan (*Rudbeckia hirta*), and yellow sundrops (*Calylophus serrulatus*) (McCabe & Post 1977; Royer & Marrone 1992). Plant species likely vary in their value as nectar sources for Dakota skipper due to the amount of nectar available to the species during the adult flight period (Dana 1991 and see

Degradation of Dakota Skipper Habitat, below). During systematic surveys in Minnesota, Swengel and Swengel (1999) observed nectaring at 25 plant species, but 85 percent of the nectaring was at the following three taxa, in declining order of frequency: blacksamson echinacea, blanketflower, and groundplum milkvetch (*Astragalus crassicarpus*). Dana (1991) reported the use of 25 nectar species in Minnesota with blacksamson echinacea most frequented; McCabe (1979; 1981) observed Dakota skippers using eight nectar plants.

From its earliest identification the Dakota skipper was considered rare (Royer & Marrone 1992), although considerable destruction of its habitat likely occurred even before the species was first described in 1911. McCabe (1981) observed very stable numbers on North Dakota and Minnesota prairies that he visited repeatedly from 1968-1979. On dry-mesic prairie in Clay County, Minnesota, Dana (1997; 1991) also observed stable numbers into the thousands during his intensive studies from 1978 to 1983. Schlicht (1997a, p. 13) and Reiser (1997) reported more variable densities on the same sites in 1995-96. Based on these more recent observations, Dana (1997) suggested that populations could experience significant size fluctuations between years. At some sites in wet-mesic bluestem prairies of North Dakota, density may exceed 40 individuals per hectare (ha) (Royer & Marrone 1992). At these densities, Dakota skippers may exclude other skipper species (Royer & Marrone 1992). At Hole-in-the-Mountain preserve, Minnesota, Dana (1991) found peak abundance of approximately 1000 Dakota skippers over about 40 ha (~20-30/ha); he estimated that 2000-3000 may have been alive at various times during the flight period and that only one-third to one-half of adults were alive simultaneously. Where they occur, these high adult densities persist for only about a week to ten days during the single annual flight period.

Dakota skippers are obligate residents of high quality prairie, ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie (Royer & Marrone 1992). High quality prairie contains a high diversity of native species, including flowering herbaceous species (forbs, R. Dana, pers. comm., 2001). Royer and Marrone (1992) categorized Dakota skipper habitat into two main types that are now mostly segregated, but "originally intermixed on a landscape scale and in some places still converge today." The first – referred to as "Type A" by Royer et al. (2008, p. 14-16) – is low (wet) prairie that occurs on "near-shore glacial lake deposits." This habitat type is dominated by bluestem grass, with three flowers almost always present and blooming during Dakota skipper's flight period – wood lily (*Lilium philadelphicum*), bluebell bellflower, and mountain deathcamas (smooth camas; *Zigadenus elegans*) (McCabe 1981). This habitat type has a high water table and is subject to intermittent flooding in the spring, but provides "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).

The second Dakota skipper habitat type – referred to as "Type B" by Royer et al. (2008, p. 14) – occurs on rolling terrain over gravelly glacial moraine deposits and is "dominated by bluestems and needle-grasses." As with Type A, bluebell bellflower and wood lily are also present in Type B habitats, but the latter supports "more extensive stands of" blacksamson echinacea, upright prairie coneflower, and common gaillardia

(*Gaillardia aristata*) (Royer & Marrone 1992, p. 22). In North Dakota, wet mesic habitats in the eastern part of the state may support denser populations than the drier mixed grass habitats in the western part of the state (Royer & Marrone 1992).

Dana (1997) described typical habitat in Minnesota as dry mesic prairie dominated by mid-height grasses with an abundance of nectar sources including blacksamson echinacea and prairie milkvetch (*Astragalus laxmannii Jacq. var. robustior*). Dana (1991) never encountered Dakota skippers in wet or wet-mesic prairies in Minnesota despite abundant floral resources and the frequent use of these habitats by similar skipper species. In systematic surveys at twelve Minnesota sites, Swengel and Swengel (1999) found that Dakota skippers were significantly more abundant on dry prairie than on either wet or mesic prairie.

In northeastern South Dakota, Dakota skippers inhabit primarily dry-mesic hill prairies with abundant blacksamson echinacea, but also occur in wet-mesic tallgrass prairie characterized by wood lily and mountain deathcamas (Skadsen 1997). All wet-mesic sites inhabited by Dakota skipper in South Dakota are near hill prairies inhabited by Dakota skipper that are managed with fall haying (Skadsen 2006b, p. 2). Dry-mesic prairies suitable for Dakota skippers in South Dakota "should include" little bluestem, side-oats grama (*Bouteloua curtipendula*), porcupine grass (*Hesperostipa spartea*), needle-and-thread grass (*H. comata*), and prairie dropseed (*Sporobolus heterolepis*), and a high diversity and abundance of forbs, including blacksamson echinacea, purple prairie clover (*Dalea purpurea*), white prairie clover, yellow sundrops, prairie groundsel (*Packera plattensis*), groundplum milkvetch, 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. asper*) , meadow zizia (*Zizia aptera*), blanket flower (*Gaillardia sp.),* prairie sagewort (*Artemisia frigida*), and leadplant (*Amorpha canescens*) (Skadsen 2006b, p. 1-2). Little bluestem and porcupine grass are the predominant grass species in Dakota skipper habitat in South Dakota (Skadsen 2006b, p. 2). In Manitoba, Dakota skippers occupy the "slightly higher drier areas" of wet-mesic prairie, "where nectar sources are more abundant" than in surrounding wetter prairie (Webster 2003). Blacksamson echinacea occurs at all sites where Dakota skipper has been recorded in South Dakota, although it is absent at some sites where this species is abundant (Skadsen 2006b, p. 2).

Lenz (1999) characterized four Dakota skipper sites in the Towner-Karlsruhe Complex in north-central North Dakota. On wet mesic sites the most common forb species were mountain deathcamas, Rocky Mountain blazing star (*Liatris ligulistylis*), Canada goldenrod (*Solidago canadensis*), and others; stiff sunflower (*Helianthus pauciflorus Nutt. ssp. pauciflorus*) and candle anenome (*Anemone cylindrica*) were most common on dry-mesic sites. Some of these species bloom after the Dakota skipper flight period, but may still be useful for characterizing wet mesic Dakota skipper habitats in north-central North Dakota. Blacksamson echinacea was rare in these habitats. In the Towner-Karlsruhe complex, Dakota skippers appear to be more commonly associated with mesic to wet-mesic prairie than in other parts of their range to the south and east (Lenz 1999).

An association of bluestems and needlegrasses (*Andropogon* and *Stipa* spp.) invaded by Kentucky bluegrass typifies dry-mesic Dakota skipper habitat in the rolling terrain of river valleys and the Missouri Coteau (Royer & Marrone 1992, R. Murphy, U.S. Fish and Wildlife Service, pers. comm. 2001). These prairies, on the western edge of the species' known range, typically contain wood lily, bluebell bellflower, and coneflowers and other asters as nectar sources; in some areas, mountain deathcamas also occurs (Royer and Marrone 1992, R. Murphy, pers. comm. 2001). In the western North Dakota prairies, Dakota skippers use microhabitats on rolling upland sites that may constitute western extensions of tallgrass prairie within what is otherwise a marginally dry climate for the species (Royer & Marrone 1992).

Two key factors have allowed persistence of remnant native prairie habitats inhabited by Dakota skippers – soils unsuitable for agriculture and/or steep topography (Royer & Marrone 1992). Some habitats inhabited by Dakota skippers, however, are still threatened by conversion for agriculture, most notably sites in the "relatively flat and featureless" (Royer et al. 2008, p. 16) landscape of North Dakota's Towner-Karlsruhe area. McCabe (1979; 1981) and Royer et al. (2008, p. 16) have linked the historical distribution of Dakota skippers to glacially related surface geology and soils and, possibly, regional precipitation-evaporation ratios. Edaphic features, such as soil moisture, compaction, surface temperature, pH, and humidity, may be significant factors in larval survival and, thus, important limiting factors for Dakota skipper populations (Royer et al. 2008). The location of larval food plants rarely seems to affect Dakota skipper distribution within habitats because these warm-season grasses are usually dominant and evenly dispersed (Swengel 1994), although invasion by smooth brome and other species may limit larval food plants (see Degradation of Dakota Skipper Habitat, below).

Historical Range/Distribution

Dakota skipper once occurred in tallgrass and mixed grass prairies of Illinois, Iowa, Minnesota, South Dakota, North Dakota, Manitoba, and Saskatchewan. It is extirpated from Illinois and Iowa and currently occurs in western Minnesota, northeastern South Dakota the eastern half of North Dakota, Manitoba, and Saskatchewan. Royer and Marrone (1992) suggested a remote possibility that Dakota skippers may also occur in far eastern Montana and southeastern Saskatchewan, in habitats similar to those occupied by the species in northwestern North Dakota. It was subsequently found in Saskatchewan by Ron Hooper 2001 after forty years of searching (R. Hooper, Royal Saskatchewan Museum, Regina, Saskatchewan, pers. comm. 2002), but Ron Royer (Minot State University, Minot, North Dakota, pers. comm. 2002) no longer thinks that the species may occur in Montana. Its status in western North Dakota seems tenuous, with the species possibly extirpated from all but two or three sites (R. Royer, pers. comm. 2001).

Habitat destruction and degradation has fragmented Dakota skipper's range from its core through its northern and western fringes (McCabe 1981; Royer 1997; Royer & Marrone 1992; Schlicht 1997a; Schlicht 1997b; Schlicht & Saunders 1994; Skadsen 1997, 1999b; Swengel & Swengel 1999). As is indicated by their occurrence records, habitat affinities, and physiological requirements, Dakota skippers were likely widely distributed

throughout northern tallgrass prairie and Dakota mixed grass prairie. The historical distribution of Dakota skippers may never be precisely known because "much of tallgrass prairie was extirpated prior to extensive ecological study" (Steinauer & Collins 1994), such as butterfly surveys. Based on records of vouchered specimens, however, we know that Dakota skipper range has contracted northward out of Illinois and Iowa. The species was last recorded in Illinois in 1888 (McCabe 1981) and in Iowa in 1992 (Orwig & Schlicht 1999). The species' status seems tenuous on the western edge of its range; far northern sites in Minnesota are also highly isolated and vulnerable (Cuthrell 1991). Britten and Glasford's (2002) genetic analyses support the presumption that this species formerly had a relatively continuous distribution. They found genetic distances among seven sites in Minnesota and South Dakota small enough to presume that these Dakota skipper populations were once connected.

Current Range/Distribution and Population Estimates/Status

Iowa

There are four historical records of Dakota skippers in three counties in Iowa, but the species is presumed extirpated from the state (Schlicht & Orwig 1998; Selby 2004). The species was last seen at Cayler Prairie, Dickinson County, in 1992, but surveys of this site in 2000 and 2004 were negative (Schlicht & Orwig 1998; Selby 2004). Selby also surveyed eight other sites in northwest Iowa in 2004 and found no Dakota skippers. The species was not observed at eight sites surveyed between 1988-1997 cited in Swengel and Swengel (1999) nor during extensive surveys for Poweshiek skipperling in 2007 (Selby 2008).

Minnesota

Minnesota contains 31 occurrences of Dakota skipper where the species' existence has been confirmed recently or where there is insufficient information to presume its extirpation [Minnesota Department of Natural Resources (MDNR), unpubl. data 2011]. At nine of these sites the last observation of the species ranges from 1936-1981 and may be best described as historical. Therefore, there may be 22 extant populations in the state.

In 2002, experts ranked only one Minnesota population, Hole-in-the-Mountain Preserve, as secure. Others were categorized as threatened (46 percent), vulnerable (22 percent), unknown (19 percent), or extirpated (11%, Cochrane & Delphey 2002). In 2007 and 2008 MDNR carried out a broad survey effort to assess the status of Dakota skipper and other prairie butterflies in the state after experts noted significant declines among these species in west-central Minnesota beginning in 2003 (Selby 2006). Seventeen and nineteen sites with previous Dakota skipper records were surveyed in 2007 and 2008, respectively; biologists found it at eight of those sites each year and at one site where it had not previously been recorded (Selby 2009a, p. 6). The surveys appear to have been confirmed Dakota skipper's extirpation from one site in Cottonwood County, where it was last recorded in 1970.

A parallel study in 2007 carried out by Dana (2008) consisted of more intensive work at a few sites thought to contain some of the state's most viable populations of Dakota skipper. These surveys indicated that The Nature Conservancy's Hole-in-the-Mountain preserve in Lincoln County still supports "a substantial population", but that it may have decreased in size since Dana's (1991) earlier studies (Dana 2008).

Besides Hole-in-the-Mountain, the Felton Prairie, Prairie Coteau, and Glacial Lakes complexes stand out as relatively large population centers for Dakota skipper in Minnesota. At Prairie Coteau SNA the number of Dakota skippers encountered per 100 m of transect was not sharply lower between 2007 and 1990 – 1.1 vs. 1.7, respectively (Dana 2008). At Felton Prairie SNA – part of the Felton Prairie complex, Selby (2009b, Appendix 4, p. iv) recorded 14 Dakota skippers during a five hour survey in 2007 and concluded that the species was "doing relatively well." During a one-hour survey in 2008, he recorded nine Dakota skippers and saw little indication of any substantial change since the previous year (Selby 2009b, Appendix 5, p. iv). The population at the Felton Prairie complex is not secure without additional land protection and management – gravel mining threatens three of the five sites that comprise this complex (Cochrane & Delphey 2002), especially the best quality habitat on property owned by Clay County (Robert Dana, Minnesota Department of Natural Resources, St. Paul, MN, pers. comm. 2001; Brian Winter, The Nature Conservancy, Glyndon, MN, pers. comm. 2001). The signing of a stewardship plan by Clay County and other landowners in the Felton Prairie complex, however, may have reduced the imminence of the gravel mining threat at Felton Prairie (Peter Buesseler, Minnesota DNR, pers. comm. 2003).

At Glacial Lakes State Park numbers recorded during recent surveys have been low despite good habitat conditions and an apparent widespread population as recently as 2001. In that year Dennis Skadsen found Dakota skippers along almost all of 25 mi (40 km) of transect in and around the park and recorded as many as 31 Dakota skippers along one transect (Skadsen 2001, p. 24). Selby (2009a) surveyed the same areas in 2007 and 2008, describing habitat at survey sites as good to excellent, but recorded only eight Dakota skippers during about seven hours of surveys in and around the park (Selby 2009a, p. 1 and liv). Dakota skippers recorded per minute by Selby in the areas of Skadsen's Transects 3 and 4 was 0.02 vs. 0.1 observed per minute by Skadsen along these two transects (Skadsen 2001, Appendix A, p. 12, 14).

North Dakota

Dakota skippers have been reported from 50 sites in 18 North Dakota counties. Royer and Marrone (1992) concluded that it was highly unlikely that little bluestem prairie tracts sufficient in size to support significant unrecorded Dakota skipper populations existed in North Dakota. In 2002, however, Gerald Fauske (North Dakota State University, pers. comm. 2004) found two previously unknown populations. One, near Lake Sakakawea on the Missouri River, may represent a significant population and was the first recorded in McLean County.

Dakota skipper is now possibly extirpated from fourteen sites and three counties in North Dakota, primarily due to heavy grazing, weed control, and other disturbances (e.g., bulldozing at Killdeer Mountain to reduce aspen growth, Royer 1997). Threats are not restricted to private lands; invasion of native prairie by exotic species [e.g., smooth brome and leafy spurge (*Euphorbia esula*)], chemical control of exotic species invasions, and fire are also potential threats to Dakota skippers on public lands in North Dakota (Robert Murphy, U.S. Fish and Wildlife Service, North Dakota in litt. 2002, Royer 1997).

Of the 35 sites at which Dakota skipper is presumed extant in North Dakota, 13 occur within the Towner-Karlsruhe in McHenry County and four are in the Sheyenne Grasslands in Ransom County – the other 18 are isolated from other sites. More than half – eighteen – are privately owned. Ownership of the remaining sites is distributed among several different public agencies (number of sites owned) – U.S. Forest Service (4); North Dakota Department of Lands (5); U.S. Fish and Wildlife Service (2), North Dakota National Guard (2); and, The Nature Conservancy (2). The state highway department also owns one site and the owner of another site is unknown. U.S. Fish and Wildlife Service has secured grassland easements on four privately owned sites in the Towner-Karlsruhe complex (McHenry County) and on one site in Ransom County (Appendix B). These easements prohibit haying, mowing, seed collection before July 15, digging, plowing, disking or otherwise destroying the vegetative cover, and agricultural crop production, but allow grazing (U.S. Fish and Wildlife Service, in litt 1999).

No Dakota skipper populations in North Dakota may be secure, although it is clear that the Towner-Karlsruhe complex is the current stronghold for the species in the state (Cochrane & Delphey 2002). All of the occupied habitat in this area is the Type A (low/wet) habitat (Royer & Marrone 1992, p. 21-22; Royer et al. 2008, p. 14-16). About 30 percent of the Towner-Karlsruhe area may still contain native prairie (Lenz 1999). Between 1996-2000, however, approximately 570 ha (1400 acres) of previously unplowed native prairie was converted to irrigated cropland primarily or exclusively for crop rotations that included potatoes (Andy Wingenbach, Natural Resources Conservation Service, McHenry County, North Dakota, pers. comm. 2001). No sites inhabited by Dakota skipper in McHenry County were known to be converted during this time, but this may indicate a general vulnerability of prairie in this area to conversion. Conversion for agriculture is most likely where flat topography and a high water table facilitates the development of irrigated row-crop agriculture (Gary Erickson, U.S. Fish and Wildlife Service, J. Clark, Salyer National Wildlife Refuge, North Dakota, pers. comm. 2001).

The North Dakota State Land Department and the state's highway department own five of the Towner-Karlsruhe sites; the rest are privately owned. Some Towner-Karlsruhe sites are linked by highway rights-of-way that contain native prairie vegetation and by other prairie remnants. Royer (in litt. 2001), however, would describe none of them as secure (Cochrane & Delphey 2002, p. 66-67) – each is subject to private or state management options that could extirpate Dakota skipper from the site. Tim Orwig (Worcester, Massachusetts, pers. comm. 2001) and Steve Spomer (University of

Nebraska, Lincoln, Nebraska, pers. comm. 2001) also ranked the status of the Sheyenne Grassland sites and two of the isolated North Dakota sites (Oakes and Hartleben Prairie – Spomer) and described all as less than secure (Cochrane & Delphey 2002, p. 66-67). Gerald Fauske (pers. comm. 2004) found two new Dakota skipper locations in North Dakota in 2002. Both were on land owned by the National Guard. One was highly degraded and appeared unlikely to support a significant population of the species, but the other (along Lake Sakakawea near Garrison) may support a significant population.

Dakota skipper populations at Sheyenne National Grasslands have evidently suffered from intensive grazing, leafy spurge invasion, and the effects of herbicides used to control leafy spurge. A few populations remain in or near Sheyenne National Grasslands, but they are highly threatened (Spomer 2004). McCabe (1979) cited the McLeod Prairie in the Sheyenne Grasslands in southeastern North Dakota as the best site for Dakota skippers in North Dakota. Since then, however, leafy spurge invasion has significantly modified the habitat and they are now extirpated from the site (Royer 1997). Swengel and Swengel (1999) did not find Dakota skippers at eight survey sites in the Sheyenne grasslands during 1988-1997, although Royer did observe a few isolated Dakota skippers in the Sheyenne grasslands during this period (R. Royer, pers. comm. 2001). In 2001, Spomer (2002) resurveyed the sites where Royer observed Dakota skippers and failed to relocate the species at any of the sites. He did find Dakota skippers at a site in the Sheyenne Grasslands at which the species was not previously recorded, but also observed the deterioration of the population at Venlo Prairie from “fair/good” in 2001 to “poor” in 2003 due to “intense grazing and disappearance of flowers” (Spomer 2004).

As of 1996, Orwig (1996) suggested that Brown’s Ranch in Ransom County, which is owned by The Nature Conservancy, had potential to support a metapopulation and that it was the “last hope” for supporting Dakota skippers in the Sheyenne River ecosystem. More recently, however, Spomer (2004) found that the population there was “struggling for existence.” Royer (1997), claimed that throughout the Sheyenne Grasslands, both public and private lands have been so heavily grazed and altered by grasshopper and leafy spurge control that extirpation of Dakota skippers from the area is almost certain in the long-term. Spomer (2004) suggested that the persistence of Dakota skipper in and around Sheyenne National Grasslands may depend on setting aside ungrazed plots of native prairie and enhancing them with wildflower plantings; he also suggested that reintroductions of Dakota skippers into suitable habitats may be necessary, but the methods to propagate the species have not been developed.

Dakota skipper experts rated all sites outside of the two complexes discussed above as threatened or vulnerable (status of Spring Creek population was unknown). Although Tewaukon National Wildlife Refuge may have the potential to support a large population of Dakota skippers (Orwig 1996), the species currently inhabits only a portion of the refuge (Hartleben Prairie) and the isolation of this population threatens its persistence (T. Orwig, pers. comm. 2001, Royer 1997). The Eagle Nest Butte population on Ft. Berthold Indian Reservation (McKenzie Co.), on the western edge of Dakota skipper range, is too small and isolated to be secure (R. Royer, pers. comm. 2001, Royer 1997); the nearest extant population, at Lostwood National Wildlife Refuge, is approximately 110 km (68

mi) away. The latter site and nearby Waterfowl Production Areas (Burke and Montrail Cos.) are isolated at the presumed northern margin of the species' current range in North Dakota. Holywater Spring (Rolette Co.) is also a northern outpost and isolated (Royer 1997). Although Royer (in litt. 2001) describes the habitat there as good, isolation and conversion threaten it.

South Dakota

Dakota skipper is not listed as threatened or endangered under South Dakota's endangered species statute, but the state natural heritage program has assigned a NatureServe ranking of S2 (imperiled).[1] The species has been documented at 83 sites in 11 counties and is possibly extirpated from 22 sites and two counties. Skadsen (2003) suggests that up to six metapopulations, groups of local populations interconnected by dispersal, may occur in South Dakota. The One Road Lake/Oak Island Complex, for example, "comprises 8500 acres of native grass" and includes nineteen distinct sites inhabited by Dakota skippers.

Skadsen (2003) suggested that an additional 25,000 acres of native grassland in the Crandall Hills, west of the One Road Lake/Oak Island Complex, may have included additional undiscovered populations. More recently, however, he concluded that the species' distribution may not extend west of the Prairie Coteau in South Dakota except for a few anomalous sites (Figure 1). His surveys of potential habitat between the Prairie Coteau and the Missouri River have been mostly negative. Moreover, Dakota skippers are present only at low densities on the west edge of the Prairie Coteau, even in high quality prairie (D. Skadsen, pers. comm. 2007). More frequent drought may play a role in determining the western edge of the species' distribution in South Dakota (D. Skadsen, pers. comm.. 2007). Clark County may contain undiscovered populations and may be the only county inhabited by the species in South Dakota in which it is yet to be recorded (Skadsen 2006b, p. 1).

[1] S2: Imperiled in the state or province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state or province. NatureServe Explorer. Glossary. < http://www.natureserve.org/explorer/glossary/gloss_a.htm >. Accessed 2007 Mar 30.

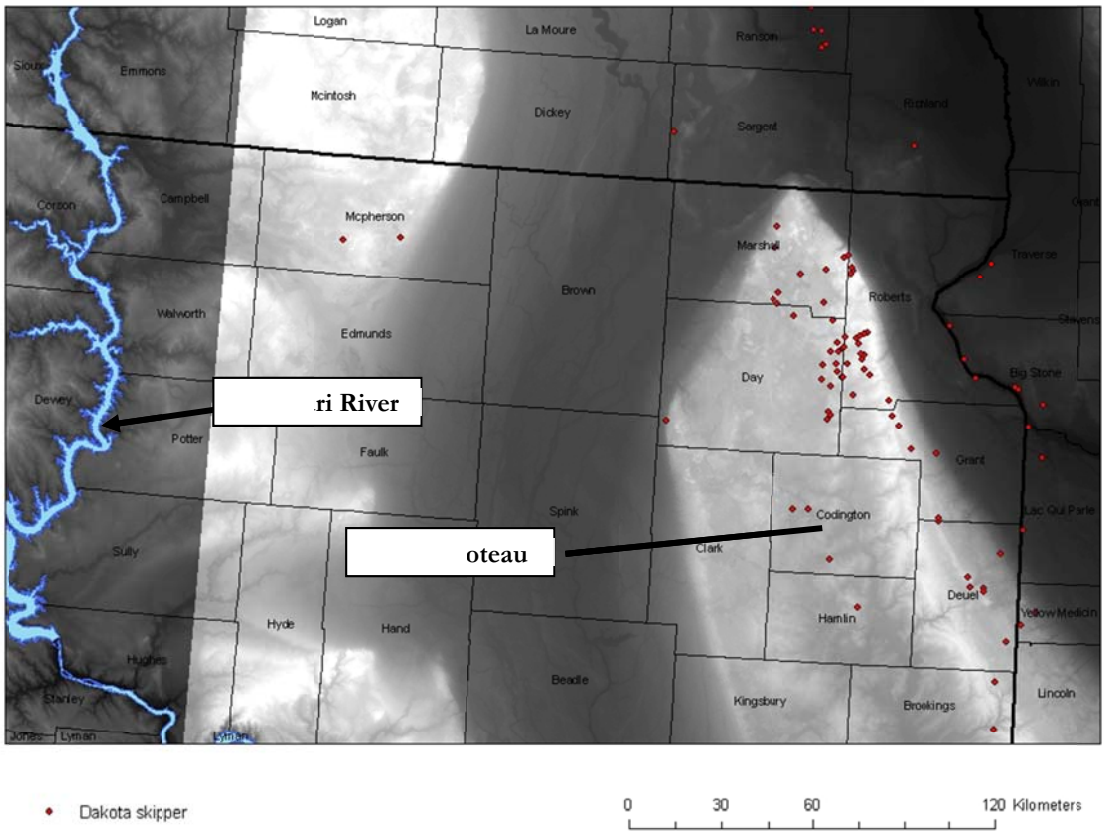


Figure 1. Locations of Dakota skipper populations presumed to be extant in South Dakota in relation to the Prairie Coteau (light-shaded area) and the Missouri River. Except for a few sites, the distribution of Dakota skipper may not extend beyond the west edge of the Prairie Coteau in South Dakota. Dakota skippers are present only at low densities on the west edge of the Prairie Coteau, even in high quality prairie, and surveys of potential habitat between it and the Missouri River have been mostly negative (D. Skadsen, pers. comm. 2007).

Skadsen found ten new localities for Dakota skipper in northeastern South Dakota between 2004 and 2007, but also found that the species has likely been extirpated from the southeastern corner of the state – in and around Lincoln County (Skadsen 2004, 2006b). The Orient Hills area of Faulk County, approximately 97 km (60 mi) south of Ordway Prairie, appears to have habitat suitable for Dakota skipper, but surveys in 2004 were negative (Skadsen 2004). Additional populations may also occur on the Lake Traverse Reservation of the Sisseton-Wahpeton Sioux (Skadsen 2006b).

Since 1983 Dakota skippers may have been extirpated from 16 sites in South Dakota due to overgrazing (e.g, Buntrock Waterfowl Production Area, Chekapa Creek Ridge, Knapp Ranch), succession (e.g., Pickerel Lake State Recreation Area, Sica Hollow East), and "several years of July mowing" (e.g., Wakidmanwin Prairie) (Skadsen 2004, 2006a; b, p. 5-13). In 2008 Dakota skipper was recorded at Pickerel Lake State Park after it was apparently absent for six years (Skadsen 2008, p. 2). Plant succession there had degraded Dakota skipper habitat, but a burn conducted in 2007 resulted in a "dramatic increase in

forbs, especially purple coneflower" that appears to have facilitated the return of the species from nearby habitat (Skadsen 2008, p. 2). Repeated surveys at the site in 2009 (Skadsen 2009, p. 3), however, were negative for Dakota skipper, suggesting that the species has not yet successfully reestablished itself on the site.

Canada

Biologists surveyed for Dakota skipper at 54 potential sites in Manitoba and Saskatchewan in 2002 and found the species at 23 localities – it was not found at eleven of the 34 locations at which it had been previously recorded , including one site that had been converted to a flaxseed field (Webster 2003, p. 7). Britten and Glasford (2002) found that Manitoba populations are genetically distinct from a group of populations in Minnesota and South Dakota. Therefore, conservation of the species should include populations from both the United States and Canada to maximize the likelihood of preserving important genetic diversity. Dakota skipper is apparently extirpated from the Tallgrass Prairie Preserve in Manitoba (see next paragraph). Therefore, Canadian populations are probably isolated from any population in the United States.

Manitoba

Nineteen of the localities at which Dakota skipper is extant in Canada are in Manitoba (Webster 2003). Most populations occur on flat sites near Lundar, east and within about 25 km (16 mi) of Lake Manitoba (Webster 2003). There is also an isolated population near Griswold, Manitoba approximately 200 km southwest of the populations along Lake Manitoba and about 125 km (78 mi) northeast of the nearest population in Saskatchewan (Webster 2003, p. 6). Typical habitat for Dakota skipper in Manitoba consists of slightly elevated areas within a matrix of wet-mesic prairie (Webster 2003). These habitats are typically mowed every other year in late summer (Webster 2003), which results in a fairly consistent habitat type containing wood lily, bluebell bellflower, mountain deathcamas, and bluestem grasses; shrubs are common only in unmowed areas. Dead standing grass may be less abundant on mowed prairie sites than on "idle" sites and quaking aspen (*Populus tremuloides*) surrounds several of the sites Webster (2003). A few populations in Manitoba occur along hillsides in drier habitats typified by blacksamson echinacea, bluestem grasses (e.g., little bluestem), and needlegrass (*Stipa* sp.). The species may now be extirpated from the southeastern corner of the province, including from the Tallgrass Prairie Preserve (Webster 2003, Richard Westwood, University of Winnipeg, pers. comm. 2007).

Saskatchewan

Dakota skipper was first recorded in Saskatchewan approximately 0.4 km (0.25 mi) south of Oxbow in 2001 where R. Hooper (pers. comm. 2002) collected three males (Hooper 2003, p. 124). He found each perching on blacksamson echinacea on an ungrazed knoll within a patch of mixed grass prairie that was approximately 1 ha in extent. Biologists later found the species at three additional sites Saskatchewan in 2002 (Webster 2003). Occupied habitats in Saskatchewan are similar to the drier hillside habitats in Manitoba, where blacksamson echinacea is an important species.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Conversion of Dakota Skipper Habitat to Non-Grassland

1. Conversion of Prairie for Agriculture

Dakota skipper populations have persisted mostly where steep terrain (e.g., in the Prairie Coteau of South Dakota), poor soils, or both have prevented conversion of habitats for agriculture (McCabe 1981). Almost all destruction of Dakota skipper habitat has likely gone unrecorded, but since about 1980 observers have recorded the extinction of several populations of Dakota skipper due to conversion of their habitat for agricultural use in the U.S. and Canada. Royer and Marrone (1992) documented loss of four sites in North Dakota that were converted to irrigated potato fields and one in South Dakota that was also converted for crop production. One site in Manitoba at which Dakota skipper was last recorded in 1991 (Fannystelle) was subsequently converted for row-crop agriculture (Webster 2003).

In North Dakota, further conversion is a threat in the important Towner-Karlsruhe complex (Lenz 1999; Royer & Royer 1998) where the flat topography and high water table facilitate conversion to irrigated crop production (G. Erickson, J. Clark, pers. comm. 2001; R. Royer, pers. comm. 2001). Populations of Dakota skipper in Manitoba typically occupy flat terrain that may be vulnerable to conversion to cropland, although soil conditions “may make some of these sites unsuitable to row crops” (Kennedy cited in Webster 2003).

2. Mining and other Conversion Threats

Conversion of prairie for non-agricultural land uses, such as gravel mining and housing (New 1991), has recently extirpated Dakota skipper populations and threatens others. Gravel mining threatens habitat of Dakota skipper at some Minnesota sites (Dana 1997); for example, the progressive loss of habitat to gravel mining is a significant threat at Felton Prairie sites (Braker 1985, R. Dana, pers. comm. 2001, B. Winter, pers. comm. 2001), although a stewardship plan may have alleviated the immediacy of this threat (P.

Buesseler, pers. comm. 2003). On at least seven sites in Minnesota Dakota skippers inhabit northern dry prairie plant communities, which are generally threatened by gravel mining (Minnesota Department of Natural Resources 2006, p. 221). Skadsen (pers. comm. 2001, 2002) also reported that one site in South Dakota (Mundt Pasture, in the One Road Lake-Oak Island Prairie complex) would be at least partly destroyed by a planned four-lane highway and that the project's need for gravel may exacerbate the threat posed by gravel mining in the project's vicinity.

Fluctuating water levels in South Dakota may also threaten some Dakota skipper habitat. Skadsen (Skadsen 1997) reported loss of one site to flooding due to rising water levels at Bitter Lake, South Dakota.

Wind turbines and associated infrastructure (e.g., maintenance roads) may threaten Dakota skipper habitat, at least on private land in South Dakota (Skadsen 2002, p. 39).

Degradation of Dakota Skipper Habitat/Effects of Grassland Management

Degradation in quality of remaining Dakota skipper habitat patches may now surpass the outright destruction of prairie as a threat to the species. Dakota skipper "seems to slowly decrease as the vegetative quality of a site wanes" (Skadsen 2009, p. 11). In South Dakota, fragmentation and "intensive use (usually season-long grazing) on most remaining tracts" of tallgrass prairie "is undoubtedly decreasing plant diversity" (Higgins et al. 2000, p. 23). Invasion by exotic plants, actions undertaken to control plant and invertebrate pests, modification of natural disturbance regimes, and other factors also degrade Dakota skipper habitats.

Degraded prairie support fewer native plant species, particularly nectar plants (R. Dana, pers. comm. 2001), which may reduce adult survival, female fecundity, or both. "Regular access by adults to nectar is clearly important" for Dakota skippers (Dana 1991). Nectar is a critical source of water, but also provides carbohydrates to fuel flight (Dana 1991) and to supplement fat reserves accumulated during the larval stage. Fecundity would likely decline in Dakota skippers with inadequate access to nectar, as has been observed in other butterfly species (Dana 1991). Dakota skippers appear to prefer plant species whose nectar resources are unavailable to nectar feeders that lack "a slender trophic apparatus about 5 mm in length or longer" (Dana 1991). This includes blacksamson echinacea, prairie milkvetch, hoary verbena (*Verbena stricta*), and purple locoweed (*Oxytropis lambertii*). These species may contain a more dependable "standing crop" of nectar for Dakota skippers (Dana 1991, p. 48), but when preferred species are absent Dakota skippers appear to be nectar-generalists (Dana 1991).

Although nectar is important for Dakota skipper, the requirements of immature stages "define habitat quality in most temperate insects species studied and adult resources are seldom limiting" (Thomas et al. 2001, p. 1794). The loss or proportional reduction of short fine-stemmed bunchgrasses, such as little bluestem and prairie dropseed, likely cause declines in Dakota skipper populations. Larvae must move at least daily to and from their shelters at ground level to harvest palatable grass parts; therefore, tallgrasses,

such as big bluestem (*Andropogon gerardii*) are likely not suitable as larval hosts (Dana 1991, p. 46). In addition, the marked hairiness and size of leaf blades in some native tallgrass species, such as Indiangrass (*Sorghastrum nutans*), may impede the progress of larvae as they travel to obtain palatable tissue (Dana 1991).

Dakota skipper larvae probably would also not be able to survive on grasslands dominated by the non-native and invasive smooth brome or Kentucky bluegrass. The effectiveness of larval shelters built at the bases of smooth brome, for example, would likely be less effective than those constructed deep in the dense bases of bunchgrasses. In addition, smooth brome is likely too tall for efficient feeding by Dakota skippers and both species are senescent at times when larvae need palatable grass tissue (Dana 1991, p. 46-47). In a floristic study of 63 prairie remnants in South Dakota and Minnesota – including three high-quality reference sites – Kentucky bluegrass and smooth brome were the only two species found on every site (Higgins 1999, p. 24).

1. Invasion by exotic or alien species

Invasion of native prairie habitats by introduced plant species such as leafy spurge, Kentucky bluegrass, smooth brome, and Canada thistle (*Cirsium arvense*) threatens Dakota skippers throughout their current range. Skadsen (2002) surveyed 51 known and prospective Dakota skipper sites in South Dakota in 2002, including Waterfowl Production Areas, a National Wildlife Refuge, state game production areas, state parks, and privately and tribally owned sites, and concluded that invasive species threatened the native prairie habitat at all sites. He cited smooth brome, Kentucky bluegrass, Canada thistle, and leafy spurge as the principal threats. Once these plants invade a site they often become dominant and replace or reduce the coverage of native forbs and grasses used by Dakota skipper adults and larvae, respectively.

2. Weed Control

Broadcast chemical control of exotic plants such as aerial spraying of leafy spurge and application of broad-spectrum herbicides to control weeds in pastures also eliminates native forbs that are important nectar sources (Royer & Marrone 1992). In repeated surveys, Royer and Marrone (1992, p. 33) observed what "appears to be a correlation between disappearance of Dakota skipper and the advent of chemical spurge control methods in Ward, Barnes and Ransom Counties of North Dakota" including the Sheyenne National Grasslands. Dana (1997) concluded that herbicide use for weed and brush control on private lands is the principal threat to skippers at the Hole-in-the-Mountain complex in Minnesota.

3. Grazing

Bison (*Bison bison*) grazed at least some Dakota skipper habitats historically (Bragg 1995; Schlicht & Orwig 1998), but cattle (*Bos taurus*) are now the principal grazing ungulate in the species' range. Bison and cattle both feed on grass primarily, but have some dissimilar effects on prairie habitats (Damhoureyeh & Hartnett 1997; Matlack et al.

2001). Cattle consume proportionally more grass and grasslike plants than bison, whereas bison consume more browse and forbs (flowering herbaceous plants) (Damhoureyeh & Hartnett 1997). Grasslands grazed by bison may also have greater plant species richness and spatial heterogeneity than those grazed by cattle (Towne et al. 2005). Both species may adversely affect Dakota skippers by removing forage for larvae (i.e., palatable grass tissue) and adults (i.e., nectar-bearing plant parts), trampling larvae, and, hypothetically, by altering larval microhabitats (Royer et al. 2008).

Effects of Grazing in Tallgrass Prairie

Dana (1997) reported that in Minnesota, grazing by cattle reduces skipper numbers in direct proportion to its intensity (also see Selby 2006, p. 16). As with fire, Dakota skipper populations may persist through intense grazing episodes or be restored afterwards, respectively, if sufficient numbers survive and reproduce in lightly grazed patches or if nearby habitats provide sufficient numbers of immigrants to reestablish the population – after restoration of habitat quality. Years of grazing without rest, however, may preclude recovery from the effects of intense grazing. Grazing may primarily affect Dakota skippers indirectly by reducing plant diversity. For example, grazing prairie each year during mid-summer may effectively eliminate nectar plants, such as purple coneflower, and native warm season grasses that function as larval host plants (D. Skadsen, pers. comm. 2007). In South Dakota, Higgins (1999, p. 15) found lower plant diversity on privately owned prairies, which were mostly grazed, than on publicly owned prairies, which were almost all idle.

On some sites floral diversity may not be easily restored when grazing pressure declines (Dana 1997; Jackson 1999; Spomer 2004). Grazing of sufficient intensity (i.e., proportion of plant biomass removed), duration, or both often leads to the replacement of native plants with exotic, “cool-season European forage grasses and legumes that can tolerate continuous grazing” (Jackson 1999; Minnesota Department of Natural Resources 2006, p. 232). In overgrazed native prairie in Minnesota, exotic grasses are “major to dominant”, native forb species richness and diversity is poor, and “foliage height is often less than 10 cm” (Dana 1997). In South Dakota, Higgins (1999, p. 27-29) found that vegetation height and litter depth were lower on privately owned prairie remnants, which were mostly grazed. Spomer (2004) found that larval host plants and nectar sources were missing from heavily grazed pastures at Sheyenne National Grassland, North Dakota. Land managers also frequently use herbicides to control weeds and brush on grazed remnant prairies, which further reduces native forb diversity (Dana 1997).

Grazing may benefit Dakota skipper under some management scenarios. Livestock grazing is the dominant use of privately owned tallgrass prairie remnants in South Dakota (Higgins 1999, p. 15) and was identified as a threat on most of the privately owned sites on which the species occurs (Cochrane & Delphey 2002, p. 62-69). Nevertheless, Dakota skipper densities have remained relatively high on some grazed sites (Tim Orwig, personal observation in Schlicht 1997b, p. 3). In some habitats, Dakota skippers may benefit from light grazing that minimizes the area dominated by tall grasses (e.g., big bluestem and Indiangrass, Dana 1991). Schlicht (Schlicht 1997b) found that Dakota

skipper was relatively abundant on prairies subjected to light grazing regimes, but absent on nearby idle prairies that were no longer used for grazing; moreover, he observed more Dakota skippers per hour on the lightly grazed prairies than on nearby habitat managed with fire (Schlicht 1997b). Similarly, in eastern South Dakota, Dakota skipper populations were deemed secure at some sites managed with rotational grazing light enough to maintain plant species diversity (Skadsen 1997), but the species was since extirpated at one site where a change in ownership resulted in significant overgrazing (Skadsen 2006b, p. 5).

The presence and density of blacksamson echinacea may serve as an indicator of grazing impacts to Dakota skipper where the species co-occur;[2] grazing from mid-June through July may reduce blacksamson echinacea abundance (D. Skadsen, pers. comm. 2007). Finally, Britten and Glasford (2002) recommended minimizing disturbance of Dakota skipper habitat during the flight period (late June/early July) to maximize genetically effective populations sizes (i.e., the number of adults reproducing) to offset the effects of genetic drift. Therefore, a significant portion of the habitat of any Dakota skipper population should remain ungrazed or only lightly grazed during the flight period.

In summary, grazing may benefit Dakota skippers in tallgrass prairie by, for example, increasing native plant diversity and patchiness of fires (Minnesota Department of Natural Resources 2006, p. 232). Grazing tends to be a threat, however, if not managed with the goal of conserving plant and invertebrate diversity. Dakota skippers may benefit when its prairie habitat is rested from grazing for at least a part of each growing season, if livestock are precluded from removing too much plant material (e.g., are moved when stubble heights are 6-8 inches, Skadsen, pers. comm. 2007), and if the timing of grazing for each field varies from year to year (D. Skadsen, pers. comm. 2007). Conversely, Dakota skipper populations may be adversely affected or extirpated when too much plant material is removed and when fields are not rested for some portion of the growing season or are grazed during the same period each year.

Effects of Grazing on Dakota skippers in Wet Mesic Prairie Habitat in North Dakota and Manitoba

On habitats described by Royer and Marrone (1992) as “wet mesic” in North Dakota, Dakota skippers may be able to tolerate little to no grazing (McCabe & Post 1977; Royer & Marrone 1992; Royer & Royer 1998). Webster (2003) described very similar Dakota skipper habitats in Manitoba and, although he did not discuss grazing in these habitats, they may be as sensitive to grazing as similar habitats in North Dakota. McCabe (1981) observed that grazing eliminated Dakota skippers on North Dakota wet mesic (alkaline) prairies; nectar plants such as yellow sundrops and bluebell bellflower rapidly diminished with light grazing and heavy grazing eliminated upright prairie coneflower and blacksamson echinacea. In North Dakota, grazing compacts soils in wet mesic prairie inhabited by Dakota skippers, potentially altering vertical water distribution (Royer et al.

[2] Blacksamson echinacea is present at all sites where Dakota skipper occurs in South Dakota, but is also abundant at some sites not inhabited by the species (Skadsen 2006b:2).

2008, p. 16). Cattle may also physically destroy larvae in wet mesic (McCabe 1981) and other habitat types.

4. Haying

As with grazing, haying (i.e., mowing grasslands and removing the cuttings) can either adversely affect or benefit Dakota skipper populations, depending on how it is implemented. Haying generally maintains prairie vegetation structure, but if done before or during the Dakota skipper's flight period it may adversely affect nectar availability, favor expansion of Kentucky bluegrass, and kill adult Dakota skippers or cause them to emigrate (Dana 1983, 1997; McCabe 1979, 1981; Royer & Marrone 1992). In the Dakotas, late season (mid-August to October) haying appears to minimize adverse affects, although Lenz (Lenz 1999) concluded that annual haying may diminish the vigor of native, warm season grasses and reduce forb density in north-central North Dakota (wet mesic) habitats. In South Dakota, "several years of July mowing" may have caused the extirpation of the species at Wakidmanwin Prairie. Skadsen (2008, p. 10) typically recommends that haying occur only biannually to conserve habitat for prairie butterflies.

The negative impacts of long-term annual haying on plant diversity in prairies are also supported by studies conducted outside the current range of Dakota skipper. In a long-term study of a prairie in southeastern Wisconsin, a switch from late season haying to fire management led to increased native plant diversity and coverage of warm season (C4) grasses, although woody plant species also increased (Rooney & Leach 2010, p, 319). Jog et al. (2006, p. 164-165) found hayed prairies to be important reservoirs of native prairie plant diversity, but recommended diversifying management to include, for example, periodic fire and to forego annual haying to increase plant species diversity.

Some remnant Dakota skipper populations in the eastern Dakotas are found on fall-hayed prairies (McCabe 1979, 1981; Skadsen 1997), as are many of the sites in Manitoba (Webster 2003). Webster (2003) found "healthy populations" of Dakota skipper in Manitoba on sites used as hay fields and described the habitat on these sites as follows:

> "The mowed sites are characterized (during the flight season of the adults) by the absence of standing dead grass and low numbers of shrubs, often extensive areas with shorter bunch grasses (bluestem grasses), and abundant and readily observable nectar flowers, as compared to un-mowed sites. Small shrubs such as *P. floribunda*[3] occur along the margins of the hayed prairies and often on un-mowed prairies."

McCabe (McCabe 1981) suggested that late season haying benefits Dakota skipper populations and Webster (2003) suggested that Dakota skipper populations might be more common on hayed prairies than on idle (unmowed) prairies. Swengel and Swengel (1999) observed significantly greater relative abundance of Dakota skippers on hayed tracts compared with either idle or burned tracts in Minnesota and Skadsen (2004)

[3] Shrubby cinquefoil – now classified as *Dasiphora fruticosa* (L.) Rydb. *ssp. floribunda* (Pursh) Kartesz.

documented the apparent extirpation of Dakota skippers from a site after its management switched from haying to intensive grazing.

5. Fire

Dakota skipper populations existed historically in a vast ecosystem maintained in part by fire. Due to the great extent of tallgrass prairie, fire and other intense disturbances (e.g., locally intensive bison grazing) likely affected only a small proportion of Dakota skipper habitat each year, allowing for recolonization from unburned areas during the subsequent flight period (Swengel 1998). Without careful planning, however, fire may now have significant adverse effects on populations of Dakota skipper, especially after repeated events (Dana 1991; McCabe 1981; Orwig & Schlicht 1999; Swengel 1998). In systematic surveys of Minnesota tallgrass prairies, Dakota skippers were less abundant on sites that had been burned, compared with otherwise similar hayed sites (Swengel 1998; Swengel & Swengel 1999). Similarly, Schlicht (1997b) counted fewer Dakota skippers per hour in burned than on grazed sites in Minnesota. Orwig and Schlicht (1999) speculated that inappropriate use of prescribed burning eliminated Dakota skippers from the last known population in Iowa on a 65 ha preserve.

Early spring burns may be less likely to adversely affect Dakota skipper populations than late spring burns due to larval phenology and differences in subsurface soil temperatures during the fire. At Hole-in-the-Mountain Prairie in southwestern Minnesota, Dana (1991) conducted experiments to evaluate the effects of early spring vs. late spring fires and of different fuel levels on Dakota skipper mortality. In one experiment, he conducted an 'early-spring' burn on April 25 when larvae were "still in buried shelters" and a 'late-spring' burn on May 30 when Dakota skippers "were in shelters on the surface." Despite higher ambient temperatures during the early spring burn, temperatures 5 mm below the soil surface – the estimated average depth of buried shelters (Dana 1991, p. 11) – were 10° C higher during the late-spring burn. Fuel load was positively related to subsurface soil temperature (Dana 1991). Fuel loads that were clearly associated with lethal subsoil temperatures, however, were more typical of mesic tallgrass prairie, which had about twice the fuel loads of the dry-mesic habitats inhabited by Dakota skipper on the site (Dana 1991).

Dana (1991) found the results of his experiments "unsatisfactory" for evaluating "the question of how much the timing of spring burns relative to larval phenology affects the risk of mortality." He was able to conclude, however, that a late-spring burn (conducted on June 5) in "moderate" fuels (430 – 440 g/m^2) would have "a devastating effect" on Dakota skipper populations and that early spring burning (e.g., on or before May 1 in southwestern Minnesota) would afford "some amelioration."

Among "duff-dwelling" insects, Dakota skippers exhibit all of the characteristics that Panzer (2002) found were likely to result in negative population responses to fire – dependence on remnant native prairie, upland inhabitance, low ability to disperse, and univoltism (having only one generation/flight per year, Panzer 2002; Swengel 1996). Panzer (2002) considered insects with at least one of these characteristics to be "fire-

sensitive" and would likely have characterized Dakota skippers as "hypersensitive", although species whose larvae spend more time above ground (e.g., Iowa skipper) are likely more vulnerable. Panzer (2002) observed mean declines of 67 percent among fire-negative species, although actual mortality was likely higher due to some immigration into experimental areas after the burn. When all or large portions of prairie remnants are burned, a large share of skippers may be eliminated at once. Complete extirpation of a population, however, may not occur after a single burn event (Panzer 2002) and the extent of effects would vary depending on time of year and fuel load.

Rotational burning has been hypothesized to benefit Dakota skippers by increasing nectar plant density and by positively affecting soil temperature and near-surface humidity levels due to reductions in litter (e.g., Dana 1991), but several years may be necessary for population recovery following a burn. It seems well established that fire tends to increase native plant diversity in prairie (see studies summarize above). Blacksamson echinacea and little bluestem, for example, occurred more frequently on burned areas than on unburned areas in mixed-grass prairie at Lostwood National Wildlife Refuge in northwestern North Dakota (Murphy et al. 2005). An increase in blacksamson echinacea, an important nectar source, may last for 1-2 years after early spring fires and female Dakota skippers may preferentially oviposit near concentrations of this nectar source (Dana 2008). Swengel (1996), however, found lower relative abundances of Dakota skipper and other prairie-specialist butterfly species in burned units than in otherwise similar hayed units even four years after burns. At Prairie Coteau Preserve in Minnesota, Schlicht (2001) found greater flower abundance on regularly burned than rarely burned sites, but Dakota skipper abundance had declined most on the burned sites. Panzer (2002), however, concluded that "(R)egimes that allow for 3 years of recovery (4-year rotations) must be considered conservative in terms of insect conservation." Based on an analysis of several burn strategies, including no fire, Schultz and Crone (1998) recommended burning one-third of upland prairies occupied by Fender's blue (*Icaricia icarioides fenderi*) every 2-3 years. The results of intensive surveys and review of recent fire management at Hole-in-the-Mountain Preserve and Prairie Coteau SNA in Minnesota suggested that "…the rotational burning approach used at Prairie Coteau SNA and Hole-in-the-Mountain Preserve is compatible with long-term persistence of the Dakota skipper…" (Dana 2008).

Studies of all life-stages may be necessary to fully evaluate the response of Lepidoptera species to fire in grasslands, but cautious implementation of fire is necessary even if some life stages benefit from fire. Females of the moth, *Hemileuca eglanterina*, preferred recently burned areas of Oregon prairies for egg-laying, whereas fire negatively affected egg survival and larval abundance, leading Severns (2003) to conclude that "(C)onservative burning practices with unburned refugia may be the most effective way to manage for the conservation of rare grassland plant communities and their insect fauna."

In summary, the long term, population level effects of rotational, controlled fire on Dakota skippers remains a subject of debate (e.g., Ann Swengel, Baraboo, WI, in litt, 1993, 1994, R. Dana, in litt. 1994, Panzer 2002; Panzer & Schwartz 2000). It is clear, however, that under at least some conditions and when too frequent or extensive relative to the area of occupied habitat, fire can threaten Dakota skipper populations. Nevertheless, it also may be an essential tool in maintaining important aspects of Dakota skipper habitat.

6. Lack of Management/Disturbance

Inappropriate or excessive grazing, haying, and burning threaten some Dakota skipper populations and have extirpated others, but the species is also threatened where none of these management practices are implemented. Prairies that lack periodic disturbance – i.e., are idle – become unsuitable for Dakota skippers due to expansion of woody plant species (secondary succession), litter accumulation, reduced densities of nectar and larval food plants, or invasion by non-native plant species (e.g., smooth brome, McCabe 1981, Dana 1983, 1997, Skadsen 2003, Higgins et al. 2000, p. 21). Braker (1985) found reduced Dakota skipper numbers at Felton Prairie, Minnesota in tracts that had not been hayed or burned for several years and Swengel and Swengel (1999) observed significantly lower Dakota skipper abundance on unmanaged or idle sites in Minnesota, compared with hayed sites. Skadsen (Skadsen 1997, 2003) reported deterioration of several unburned and unmowed South Dakota prairies in just a few years due to encroachment of woody plants and invasive species (Skadsen 2003) and found lower species richness of prairie-dependent butterflies and lower floristic quality indices at sites with no disturbance vs. sites managed by grazing or fall mowing (Skadsen 2006a, p. 3). Dakota skipper returned to one idle site – Pickerel Lake State Park – after a burn conducted in 2007 resulted in a “dramatic increase in forbs, especially purple coneflower” (Skadsen 2008, p. 2). In a separate study, Higgins et al. (Higgins et al. 2000, p. 24) found that prairie habitats left idle after acquisition by conservation agencies had lower floristic quality than prairies managed with fire.

On some sites land managers intentionally facilitated succession of native prairie communities to woody vegetation or simply plant trees, such as Ponderosa pine (*Pinus ponderosa*). This converts prairie to shrubland, forest, or semi-forested habitat types and facilitates invasion of adjacent grasslands by exotic, cool-season grasses, such as smooth brome (Skadsen 2003). Moreover, the trees and shrubs provide perches for birds that may prey on Dakota skippers (for example, Hole-in-the-Mountain County Park, Minnesota - Dana 1997).

7. Prairie Plant Harvesting

A potential threat to Dakota skipper populations is collection of blacksamson echinacea for the commercial herbal remedy market (Skadsen 1997). This species is an important nectar source for Dakota skippers in much of their range. Biologists surveying skipper habitats have not reported signs of collecting, but illegal or unregulated harvest could become a problem in Dakota skipper habitats due to economic demands (Skadsen 1997).

8. Habitat Fragmentation

Fragmentation of tallgrass prairie has degraded the genetic diversity of remaining Dakota skipper populations. What may have once been a single metapopulation of Dakota skippers spread across formerly extensive tallgrass and mixed grass prairie (McCabe 1981, p. 184) is now fragmented into about 60 separate populations (Fig. 2, Cochrane & Delphey 2002). Britten and Glasford (2002) found that the small genetic differences among seven populations in the southern portion of the species' range suggest that they were formerly connected. Each population is now subject to "genetic drift that will erode its genetic variability over time" and possesses heterozygote deficiencies and high inbreeding coefficients indicative of inbreeding (Britten & Glasford 2002). Inbreeding may lower the capacity of local populations to adapt to environmental changes and may magnify the effect of deleterious alleles (Nieminen et al. 2001).

Dakota skippers are not likely to disperse over long distances – typical movements from one prairie patch to another may be less than 1 km (Cochrane & Delphey 2002, p. 32). Therefore, Dakota skipper habitat patches separated by more than 1 km may be effectively isolated from one another (McCabe 1981; Swengel 1998). Extirpation of small, isolated populations may occur over many years in some cases, but may be inevitable where immigration from nearby populations is not possible (Hanski et al. 1996).

The likelihood of population extirpation may be directly related to the size of habitat fragments. In systematic surveys on Minnesota prairies, Swengel and Swengel (1997; Swengel & Swengel 1999) found no Dakota skippers on the smallest remnants (<20 ha), and significantly lower abundance on intermediate size (30-130 ha) than on larger tracts (>140 ha). These differences were unrelated to vegetation characteristics – habitat area did not correlate significantly with vegetation type, quality, or topographic diversity.

Even with proper prairie management, small populations may be vulnerable to weather conditions (e.g., late frosts) and isolated sites may succumb to accidents or unintentional events. Dakota skipper numbers may decline due to the extirpation of isolated local populations where recolonization is no longer possible, even without further habitat destruction (Schweitzer 1989).

9. Pest Control

Broadcast spraying of insecticides to control grasshoppers kills butterflies and is greatly harmful to small populations of Dakota skipper (Royer & Marrone 1992). Grasshopper outbreaks may also adversely affect small and isolated butterfly populations, however, through their short-term destruction of prairie vegetation (John Payne, Animal and Plant Health Inspection Service, Hyattsville, Maryland, in litt. 1994).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

Although its population biology could make the Dakota skipper sensitive to collection losses at some locations, the present level of scientific collection is incidental and does not threaten the existence of the species. The species is not collected for commercial purposes.

C. Disease or predation.

No known diseases or parasites are specific to the Dakota skipper and no threats to Dakota skipper populations due to disease have been reported. Predation by birds or insects is not considered a major component of Dakota skipper population dynamics and is not likely a threat.

D. The inadequacy of existing regulatory mechanisms.

The Dakota skipper receives no regulatory protection in North Dakota or South Dakota, which together comprise approximately half of the species' current range. The species is listed as threatened under Minnesota's endangered species statute. Under the Minnesota statute "a person may not take, import, transport, or sell any portion of an endangered species of wild animal or plant, or sell or possess with intent to sell an article made with any part of the skin, hide, or parts of Dakota skippers, except as permitted by the Minnesota DNR (Minnesota Statutes 2001, 84.0895, Protection of threatened and endangered species).

Dakota skippers are listed as threatened under Canada's Species at Risk Act (SARA) (Environment Canada. 2007 Mar 20. Species at Risk Act Public Registry. <http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=792>. Accessed 2007 Apr 4). SARA prohibits the following activities per Dakota skipper on federal lands:

- kill, harm, harass, capture or take an individual of a listed species that is extirpated, endangered or threatened;
- possess, collect, buy, sell or trade an individual of a listed species that is extirpated, endangered or threatened, or its part or derivative;
- damage or destroy the residence of one or more individuals of a listed endangered or threatened species or of a listed extirpated species if a recovery strategy has recommended its reintroduction.

It is unclear whether Dakota skipper exists on any federal lands. Therefore, the provincial protections may apply more directly to Dakota skipper. In Manitoba it is unlawful to kill, injure, possess, disturb, or interfere with the Dakota skipper; destroy, disturb, or interfere with its habitat; or damage, destroy, obstruct, or remove a natural resource on which the Dakota skipper depends for its life and propagation. Saskatchewan has previously lacked the legal basis for protecting threatened or endangered invertebrates, but now that the species is listed under SARA, the national government could step in to protect the species in the province if it does not act to protect the species (Environment Canada. 2008 Apr

28. Species at Risk Act: A Guide. <http://www.sararegistry.gc.ca/approach/act/Guide_e.cfm>. Accessed 2008 Apr 28).

The existing regulatory mechanisms are not adequate to protect Dakota skipper against the numerous threats it faces. About one-half (47 percent) of sites inhabited by Dakota skipper in the U.S. are privately owned (i.e., excluding populations on land owned by The Nature Conservancy, Table 1). Fifteen of these populations are on private land with Federal conservation easements that preclude plowing. These easements would not prevent the use of grazing practices that would adversely affect Dakota skippers and one property with a FWS easement was recently overgrazed to the extent that Dakota skipper was extirpated from the site (Skadsen 2006b, p. 5).

E. Other natural or manmade factors affecting the conservation of Dakota skipper

Global climate change, with projections of increased variability in weather patterns and greater frequency of severe weather events, as well as warmer average temperatures, would affect remnant prairie habitats and may be detrimental to Dakota skippers (Royer & Marrone 1992). The effects of gradual shifts in plant communities and catastrophic events, such as severe storms, flooding, and fire, are exacerbated by habitat fragmentation. Populations that are isolated – greater than about 1 km (0.62 mi) from other populations – are unlikely to recover from local catastrophes.

For species that are being removed from candidate status:

___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Conservation measures implemented before the completion of our comprehensive 2002 status assessment (Cochrane & Delphey 2002) are summarized in that document. The information below pertains only to measures planned or implemented since 2002. This section almost certainly describes only a subset of the measures that have benefitted Dakota skipper since 2002. The species is present on 60 sites owned by conservation agencies and not all actions implemented on these or other lands that benefit the species are reported to the Service.

MDNR has planned and/or implemented conservation measures on four private properties inhabited by Dakota skipper through its Landowner Incentives Program. The conservation measures to be implemented on these sites include control of exotic species, grazing management, prescribed fire, inter-seeding of degraded prairie with native species, and restoration of native prairie on cropland.

In South Dakota management plans have been completed that are intended to guide habitat restoration at Hartford Beach State Park (HBSP) and Pickerel Lake State Recreation Area (PLSRA, Skadsen 2008p, 4-7). At each site, the lack of haying, grazing, or fire had allowed plant succession to degrade and reduce the extent of Dakota skipper habitat. Dakota skipper habitat at these sites has been divided into 3-4 management units. A controlled burn was conducted in one unit at HBSP in 2008 and shrubs were removed from two of the units (Skadsen 2008, p. 4). At PLSRA, a controlled burn was conducted in 2007 and in 2008 the site was hayed and shrubs were removed. Dakota skipper was present in the burned unit for the first time since 2002 after "a dramatic increase in forbs, especially purple coneflower (*Echinacea angustifolia*), occurred after the burn" and "apparently attracted Dakota skippers from a nearby site" (Skadsen 2008, p. 2).

A privately owned ranch that contains Dakota skippers in Day County, South Dakota is being managed with a patch burn grazing system in which each grazing unit is rested for a full year (Skadsen 2008, p. 10).

In 2005, U.S. Fish and Wildlife's National Wildlife Refuge System in North and South Dakota adopted the *Conservation Strategy & Guidelines for Dakota Skippers on Service Lands in the Dakotas*, which are based on the Service's *Dakota Skipper Conservation Strategy & Guidelines*. In the Dakotas, the Service will implement the conservation guidelines on any of its land where Dakota skipper is known to occur. The Service will also evaluate habitat features on other land that it owns to determine whether unrecorded populations of Dakota skipper may be present. Where the habitat features suggest that Dakota skippers could occur, the Service will conduct surveys for the species and/or manage the site in accordance with the *Dakota Skipper Conservation Strategy & Guidelines*.

Surveys are important for monitoring the status of Dakota skipper populations and its habitat and for determining whether any sites support previously unrecorded populations. South Dakota has established a robust effort to survey some of the Dakota skipper sites each year and to survey for new populations (Skadsen 2005). Skadsen (Skadsen 2007)found two new populations in 2007 and a similar effort in Minnesota also found two new populations in Minnesota (Selby 2009a, p. 10). The Sisseton-Wahpeton Sioux Tribe also began conducting surveys for Dakota skipper on its lands in 2006 (Skadsen 2006b). South Dakota Department of Game, Fish, and Parks sharply curtailed its survey efforts in 2008 and shifted to intensive monitoring of prairie butterfly abundance, habitat quality, and the effects of management on five sites in eastern South Dakota (Skadsen 2008).

Surveys and studies that track abundance of Dakota skippers in relation to different management scenarios are also important, especially in light of sharp differences in opinion regarding appropriate management techniques. Rooney and Leach (2010, p, 319), who concluded that fire exclusion from tallgrass prairie leads to decreased in prairie plant diversity – at least in Wisconsin – summed up the need for this information: "High quality, site-specific multi-annual monitoring data with invertebrate abundance data are rare but are desperately needed if we are to attempt to maintain the diversity of all taxa in tallgrass prairie."

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate):

The Dakota skipper is adversely affected by a variety of activities that threaten the persistence of populations, especially when they are isolated due to habitat fragmentation. Dakota skippers occur only in native tall- and mixed-grass prairie remnants where they have survived since the onset of prairie destruction following Euro-American settlement. Extant populations may only be likely to persist where (1) management facilitates the persistence of a plant community dominated by certain native grasses and forbs important for larval feeding and adult nectaring; (2) grazing, if conducted, is managed to allow for abundant larval and adult food sources at least in a significant portion of the site; (3) haying, if conducted, is done after approximately mid-August, at least in a sufficient area within the site and not every year; (4) habitat is managed by fire, grazing, or mowing that limits invasive species (e.g., cool-season grasses) and woody plants; (5) managers ensure that the frequency, timing, and relative coverage (e.g., patchiness) of prescribed fires and other disturbances allow for sufficient recolonization of burned areas from unburned patches near the burned site; (6) conversion of Dakota skipper habitat by gravel mining, agriculture, or other activities is precluded; and, (8) genetically effective population sizes are large enough to avoid deleterious effects of genetic drift on population growth.

In 1995, the U.S. Fish and Wildlife Service concluded that the Dakota skipper faced loss and degradation of its prairie habitat due to harmful burning, haying, grazing, and pesticide use (Federal Register 65:10535-10536). Invasion of prairie by alien plants, plant succession, and habitat loss through physical conversion of prairie were also negative factors. Dakota skipper and its habitat were in long term decline, but the demise of the species was deemed not imminent. Schweitzer (Schweitzer 1989) concluded, "This species is extirpated from a significant portion of its range… Its continued survival…is now threatened by fragmentation of its habitat. …Several decades into the future…the best that can be hoped for is the survival of a few metapopulations on some of the larger prairie preserves and gradual disappearance of the small remnant colonies." Royer and Marrone (1992) similarly concluded that because of ongoing trends the Dakota skipper was very likely heading to eventual extinction throughout its range unless it was conserved within extensive reserves.

In the mid-1990's expert advice to the U.S. Fish and Wildlife Service suggested that additional survey work was needed in Minnesota (R. Dana, in litt. 1994) and South Dakota (Skadsen 1999a) and that generally more surveys and trend analyses were needed

(A. Swengel, in litt. 1994). Numerous additional surveys have been conducted throughout the range of Dakota skipper since that time and those surveys' positive findings are represented in this document. Until recently, eastern South Dakota may be the only area in which significant areas of potential habitat remain unsurveyed. Extensive surveys conducted since 1997, however, appear to have defined the range of the species in the state (Skadsen 1997, 2002, 2003, 2004, 2005, 2006a, b, 2007, 2008). Royer (in litt. 1994) contended that declines in North Dakota habitat, however, were clearly threatening the species in that state. The U.S. Fish and Wildlife Service determined that listing Dakota skippers under the Endangered Species Act was not warranted in 1995 and stated its intent to bring sufficient management and protection to the species to enable its removal from the candidate species list.

Since the early 1990s, Dakota skipper populations have been lost from seven North and South Dakota sites documented in Royer and Marrone (1992) (Royer 1997; Skadsen 1997) and threats at many remnant sites are unabated. Due to substantial survey effort, however, numerous previously unrecorded locations have been documented since 1991, including about 40 site records in South Dakota (Skadsen 1997, 1999a, 2002, 2006a, 2007), 17 in Minnesota (Schlicht 1997a; Schlicht 1997b; Schlicht & Saunders 1994; Selby 2006, 2009a; Skadsen 1997, 1999a, 2002, 2006a, 2007), 13 in North Dakota (Royer 2002; Royer & Royer 1998, G. Fauske, pers. comm. 2004) and several in Manitoba in 2002 (Webster 2003). Many of these sites are within complexes, however, and may only comprise local populations that are parts of metapopulations. Further surveys may record new populations in South Dakota (Skadsen 1999a, 2002), although the general range of the species there seems to have been determined (see the section, **South Dakota**).

Fifteen sites with extant Dakota skipper populations have been protected from some threats with conservation easements – three of these sites are owned by The Nature Conservancy. Fish and Wildlife Service easements do not provide legally binding protection from overgrazing, but do preclude conversion to non-grassland.

RECOMMENDED CONSERVATION MEASURES

Conservation guidelines are available on the internet (*Dakota Skipper Conservation Strategy & Guidelines*) and are summarized below.

Dakota skipper is distributed among a number of isolated populations occurring in patches of habitat. The structure and viability of these populations is most likely determined by the extent of the habitat patches, the quality of habitat within the patches, connectivity of patches to other occupied patches (e.g., see Schmitt 2003) and the management of the patches. These factors should be considered when planning for the conservation of Dakota skipper populations.

Prescribed Fire

- Divide the Dakota skipper habitat at the site into as many burn units as feasible.
- 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. Longer intervals may be necessary where Dakota skipper populations are small and/or isolated.
- Never attempt to burn an entire isolated Dakota skipper habitat patch in any single year.
- Allow fires to burn in a patchy ("fingering") pattern within units – i.e., do not make a concerted effort to burn 'every square inch' and 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).
- 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 greater than 0.5 km from the burn area.
- 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) 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.
- Spring burns should be conducted as early as possible to limit larval mortality – in southwest Minnesota, for example, burns on or before May 1 may be early enough to ensure that Dakota skipper larvae have not yet emerged from their buried shelters. Dakota skipper larvae are less vulnerable to fire before they have resumed activity in the spring and after they have ceased activity in the fall (i.e., when they are in shelters at or below the ground surface). Moreover, late spring burns may delay flowering of early and midsummer blooming forbs, thereby limiting nectar sources for Dakota skippers during their flight period (Dana 1991, p. 56). Fall burns, however, 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, which may reduce their survival.
- 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 multiple burn units, ensuring that fires stay within planned burn areas, maximizing the number of years between fires, and reducing fuel loads (e.g., haying) in Dakota skipper habitat in units where frequent or intense fire is not necessary.

- If a site is managed with prescribed fire, subdivide Dakota skipper habitat into rotational burn units even if all burning will likely be done when Dakota skippers are in sub-surface shelters. Other species of butterflies that rely on native prairie [e.g., Iowa skipper (*Atrytone arogos iowa*) and Poweshiek skipperling (*Oarisma poweshiek*)] 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.
- 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.
- Be sure to consider any other rare, prairie-dependent species present on sites when designing burn plans.
- 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.
- 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.

Haying

The guidelines below also apply to mechanical collection of native prairie seed.

- Hay or mow after mid-August to reduce the likelihood of removing or destroying Dakota skipper eggs and to avoid removing nectar sources during the flight period. In general, hay or mow as late as feasible after mid-August to reduce the likelihood of adverse effects to any life stage.
- Leave at least 20 cm (8 in) 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). The senescence of native warm-season grasses may be a good indication that Dakota skippers have entered diapause. Mowing early in the spring during the time that burning should be conducted would also reduce the likelihood of adverse effects to Dakota skipper.
- As with annual burning, annual haying may reduce plant diversity in tallgrass prairie. Therefore, hay in alternate years or subdivide the habitat into multiple units and leave at least some of the units unhayed each year. Resting hay units may also reduce the impacts of 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

- Beyond a certain level, grazing is likely to adversely affect Dakota skipper populations in proportion to its intensity because it removes nectar sources and degrades native prairie plant communities (e.g., increases coverage of invasive/non-native species), leading to a reduction in larval food plants. Therefore, limit the duration and intensity of grazing for the conservation of the Dakota skipper and the native prairie ecosystem.
- Avoid grazing regimes that remove a significant proportion of floral nectar resources during the flight period. To protect nectar resources and vegetation for egg deposition and larval food (warm season grasses) in South Dakota, "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).
- As with haying, Skadsen (2003) also recommends that grazing never reduce stubble heights below 20 cm (8 inches) in tallgrass prairie.
- Do not graze Dakota skipper habitats for the entire season – 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 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 threaten the Dakota skipper populations at these sites.

Habitat Preservation

- Whenever feasible, avoid any destruction or conversion of Dakota skipper habitats to other uses. Successful restoration of Dakota skipper habitat has not been demonstrated and butterfly species diversity is lower on restored than on remnant prairies (Shepherd & Debinski 2005). Therefore, there is no evidence to support a presumption that destroyed Dakota skipper habitat could be restored through planting or other means. Nevertheless, degraded Dakota skipper habitats may be recoverable, especially if the adverse management has not been especially intense or is recent. For example, good quality Dakota skipper habitat that is intensively grazed for one year may be likely to recover if more appropriate management is resumed and if a source population is nearby or if the species persisted on a portion of the site.

Habitat Restoration

- 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 any chance for colonization of the restored habitat. Sites adjacent to occupied habitats or connected to occupied habitats by suitable habitat corridors would 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 & Delphey 2002).
- Road rights-of-way containing native prairie habitat may serve as corridors for grassland butterflies (Ries & 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 likely once occurred there, manage the site to favor the recolonization of the species, especially if it has retained significant characteristics of Dakota skipper habitat. Depending on the quality of the habitat, recolonization may be feasible if source sites are nearby or if artificial reintroduction may become an alternative in the future. If recolonization is possible, monitor the site during the flight period to detect any Dakota skippers.

Control of Weeds and Invasive Species

- 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

- Conduct surveys or review available data to delineate local populations and habitat. This would enable coordination and management of populations that may cross one or more management units or 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.

Survey Habitats and Monitor for Dakota Skippers

- Effective management of sites to conserve Dakota skippers depends on knowledge of the local distribution and relative abundance of Dakota skippers. Employ qualified persons to survey known and potential habitats and to monitor Dakota skipper populations. This is especially important when first devising management plans, changing management plans, and for ongoing evaluation of the effects of management on Dakota skipper populations.

Maintain Genetic Diversity of Populations

- Dakota skipper populations show signs of inbreeding (Britten & 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, 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.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8***
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

Threats to this species are pervasive and include a wide variety of factors that reduce the viability of populations on both public and private lands. Moreover, the threats are exacerbated by the isolation of remaining populations and evidence of inbreeding. We are aware of 169 sites at which Dakota skippers occur in the U.S. and Canada and at least a few populations are yet unrecorded (e.g., Skadsen 2008, p. 2). During the initial assessment of this species' status in 2002, we interviewed Dakota skipper experts and asked them to assign a status to sites with which they were familiar.[4] Of the 102 sites to which experts were able to assign a status, 21 percent were rated as secure, 24 percent as vulnerable, and 56 percent as threatened.

A few factors temper the magnitude of these threats. First, public and private conservation agencies are now undertaking conservation actions and habitat management activities that benefit the species or, in some cases, minimize adverse effects. Second, land management by private landowners that appears to benefit the species (e.g., fall haying and light grazing), although uncommon, are occurring in some areas. Third, since our initial status assessment (Cochrane & Delphey 2002), Dakota skippers have been

[4] In 2001, the Service asked Dakota skipper experts to describe the status of Dakota skippers at each site according to the following definitions: Secure: Inherently viable by size; no active threats (<5% probability of extinction within 50 years); Vulnerable: Possibly not viable by isolation, etc.; threats may affect (not secure, but <20% probability extinction within 20 years); Threatened: Active threats and/or high inherent vulnerability (>20% probability extinction within 20 years); Extinct: Converted habitat or degraded and no recent observations despite searching.

recorded at 43 additional sites in the U.S. and Canada and we are now aware of approximately 82 populations (i.e. 22 complexes composed of one or more local populations plus 60 isolated populations) distributed from southwestern Minnesota to south-central Manitoba. The number of distinct populations is partly a consequence of extensive fragmentation of formerly contiguous Dakota skipper habitat and the status of many of the populations is unknown. Nevertheless, the relatively broad geographic distribution and separation of populations may reduce the species' vulnerability to any single threat or catastrophic event. Based on this and information described in detail above, the magnitude of threats to Dakota skipper may best be described as moderate.

Immediacy

Dakota skipper faces a wide variety of imminent and non-imminent threats. Imminent threats include: (1) **invasive species** on sites where land management is conducive to their invasion or expansion or where they have become so pervasive that even favorable management may not be quickly effective; (2) **gravel mining** in the foreseeable future on some lands unprotected from such impacts; (3) **grazing** where its intensity is likely to be maintained or to increase to levels at which Dakota skippers are unlikely to thrive or even persist; (4) **succession** at sites where management is insufficient to control expansion of woody plant species; (5) **genetic drift** in isolated populations; (6) **fire** where managers burn without ensuring the existence of a sufficient amount of contiguous or nearby habitat from which immigrants can reinhabit burned areas; and, (7) **haying** where the site is normally hayed or mowed before mid-August and where annual haying is reducing availability of larval food and adult nectar plants. Approximately half of the inhabited sites are privately owned with little or no protection. Imminent threats on these sites include invasive species, overgrazing, and herbicide applications. Fifteen privately owned sites are protected from conversion by easements (App. B), but these do not prevent adverse effects from overgrazing or herbicide application (see Summary of Threats).

Non-imminent threats include: (1) **conversion for agriculture** on lands suitable for such purposes, but where there is currently no clear threat of imminent conversion (e.g., Towner-Karlsruhe complex in North Dakota; potential conversion to alfalfa, Skadsen 2005:4); (2) **gravel mining** where it is deferred temporarily by a conservation agreement; (3) **grazing** on private lands where current management is conducive to Dakota skipper conservation, but where landowners may allow excessive grazing in the future; and, (4) a shift in management of private agricultural lands from practices that conserve Dakota skippers (e.g., biennial late summer haying) to practices that would degrade habitat suitability for Dakota skippers (e.g., fertilization and application of herbicide to native hay prairies or prairie pastures, Skadsen 2006b).

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? Emergency listing is not warranted. There is currently no emergency posing a significant risk to the conservation of Dakota skipper.

DESCRIPTION OF MONITORING:

The Service's Twin Cities Field Office maintains a database to track the status of every recorded Dakota skipper locality in Canada and the U.S. and is in close and ongoing contact with Dakota skipper experts who work in South Dakota (Dennis Skadsen) and Minnesota (Robert Dana and Rich Baker – Minnesota Department of Natural Resources and Gerald Selby – GIS and Ecological Services) and contact experts in North Dakota (Ron Royer – Minot State University) and Canada (Richard Westwood – University of Winnipeg) about once per year to ensure that we obtain any new information regarding the status and distribution of Dakota skipper there.

In recent years, South Dakota Department of Game, Fish and Parks carried out a robust survey effort to describe the distribution of the species in the state. This appears to have been successful in defining the species' western distribution limit in the state. Survey efforts in recent years have been sharply curtailed to focus on intensive monitoring of selected populations (Skadsen 2008). In the years 2006-2009, for example, Skadsen conducted repeated surveys at five sites in South Dakota. Repeated surveys provide a thorough understanding the status of Dakota skipper at each site, whereas extensive surveys over broad geographic areas may consist of only a single visit to each site.

Minnesota Department of Natural Resources carried out extensive survey and monitoring in 2007 and 2008 to assess the current status of Dakota skipper and other prairie-dependent Lepidoptera. Through this effort, five new occurrences were recorded. Three of these are isolated from other sites by 5-21 km (3.1-13.0 mi) each whereas two are near (about 1 km (0.62 mi) away from) previously recorded populations. In 2007, a part of that effort focused on intensive monitoring of eight sites (Dana 2008).

In North Dakota the U.S. Forest Service has conducted butterfly surveys on grazing allotments with an emphasis on tracts slated for burning at Sheyenne National Grasslands (Spomer 2002) and at other sites with potential habitat on lands in Dakota Prairie Grasslands further west in the state. Survey effort in North Dakota, however, seems to have waned recently and we are aware of no survey or monitoring that occurred in 2008. The North Dakota National Guard conducted some surveys in 2002 that resulted in the location of two new Dakota skipper populations.

Canada conducted extensive surveys for the species in 2002 and identified many new populations, especially in the Lundar region of Manitoba. We are not aware of any significant survey effort in Canada since then. Richard Westwood (University of Winnipeg, pers. comm. 2007) usually conducts annual searches for Dakota skipper at the Tallgrass Prairie Preserve in southern Manitoba and confirmed the extirpation of the species there, where it was last seen in the mid-1980's. He did not carry out any surveys in 2008, but plans to have a graduate student begin work on a population biology study of the species in Manitoba (R. Westwood, pers. comm. 5 May 2009).

Although surveys since about 1990 have significantly improved our understanding of the distribution of Dakota skipper, current efforts to monitor the status of populations are

insufficient. There is currently no rangewide systematic monitoring. Due to its similarity to other species of skippers, it is not generally identifiable except by experts. Moreover, it is only detectable during its flight period, which only lasts approximately 2-4 weeks at each site. During this brief flight period skippers may not fly on some days due to rain, wind, or excessively cloudy conditions, further reducing the time available for effective surveys. Despite these difficulties, systematic monitoring throughout the range would be necessary to effectively assess the status of the species and to improve our ability to predict the impacts of various management techniques. In South Dakota, Skadsen regularly monitors a subset of inhabited sites and is now also collecting floristic quality data to improve our understanding of management impacts, including attempts to restore degraded habitats (Skadsen 2006a, 2007, 2008). Many sites at which the species has been recorded, however, have not been visited for several years by anyone qualified to assess the species' status, although the paucity of recent data has been improved in Minnesota by surveys in 2007 and 2008.

Although the status of the species may only be verified by qualified biologists conducting surveys during the flight period, site inspections conducted at other times of the year can provide useful information on threats and condition of the habitat. For example, if a site is inspected during the growing season and found to be severely degraded by grazing, one may infer that Dakota skipper is threatened or possibly extirpated at the site due to the reliance of the species on high quality prairie habitat consisting of a high diversity of native prairie plants.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Employees of each state within the current range of the species, Minnesota, North Dakota, and South Dakota have provided information on earlier versions of our assessments of this species. They did not have an opportunity to review this particular version.

South Dakota and Minnesota have each designated Dakota skipper as a Species of Greatest Conservation Need (SGCN) as part of their Comprehensive Wildlife Conservation Strategies. North Dakota did not include any terrestrial invertebrates on its list of SGCN.

Appendix A. Summary information for sites under public ownership where Dakota skipper is presumed extant.

STATE	SITE_NAME	OWN	STATUS	Status_Source	ACRES	Acres_Source
MN	Bicentennial_Prairie	C	v	Cochrane and Delphey 2002	140	
MN	Felton_Prairie_County	C	t	Cochrane and Delphey 2002	200	
MN	Hole-in-the-Mountain_County_Pk	C	t	Cochrane and Delphey 2002	40	
MN	Pope_County_Highway_Pit	C	t	Cochrane and Delphey 2002	20	
MN	Big_Stone_NWR	FWS	t	P. Delphey, pers. obs., 25-Mar-05	360	
MN	Glacial_Lakes_WPA	FWS	t	P. Delphey, pers. obs.	10	
MN	Altona_WMA	SC	p	Selby 2006	60	R. Dana, pers. comm. 2 July 2008
MN	Big_Stone_WMA	SC	t	Cochrane and Delphey 2002	40	
MN	Blue_Hills-Glacial_Lakes_St_Pk	SC	v	Cochrane and Delphey 2002	600	
MN	Bluestem_Prairie;_Buffalo_R_SP	SC	t	Cochrane and Delphey 2002	15	
MN	Bonanza_Prairie_SNA	SC	v	Cochrane and Delphey 2002	80	
MN	Chippewa_Prairie_Wildlife_Area	SC	u	Cochrane and Delphey 2002	240	
MN	Hole-in-the-Mountain_WMA_1	SC	v	Cochrane and Delphey 2002	190	
MN	Hole-in-the-Mountain_WMA_2	SC	t	Cochrane and Delphey 2002	190	
MN	Lake_Bronson_St_Pk_prairie	SC	v	Cochrane and Delphey 2002	100	
MN	Prairie_Coteau_SNA	SC	v	Cochrane and Delphey 2002	2.8	
MN	Terrace WMA	SC	p	Selby 2009a		
MN	Tympanuchus_WMA	SC	t	Cochrane and Delphey 2002	20	
MN	Woodstock WMA	SC	p	Selby 2009a		
ND	Jones	FS	u	Cochrane and Delphey 2002		
ND	McKenzie District Pasture 12, Site 1	FS	u	Cochrane and Delphey 2002		
ND	McKenzie District Pasture 12, Site 2	FS	u	Cochrane and Delphey 2002		
ND	Milton Sr.	FS	u	Cochrane and Delphey 2002		
ND	Hartleben_Prairie	FWS	v	Cochrane and Delphey 2002	200	
ND	Lostwood_NWR	FWS	t	Cochrane and Delphey 2002	0	
ND	Camp Grafton	MIL	u	Cochrane and Delphey 2002		
ND	Garrison_Training_Area	MIL	u	Cochrane and Delphey 2002		
ND	McHenry_School_Prairie	SN	t	Cochrane and Delphey 2002	130	
ND	Mt._Carmel_Camp	SN	v	Cochrane and Delphey 2002	160	
ND	New_Rockford	SN	t	Cochrane and Delphey 2002	160	
ND	Smokey_Lake_School_Sec.	SN	v	Cochrane and Delphey 2002	160	
ND	Towner	SN	t	Cochrane and Delphey 2002	80	

STATE	SITE_NAME	OWN	STATUS	Status_Source	ACRES	Acres_Source
ND	Voltaire	SN	t	Cochrane and Delphey 2002	1	
SD	Berwald/Schuchard_WPA	FWS	p	Skadsen 2004	359	Skadsen 2002
SD	Cox_WPA	FWS	p	Skadsen 2004	448	Skadsen 2003
SD	Jensen_WPA	FWS	p	Skadsen 2004	764	Skadsen 2002
SD	Lake Emma WPA	FWS	p	L. Hubers, pers. comm. 2010		
SD	Meyer_Lake_WPA	FWS	p	Skadsen 2004	1326	Skadsen 2004
SD	North_Red_Iron_Lake_WPA	FWS	u	Skadsen 2004	1000	
SD	O'Farrell_WPA	FWS	p	Skadsen 2004	480	Skadsen 2003
SD	Severson WPA	FWS	p	Skadsen 2004	157	Skadsen 2004
SD	Weeks_WPA	FWS	p	Skadsen 2004	40	Skadsen 2003
SD	Sica_Hollow_State_Park_Ringen_Addn	SC	p	Skadsen 2008	80	Skadsen 2008
SD	Hartford_Beach_St_Pk	SDP	p	Skadsen 2009	12	Skadsen 2004
SD	Sica_Hollow_State_Park	SDP	p	Skadsen 2004		
SD	Oak_Lk_Research_Ctr	SDSU	u	Skadsen 2004		
SD	Black_Slough_GPA	SDW	p	Skadsen 2004	738	Skadsen 2003
SD	Crystal_Springs_GPA	SDW	p	Skadsen 2004	25	Cochrane and Delphey 2002
SD	Mud Lake Game Production Area	SDW	p	Skadsen 2004	640	Skadsen 2004
SD	Rock_Crandall_GPA	SDW	p	Skadsen 2004		
SD	Roy_West_GPA	SDW	p	Skadsen 2004		
SD	Summit_Lk_GPA	SDW	p	Skadsen 2004	201	Skadsen 2003
SD	Sundahl_GPA	SDW	p	Skadsen 2004	150	Skadsen 2003

Appendix B. Summary information for sites where Dakota skipper is known or presumed extant that are at least partially covered by U.S. Fish and Wildlife Service grassland easements, which preclude conversion to non-grassland (e.g., by plowing).

Site Name	State	County	Status*	Status Source	Ownership	Last Observation
Anderson's_Meadow	ND	McHenry	t	Cochrane and Delphey 2002	Private	
Brown_Ranch	ND	Ransom	v	Cochrane and Delphey 2002	The Nature Conservancy	
Eidmann_Ranch	ND	McHenry	v	Cochrane and Delphey 2002	Private	
Klein's_Meadow	ND	McHenry	t	Cochrane and Delphey 2002	Private	
Smokey_Lake	ND	McHenry	v	Cochrane and Delphey 2002	Private	30-Jun-98
Altamont Prairie	SD	Deuel	p	Skadsen 2004	The Nature Conservancy	13-Jul-04
Crystal_Springs_Preserve	SD	Deuel	u	Skadsen 2004	Private	21-Jul-96
Crystal Springs Ranch	SD	Deuel	U	Skadsen 2004	Private	3-Jul-87
East_Fisher_Pasture	SD	Roberts	u	Skadsen 2004	Private	7-Jul-98
Fisher_Hay_Prairie	SD	Roberts	p	Skadsen 2004	Private	6-Jul-02
Hanson_Pasture	SD	Roberts	u	Skadsen 2004	Private	7-Jul-98
Ordway_Prairie_Preserve	SD	McPherson	p	Skadsen 2004	The Nature Conservancy	3-Jul-03
Peckham Ranch	SD	Day	p	Skadsen 2007	Private	10-Jul-08
Phillip's_Prairie	SD	Roberts	u	Skadsen 2004	Private	10-Jul-97
Sica_Hollow_West (Ringen)	SD	Marshall	u	Skadsen 2008	South Dakota State Parks	9-Jul-08

* e = extirpated; p = present; t = threatened; u = unknown; v = vulnerable (Cochrane and Delphey 2002:61)

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Thomas O. Melius
Regional Director, Fish and Wildlife Service Date June 9, 2011

Concur: _____
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review:
Conducted by:

Comments: