DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R3–ES–2013–0043; 4500030113]

RIN 1018–AY01

Endangered and Threatened Wildlife and Plants; Threatened Status for Dakota Skipper and Endangered Status for Poweshiek Skipperling

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to list the Dakota skipper as a threatened species and the Poweshiek skipperling as an endangered species under the Endangered Species Act of 1973, as amended. If we finalize this rule as proposed, it would extend the Act's protections to the Dakota skipper and the Poweshiek skipperling. The effect of this regulation is to add the Dakota skipper and the Poweshiek skipperling to the List of Endangered and Threatened Wildlife. We also propose a special rule under section 4(d) of the Act that outlines the prohibitions necessary and advisable for the conservation of the Dakota skipper, if it is listed as a threatened species.

DATES: *Written Comments:* We will accept comments received or postmarked on or before December 23, 2013. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** section, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in the **ADDRESSES** section by December 9, 2013.

Public Informational Meetings: To better inform the public of the implications of the proposed listing and to answer any questions regarding this proposed rule, we plan to hold five public informational meetings. We have scheduled informational meetings regarding the proposed rule in the following locations:

(1) Minot, North Dakota, on November 5, 2013, at the Souris Valley Suites, 800 37th Avenue SW;

(2) Milbank, South Dakota, on November 6, 2013, at the Milbank Chamber of Commerce, 1001 East 4th Avenue;

(3) Milford, Iowa, on November 7, 2013, at the Iowa Lakeside Laboratory, 1838 Highway 86;

(4) Holly, Michigan, on November 13, 2013, at the Rose Pioneer Elementary School, 7110 Milford Road; and

(5) Berlin, Wisconsin, on November 14, 2013, at the Berlin Public Library, 121 West Park Avenue.

Except for the meeting in Berlin, Wisconsin, each informational meeting will be from 5:30 p.m. to 8:00 p.m.; the meeting in Berlin, Wisconsin will be from 4:30 p.m. to 7:00 p.m.

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Search box, enter FWS–R3–ES–2013–0043, which is the docket number for this rulemaking. Then, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on ''Comment Now!''

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R3–ES–2013–0043; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

We request that you send comments only by the methods described above. We will post all comments on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see the Public Comments section below for more information).

FOR FURTHER INFORMATION CONTACT: Pete Fasbender, Field Supervisor, U.S. Fish and Wildlife Service, Twin Cities Ecological Services Office, 4101 American Boulevard East, Bloomington, Minnesota, 55425, by telephone (612) 725–3548 or by facsimile (612) 725–3609. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Endangered Species Act (Act), if a species is determined to be an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the **Federal Register** and make a determination on our proposal within one year. Listing a species as an endangered or threatened species can only be completed by issuing a rule. A species may warrant protection through listing under the Act if it meets the definition of an endangered or threatened species throughout all or a significant portion of its range.

This rule consists of:

- A proposed rule to list the Poweshiek skipperling as an endangered species;
- A proposed rule to list the Dakota skipper as threatened species; and
- A proposed special rule under section 4(d) of the Act that outlines the prohibitions necessary and advisable for the conservation of the Dakota skipper.

Elsewhere in today's **Federal Register**, we propose to designate critical habitat for the Dakota skipper and Poweshiek skipperling under the Act.

The basis for our action. Under the Act, we can determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Furthermore, whenever a species is listed as a threatened species, we may issue regulations that are necessary and advisable for the conservation of that species under section 4(d) of the Act.

We have determined the threats to both species include:

- Habitat loss and degradation of native prairies and prairie fens, resulting from conversion to agriculture or other development; ecological succession and encroachment of invasive species and woody vegetation primarily due to lack of management; past and present fire, haying, or grazing management that degrades or eliminates native prairie grasses and flowering forbs; flooding; and groundwater depletion, alteration, and contamination.
- Other natural or manmade factors, including loss of genetic diversity, small size and isolation of sites, indiscriminate use of herbicides such that it reduces or eliminates nectar sources, climate conditions such as drought, and other unknown stressors.
- Existing regulatory mechanisms are inadequate to mitigate these threats to both species.

We will seek peer review. We are seeking comments from knowledgeable individuals with scientific expertise to review our analysis of the best available science and application of that science and to provide any additional scientific information to improve this proposed rule. Because we will consider all comments and information received during the comment period, our final

determinations may differ from this proposal.

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from other concerned government agencies, the scientific community, industry, or any other interested party concerning this proposed rule. We particularly seek comments concerning:

(1) The species' biology, range, and population trends, including:

(a) Habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends; and

(e) Past and ongoing conservation measures for the species, its habitat, or both.

(2) The factors that are the basis for making a listing determination for a species under section 4(a) of the Act (16 U.S.C. 1531 *et seq.*), which are:

(a) The present or threatened destruction, modification, or curtailment of its habitat or range;

(b) Overutilization for commercial, recreational, scientific, or educational purposes;

(c) Disease or predation;

(d) The inadequacy of existing regulatory mechanisms; or

(e) Other natural or manmade factors affecting its continued existence.

(3) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to these species and existing regulations that may be addressing those threats;

(4) Additional information concerning the historical and current status, range, distribution, and population size of these species, including the locations of any additional populations;

(5) Any information on the biological or ecological requirements of these species and ongoing conservation measures for these species and their habitat;

(6) Specific information on the amount and distribution of the Dakota skipper and Poweshiek skipperling and their habitat; and

(7) Our approach to determining the status of each species at each site, and our definitions of ''present,'' ''unknown,'' ''possibly extirpated,'' and ''extirpated'' as described under *Species Status,* below.

(8) Suitability of the proposed 4(d) rule for the conservation, recovery, and management of the Dakota skipper.

(9) Whether it would be appropriate to allow routine livestock grazing activities on lands inhabited by Dakota skipper in any additional counties. The proposed 4(d) rule would allow routine livestock grazing activities on lands inhabited by the Dakota skipper in counties where the species does not primarily occur in relatively flat and moist (wet-mesic or mesic) prairie habitats. Wet-mesic or mesic habitats in which the Dakota skipper occurs are typically hayed after July 15 and not grazed. We are seeking comments on whether or not grazing may be implemented in these habitats in a manner that would allow for the persistence of the Dakota skipper.

(10) Any information on Tribal regulations or Tribal conservation efforts that may affect either the Dakota skipper or Poweshiek skipperling and their habitat.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is a threatened or endangered species must be made ''solely on the basis of the best scientific and commercial data available.''

You may submit your comments and materials concerning this proposed rule by one of the methods listed in the **ADDRESSES** section. We request that you send comments only by the methods described in the **ADDRESSES** section.

If you submit information via *http://www.regulations.gov,* your entire submission—including any personal identifying information—will be posted on the Web site. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov.* Please include sufficient information with your comments (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov,* or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Twin Cities Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Previous Federal Actions

The U.S. Fish and Wildlife Service (Service) initiated proceedings to list the Dakota skipper as a threatened species in 1978 (43 FR 28938), but withdrew the proposed rulemaking after Congress amended the Endangered Species Act in 1979 (45 FR 58171). The Dakota skipper was designated a category 2 candidate species in the May 22, 1984, Notice of Review (49 FR 21664) and remained a category 2 species (January 6, 1989, 54 FR 572; November 21, 1991, 56 FR 58830; and November 15, 1994, 59 FR 59020). A category 2 candidate was defined as a species for which information in the Service's possession indicates that listing was possibly appropriate, but for which sufficient information on biological vulnerability and threats was not currently available to support a proposal for listing under the Act.

On January 21, 1994, the Service received a petition from the Biodiversity Legal Foundation to list the Dakota skipper as an endangered or threatened species and to designate critical habitat. We made a 90-day finding that the petition presented substantial information to indicate that the requested action may be warranted; the finding was published in the **Federal Register** on July 28, 1994 (59 FR 38424). On February 27, 1995, we announced a 12-month finding in which we determined that the species should remain as a category 2 candidate, that timely appropriate prairie management and protection may eliminate the need to list the species, and that researchers indicated that more surveys, particularly in Minnesota, Iowa, and North Dakota, were needed (60 FR 10535).

In a December 5, 1996 (61 FR 64481) decision, the Service discontinued the practice of maintaining a list of species regarded as ''category-2 candidates.'' Instead, the Service would keep a single list of candidate species—species for which the Service has on file sufficient information to support issuance of a proposed listing rule.

In 2002, the Service reviewed the status of the Dakota skipper and determined that it met the definition of a candidate species. The Dakota skipper was assigned a listing priority number of 11 on June 13, 2002 (67 FR 40657).

The Dakota skipper remained a candidate species with a listing priority number of 11 in subsequent notices, including May 4, 2004 (69 FR 24876), May 11, 2005 (70 FR 24870), and September 12, 2006 (71 FR 53756). The Service changed the listing priority from 11 to 8 on December 6, 2007 (72 FR 69034), and the Dakota skipper remained a candidate species with a listing priority number of 8 in subsequent notices, including December 10, 2008 (73 FR 75176), November 9, 2009 (74 FR 57804), November 10, 2010 (75 FR 69222), and October 26, 2011 (76 FR 66370).

On May 12, 2003, the Service received a petition from the Biodiversity Conservation Alliance and five others to list the Dakota skipper as endangered or threatened and to designate critical habitat. The Service agreed with the petitioners, by virtue of having made it a candidate in 2002, that the Dakota skipper warranted listing as threatened or endangered under the Act. The petition did not contain evidence supporting emergency listing or changing the listing priority number; therefore, the Service took no further action on the petition.

On July 12, 2011, the Service filed a proposed settlement agreement with the Center for Biological Diversity in a consolidated case in the U.S. District Court for the District of Columbia. The settlement agreement was approved by the court on September 9, 2011. As part of this settlement agreement, the Service agreed to complete a proposed listing rule or not warranted finding for the Dakota skipper by September 30, 2013.

The Service identified the Poweshiek skipperling (*Oarisma poweshiek*) as a candidate species, with a listing priority number of 2, in a notice of review published in the **Federal Register** on October 26, 2011 (76 FR 66370).

Status Assessments for Dakota Skipper and Poweshiek Skipperling

Background

Dakota Skipper

Species Description

The Dakota skipper (*Hesperia dacotae*) is a member of the skipper family Hesperiidae and was first described in 1911 from collections taken at Volga, South Dakota, and Grinnell, Iowa (Skinner 1911 in Royer and Marrone 1992a, p. 1). The family Hesperiidae includes 3 other subfamilies, and the genus *Hesperia* contains 18 species (Miller and Brown 1981, p. 31; Ferris 1989 in Royer and Marrone 1992a, p. 1). Dakota skipper is the accepted common name for *H. dacotae.*

The 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 and Marrone 1992a, p. 3). 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 have variable markings. The dorsal surface of adult male wings ranges in color from tawny-orange to brown and has a prominent mark on the forewing; the ventral surface is dusty yellow-orange (Royer and Marrone 1992a, p. 3). 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 and Marrone 1992a, p. 3). Adult Dakota skippers may be confused with the Ottoe skipper (*H. ottoe*), which is somewhat larger with slightly longer wings (Royer and Marrone 1992a, p. 3). Dakota skipper pupae are reddish-brown, and the larvae are light brown with a black collar and dark brown head (McCabe 1981, p. 181).

General Life History

Dakota skippers are univoltine (having a single flight per year), with an adult flight period that may occur from the middle of June through the end of July (McCabe 1979, p. 6; McCabe 1981, p. 180; Dana 1991, p. 1; Royer and Marrone 1992a, p. 26; Skadsen 1997, p. 3; Swengel and Swengel 1999, p. 282). The actual flight period varies somewhat across the range of each species and can also vary significantly from year-to-year, depending on weather patterns. Females emerge slightly later than males (Dana 1991, p. 1), and the observed sex ratio of Dakota skippers was roughly equal during peak flight periods (Dana 1991, p. 15; Swengel and Swengel 1999, pp. 274, 283).

The Dakota skipper flight period in a locality lasts two to four weeks, and mating occurs throughout this period (Braker 1985, p. 46; McCabe and Post 1977a, p. 38; McCabe and Post 1977b, p. 36; McCabe 1979, p. 6; McCabe 1981, p. 180; Dana 1991, p. 15; Swengel and Swengel 1999, p. 282). Adult male Dakota skippers exhibit perching behavior (perch on tall plants to search for females), but occasionally appear to patrol in search of mating opportunities (Royer and Marrone 1992a, p. 25).

Dakota skippers lay eggs on broadleaf plants (McCabe 1981, p. 180) and grasses (Dana 1991, p. 17), although larvae feed only on grasses. Potential lifetime fecundity is between 180 and 250 eggs per female Dakota skipper; realized fecundity depends upon longevity (Dana 1991, p. 26). Female Dakota skippers lay eggs daily in diminishing numbers as they age (Dana 1991, pp. 25–26). Dana (1991, p. 32) estimated the potential adult life span of Dakota skipper to be 3 weeks and the average life span (or residence on site before death or emigration) to be 3 to 10 days on one Minnesota prairie.

Dakota skippers overwinter as larvae and complete one generation per year. Dakota skipper eggs hatch after incubating for 7–20 days; therefore, hatching is likely completed before the end of July. After hatching, Dakota skipper 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, p. 16). They construct 2–3 successively larger shelters as they grow (Dana 1991, p. 16). The larvae emerge from their shelters at night to forage (McCabe 1979, p. 6; McCabe 1981, p. 181; Royer and Marrone 1992a, p. 25) and appear to clip blades of grass and bring them back to their shelters to consume (Dana 2012a, pers. comm.).

Dakota skippers have six or seven larval stages (instars) (Dana 1991, pp. 14–15) and overwinter (diapause) in ground-level or subsurface shelters during either the fourth or fifth instar (McCabe 1979, p. 6; McCabe 1981, pp. 180, 189; Dana 1991, p. 15; Royer and Marrone 1992a, pp. 25–26). 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, p. 16).

Food and Water

Nectar and water sources for adult Dakota skippers vary regionally and include purple coneflower (*Echinacea angustifolia*), bluebell bellflower (*Campanula rotundifolia*), white prairie clover (*Dalea candida*), upright prairie coneflower (*Ratibida columnifera*), fleabanes (*Erigeron spp.*), blanketflowers (*Gaillardia spp.*), black-eyed Susan (*Rudbeckia hirta*), groundplum milkvetch (*Astragalus crassicarpus*), and yellow sundrops (*Calylophus serrulatus*) (McCabe and Post 1977b, p. 36; Royer and Marrone 1992a, p. 21). Plant species likely vary in their value as nectar sources due to the amount of nectar available during the adult flight period (Dana 1991, p. 48). Swengel and

Swengel (1999, pp. 280–281) observed nectaring at 25 plant species, but 85 percent of the nectaring was at the following three plants, in declining order of frequency: Purple coneflower, blanketflower, and groundplum milkvetch. Dana (1991, p. 21) reported the use of 25 nectar species in Minnesota with purple coneflower most frequented; McCabe (1979, p. 42, McCabe 1981, p. 187) observed Dakota skippers using eight nectar plants. In addition to nutrition, the nectar of flowering forbs provides water for Dakota skipper, which is necessary to avoid desiccation during flight activity (Dana 1991, p. 47; Dana 2013, pers. comm.).

Dakota skipper larvae feed only on several native grass species; little bluestem (*Schizachyrium scoparium*) is a frequent food source of the larvae (Dana 1991, p. 17; Royer and Marrone 1992a, p. 25), although they have been found on *Panicum* spp., *Poa* spp., and other native grasses (Royer and Marrone 1992a, p. 25). Seasonal senescence patterns of grasses relative to the larval period of Dakota skippers are likely important in determining the suitability of grass species as larval host plants. Large leaf blades, leaf hairs, and the distance from larval ground shelters to palatable leaf parts preclude the value of big bluestem and Indian grass as larval food plants (Dana 1991, p. 46).

Dispersal

Dakota skipper are not known to disperse widely; the species was evaluated among 291 butterfly species in Canada as having relatively low mobility. Experts estimated Dakota skipper to have a mean mobility of 3.5 (standard deviation = 0.7) on a scale of 0 (sedentary) to 10 (highly mobile) (Burke *et al.* 2011, p. 2279; Fitzsimmons 2012, pers. comm.). Dakota skippers may be incapable of moving greater than 1 kilometer (km) (0.6 miles (mi)) between patches of prairie habitat separated by structurally similar habitats (*e.g.,* crop fields, grass-dominated fields or pasture, but not necessarily native prairie) (Cochrane and Delphey 2002, p. 6). Royer and Marrone (1992a, p. 25) concluded that Dakota skippers are not inclined to disperse, although they did not describe individual ranges or dispersal distances. McCabe (1979, p. 9; 1981, p. 186) found that concentrated activity areas for Dakota skippers shift annually in response to local nectar sources and disturbance.

In a mark-recapture study, average adult movements of Dakota skipper were less than 300 meters (m) (984 feet (ft)) over 3–7 days; marked adults crossed less than 200 m (656 ft) of unsuitable habitat between two prairie patches and moved along ridges more frequently than across valleys (Dana 1991, pp. 38–40). Dana (1997, p. 5) later observed reduced movement rates across a small valley with roads and crop fields compared with movements in adjacent widespread prairie habitat. Skadsen (1999, p. 2) reported possible movement of Dakota skippers in 1998 from a known population at least 800 m (2625 ft) away to a site with an unusually heavy growth of purple coneflower; 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, interspersed by a few asphalt and gravel roads (Skadsen 2001, pers. comm.).

In summary, dispersal of Dakota skipper is very limited due in part to its short adult life span and single annual flight. Therefore, the species' extirpation from a site is likely permanent unless it is within about 1 km (0.6 mi) of a site that generates a sufficient number of emigrants or is artificially reintroduced to a site; however, the capability to propagate the Dakota skipper is currently lacking.

Habitat

Dakota skippers are obligate residents of undisturbed (remnant, untilled) high-quality prairie, ranging from wet-mesic tallgrass prairie to dry-mesic mixed-grass prairie (Royer and Marrone 1992a, pp. 8, 21). High-quality prairie contains a high diversity of native plant species, including flowering herbaceous plants (forbs). Royer and Marrone (1992a, p. 21) categorized Dakota skipper habitat into two main types that were once intermixed on a landscape scale, but are now mostly segregated. The first, referred to as ''Type A'' by Royer *et al.* (2008, pp. 14–16), is low wet-mesic prairie that occurs on near-shore glacial lake deposits. Type A Dakota skipper habitat is dominated by bluestem grasses, with three other plant species 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, p. 190). 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). Common forbs in bloom during the late season in Type A habitat include Rocky Mountain blazing star (*Liatris ligulistylis*), Canada goldenrod (*Solidago canadensis*), strict blue-eyed grass (*Sisyrinchium montanum*), common goldstar (*Hypoxis hirsuta*), and black-eyed Susan (Lenz 1999a, p. 6). Type A habitats also contain small patches of dry-mesic prairie inhabited by Dakota skippers. Common forb species in these dry-mesic areas include stiff sunflower (*Helianthus pauciflorus Nutt. ssp. pauciflorus*), and candle anenome (*Anemone cylindrica*), although purple coneflower was rare in these habitats (Lenz 1999a, pp. 6–11). Dakota skipper inhabits Type A habitat in north-central North Dakota, southeast North Dakota, and Manitoba.

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 (*Heterostipa spp.*). As with Type A habitat, bluebell bellflower and wood lily are also present in Type B habitats, but Type B habitats also support more extensive stands of purple coneflower, upright prairie coneflower, and common gaillardia (*Gaillardia aristata*) (Royer and Marrone 1992a, p. 22). Both Type A and Type B prairies may contain slightly depressional (low topographical areas that allow for the collection of surface water) wetlands with extensive flat areas and slightly convex hummocks, which are dryer than the wet areas (Lenz 1999b, pp. 4, 8).

In northeastern South Dakota, Dakota skippers inhabit primarily Type B habitats with abundant purple coneflower, but they also occur in nearby Type A habitats in some areas (Skadsen 1997, p. 4). All Type A habitats occupied by Dakota skipper in South Dakota are near hill prairie (Type B) habitats that are managed with fall haying (Skadsen 2006b, p. 2).

Little bluestem and porcupine grass are the predominant grass species in Dakota skipper habitat in South Dakota (Skadsen 2006b, p. 2). Dry-mesic prairies suitable for Dakota skippers in South Dakota typically include little bluestem, side oats grama, porcupine grass, needle-and-thread grass (*H. comata*), and prairie dropseed, and a high diversity and abundance of forbs, including purple coneflower, 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, pp. 1–2). Purple coneflower occurs at all sites where the Dakota skipper has been recorded in South Dakota, although it is absent at some sites where Dakota skipper is abundant in other states (Skadsen 2006b, p. 2).

In Minnesota, Dakota skippers inhabit Type B habitats. Dana (1997, p. 8) described typical habitat in Minnesota as dry-mesic prairie dominated by mid-height grasses with an abundance of nectar sources including purple coneflower and prairie milkvetch (*Astragalus laxmannii Jacq. var. robustior*). Southern dry prairies in Minnesota are described as having sparse shrub cover (less than 5 percent) composed primarily of leadplant, with prairie rose (*Rosa arkansana*), wormwood sage, or smooth sumac (*Rhus glabra*) present and few, if any, trees (Minnesota DNR 2012a). Dana (1991, p. 21) never encountered Dakota skippers in wet or wet-mesic prairies in Minnesota, despite abundance of suitable plants and the frequent use of these habitats by similar skipper species. In systematic surveys at twelve Minnesota sites, Swengel and Swengel (1999, pp. 278–279) found that Dakota skippers were significantly more abundant on dry prairie than on either wet-mesic prairie. In Manitoba, Dakota skippers inhabit Type A habitats, occupy the slightly higher, drier areas of wet-mesic prairie where nectar sources are more abundant (Webster 2003, p. 7). Occupied habitats in Saskatchewan are similar to the drier upland dry-mesic mixed-grass prairie hillside habitats in Manitoba, which is dominated by bluestems and needlegrass. The Dakota skipper was most common on ridgetops and hillsides near purple coneflower (Webster 2003, p. 8).

In North Dakota, an association of bluestems (*Schizachyrium scoparium, Andropogon gerardii*) and needlegrasses, typically invaded by Kentucky bluegrass (*Poa pratensis*), typifies dry-mesic Dakota skipper habitat in the rolling terrain of river valleys and the Missouri Coteau (Royer and Marrone 1992a, p. 22). These prairies, located on the western edge of the species' known range, typically contain wood lily, bluebell bellflower, coneflowers, and other asters as nectar sources; in some areas, mountain deathcamas also occurs (Royer and Marrone 1992a, p. 22). 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, p. 6), although invasion by smooth brome grass (*Bromus inermis*) and other invasive species may displace or extirpate native larval food plants (Culliney 2005, p. 134, Bahm *et al.* 2011, p. 240, LaBar and Schultz 2012, p. 177).

Two key factors, soils unsuitable for agriculture and steep topography, have allowed remnant native prairie habitats inhabited by Dakota skippers to persist (Royer and Marrone 1992a, p. 22). McCabe (1979, pp. 17–18; 1981, p. 192) and Royer *et al.* (2008, p. 16) have linked the historical distribution of Dakota skippers to surface geological features and soils that are glacial in origin and, possibly, regional precipitation-evaporation ratios (ratio of evaporation occurring naturally in one location over a given area compared to the amount of precipitation, such as rain and snow, falling over the same area). Soil types typical of Dakota skipper sites were described as sandy loams, loamy sand, or loams (Lord 1988 in Royer *et al.* 2008, pp. 3, 10). Additional edaphic (soil) features, such as soil moisture, compaction, surface temperature, pH, and humidity, may be contributing factors in larval survival and, thus, important limiting factors for Dakota skipper populations (Royer *et al.* 2008, p. 2). For example, edaphic parameters measured in sites throughout the range of Dakota skipper included a bulk density (an indicator of soil compaction) that ranged from 0.9g/cm^3 to 1.3 g/cm^3 and mean soil pH that ranged from 6.3 to 6.7 with high micro-scale variation (variation on a small scale) (Royer *et al.* 2008, p. 10). Soil texture ranged from 4 to 12 percent clay, 53 to 74 percent sand, and 14 to 39 percent silt (Royer *et al.* 2008, p. 12). Seasonal soil temperatures, measured at three depths (20, 40, and 60 cm (8, 16, and 24 in)) were the same at all depths within a site; Minnesota sites generally had higher soil temperatures at all depths than sites in North Dakota or South Dakota (Royer *et al.* 2008, p. 11).

Dakota skipper larvae are particularly vulnerable to desiccation (drying out) during dry summer months and require ''vertical water distribution'' (movement of shallow groundwater to the soil surface) in the soils or wet low areas to provide relief from high summer temperatures (Royer *et al.* 2008, pp. 2, 16). Humidity may also be essential for larval survival during winter months since the larvae cannot take in water during that time and depend on humid air to minimize water loss through respiration (Dana 2013, pers. comm.). Royer (2008, pp. 14–15) measured microclimalogical levels (climate in a small space, such as at or near the soil surface) within ''larval nesting zones'' (between the soil surface and 2 cm deep) throughout the range of Dakota skippers, and found an acceptable rangewide seasonal (summer) mean temperature range of 18 to 21°C (64 to 70 °F), rangewide seasonal mean dew point ranging from 14 to 17 °C (57 to 63 °F), and rangewide seasonal mean relative humidity between 73 and 85 percent.

Species Occupancy

We generally consider the Dakota skipper or Poweshiek skipperling to be ''present'' at sites where the species was detected during the most recent survey, if the survey was conducted in 2002 or more recently and there is no evidence to suggest the species is now extirpated from the site, (*e.g.,* no destruction or obvious and significant degradation of the species' habitat), with the exception of the following five sites. We consider the species to be present at one Poweshiek skipperling site in Michigan where the species was observed at the site in 1996 and no further surveys have been conducted. This site, however, still has suitable habitat for the species according to species experts in the State and at least one other species of prairie fen dependent butterfly is present (Hosler 2013, pers. comm.). Therefore, the Poweshiek skipperling is most likely still present at this site. We also consider the species to be present at one Dakota skipper site (Frenchman's Bluff Preserve in Minnesota) where the most recent survey was from 1993. At this site, no evidence suggests the species is not still present because, based on a species-expert review of the site, the habitat and management is still conducive to the species. Additional sites where we consider Dakota skipper to be present include two sites in Minnesota with 1996 records (Bluestem Prairie and Buffalo River State Park) and one site with a 1998 record (an unnamed site in North Dakota). Although no survey for the species has taken place at Bluestem Prairie since 1996, a 2012 assessment of the habitat at the site indicates that this site is a high-quality prairie that contains the native prairie flora conducive to the Dakota skipper (Selby 2012, p. 9). The site at Buffalo River State park, which adjoins Bluestem Prairie, has not been surveyed since 1996 but recent habitat assessments show that it still contains prairie habitats with the native prairie flora conducive to the species (MN DNR 2013, unpubl.). Furthermore, the species expert in Minnesota supports that the species is most likely still present at these sites. Little information is known about the one unnamed site in North

Dakota; however, the best information we have indicates that the habitat is still suitable for the species, and the North Dakota species expert supports that the species is likely present.

We assigned a status of ''unknown'' if the species was found in 1993 or more recently, but not in the most recent one to two sequential survey year(s) since 1993 and there is no evidence to suggest the species is now extirpated from the site (*e.g.,* no destruction or obvious and significant degradation of the species' habitat). We considered a species is to be ''possibly extirpated'' at sites where it was detected at least once prior to 1993, but not in the most recent one to two sequential survey years(s). A species is also considered ''possibly extirpated'' at sites where it was found prior to 1993 and no surveys have been conducted in 1993 or more recently. At least three sequential years of negative surveys were necessary for us to consider the species ''extirpated'' from a site, because of the difficulty of detecting these species, as explained further in this section. A species is also considered ''extirpated'' at sites where habitat for the species is no longer present.

When determining whether the species occupancy is unknown, possibly extirpated, or extirpated at a particular site, we used the survey year 1993 as a cut-off date, because most known sites (more than 75 percent of known Poweshiek skipperling sites and over 89 percent of known Dakota skipper sites) have been surveyed at least once since 1993 and survey data more than 20 years old may not reflect the current status of a species or its habitat at a site (for example, due to habitat loss from secondary succession of woody vegetation or a change in plant communities due to invasive species). Although it cannot be presumed that the species is absent at sites not surveyed since 1993, the likelihood of occupancy of these sites should be considered differently than sites with more recent survey data (*e.g.,* due to woody vegetation succession over time). When analyzing survey results, we disregarded negative surveys conducted outside of the species' flight period or under unsuitable conditions (*e.g.,* high wind speeds).

After we applied these standards to initially ascertain the status of the species, we asked species experts and Service personnel to help verify, modify, or correct species' occupancy at each site (particularly for sites with questionable habitat quality or those that have not been surveyed recently). In most cases, we used the status confirmed during expert review, unless we received additional information (*e.g.,* additional survey or habitat data provided after the expert reviews) that suggests a different status at a particular site.

Timing of surveys is based on initial field checks of nectar plant blooms and sightings of butterfly species with synchronous emergence (sightings of butterfly species that emerge at the same time as Dakota skipper and Poweshiek skipperling), and, more recently, emergence estimated by a degree-day emergence model using high and low daily temperature data from weather stations near the survey sites (Selby, undated, unpublished dissertation). Surveys are conducted during flight periods when the species' abundance is expected to be at levels at which the species can be detected. However, as with many rare species, detection probabilities are imperfect and some uncertainty remains between non-detection and true absence (Gross *et al.* 2007, pp. 192, 197–198; Pellet 2008, pp. 155–156). Three sequential years of negative surveys is sufficient to capture variable detection probabilities, since each survey year typically encompasses more than one visit (*e.g.,* the average number of visits per Dakota skipper site per year ranges from 1 to 11) and the probability of false absence after 5–6 visits drops below 5 percent for studied butterfly species with varying average detection probabilities (Pellet 2008, p. 159). Therefore, the site is considered ''extirpated'' if there are three sequential years of negative surveys.

It cannot be presumed that the species is not persisting at a site only because there have not been recent surveys. At several sites, the species has persisted for longer than 20 years; for example, Dakota skipper was first recorded at Scarlet Fawn Prairie in South Dakota in 1985 and has had positive detections every survey since that date—the most recent detection was in 2012. The year 1993 was chosen based on habitat-related inferences, specifically, the estimated time for prairie habitat to degrade to non-habitat due to woody encroachment and invasive species. For example, native prairies with previous light-grazing management that were subsequently left idle transitioned from mixed grass to a mix of woody vegetation and mixed grass in 13 years and it was predicted that these idle prairies would be completely lost due to woody succession in a 30-year timeframe (Penfound 1964, pp. 260–261). The time for succession of idle prairie depends on numerous factors, such as the size of the site, edge effects (the changes that occur on the boundary of two habitat types), and the plant composition of adjacent areas.

This approach is the most objective way to evaluate the data range-wide. Most sites have been surveyed over multiple years, although the frequency and type of surveys varied among sites and years. In several cases, species experts provided input on occupancy based on their familiarity with the habitat quality and stressors to populations at particular sites.

To summarize, there are few sites with relatively older data where we consider the species to still be present. In general, most sites with a present status have had a positive detection in 2002, or more recently with a few exceptions. At one Poweshiek skipperling site, the species was observed at the site in 1996, and no further surveys have been conducted. The remaining Poweshiek skipperling sites where the species is considered present have had detections in 2012, except one site where the species was detected in 2011 and no further surveys have occurred. Likewise, at four Dakota skipper sites we consider the species to be present with the most recent record from 2001 or earlier including one site where the most recent survey was from 1993, two sites with 1996 records, and one site with a 1998 record. No evidence suggests that the species is not still present at these sites because the best information indicates that the site's habitat is still conducive to the butterfly, and, therefore, the species may still be present there. We also consider Dakota skipper to be present at the following sites: 20 sites in Canada that were surveyed only once in 2002; 1 additional site with a 2002 detection of the species and a favorable habitat assessment in 2012; 1 site with a 2003 detection; 1 site with a 2005 detection; 2 sites with a 2006 detection; 25 sites in Canada that were surveyed only once in 2007; 1 additional site with a 2007 detection; 7 sites with a positive detection in 2008; 2 sites with a positive detection in 2009; and 27 sites with positive detections in 2012.

Population Distribution and Occupancy Status

Once found in native prairies in five states and two Canadian provinces, the Dakota skipper and its habitat have undergone dramatic declines; the species is now limited to native prairie remnants in three states and two Canadian provinces. The Dakota skipper is presumed extirpated from Illinois and Iowa and no longer occurs east of western Minnesota—an approximately 690-kilometer (km) (430-mile) reduction of its range. Populations persist in

western Minnesota, northeastern South Dakota, North Dakota, southern Manitoba, and southeastern Saskatchewan. Royer and Marrone (1992a, p. 5) stated 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. The Dakota skipper was subsequently found in Saskatchewan in 2001 after 40 years of searching (Hooper 2002, pers. comm.), but Royer (2002, pers. comm.) no longer thinks that the species occurs in Montana.

From its earliest identification, the Dakota skipper was considered rare (Royer and Marrone 1992a, p. 1), although considerable destruction of its habitat likely occurred even before the species was first described in 1911. Habitat destruction and degradation has greatly fragmented Dakota skipper's range from its core through its northern and western fringes (McCabe 1981, p. 179; Royer and Marrone 1992a, p. 28; Schlicht and Saunders 1994, p. 1; Royer 1997, p. 2; Schlicht 1997a, p. 2; Schlicht 1997b, p. 2; Skadsen 1997, pp. 25–26; Skadsen 1999, p. 15; Swengel and Swengel 1999, p. 267). The historical distribution of Dakota skippers may never be precisely known because ''much of tallgrass prairie was extirpated prior to extensive ecological study'' (Steinauer and Collins 1994, p. 42), such as butterfly surveys. Destruction of tallgrass and mixed-grass prairie began in 1830 (Samson and Knopf 1994, p. 418), but significant documentation of the ecosystem's butterfly fauna did not begin until about 1960. Therefore, most of the species' decline probably went unrecorded. 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, p. 191) and in Iowa in 1992 (Orwig and Schlicht 1999, p. 6). Britten and Glasford's (2002, pp. 363, 372) genetic analyses support the presumption that this species formerly had a relatively continuous distribution; the small genetic divergence (genetic distance) among seven sites in Minnesota and South Dakota indicate that populations there were once connected. Dakota skipper dispersal is very limited due in part to its short adult life span and single annual flight. Therefore, the species' extirpation from a site is likely permanent unless it is within about 1 km (0.62 mi) of a site that generates a sufficient number of emigrants or is artificially reintroduced to a site.

The Dakota skipper's range once comprised native prairie in five states and Canada, extending from Illinois to Saskatchewan; it now occurs only in native prairie remnants in portions of three states and two Canadian provinces. Of the 259 historically documented sites, there are 91 sites where we consider the Dakota skipper to be present, 81 sites with unknown status, 40 possibly extirpated sites, and 47 that are considered extirpated (Table 1). Approximately half (45 of 91) of the sites where the species is considered to be present are located in Canada, mostly within three isolated complexes, and were observed in either 2002 or 2007 with no subsequent surveys. The remaining 46 sites where the species is considered to be present are about equally distributed among Minnesota (14 sites), North Dakota (18 sites), and South Dakota (14 sites). Researchers made positive detections of the species in 27 of these sites in 2012. Other sites with a present status with relatively older positive detections and no subsequent surveys for the species include 2 sites with positive detections in 1996, one site with a positive detection in 1998, one site with a positive detection in 2002, one site with a positive detection in 2003, one site with a positive detection in 2005, 2 sites with a positive detection in 2006, one site with a positive detection in 2007, 7 sites with a positive detection in 2008, and 2 sites with a positive detection in 2009. At several of these sites, the habitat has been assessed more recently than they were surveyed for the species. The distribution and status of Dakota skipper in each state of known historical or extant occurrence are described in detail below.

TABLE 1—NUMBER OF HISTORICALLY DOCUMENTED DAKOTA SKIPPER SITES WITHIN EACH STATE AND THE NUMBER OF SITES WHERE THE SPECIES IS THOUGHT TO BE PRESENT, UNKNOWN, POSSIBLY EXTIRPATED, OR EXTIRPATED

State	Present	Unknown	Possibly extirpated	Extirpated	Total	Percent of total number of historical sites by state
Illinois	.....	.....	.....	1	1	0.4
Iowa	.....	.....	.....	3	3	1
Minnesota	14	22	18	12	66	26
North Dakota	18	13	10	13	54	21
South Dakota	14	46	10	15	85	33
Manitoba	31	0	2	3	36	14
Saskatchewan	14	0	0	0	14	5
Total Number of Historically Documented Sites	91	81	40	47	259	.....
Percent of the Total Number of Historical Sites by Occupancy	35	31	16	18	.....	100

Illinois

Dakota skippers are considered to be extirpated from Illinois. The species was last recorded near Chicago in 1888 (McCabe 1981, p. 191).

Iowa

There are three historical records of Dakota skippers in three counties in Iowa (Dickinson, Poweshiek, and Woodbury), but the species is presumed extirpated from the State (Schlicht and Orwig 1998, pp. 84–85; Selby 2004a, pp. 1, 5; Selby 2012, pers. comm.; Nekola and Schlicht 2007, p. 9). The species was last seen at Cayler Prairie (Dickinson County) in 1992, but surveys of this site in 2000, 2004, 2005, and 2007 were negative, so we presume it to be extirpated from that site (Schlicht and Orwig 1998, p. 85; Selby 2004a, p. 5; Selby 2006a, p. 5; Selby 2008, p. 6).

The species was not observed at eight sites surveyed between 1988–1997 (Swengel and Swengel 1999, pp. 288–289), at eight sites surveyed in 2004 (Selby 2004a, p. 5), nor during extensive surveys at 32 sites in 2007 (Selby 2008, p. 6).

Minnesota

Minnesota historically contained about 26 percent of the sites where the Dakota skipper has been recorded (Table 1) (Service 2013, unpubl. geodatabase). Since the earliest known record (1965) of the species in Minnesota, 66 sites have been recorded in the State, but recent surveys indicate that the species is declining in the State (Service 2013, unpubl. geodatabase). Of the 66 known locations of Dakota skipper in Minnesota; the species is extirpated or possibly extirpated from 30 of those sites and the status is unknown at 22 others (Service 2013, unpubl. geodatabase). Dakota skipper is considered to be present at 14 sites in Minnesota in 6 counties: Clay, Lincoln, Murray, Norman, Pipestone, and Pope, although 2 of those sites have not been surveyed since 1996 and 1 site has not been surveyed since 1993.

McCabe (1981, p. 187) observed very stable population numbers in Minnesota prairies that he visited repeatedly from 1968–1979. On dry-mesic prairie in Lincoln County, Minnesota, Dana (Dana 1997, pp. 3–5) also observed stable numbers into the thousands during his intensive studies from 1978 to 1983. Schlicht (1997a, p. 13) and Reiser (1997, p. 16) reported more variable numbers on the same sites in 1995–1996, and based on these more recent observations, Dana (1997, pp. 3–5) suggested that populations could experience significant size fluctuations between years. At Hole-in-the-Mountain preserve, Minnesota, Dana (1991, pp. 36–37) found peak abundance of approximately 1,000 Dakota skippers over about 40 ha (98 ac); he estimated that 2,000–3,000 individuals 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 10 days during the single annual flight period (Selby and Glenn-Lewin 1989, pp. 24–28).

The percentage of sites surveyed each year in Minnesota with positive detections remained relatively stable from 1985 to 2005, with an average detection rate of 67 percent for all survey years with more than one site surveyed (excluding sites newly discovered in the first year it was discovered), an average of 70 percent detection rate for survey years with 5 or more sites surveyed and an average of 66 percent detection rate for survey years with 10 or more sites surveyed. One exception to the high detection rates was 1994; only 26 percent (5 of 19 sites) of sites surveyed in 1994 resulted in positive detections. Recent surveys of the species resulted in significantly lower than average positive detections. The percent of sites surveyed each year with positive detections has recently decreased from 70 percent (7 of 10 sites) in 2005, to 47 percent (8 of 17 sites) in 2007, to 56 percent (10 of 18 sites) in 2008, to 6 percent (1 of 18 sites) in 2012 (for years with greater than 10 sites surveyed, see Figure 1). Only one individual was detected in Minnesota during 2012 surveys, which included 18 sites with previous records and 23 prairie remnants without previous records for the species (Dana 2012c, pers. comm.; Runquist 2012a, pers. comm.; Olsen 2012, pers. comm.). The cause for this sharp decline is unknown.

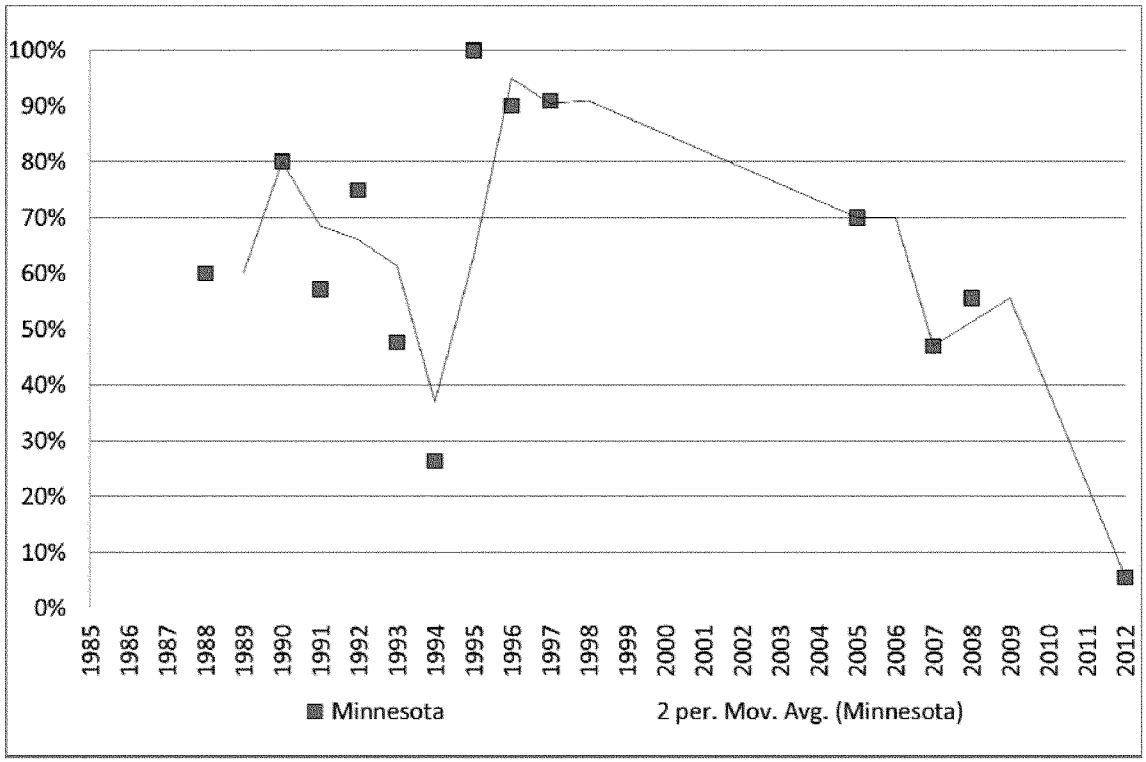

Figure 1: Percent of surveyed sites with positive detections of Dakota skipper for years with at least 5 surveys in Minnesota since 1985 with line showing the moving average over time. These data exclude new sites in the first year of discovery, as well as sites that were surveyed but where the species has never been found (null sites).

The Dakota skipper is presumed extirpated at 12 sites in Minnesota; at 7 of these sites the species has not been observed since 1984 or earlier. Four sites at which the species is now presumed to be extirpated have had fairly recent positive observations. The species was last observed at Prairie Waterfowl Production Area (WPA) in Big Stone County in 2000 (Skadsen 2000, p. 1), for example, but was not found in 2008 (Selby 2009a, p. i), 2010, and 2012 (Service 2013, unpubl. geodatabase). Dakota skippers were observed at the Glacial Lakes WPA in 2001 (Schlicht 2001b, p. 18), but the species was not observed in 2003, 2004, and 2005 (Selby 2006b, p. Appendix A xii); the species is now considered to be extirpated at that site (Service 2013, unpubl. geodatabase). The last observation of Dakota skipper at the Big Stone National Wildlife Refuge (NWR) in Lac Qui Parle County was in 2000, and it was not observed during surveys in 2009, 2011, or 2012 (Skadsen 2012a, p. 5). Dakota skippers were observed at Chippewa Prairie in 1995, but not in 1996, 2005, and 2012 (Service 2013, unpubl. geodatabase). Of the 18 sites where the species is possibly extirpated, 10 have not been surveyed since the species was last seen in 1988 or earlier. Dakota skippers at two of the sites where the species is possibly extirpated have not been observed since 1991 (Service 2013, unpubl. geodatabase). The remaining 6 sites had positive observations prior to 1993, were surveyed once more recently, and had a negative observation (Service 2013, unpubl. geodatabase).

The status of Dakota skipper is unknown at 22 sites; Dakota skipper have not been observed at 11 of these sites since the mid- to late 1990s, despite one or two years of survey effort at several sites. The remaining 11 sites with unknown status have had positive observations in 2007 or more recently, but are given this designation due to a subsequent negative survey. For example, Dakota skipper was documented at the Gens Prairie in Murray County and Woodstock Prairie in Pipestone County in 2007, but the species was not observed during surveys in 2008 (Selby 2009a, p. Appendix 5 li, xxxiii and Appendix 4 xlix).

In 2007 and 2008, the Minnesota DNR 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 in these species in west-central Minnesota beginning in 2003 (Selby 2006b, p. 30). Researchers surveyed 17 and 19 sites with previous Dakota skipper records in 2007 and 2008, respectively; Dakota skipper was found at 8 sites each year and at 1 site where it had not previously been recorded (Selby 2009a, p. 6). The surveys confirmed Dakota skipper's extirpation from one site in Cottonwood County, where it was last recorded in 1970.

A parallel study in 2007 (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. Among these sites was The Nature Conservancy's Hole-in-the-Mountain preserve in Lincoln County, which was the only Minnesota population rated as secure in 2002 (Cochrane and Delphey 2002, p. 16). The 2007 surveys indicated that the site still supported a substantial population, but that it may have decreased in size since earlier studies were conducted (Dana 1991, p. 36; Dana 2008, p. 18). Dakota skippers were not detected during the 2012 flight period (Runquist

2012, pp. 13–14, 18–20; Runquist 2012a, pers. comm.); therefore, we consider the status of the species at the Hole-in-the-Mountain preserve to be unknown.

Relatively important populations of Dakota skipper in Minnesota may still occur at the Prairie Coteau, Felton Prairie, and Glacial Lakes complexes, but the 2012 survey results raised concern for the species' status at Prairie Coteau. The number of Dakota skippers encountered per 100 m (328 ft) of transect at Prairie Coteau State Natural Area (SNA) were 1.7 in 1990 and 1.1 in 2007 (Dana 2008, p. 19). No Dakota skippers were observed at Prairie Coteau SNA during the 2012 flight period (Runquist 2012, pp. 9–10); therefore, we consider the status of the species to be unknown at that site. Selby (2009b, Appendix 4, p. iv) recorded 14 Dakota skippers during a 5-hour survey in 2007 at the Felton Prairie SNA. During a one-hour survey in 2008, nine Dakota skippers were recorded and with little indication of any substantial change since the previous year (Selby 2009b, Appendix 5, p. iv); Felton Prairie has not been resurveyed since 2008 (Service 2013, unpubl. geodatabase). The number of Dakota skippers recorded during recent surveys at Glacial Lakes State Park has been low despite good habitat conditions. An apparently widespread population was present as recently as 2001 when Skadsen (2001, p. 24) found Dakota skippers along almost all of 25 mi (40 km) of transect in and around the park—he recorded as many as 31 Dakota skippers along one transect (Skadsen 2001, p. 24). Selby (2009a, p. l and liv) 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). Glacial Lakes State Park surveys conducted in 2012 were outside of the Dakota skipper flight period (Runquist 2012a, pers. comm.).

In summary, the Dakota skipper is now considered to be extirpated or possibly extirpated from at least 30 of the 66 sites in Minnesota, which historically contained approximately 26 percent of all known historical Dakota skipper locations rangewide (Table 1). The species is considered to be present and unknown at 14 and 22 sites, respectively. However, only one individual male was detected in the State during 2012 surveys, which included 18 sites with previous records; 2012 surveys for undiscovered populations were also carried out on 23 prairie remnants without previous records for the species. Similar surveys of prairie remnants with no previous documentation of Dakota skipper were completed in Minnesota in 2007 and 2008. Based on these surveys, the likelihood that significant undiscovered Dakota skipper populations occur in Minnesota is low.

North Dakota

North Dakota historically contained approximately 21 percent of all known historical locations of Dakota skippers rangewide (Table 1); the State contained 54 historical sites distributed among 18 counties (Service 2013, unpubl. geodatabase). The Dakota skipper is currently present at 18 sites in 5 North Dakota counties, of these, 13 occur within the Towner-Karlsruhe complex in McHenry County, 1 is within the Sheyenne National Grasslands complex in Ransom County, 2 in northern McKenzie County, 1 site is in Wells County, and 1 site in McLean County. Of the 18 sites where we consider the Dakota skipper to be present, 15 sites had positive observations of the species in 2012 and the remaining 3 sites had positive observations between 1998 and 2003. The status of the species is unknown at 13 sites; 10 of these sites have not had positive records since the mid- to late 1990s and the other 3 sites had positive records between 2001 and 2003. The Dakota skipper is presumed extirpated from 13 sites and 4 counties, primarily due to heavy grazing, weed control, and other disturbances (*e.g.,* bulldozing at Killdeer Mountain to reduce aspen growth, Royer 1997). The species is possibly extirpated from 10 additional sites and 3 additional counties. Researcher surveyed 25 sites, believed to possibly have Dakota skipper populations, in 2012; of these sites, 23 had previous records of the species (Royer and Royer 2012a, entire). Thirteen of the 25 surveyed sites had Dakota skipper present (Royer and Royer 2012a, pp. 3–4; Royer and Royer 2012b, pp. 2–3). One new site was found in 2012 (Royer and Royer 2012a, p. 33), adjacent to a site with previous records but with different land-ownership, so the researcher considered it a new site. Another new site was found in North Dakota in 2012, in Wells County, where two observations were made—possibly the same individual (HDR, Inc. 2012, pp. 21–23). At sites with Dakota skipper, lower average encounter frequencies were observed across the State in 2012 (state average = 9.4 encounters per hour) than during the 1996–1997 statewide surveys (state average = 17.4 encounters per hour) (Royer and Royer 2012b, p. 5; Royer and Royer 2012a. pp. 7–8).

Of the Dakota skipper populations in North Dakota, none may be secure, although the Towner-Karlsruhe complex was considered to be the stronghold for the species in the State in 2002 (Cochrane and Delphey 2002, p. 17) and most of the sites where the species is currently present are still occupied by ''viable populations'' (Royer 2012a, pers. comm.). All of the habitat where the species is present in the Towner-Karlsruhe complex is Type A (wet-mesic) habitat (Royer and Marrone 1992a, p. 21–22; Royer *et al.* 2008, pp. 14–16). Five sites within the Towner-Karlsruhe complex are owned by the North Dakota State Land Department, and the remaining seven sites with extant populations 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 and Royer 2012a, p. 18). In 2002, none of these sites were described as secure (Cochrane and Delphey 2002, pp. 66–67) since each is subject to private or State management options that could extirpate Dakota skipper from the site. In 1999, it was estimated that about 30 percent of the Towner-Karlsruhe area still contained native prairie (Lenz 1999b, p. 2); more recent observations indicate that several native prairie sites have been invaded to varying extents by nonnative species, such as leafy spurge, Kentucky bluegrass, and alfalfa (*Medicago sativa*), and several are subject to intense grazing or early haying (Royer and Royer 2012b, pp. 5–6, 7–10, 13–16, 18–19, 22–23; Royer 2012, in litt.).

Dakota skipper populations in the Sheyenne National Grasslands complex have experienced intensive grazing, leafy spurge (*Euphorbia esula*) invasion, and the effects of herbicides used to control leafy spurge and grasshoppers (Royer 1997, pp. 15 and 27). For example, McCabe (1979, p. 36) 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 the Dakota skipper is now extirpated from the site (Royer 1997, p. 14). Swengel and Swengel (1999, p. 286) 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 National Grasslands during this period (e.g., Royer 1997, pp. 14–15). Dakota skippers were recorded at one new site (Gregor) in the Sheyenne National Grasslands in 2001 (Spomer 2004, pp. 14–15). The status of Dakota skipper at the Gregor site is currently

unknown, since the species was not observed during the 2002 survey (Royer and Royer 2012a, pp. 3–4). Orwig (1996, p. 3) suggested that Brown's Ranch in Ransom County, owned by The Nature Conservancy, had potential to support a metapopulation (groups of local populations interconnected by dispersal habitat) in the Sheyenne River watershed. More recently, however, Spomer (2004, p. 36) found that the population there was not doing well, and Royer failed to find the species in 2012 (Royer and Royer 2012a, p. 3). Therefore, the status of the species at the Brown Ranch site is unknown. Royer (1997, pp. 15 and 27) 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 to occur. The population at Venlo Prairie, for example, deteriorated from good/fair in 2001 to poor in 2003 due to intense grazing and disappearance of flowers (Spomer 2004, pp. 9, 12); the species is now considered to be extirpated at that site.

In 2002, experts ranked all sites outside of the two complexes discussed above as threatened or vulnerable; most were small and isolated populations threatened by conversion and invasive species (Cochrane and Delphey 2002, pp. 66–67). Most of these sites are now considered extirpated or possibly extirpated. Today, only 4 sites outside of the Towner-Karsruhe Complex and Sheyenne National Grasslands complexes are thought to have extant (present) Dakota skipper populations, including Garrison Training Center in McLean County. In addition to the Towner-Karsruhe Habitat Complex sites in McHenry County, only 2 of the 25 sites surveyed by Royer in 2012, both in northern McKenzie County, may have ''viable populations'' (Royer 2012b, pers. comm.), although only one individual was observed at each site in 2012 (Royer and Royer 2012b, pp. 16–17).

In summary, North Dakota contains approximately 21 percent (N= 53) of all known historical locations of the species rangewide; however, the current occupancy status of the Dakota skipper is unknown at 12 sites, and it is considered to be extirpated or possibly extirpated from at least 23 of the 53 known sites in the state (Table 1). The species is considered to be present at only 18 sites in the State. North-central North Dakota may hold hope for the species' long-term conservation. Dakota skipper was detected at 13 of the 25 sites surveyed during 2012 (23 of the sites had previous Dakota skipper records); average encounter frequencies observed across the State in 2012 (9.4 encounters per hour), however, were lower than during the 1996–1997 statewide surveys (ND state average = 17.4 encounters per hour).

Although only a small fraction of all grassland in North Dakota has been surveyed for Dakota skippers, a significant proportion of the un-surveyed area is likely not suitable for Dakota skipper. The species was never detected at approximately 135 additional locations in North Dakota that were surveyed for the species from 1991–2012 (USFWS 2013, unpubl. geodatabase). Many of these sites have been surveyed multiple times over multiple years (USFWS 2013, unpubl. geodatabase). Surveys for the Dakota skipper are typically conducted only in areas where floristic characteristics are indicative of their presence. New potential sites surveyed are generally focused on prairie habitat that appear suitable for the species and have a good potential of finding the species, in other words, sites are not randomly selected across the landscape. Therefore, these sites have a higher likelihood of detecting the species than at sites randomly selected across the landscape. Based on these surveys, the likelihood that significant numbers of undiscovered Dakota skipper populations occur in North Dakota is low. Moreover, data available from the numerous sites that have been surveyed are likely to be representative of areas that have not been surveyed—that is, population trends and the nature and extent of stressors that may impact the populations in un-surveyed areas can reasonably be inferred by analyzing data collected from the sites that have been surveyed.

South Dakota

South Dakota historically contained approximately 33 percent of all known locations of Dakota skippers rangewide (Table 1). Since the earliest known record of Dakota skipper (1905) of the species in South Dakota, 85 sites have been documented across 11 counties in the State, but recent surveys indicate that the species is declining in the State (Service 2013, unpubl. geodatabase). Of the 85 historical sites, Dakota skipper is presumed extirpated from 15 sites and 2 counties (Brown and Moody), and is possibly extirpated from 10 additional sites. Dakota skipper is considered present at 14 sites and the status of the species is unknown at 46 sites. Twenty-six sites in South Dakota with previous Dakota skipper records were surveyed in 2012; the species was detected at 9 of those sites (Service 2013, unpubl. geodatabase). Eight additional sites within the species' historical range were surveyed during the 2012 flight period, which resulted in the discovery of two new nearby Dakota skipper sites (Service 2013, unpubl. geodatabase; Skadsen 2012a, pers. comm.). The proportion of positive surveys at known sites has fluctuated over time; however, the 2012 surveys had the lowest positive detection rate (35 percent) for the last 16 years (since 1996), much less than comparable survey years (years with 10 or more sites surveyed) in South Dakota.

While there are some sites with earlier records, most South Dakota sites were initially documented during extensive surveys conducted during 1996 to 1998. Forty-eight locations without previous records were surveyed during 2002–2004, which resulted in the discovery of 20 new Dakota skipper sites in northeastern South Dakota (Skadsen 2003, p. 8; Skadsen 2004, pp. 3–6), but due to more recent negative surveys, the occupancy of the species is currently unknown or extirpated at many of these sites (Skadsen 2011, p. 5; Skadsen 2012, pp. 4–5; Skadsen, 2012, pers. comm.; Skadsen 2003, p. 10; Skadsen 2004, p. 2;; Skadsen 2006a, p. 2, 10; Skadsen 2006b, p. 5; Skadsen 2007, p. 3; Skadsen 2008, p. 3, 12; Skadsen 2009, p. 3). Additional survey effort resulted in the discovery of nine new sites between 2005 and 2012, with a maximum of three new sites discovered in 2006 (Skadsen 2010a, p. 6; Skadsen 2012, pp. 4–5; Skadsen 2012, pers. comm.; Skadsen 2005, pp. 5–6, Skadsen 2006a, p. 12; Skadsen 2006b, p. 5; Skadsen 2007, p. 3; Skadsen 2008, p. 9; Skadsen 2009, p. 2). Eight additional sites without previous documentation of the species were surveyed in 2012, which resulted in the discovery of two nearby sites (Service 2013, unpubl. geodatabase). To summarize, new sites have been discovered in South Dakota during most survey years since 2002, however, the number of new sites discovered each year has been low recently; 2 or 3 new sites have been discovered each survey year since 2005 (3 sites in 2005, 2 sites in 2006, 2 sites in 2007, zero sites in 2010, and 2 sites in 2012). The rate that known sites are becoming extirpated is higher than the rate of new discovery—the occupancy of the species at many sites is now unknown or extirpated due to more recent negative surveys.

The species has never been documented in Clark County, but because few surveys have been conducted there, the county may contain undiscovered populations (Skadsen 2006b, p. 1). Skadsen (2012b,

pers. comm.) doubts the existence of public lands with suitable Dakota skipper habitat in Clark County and has not received permission to survey a few possible suitable locations that are privately owned.

Although only a small fraction of all grassland in eastern South Dakota has been surveyed for Dakota skippers (*e.g.,* Dakota skipper surveys have been conducted on less than approximately 30,000 acres (12,140 ha) in South Dakota within the species range (Service 2013, unpubl. geodatabase)), a significant proportion of the un-surveyed area is likely not suitable for the Dakota skipper. For example, there is an estimated 1,620,549 acres (ac) (655,813 hectares (ha)) of unbroken (untilled) grasslands (excluding Conservation Reserve Program (CRP) grasslands, which generally do not provide habitat for the Dakota skipper (Larson 2013, pers. comm.)) in the 9 counties where the Dakota skipper is considered be present or to have unknown occupancy in South Dakota (HAPET 2012, unpubl. data). Additional areas of unbroken prairie were estimated in three other counties where the species may have occurred historically (HAPET 2012, unpubl. data). While these lands represent unbroken grassland in South Dakota, the models used to identify unbroken grassland are not able to identify plant species, plant species composition, floristic quality, or presence of invasive species (Loesch 2013 pers. comm.). Therefore, these unbroken grasslands may not contain the specific native prairie plants that the Dakota skipper requires (as discussed in detail in the Background section of this proposed rule) and, therefore, may not equate to suitable habitat for the species.

The species was never detected at approximately 73 additional locations in South Dakota that were surveyed from 1991 through 2012 (USFWS 2013, unpubl. geodatabase). Several of these sites have been surveyed multiple times in one year or during multiple years (USFWS 2013, unpubl. geodatabase). Surveys for Dakota skipper are typically conducted only in areas where floristic characteristics are indicative of their presence. For example, in South Dakota, Skadsen (1997, p. 2) selected for surveys dry-mesic prairie that supported purple coneflower and wet-mesic prairie that supported wood lily and mountain deathcamas based on searches for these sites by car and reports from resource managers. New potential sites surveyed are generally focused on prairie habitat that appear suitable for the species and have a good potential of finding the species, in other words, sites are not randomly selected across the landscape. Therefore, these sites have a higher likelihood of detecting the species than at sites randomly selected across the landscape. Based on these surveys, the likelihood that significant undiscovered Dakota skipper populations occur in South Dakota is low. Moreover, data available from the numerous sites that have been surveyed are likely to be representative of areas that have not been surveyed—that is, population trends and the nature and extent of stressors that may impact the populations in un-surveyed areas can reasonably be inferred by analyzing data collected from the sites that have been surveyed.

Since there is little long-term quantitative data for sites in South Dakota, we examined presence-absence (non-detection) data over time. The percent of sites surveyed each year with positive detections of the species remained relatively stable from 1985 to 2010, with an average positive detection rate of 63 percent for all survey years with more than one site surveyed (excluding new sites for the first year of discovery), an average positive detection rate of 60 percent for survey years with at least 5 sites surveyed, and an average positive detection rate of 71 percent for survey years with at least 10 sites surveyed. One exception to the high detection rates was during the 1991 survey year when none (0 of 7 sites) of the sites surveyed in 1991 resulted in positive detections of the species, excluding 3 new sites that were discovered that year. Another exception was in 1996, when 2 of the 8 sites with previous records surveyed had a positive detection; however, 6 new sites were discovered that year. The detection rate remained relatively stable until 2010, when the percent of sites with positive detections fell from 89 percent (8 of 9 sites) in 2010, to 46 percent (5 of 11 sites) in 2011, and 35 percent (9 of 26 sites) in 2012 (Figure 2). These types of fluctuations had been observed in prior years; therefore, it is difficult to determine a clear trend in the data using positive detections—the last two survey years may fall within the normal range of variation.

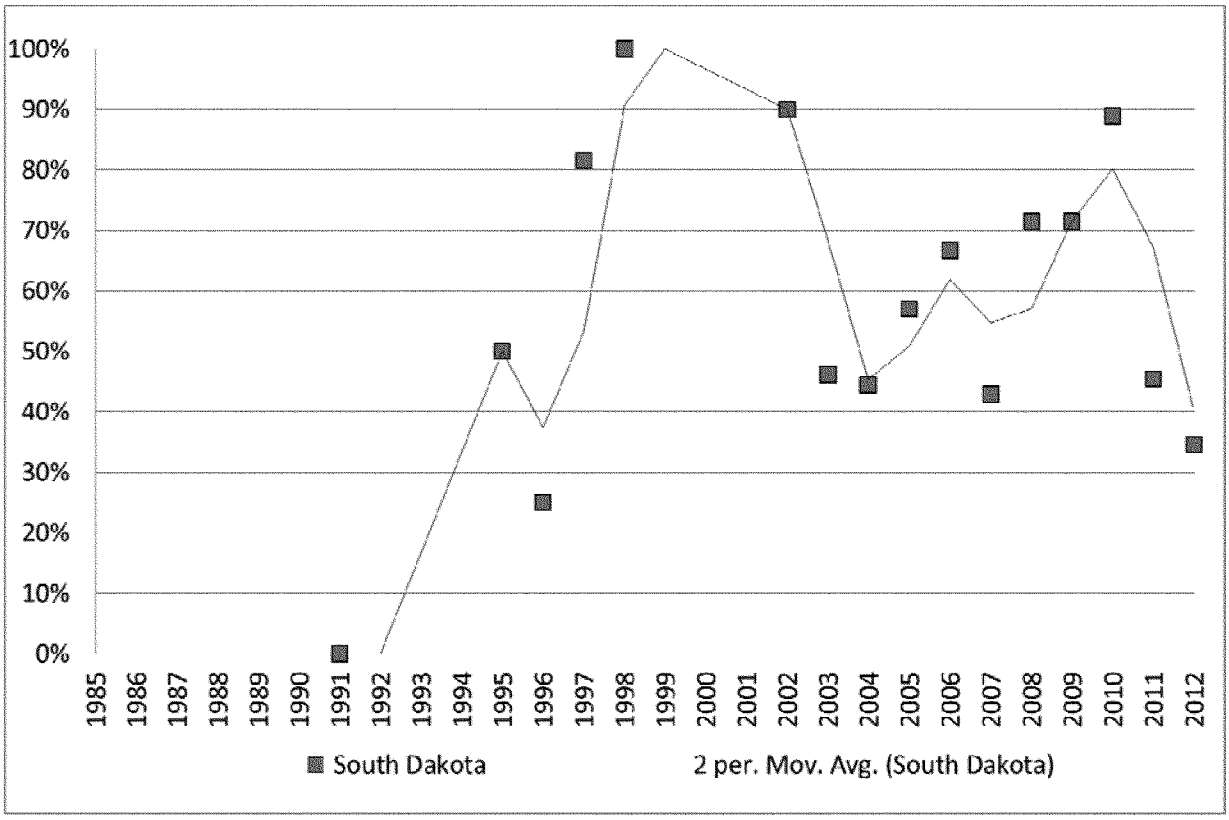

Figure 2: Percent of surveyed sites with positive detections of Dakota skipper for years with at least 5 surveys in South Dakota since 1985 with line showing the moving average over time. These data exclude new sites in the first year of discovery as well as sites that were surveyed, but where the species has never been found (null sites).

The Outer Coteau des Prairies subsection of the North Central Glaciated Plains section of Bailey's Eco-regions is thought to be a stronghold for Dakota skipper, since nearly 40 percent of the total documented Dakota skipper sites are within that subsection (83 of the 259 documented sites—Service 2013, unpubl. geodatabase). Most of these Outer Coteau des Prairie sites are in South Dakota; 73 of the 85 Dakota skipper sites in South Dakota are within the Outer Coteau des Prairies subsection (Service 2013, unpubl. geodatabase). Dakota skipper is considered to be present at only 10 of those 73 sites—the species status is unknown at 41 of those sites, possibly extirpated at 8 sites, and extirpated at the remaining 13 sites within that ecoregion subsection in South Dakota (Service 2013, unpubl. geodatabase).

In summary, South Dakota historically contained approximately 33 percent of all known locations of the species rangewide. The current occupancy status of the Dakota skipper is unknown at 46 sites and it is considered to be extirpated or possibly extirpated from at least 25 of the 85 known sites in the State, although large areas of grasslands remain in South Dakota and substantial additional populations of Dakota skipper would be expected to be found if more surveys were conducted. Furthermore, downward trends and threats impacting populations at known sites are also likely occurring at potentially undiscovered sites. The species is considered to be present at 14 of the 85 documented sites in the State. Twenty-six sites in South Dakota with previous Dakota skipper records were surveyed in 2012; the species was detected at nine of those sites; eight sites with no previous records for the species were surveyed during the 2012 flight period, which resulted in the discovery of two nearby sites. The proportion of positive surveys at known sites has fluctuated over time; however, the 2012 surveys had the lowest positive detection rate (35 percent) for the last 16 years (since 1996)—much less than comparable survey years in South Dakota.

Manitoba

Manitoba historically contained approximately 14 percent (N = 36) of the known locations of the Dakota skipper rangewide. The Dakota skipper is considered present at 1 isolated site and 30 sites split between 2 distinct complexes, 14 sites near Griswold and 16 sites along Lake Manitoba. The 14 sites near Griswold are located approximately 200 km (124 mi) southwest of the populations along Lake Manitoba (at 16 sites) and about 125 km (78 mi) northeast of the nearest population in Saskatchewan (Webster 2003, pp. 5–6; Webster 2007, p. 4). The species is presumed extirpated or possibly extirpated from five sites in Manitoba, including from the Tallgrass Prairie Preserve, where it has not been found in the seven most recent survey years (Webster 2003, p. 5; Westwood *et al.* 2012, p. 1; Westwood 2007, pers. comm.; Hamel *et al.* 2013, pp. 8–16)—(the later surveys were focused on Poweshiek skipperlings, but other species were recorded) and one site that was converted to a flaxseed field (Webster 2003, p. 7). Population

estimates and trends at these sites have not been examined quantitatively; however, the population appears to be stable at two sites with repeated survey years. Numbers observed during searches at a site near Griswold in 2007 did not appear to change appreciably since 2002 surveys, when the population was estimated (non-quantitatively) to be approximately 750 individuals (Webster 2003, p. 5; Webster 2007, p. 4). A total of 273 adults were observed during a 3.3-hour survey at the second site, where the population was estimated non-quantitatively to be about 2,000 individuals (Webster 2007, p. 4).

Dakota skipper was first recorded near Miniota in 1944 and then at two additional sites in the early 1990s. In 2002, the species was observed at 19 sites near Lundar, within about 25 km (16 mi) east of Lake Manitoba (Webster 2003, p. 4); however, most of these sites have not been surveyed since. In 2007, researchers surveyed 16 sites for the Dakota skipper near Griswold, Manitoba (Webster 2007, p. 4) and found Dakota skippers at 14 of the 16 sites; 12 of these represent new sites for the species in Manitoba (Webster 2007, p. 4). Several additional areas were examined for potential Dakota skipper habitat in 2007, including areas east of Hwy 21, within the Lauder Sandhills Wildlife Management Area, north of Oak Lake and near Tilston, Sinclair, Cromer, and Brandon, as well as other locations. Most of the areas examined were under row crop agriculture, were heavily grazed, were dry scrub prairies or were otherwise habitats unsuitable for Dakota skipper (Webster 2007, p. 6). The areas near Brandon and the high ground within the wetland complexes near Oak Lake may still contain suitable habitat (Webster 2007, p. 6).

The nearest known extant (present) population of Dakota skippers in Manitoba is approximately 120 km (75 mi) from the closest extant (present) population in North Dakota and about 200 km (125 mi) from the closest Saskatchewan population. Britten and Glasford (2002, pp. 367, 372) suggested that Manitoba populations are genetically distinct from a group of populations in Minnesota and South Dakota, although populations in additional intervening locations should be sampled to confirm this hypothesis (Runquist 2012b, pers. comm.).

Saskatchewan

Saskatchewan historically contained approximately 5 percent (N= 14) of all known records of Dakota skippers rangewide. In Saskatchewan, the Dakota skipper is restricted to undisturbed or lightly grazed, steep, south-facing hills near the Souris River (Webster 2007, p. ii). The Dakota skipper was first recorded south of Oxbow, Saskatchewan, in 2001 where three males were collected (Hooper 2003, p. 124) on an ungrazed knoll within a patch of mixed-grass prairie that was approximately one ha (2 ac) in extent. Dakota skippers were found at three additional sites during 2002 surveys (Webster 2003, pp. 6–7). In 2007, researchers surveyed 16 sites in southeastern Saskatchewan and found Dakota skippers at 10 of these sites (including Oxbow); 8 of these represent new sites for the species in Saskatchewan (Webster 2007, p. i). During 2007 surveys, which were conducted late in the flight period, only a few individuals were observed at each site where the species was present (Webster 2007, p. ii). Nine of these sites where the species was found in 2007 were surveyed along an approximate 50-km (31-mi) stretch of steep hillsides along the ridgeline north of Souris River; distances between sites range from 1 to 28 km (0.8 mi to 17 mi). We consider Dakota skipper to be present at all 14 sites in Saskatchewan, although 3 of those sites have not been surveyed since 2002. The nearest known extant population of Dakota skippers in Saskatchewan is approximately 111 km (69 mi) from the closest extant (present) population in North Dakota and 200 km (125 mi) from the closest Manitoba population.

Poweshiek skipperling

Species Description

The Poweshiek skipperling (*Oarisma poweshiek*) is a member of the skipper family, Hesperiidae, and was first described by Parker (1870, pp. 271–272). Parker (1870, pp. 271–272) provided the original description of this species from his type series collected near Grinnell, Iowa. It was named for the county in which it was found (Poweshiek County), but it was misspelled, Powesheik, in the original description. This spelling was retained by most early authorities (Lindsey 1922, p. 61; Holland 1931, p. 360). Miller and Brown (1981, p. 31) used the corrected spelling, Poweshiek, but then Miller and Ferris (1989, p. 31) changed it back in their supplement. Current usage is mixed, with many authorities retaining the original spelling (e.g., Miller 1992, p. 20), while others have opted for the corrected spelling (Layberry *et al.* 1998, p. 48; Opler *et al.* 1998, p. 363; Glassberg 1999, p. 167; Brock and Kaufman 2003, p. 306). Layberry *et al.* (1998, p. 48) state ''. . . since it is a clear case of an original incorrect spelling it can be corrected [rule 32(c)ii of the International Code of Zoological Nomenclature].''

Poweshiek skipperlings are small and slender-bodied, with a wingspan generally ranging from 2.3 to 3.0 cm (0.9 to 1.2 in). The size of Poweshiek skipperlings appears to vary somewhat across their range (Royer and Marrone 1992b, p. 3). North Dakota and South Dakota specimens tend to be slightly smaller than the 2.9 to 3.2 cm (1.1 to 1.3 in) range given by Parker (1870) for the type specimens from Grinnell, Iowa (Royer and Marrone 1992b, p. 3). A sample of Richland County, North Dakota, specimens from Royer's collection had an average wingspan of 2.8 cm (1.1 in) for males and 3.0 cm (1.2 in) for females. South Dakota specimens in Marrone's collection had an average wingspan of 2.6 cm (1.0 in) for males and 2.7 cm (1.1 in) for females. The upper wing surface is dark brown with a band of orange along the leading edge of the forewing. Ground color of the lower surface is also dark brown, but the veins of all but the anal third of the hindwing are outlined in hoary white, giving an overall white appearance to the undersurface.

The Poweshiek skipperling is most easily confused with the Garita skipperling (*Oarisma garita*), which can be distinguished from Poweshiek skipperling by their smaller size, quicker flight, and overall golden-bronze color (Royer and Marrone 1992b, p. 3). Another distinguishing feature is the color of the anal area of the ventral hindwing (orange in Garita; dark brown in Poweshiek). The Garita skipperling generally occurs west of Poweshiek skipperling range, although there are records of both species from two counties in southeastern North Dakota and two counties in northwestern Minnesota (Montana State University—Big Sky Institute 2012, Butterflies of North America *http://www.butterfliesandmoths.org/* Accessed 5/14/12; Minnesota Department of Natural Resources (DNR) 2012, Rare features database. Accessed 5/14/12).

McAlpine (1972, pp. 85–92) described Poweshiek skipperling eggs as pale yellowish green, mushroom shaped with a flattened bottom, a slightly depressed micropyle (pore in the egg's membrane through which the sperm enter) and smooth surfaced. They were 0.8 millimeters (mm) (0.01 in) long, 0.7 mm (0.03 in) wide and 0.5 mm (0.02 in) high. The overall color of the head and body of the larvae is pale grass green, with a distinctive darker green mid-dorsal stripe and seven cream-colored stripes on each side. First instars were 1.8 mm (0.07 in) at hatching, and the

lone 7th instar survivor was 23.6 mm (1.0 in) near the end of that stage. McAlpine did not have any observations past the 7th instar (the stage between successive molts, the first instar being between hatching and the first molt) (McAlpine 1972, pp. 85–93).

General Life History

Poweshiek skipperlings lay their eggs near the tips of leaf blades and overwinter as larvae on the host plants (Bureau of Endangered Resources in Swengel and Swengel 1999, p. 285, Borkin 2000a, p. 7). McAlpine (1972, pp. 85–92) described the various life-history stages of Poweshiek skipperling. McAlpine (1972, pp. 85–93) observed hatching of larvae Poweshiek skipperling after about nine days. McAlpine's records were incomplete, and he did not have any observations past the 7th instar, but he believed that there should have been one or two additional instars, followed by the chrysalis (pupa) and then the imago (adult) stages (McAlpine 1972, pp. 85–93). After hatching, Poweshiek skipperling larvae crawl to the base of grasses, but unlike Dakota skippers, Poweshiek skipperling do not form shelters underground (McAlpine 1972, pp. 88–92; Borkin 1995a, p. 9; Borkin 2008, pers. comm.). Poweshiek skipperling are not known to form shelters, instead the larvae overwinter up on the blades of grasses and on the stem near the base of the plant (Borkin 2008, pers. comm.; Dana 2008, pers. comm.). Borkin (2008, pers. comm.) observed larvae moving to the tips of grass blades to feed on the outer and thinner edges of the blades, with later movement down and among blades.

Food and Water

For the Poweshiek skipperling, preferred nectar plants vary across its geographic range. Smooth ox-eye (*Heliopsis helianthoides*) and purple coneflower were noted as the favored nectar plants in Iowa, Minnesota, and North Dakota (Swengel and Swengel 1999, p. 280). Other nectar species used, in descending order of number of observations, were stiff tickseed (*Coreopsis palmata*), black-eyed Susan, and palespike lobelia (*Lobelia spicata*) (Swengel and Swengel 1999, p. 280). On drier prairie habitats in Iowa and Minnesota, purple coneflower is used almost exclusively, and the emergence of the adults corresponds closely to the early maturity of this species' disk florets (Selby 2005, p. 5). On the wetter prairie habitats of Canada and the fen habitats of Michigan, favored nectar plants are black-eyed Susan, palespike lobelia, sticky tofieldia (*Triantha glutinosa*), and shrubby cinquefoil (*Dasiphora fruticosa ssp. floribunda*) (Nielsen 1970, p. 46; Holzman 1972, p. 111; Catling and Lafontaine 1986, p. 65; Bess 1988, p. 13; Summerville and Clampitt 1999, p. 231). In addition to nutrition, the nectar of flowering forbs provides water for Poweshiek skipperling, which is necessary to avoid desiccation during flight activity (Dana 2013, pers. comm.).

Until recently, the larval food plant was presumed to be elliptic spikerush (*Eleocharis elliptica*) or sedges, but this was based on limited observations, primarily from the Michigan populations (e.g, Holzman 1972, p. 113). More recent observations show that the preferred larval food plant for some populations of Poweshiek skipperling is prairie dropseed (*Sporobolus heterolepis*) (Borkin 1995b, p. 6); larvae have also been observed feeding on little bluestem (*Schizachyrium scoparium*) (Borkin 1995b, pp. 5–6) and sideoats grama (*Bouteloua curtipendula*) (Dana 2005a, pers. comm.). Poweshiek skipperling have been observed laying eggs (ovipositing) on mat muhly (*Muhlenbergia richardsonis*) (Cuthrell 2012a, pers. comm.), a grass in Michigan's prairie fens (Penskar and Higman 1999, p. 1).

In southwestern Minnesota dry hill prairies, Poweshiek skipperling oviposition was observed on prairie dropseed, little bluestem, big bluestem (*Andropogon gerardii*), porcupine grass (*Hesperostipa spartea*), and a couple unidentified species; a larva was observed feeding on sideoats grama (Dana 2005a, pers. comm.). Poweshiek skipperlings were observed to oviposit on big bluestem in Wisconsin (Borkin 2012a, pers. comm.), although indiscriminate oviposition on unsuitable larval plants has been observed during high summer temperatures (Borkin 1995a, p. 6). Dana (2005b, pers. comm.) noted that larvae and ovipositing females prefer grasses with ''very fine, threadlike structures'' and hypothesized that Poweshiek skipperling lack a specific host and may adapt to acceptable plant species at a site.

Dispersal

Poweshiek skipperlings are also not known to disperse widely; the species was evaluated among 291 butterfly species in Canada as having relatively low mobility; experts estimated Poweshiek skipperling to have a mean mobility of 2 (standard deviation = 1.4) on a scale of 0 (sedentary) to 10 (highly mobile) (Burke *et al.* 2011, p. 2279; Fitzsimmons 2012, pers. comm.). A maximum dispersal distance of 1.6 km (1.0 mi) is estimated to be a reasonable and likely distance for male Poweshiek skipperling to travel between patches of prairie habitat separated by structurally similar habitats (*e.g.,* perennial grasslands but not necessarily native prairie). The species, however, will not likely disperse across habitat that is not structurally similar to native prairies, such as certain types of row crops or anywhere not dominated by grasses (Westwood 2012a and 2012b, pers. comm; Dana 2012b, pers. comm.). In Manitoba, Poweshiek skipperling have been observed avoiding dispersal over short distances, even to suitable habitat, if a barrier such as a road exists between suitable prairie habitat or nectar sources (Westwood *et al.* 2012, p.18). Since experts estimated Dakota skippers to have a mean mobility of 3.5 (standard deviation = 0.7) on a scale of 0 (sedentary) to 10 (highly mobile), which is higher than the estimate for Poweshiek skipperling (mean mobility of 2) (Burke *et al.* 2011, p. 2279; Fitzsimmons 2012, pers. comm.), a more conservative estimated dispersal distance would be that of the Dakota skipper, approximately 1 km (0.6 mi) (Cochrane and Delphey 2002, p. 6).

In summary, dispersal of Poweshiek skipperling is very limited due in part to its short adult life span and single annual flight. Therefore, the species' extirpation from a site is likely permanent unless it is within about 1 km (0.6 mi) of a site that generates a sufficient number of emigrants or is artificially reintroduced to a site; however, the capability to propagate the Poweshiek skipperling is currently lacking.

Habitat

Poweshiek skipperling habitats include prairie fens, grassy lake and stream margins, moist meadows, and wet-mesic to dry tallgrass prairie. McCabe and Post (McCabe and Post 1977a, p. 38) describe the species' habitat in North Dakota as ''. . . high dry prairie and low, moist prairie stretches as well as old fields and meadows.'' Royer and Marrone (1992b, p. 12) describe Poweshiek skipperling habitat in North Dakota and South Dakota as moist ground in undisturbed native tallgrass prairies. Poweshiek skipperling habitat throughout Iowa and Minnesota is described as both ''high dry'' and ''low wet'' prairie (McCabe and Post 1977a, p. 38). The only documented Illinois record was associated with high rolling prairie (Dodge 1872, p. 218); the only documented Indiana record was from marshy lakeshores and wetlands

(Blatchley 1891, p. 398; Shull 1987, p. 29).

Southern dry prairies in Minnesota are described as having sparse shrub cover (less than 5 percent) composed primarily of leadplant, with prairie rose, wormwood sage, or smooth sumac present and few, if any, trees (Minnesota DNR 2012a, p. 1). Southern mesic prairies also have sparse shrubs (5–25 percent cover) consisting of leadplant and prairie rose with occasional wolfberry (*Symphoricarpos occidentalis*) and few, if any, trees (Minnesota DNR 2012b, p. 1).

The disjunct populations of Poweshiek skipperlings in Michigan have more narrowly defined habitat preferences, variously described as wet marshy meadows (Holzman 1972, p. 114), bog fen meadows or carrs (Shuey 1985, p. 181), sedge fens (Bess 1988, p. 13), and prairie fens (Michigan Natural Features Inventory 2011, unpubl. data; Michigan Natural Features Inventory 2012, unpubl. data); prairie fen is the currently accepted name for this habitat type. Bess (1988, p. 13) found the species primarily in the drier portions of Liberty Fen, Jackson County, dominated by ''low sedges'' and an abundance of nectar sources. Summerville and Clampitt (1999, p. 231) noted that the population was concentrated in areas dominated by spikerush and that only 10–15 percent of the fen area was occupied despite the abundance of nectar sources throughout. Poweshiek skipperling have been described as occupying peat domes within larger prairie fen complexes in areas either dominated by mat muhly or prairie dropseed (Cuthrell 2013a, pers. comm.). A few prairie fens in Michigan also contain other rare butterflies, such as Mitchell's satyr and swamp metalmark (Cuthrell 2013a, pers. comm.).

Poweshiek skipperling populations in Wisconsin are also disjunct from the population to the west and are associated with areas that contain intermixed wet-mesic, and dry-mesic prairie habitats (Borkin 1995b, p. 6). The dry-mesic habitats contain ''extensive patches of prairie dropseed and little bluestem grasses'' (Borkin 1995b, p. 7). Survival in wetter areas, which tend to burn cooler and less completely, coupled with low recolonization rates, or the disproportionate loss of wet versus dry prairie could give the false impression that the wet areas were their preferred habitat (Borkin 1995b, p. 7). Like Dakota skipper, Poweshiek skipperling larvae may be vulnerable to desiccation during dry summer months (Borkin 2012a, pers. comm.) and require movement of shallow groundwater to the soil surface or wet low areas to provide relief from high summer temperatures or dry conditions (Royer *et al.* 2008, pp. 2, 16; Borkin 2012a, pers. comm.). Humidity may also be an essential factor to larval survival during winter months since the larvae cannot take in water during that time and depend on humid air to minimize water loss through respiration (Dana 2013, pers. comm.). Royer (2008, pp. 14–15) measured microclimalogical (climate in a small space, such as at or near the soil surface) levels within ''larval nesting zones'' (between the soil surface and 2 cm deep) at six known Poweshiek skipperling sites, and found an acceptable rangewide seasonal (summer) mean temperature range of 18 to 21 °C (64 to 70 °F), rangewide seasonal mean dew point ranging from 14 to 17 °C (57 to 63 °F), and rangewide seasonal mean relative humidity between 73 and 85 percent

Canadian populations of Poweshiek skipperlings are restricted to a single 2,300-ha (5,683-ac) area in southeastern Manitoba (COSEWIC 2003, p. 5). The wet to mesic tallgrass prairie in this area is characterized by low relief (1–2 m (3–7 ft)), with alternating lower, wetter areas and higher, drier prairie; Poweshiek skipperlings tend to be concentrated on or near the edge of the higher, drier prairie (COSEWIC 2003, p. 8). Spikerush is frequent in the wetter areas, and prairie dropseed, black-eyed Susan, and palespike lobelia are frequent in the drier areas (COSEWIC 2003, pp. 7–8).

Prairie fen habitat soils in Michigan are described as saturated organic soils (sedge peat and wood peat) and marl, a calcium carbonate ($CaCO_3$) precipitate (MINFI Web site accessed August 3, 2012). In other states, soil textures in Poweshiek skipperling habitats are classified as loam, sandy loam, or loamy sand (Royer *et al.* 2008, pp. 3, 10); soils in moraine deposits are described as gravelly, except the deposits associated with glacial lakes.

Population Distribution and Occupancy

The Poweshiek skipperling is historically known from eight states, ranging widely over the native wet-mesic to dry tallgrass prairies from eastern North and South Dakota (Royer and Marrone 1992b, pp. 4–5) through Iowa (Nekola and Schlicht 2007, p. 7) and Minnesota (Minnesota DNR, Division of Ecological Resources, unpubl. data), with occurrences also documented in northern Illinois (Dodge 1872, p. 218), Indiana (Blatchley 1891, p. 898), Michigan (Holzman 1972, p. 111; McAlpine 1972, p. 83), and Wisconsin (Borkin 2011, in litt.; Selby 2010, p. 22). The relatively recent discovery of Poweshiek skipperling populations in the Canadian province of Manitoba further extends its known historical northern distribution (Westwood 2010, pp. 7–22; Dupont 2010, pers. comm.). Additional historical accounts of Poweshiek skipperling from the States of Montana, Colorado, and Nebraska are likely misidentifications of its western congener, the Garita skipperling.

Once common and abundant throughout native prairies in eight states and at least one Canadian province, the Poweshiek skipperling and its habitat have experienced significant declines. The species is considered to be present at a few native prairie remnants in two states and one location in Manitoba, Canada. The species is presumed extirpated from Illinois and Indiana, and the status of the species is uncertain in four of the six states with relatively recent records (within the last 20 years). The historical distribution of Poweshiek skipperling may never be precisely known because ''much of tallgrass prairie was extirpated prior to extensive ecological study'' (Steinauer and Collins 1994, p. 42), such as butterfly surveys. Destruction of tallgrass and mixed-grass prairie began in 1830 (Sampson and Knopf 1994, p. 418), but significant documentation of the ecosystem's butterfly fauna did not begin until about 1960. Therefore, most of the decline of the Poweshiek skipperling probably went unrecorded. Poweshiek skipperling dispersal is very limited due in part to its short adult life span and single annual flight. Therefore, the species' extirpation from a site is likely permanent unless it is within about 1 km (0.6 mi) of a site that generates a sufficient number of emigrants or is artificially reintroduced to a site.

Recent survey data indicate that Poweshiek skipperling has declined to zero or to undetectable levels at 87 percent of sites where it has ever been recorded. Until about 2003, Poweshiek skipperling was regarded as the most frequently and reliably encountered prairie-obligate skipper butterfly in Minnesota, which contains nearly 50 percent of all known Poweshiek skipperling locations rangewide. Numbers and distribution dropped dramatically in subsequent years, however, and the species has not been seen in Minnesota since 2007. In Iowa, the Poweshiek skipperling was found at 2 of 33 sites with previous records surveyed in 2007; the species was last observed at one site in 2008. Iowa contains about 14 percent of documented sites rangewide. Unidentified threats to the species have acted to extirpate or sharply diminish

populations at all or the vast majority of sites in Iowa and Minnesota (Dana 2008, p. 16; Selby 2010, p. 7).

South Dakota historically contained about 24 percent of the rangewide sites with documented presence of Poweshiek skipperling, although recent surveys in that State also suggest an emergent and mysterious decline. The species was last observed in South Dakota in 2008, at three sites. North Dakota historically contained about six percent of the rangewide sites with documented presence of Poweshiek skipperling; the species was last observed in North Dakota in 2001. Survey efforts in North Dakota have been minimal between 1998 and 2011, but surveys conducted in 1997 documented more than 10 Poweshiek skipperlings at 1 site; 6 individuals were counted at 1 site, and 0 were detected at 6 other sites. Surveys conducted during the 2012 flight season resulted in zero detections of the species.

Seven Michigan sites were recently ranked as having good or better ''viability'', a habitat-based element occurrence rank assigned by the Michigan Natural Features Inventory (2011); however, the number of individuals observed at a few of those sites has declined in recent years and the species is presumed extirpated from one of those sites. Currently, four of the ten extant occurrences of Poweshiek skipperling in Michigan are considered to have good or better viability (Michigan Natural Features Inventory (2011, unpubl. data). Each of those faces threats of at least low to moderate magnitude, and the State contains only about 6 percent of all known historical Poweshiek skipperling records. There is one population of Poweshiek skipperling in Wisconsin with fairly consistent numbers observed over the last 5 years (17 to 63 individuals counted, no consistent measure of effort) and one population in Manitoba with fairly consistent numbers (typically hundreds of individuals observed each year). To summarize, of the 296 documented sites, there are 14 sites where we consider the Poweshiek skipperling to be present, 131 sites with unknown status, 98 possibly extirpated sites, and 53 where we consider the species to be extirpated (Table 2). The distribution and status of Poweshiek skipperling in each state of known historical or extant occurrence are described in detail below.

TABLE 2—NUMBER OF HISTORICALLY DOCUMENTED POWESHIEK SKIPPERLING SITES WITHIN EACH STATE AND THE NUMBER OF SITES WHERE THE SPECIES IS THOUGHT TO BE PRESENT, UNKNOWN, POSSIBLY EXTIRPATED, OR EXTIRPATED

State	Present	Unknown	Possibly extirpated	Extirpated	Total	Percent of the total number of historical sites by state
Illinois	.....	.....	.....	3	3	1
Indiana	.....	.....	.....	1	1	0.3
Iowa	.....	4	24	13	41	14
Michigan	10	1	.....	6	17	6
Minnesota	.....	67	68	7	142	48
North Dakota	.....	10	6	1	17	6
South Dakota	.....	48	.....	22	70	24
Wisconsin	3	1	.....	.....	4	1
Manitoba	1	.....	.....	.....	1	0.3
Total Number of Historically Documented Sites	14	131	98	53	296	.....
Percent of the Total Number of Historical Sites by Occupancy	5%	44%	33%	18%	.....	.....

Illinois

The Poweshiek skipperling historically occurred in Illinois, although only one historical occurrence is supported (Table 2). In the early 1870s, Dodge (1872, p. 218) reported abundant Poweshiek skipperling occupying ''the high rolling prairie that forms the divide between the Illinois and Rock rivers'' in Bureau County, Illinois. In addition to Bureau County, the Web site *Butterflies and Moths of North America* lists Poweshiek skipperling historical occurrences for Lake and Mason Counties, which were submitted to the Web site before the date field was required, so a default date of January 1, 1950, was assigned, which is outside of the typical flight period (*http://www.butterfliesandmoths.org/species/Oarisma-poweshiek;* accessed August 16, 2012). The Web site maintains a verifiable database on species occurrences, but there is no accessible supporting data for the Lake and Mason Counties records (Lundh 2012, pers. comm.). Poweshiek skipperling is, therefore, presumed to be extirpated from Illinois.

Indiana

There is one supported historical occurrence of Poweshiek skipperlings in Indiana (Table 2). Blatchley (1891, p. 898) reported small numbers of Poweshiek skipperlings near Whiting, Indiana; Shull (1987, p. 49) expressed confidence that this record is authentic. The Poweshiek skipperling is considered extirpated from Indiana.

Iowa

Iowa historically contained approximately 14 percent (N= 41) of all known records of Poweshiek skipperlings rangewide (Table 2). The Poweshiek skipperling was historically known to occur at 38 sites in 13 counties in Iowa (Nekola 1995, p. 8; Saunders 1995, pp. 27–28; Selby 2005, p. 18; Nekola and Schlicht 2007, p. 7; Selby 2010, p. 6); however, this number may vary slightly (up to 41 sites) depending on how one divides sites along the Little Sioux River in the Freda-Cayler area (Selby 2012a, pers. comm.). Early reports from Parker (1870, p. 271) described Poweshiek skipperling as abundant on a prairie slope at Grinnell, Iowa, while Lindsey (1917, p. 352; 1920, p. 320) noted additional rare occurrences in Story, Dickinson,

Poweshiek, and Woodbury Counties, Iowa—among these, habitat has long since been destroyed in all but Dickinson County.

In 1993–1994, 65 sites were surveyed in 17 counties where Dakota skipper or Poweshiek skipperling had been previously recorded or where prairie and butterfly surveys or infra-red photography suggested the presence of Poweshiek skipperling habitat (Saunders 1995, pp. 7–8). Among the 65 sites surveyed, Poweshiek skipperlings were found at 29 sites in 10 counties (Saunders 1995, p. 27). In 2000, Poweshiek skipperlings were found at six sites surveyed in and near Cayler Prairie and Freda Haffner Kettlehole state preserves in Dickinson County (Selby 2000, p. 19). Followup surveys of this complex in 2004, 2005, and 2007, however, produced no confirmed sightings (Selby 2010, p. 6). Extensive surveys were conducted in 2007, and included 32 of the 38 sites in the State with post-1990 records (Selby 2008, pp. 4, 6). Poweshiek skipperlings were found at 2 of the 38 sites surveyed—Hoffman Prairie State Preserve in Cerro Gordo County and Highway 60 Railroad Prairie in Osceola County (Selby 2008, pp. 6–7). Five of the six sites not included in the 2007 surveys had very little quality prairie (Selby 2012a, pers. comm.). Supplementary surveys conducted further west along U.S. Highway 18 in Hancock County also produced no confirmed sightings (Selby 2010, p. 7). No surveys were conducted at previously known Poweshiek skipperling sites in the State during the 2012 flight season.

The Poweshiek skipperling is presumed extirpated or possibly extirpated from all but four of the known sites in Iowa. The status of the Poweshiek skipperling is unknown at four sites: Highway 60 Railroad Prairie, Floete Prairie in Dickinson County, Florenceville Prairie, and Hayden Prairie in Howard County. There have been no surveys at Highway 60 Railroad Prairie since the species was observed there in 2007 (Selby 2012a, pers. comm.). The last observation of Poweshiek skipperling at Floete Prairie was in 1994 and the habitat ''did not appear to be very good quality'' in 2007, although the site was not surveyed for butterflies that year (Selby 2012a, pers. comm.) or in subsequent years. The Poweshiek skipperling was last observed at the Florenceville Prairie in 1994 (Saunders 1995, p. 27), but not during the 2007 survey year (Selby 2010, pp. 8–11). The species was last observed at Hayden Prairie in 2005, but not during surveys conducted in 2007 (Selby 2010, p. 10). Four Poweshiek skipperlings were found at Hoffman Prairie in Cerro Gordo County in 2008 (Selby 2009b, p. 3), but none were found during surveys in 2009 (Selby 2009b, p. 7) and 2010 (Selby 2010, p. 7). We initially assigned an unknown status to Hoffman Prairie site because the species had not been seen in the last two survey years; however, Selby believes that the species may be extirpated from this site (Selby 2012a, pers. comm.), so we have assigned a status of extirpated to this site.

To summarize, Poweshiek skipperling was historically documented in 41 sites in Iowa. The species occupancy is unknown at 4 of those sites and the species is considered to be extirpated or possibly extirpated at 13 and 24 sites, respectively (Table 2). The species is not considered to be present at any of the sites in Iowa.

Michigan

Michigan historically contained approximately 6 percent (N=17) of all known records of Poweshiek skipperlings rangewide (Table 2). Poweshiek skipperling has been historically documented at 17 sites in 6 counties in Michigan. The species was first recorded in Michigan in 1893 at Lamberton Lake near Grand Rapids in Kent County (Holzman 1972, p. 111) and then at nearby Button Lake Fen (also known as Emerald Lake Fen) in 1944 (McAlpine 1972, p. 83). Shrubs have invaded both sites, however, and no Poweshiek skipperlings have been found at either of these two western Michigan sites since 1944 and 1968, respectively (Michigan Natural Features Inventory 2011, unpubl. data). Holzman (1972, p. 111) documented Poweshiek skipperling in Oakland County in 1970, and the species has since been found at a total of 15 locations in eastern Michigan.

The Poweshiek skipperling is currently considered to be present at ten sites (Table 2) in four counties in Michigan: Jackson, Lenawee, Oakland, and Washtenaw. The species has been observed very recently (2007–2012) at most of those sites, except at the Liberty Bowl Fen in Jackson County, which has not been surveyed since one individual was observed in 1996. The status of the species is unknown at one site; Bullard Lake in Livingston County, where Poweshiek skipperling were last seen in 2007, but not in subsequent surveys in 2008 and 2009 (Cuthrell 2012a, pers. comm.). The species is presumed extirpated from six sites including the only two sites in Kent County and three sites in Oakland County; Rattalee Road, Fenton Road, and Rattalee Lake Fen (Call C Burr Preserve) fens. The species has not been observed at the Rattalee Road and Fenton Road sites since 1970 and 1973, respectively (Michigan Natural Features Inventory 2011, unpubl. data). Four Poweshiek skipperlings were seen in 2009 at the Rattalee Lake Fen (Calla C Burr Preserve), but none were observed during surveys conducted in 2010, 2011, and 2012 (Cuthrell 2012a, pers. comm.; Michigan Natural Features Inventory 2011, unpubl. data). The Michigan Natural Features Inventory (MNFI) also considers the two sites in Kent County to be extirpated due to habitat loss and destruction, Lamberton Lake and Button Lake (also known as Emerald Lake); the species has not been observed at either site since 1968 and 1944, respectively. The species is presumed to be extirpated at Whalen Lake Fen in Livingston County, where the species has not been observed since 1998 despite three subsequent years of surveys (Michigan Natural Features Inventory 2011, unpubl. data).

Four of Michigan's ten extant (present) Poweshiek skipperling occurrences are considered to have at least good viability (Michigan Natural Features Inventory 2011, unpubl. data). Three of these sites (Buckthorn Lake (also known as Big Valley), Brandt Road Fen (also known as Holly Fen) and Long Lake Fen) are within 20 km (12 mi) of one another in Oakland County; all with relatively large numbers (61–389) of the species recorded in 2010–2012 surveys (Michigan Natural Features Inventory 2011, unpubl. data; Cuthrell 2012a, pers. comm.). The largest extant (present) Poweshiek skipperling population in Michigan is at Long Lake Fen, where 225 individuals (1.3/hr.) were counted during 2012 surveys, down from 389 individuals (2.2/hr.) observed in the previous survey year with similar sampling effort. Long Lake Fen is likely the largest population of Poweshiek skipperling in the United States, and is subjected to intense development pressure. The fourth site, Grand River Fen (also known as Liberty Fen) in Jackson County, is approximately 100 km (62 mi) from the other three sites. In 2010, researchers counted 54 (0.3/hr.) Poweshiek skipperling at Grand River Fen, and 114 (0.6/hr.) in 2011 (Michigan Natural Features Inventory 2011, unpubl. data; Cuthrell 2012a, pers. comm.). This number fell to 14 (0.1/hr.) in 2012 (Cuthrell, 2012a, pers. comm.; 2012b, pers. comm.).

Small populations, immediate threats that have significant impacts on the species, or both limit the viability of the remaining five sites where we consider Poweshiek skipperling to still be present

in Michigan. In 2010, eight (0.1/hr.) Poweshiek skipperling were recorded at Park Lydon in Washtenaw County; 12 individuals were counted in 2011 (0.1/hr.), and 22 were counted in 2012 (0.2/hr.) (Cuthrell 2012a, pers. comm.). Two individuals (0.02/hr.) were recorded at Goose Creek Grasslands (also known as Little Goose Lake Fen) in Lenawee County in 2010, nine (0.07/hr.) were seen in 2011 (Cuthrell 2012a, pers. comm.; Cuthrell 2012b, pers. comm.). Only one Poweshiek skipperling was seen during a 15-minute 3-person survey in 2007 at the Snyder Lake site. Fourteen individuals were observed during 2008 surveys at Halstead Lake Fen (Michigan Natural Features Inventory 2011, unpubl. data), and 18 were observed in 2012 (Cuthrell 2012a, pers. comm.); neither survey year had units of effort associated with the counts at this site. One individual was counted at Bullard Lake fen in 2007, but the species was not observed in the two most recent survey years (2008 and 2009); therefore, the status is unknown at that site. We have only one year of data from Liberty Bowl Fen, where the species was recorded in 1996. The Eaton Road Fen is thought to be fairly viable, where 15–20 individuals were observed on multiple occasions in 2005 and a high of 68 individuals were observed in 2011 (Cuthrell 2013b, pers. comm.). The Eaton Road site is approximately 1 mi (0.6 km) from the Long Lake Fen site and is considered a sub-site within Long Lake Fen (Cuthrell 2013b, pers. comm.), but we consider it to be a separate site for the purposes of this rule.

To summarize, Poweshiek skipperling was historically documented in 17 sites in Michigan (Table 2). The species is considered to be present at 10 of the sites. The occupancy is unknown at 1 site, and the species is considered to be extirpated at 6 sites.

Minnesota

Minnesota historically contained approximately 48 percent (N=142) of all known records of Poweshiek skipperlings rangewide (Table 2). There are approximately 189 historical Poweshiek skipperling occurrence records in 32 counties in Minnesota [Minnesota Natural Heritage Inventory (MN NHI) database accessed June 19, 2013, plus additional surveys]. Clusters of records occur within five general areas from the State's southwest corner to near the Canadian border in the north. Based on the proximity of some occurrences to one another (*e.g.,* overlapping or occurrences in close proximity to one another in one general location), there appear to be approximately 142 distinct historical site records in the State (Dana 2012d, pers. comm; Service 2013, unpubl. geodatabase). Poweshiek skipperling are presumed extirpated or possibly extirpated from at least 75 of these known sites. The status of the species is unknown at 67 sites, although 31 of those locations have not been surveyed since 2003, and the species has undergone a sharp decline in the State since then.

Until about 2003, the Poweshiek skipperling was regarded as ''the most frequently and reliably encountered prairie-obligate skipper in Minnesota'' (Dana 2008, p. 1). Signs of the species' decline in Minnesota were noted in 2003 when Selby (2005, p. 20) found sharply lower numbers in and near Glacial Lakes State Park (Selby 2005, p. 20) compared to those observed in 2001 (Skadsen 2001, pp. 22–24). For example, numbers recorded along four transects that were surveyed in both years decreased from 104 to 2 individuals (Selby 2006b, Appendix 2, p. ii). In 2004 and 2005, Selby (2006b, Appendix 2, p. 2) did not record a single Poweshiek skipperling on any of these transects in and around the park during 11 separate surveys.

An extensive survey effort was conducted in 2007 and 2008 throughout most of the species' known range in the State (Selby 2009a, entire). Sites with previous Poweshiek skipperling records that were considered to have the greatest conservation importance to the species (large, high-quality prairie remnants) were surveyed, as well as sites with no previous records that appeared likely to support the species (Selby 2009a, p. 2). In 2007, 70 sites in 15 counties were surveyed, including 26 sites with previous Poweshiek skipperling records (Selby 2009a, pp. 1, 6). In 2008, 58 sites were surveyed in 13 counties, including 22 sites with prior records (Selby 2009a, pp. 1, 6). A total of 34 sites with previous Poweshiek skipperling records were surveyed in both years combined. Poweshiek skipperling presence was recorded on only three of the 70 surveyed sites in 2007; each of these three sites had just one confirmed individual (Selby 2009a, p. 1). The 2008 surveys documented no Poweshiek skipperling records on any of the 58 sites surveyed (Selby 2009a, p. 1).

An extensive survey effort was also completed in 1993 and 1994 (Schlicht and Saunders 1994, entire; Schlicht and Saunders 1995, entire). During those surveys, Poweshiek skipperlings were found in 11 of 19 sites on which it had been previously recorded and in 13 new sites, for a total of 25 of 63 surveyed prairie sites; the species was present at 30 and 39 percent of the sites in 1993 and 1994, respectively (Schlicht and Saunders 1995, pp. 5–7). These results contrast sharply with those from the surveys conducted in 2007 and 2008, when the species was found at four and zero percent of sites, respectively. Although the species was apparently more common in 1993 and 1994, numbers of Poweshiek skipperling found during surveys were typically low. Large numbers were observed at only three sites (Schlicht and Saunders 1995, p. 4). At one of these sites, Glynn Prairie, 25 Poweshiek skipperling were recorded during a 50-minute survey in July 1993 (Schlicht and Saunders 1995, data sheet); no Poweshiek skipperling were observed at this site during the 2007 survey despite good survey conditions (Selby 2009a, p. xxxv).

In 2007, multiple transect surveys were conducted in four sites with previously well-documented Poweshiek skipperling populations—transects totaling 52,985 m (33 mi) were surveyed without observing a single Poweshiek skipperling (Dana 2008, p. 5). About half of these transects (totaling 20,959 m (13 mi)) were in Prairie Coteau Scientific and Natural Area (SNA), where in 1990 Selby recorded 116 Poweshiek skipperlings during the flight peak (Selby and Glenn-Lewin 1990, pp. 19–20) along a total of about 6,250 m (4 mi) of transects (Dana 2008, p. 16). No Poweshiek skipperling were observed during surveys of the Prairie Coteau SNA in 2012 (Runquist 2012, pp. 9–10).

Additional surveys were conducted in 2012, however, Poweshiek skipperling were not observed at any of the 18 sites with relatively recent records (Runquist 2012, pp. 4–25; Selby 2012, p. 2; Selby 2013, p. 2; Dana 2012c, pers. comm.; Runquist 2012a, pers. comm.; Olsen 2012a, pers. comm.). Fifteen additional prairie sites with potential habitat or records of other skippers were surveyed in 2012, but no Poweshiek skipperling were observed (Runquist 2012, pp. 4–25; Selby 2012, p. 2; Selby 2013, p. 2; Dana 2012c, pers. comm.; Runquist 2012a, pers. comm.; Olsen 2012a, pers. comm.).

Nearly half (approximately 48 percent) of all documented Poweshiek skipperling sites rangewide are in Minnesota, thus the apparent collapse of large numbers of Poweshiek skipperling populations across the State may pose a significant challenge for the long-term existence of this species. Although the possibility remains that the species is extant at some sites where recent (2007, 2008, or 2012) surveys were negative, it seems unlikely that it is present at those sites in any significant numbers. Extensive surveys in 1993 and 1994 documented the species at about 35

percent of all surveyed sites, whereas the 2007 effort found them at only about 2 percent of all sites surveyed; no Poweshiek skipperling were detected despite widespread and robust survey efforts involving multiple observers in 2008 or 2012 (Dana 2008, p. 8; Selby 2009a, p. 1; Dana 2012c, pers. comm.; Runquist 2012a, pers. comm.; Olsen 2012, pers. comm.; Runquist 2012, pp. 4–25; Selby 2012, p. 2, 2013, p. 2).

To summarize, Poweshiek skipperling was historically documented in approximately 142 sites in Minnesota (Table 2). The species is not considered to be present at any of these sites (Table 2). The occupancy is unknown at 67 sites, and the species is considered to be extirpated or possibly extirpated at 7 and 68 sites, respectively (Table 2).

North Dakota

North Dakota historically contained approximately 6 percent (N=17) of all known records of Poweshiek skipperlings rangewide (Table 2). Poweshiek skipperlings have been historically documented at 17 sites (Table 2) in 7 North Dakota counties (Selby 2010, p. 18; Service 2013, unpubl. geodatabase): Cass, Dickey, LaMoure, Ransom, Richland, and Sargent in the southeastern corner of the State and Grand Forks County in the Northeast. Poweshiek skipperling are now considered extirpated or possibly extirpated from seven sites and four counties (Cass, Dickey, LaMoure, and Grand Forks) in North Dakota. The status of the species is unknown at 10 sites, where the species was last observed between 1996 and 2001, but not during the most recent 1–2 year(s) surveyed. The status of the species is also unknown at one site where the species was observed in 1996 with no recent surveys for the species, but the habitat was recently rated as poor (Service 2013, unpubl. geodatabase). Four sites with fairly recent Poweshiek skipperling records were surveyed in 2012; Poweshiek skipperling were not found at any of those sites (Royer and Royer 2012b, pp. 21–24; Royer and Royer 2012a, p. 6). One additional site was surveyed, which had the potential for Poweshiek skipperling presence because of its proximity to a known site for the species; however, no Poweshiek skipperling were found (Royer and Royer 2012b, pp. 18–19; Royer and Royer 2012a, p. 6; Royer 2012b, pers. comm.).

The Poweshiek skipperling was known from seven North Dakota sites across six counties in the 1990s; however, only two of those sites were considered to have extant populations at that time; three records were represented by incomplete or ambiguous locality data and the species was assumed to be extirpated at one site (Royer and Marrone 1992b, pp. 8–11). Surveys conducted in the State after 1992 documented additional populations, but the most recent surveys at these sites were mostly negative. Orwig discovered eight new populations of Poweshiek skipperling (six in Richland County and two in Sargent County) during three years of survey work (1995–1997) in southeast North Dakota (Orwig 1995, pp. 3–4; Orwig 1996, pp. 4–6, 9–12; Orwig 1997, p. 2). The species was found at two of the eight sites surveyed in 1997 (Orwig 1997, p. 2) and at two additional sites in 1996 (Spomer 2004, p. 11).

Once abundant at several known sites in North Dakota, Poweshiek skipperlings have experienced a dramatic decline over the last few decades. In 1977, McCabe and Post (1977a, p. 38), for example, found Poweshiek skipperling to be abundant at McLeod Prairie in Ransom County, stating that they could ''be collected two at a time on the blossoms of Long-headed coneflower…'' In six years of subsequent monitoring (1986–1991), however, Royer failed to find a single Poweshiek skipperling at the site after it was converted to a cattle-loading area (Royer and Marrone 1992b, p. 10). Royer and Marrone (1992b, pp. 10–11) assumed the species had been extirpated at this site. Similarly, the number of Poweshiek skipperlings recorded during surveys at the West Prairie Church site along the boundary of Cass and Richland counties, fell from hundreds in 1986, to four in 1990 and zero in 1991 and 2012 (Royer and Marrone 1992b, p. 8; Royer and Royer 2012b, p. 21). Poweshiek skipperlings are unlikely to persist at this small and isolated site (Royer and Royer 2012b, p. 21; Royer 2012c, pers. comm.).

The last observation of a live Poweshiek skipperling in North Dakota was in 2001, at a new site discovered by Spomer (2001, p. 9) in Ransom County. Poweshiek skipperlings were not found in subsequent surveys at this site in 2002, 2003, and 2012 (Spomer 2001, p. 2; Spomer 2002, p. 3; Spomer 2004 p. 36; Selby 2010, p. 18; Royer and Royer 2012b, p. 22), although the 2012 survey may have been conducted too late in the year to detect the species at that site (Royer 2012b, pers. comm; Royer 2012d, pers. comm.). Therefore, the status of the species at this site is unknown.

To summarize, Poweshiek skipperling was historically documented in 17 sites in North Dakota (Table 2). The species is not considered to be present at any of these sites (Table 2). The occupancy is unknown at 10 sites, and the species is considered to be extirpated or possibly extirpated at 1 and 6 sites, respectively (Table 2).

South Dakota

South Dakota historically contained approximately 24 percent (N=70) of all known records of Poweshiek skipperlings rangewide (Table 2). The Poweshiek skipperling has been historically documented at approximately 70 sites (Table 2) across 10 counties in South Dakota (Selby 2010, p. 19). Based on expert review and additional survey and habitat information, the status of the species was determined to be unknown at 48 sites and presumed extirpated at the remaining 22 sites (Table 2); at least 8 of the extirpated sites have been destroyed by conversion, gravel mining, loss of native vegetation, flooding, or heavy grazing (Skadsen 2012c, pers. comm.).

The Poweshiek skipperling was not detected at any site that was surveyed between 2009 and 2012: 6 sites in 2009, 10 sites in 2010, 1 sites in 2011, and 10 sites in 2012 (Skadsen 2009, p. 12; Skadsen 2011, p. 5; Skadsen 2010, pers. comm.; Skadsen 2012a, pers. comm.; Skadsen 2012, p. 3). The 2009 to 2012 results are in marked contrast to surveys conducted in 2002 when the species was recorded at 23 of 24 sites surveyed (Skadsen 2003, pp. 11–45). Cool and wet weather may have depressed butterfly populations, in general, in eastern South Dakota and west-central Minnesota in 2009 as it apparently did in 2004 (Skadsen 2004, p. 2; Skadsen 2009, p. 2).

Wisconsin

Wisconsin historically contained approximately 1 percent (N=4) of all known records of Poweshiek skipperlings rangewide (Table 2). Naturalists reported Poweshiek skipperling to be common to abundant on prairies in southeastern Wisconsin in the late 1800s (*e.g.,* in Milwaukee and Racine Counties), although exact localities are unknown (Borkin 2011, in litt.; Selby 2010, p. 22). By 1989, however, the species was listed as State endangered (Borkin 2011, in litt.). The Poweshiek skipperling is considered to be present at three sites in Wisconsin (Table 2); two sites are within the Southern Unit of the Kettle Moraine State Forest in Waukesha County. The third site, Puchyan Prairie State Natural Area (SNA), is approximately 100 km (62 mi) to the northwest of the Kettle Moraine State Forest in Green Lake County. The status of the species is unknown at another site within the

Kettle Moraine State Forest. An additional 2010 record of a butterfly was incorrectly identified as a Poweshiek skipperling at Melendy's Prairie Unit of the Scuppernong Prairie SNA (Borkin 2012b, pers. comm.).

The two occurrences of Poweshiek skipperling in the Kettle Moraine State Forest inhabit small areas that were once part of a larger prairie complex, which was fragmented by conversion to agriculture, other human development, and encroachment of woody vegetation (Borkin 2011, in litt.). The larger of the two populations at Kettle Moraine State Forest inhabits a 6-ha (15-ac) prairie remnant on Scuppernong Prairie SNA, which had record counts exceeding 100 individuals in 1994, 1995, 1998, and 1999 (Borkin 1995a, p. 10; Borkin 1996, p. 7; Borkin 2000b, p. 4; Borkin 2011, in litt.). Four were found in 2007 (Borkin 2008, in litt., p. 1), although these data were collected during a single transect survey that may have been early in the flight season and are, therefore, not comparable to other survey years (Borkin 2012a, pers. comm.). A maximum count of 42, 17, 63, and 45 were counted in 2009, 2010, 2011, and 2012, respectively (Borkin 2011a, pers. comm.; Borkin 2012c, pers. comm.). There was some concern that a controlled burn in late March of 2012 may correlate with lower numbers observed during the 2012 flight (Borkin 2012a, pers. comm.); however, this difference is within the range of variation observed over the previous four years (Wisconsin DNR 2012, in litt.).

After brush was cleared from the area in 2002, a small number of Poweshiek skipperlings were discovered the following year in a small isolated prairie remnant patch at a second site in the Kettle Moraine State Forest, (Borkin in litt. 2008). Once the intervening woody growth was removed, individuals presumably dispersed from the Scuppernong SNA remnant prairie to a small habitat patch about 200 ft (61 m) away (Borkin 2012a, pers. comm.). Surveys at each habitat patch have consistently yielded counts of less than 10 (Borkin 2008, in litt.), with a combined high count of 11 to 15 individuals in 2011. A total of six individuals, with a high single day count of three, were observed in eight surveys during 2012 (Borkin 2012c, pers. comm.; Borkin 2012a, pers. comm.).

The status of the Poweshiek skipperling is unknown at a third and much larger fragment of Kettle Moraine State Forest, the Kettle Moraine Low Prairie SNA, which is adjacent to the Wilton Road site. The Kettle Moraine Low Prairie SNA was overgrown by shrubs including willows (*Salix spp.*), quaking aspen (*Populus tremuloides*), and glossy buckthorn *(Frangula alnus*) and has been managed with a series of controlled burns, in addition to a 1975 wild fire (Borkin 2011, in litt; Borkin 2012a, pers. comm.; Wisconsin DNR 2012, in litt). The highest number recorded at the Kettle Moraine Low Prairie SNA was 28 on July 8, 1995 (Borkin 2012a, pers. comm.). Preliminary attempts in 2000 to 2003 to augment the population with adults from Scuppernong SNA and captive-reared larvae were not successful (Borkin 2012a, pers. comm.). A single Poweshiek skipperling was sighted there on July 2, 2004, but none were found in surveys conducted in 2007–2009 and 2011–2012 (Borkin 2011b, pers. comm.; Borkin 2012a and 2012c, pers. comm.). Two Poweshiek skipperlings were recorded in 2010 at this site (Wisconsin DNR2012, in litt.); however, there were no photographs or voucher specimens to confirm the sighting. This site was surveyed less intensively than Scuppernong Prairie, because of the species' relatively low density and abundance at Kettle Moraine Low Prairie SNA (Borkin 2012a, pers. comm.). Extensive brush cutting, additional burns, and restoration of the hydrology have been undertaken in recent years (Borkin 2012a, pers. comm.).

Poweshiek skipperlings are present at a third site in Wisconsin, Puchyan Prairie SNA, in Green Lake County, although this population is small and declining (Borkin 2009, pers. comm.). The Poweshiek skipperling was first discovered at Puchyan Prairie in 1995, and 6 to 30 individuals have been recorded in subsequent surveys (Borkin 2008, in litt.; Swengel 2012, pers. comm). In 2012, Swengel (2012, pers. comm.) found a maximum of three individuals, despite several hours of searching over three days.

Additional sites in eight counties (Crawford, Grant, Iowa, Jefferson, Monroe, Rock, Sauk, and Walworth) have been surveyed in an attempt to find undiscovered Poweshiek skipperling populations. Four of the eight sites surveyed in 1998 and 1999 seemed to have adequate host plants, nectar resources, and size typical of Poweshiek skipperling habitat, but Poweshiek skipperling were not present at any of the sites (Borkin 2000b, pp. 5–7).

To summarize, Poweshiek skipperling was historically documented in 4 sites in Wisconsin (Table 2). The species is considered to be present at three sites and the occupancy is unknown one site (Table 2).

Manitoba

Manitoba historically contained less than 1 percent (N=1) of all known records of Poweshiek skipperlings rangewide (Table 2); however, multiple Poweshiek skipperling historical records occur in one general location—a complex of several nearby small sites within the Tallgrass Prairie Preserve—in far southern Manitoba, near the United States border. Poweshiek skipperlings were first recorded in Canada near Vita, Manitoba, in 1985 at each of seven prairies surveyed, and populations were described as abundant but localized (Catling and Lafontaine 1986, p. 63). Poweshiek skipperlings were found at 15 of 18 locations surveyed within the same area in 2002 (COSEWIC 2003, p. 5).

The Poweshiek skipperling is currently present at one location in Canada, The Nature Conservancy's Tall Grass Prairie Preserve near Vita, Manitoba (Westwood 2010, p. 2; Westwood *et al.* 2012, p. 1; Hamel *et al.* 2013, p. 1). Poweshiek skipperlings were historically moderately common in areas of the preserve (Klassen *et al.* 1989, p. 27). In 2002, Webster (2003, p. 5) counted approximately 150 individuals, and in 2006, approximately 126 individuals were sighted across 10 sites (Westwood 2010, p. 3). Surveys of 10 sites in 2008 and 2009 yielded 281 and 79 Poweshiek skipperlings, respectively (Dupont 2010, pers. comm.). Poweshiek skipperling numbers in the preserve declined sharply after a 647-ha (1,600-ac) wildfire in fall 2009 burned much of the species' habitat, including areas that likely contained the largest and highest density populations (Westwood 2010, p. 2); surveys of comparable effort to the 2008 and 2009 surveys yielded only 13 Poweshiek skipperlings on the preserve in 2010 (Westwood 2010, pp. 7–22). Surveys of 45 sites within the Tall Grass Prairie Reserve during 2011 resulted in 13 sites with positive sightings, 9 of which were new sites (Westwood *et al.* 2012, p. 11; Dupont 2011, pers. comm.). The average number of Poweshiek skipperlings found at each site ranged from 10 to 15 per hour. These numbers are up considerably from 2010, but not as high as observed in 2008 (Dupont 2011, pers. comm.). In 2012, a total of 50 individuals were observed, which was ''low when compared to historic densities'' (Hamel *et al.* 2013, p. 17). The preserve has detailed management recommendations to facilitate recovery of the Poweshiek skipperling (Westwood 2010, p. 5).

Following an assessment and status report completed in 2003 under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the Poweshiek skipperling was listed under the Species at Risk Act as Threatened in Canada in July 2005 (COSEWIC 2003). A recovery strategy is now in place for the species in Canada (Environment Canada 2012), which includes critical habitat designations within and adjacent to the Tall Grass Prairie Preserve (Environment Canada 2012, p. ii).

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR Part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors is discussed below.

We evaluated the level of impact to the population at each site of stressors at 170 Dakota skipper sites where the occupancy status of the site is considered to be present or unknown, as defined in the Background section of this rule. These 170 sites are found across the current range of the species in Minnesota, North Dakota, and South Dakota. Two Dakota skipper sites with an unknown or present occupancy were not evaluated. To determine the levels of impact to the population at each site, we used the best available and most recent information for each site, including reports, discussions with site managers, information from natural heritage databases, etc. (Service 2012, unpubl. data; Service 2013, unpubl. geodatabase). We only evaluated a stressor to the population at any one site if we had sufficient information to determine if the level of impact was high, medium, or low as defined for each stressor below; therefore, the number of sites evaluated varies with each stressor.

We evaluated the level of impact to the species from stressors at 68 Poweshiek skipperling sites where the occupancy status of the site is considered to be present or unknown, as defined in the Background section of this proposed rule. Although we did not evaluate every stressor at all 145 Poweshiek skipperling sites with present or unknown occupancy, the 68 sites that were evaluated are representative of all those sites in terms of geography (sites in Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin were evaluated), ownership, and management. To determine the levels of impact to the population at each site, we used the best available and most recent information, including reports, discussions with site managers, and information from natural heritage databases (Service 2012, unpubl. data; Service 2013, unpubl. geodatabase). We only evaluated a particular stressor at any one site if we had sufficient information to determine if the level of impact was high, medium, or low (as defined below); therefore, the number of sites evaluated varies with each stressor.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Habitat quality is a powerful determinant of extinction probability in butterflies such as the Dakota skipper and Poweshiek skipperling (Thomas *et al.* 2001, p. 1795). Among butterfly species in the United Kingdom, for example, equilibrium density of butterflies at sites with optimum habitat are from 25 to more than 200 times greater than those for occupied sites with suboptimal, yet suitable, habitat (Thomas 1984, cited in Thomas *et al.* 2001, p. 1794). Consistently good habitat quality is especially important for Dakota skipper and Poweshiek skipperling isolated populations, which would not be naturally recolonized if they were extirpated. Protection or restoration of habitat quality at these isolated sites is critical to the survival of both species, although stochastic events still pose some risk, especially for smaller populations and at small sites.

The Poweshiek skipperling and Dakota skipper depend on a diversity of native plants endemic to tallgrass prairies and, for the Poweshiek skipperling in Michigan, prairie fens. When nonnative or woody plant species become dominant, Poweshiek skipperlings and Dakota skippers decline due to insufficient sources of larval food and nectar for adults. For example, at Wike Waterfowl Production Area in Roberts County, South Dakota, the extirpation of Poweshiek skipperling is attributed to the deterioration of native vegetation, in particular, the loss of nectar sources for adult butterflies due to invasive species encroachment (Skadsen 2009, p. 9).

Destruction of native tallgrass and mixed-grass prairie began in 1830 (Samson and Knopf 1994, pp. 418–419). Extant populations of Dakota skipper and Poweshiek skipperling are restricted to native prairie remnants and prairie fens; native prairies have been reduced by 85 to 99.9 percent of their former area throughout the historical range of both species (Samson and Knopf 1994, pp. 418–419). Degradation and destruction of habitat occurs in many ways, including but not limited to: conversion of native prairie to cropland or development; ecological succession to woody vegetation; encroachment of invasive species; past and present fire, haying, or grazing management that degraded or destroyed the species' habitats; flooding; and, groundwater depletion, alteration, and contamination, which are discussed in further detail below.

We evaluated the level of impact to the population at each site of several habitat-related stressors at 170 Dakota skipper sites where the occupancy status of the site is considered to be present or unknown, as defined in the Background section of this proposed rule (Table 3). These 170 sites are found across the current range of the species in Minnesota, North Dakota, and South Dakota. Two sites with an unknown or present occupancy were not evaluated. To determine the levels of impact to the population at each site, we used the best available and most recent information for each site, including reports, discussions with site managers, information from natural heritage databases, etc. (Service 2012, unpubl. data; Service 2013, unpubl. geodatabase). We only evaluated a stressor to the population at any one site if we had sufficient information to determine if the level of impact was high, medium, or low as defined for each stressor below. Similarly, the level of impact to the population was evaluated at 68 Poweshiek skipperling sites with present or unknown status (Table 4). Although we did not evaluate Factor A stressors at all 145 Poweshiek skipperling sites with present or unknown occupancy, the 68 sites that were evaluated are representative of all the present or unknown Poweshiek skipperling sites in terms of geography (range of the species, *i.e.,* sites in Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin were evaluated), ownership, and management. Many sites for both species (59 sites for Dakota skipper and 32 sites for Poweshiek skipperling) experience at least two habitat-related

stressors at a medium or high level of impact (Tables 3 and 4).

TABLE 3—NUMBER OF DAKOTA SKIPPER SITES WITH EACH LEVEL OF IMPACT AND THE TOTAL NUMBER OF SITES THAT WERE RATED FOR EACH TYPE OF STRESSOR—A TOTAL OF 170 DAKOTA SKIPPER SITES WITH EITHER PRESENT OR UNKNOWN STATUS WERE EXAMINED; ONLY SITES WITH SUFFICIENT DATA FOR A PARTICULAR STRESSOR WERE RATED AS HIGH, MEDIUM, OR LOW (SERVICE 2012 UNPUBL. DATA; SERVICE 2013, UNPUBL. DATA)

Stressor	High level of impact	Medium level of impact	Low level of impact	Total number of rated sites
Destruction & Conversion (Agricultural & Nonagricultural Development)	3	87	60	150
Wind Development	1	0	8	9
Flooding	0	6	6	12
Invasive Species	13	31	18	62
Fire	9	4	6	19
Grazing	10	29	14	53
Haying & Mowing	2	11	27	40
Lack of Management	10	5	3	18
Size/Isolation	50	35	58	143
Herbicide and/or Pesticide Use	5	2	9	16

TABLE 4—NUMBER OF POWESHIEK SKIPPERLING SITES WITH EACH LEVEL OF IMPACT AND THE TOTAL NUMBER OF SITES THAT WERE RATED FOR EACH TYPE OF STRESSOR—A TOTAL OF 68 POWESHIEK SKIPPERLING SITES WITH EITHER PRESENT OR UNKNOWN STATUS WERE EXAMINED; ONLY SITES WITH SUFFICIENT DATA FOR A PARTICULAR STRESSOR WERE RATED AS HIGH, MEDIUM, OR LOW (SERVICE 2012 UNPUBL. DATA; SERVICE 2013, UNPUBL. DATA)

Stressor	High level of impact	Medium level of impact	Low level of impact	Total number of rated sites
Destruction & Conversion (Agricultural & Nonagricultural Development)	1	13	40	54
Wind Development	0	0	6	6
Flooding/Hydrology	2	4	14	20
Invasive Species	9	30	12	51
Fire	7	3	14	24
Grazing	7	14	2	23
Haying & Mowing	0	3	7	10
Lack of Management	5	6	2	13
Size/Isolation	25	24	19	68
Herbicide and/or Pesticide Use	3	1	6	10

Destruction and Conversion of Prairies

Destruction and Conversion of Prairies to Agricultural Land

Conversion of prairie for agriculture may have been the most influential factor in the decline of the Poweshiek skipperling and Dakota skipper since Euro-American settlement, but the threat of such conversion to extant populations is not well known and may now be secondary to other threats. By 1994, tallgrass prairie had declined by 99.9 percent in Illinois, Iowa, Indiana, North Dakota, Wisconsin, and Manitoba; and by 99.6 percent in Minnesota; and 85 percent in South Dakota (Samson and Knof 1994, p. 419). Samson and Knof (1994, p. 419) did not provide a figure for the decline of tallgrass prairie in Saskatchewan, but mention an 81.3 percent decline in mixed grasses from historical levels. By 1994, mixed-grass prairie had declined from historical levels by 99.9 percent in Manitoba and 71.9 percent in North Dakota (Samson and Knof 1994, p. 419). Destruction of tallgrass and mixed-grass prairie began in 1830, but significant documentation of the ecosystem's butterfly fauna did not begin until about 1960. Therefore, most of the decline of the Dakota skipper and Poweshiek skipperling probably went unrecorded.

Since about 1980, observers have documented the extinction of several populations of the Dakota skipper and Poweshiek skipperling due to habitat conversion to agricultural use in the United States and Canada. For example, four Dakota skipper sites in North Dakota were converted to irrigated potato fields, and one in South Dakota was converted for crop production (Royer and Marrone 1992a, p. 17). The Fannystelle site in Manitoba, where the Dakota skipper was last recorded in 1991, was subsequently converted for row-crop agriculture (Webster 2003, p. 7). In North Dakota, further conversion is a threat to Dakota skippers in the important Towner-Karlsruhe complex (Royer and Royer 1998, p. 22; Lenz 1999b, p. 13), where the flat topography and high water table facilitate conversion to irrigated crop production. Populations of Dakota skipper in Manitoba typically occupy flat terrain that may be vulnerable to conversion to cropland, although soil conditions may be unsuitable for row crops at some of these sites (Webster 2003, p. 10). Similarly, conversion of native prairie to cropland continues to be a threat to Poweshiek skipperling habitat throughout its range (Royer and Marrone 1992b, p. 17).

The Dakota skipper, and until recently, the Poweshiek skipperling, have largely persisted in areas that are relatively unsuitable for row crop agriculture because of their steep terrain (*e.g.,* in the Prairie Coteau of South Dakota) or where soils are too wet or rocky for row-crop agriculture (McCabe 1981, pp. 189–190, Webster 2003, p. 10). Densely spaced, large glacial rocks, for example, may have deterred cultivation

at the Chippewa Prairie in Minnesota and ''spared Chippewa Prairie in Minnesota from the plow'' (Dana 2012, pers. comm.). In areas where Poweshiek skipperling and Dakota skipper habitat persists but is adjacent to agriculture, added nutrients from agricultural runoff affects groundwater and additional nutrients in the system contribute to the dominance of invasive plants (Fiedler and Landis 2012, p. 51: Michigan Natural Features Inventory 2012, p. 4).

In summary, conversion for agriculture on lands suitable for such purposes is a current, ongoing stressor of high level of impact to the Poweshiek skipperling and Dakota skipper populations in areas where such lands still remain. Advances in technology may also increase the potential of conversions in areas that are currently unsuitable for agriculture.

We rated the level of impact to the populations of the stressor posed by habitat destruction or conversion for both agriculture and nonagricultural purposes (except for conversion for wind energy development, which was analyzed separately) at 150 Dakota skipper and 54 Poweshiek skipperling sites with present or unknown status (see Tables 3 and 4) where we had sufficient information to evaluate the stressor. In our evaluation of this stressor, we combined agricultural and nonagricultural impacts—our analyses are discussed below (see *Destruction and Conversion of Prairies due to Nonagricultural Development*).

Destruction and Conversion of Prairies to Nonagricultural Development

Conversion of prairie for nonagricultural land uses, such as energy development, gravel mining, transportation, and housing are stressors to both Poweshiek skipperling and Dakota skipper populations. For example, a site where the Dakota skipper and Poweshiek skipperling were recorded in 1997 (Skadsen 1997, pp. 15–16, B–1) in the Bitter Lake area of Day County, South Dakota, is now a gravel pit, and the species' habitat no longer exists there (Skadsen 2003, pp. 47–48).

Almost all prairie remnants with Poweshiek skipperling and Dakota skipper populations are associated with gravelly glacial till soils (Service 2013, unpubl. geodatabase); therefore, gravel mining is a potential stressor to populations at a large number of sites. Gravel mining is a stressor to Poweshiek skipperling and Dakota skipper populations at several sites in Minnesota (Dana 1997, p. 15). For example, gravel mining is a threat in at least three of the five sites that comprise the Felton Prairie complex (Cochrane and Delphey 2002, pp. 16–17); however, the Clay County Stewardship Plan (Felton Prairie Stewardship Committee 2002) may have reduced the likelihood of the gravel mining stressor to populations at this complex. On at least seven sites in Minnesota, Dakota skippers inhabit northern dry prairie plant communities, which are generally impacted by gravel mining due to the predominance of gravel soils (Minnesota DNR 2006, p. 221). Gravel mines are considered a stressor with a high level of impact to populations of both species because, where it occurs, the habitat is completely destroyed.

Energy development (oil, gas, and wind) and associated roads and facilities result in the loss or fragmentation of suitable prairie habitat (Reuber 2011, pers. comm.). Much of the Dakota skipper's range and some of the Poweshiek skipperling's range overlaps with major areas of oil and gas development, which have been increasing rapidly in parts of both species' ranges. North Dakota, for example, is now one of the top two oil-producing states in the United States, and new development is occurring rapidly (MacPherson 2012, p. 1; North Dakota Petroleum Council 2012, p. 1). The number of drilling permits in North Dakota nearly doubled between 2007 and 2008, from 494 permits issued in 2007 to 946 in 2008 (North Dakota Petroleum Council 2009, p. 2). Permits dropped to 627 in 2009 (North Dakota Petroleum Council 2010, p. 2), but increased dramatically to 1,676 in 2010 (Ogden 2011, p. 1). While much of the oil activity is currently occurring in areas of native prairie overlaying the Bakken and Three Forks formations to the west of known locations for both species, mineral exploration has occurred in all but one county in North Dakota (North Dakota Petroleum Council 2012, p. 1). McKenzie County falls in the center of this development and McHenry County is also within these formations (Mueller 2013, pers. comm.). The oil development on the Bakken formation in North Dakota, for example, is a future stressor to Dakota skipper populations in McKenzie County (Royer and Royer 2012b, p. 16). Oil company officials anticipate that production will continue to expand at record levels (MacPherson 2012, p. 1; MacPherson 2010, entire).

Native prairie habitat would be destroyed in the footprint of an oil and gas well pad, but the pads are relatively small. However, each oil and gas well pad requires new road construction, and evidence suggests that Poweshiek skipperlings may avoid crossing roads (Westwood *et al.* 2012, p. 18). Oil and gas development can double the density of roads on range lands (Naugle *et al.* 2009, pp. 11, 46), increase pipelines, and increase the number of gravel pits to accommodate the increased road construction (Mueller 2013, pers. comm.). In areas with ranching, tillage agriculture, and oil and gas development, 70 percent of the developed land was within 100 m (109 yards (yd)), and 85 percent of the developed land was within 200 m (218 yd), of a human structure (Naugle *et al.* 2009, p. 11). Researchers estimated that in those areas, every square km (0.39 square miles) of land may be both bounded by a road and bisected by a power line (Naugle *et al.* 2009, p. 11). The habitat fragmentation associated with oil and gas development may amplify other threats to both species, such as the effects of population isolation and the impacts of stochastic events.

Energy development has additional undesirable and potentially significant cumulative impacts on wildlife. Catastrophic events, such as oil and brine spills, could cause direct mortality of Dakota skipper or Poweshiek skipperling larvae that are in shelters at or below the soil surface. Such spills may also cause the loss of larval host and nectar plants in the spill path. Additional plants may be lost during spill response, particularly if the response involves burning. No such spills are known to have occurred in the region, however, and the likelihood of spills occurring on the small fraction of land that remains native tallgrass prairie in North Dakota (less than one percent according to Samsom and Knoff 1994, p. 419) is low.

Wind energy turbines and associated infrastructure (*e.g.,* maintenance roads) are likely stressors to Dakota skipper and Poweshiek skipperling populations, particularly on private land in South Dakota (Skadsen 2002, p. 39; Skadsen 2003, p. 47; Skadsen 2012d, pers. comm.). Similar to oil and gas development, wind development would destroy native prairie habitat in the footprint of the structure, add access roads and other infrastructure that may further fragment prairies, and could be catalysts for the spread of invasive species. Further, it is unknown if the noise and flicker effects associated with wind turbines may impact Dakota skipper or Poweshiek skipperling populations beyond direct impacts from the turbines and/or infrastructure. Other wildlife species, such as birds, have shown significant avoidance of grasslands where wind development has occurred (Pruett *et al.* 2009, p. 1256;

Shaffer *et al.* 2012, p.). Wind development was assessed at nine Dakota skipper sites and six Poweshiek skipperling sites where we had sufficient information. The level of threat was considered to be low at most sites because although the site may be in an area with the potential for wind development, there are no specific plans or proposals to develop wind power on the site. Wind development is considered a stressor of high level of impact to populations at sites where development is proposed and there are no actions or plans to mitigate impacts to the species. For example, a wind facility was recently proposed at a Dakota skipper site in South Dakota (Skadsen 2012d, pers. comm.), which poses a high-level threat for the species at that site because there are no plans to mitigate impacts of habitat destruction. Although wind power development currently poses a high level of impact to the population at only one site, the extent of this threat will likely increase in the future, due to the high demand for wind energy and the number of Dakota skipper and Poweshiek skipperling sites that are conducive to wind development (*e.g.,* Skadsen 2003, pp. 47–48). Furthermore, power distribution lines may be developed in order to accommodate the added power of wind farms, for instance, a new power line is currently being planned in the Prairie Coteau in South Dakota for that purpose (Mueller 2013, pers. comm.).

Housing construction has likely contributed to the loss of at least two Poweshiek skipperling populations in Michigan, and the largest extant population in Michigan is located in an area under intense development pressure (Michigan Natural Features Inventory 2011, unpubl. data). Residential wells and drainage disrupt prairie fen hydrology by reducing water levels and thus, facilitating rapid growth of woody vegetation. In addition, nutrients added to the groundwater from leaking septic tanks contribute to the dominance of invasive plants, such as narrow-leaved cattail (*Typha angustifolia*) and red canary grass (*Phalaris arundinacea*) (Michigan Natural Features Inventory 2012, p. 4).

Road construction impacts Poweshiek skipperling and Dakota skipper habitat because it increases the demand for gravel, and as a result of routine maintenance (*e.g.,* broadcast herbicide applications, early mowing, and cleaning out ditches), improvements (*e.g.,* widening roads or converting two-lane highways to four-lane highways), or new construction. Poweshiek skipperling habitat was destroyed or degraded on at least two private properties in Roberts County, South Dakota, for example, in association with the widening of U.S. Highway 12 (Skadsen 2003, p. 47). Roadside prairie remnants can help support populations of both species and serve as dispersal corridors between larger remnants; therefore, loss of these areas to road expansion or construction further reduces and fragments remaining habitat.

In summary, nonagricultural development, such as gravel mining, activities associated with energy development, or housing and road development, poses a current stressor of moderate to high impact to populations on those lands that are not protected from destruction or conversion through a conservation easement or fee title ownership by a conservation agency. This type of development may become more widespread as such practices increase in the future.

As discussed above in *Destruction and Conversion of Prairies to Agricultural Land,* we rated the level of impact to the populations of the stressor posed by habitat destruction or conversion for both agriculture and nonagricultural purposes combined (except for conversion for wind energy development, which was analyzed separately) at 150 Dakota skipper sites with present or unknown status (see Table 3) where we had sufficient information to evaluate the stressor. The level of impact of each stressor to the population at each site is high at three of those sites, due to ongoing destruction of the native prairie or there was a high likelihood of conversion because it is located close to other converted areas and the land is conducive for agriculture. The level of threat is high at 3 sites, moderate at 87 sites, and 60 sites are protected from destruction or conversion through a conservation easement or fee title ownership by a conservation agency (Table 3). This stressor occurs across the range of the Dakota skipper; the stressor has a medium to high level of impact to Dakota skipper populations in Minnesota, North Dakota, South Dakota, Manitoba, and Saskatchewan. The level of impact was considered to be low if the site is protected from destruction or conversion by fee title ownership by a governmental conservation agency, nongovernmental conservation organization (*e.g.,* The Nature Conservancy), or educational institution (*e.g.,* South Dakota State University). Similarly, 54 Poweshiek skipperling sites with present or unknown status were assessed that had sufficient information: The level of threat was high at one site and moderate at 13 sites, and 40 sites are protected from destruction or conversion through a conservation easement or fee title ownership by a conservation agency (Table 4). At least 5 of the 14 sites where the Poweshiek skipperling is considered to still be present have a medium risk of conversion. This stressor occurs across most of the Poweshiek skipperling range; the stressor has a medium to high level of impact to Poweshiek skipperling populations in Iowa, Michigan, Minnesota, and South Dakota; the level of impact is low for the species at the Manitoba location.

Fluctuating Water Levels

Flooding is a threat to Poweshiek skipperlings and Dakota skippers at sites where too much of the species' habitat is flooded or where patches are flooded too frequently. Poweshiek skipperlings and Dakota skippers must either survive flooding events in numbers sufficient to rebuild populations after the flood or recolonize the area from nearby areas that had not flooded. In addition, the return interval of floods must be infrequent enough to allow for recovery of the populations between floods. Changes in hydrology resulting from wetland draining and development may permanently alter the plant community and, therefore, pose a threat to Poweshiek skipperling and Dakota skipper due to loss of larval food and nectar sources.

The Dakota skipper and Poweshiek skipperling are presumed extirpated from several sites due to flooding or draining. For example, one Dakota skipper site was lost to flooding due to rising water levels at Bitter Lake, South Dakota (Skadsen 1997, p. 15). At Whalen Lake Fen in Michigan, dredging and channelization disrupted the hydrology of the site and the fen has since been invaded by glossy buckthorn and narrow leaf cattail; Poweshiek skipperlings are presumed to be extirpated from the site (Michigan Natural Features Inventory 2011, unpubl. data).

Fluctuating water levels are a current stressor to populations across both species' ranges. Loss of habitat or direct mortality due to fluctuating water levels, such as permanent flooding or wetland draining is a current stressor to populations in at least 12 Dakota skipper sites with present or unknown status and 20 Poweshiek skipperling sites with present or unknown status. For example, one of the three sites with present or unknown status of Poweshiek skipperling in Wisconsin, Puchyan Prairie, is subject to flooding—the entire prairie portion of the site was

submerged in 1993 (Hoffman 2011, pers. comm.; Wisconsin DNR 2012, in litt). The number of Poweshiek skipperling observed at that site is consistently low. Flooding is a likely factor that has contributed to the low numbers observed in at least part of this site (Borkin 2012c, pers. comm.).

Conversely, groundwater disruption and draining is a stressor at all 10 of the Michigan prairie fen Poweshiek skipperling sites where the species is present and one with unknown occupancy (Service 2013, unpubl. data). Interrupted groundwater flow-through fens can reduce water levels and facilitate woody vegetation establishment and growth (Michigan Natural Features Inventory 2012, p. 4). Agricultural and residential drains and wells can lower the groundwater table, thereby reducing the supply of calcareous seepage, which is an essential underlying component of prairie fen hydrology (Michigan Natural Features Inventory 2012, p. 4). Furthermore, nutrient additions associated with drain fields can contribute to invasive species encroachment. For instance, if groundwater flow to prairie wetlands is severed, fen habitats may convert from native grasses and flowering forbs to habitats dominated by invasive species or woody vegetation (Fiedler and Landis 2012, p. 51, Michigan Natural Features Inventory 2012, p. 4). The site with the highest number of Poweshiek skipperlings in Michigan, for instance, is partially bordered by residential areas and is under intense development pressure (Michigan Natural Features Inventory 2011, unpubl. data). At least 8 of the 11 fen sites with present or unknown status are at least partially unprotected from development, and at least 7 of those are closely bordered by roads, agriculture, or residential developments (Michigan Natural Features Inventory 2011, unpubl. data; Service 2013, unpubl. geodatabase). The status of Poweshiek skipperling is unknown at one fen site where the hydrology was likely disrupted by roads and extensive residential development in close proximity to the fen (Michigan Natural Features Inventory 2011, unpubl. data).

The level of impact to populations due to flooding was assessed at 12 Dakota skipper sites with present or unknown status that had sufficient information to evaluate the stressor (Table 3); this evaluation only included sites in North and South Dakota. Flooding is a stressor of moderate-level impact to populations at 6 of the sites, where there is evidence of recent or pending decrease in the quality or extent of suitable habitat at the site due to a change in wetland vegetation, wetland hydrology, or flooding—all of these sites occur in North Dakota (Service 2012 unpubl. data; Service 2013, unpubl. data). Similarly, we assessed 20 Poweshiek skipperling sites with present or unknown occupancy for the level of impact to populations due to water fluctuations (*e.g.,* flooding or draining) where we had sufficient information to evaluate the stressor (Table 4). Flooding is a stressor with moderate impact to the populations at 3 Poweshiek skipperling sites (including a site in Wisconsin—one of the 14 Poweshiek skipperling sites with a present status), and changes to hydrology is a stressor of moderate- to high-level impact to populations at all 11 Michigan sites (including 10 of 14 Poweshiek skipperling sites that have a present status) and 1 site in North Dakota (Service 2012 unpubl. data; Service 2013, unpubl. data).

In summary, fluctuating water levels is a current and ongoing stressor of moderate level of impact to populations where the habitat may be temporarily lost due to intermittent flooding and is a threat of high severity where a change in hydrology may completely degrade the habitat quality of a site, particularly prairie fens.

Invasive Species and Secondary Succession

Poweshiek skipperlings and Dakota skippers typically occur at sites embedded in agricultural or developed landscapes, which make them more susceptible to nonnative or woody plant invasion. Nonnative species including leafy spurge, Kentucky bluegrass, alfalfa, glossy buckthorn, smooth brome, purple loosestrife (*Lythrum salicaria*), Canada thistle (*Cirsium arvense*), reed canary grass, and others have invaded Poweshiek skipperling and Dakota skipper habitat throughout their ranges (Orwig 1997, pp. 4, 8; Michigan Natural Features Inventory 2011, unpubl. data; Skadsen 2002, p. 52; Royer and Royer 2012b, pp. 15–16, 22–23). Leafy spurge and Kentucky bluegrass have been cited as one of the major threats to native prairie habitat at several public and privately owned Dakota skipper sites in North Dakota (Royer and Royer 2012b, pp. 15–16, 22–23; Royer 2012, pers. comm.). Once these plants invade a site, they replace or reduce the coverage of native forbs and grasses used by adults and larvae of both butterflies. Leafy spurge displaces native plant species, and its invasion is facilitated by actions that remove native plant cover and expose mineral soil (Belcher and Wilson 1989, p. 172). The seasonal senescence patterns (timing of growth) of grass species as they relate to the larval period of Dakota skippers determine which grass species are suitable larval host plants. Exotic cool season grasses, such as Kentucky bluegrass and smooth brome, are not growing when Dakota skipper and Poweshiek skipperling larvae are feeding, thus a prevalence of these grasses reduces food availability for the larvae.

The stressor from nonnative invasive herbaceous species is compounded by the encroachment of woody species into native prairie habitat. Glossy buckthorn and gray dogwood encroachment, for example, is a major stressor to Poweshiek skipperling populations at the Brandt Road Fen in Michigan, which supports the second largest population of Poweshiek skipperlings in the State (Michigan Natural Features Inventory 2011, unpubl. data). Invasion of tallgrass prairie and prairie fens by woody vegetation such as glossy buckthorn reduces light availability, total plant cover, and the coverage of grasses and sedges (Fiedler and Landis 2012, pp. 44, 50–51). This in turn reduces the availability of both nectar and larval host plants for Poweshiek skipperlings and Dakota skippers. If groundwater flow to prairie wetlands is disrupted (*e.g.,* by development) or intercepted (*e.g.,* digging a pond in adjacent uplands or installing wells for irrigation or drinking water), it can quickly convert to shrubs or other invasive species (Fiedler and Landis 2012, p. 51; Michigan Natural Features Inventory 2012, p. 4). For example, roads and residential development likely disrupted the hydrology of a prairie fen where the Poweshiek skipperling was last observed in 2007 and where 2008 and 2009 surveys for Poweshiek skipperlings were negative (Michigan Natural Features Inventory 2011, unpubl. data). Furthermore, on some sites, land managers intentionally facilitated succession of native-prairie communities to woody vegetation or trees, such as Ponderosa pine (*Pinus ponderosa*) or spruce (*e.g.,* Dana 1997, p. 5). This converts prairie to shrubland, forest, or semi-forested habitat types and facilitates invasion of adjacent native prairie by exotic, cool-season grasses, such as smooth brome. Moreover, the trees and shrubs provide perches for birds that may prey on the butterflies (Royer and Marrone 1992b, p. 15; 1992a, p. 25).

We rated the level of impact to populations of invasive species at 62 Dakota skipper sites and 51 Poweshiek skipperling sites that had sufficient information to evaluate the stressor (Table 3 and Table 4; Service 2012

unpubl. data; Service 2013, unpubl. data). This stressor is considered to have a low level of impact to the populations if there was either no information to indicate a stressor or management was ongoing to control invasive species using methods that are unlikely to cause adverse effects to Dakota skippers or Poweshiek skipperlings (*e.g.,* spot-spraying or hand-pulling). Sites were assigned a moderate level of impact to populations if invasive species are typically a primary driver of management actions and make it difficult for managers to specifically tailor management to conserve Dakota skipper or Poweshiek skipperling habitat. The site was assigned a high level of impact to populations if one or more nonnative invasive plant species are abundant or increasing and management activities are not being implemented to control their expansion; or if necessary management actions cannot be implemented without themselves causing an additional stressor to the Dakota skipper or Poweshiek skipperling populations at the site.

Invasive species are a current and ongoing stressor with high levels of impact to Dakota skipper and Poweshiek skipperling populations 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. Succession is a current and ongoing stressor of moderate-level impact to populations at sites where management is insufficient. The stressor of invasive species to populations on small and isolated sites (*e.g.,* Big Stone NWR) is a current and ongoing stressor of high level of impact to populations, because Dakota skipper and Poweshiek skipperling populations have little resilience to the resulting habitat degradation and to the often aggressive management needed to control the invasive plants. Loss of habitat or degradation of the native plant community due to encroachment of invasive species or woody vegetation is considered a high level of impact to populations at 13 of the 62 assessed Dakota skipper sites, a moderate level of impact to populations at 31 sites, and low impact to populations at 18 sites. Sites with high and moderate level of impact occur throughout the species range in Minnesota, North and South Dakota (Service 2012 unpubl. data; Service 2013, unpubl. data). Similarly, invasive species are a stressor of high level of impact to populations at 9 of the 51 evaluated Poweshiek skipperling sites, moderate of level impact to populations at 30 sites, and low level of impact to populations at 12 sites—sites with high and moderate levels of impact are throughout the range of the species in Iowa, Minnesota, Michigan, North Dakota, South Dakota, Wisconsin, and Manitoba and include at least 11 of the 14 sites where the species is still present (Service 2013, unpubl. data).

Fire

Dakota skipper and Poweshiek skipperling populations existed historically in a vast ecosystem maintained in part by fire. Due to the great extent of tallgrass prairie in the past, fire and other intense disturbances (*e.g.,* locally intensive bison grazing) likely affected only a small proportion of the habitat each year, allowing for recolonization from unaffected areas during the subsequent flight period (Swengel 1998, p. 83). Fire can improve Poweshiek skipperling (Cuthrell 2009, pers. comm.) and Dakota skipper habitat (*e.g.,* by helping to control woody vegetation encroachment), but it may also kill most or all of the individuals in the burned units and alter entire remnant prairie patches, if not properly managed (*e.g.,* depends on the timing, intensity, etc.). Accidental wildfires also may burn entire prairie tracts (Dana 1997, p. 15) and may hamper plans to carefully manage Dakota skipper and Poweshiek skipperling habitat. A human-set wildfire in late fall 2009 and another extensive fire in 2011, for example, burned considerable amounts of good prairie habitat in Manitoba's Tall Grass Prairie Preserve (Hamel *et al.* 2013, p. 1; Westwood 2010, pers. comm.), which is the only location in Canada where Poweshiek skipperlings are present; Dakota skippers are extirpated from the site. The fires at the Tall Grass Prairie Preserve may have killed overwintering larvae, and the population of Poweshiek skipperling in Canada ''may have been greatly reduced as a result of these fires'' (Hamel *et al.* 2013, p. 1).

Intentional fires, without careful planning, may also have significant adverse effects on populations of Dakota skippers and Poweshiek skipperlings, especially after repeated events (McCabe 1981, pp. 190–191; Dana 1991, pp. 41–45, 54–55; Swengel 1998, p. 83; Orwig and Schlicht 1999, pp. 6, 8). In systematic surveys of Minnesota tallgrass prairies, for example, Dakota skippers were less abundant on sites that had been burned, compared with otherwise similar hayed sites (Swengel 1998, p. 80; Swengel and Swengel 1999, pp. 278–279). Similarly, Schlicht (1997b, p. 5) counted fewer Dakota skippers per hour in burned than on grazed sites in Minnesota. Orwig and Schlicht (1999, p. 8) speculated that inappropriate use of prescribed burning eliminated Dakota skippers from the last known occupied site in Iowa, a 65-ha (160-ac) preserve. At Prairie Coteau Preserve in Minnesota, Schlicht (2001a, pp. 9–10) found greater flower abundance on regularly burned than rarely burned sites, but Dakota skipper abundance showed the greatest decline on the burned sites.

The effects of fire on prairie butterfly populations are difficult to ascertain (Dana 2008, p. 18), but the apparent hypersensitivity of Poweshiek skipperlings and Dakota skippers indicates that it is a threat to both species in habitats burned too frequently or too broadly. The Poweshiek skipperling and Dakota skipper are not known to disperse widely (Swengel 1996, p. 81; Burke *et al.* 2011, p. 2279); therefore, in order to reap the benefits of fire to habitat quality, Poweshiek skipperlings and Dakota skippers must either survive in numbers sufficient to rebuild populations after the fire or recolonize the area from a nearby unburned area. In addition, the return interval of fires needs to be infrequent enough to allow for recovery of the populations between burns. Therefore, fire is a threat to Poweshiek skipperlings and Dakota skippers at any site where too little of the species' habitat is left unburned or where patches are burned too frequently.

Panzer (2002, p. 1306) identified four life-history traits of duff-dwelling insects such as the Dakota skipper and Poweshiek skipperling that were good predictors of a negative response to fire: (1) Remnant dependence (occurring as small, isolated populations); (2) upland inhabitance (dry uplands burn more thoroughly than wetter habitats); (3) nonvagility (low recolonization rate); and (4) univoltine (slower recovery rates for species with only one generation per year). Species exhibiting all four traits should be considered ''hypersensitive'' to fire (Panzer 2002, p. 1306). The Poweshiek skipperling and Dakota skipper meet all of Panzer's criteria for hypersensitivity (Panzer 2002, p. 1306) and have additional life history traits that further suggest hypersensitivity to fire. 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, many or all prairie butterflies may be eliminated at once. Complete

extirpation of a population, however, may not occur after a single burn event (Panzer 2002, p. 1306) and the extent of effects would vary depending on time of year and fuel load.

Poweshiek skipperlings lay their eggs near the tips of leaf blades, and they overwinter as larvae on the host plants (Borkin 2000a, p. 2), where they are exposed to fires during their larval stages. If larvae are on prairie dropseed or little bluestem, which occur in dry prairie, rather than spike-rush or sedges, which typically occur in wet prairie, then the larvae are even more vulnerable to fire (Selby 2005, p. 36). Unlike Dakota skippers, Poweshiek skipperlings do not burrow into the soil surface (McAlpine 1972, pp. 88–92; Borkin 1995b, p. 9), which makes them more vulnerable to fire (and likely more vulnerable to chemicals such as herbicides and pesticides)) throughout their larval stages. Species whose larvae spend more time above ground, such as Poweshiek skipperlings, are likely more vulnerable to fire than species that form underground shelters. As the spring progresses, however, the vulnerability of Dakota skippers to fire increase as larvae shift from buried shelters to horizontal shelters at the soil surface (Dana 1991, p. 16).

Studies of all life-stages may be necessary to fully evaluate these species' response to fire. Early spring burns may be less likely to harm Dakota skipper populations than late spring burns, due to larval phenology and differences in subsurface soil temperatures during the fire; however, studies have not conclusively linked the relationship of mortality risk to the timing of spring burns. Experiments to evaluate the effects of early spring versus late spring fires and of different fuel levels on Dakota skipper mortality found that, despite higher ambient temperatures during the early spring burn, temperatures at the average depth of buried Dakota skipper shelters (Dana 1991, p. 11), were 10 °C (50 °F) higher during the late-spring burn (Dana 1991, p. 41). Fuel load was positively related to subsurface soil temperature (Dana 1991, pp. 41–43). 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 skippers on the site (Dana 1991, pp. 41, 54). Although Dana's study was inconclusive in quantifying the risk of mortality in relation to the timing of spring burns, he was able to conclude that a late-spring burn in ''moderate'' fuels (430–440 g/m^2) would have a devastating effect on Dakota skipper populations, and that early spring burning would afford some amelioration (Dana 1991, p. 55).

Rotational burning may benefit prairie butterflies by increasing nectar plant density and by positively affecting soil temperature and near-surface humidity levels due to reductions in litter (Dana 1991, pp. 53–55; Murphy *et al.* 2005, p. 208; Dana 2008, p. 20). Purple coneflower 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, pp. 208–209). An increase in purple coneflower, an important nectar source for Dakota skippers and Poweshiek skipperlings, may last for 1–2 years after early spring fires and females may preferentially oviposit near concentrations of this nectar source (Dana 2008, p. 20).

Although fire tends to increase native plant diversity in prairies (Murphy *et al.* 2005, pp. 208–209), several years may be necessary for Dakota skipper and Poweshiek skipperling populations to recover after a burn. Few studies have documented recovery times for prairie butterflies after a burn, and even fewer have measured the relationships between species abundance in tallgrass prairies and time since burn. One such study, however, found lower relative abundances of Dakota skippers and Poweshiek skipperlings in burned units than in otherwise similar hayed units even four years after burns (Swengel 1996, p. 83). Poweshiek skipperling had the most negative initial response to fire among six species of prairie-obligate butterfly species (Swengel 1996, p. 83). Numbers were still lower than expected one year post-fire, exceeded expectations after two years, and declined slightly after three years (Swengel 1996, p. 83). In habitats that had not been burned for four or more years, Poweshiek skipperling abundance was about as low as in habitats sampled less than one year after being burned (Swengel 1996, p. 83).

Swengel's (1996, p. 83) observations are consistent with other findings. That is, Poweshiek skipperling numbers decline in burned areas for 1–2 years after the burn then rebound, but may decline again if management does not maintain the habitat (Skadsen 2001, p. 37; Webster 2003, p. 12). In general, recovery times of 1–5 years post burn have been predicted (Swengel 1996, pp. 73, 79, 81; Panzer 2002, pp. 1302–1303); however, Vogel *et. al* (2010, p. 671) found that habitat-specialist butterfly abundance recovery time was approximately 50 months after prescribed fires. Recent survey results in some areas, most notably, Iowa and Minnesota, indicate that other factors are acting independently (Dana 2008, p. 18) or in concert with fire to forestall the typical post-fire rebound.

We assessed the stressor posed by fire at 19 Dakota skipper sites with present or unknown status and 24 Poweshiek skipperling sites with present or unknown site status where we had sufficient information to evaluate the stressor (Tables 3 and 4; Service 2012 unpubl. data; Service 2013, unpubl. data). We considered fire a stressor of high level of impact to populations at 9 of the 19 evaluated Dakota skipper sites and 7 of the 24 Poweshiek skipperling sites. Sites that face a high level of impact to populations were primarily those with a high proportion of Dakota skipper or Poweshiek skipperling habitat that may be burned in a single year or where all of the species' habitat is burned with no likely source of immigrants to sustain the population. This type of fire management is a documented cause of extirpation (Selby 2000, p. 19). Sites with a moderate level of impact to populations from fire management were those where the habitat is divided into at least three burn units and no unit is burned more frequently than once every three years; or, habitat is divided into two or more burn units, each unit is burned no more frequently than once every three years, but the entirety of the species' habitat is never burned in the same year and the species is present at another site that is less than 1 km (1.6 mi) away. Fire is considered to be a threat of moderate severity at 4 of the 19 evaluated Dakota skipper sites and 3 of the 24 Poweshiek skipperling sites. Fire presents a low level of impact to populations at sites where the species' habitat is divided into at least four burn units and no unit is burned more frequently than once every four years; or, the species' habitat is divided into three or more burn units, at least three units are burned no more frequently than once every four years, and the site contains more than 140 ha (346 ac) of native prairie or where the site is separated from another occupied site by less than 1 km (1.6 mi). Fire is considered to be a stressor with a low level of impact to populations at 6 of the 19 evaluated Dakota skipper sites and 14 of the 24 Poweshiek skipperling sites.

In summary, fire may be an important management tool for these butterflies, if carried out appropriately. However, where managers burn without ensuring a sufficient amount of contiguous or nearby habitat from which immigrants can re-inhabit burned areas or if not

conducted with conservation of prairie invertebrates as a primary objective, it is a current stressor that can have moderate impacts on populations. Uncontrolled wildfires may also have high or moderate levels of impacts to populations, and would also depend on the timing, intensity, and extent of the burn. Poweshiek skipperlings may be among the most sensitive of prairie butterflies to fire, and thus, coordination between habitat managers and butterfly experts is necessary to ensure that it is not implemented in a manner that degrades population viability. Fire is a current and ongoing stressor of high level of impact where burns occur without ensuring there is a sufficient amount of contiguous or nearby habitat from which immigrants can re-inhabit burned areas. Fire is an ongoing stressor rangewide for both species and has been documented at a high or moderate level of impact to populations at several sites in North Dakota, South Dakota, Minnesota, Wisconsin, and the Tallgrass Prairie Preserve in Manitoba.

Grazing

As with fire management, grazing may maintain habitat for the Poweshiek skipperling and Dakota skipper, but as with any management practice, appropriate timing, frequency, and intensity are important. The level of impact of grazing on Dakota skipper and Poweshiek skipperling populations also depends on the type of habitat that is being grazed. Furthermore, in contrast to the permanent habitat destruction and larval mortality caused by plowing or mining, for example, some habitats can remain suitable for Dakota skipper when grazed (Dana 1991, p. 54, Schlicht 1997, p. 5, Skadsen 1997, pp. 24–29) and native plant diversity in tallgrass prairie may recover from overgrazing if it has not been too severe or prolonged. In addition, grazing is one of the primary treatments for controlling smooth brome and enhancing native plant diversity in prairies that have been invaded by this nonnative grass species (Service 2006, p. 2; Smart *et al.* in prep.).

Grazing may benefit the Dakota skipper and Poweshiek skipperling under some management scenarios (*e.g.,* adaptive management to adjust grazing prescriptions according to their effects on essential features of the prairie ecosystem). In some habitats, Dakota skippers benefit from light grazing that minimizes the area dominated by tall grasses (*e.g.,* big bluestem and indiangrass) (Dana 1991, p. 54). Schlicht (1997b, p. 5) found that the 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, p. 5). 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, pp. 24–29), but the species was since extirpated at one site where a change in ownership resulted in significant overgrazing (Skadsen 2006b, p. 5). The economic benefit of grazing to ranchers may also benefit the species at some sites by deterring conversion of remnant prairies to row crop agriculture.

Bison (*Bison bison*) grazed at least some Dakota skipper and Poweshiek skipperling habitats historically (McCabe 1981, p. 190; Bragg 1995, p. 68; Schlicht and Orwig 1998, pp. 4, 8; Trager *et al.* 2004, pp. 237–238), but cattle (*Bos taurus*) are now the principal grazing ungulate in both species' ranges. Bison and cattle both feed primarily on grass, but have some dissimilar effects on prairie habitats (Damhoureyeh and Hartnett 1997, pp. 1721–1725; Matlack *et al.* 2001, pp. 366–367). Cattle consume proportionally more grass and grasslike plants than bison, whereas bison consume more browse and forbs (flowering herbaceous plants) (Damhoureyeh and Hartnett 1997, p. 1719). Grasslands grazed by bison may also have greater plant species richness and spatial heterogeneity than those grazed by cattle (Towne *et al.* 2005, pp. 1553–1555). Both species remove forage for larvae (palatable grass tissue) and adults (nectar-bearing plant parts), change vegetation structure, trample larvae, and alter larval microhabitats. Livestock grazing was identified as a stressor to populations on most of the privately owned sites and some public sites on which Dakota skippers occurred in 2002 (Cochrane and Delphey 2002, pp. 62–69). Swengel and Swengel (1999, p. 286), for example, noted that at the Sheyenne National Grassland in North Dakota, grazing appeared to be unfavorable for the Poweshiek skipperling and Dakota skipper.

Reduced availability of nectar resources and larval food plants is likely the primary factor leading to declines in Poweshiek skipperling and Dakota skipper populations on heavily grazed sites. In South Dakota, for example, 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 (no grazing or fire management). McCabe (1981, p. 189) observed that grazing eliminated Dakota skippers on North Dakota wet-mesic prairies; nectar plants such as yellow sundrops and bluebell bellflower rapidly diminished with light grazing, and heavy grazing eliminated upright prairie coneflower and purple coneflower.

The intensity at which grazing occurs may dictate the level of impact to the Dakota skipper and Poweshiek skipperling. Grazing reduces Dakota skipper numbers in direct proportion to its intensity, due to the reduction in flowers that provide nectar and perhaps by influencing adult behavior (Dana 1997, p. 4). Dana (1997, p. 5) predicted that privately owned pastures in Minnesota's Hole-in-the-Mountain complex, for example, will likely only support low densities of skippers if they continued to be heavily grazed and sprayed with herbicides. Surveys at this habitat complex in 2007, 2008, and 2012 failed to record any Poweshiek skipperlings (Dana 2008, p. 8; Selby 2009a, pp. xxxi–xxxii; Runquist 2012a, pers. comm.; Runquist 2012, pp. 13–14, 18–20) and Dakota skippers were not detected in 2012 surveys (Runquist 2012, pp. 13–14, 18–20; Runquist 2012a, pers. comm.).

While most references to grazing impacts on prairie butterflies are based on ancillary observations made during research focused on other management impacts, one Minnesota study (Selby 2006b) focused on the effects of grazing on all life stages of the Dakota skipper, and also included data for the adult stage of the Poweshiek skipperling. Both species were too scarce to collect data adequate to test the hypotheses (Selby 2006b, p. 2), but observations based on two years (2003 and 2004) of surveys suggested that numbers in the lightly to moderately grazed pasture were similar to those in the best portions of nearby ungrazed habitats (Selby 2006b, p. 30). Poweshiek skipperlings were almost absent from the study sites (Selby 2006b, pp. iii–xxiii). Within the grazed study area, the number of Dakota skippers declined with increasing grazing intensity; Dakota skippers were absent from the most heavily grazed areas (Selby 2006b, p. 16). Skadsen (2001, p. 55) found that forb diversity was poor on the grazed lands and predicted the extirpation of both species unless management practices were changed. The Dakota skipper is now extirpated at one of these sites, and its status is unknown at the other; Poweshiek skipperling status is unknown at both sites (Service 2013, unpubl. geodatabase). Spomer (2004, p. 4) found that larval host plants and

nectar sources were missing from heavily grazed pastures at Sheyenne National Grassland, North Dakota.

Grazing intensity combined with varying habitat type may also affect the level of grazing impacts. On wet-mesic habitat in North Dakota, for example, Dakota skippers and Poweshiek skipperlings tolerate little to no grazing (McCabe and Post 1977b, p. 36; Royer and Marrone 1992a, pp. 10, 17, 28; Royer and Marrone 1992b, pp. 17–18; Royer and Royer 1998, p. 22). Webster (2003, pp. 7–8) described very similar Dakota skipper habitats in Manitoba and, although grazing generally does not occur in these habitats that are occupied by Dakota skipper, they may be as sensitive to grazing as similar habitats in North Dakota; in a later report, he described the conversion of lands from haying to grazing as a major threat to Dakota skipper in the wet-mesic habitats of Manitoba (Webster 2007, pp. i–ii, 6). In the drier and hillier habitats that the species inhabits, grazing may benefit Dakota skipper depending on its intensity. For example, in eastern South Dakota, Dakota skipper populations were deemed secure at some sites managed with rotational grazing that was sufficiently light to maintain native plant species diversity (Skadsen 1997, pp. 24–29), and grazing may also benefit Dakota skippers by reducing the area dominated by tall native grasses, such as big bluestem and Indiangrass (Dana 1991).

Proximity of nearby populations or contiguous habitat may alleviate some of the negative impacts of grazing. Royer and Marrone (1992b, p. 29; 1992a, p. 18) stated that heavy grazing was a threat to Dakota skippers and Poweshiek skipperlings, but that occasional light grazing is not a long-term threat in some habitats as long as there are areas of contiguous habitat that remain ungrazed. At Chekapa Creek Ridge and Knapp Pasture in South Dakota, heavy grazing apparently extirpated both the Poweshiek skipperling and Dakota skipper (Skadsen 2002, p. 38; 2004, p. 7; 2006a, p. 11). Due to its proximity to other Poweshiek skipperling populations and a return to fall haying in 2005, the Poweshiek skipperling recolonized Chekapa Creek Ridge in 2006 (Skadsen 2006a, p. 12), but more recent surveys indicate that the Poweshiek skipperling has again been extirpated from this site due to habitat degradation because of a change from haying to grazing (Skadsen 2012a, pers. comm., Skadsen 2012c, pers. comm.).

As with fire, Dakota skipper and Poweshiek skipperling populations may persist through intense grazing episodes or be restored afterwards, if sufficient numbers survive and reproduce in lightly grazed patches or if nearby habitats provide sufficient numbers of immigrants to reestablish the population after habitat quality is restored. Years of grazing without rest, however, may preclude recovery from the effects of intense grazing, although the capacity for restoration of suitable plant community and other habitat features may be highly variable among sites. On some sites, plant diversity may not be restored when grazing pressure declines (Dana 1997, p. 30; Jackson 1999, pp. 134–135; Spomer 2004, p. 4). Grazing intensely (where a high proportion of plant biomass is removed) or for long duration leads to native plants being replaced with exotic, cool-season European forage grasses and legumes that are tolerant of continuous grazing (Jackson 1999, p. 128, Minnesota DNR 2006, p. 232). In overgrazed native prairie in Minnesota, for example, the prairie is dominated by exotic grasses with a low native forb species diversity and abundance, and foliage height is less than 10 cm (4 in) (Dana 1997, p. 3); these prairies lack the native plants necessary to sustain adult and larval prairie butterflies. In comparison, sites less disturbed by grazing have a high native forb (nectar) species diversity and abundance foliage height is generally more conducive to perching and reproductive activities (between 25 and 40 cm (10 and 16 in)) (Dana 1997, p. 2).

Land managers also frequently use herbicides, often through broadcast application, to control weeds and brush on grazed remnant prairies, which further reduces native forb diversity and abundance (Dana 1997, p. 3; Stark *et al.* 2012, pp. 25, 27) necessary for adult nectar sources. Skadsen (2006, p. 11), for example, documented the likely extirpation of Dakota skippers at Knapp Ranch in South Dakota after a July 2006 application of broadleaf herbicide in concert with heavy grazing. Herbicide and pesticide use is discussed further under *Factor E* of this proposed rule.

While reduced availability of nectar resources and larval food plants may be the primary factors leading to declines in Poweshiek skipperling and Dakota skipper populations on heavily grazed sites, changes in vegetation structure may also be important. For example, grazing prairie each year during mid-summer eliminates nectar plants, such as purple coneflower, and native warm-season grasses that function as larval host plants (Skadsen 2007, pers. comm.). In South Dakota, vegetation height and litter depth were lower on prairie remnants that were mostly grazed (Higgins 1999, pp. 27–29). Grazing also causes direct mortality of larvae due to trampling and altering larval microhabitats (Royer *et al.* 2008, pp. 10–15). In North Dakota, grazing can compact soils in wet-mesic prairie inhabited by Dakota skippers and Poweshiek skipperlings, altering vertical water movement in the soil, which may lead to larval desiccation (Royer *et al.* 2008, p. 16). Cattle may also kill larvae by trampling them, particularly in wet-mesic prairies (McCabe 1981, p. 189).

Livestock grazing is the predominant use of privately owned tallgrass prairie remnants in South Dakota (Higgins 1999, p. 15) and was identified by the Service as a threat on most of the privately owned sites on which Dakota skipper occurred when the species was identified as a candidate species in 2002 (Cochrane and Delphey 2002, pp. 62–69). The presence and density of purple coneflower may serve as an indicator of grazing impacts to Dakota skippers and Poweshiek skipperlings where the species occur in dry-mesic prairie (Skadsen 2006a, p. 2); grazing from mid-June through July may reduce purple coneflower abundance (Skadsen 2007, pers. comm.)—as discussed in the Background section of this rule, purple coneflower has been identified as a primary source of nectar for both species, particularly in dry prairie habitats.

Britten and Glasford (2002, p. 373) recommended minimizing disturbance of Dakota skipper habitat during the flight period (late June to early July) to maximize genetically effective population sizes (the number of adults reproducing) to offset the effects of genetic drift of small populations (change in gene frequency over time due to random sampling or chance, rather than natural selection). Therefore, a large portion of the habitat of any Dakota skipper population should remain ungrazed or only lightly grazed during the flight period, and similar precautions should be taken for the Poweshiek skipperling.

We assessed the level of impact to populations from grazing at 53 Dakota skipper sites and 23 sites currently occupied by Poweshiek skipperling with present or unknown status that had sufficient information to evaluate the stressor (Tables 3 and 4; Service 2012 unpubl. data; Service 2013, unpubl. data). This analysis was conducted differently for different habitat types. For Type A habitat (Royer *et al.* 2008, pp. 14–16) where stocking rates (number of cattle or bison over a given area) have little or no evidence of grazing effects on Dakota skipper or Poweshiek skipper habitat quality, we found the level of impact to populations of grazing to be low. For Type B habitat

(Royer *et al.* 2008, p. 14), we assumed that the level of impact of grazing to populations would be low if the dry-mesic slopes were grazed only before June 1 with at least one year of rest between rotations and if the pasture were only spot-sprayed with herbicides when and where necessary, or, the best available information does not indicate that grazing practices are degrading habitat quality for the species (*i.e.,* no apparent diminishment of nectar plant density and diversity and habitat is good or excellent for Dakota skipper).

At grazed sites where extirpation of the local population is not imminent, but habitat quality is fair to poor and the relative abundance of Dakota skippers or Poweshiek skipperlings is often low, we found the level of impact of grazing to populations to be moderate. Sites with a moderate level of impact to populations due to grazing may be lightly grazed for less than 4 months or less than 25 percent of the above-ground biomass of native grasses and forbs is consumed (Smart *et al.* 2011, pp. 182–183), are grazed after June 1, or are not given a year of rest between grazed years. At sites where grazing is conducted season-long, or for more than four months during the year, or more than 50 percent of the above-ground biomass of native grasses and forbs is consumed and herbicide use is frequent; we found the level of impact of grazing to populations to be high. At sites where grazing is a high-level threat, extirpation of the population is likely imminent and habitat quality is poor. On public lands inhabited by the species, grazing is typically used to control nonnative cool-season grasses and invasive species. Cattle are often removed by July 1 to minimize adverse impacts to warm-season grasses, but this type of management minimizes the density of nectar species that are important to the Dakota skipper and Poweshiek skipperling. Invasive species are often present at grazed sites, which often lead to further management actions (see Invasive Species and Secondary Succession).

Of the 53 Dakota skipper sites assessed, we found the level of impact to Dakota skipper populations from grazing to be high at 10 sites, moderate at 29 sites, and low at 14 sites (Service 2012 unpubl. data; Service 2013, unpubl. data). Moderate- to high-level impacts to populations were primarily at South Dakota sites (N=28)—other sites with moderate- to high-level impacts were in Minnesota (N=7), North Dakota (N=3), and Manitoba (N=1). As described above as part of our assessment of grazing, we examined the habitat quality ratings that were primarily assigned by researchers during surveys for the species, during separate habitat assessments, or that were available from state heritage databases or other sources of scientific data. The habitat quality was rated as poor at 7 of the 10 sites where grazing poses a high level of impact to Dakota skipper populations. At each of the 14 sites where grazing pressure is low, habitat quality was good or excellent, with two exceptions where habitat was rated as fair to good. Among the 29 sites where grazing is a moderate level of impact to Dakota skipper populations, 6 had habitat rated good or excellent.

Of the 19 Poweshiek skipperling sites for which we had sufficient information to assess grazing, the level of impact to populations from grazing is high at 7 sites, moderate at 14 sites, and low at 2 sites—all but 2 of these sites were in South Dakota. No sites in Wisconsin or Michigan were assessed for grazing impacts to populations, where the grazing does not occur. Among the 14 sites where grazing is a moderate level of impact to Poweshiek skipperling populations, 10 have habitat rated as fair to excellent. The habitat quality was rated as poor at 3 of the 6 sites where grazing is having a high level of impact to Poweshiek skipperling populations.

In summary, grazing may benefit Dakota skippers and Poweshiek skipperlings in native tallgrass prairie by increasing native plant diversity and patchiness of fires (Minnesota DNR 2006, p. 232). The economic benefit of grazing to ranchers may also be a benefit to the species by deterring conversion of remnant prairies to row crop agriculture. Grazing is a stressor to these species, however, if it is not managed with the goal of conserving native-prairie vegetation that comprises suitable habitat for Dakota skipper and Poweshiek skipperling. Dakota skippers and Poweshiek skipperlings may benefit when 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 in (15–20 cm) (Skadsen 2007, pers. comm.), and if the timing of grazing for each field varies from year to year (Skadsen 2007, pers. comm.).

Conversely, Dakota skipper and Poweshiek skipperling populations may be reduced or extirpated when too much plant material is removed, when fields are not rested for some portion of the growing season, or fields are grazed during the same period each year. Grazing poses a current and ongoing stressor of moderate to high level of impact to populations where its intensity is such that Dakota skippers and Poweshiek skipperlings are unlikely to thrive or even persist. Grazing poses a likely future stressor where current management is conducive to Dakota skipper or Poweshiek skipperling conservation, but where landowners may allow excessive grazing in the future, for example, where management may change as a result of the changing market prices of agricultural products. Unsuitable grazing is an ongoing stressor throughout much of the range of the Dakota skipper and Poweshiek skipperling (primarily in flat wet prairies of Minnesota, North Dakota, and South Dakota); grazing is not a documented stressor at the Poweshiek skipperling sites with present or unknown status in Wisconsin, Michigan, and Iowa or at most Dakota skipper sites in Canada.

Haying

As with grazing and fire, haying (mowing grasslands and removing the cuttings) may maintain habitat for the Poweshiek skipperling and Dakota skipper, but as with any management practice, appropriate timing, frequency, and intensity are important. Poweshiek skipperling habitat at Scuppernong Prairie in Wisconsin, for example, would have succeeded to shrubby or forested habitat if it had not been hayed each fall (Borkin 2011, in litt.)—it is now one of the few sites in Wisconsin that are occupied by the Poweshiek skipperling. Nearly all of the Dakota skipper sites in Canada where the species is present are privately owned, fall hayed prairies (Westwood 2013, pers. comm.).

Haying generally maintains prairie vegetation structure, but it may favor expansion of invasive species such as Kentucky bluegrass. If done during the adult flight period, haying may kill the adult butterflies or cause them to emigrate, and if done before or during the adult flight period, it may reduce nectar availability (McCabe 1979, pp. 19–20; McCabe 1981, p. 190; Dana 1983, p. 33; Royer and Marrone 1992a, p. 28; Royer and Marrone 1992b. p. 14; Swengel 1996, p. 79; Webster 2003, p. 10). Royer and Marrone (1992b, p. 14), for example, ascribed the loss of a North Dakota Poweshiek skipperling population to June and July haying. Several years of July haying may have led to the Poweshiek skipperling's extirpation at Wakidmanwin Prairie in South Dakota (Skadsen 2006b, p. 13). The Dakota skipper was observed at the Wakidmanwin Prairie in 2010 (Skadsen 2010, p. 6); however, it is not clear if the management has changed since the observation. Early June haying may have

eliminated Dakota skippers from at least one site in North Dakota (Royer and Royer 2012a, p. 72).

Hayed prairies are important reservoirs of native prairie plant diversity; however, long-term annual haying negatively impacts prairie plant diversity (Jog *et al.* 2006, pp. 164–165). Jog *et al.* (2006, pp. 164–165) recommended diversifying management to include, for example, periodic fire and to forego annual haying to increase plant species diversity. 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 grasses, although woody plant species also increased (Rooney and Leach 2010, p, 319).

Late-season haying may benefit Dakota skipper populations (McCabe 1981, p. 190), and Dakota skipper populations might be more common on hayed prairies than on idle (not hayed) prairies (Webster 2003, p. 10). Swengel and Swengel (1999, p. 279) observed significantly greater relative abundance of Dakota skippers on hayed tracts compared with either idle or burned tracts in Minnesota, and Skadsen (2004, p. 7) documented the extirpation of Dakota skippers from a site after its management switched from haying to intensive grazing. Some remnant Dakota skipper populations in the eastern Dakotas are found on fall-hayed prairies (Skadsen 1997, pp. 10–23; Royer and Royer 2012b) as are many of the sites in Manitoba (Webster 2003, p. 10). Webster (2003, p. 8) found ''healthy populations'' of Dakota skippers in Manitoba on sites used as hay fields, as described by the absence of standing dead grass, low numbers of shrubs, shorter bluestem grasses, and abundant and readily observable nectar flowers, as compared to un-hayed sites. Scarlet Fawn Prairie in South Dakota, which is hayed in the fall, is considered one of the highest quality prairies in that State (Skadsen 2012, pers. comm.). In the Dakotas, late-season (mid-August to October) haying appears to minimize impacts to the prairie butterflies, although annual haying may diminish the vigor of native, warm-season grasses and reduce forb density in north-central North Dakota (wet-mesic) habitats (Lenz 1999b, p. 14; Skadsen 2009, p. 8). Consistent late-season haying of Poweshiek skipperling habitat in South Dakota, appears to have facilitated the expansion of green needlegrass (*Stipa viridula*), a cool-season grass, and prevented seed development in warm-season plants (Skadsen 2009, p. 8).

We assessed the level of impact of haying to populations at 40 Dakota skipper sites and 10 Poweshiek skipperling sites with present or unknown status where we had sufficient information to assess the stressor (Tables 3 and 4; Service 2012 unpubl. data; Service 2013, unpubl. data). Haying was considered to be a stressor with a low or no negative impact on populations where it is implemented after the flight period (after approximately August 1) and when there is no reduction in the availability of native plant species. Haying was considered to be a stressor with a moderate level of impact on populations, where the timing or extent of haying was unknown, but there are: (1) One or more indications that haying is resulting in a reduction in nectar or larval food sources important to the species due to timing or frequency of mowing; (2) part of the Dakota skipper or Poweshiek skipperling habitat on the site is hayed before August 1, but a substantial proportion of habitat is not hayed and not clearly subject to other threats, such as frequent fire or grazing (*e.g.,* Smokey Lake site, North Dakota); or (3) where haying occurs before or after August 1, but the site is hayed no more frequently than once every three years (*e.g.,* Roy West Game Production Area, South Dakota).

We considered haying to be a stressor with a high level of impact on populations where the site was hayed prior to August 1 (*e.g.,* Oaks Prairie, North Dakota). At 27 of the 40 evaluated Dakota skipper sites, current haying practices are conducive (beneficial) to Dakota skipper conservation, because it is conducted after August 1 and is not reducing native plant species diversity. One or more indications that current haying practices are slowly degrading habitat quality for Dakota skippers has been documented at 13 of the 40 sites. At several sites in North Dakota, for example, Royer and Royer (2012b, pp. 15, 21, 24, 45) noted a decrease in the diversity and density of forbs at sites hayed annually. Haying is a stressor with a high level of impact on populations at 2 of the 40 Dakota skipper sites assessed and a stressor of moderate-level impacts to the populations at 11 of the 40 Dakota skipper sites assessed. Of the 10 Poweshiek skipperling sites evaluated, haying was a stressor with moderate-level impacts on populations at 3 sites and was not considered to have high-level impacts to the populations at any of the 10 sites.

In summary, haying is a current and ongoing threat of moderate to high level of impacts to Dakota skippers and Poweshiek skipperlings at the few sites where the site is normally hayed before August and where annual haying is reducing availability of larval food and adult nectar plants. However, fall haying is beneficial to both species, specifically if it is conducted after August 1, no more than every other year, and there is no indication that native plant species diversity is declining due to timing or frequency of haying. Haying is a current stressor at a small number of sites for both species; these sites occur primarily in North Dakota and South Dakota.

Lack of Disturbance

While inappropriate or excessive grazing, haying, and burning are stressors to some Poweshiek skipperling and Dakota skipper populations and have led to the extirpation of others, both species are also subject to the stress of no management practices being implemented. Prairies that lack periodic disturbance become unsuitable for Poweshiek skipperlings and Dakota skippers due to expansion of woody plant species (secondary succession), litter accumulation, reduced densities of adult nectar and larval food plants, or invasion by nonnative plant species (*e.g.,* smooth brome) (McCabe 1981, p. 191; Dana 1983, p. 33; Dana 1997, p. 5; Higgins *et al.* 2000, p. 21; Skadsen 2003, p. 52). For example, Dakota skipper numbers were reduced at Felton Prairie, Minnesota, in tracts that had not been hayed or burned for several years (Braker 1985, p. 47). Another study also observed significantly lower Dakota skipper abundance on unmanaged or idle sites, compared with hayed sites; however, Poweshiek skipperlings were significantly denser with idling (Swengel and Swengel 1999, p. 285). Skadsen (1997, pp. 10–23; 2003, pp. 8, 35, 42) reported deterioration of several unburned and unhayed South Dakota prairies in just a few years due to encroachment of woody plants and invasive species and found lower species richness of prairie-dependent butterflies and lower floristic quality at sites with no disturbance versus sites managed by grazing or fall haying (Skadsen 2006a, p. 3). For example, Dakota skippers returned to an idle site, Pickerel Lake State Park, after a burn conducted in 2007 resulted in a significant increase in forbs, particularly purple coneflower (Skadsen 2008, p. 2). In a separate study, Higgins *et al.* (2000, p. 24) found that prairie habitats left idle had lower plant diversity and quality than prairies managed with fire.

We assessed the stressor posed by lack of management for populations at 18 Dakota skipper sites and 13

Poweshiek skipperling sites with present or unknown status where we had sufficient information to evaluate the stressor (Tables 3 and 4; Service 2012 unpubl. data; Service 2013, unpubl. data). Lack of management was considered to be a stressor of moderate-level impacts to the population where the species' habitat is degraded or likely to become degraded due to secondary succession, invasive species, or both, but actions to restore habitat quality are planned or ongoing, or where the site is idle with no evident plans to initiate management (*e.g.,* fire, grazing, haying), and there are signs of ongoing or imminent secondary succession. Lack of management was considered to be a stressor with a high level of impact to the population where the habitat quality at a site is degraded or likely to become degraded due to secondary succession or invasive species, and there are no ongoing or planned actions to maintain or restore habitat quality. Lack of management was considered to be a stressor of low-level impacts to Dakota skipper or Poweshiek skipper populations at sites that are managed by grazing, haying/mowing, or fire that precludes loss of Dakota skipper or Poweshiek skipperling habitat to secondary succession and invasive species (*e.g.,* smooth brome). Ten of the 18 Dakota skipper sites assessed are under high level of impact to population due to lack of management and 5 sites are under moderate level of impact to the population. Five of the 13 Poweshiek skipperling sites assessed are under high level of impact to the population due to lack of management and 6 sites are under moderate level of impact to the population. The Dakota skipper and Poweshiek skipperling are unlikely to persist at those sites where the level of impact to the population due to lack of management is high. Sites currently under stress by lack of management occur throughout the range of both species; however, most of the present or unknown sites that lack appropriate management are in North Dakota, South Dakota, Minnesota, and Michigan. In summary, lack of disturbance is a current and ongoing stressor to Dakota skipper and Poweshiek skipperling populations where woody vegetation or invasive species expansion will reduce native prairie grasses and flowering forbs.

Summary of Factor A

We identified a number of threats to the habitat of the Dakota skipper and Poweshiek skipperling that operated in the past, are impacting both species now, and will continue to impact the species in the future. The decline of both species is the result of the long-lasting effects of habitat loss, fragmentation, degradation, and modification from agriculture, development, invasive species, secondary succession, grazing, and haying. Although efforts have been made to effectively manage habitat in some areas, the long-term effects of large-scale and wide-ranging habitat modification, destruction, and curtailment will last into the future. Invasion of the species' habitat by exotic species and woody vegetation, overgrazing, long-lasting or permanent alterations in water levels or hydrology, and too frequent or improperly timed haying remove or significantly reduce the availability of plants that provide nectar for adults and food for larvae. Fire and flooding cause direct mortality or destroy nectar and food plants if the intensity, extent, or timing is not conducive to the species' biology.

Of the 170 Dakota skipper sites for which we evaluated for one or more habitat stressors, at least 136 sites have at least one documented stressor with moderate to high levels of impact to populations—these sites are found across the current range of the species in Minnesota, North Dakota, South Dakota, Manitoba, and Saskatchewan (Service 2012 unpubl. data; Service 2013, unpubl. data). Fifty-eight sites have 2 or more documented stressors of moderate to high levels of impact to populations, and 23 sites have three or more documented stressors of moderate to high level of impact to populations. Sites with three or more stressors are found across most of the current range of the species; these sites occur in Minnesota, North Dakota, South Dakota, and Manitoba (Service 2012 unpubl. data; Service 2013, unpubl. data). Twenty-three of these sites had 3 or more documented stressors at moderate or high levels of impact. Sites with three or more stressors are found across the current range of the species in the United States; these sites occur in Minnesota, North Dakota, and South Dakota. Furthermore, concurrently acting stressors may have more intense effects than any one stressor acting independently. Therefore, based on our analysis of the best available information, present and future loss and modification of Dakota skipper habitat is a stressor that has significant impacts on populations of the species throughout all of its range. Habitat-related stressors occur at sites with Dakota skipper populations within every state and province of occurrence.

Similarly, of the 68 Poweshiek skipperling sites with present or unknown status that we analyzed for one or more habitat stressors, 55 of them have at least one stressor at moderate to high levels of impact to the population. These sites are found across the current range of the species and occur in Iowa, Michigan, Minnesota, North Dakota, South Dakota, Wisconsin, and Manitoba (Service 2013, unpubl. data). Fifty-five sites have 2 or more documented stressors that have moderate to high levels of impact to the population. These sites are found across the current range of the species and occur in Iowa, Michigan, Minnesota, North Dakota, South Dakota, Wisconsin, and Manitoba (Service 2013, unpubl. data). Thirty-seven of them have at least three documented stressors that have moderate to high levels of impact to the population. These sites are found across the current range of the species and occur in Iowa, Michigan, Minnesota, North Dakota, South Dakota, Wisconsin, and Manitoba (Service 2013, unpubl. data). Thirty-seven of these sites had 3 or more documented stressors at moderate or high levels of impact to the population for both species. These sites are found across most of the current range of the species and occur in Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Manitoba (Service 2013, unpubl. data); furthermore, concurrently acting stressors may have more intense effects than any one stressor acting independently. Therefore, based on our analysis of the best available information, present and future loss and modification of Poweshiek habitat is a stressor that has significant impacts on the species throughout its range.

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

In the past, funding for conservation of rare species was primarily directed toward federally listed or candidate species, so while the Poweshiek skipperling may have benefited indirectly from conservation activities focused on species such as the Dakota skipper and Mitchell's satyr (*Neonympha mitchellii mitchellii*), it has not generally been the primary focus of those activities. As a result, survey data and incidental life-history observations have been accumulated as a part of projects focused on other species, but surveys were not necessarily focused on Poweshiek skipperling sites and detailed life-history, population, and demographic data have generally not been collected for the species. Various conservation activities directed at the Dakota skipper also indirectly benefit the Poweshiek

skipperling; these activities are summarized below.

Conservation agencies have recognized the need to address the status of prairie butterflies for more than 30 years beginning with a 1980 workshop held to initiate studies of Dakota skippers and other prairie butterflies. In June 1995, the U.S. Fish and Wildlife Service convened Dakota skipper experts to outline tasks needed to preserve enough viable populations to ensure long-term security for the species. The group outlined a plan for surveying populations and characterizing sites and habitats at priority areas, identifying and recommending management needs, monitoring, and outreach and education. In 1999, a Dakota skipper recovery strategy meeting was held in South Dakota with state, Federal, and nongovernmental biologists attending (Skadsen 1999b, entire). In 2011, researchers in Canada organized a Poweshiek Skipperling Workshop and followup conference call that brought together researchers and managers from across the range of the Poweshiek skipperling to provide updates on survey data, discuss ongoing activities, and plan future work. The workshop resulted in specific conservation action plans for the species. The Minnesota Zoo organized a followup conference during March 2013 to assess progress of the 2011 Poweshiek Skipperling Workshop Action Plans, facilitate discussion on the potential effects of management activities on prairie butterflies, identify needed information and data gaps, establish new priorities for research and a draft action plan for 2013, and facilitate networking and collaborations focused on the conservation of the Dakota skipper and Poweshiek skipperling, as well as other tallgrass prairie butterflies in the Midwest.

Research and survey work has occurred throughout the range of both species to document populations, to study the life history of both species, and to examine the effects of various management practices, such as fire and grazing, on the species and their habitat. For example, research and survey work on Dakota skippers began with Dana's (1991, entire) doctoral study on fire effects at Hole-in-the-Mountain, Minnesota, beginning in 1979 and McCabe's (1981, entire) 1979 surveys for the Garrison Diversion project in North Dakota. Additional work has been completed on characterizing habitat at important Dakota skipper sites in Minnesota (Dana 1997, entire) and North Dakota (Lenz 1999, entire, Royer and Royer 1998, entire, Royer and Royer 2012a, entire). Royer (2008, entire) assessed abiotic habitat parameters of soil in relation to management and conservation of Dakota skippers to complement prior floristic characterization of these habitats. The Minnesota DNR and the Service planned to cooperatively study the effects of grazing on the Dakota skipper and Poweshiek skipperling (Selby 2003a, entire; Selby 2003b, entire; Selby 2004b, entire, Selby 2006, entire); however, skipper numbers were too low to collect sufficient data to test hypotheses (Selby 2006, p. 30).

In the past, the Service funded some management activities intended to benefit the Dakota skipper, including habitat management at Big Stone National Wildlife Refuge, Minnesota (Olson 2000, entire), landowner contacts and education on conservation practices in South Dakota (Skadsen 1999b, entire), and prairie vegetation restoration at Chippewa Prairie in 2000 and at Twin Valley Prairie SNA, Minnesota, in 2001. The results of these efforts are varied; for instance, the prairie habitat at Twin Valley Prairie SNA was recently rated as excellent quality (Service 2013, unpubl. geodatabase), but the status of both species at that site is unknown; the last positive observation of Dakota skippers and Poweshiek skipperlings was 1993 and 1994, respectively. The Dakota skipper is extirpated from Chippewa Prairie and the status of the Poweshiek skipperling is unknown at the site; the last positive observations of the species were in 1995 and 1994, respectively (Service 2013, unpubl. geodatabase).

The Service purchases easements to prevent prairie conversion for agriculture and provide cost-share to support rotational grazing and other practices that may benefit Dakota skippers and Poweshiek skipperlings. For example, in 12 counties in South Dakota within the range of the species, the Service's grassland easement program has protected 365,193 ac (147,788 ha) of grassland that are primarily native prairie (Larson 2013, pers. comm.; HAPET 2012 unpubl. data), although it is not clear whether these lands are suitable habitat for either species. Other Service fee title lands, state lands, and Natural Resources Conservation Service easement lands may also protect areas from conversion, depending on the protections in those areas (Larson 2013, pers. comm.). If easements are near prairie butterfly habitat they can minimize the threat of conversion and may provide dispersal corridors or buffer sites from external threats (*e.g.,* pesticide drift).

Prairie easements generally prevent grasslands from being plowed or destroyed and prevent haying before July 16, but may not restrict grazing, pesticide use, or other practices that can degrade the status of Dakota skipper or Poweshiek skipperling populations. For example, one property with a Service easement was recently overgrazed to the extent that Dakota skipper was extirpated from the site (Skadsen 2006b, p. 5). Cost-share partnerships on easements and other areas, however, may further enable landowners to manage grasslands to benefit Dakota skippers and other prairie endemic species. The Service may implement such actions through the Partners for Fish and Wildlife program or in collaboration with U.S. Department of Agriculture Natural Resources Conservation Service or other agencies. Since 1990, the Service has purchased easements to prevent grassland conversion on millions of acres in Minnesota, North Dakota, and South Dakota (Larson 2013, pers. comm.). Only some of these areas include Dakota skipper or Poweshiek skipperling sites, are within the range of either species, or include suitable habitat for either species.

Conservation-interested agencies, individuals, and Tribes in South Dakota have made concerted efforts for decades to conserve native prairie within the Dakota skipper range. For example, there are approximately 54,000 ac (21,853 ha) of fee title lands in grassland that are managed by the Service in 12 of the counties within the historical or current range of the Dakota skipper and 365,000 ac (147,710 ha) protected by the Services' grassland easement program (Table 5; Larson 2013, pers. comm.). These acreages do not include an additional 4,000 ac (1,619 ha) of grass protected by acquisitions that have occurred in 2012 (Larson 2013, pers. comm.). Not all of these lands, however, may be managed in such a manner that is conducive to Dakota skipper populations.

About one-half of the present or unknown Dakota skipper sites (total number of present/unknown sites is 172) in the United States are privately owned (excluding populations on land owned by The Nature Conservancy). Twelve of these populations are on private land on which the Service has purchased conservation easements that preclude plowing and haying before July 16. Manitoba Habitat Heritage Corporation has an easement that overlaps with one Dakota skipper site in Canada (Friesen 2013, pers. comm.). Similarly, of the 70 privately owned sites where Poweshiek skipperling has

been recorded since 1985, 8 sites (all in Minnesota) have conservation easements. These easements do not prescribe grazing practices but are intended to prevent grassland conversion to cropland, which is detrimental to Dakota skippers or Poweshiek skipperlings. Additional measures on some easement properties could ensure grazing practices do not inadvertently impact either species.

The Nature Conservancy's Minnesota and Dakotas offices initiated a Prairie Coteau Coordinated Conservation Planning Effort and Plan in 1998 to facilitate conservation actions by various landowners, including private, county, state, tribal and Federal, on high biodiversity prairie sites (Skadsen 1999b, entire). Additional partners include conservation organizations, local conservation districts, and universities. The Nature Conservancy acquired a reserve in the Sheyenne Grassland area, Brown Ranch, which is a Dakota skipper site with an unknown status, and manages some of the most significant habitats for the two species in Minnesota, including the Hole-in-the-Mountain Prairie preserve. Based on intensive surveys in 2007, Dana (2008, p. 19) found ''considerable reassurance'' 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, for example, by controlling woody vegetation encroachment. The Minnesota DNR also manages the Prairie Coteau SNA with rotational burning (Dana 2008, p. 19), which may control woody vegetation encroachment. The Clay County Stewardship Plan (Felton Prairie Stewardship Committee 2002) may have reduced the likelihood and severity of gravel mining within the Felton Prairie complex in Minnesota.

Many of the best sites for Dakota skipper and Poweshiek skipperling in South Dakota are on tribal lands managed by the Sisseton-Wahpeton Sioux Tribe (*e.g.,* Scarlet Fawn and Oak Island Prairies) (Skadsen 1997, Skadsen 2012, p. 3), with late season haying. According to Skadsen (2012, p. 3) ''. . . as in prior years, the fall hayed prairies held in trust by the Sisseton Wahpeton Oyate had the most diverse native flora and thus the largest numbers of Dakota skippers.'' Although these lands generally contain high-quality habitat for prairie butterflies in eastern South Dakota (Skadsen 2012, p. 3), a change to alternate year haying—instead of annual haying—may further improve habitat quality by ensuring that plants that flower during the Dakota skipper and Poweshiek skipperling flight periods are able to produce seed (Royer and Royer 2012, p. 15).

The Day County Conservation District, South Dakota, places a high priority on implementing prescribed grazing on rangelands known to support Dakota skippers and bordering sites in the Upper Waubay Basin Watershed (Skadsen 1999b, p. 3). Their efforts include soliciting grants and providing education on grazing management, controlled burning, and integrated pest management to control leafy spurge, through workshops and a demonstration site. There are seven Poweshiek skipperling sites in Day County with unknown occupancy and no sites where the species is considered to be present. There are a total of 14 Dakota skipper sites in Day County: 2 sites where the species is considered to be present, and 12 sites that have an unknown occupancy. It is not known how many of these sites are benefiting from these efforts and to what degree.

In South Dakota, completed management plans guide habitat restoration at Hartford Beach State Park and Pickerel Lake State Recreation Area (Skadsen 2008, pp. 4–7; Skadsen 2011, pp. 1–4). 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 is divided into 3–4 management units. A controlled burn was conducted in one unit at Hartford Beach State Park in 2008, and shrubs were removed from two of the units (Skadsen 2008, p. 4). At Pickerel Lake State Recreation Area, a controlled burn was conducted in 2007, and in 2008 the site was hayed and shrubs were removed. The Dakota skipper was present in the burned unit for the first time since 2002 after ''a dramatic increase in forbs, especially purple coneflower, occurred after the burn'' and ''apparently attracted Dakota skippers from a nearby site'' (Skadsen 2008, p. 2). The Poweshiek skipperling is extirpated from both sites, but the reasons for its disappearance are not known (Service 2012, unpubl. data). At each site, prescribed fire and brush control are implemented on a rotational basis (Skadsen 2011, pp. 1–4); at Pickerel Lake State Recreation Area, forbs were planted in 2011 to diversify nectar resources for prairie butterflies (Skadsen 2011, pp. 2–4).

A privately owned ranch with Dakota skippers in Day County, South Dakota, is managed with a patch burn grazing system in which each grazing unit is rested for a full year (Skadsen 2008, p. 10), which may be beneficial to the species. The effects of patch burn grazing at this site are being studied jointly by The Nature Conservancy and South Dakota State University (Skadsen 2008, p. 10).

In 2005, the Service's National Wildlife Refuge System in North and South Dakota adopted the Conservation Strategy and Guidelines for Dakota Skippers on Service Lands in the Dakotas, which are based on the Service's Dakota Skipper Conservation Strategy and Guidelines and on versions of the Service's conservation guidelines for Dakota skipper. The guidelines were revised in March 2013 (*http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines2013.html*). In the Dakotas, the Service plans to implement the conservation guidelines on all of its lands where the Dakota skipper is known to occur—the Service owns 12 Dakota skipper sites in the Dakotas where the species is considered present or has unknown occupancy. The guidelines also suggest that the Service examine other lands under its ownership to determine whether unrecorded populations of Dakota skippers may be present and to conduct surveys in those areas or manage the site in accordance with the Dakota Skipper Conservation Strategy and Guidelines. These guidelines will be reviewed and updated to reflect new information as it is developed.

Poweshiek Skipperling

Most of the conservation initiatives discussed above were put in place to benefit the Dakota skipper, but may also benefit the Poweshiek skipperling. Conservation initiatives are also in place at several Poweshiek skipperling sites in Wisconsin and one or two sites in Michigan.

At least two sites occupied by Poweshiek skipperling in Michigan are at least partially owned and managed by the Michigan Nature Association (MNA); however, the MNA does not specifically manage for Poweshiek skipperling conservation. The State of Michigan owns part or all of four occupied Poweshiek skipperling sites; however, most of those lands are managed as state recreational areas, not for prairie butterfly conservation. Landowners at one fen site are participating in a Michigan DNR Land Incentive Program, and a portion of another occupied site is part of the Burr Memorial Prairie Plant Preserve (Michigan Natural Features Inventory 2011, unpubl. data). The Poweshiek skipperling may benefit from conservation activities in place for the federally endangered Mitchell's satyr at one Michigan site.

Poweshiek skipperling sites in Wisconsin are owned and managed by the Wisconsin DNR, who manage the land to maintain and improve prairie habitat. The Wisconsin DNR recently received a Sustain Our Great Lakes (SOGL) grant to conduct invasive species management on several SNAs, including Puchyan Prairie (Wisconsin DNR 2012, in litt.). The Scuppernong Prairie SNA, Wilton Road, and Kettle Moraine Low Prairie SNA are managed primarily through fire and invasive species control.

Furthermore, the Minnesota Zoo recently initiated a propagation research program for the Poweshiek skipperling and Dakota skipper to develop methods to propagate this and other species in the future. If this program is successful, the conservation benefit could be possible if it could facilitate reintroduction and augmentation efforts into areas where the species has declined or disappeared. Furthermore, this propagation effort may lead to knowledge of basic biology and life history of both species.

To summarize, the conservation initiatives discussed above may ameliorate one or more stressors on populations of Dakota skipper and Poweshiek skipperling at a relatively small number of sites. Approximately 12 Dakota skipper sites and 8 Poweshiek skipperling sites benefit from conservation easements; 12 Dakota skipper sites are owned by the Service and may benefit from implementation of Dakota skipper conservation guidelines; 2 sites in state parks are undergoing prairie restoration and management; approximately 5 additional Dakota skipper sites and 4 Poweshiek skipperling sites are managed to benefit prairie butterflies, such as rotational fire management. Since numerous sites have two or more stressors of moderate to high-level impacts to one or both species, all stressors are likely not completely ameliorated at many sites. Initiatives such as captive propagation and studies of the effects of various management techniques may be applied broadly and may be beneficial to each species as a whole—the timeframe for these benefits to be realized, however, will not be immediate.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Although its biology could make the Dakota skipper sensitive to collection at some locations, the present level of scientific collection is minimal and recreational collecting is unlikely (Royer and Marrone 1992a, p. 27). No collection threats are known or likely for the Poweshiek skipperling (Royer and Marrone 1992b, p. 16). Collection is not currently a threat to either species in Canada (COSEWIC 2003, p. 18). Scientific Collectors Permits are required in states where both species have legal protection, and permission is often required to collect specimens on protected areas. Furthermore, these species are not collected for commercial purposes; the drab coloration likely makes both species less desirable for collectors and the remoteness of occupied habitat and limited flight period would make recreational collections difficult (Borkin 2012, pers. comm.). Therefore, overutilization for commercial, recreational, scientific, or educational purposes is not currently a threat to Dakota skipper and Poweshiek skipperling.

Although recreational collection is not a threat to these species at this time, due to the few populations, small population size, and restricted range, if any recreational collecting did occur in the future, even limited collection from the remaining small and isolated populations could have deleterious effects on these species' reproductive and genetic viability.

Factor C. Disease or Predation

Diseases or parasites that are specific to the Dakota skipper or Poweshiek skipperling are not known, but some parasitism or predation likely occurs during each of the life stages. For example, 10 of 130 eggs tagged for field observation in a 1994 study of a Wisconsin Poweshiek skipperling population appeared to have suffered from predation or parasitism (Borkin 1995b, p. 5); some were punctured and had the contents extracted, and others turned black and dried up. Dana (1991, pp. 19–21) documented some parasitism of Dakota skipper and Ottoe skipper (*Hesperia ottoe*) eggs and larvae by various wasp and ant species and predation by various insects. Wolbachia, ubiquitous intercellular bacteria estimated to affect 20–70 percent of all insect species, including many butterfly species, affects the reproductive ecology of its host (Kodandaramaiah 2011, pp. 343–350). It is uncertain if Wolbachia are affecting the Dakota skipper or Poweshiek skipperling. The University of Michigan (at Dearborn) has plans to study Wolbachia bacteria on one or both of the species.

Predation by birds or insects is not considered a major component of Dakota skipper or Poweshiek skipperling population dynamics and does not likely impact the species. McCabe (1981, p. 187), however, noted three kinds of predators to Dakota skippers, including Ambush bugs (Hemiptera: *Phymata* sp.), flower spiders (Aranaea: *Misumena* spp.), and orb weavers (various Araneldae). Although flower spiders and ambush bugs are effective predators of nectar-feeding insects (McCabe 1981, pp. 187–188) and may cause mortality to some individuals, no evidence indicates that these predators have population level impacts to either the Dakota skipper or Poweshiek skipperling. Similarly, Orb weaver spiders appear to be successful predators of ''old, warn individuals'' (McCabe 1981, p. 188), but no evidence indicates that these predators have population-level impacts to the Dakota skipper and Poweshiek skipperling.

Therefore, we do not consider either disease or predation to be a significant stressor to the Dakota skipper or Poweshiek skipperling populations at this time, nor do we expect these stressors to become threats in the future.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms vary by location, but generally do not mitigate for the numerous threats that the Dakota skipper and Poweshiek skipperling face.

State Regulations

The Dakota skipper 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 . . . an endangered species of wild animal or plant'' except as permitted by the Minnesota DNR (Minnesota Statutes 2012, 84.0895). The Poweshiek skipperling is listed as a species of special concern in Minnesota, which conveys no prohibitions against take of the species. The Minnesota DNR has proposed to list Poweshiek skipperling as endangered and to change the status of Dakota skipper from threatened to endangered (Minnesota DNR 2012), but it is unclear when this may go into effect. The Poweshiek skipperling is listed as threatened under state endangered species statutes in Iowa and Michigan and as endangered in Wisconsin. South Dakota has an endangered species act, but no invertebrates are currently listed. South Dakota put forth a proposal to add the Dakota skipper to the state endangered species act list, but it was not finalized. Although the Dakota skipper is not listed as threatened or endangered under South Dakota's endangered species statute, the State natural

heritage program considers the species to be imperiled because of rarity due to very restricted range and very few populations. North Dakota does not have a mechanism for conferring protection to threatened or endangered species at the State level.

State Endangered species statutes provide state natural resource or conservation agencies with the authority to regulate collection of individuals and related activities (for Poweshiek skipperling in Iowa, Michigan, and Wisconsin and Dakota skipper in Minnesota), but we have no information to suggest that collection is a stressor that impacts populations of the species. With the exception of the regulation of some incidental take in Wisconsin and Minnesota, the statutory protections afforded by these state statutes may do little to protect or mitigate Poweshiek skipperling or Dakota skipper from non-collection threats. While some threats may result in direct mortality of both species, such as ill-timed fires, most threats to the species are indirect and state laws that regulate direct harm to the species do not address these threats. In Iowa, for example, Poweshiek skipperling populations are likely now extirpated due to habitat destruction and conversion and other undetermined threats, despite its presence on the State's list of threatened species since 1994. In Wisconsin, where threats from actions that may incidentally take Poweshiek skipperlings may be addressed in conservation plans, state endangered species protections do not protect the species from stochastic events and habitat fragmentation that are threats to the State's small and isolated populations.

Federal Regulations

The U.S. Forest Service (Forest Service or USFS) has designated the Poweshiek skipperling and the Dakota skipper as sensitive species (a species identified by a Regional Forester for which population viability is a concern) in North Dakota (Forest Service 2011). The Forest Service's objectives for sensitive species benefit Dakota skipper and Poweshiek skipperling where they occur (or could occur) on USFS lands; however, the majority of populations of both species do not occur within USFS lands. The Poweshiek skipperling has been documented at two sites on the Sheyenne National Grasslands; however, it has not been observed since 2001 at one site and 1996 at the other. Therefore, these Forest Service objectives, although promising, have little ability to affect the rangewide status of the species. If Forest Service lands were to be occupied by either species in the future, these objectives may benefit the species at a local scale.

Canadian Regulations

Dakota skipper and Poweshiek skipperling are listed as threatened under Canada's Species at Risk Act (SARA) (Environment Canada 2012. Species at Risk Act Public Registry. <*http://www.registrelep-sararegistry.gc.ca/sar/index/default_e.cfm*>. Accessed February 8, 2012). Under SARA, take of both species is prohibited on Canadian Federal lands, but the Poweshiek skipperling occurs only on non-federal lands in Canada, and only four or five Dakota skipper sites are on Federal lands (Coalfields Community Pasture) in Canada. The Federal Cabinet may create an order extending SARA's powers (*e.g.,* to private lands) if a species is insufficiently protected by provincial laws; however this has not been done for either of these species. The Dakota skipper is listed as threatened under the Manitoba Endangered Species Act, and it is therefore 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 species depends for its life and propagation (Manitoba Endangered Species Act <*http://www.gov.mb.ca/conservation/wildlife/legislation/endang_act.html*> Accessed February 7, 2012). The Poweshiek skipperling was recently listed as endangered in Manitoba (<*http://www.gov.mb.ca/conservation/wildlife/sar/sarlist.html*> Accessed December 28, 2012). There is no legal basis for protecting threatened or endangered invertebrates in Saskatchewan, but since both species are listed under SARA, the national government could step in to protect the species in the province if the province does not act to protect the species (Environment Canada. 2012. Species at Risk Act: A Guide. <*http://www.sararegistry.gc.ca/approach/act/Guide_e.cfm*> Accessed February 7, 2012).

To summarize, some of the regulatory mechanisms discussed above are beneficial to populations of Dakota skipper and Poweshiek skipperling at a local scale; however, most do not ameliorate stressors except for harm to individuals in certain states. With the exception of the regulation of some incidental take in Wisconsin, Minnesota, and Canada, the statutory protections afforded by these statutes may do little to protect Poweshiek skipperling or Dakota skipper from non-collection stressors.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Habitat Fragmentation and Population Isolation

As habitat specialists, habitat fragmentation has a strong negative effect on the distribution and abundance of the Dakota skipper and Poweshiek skipperling because both are dependent on remnant native tallgrass prairie or native mixed-grass prairie and, in Michigan, Poweshiek skipperling depends on native prairie fens. Habitat fragmentation reduced once extensive areas of these habitats to a collection of patches of varying quality and isolation. The probability of extinction within patches can be determined primarily by degradation of habitat quality, management techniques (*e.g.,* haying, prescribed burns), and likelihood of stochastic events, such as wildfire or floods.

Although there are no genetic studies on the Poweshiek skipperling, fragmentation of tallgrass prairie has degraded the genetic diversity of remaining Dakota skipper populations (Britten and Glasford 2002, pp. 371–372). What may have once been a single population of Dakota skippers spread across formerly extensive tallgrass and mixed-grass prairie (McCabe 1981, p. 184) is now fragmented into about 172 separate sites where the species is known to be or may still be present (sites with present (91) or unknown (81) status). The small genetic differences among seven Dakota skipper populations in the southern portion of the species' range suggest that they were formerly connected (Britten and Glasford 2002, pp. 371–372). Each Dakota skipper population is now subject to genetic drift that may erode its genetic variability over time and possesses genetic qualities indicative of inbreeding (Britten and Glasford 2002, pp. 371–372). Inbreeding lowers the capacity of local populations to adapt to environmental changes and may magnify the effect of deleterious alleles (genes with undesirable effects on individuals or populations) (Nieminen *et al.* 2001, pp. 242–243).

Poweshiek skipperlings are not wide dispersers (Burke *et al.* 2011, p. 2279; Fitzsimmons 2012, pers. comm.); species experts have estimated maximum dispersal distance to be less than 1.6 km (1.0 mi) (Westwood 2012b, pers. comm; Dana 2012b, pers. comm.). Its mobility, however, has been ranked as less than that of Dakota skipper (Burke *et al.* 2011, p. 2279; Fitzsimmons 2012, pers. comm.); therefore, a more conservative maximum dispersal

distance may be more similar to that of the Dakota skipper (less than 1 km (0.6 mi)). Most individuals may remain within a single habitat patch during their 5–7 day adult life span; therefore, local extinctions of the Poweshiek skipperling on isolated habitat fragments are likely permanent unless one or more populations located within 1.0–1.6 km (0.6–1.0 mi) are large enough to produce immigrants to reestablish populations. Furthermore, fragmentation of tallgrass prairie began in about 1830, and at least 85 to 99 percent of the original prairie is now gone across the species' ranges (Samson and Knopf 1994, p. 419). As a result, Poweshiek skipperling and Dakota skipper populations are now scattered in fragments of this once vast ecosystem. The Poweshiek skipperling may not move across barriers; for instance, in Manitoba, Poweshiek skipperlings have been observed avoiding dispersal over short distances, even to suitable habitat, if a barrier such as a road exists between suitable prairie habitat or nectar sources (Westwood *et al.* 2012, p.18). Repopulation of Poweshiek skipperling sites after extirpation has been observed (*e.g.,* after a flood) (Saunders 1995, p. 15), but source populations need to be adjacent or very close.

Similarly, Dakota skippers have a short (5- to 7-day) life span (Dana 1991, p. 32) and an estimated maximum dispersal distance to be no greater than 1 km (0.6 mi) between patches of prairie habitat separated by structurally similar habitats (Cochrane and Delphey 2002, pp. 6, 32). Therefore, Dakota skipper and Poweshiek skipperling habitat patches separated by more than 1 km (0.6 mi) are effectively isolated from one another (McCabe 1981, p. 190; 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, p. 535).

Because Dakota skipper and Poweshiek skipperling habitat is highly fragmented and because the species are subject to local extinction, their ability to disperse to reoccupy vacant habitat patches may be crucial for their long-term persistence. Patch isolation and decreased permeability of surrounding habitat acts as a dispersal barrier between patches, ultimately decreasing genetic diversity within the patch through genetic drift and inbreeding. If we assume isolation occurs when a patch is more than 1.6 km (1.0 mi) from another patch, then about 45 percent of Poweshiek skipperling locations with present or unknown status are effectively isolated, and would not be recolonized if extirpated (Service 2012 unpubl. data; Service 2013, unpubl. data). Using a more conservative maximum dispersal of 1.0 km (0.6 mi), approximately 56 percent of Poweshiek skipperling locations with present or unknown status are effectively isolated. Isolation was a factor in loss of a site at Hartford Beach State Park, South Dakota, where the Poweshiek skipperling was extirpated due to habitat succession and exotic plant invasion (Skadsen 2009, p. 4; Skadsen 2010, pers. comm.), but was located too far from a source population for natural recolonization to occur. Improved prairie management has since markedly improved habitat quality, but the species has not been detected since 2006 at Hartford Beach State Park (Skadsen 2009, p. 4; Skadsen 2012, p. 4; Service 2013, unpubl. data). For Dakota skipper, if we use a maximum dispersal distance of 1 km (0.6 miles), approximately 84 percent of Dakota skipper sites with present or unknown status are effectively isolated.

This simple analysis, however, probably underestimates the impacts of habitat fragmentation on the species. Populations of both species may only be near others that are too small to produce sufficient numbers of immigrants. This is true for the Poweshiek skipperling in Scuppernong Prairie in Wisconsin, for example, which is about 0.3 km (0.2 mi) from the Wilton Road population; fewer than 100 individuals have been counted at this site each year (See *Population Distribution and Status*). Numbers at Wilton Road are currently too small (less than 12 individuals counted each year) to produce sufficient numbers of emigrants to Scuppernong Prairie to reestablish a viable population in the event of the latter's extirpation. There is no population of Poweshiek skipperlings near the Puchyan Prairie site (which is about 100 km (62 mi) from the nearest site in Wisconsin); additionally, only a few individuals have been observed at this site each year. In North Dakota, Orwig (1997, p. 3) found that a 6 ha (15 ac) patch of Poweshiek skipperling habitat at Hartleben Prairie was connected by grassland to another Poweshiek skipperling population, but neither was considered a robust population. Only 2 of the 11 Poweshiek skipperling sites with present status in Michigan are located within 1 mi (1.6 km) of another site; the rest are completely isolated from other populations. Furthermore, most of these populations consist of few individuals (see *Population Distribution and Status*). Poweshiek skipperlings at Little Goose Lake Fen, for example, are separated from other populations by at least 8 km (5 mi)—too far for immigrants to repopulate the site. Furthermore, Little Goose Lake Fen may contain too few Poweshiek skipperlings (Michigan Natural Features Inventory 2011, unpubl. data) to generate sufficient numbers of immigrants. In addition, poor habitat quality negatively influences the number and quality of emigrants (Thomas *et al.* 2001, p. 1795; Matter *et al.* 2009, p. 1467). Isolation is not likely alleviated by connections to low-quality habitats that are not capable of producing emigrants at the numbers or frequency sufficient to reliably repopulate nearby patches.

Even with proper prairie management, extreme weather patterns or severe weather events may significantly impact Poweshiek skipperling and Dakota skipper populations, because they can occur across a large geographic area. These events include extremely harsh winters, late hard frosts following a spring thaw, severe storms, flooding, fire, or cool damp conditions. Habitats isolated as a result of fragmentation will not be recolonized naturally after local extirpations, as described above. Dakota skipper and Poweshiek skipperling numbers may decline due to the extirpation of isolated local populations where recolonization is no longer possible, even without further habitat destruction (Schweitzer 1989, unpaginated). The likelihood of population extirpation may be directly related to the size of habitat fragments. For example, in systematic surveys on Minnesota prairies, Swengel and Swengel (1997, pp. 134–137; 1999, p. 284) found no Dakota skippers on the smallest remnants (less than 20 ha (49 ac)), and significantly lower abundance on intermediate size (30–130 ha (74–321 ac)) than on larger tracts (greater than 140 ha (346 ac)). These differences were unrelated to vegetation characteristics; habitat area did not correlate significantly with vegetation type, quality, or topographic diversity (Swengel and Swengel 1999, p. 284).

We assessed the stressor of small size and isolation of habitat for 143 Dakota skipper sites and 68 Poweshiek skipperling sites with present or unknown status—many of the sites with where the species is present in Canada were not evaluated because we had little or no information on the size of sites (Service 2012 unpubl. data; Service 2013, unpubl. data). We considered small size and isolation of habitat to be a stressor with a low-level impact on populations at sites that contain more than 140 ha (346 ac) of native prairie or

the species' habitat onsite is located less than 1 km (0.6 mi) from habitat occupied by the species on another site. If the sum of native prairie on the site under review plus that on the nearby site(s) is less than 140 ha (346 ac), then this threat was considered to have a moderate or high impact on populations. We considered small size and isolation of habitat to be a stressor with moderate impacts on populations at sites where the species' habitat is greater than 1 km (0.6 mi) from any other area where the species is present, but contains more than 30 ha (74 ac) of habitat for the species; or where the species' habitat is less than 1 km (0.6 mi) from occupied Dakota skipper and Poweshiek skipperling habitat on another site, but the sum of native prairie on the site under review plus that on the nearby site(s) is less than 140 ha (346 ac) and greater than 30 ha (74 ac). Sites that contain a small area of Dakota skipper and Poweshiek skipperling habitat—no more than 30 ha (74 ac)—and that are not within 1 km (0.6 mi) estimated maximum dispersal distance of occupied Dakota skipper habitat are considered to have a stressor of high magnitude to those populations due to a combination of their small size and isolation.

Dakota skipper populations on about 35 percent of the evaluated sites (50 of 143 sites) face a high level of impact to populations due to a combination of size and isolation (Service 2012, 2013, unpubl. data). Approximately 24 percent of evaluated sites (35 sites) face a moderate level of impact to populations due to small size and isolation. About 40 percent of Dakota skipper sites (50 of the 143 evaluated sites) in the United States inhabit sites that are either sufficiently large (greater than 130 ha (346 ac)) or are close enough to other Dakota skipper populations that small size and isolation is not a stressor. Similarly, the stressor of small size and isolation has a high level of impact on Poweshiek skipperling populations on about 37 percent of rated sites (25 of 68 sites), on 24 sites (35 percent) the threat is considered to have a moderate level of impact to populations, and on 28 percent (19 of the 68 evaluated sites) of the sites, we do not consider a small size and isolation to be a stressor. In a separate analysis strictly looking at distances between Poweshiek skipperling sites where the species is present, we found that only 2 sites are within 1 km (0.6 mi) of another site where the species is present (Service 2013, unpubl geodatabase).

In summary, small, isolated populations face a current and ongoing stressor of moderate to high severity to both the Dakota skipper and Poweshiek skipperling. The stressor has a high impact to populations when isolation is combined with small habitat fragments or small populations; for example, where the population is too small to supplement nearby populations without adverse genetic consequences to the source population. Isolated populations occur throughout both species' entire ranges; only two percent of Poweshiek sites with present or unknown status are within the estimated maximum dispersal distance from one another as are about 16 percent of Dakota skipper sites with present or unknown occupancy. The small populations are subject to erosion of genetic variability leading to inbreeding, which lowers the ability of the species to adapt to environmental change. Small populations occur rangewide for both species; for example, surveyors have counted fewer than 100 individuals in all but 4 Poweshiek skipperling sites in 2011 and all but one site surveyed in 2012.

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). The term ''climate'' refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, p. 78). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, p. 78).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has been faster since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions. (For these and other examples, see IPCC 2007a, p. 30; and Solomon *et al.* 2007, pp. 35–54, 82–85). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate, and is ''very likely'' (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007a, pp. 5–6 and figures SPM.3 and SPM.4; Solomon *et al.* 2007, pp. 21–35). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al.* 2007, pp. 760–764 and 797–811; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529). (See IPCC 2007b, p. 8, for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation. Also see IPCC 2011(entire) for a summary of observations and projections of extreme climate events.)

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). Identifying likely effects often involves aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with,

adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (IPCC 2007a, p. 89; see also Glick *et al.* 2011, pp. 19–22). There is no single method for conducting such analyses that applies to all situations (Glick *et al.* 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

As is the case with all stressors that we assess, even if we conclude that a species is currently affected or is likely to be affected in a negative way by one or more climate-related impacts, it does not necessarily follow that the species meets the definition of an ''endangered species'' or a ''threatened species'' under the Act. If a species is listed as endangered or threatened, knowledge regarding the vulnerability of the species to, and known or anticipated impacts from, climate-associated changes in environmental conditions can be used to help devise appropriate strategies for its recovery.

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 prairie fen habitats and may be a threat that has significant impacts on prairie butterflies such as Dakota skippers and Poweshiek skipperling (Royer and Marrone 1992b, p. 12; Royer and Marrone 1992a, pp. 22–23; Swengel *et al.* 2011, p. 336; Landis *et al.* 2012, p. 140). For example, climatic factors, particularly precipitation and evaporation, play an important role in defining suitable Dakota skipper habitat (McCabe 1981, pp. 189–192). Larval Dakota skipper have ''hydrofuge glands'' that suggest an historical or present need of the species for protection from flooding (McCabe 1981, p. 181). Royer *et al.* (2008, p. 2) hypothesize that temperature and relative humidity at or near the soil surface may be important factors dictating larval survival, particularly since early stages live in a silken nest within a few centimeters (2–3) (0.8–1.2 in) of the soil surface during most of the summer (McCabe 1981, pp. 180–181, 189; Dana 1991, p. 16). Furthermore, both species and their habitats may experience the effects of gradual shifts in plant communities and an increase in catastrophic events (such as severe storms, flooding, and fire) due to climate change, which are exacerbated by habitat fragmentation. Isolated populations, specifically, Dakota skipper populations and Poweshiek skipperling populations that are separated by more than about 1 km (0.6 miles), are unlikely to recover from local catastrophes unless sufficient numbers are successfully reintroduced, for instance, through artificial propagation efforts.

Documentation of climate-related changes that have already occurred throughout the range of the Dakota skipper and Poweshiek skipperling (Johnson *et al.* 2005, pp. 863–871) and predictions of changes in annual temperature and precipitation in the Midwest region of the United States, such as Minnesota prairies (Galatowitsch *et al.* 2009, pp. 2017), Michigan fens (Landis *et al.* 2012, p. 140), and throughout North America (IPCC 2007, p. 9) indicate that increased severity and frequency of droughts, floods, fires, and other climate-related changes will continue in the future. Recent studies have linked climate change to observed or predicted changes in distribution or population size of insects, particularly Lepidoptera (Wilson and Maclean 2011, p. 262). Native remnant prairies have been reduced by 85 to 99.9 percent across the range of both species (Samson and Knof 1994, p. 419)—this fact, coupled with the low dispersal ability of both species, makes it unlikely that populations may expand to new areas, for example, in a northward direction, to adapt to changing climate. Climate change is a threat that has the potential to have severe impacts on the species; however, at this time our knowledge of how these impacts may play out is limited. All of the sites within the range of both species are in an area that could experience the effects of climate change.

Prairie Plant Harvesting

A potential, future threat to the Dakota skipper and Poweshiek skipperling is collection of purple coneflower (blacksamson echinacea), a predominate nectar source for both species, for the commercial herbal remedy market (Skadsen 1997, p. 30). Biologists surveying skipper habitats have not reported signs of plant collecting, but illegal or unregulated harvest could become a problem in Dakota skipper and Poweshiek skipperling habitats due to economic demand (Skadsen 1997, p. 30). Currently, prairie plant harvesting is not considered a threat that impacts the species; however, this situation may change if the demand for echinacea increases.

Management for Invasive Species and Succession

Native prairie and native prairie fens must be managed to prevent the indirect effects of invasive species and succession (processes of change in species structure to an ecological community over time; secondary succession is a disruption to succession that occurs due to an event such as fire) to Dakota skippers and Poweshiek skipperlings. If succession progresses too far, established shrubs or trees must be removed in a way that avoids or minimizes damage to the native prairie. When succession is well advanced, managers must use intensive methods, including intensive fire management, to restore prairie plant communities. If not done carefully, these actions may themselves harm local populations of the butterflies (for example, see *Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*). For example, once smooth brome has invaded Poweshiek skipperling or Dakota skipper habitat, it is challenging to eradicate it while minimizing harm to the butterflies. Willson and Stubbendiecks (2000, p. 36) recommended burning prairie habitats, annually in some cases, to control smooth brome at the stage when the lateral shoots are elongating. In southwest Minnesota and in other parts of Dakota skipper's range, the optimum time to burn to control smooth brome may occur during the time that the adult butterflies are active. Cutting or grazing to remove smooth brome may have less intensive effects on Poweshiek skipperling and Dakota skipper larvae and could be used as an alternative to fire, although these techniques also pose a risk to both species if carried out annually at isolated sites. Puchyan Prairie is another example of a small and isolated population that is susceptible to invasive species control efforts, if they are not conducted properly (Swengel and Swengel 2012, p. 6), although the Wisconsin DNR proposed control efforts that may improve habitat by removing reed canary grass, Canada thistle, and glossy buckthorn (Wisconsin DNR 2012 in litt.; Carnes 2012, in litt.).

If not appropriately managed with fire, grazing, or haying, Poweshiek skipperling and Dakota skipper habitat is degraded due to reduced diversity of native prairie plants and eventually succeeds to shrubby or forested habitats that are not suitable for either species. At Hartford Beach State Park in South Dakota, for example, the Poweshiek skipperling was extirpated (Skadsen

2009, p. 4) after lack of management led to invasion by smooth sumac (*Rhus glabra*) and quaking aspen (*Populus tremuloides*) (Skadsen 2006a, p. 5). Lack of management may also increase the likelihood of invasion of exotic cool-season grasses, such as Kentucky bluegrass and smooth brome (Mueller 2013, pers. comm.), which do not grow when Dakota skipper and Poweshiek skipperling larvae are feeding; thus a prevalence of these grasses reduces food availability for the larvae.

As with invasive species, actions intended to reverse secondary succession may be intensive and can themselves affect Poweshiek skipperling and Dakota skipper populations. For example, Poweshiek skipperling populations failed to recover after prescribed burns were carried out at Kettle Moraine Low Prairie SNA after it had become overgrown (Borkin 2011, in litt.).

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 for both species (Royer and Marrone 1992a, pp. 10, 16, 28, 29, 33, 1992b, p. 17, Orwig 1997, p. 7). For example, invasion of native prairie by exotic species, primarily leafy spurge and Kentucky bluegrass, as well as chemical control of exotic species, are documented threats to Dakota skippers at about 12 sites in North Dakota (Royer and Royer 2012b, pp. 15–16, 22–23). In repeated surveys, Royer and Marrone (1992a, p. 33) observed a correlation between the disappearance of the Dakota skipper and the advent of chemical weed control methods in North Dakota, including the Sheyenne National Grasslands. Royer and Marrone (1992b, p. 17), cited the combination of drought and grasshopper control programs along the Red River Valley as having serious impacts on the Poweshiek skipperling. Dana (1997, p. 5) concluded that herbicide use for weed and brush control on private lands is the principal threat to the Hole-in-the-Mountain complex in Minnesota, where both butterfly species have been documented. Furthermore, herbicide or pesticide use in concert with other management types may amplify other threats to the butterflies. Skadsen (2006b, p. 11), for example, documented the likely extirpation of the Poweshiek skipperling at Knapp Ranch in South Dakota after a July 2006 application of broadleaf herbicide associated with heavy grazing. The degree and immediacy of the threat posed by broadcast application of herbicides or pesticides is not precisely understood, but may be mostly tied to the use of herbicides to control invasive species on rangelands. If broad applications of herbicides are used in ways that remove plants from rangelands that are important for Poweshiek skipperling or Dakota skipper, then this is a potential threat on all privately owned sites where broadcast applications may occur.

Indiscriminant use of insecticides for pest control on rangeland, adjacent cropland, or forests is a stressor to populations of Poweshiek skipperling and Dakota skipper. Insecticides used in agriculture, urban gardens, and forests are a suspected cause of Colony Collapse Disorder in bees by reducing resistance to parasites and pathogens and may have similar effects on other insects (Beyers 2012, p. 1). Neonicotinyl pesticides, such as the imidacloprid compound, for example, are a commonly used seed dressing that spreads to nectar and pollen of flowering crops (Whitehorn 2012, p. 1). The spread of nonnative gypsy moths (*Lymantria dispar dispar*) has increased efforts to control this damaging species and may also pose a threat, especially in the range of Poweshiek skipperling. Insecticides used in the gypsy moth suppression programs typically include Foray, a formulation of the bacterial insecticide *Bacillus thuringiensis kurstakii* (Btk), or Gypchek, a viral insecticide specific to gypsy moth caterpillars. Btk is known to be lethal to butterfly larvae (*e.g.,* Karner blue butterfly) (Carnes 2011, p. 1). In Wisconsin, the gypsy moth suppression program is managed under State Statute 26.30 and Natural Resources Board Rule number 47, and Gypchek is used when endangered or threatened moths or butterflies are present (Wisconsin DNR, *http://dnr.wi.gov/topic/ForestHealth/GypsyMothPesticides.html,* accessed May 24, 2012).

Herbicide and pesticide use was assessed at 16 present and unknown Dakota skipper sites and 10 Poweshiek skipperling sites occupied with present or unknown occupancy where we had sufficient information to evaluate the stressor (Service 2012, 2013, unpubl. data). We considered the level of impact to populations posed by herbicide and pesticide use to be low if herbicides or pesticides are used, if the site is only spot sprayed when and where necessary (Smart *et al.* 2011, p. 182) and their use is not expected to change in the future. The level of threat was considered to be moderate if the use of herbicides is likely to increase at a site (*e.g.,* in response to new or expanding invasive species), but Dakota skipper and Poweshiek skipperling habitat is unlikely to be exposed to broadcast applications. The level of impact to populations posed by herbicide and pesticide use was considered to be high at sites where herbicides are likely to be broadcast over the entire site at least once every four years, or herbicide use has significantly reduced forb or nectar plant density and diversity or is likely to in the future. The level of impact to populations posed by herbicide and pesticide use was high at 5 of the 16 assessed Dakota skipper sites (2 in North Dakota and 3 in South Dakota) and moderate at 2 sites—one in North Dakota and one in South Dakota. The level of impact to populations posed by herbicide and pesticide use was considered to be high at 3 of the 10 assessed Poweshiek skipperling sites (all 3 in South Dakota), and 1 site in North Dakota had a moderate level of impact to populations.

In summary, some efforts to manage woody encroachment and invasive species, such as herbicide use, can be a stressor to both Dakota skipper and Poweshiek skipperling populations. Invasive species management is a current and ongoing threat of low to high impact to populations, depending on the intensity and extent of the use, types of techniques, and the compounding effects that may occur from varying management. Medium- to high-level impacts of herbicide or pesticide use to Dakota skipper and Poweshiek skipperling populations have been documented in North and South Dakota. This stressor has a high impact to populations when it is combined with other stressors, such as management, that reduces or eliminates nectar food sources, or small habitat fragments that are isolated from other source populations that may replenish individuals killed by pesticides. Herbicide and pesticide use may have direct or indirect effects on Dakota skipper and Poweshiek skipperling. Although such activities occur, there is no evidence that these activities alone have significant impacts on either species, since their effects are often localized. However, these factors may have a cumulative effect on the Dakota skipper and Poweshiek skipperling when added to habitat curtailment and destruction because dramatic population declines have occurred in both species (discussed in *Factor A*). Invasive species and woody vegetation management helps to maintain prairie habitats and can also be beneficial to populations of both species, for example, when concentrated on affected areas through spot spraying.

Pharmaceuticals

The effect of pharmaceutical residues in the environment on nontarget animals is an emerging concern (Lange *et al.* 2009). Ivermectin, a widely used and persistent veterinary pharmaceutical used to treat cattle, is a chemical of emerging concern to the Dakota skipper and Poweshiek skipperling. Ivermectin is an anthelmintic (drugs that are used to treat infections with parasitic worms) that is spread to prairie environments via the dung of grazing cattle (Lange *et al.* 2009, p. 2238). Lange *et al.* (2009, pp. 2234, 2238) found that skipper butterflies are particularly vulnerable to ivermectin, due to their low dispersive capacities and habitat preferences for soil. The extirpation of the Dakota skipper in at least one South Dakota site (Sica Hollow West) is possibly due to ivermectin that has leached into the environment (Skadsen 2010, pers. comm.).

Pharmaceutical use is a stressor that has the potential to have high-level impacts on populations of the Dakota skipper and Poweshiek skipperling; however, at this time our knowledge of these impacts is limited. Sites within the range of both species could experience the effects of pharmaceuticals. Sites that experience grazing, however, are particularly vulnerable to ivermectin use; these sites are primarily in South Dakota, North Dakota, and Minnesota. The use of pharmaceuticals such as ivermectin may have a cumulative effect on the Dakota skipper and Poweshiek skipperling when added to habitat curtailment or destruction, because habitat destruction leads to population declines in populations of both species (discussed in Factor A).

Unknown Stressors Causing Population Declines

The sharp and broad declines of Poweshiek skipperling documented in Iowa, Minnesota, North Dakota, and South Dakota are indicative of a response to one or more stressors that have yet to be ascertained. These unknown factors may consist of a combination of one or more of the threats described throughout Factors A, C and E of this proposed rule, or may be something that has not yet been identified. These declines are reminiscent of the widely publicized decline of honey bees (*Apis mellifera*) in that they seem sudden and mysterious (Spivak *et al.* 2011, p. 34).

One or more unidentified stressors have strongly impacted Poweshiek skipperling populations in the western portion of its range, which contains more than 80 percent of the species' site records. Unknown stressors may be the current threat with the most significant impacts to Poweshiek skipperling in Minnesota, North Dakota, and South Dakota, where populations experienced a sudden decline to undetectable numbers after about 2003. Until about 2003, Poweshiek skipperling was regarded as the most frequently and reliably encountered prairie-obligate skipper in Minnesota, which contains nearly 50 percent of all known Poweshiek skipperling locations. Numbers and distribution dropped dramatically in subsequent years, however, and the species has not been seen in Minnesota since 2007. Similar recent dramatic declines were observed in North Dakota, South Dakota, and Iowa (See Background of this rule).

Recent declines of Dakota skippers indicate that this species may also be impacted by unknown stressors. The Dakota skipper was last detected at one site in Iowa in 1992. Only one individual was detected in Minnesota during 2012 surveys, which included 18 sites with previous records; surveys for undiscovered populations were also carried out on 23 prairie remnants without previous records for the species. Based on similar conditions in other parts of the species' range, similar trends are anticipated outside of Minnesota. Indications of recent declining trends have been observed in South Dakota and North Dakota. In South Dakota, for example, the proportion of positive surveys at known sites has fluctuated over time; however, the 2012 surveys had the lowest positive detection rate (35 percent) for the last 15 years (since 1996)—much less than comparable survey years in South Dakota (for years with more than 20 surveys). The Dakota skipper was detected at 12 of the 23 sites surveyed during 2012 in North Dakota (and 2 additional sites with no previous Dakota skipper records); average encounter frequencies observed across the State in 2012 (9.4 encounters per hour), however, were about half of those observed during the 1996–1997 statewide surveys (ND state average = 17.4 encounters per hour). Recent survey results and similar life histories suggest that the Dakota skipper can be reasonably compared to the Poweshiek skipperling in their potential rate of decline—that is, it is reasonable to assume that Dakota skipper may be vulnerable to the same unidentified factors that have caused dramatic declines in the Poweshiek skipperling, with a slight delay in timing.

In summary, the results of extensive surveys in the western portion of the Poweshiek skipperling's range have documented the species' response to unknown stressors and indicate that they are a current threat of high severity. Although to date the Dakota skipper has not experienced such dramatic declines as the Poweshiek skipperling, similar unknown stressors on Dakota skipper populations likely have affected the species in Minnesota and Iowa, where recent surveys indicate that the species may be absent or at undetectable levels.

Summary of Factor E

Based on our analysis of the best available information, we have identified several natural and manmade factors affecting the continued existence of the Dakota skipper and Poweshiek skipperling. Effects of small population size, population isolation, and loss of genetic diversity are likely threats that have significant impacts on both species. Environmental effects resulting from climatic change, including increased flooding and drought, are expected to become severe in the future and result in additional habitat losses; however, we have limited information on how this stressor may affect either species. Possibly the threat with the most significant impacts to the Poweshiek skipperling are one or more unknown stressors that have led to widespread and sharp population declines in the western portion of the species' range. These unknown stressors may also be the cause of the recent declines observed in Dakota skipper populations over much of its range. Anthropogenic factors such as insecticides, herbicide and pesticide use, and prairie plant harvest are also threats to both species. Collectively, these threats have operated in the past, are impacting both species now, and will continue to impact the Dakota skipper and Poweshiek skipperling in the future.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

Several of the conservation activities discussed under *Factor A.* in this rule may address some factors discussed under *Factor E,* for example life-history studies of both species, studies to examine the effects of various management strategies on the species and its habitat, and habitat restoration techniques such as controlled burns on sites divided into several management units.

The Minnesota Zoo has initiated a new program to research Poweshiek skipperling and Dakota skipper

propagation. If this program is successful, it could facilitate reintroduction and augmentation into areas where the species has declined or disappeared, to bolster the small genetic pool and small numbers. In 2012, researchers at the Minnesota Zoo and the University of Michigan initiated a genetics study of Dakota skipper and Poweshiek skipperling using specimens at some of the few sites where either species was observed in 2012, specifically a few sites in Michigan, Wisconsin, and Manitoba for the Poweshiek skipperling and sites in North Dakota, South Dakota, and Manitoba for Dakota skipper. Too few (one adult male) Dakota skipper were observed in Minnesota to obtain samples from that State in 2012. The genetics studies will help inform captive propagation and reintroduction efforts, which may help alleviate stressors associated with small and isolated populations.

In 2011, researchers collected 32 adult Dakota skippers from a combination of 4 sites in South Dakota and translocated them to Pickerel Lake State Park, where the species was last detected in 2008 (Skadsen 2011, pp. 7–9). The phenology of the adult flight period and purple coneflower blooms did not coincide, and no Dakota skippers were observed at the release site during subsequent visits in 2011 or 2012 (Skadsen 2011, pp. 8–9, Skadsen 2012, p. 4). Researchers and managers continue to develop prairie restoration and management goals for this and the Hartford Beach State Park site in South Dakota (Skadsen 2011, p. 9; Skadsen 2012, p. 7).

We are unaware of any conservation efforts that directly address the impacts of climate change to Dakota skippers or Poweshiek skipperlings. We are unaware of any conservation efforts that address the possible effects of pharmaceuticals on the Poweshiek skipperling and Dakota skipper.

Cumulative Effects From Factors A through E

Many of the threats described in this finding may cumulatively or synergistically impact the Dakota skipper and Poweshiek skipperling beyond the scope of each individual threat. For example, improper grazing management alone may only affect portions of Dakota skipper or Poweshiek skipperling habitat; however, improper grazing combined with invasive plants, herbicide use, and drought may collectively result in substantial habitat loss, degradation, or fragmentation across large portions of the species' ranges. In turn, climate change may exacerbate those effects, further diminishing habitat and increasing the isolation of already declining and isolated populations, making them more susceptible to genetic drift or catastrophic events such as fire, flooding, and drought. Further, nonagricultural development such as gravel mining or housing development not only can directly destroy habitat, but also can increase fragmentation of habitat by increasing associated road development. Additionally, draining prairie fens will increase invasive plant and woody vegetation encroachment. Numerous threats are likely acting cumulatively to further increase impacts on the already vulnerable, small and isolated populations of Poweshiek skipperling and Dakota skipper.

Proposed Determinations

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

Dakota skipper

We carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Dakota skipper. Dakota skippers are obligate residents of undisturbed (remnant, untilled) high-quality prairie, ranging from wet-mesic tallgrass prairie to dry-mesic mixed-grass prairie. Native tallgrass prairies have been reduced by 85 to 99.9 percent of their former area and native mixed-grass prairies have been reduced by 71.9 to 99 percent of their former area in North Dakota, Manitoba, and Saskatchewan. The Dakota skipper was once a common prairie butterfly widely dispersed in five states, extending from Illinois to North Dakota, and portions of 2 Canadian provinces. However, its range is now substantially reduced such that the Dakota skipper is restricted to small patches of fragmented native prairie remnants in portions of three states and two Canadian provinces. Recent survey data indicate that the Dakota skipper has declined to zero or to undetectable levels in approximately 50 percent of sites where it had been recorded rangewide. It is presumed extirpated from Illinois and Iowa and no longer occurs east of western Minnesota—an approximately 430-mi (690-km) reduction of its range. Much of the rangewide decline in the species has been observed in the last few years. Since 1985, researchers have surveyed 10 or more sites in 27 years; the average positive detection rate for those years is 69 percent rangewide. Since 2010, the percent of surveyed sites with positive detections of the species has dropped from 80 percent in 2010, to 42 percent in 2011, and to 35 percent in 2012. While these types of lows in detections have been observed in past years, for example, in the early 1990s, the numbers of individuals observed in 2012 were the lowest ever recorded, despite extensive survey effort. Dakota skippers currently occupy sites in northeastern South Dakota, North Dakota, western Minnesota, southern Manitoba, and southeastern Saskatchewan.

Of the 259 historical locations, the species is presumed extirpated or possibly extirpated from at least 87 (34 percent) of those sites, and the occupancy of the species is unknown at approximately 81 (31 percent) sites. Of the 81 sites where the occupancy is unknown, at least 72 sites are subject to one or more threats that have a moderate to high impact on those populations—these sites are distributed across Minnesota, North Dakota, and South Dakota. The 9 sites with unknown occupancy without moderate- to high-level threats are scattered in various counties in Minnesota and South Dakota, and the skipper is thought to still be present at approximately 91 (35 percent) of the 259 historical locations, although 23 of these sites have not been surveyed since 2002. Of those 91 sites, at least 83 sites are subject to one or more threats that have a moderate to high impact on those populations, such as conversion to agriculture, lack of management, and small size and isolation. The remaining 8 sites that do not have stressors with moderate- to high-level impacts to populations occur in scattered counties in Minnesota and South Dakota. Approximately half (45 of 91) of the locations where the species is considered to be present are located on privately owned fall hayed prairies in Canada, mostly within 3 isolated complexes, and have not been surveyed since 2007. All 45 of those Canadian sites have one or more stressors of moderate to high level of impact to

populations. A fair number of populations in Canada are being managed in a manner conducive to the conservation of the Dakota skipper and the threats at those sites are not immediate. However, few (4–5 sites) of these Canadian populations are protected (on Federal land). The remaining sites where the species is considered to be present are about equally distributed among Minnesota (14 sites), North Dakota (18 sites), and South Dakota (14 sites). Sites with stressors with moderate to high level of impacts to populations occur in all three states.

Many factors likely contributed to the Dakota skipper's decline, and numerous major threats, acting individually or synergistically, continue today (see Summary of Factors Affecting the Species). Habitat loss and degradation have impacted the Dakota skipper, curtailing the ranges of the species (see Factor A). Extensive historical conversion of prairie and associated habitats, nearly complete in some areas, has isolated many Dakota skipper populations. These small and isolated populations are subject to loss of genetic diversity through genetic drift (see Factor E) and are susceptible to a variety of stochastic (*e.g.,* wildfires, droughts, and floods) and deterministic (*e.g.,* overgrazing, invasive species) factors (see Factor A) that may kill all or a substantial proportion of a population. Although much of the habitat conversion occurred in the past, the effects of the dramatic reduction and fragmentation of habitat have persistent and ongoing effects on the viability of populations; furthermore, conversion of native prairies to agriculture or other uses is still occurring today. The life history of the species exacerbates the threats caused by the fragmentation and degradation of the species' habitat (see Factors A and E) as the Dakota skipper is not likely to recolonize distant sites due to its short adult life span, single annual flight, and limited dispersal ability. Therefore, the species' extirpation from a site is likely permanent unless it is near another site from which it can emigrate. Furthermore, because the larvae are located at or near the soil surface, they are more vulnerable to fire (Factor A), herbicides, pesticides, and other chemicals (see Factor E); desiccation due to changing climate (see Factor E); or flooding (see Factor A).

Within the remaining native prairie patches, degradation of habitat quality is now the primary threat to the Dakota skipper (see Factor A). Of the various threats to Dakota skipper habitat, conversion, invasive species, secondary succession, and reduction in the diversity of native prairie plant communities have moderate- to high-level impacts to populations throughout the range of the Dakota skipper. An array of other factors including nonagricultural development, chemical contaminants, pesticides, and intensive grazing are also current and ongoing threats to the Dakota skipper and its habitat (see Factors A and E). Current and ongoing prairie management practices, such as indiscriminate use of herbicides or intensive grazing that reduces or eliminates food sources, contribute to the species' imperilment at sites throughout the range of the species (see Factors A and E). Unknown stressors may be the current threat that has the most significant impacts to the Dakota skipper in Iowa and Minnesota, where populations experienced a sudden decline to undetectable numbers in the most recent years (see *Factor E*). Based on recent data, similar conditions in other parts of the Dakota skipper's range, and the similarities in life histories between Poweshiek skipperling and Dakota skipper, similar declining trends are anticipated in other parts of the Dakota skipper's range due to unknown stressors, and may only be a few years behind those declines experienced by Poweshiek skipperling (see Factor E). Existing regulatory mechanisms vary across the species' ranges, and although mechanisms do exist that protect the species from direct take in Iowa and Minnesota, these mechanisms do not sufficiently mitigate threats to the species (see Factor D). Climate change may affect Dakota skipper, especially increased frequency of extreme climatic conditions such as flooding and drought, but there is limited information on the exact nature of impacts that these species may experience. Recent temperature and precipitation trends indicate that certain aspects of climate change may be occurring in Dakota skipper range now (see Factor E).

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the Dakota skipper is likely to become endangered throughout all of its range within the foreseeable future, based on the immediacy, severity, and scope of the threats described above. These threats are exacerbated by small population sizes, the loss of redundancy and resiliency of these species, and the continued inadequacy of existing protective regulations. A few scattered populations of Dakota skipper are doing relatively well, however, and are in habitats that have low or non-immediate threats. Canada has a fair number of populations that are being managed in a manner conducive to the conservation of Dakota skipper, and the threats at those sites are not imminent. However, few of these populations are protected, many are vulnerable to changes in land use, and the sites have not been surveyed in the last 5 years. While a few new locations of Dakota skipper populations continue to be discovered in North and South Dakota, the numbers of individuals observed at those sites is generally low, and extirpation at previously known sites seems to be occurring at a faster rate than new discoveries. The decreasing numbers of sites with positive detections and the decreasing numbers of individuals observed at each site throughout its range, including known sites in North Dakota and South Dakota, is likely to continue. Therefore, on the basis of the best available scientific and commercial information, we propose listing the Dakota skipper as threatened in accordance with sections 3(6) and 4(a)(1) of the Act.

We find that an endangered species status is not appropriate for the Dakota skipper because some Dakota skipper populations still appear to be doing relatively well—primarily in North Dakota, South Dakota, Manitoba, and Saskatchewan. Canada has a fair number of populations that are being managed in a manner conducive to the conservation of Dakota skipper, and the threats at those sites are not imminent. Furthermore, we believe the species to be present in at least 8 sites that do not have documented stressors of a moderate to high level impact to populations, primarily in scattered counties in Minnesota and South Dakota. Additionally, a few new Dakota skipper sites continue to be discovered in suitable prairie habitat in North Dakota and South Dakota.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. Threats to the survival of the Dakota skipper occur throughout the species range and are not restricted to any particular significant portion of that range. Accordingly, our assessment and proposed determination applies to the Dakota skipper throughout its range.

Significant Portion of the Range

In determining whether a species is threatened or endangered in a

significant portion of its range, we first identify any portions of the range of the species that warrant further consideration. The range of a species can theoretically be divided into portions an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be both (1) Significant and (2) threatened or endangered. To identify only those portions that warrant further consideration, we determine whether substantial information indicates that: (1) The portions may be significant, and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that are not significant, such portions will not warrant further consideration.

If we identify portions that warrant further consideration, we then determine whether the species is threatened or endangered in these portions of its range. Depending on the biology of the species, its range, and the threats it faces, the Service may address either the significance question or the status question first. Thus, if the Service considers significance first and determines that a portion of the range is not significant, the Service need not determine whether the species is threatened or endangered there. Likewise, if the Service considers status first and determines that the species is not threatened or endangered in a portion of its range, the Service need not determine if that portion is significant. However, if the Service determines that both a portion of the range of a species is significant and the species is threatened or endangered there, the Service will specify that portion of the range as threatened or endangered under section 4(c)(1) of the ESA.

We evaluated the current range of the Dakota skipper to determine if potential threats for the species have any apparent geographic concentration. We examined potential habitat threats from effects of habitat loss, fragmentation, degradation, and modification from agriculture, development, invasive species, secondary succession, grazing, and haying (Factor A); overutilization for scientific or recreational collection (Factor B); disease and predation (Factor C); the inadequacy of existing regulatory mechanisms (Factor D); and the effects of habitat fragmentation and small population size and isolation, climate change, pharmaceuticals, insecticides, pesticides, prairie plant harvest, and unknown stressors (Factor E). As discussed above, although the specific threats affecting the species may be different at individual sites or in different parts of the Dakota skipper's range, on the whole threats are occurring throughout the species' range. The Dakota skipper is thought to still be present at approximately 91 sites, at least 83 of which are subject to one or more threats that have a moderate to high impact on those populations. On no portions of its range are threats significantly concentrated or substantially greater than in other portions of its range; therefore, we find that impacts to the Dakota skipper are essentially uniform throughout its range, indicating that the entire range warrants a threatened status under the Act. As discussed above, our review of the best available scientific and commercial information indicates that the Dakota skipper is not in danger of extinction (endangered) but is likely to become endangered within the foreseeable future (threatened) throughout all of its range. Therefore, we find that listing the Dakota skipper as a threatened species under the Act throughout its entire range is warranted at this time.

Poweshiek skipperling

We carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Poweshiek skipperling. Poweshiek skipperling are obligate residents of undisturbed (remnant, untilled) high-quality prairie, ranging from wet-mesic tallgrass prairie to dry-mesic mixed-grass prairie. Native tallgrass prairies have been reduced by 85 to 99.9 percent of their former area and native mixed-grass prairies have been reduced by 72 to 99 percent of their former area in North Dakota, Manitoba, and Saskatchewan. The Poweshiek skipperling was once a common prairie butterfly widely dispersed in eight states, extended from Michigan to North Dakota, and portions of Manitoba, Canada. However, its range is now substantially reduced such that the Poweshiek skipperling is restricted to small patches of fragmented native prairie remnants in portions of two states and one Canadian province. The species is presumed extirpated from Illinois and Indiana, and the status of the species is unknown in four of the six states with relatively recent records (within the last 20 years). Recent survey data indicate that the Poweshiek skipperling has declined to zero or to undetectable levels in approximately 87 percent of sites where it has ever been recorded.

A drastic decline in this species has been observed rangewide very recently. Between 1985 and 2003, researchers surveyed 10 or more sites in 7 different years (excluding new sites in the first year); the average positive detection rate for those years is 71 percent rangewide. Since 2003, the percent of surveyed sites with positive detections of the species has dropped to an average of 29 percent each year (2004–2012), with a low of 13 percent at sites surveyed in 2012. Despite recent substantial survey efforts in those states, the Poweshiek skipperling has not been recorded in Iowa since 2007, when it was observed at 1 site; in Minnesota since 2007, when it was observed at 1 site; in North Dakota since 2001, when it was observed at 1 site, nor in South Dakota since 2008, when it was observed at 3 sites. The species was not observed in North Dakota, South Dakota, or Minnesota during 2012 surveys, for example. Iowa sites were not surveyed in 2012. Poweshiek skipperling have historically been documented at approximately 296 sites; now we consider the species to be present at only 14 of those sites—one of these is considered a sub-site of a larger site.

The only confirmed extant (present) populations of Poweshiek skipperling are currently restricted to 2 small and isolated native-prairie remnants in Wisconsin, 10 small and isolated prairie fen remnants in Michigan, and a prairie complex in Manitoba. These sites represent only 5 percent of the total number of sites ever documented for the species. The numbers observed at these sites are relatively small (less than 100 at all but 2 sites), and all of these sites have at least one documented threat that have moderate to high impacts on those populations. The strongest population in the United States, a prairie fen in Michigan with relatively high and fairly consistent numbers observed each year (numbers observed per minute ranged from 1.2 to 2.2 during the last 4 survey years), for instance, is under threat from intense development pressure. The Tallgrass Prairie Preserve site in Manitoba also has relatively high numbers observed each year; however, this site is impacted by several immediate, moderate- to high-level threats, including the encroachment of invasive plants and woody vegetation, flooding, and isolation from the nearest site by hundreds of kilometers. In addition, recent unplanned fires in 2009 and 2011 affected large portions of the site. Poweshiek skipperling is

considered to have unknown occupancy at 131 sites—throughout the range of the species (Iowa, Michigan, Minnesota, North Dakota, and South Dakota), 54 of these sites were included in the threats assessment. Of the 54 sites where the occupancy is unknown that had sufficient information to assess, at least 43 sites are subject to one or more threats that have a moderate to high impact on those populations. These sites are throughout the range of the species in Iowa, Michigan, Minnesota, North Dakota, and South Dakota.

Summary

Many factors likely contributed to the Poweshiek skipperling's decline, and numerous major threats, acting individually or synergistically, continue today (see Summary of Factors Affecting the Species). Habitat loss and degradation have impacted the Poweshiek skipperling, curtailing the ranges of both species (see Factor A). Extensive historical conversion of prairie and associated habitats, nearly complete in some areas, has isolated many Poweshiek skipperling populations. These small and isolated populations are subject to loss of genetic diversity through genetic drift (see Factor E) and are susceptible to a variety of stochastic (*e.g.,* wildfires, droughts, and floods) and deterministic (*e.g.,* overgrazing, invasive species) factors (see Factor A) that may kill all or a substantial proportion of a population. Although much of the habitat conversion occurred in the past, the effects of the dramatic reduction and fragmentation of habitat have persistent and ongoing effects on the viability of populations; furthermore, conversion of native prairies to agriculture or other uses is still occurring today. The life history of the species exacerbates the threats caused by the fragmentation and degradation of its habitat (see Factors A and E) as Poweshiek skipperlings are not likely to recolonize distant sites due to their short adult life span, single annual flight, and limited dispersal ability. Therefore, the Poweshiek skipperling's extirpation from a site is likely permanent unless it is near another site from which it can emigrate. Furthermore, because the larvae are located at or near the soil surface, they are more vulnerable to fire (Factor A), herbicides, pesticides, and other chemicals (see Factor E); desiccation due to changing climate (see Factor E); or changes in hydrology (see Factor A).

Within the remaining native-prairie patches, degradation of habitat quality is now the primary threat to the Poweshiek skipperling (see Factor A). Of the various threats to Poweshiek skipperling habitat, conversion, invasive species, secondary succession, and reduction in the diversity of native-prairie plant communities have moderate- to high-level impacts to populations throughout the range of the Poweshiek skipperling. An array of other factors including nonagricultural development, chemical contaminants, pesticides, and intensive grazing are also current and ongoing threats to the Poweshiek skipperling and its habitat (see Factors A and E). Current and ongoing prairie management practices, such as indiscriminate use of herbicides or intensive grazing that reduces or eliminates food sources, contribute to the species' imperilment, particularly in North Dakota, South Dakota, and Minnesota (see Factors A and E). Unknown stressors may be the current threat that has the most significant impacts to the Poweshiek skipperling species in Iowa, Minnesota, North Dakota, and South Dakota, where populations experienced a sudden decline to undetectable numbers in the most recent years (see *Factor E*). Existing regulatory mechanisms vary across the species' ranges, and although mechanisms do exist in Iowa, Michigan, Minnesota, and Wisconsin that protect the species from direct take, these mechanisms do not sufficiently mitigate threats to the Poweshiek skipperling (see Factor D). Climate change may affect the Poweshiek skipperling, especially increased frequency of extreme climatic conditions such as flooding and drought, but there is limited information on the exact nature of impacts that the species may experience. Recent temperature and precipitation trends indicate that certain aspects of climate change may be occurring in Poweshiek skipperling range now (see Factor E).

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the Poweshiek skipperling is presently in danger of extinction throughout its entire range, based on the immediacy, severity, and scope of the threats described above. These threats are exacerbated by small population sizes, the loss of redundancy and resiliency of these species, and the continued inadequacy of existing protective regulations. There are only 14 locations where we believe the species to be present, and all of those sites are subject to at least one or more ongoing and immediate moderate- to high-level threats that have moderate- to high-level effects on those populations that is ongoing and immediate. Therefore, on the basis of the best available scientific and commercial information, we propose listing the Poweshiek skipperling as endangered in accordance with sections 3(6) and 4(a)(1) of the Act.

We find that a threatened species status is not appropriate for the Poweshiek skipperling because the unknown stressors have significant impacts to the species throughout most of its range and have occurred in a short timeframe. Sharp population declines have not been detected at the few remaining sites where the species is still present, but all of these sites are currently experiencing one or more stressors that has moderate- to high-level impacts to populations. Based on recent data and similar conditions in other parts of Poweshiek skipperling range, similar declining trends are anticipated in other parts of the range of the species, and may only be a few years behind those declines experienced by the species in Iowa, Minnesota, North Dakota, and South Dakota (see Factor E). The impacts of the unknown stressors on populations are exacerbated by habitat curtailment and destruction and other factors such as the effects of small and isolated populations due to habitat fragmentation.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The Poweshiek skipperling proposed for listing in this rule is highly restricted in its range, and the threats occur throughout its range. Therefore, we assessed the status of the species throughout its entire range. The threats to the survival of the Poweshiek skipperling occur throughout the species' range and are not restricted to any particular significant portion of that range. Accordingly, our assessment and proposed determination applies to the Poweshiek skipperling throughout its entire range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and requires

that recovery actions be carried out for all listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed, preparation of a draft and final recovery plan, and revisions to the plan as significant new information becomes available. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. The recovery plan identifies site-specific management actions that will achieve recovery of the species, measurable criteria that determine when a species may be downlisted or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (comprising species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outlines, draft recovery plans, and the final recovery plans will be available on our Web site (*http://www.fws.gov/endangered*), or from our Twin Cities Ecological Services Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribal, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (*e.g.,* restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

If these species are listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin would be eligible for Federal funds to implement management actions that promote the protection and recovery of the Poweshiek skipperling and Dakota skipper. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants.*

Although the Dakota skipper and Poweshiek skipperling are only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for these species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may adversely affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agency actions within the species habitat that may require conference or consultation or both as described in the preceding paragraph include, but are not limited to, management and any other landscape-altering activities on Federal lands such as actions within the jurisdiction of the Natural Resources Conservation Service; land management by the U.S. Forest Service; issuance of section 404 Clean Water Act permits by the U.S. Army Corps of Engineers; land management by the U.S. Fish and Wildlife Service; construction and management of gas pipeline, wind facilities and associated infrastructure, and power line rights-of-way by the Federal Energy Regulatory Commission; construction and maintenance of roads or highways by the Federal Highway Administration; and land management within branches of the Department of Defense (DOD). Examples of these types of actions include activities funded or authorized under the Farm Bill Program, Environmental Quality Incentives Program, Clean Water Act (33 U.S.C. 1251 *et seq.*), Partners for Fish and Wildlife Program, and DOD construction activities related to training or other military missions.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. The prohibitions of section 9(a)(2) of the Act, codified at 50 CFR 17.21 for endangered wildlife, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import, export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. Under the Lacey Act (18 U.S.C. 42–43; 16 U.S.C. 3371–3378), it is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 for endangered species, and at 17.32 for threatened species. With regard to endangered wildlife, a permit must be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities.

Our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), is to identify to the maximum

extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of species proposed for listing. The following activities could potentially result in a violation of section 9 of the Act; this list is not comprehensive:

(1) Unauthorized collecting, handling, possessing, selling, delivering, carrying, or transporting of the species, including import or export across State lines and international boundaries, except for properly documented antique specimens of these taxa at least 100 years old, as defined by section 10(h)(1) of the Act;

(2) Introduction of nonnative species that compete with or prey upon the Dakota skipper and Poweshiek skipperling or their food sources, such as the introduction of nonnative leafy spurge, reed canary grass, or glossy buckthorn, to the State of Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin;

(3) The unauthorized release of biological control agents that attack any life stage of these species, including the unauthorized use of herbicides, pesticides, or other chemicals in habitats in which the Poweshiek skipperling or Dakota skipper is known to occur;

(4) Unauthorized modification, removal, or destruction of the prairie vegetation, soils, or hydrology in which the Dakota skipper and Poweshiek skipperling are known to occur; and

(5) Unauthorized discharge of chemicals or fill material into any wetlands in which the Poweshiek skipperling or Dakota skipper are known to occur.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Twin Cities Ecological Services Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**). Requests for copies of the regulations concerning listed animals and general inquiries regarding prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Endangered Species Permits, 5600 American Blvd., West, Suite 990, Bloomington, MN (telephone 612–713–5350; facsimile 612–713–5292).

Special Rule

Under section 4(d) of the Act, the Secretary may publish a special rule that modifies the standard protections for threatened species in the Service's regulations at 50 CFR 17.31, which implement section 9 of the Act, with special measures that are determined to be necessary and advisable to provide for the conservation of the species. As a means to promote conservation efforts on behalf of the Dakota skipper, we are proposing a special rule for this species under section 4(d) of the Act. In the case of a special rule, the general regulations (50 CFR 17.31 and 17.71) applying most prohibitions under section 9 of the Act to threatened species do not apply to that species, and the special rule contains the prohibitions necessary and appropriate to conserve that species.

As discussed above, the primary factors supporting the proposed determination of threatened species status for the Dakota skipper are habitat loss and degradation of native prairies, including conversion of native prairie for agriculture or other development; ecological succession and encroachment of invasive species and woody vegetation; certain fire, haying, and grazing management that reduces the availability of certain native-prairie grasses and flowering herbaceous plants to Dakota skipper; some fire management; flooding; existing regulatory mechanisms that are inadequate to mitigate threats to the species; loss of genetic diversity; small size and isolation of remnant patches of native prairie; indiscriminate use of herbicides that reduces or eliminates nectar sources; climate conditions such as drought; and other unknown stressors.

The Act does not specify particular prohibitions, or exceptions to those prohibitions, for threatened species. Instead, under section 4(d) of the Act, the Secretary of the Interior has the discretion to issue such regulations as she deems necessary and advisable to provide for the conservation of such species. The Secretary also has the discretion to prohibit by regulation with respect to any threatened species, any act prohibited under section 9(a)(1) of the Act. Exercising this discretion, the Service has developed general prohibitions (50 CFR 17.31) and exceptions to those prohibitions (50 CFR 17.32) under the Act that apply to most threatened species. Alternately, for other threatened species, the Service develops specific prohibitions and exceptions that are tailored to the specific conservation needs of the species. In such cases, some of the prohibitions and authorizations under 50 CFR 17.31 and 17.32 may be appropriate for the species and incorporated into a special rule under section 4(d) of the Act, but the section 4(d) special rule will also include provisions that are tailored to the specific conservation needs of the threatened species and may be more or less restrictive than the general provisions at 50 CFR 17.31.

In recognition of efforts that provide for conservation and management of the Dakota skipper and its habitat in a manner consistent with the purposes of the Act, we are proposing a 4(d) special rule that outlines the prohibitions, and exceptions to those prohibitions, necessary and advisable for the conservation of the Dakota skipper. Economic and policy incentives are likely to continue to place pressure on landowners to convert native grassland from ranching to agricultural cropland (Doherty *et al.* 2013, p. 14) and a wide variety of peer-reviewed publications and government reports have documented recent loss of native grassland (Congressional Research Service (CRS) 2007, p. 5; United States Government Accountability Office (USGAO) 2007, p. 15; Stephens *et al.* 2008, p. 6; Rashford *et al.* 2011, p. 282; Sylvester *et al.* 2013, p. 13). Grassland loss in the western corn belt may be occurring at the fastest rate observed since the 1920s and 1930s and at a rate comparable to that of deforestation in Brazil, Malaysia, and Indonesia (Wright and Wimberly 2013, p. 5). Between 2006 and 2011 destruction of native grassland was mostly concentrated in North Dakota and South Dakota, east of the Missouri River, an area corresponding closely to the range of Dakota skipper (Wright and Wimberly 2013, p. 2).

As with agricultural policies (Doherty *et al.* 2013, p. 15), the prohibitions against take of Dakota skipper that would become effective if the species is listed could interact with other factors to affect the rates at which native grassland is converted in the range of the species. Less than 20 percent of the grassland in the Prairie Pothole Region of the United States is permanently protected (Doherty *et al.* 2013, p. 7), and the vast majority of remaining grassland is privately owned. The conservation of ''working landscapes'' based on ranching and livestock operations is frequently a priority of programs to conserve native grassland ecosystems in the northern Great Plains (*e.g.,* Service 2011, p. 5). We believe that allowing incidental take of Dakota skippers that may result from grazing in certain geographic areas will afford us more time to protect the species' habitats in these areas and would facilitate the coordination and partnerships needed to recover the species.

In light of the socioeconomic and policy factors that are leading to the conversion of native prairie to

agricultural cropland and because there is evidence that some grazing practices are conducive to conservation of Dakota skipper in parts of its range, we determine that it is necessary and advisable to allow take of the species caused by certain ranching activities. Whereas conversion to cropland would kill any Dakota skipper larvae present and destroy any habitat value for the species into the foreseeable future, some habitats can remain suitable for Dakota skipper when grazed (Dana 1991, p. 54; Schlicht 1997, p. 5; Skadsen 1997, pp. 24–29). In addition, grazing is one of the primary treatments for controlling smooth brome and enhancing native plant diversity in prairies that have been invaded by this nonnative grass species (Service 2006, p. 2; Smart *et al.* in prep.). However, some grazing practices are adverse for Dakota skipper; therefore, we will work with private landowners, public land managers, state and Federal conservation agencies, and nongovernmental organizations to identify, refine, and implement grazing practices that are conducive to the species' conservation.

Provisions of the Proposed Special Rule for Dakota Skipper

Section 4(d) of the Act states that ''the Secretary shall issue such regulations as [s]he deems necessary and advisable to provide for the conservation'' of species listed as a threatened species. Conservation is defined in the Act to mean ''to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the Act] are no longer necessary.'' Additionally, section 4(d) states that the Secretary ''may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1).''

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, the Secretary may find that it is necessary and advisable not to include a taking prohibition, or to include a limited taking prohibition. See *Alsea Valley Alliance* v. *Lautenbacher,* 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council* v. *National Marine Fisheries Service,* and 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002). In addition, as affirmed in *State of Louisiana* v. *Verity,* 853 F.2d 322 (5th Cir. 1988), the rule need not address all the threats to the species. As noted by Congress when the Act was initially enacted, ''once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him with regard to the permitted activities for those species. [S]he may, for example, permit taking, but not importation of such species,'' or [s]he may choose to forbid both taking and importation but allow the transportation of such species, as long as the measures will ''serve to conserve, protect, or restore the species concerned in accordance with the purposes of the Act'' (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

Section 9 prohibitions make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, shoot, wound, kill, trap, capture, or collect; or attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any wildlife species listed as an endangered species, without written authorization. It also is illegal under section 9(a)(1) of the Act to possess, sell, deliver, carry, transport, or ship any such wildlife that is taken illegally. Prohibited actions consistent with section 9 of the Act are outlined for threatened species in 50 CFR 17.31(a) and (b). This proposed 4(d) special rule proposes that all prohibitions in 50 CFR 17.31(a) and (b) will apply to the Dakota skipper except in the specific instances as outlined below. The proposed 4(d) special rule will not remove or alter in any way the consultation requirements under section 7 of the Act.

Routine Livestock Operations and Maintenance of Recreational Trails

First, the Service proposes that incidental take that is caused by the routine livestock ranching and recreational trail maintenance activities described below and that are implemented on private, state, and tribal lands will not be prohibited, as long as those activities are otherwise legal and conducted in accordance with applicable State, Federal, tribal, and local laws and regulations. For the purposes of this rule, routine livestock ranching and recreational trail maintenance activities include:

(1) Fence Construction and Maintenance: Fences are an essential tool for livestock and ranch management. In addition, the strategic distribution of fencing is also necessary to implement multi-cell rotational grazing systems, which may be necessary to improve grazing management and conserve Dakota skipper habitat.

(2) Livestock Gathering and Management: The installation and maintenance of corrals, loading chutes, and other livestock working facilities that are critical to ranch operations. These activities may be carried out with only minimal impacts to Dakota skipper if carefully sited with respect to the location and distribution of important Dakota skipper habitat.

(3) Development and Maintenance of Livestock Watering Facilities: Without a suitable water source in a pasture, livestock ranching is impossible. The proper distribution of livestock watering sources is also a prerequisite to implementing improved grazing management via the use of multi-cell rotational grazing systems that may be necessary to conserve Dakota skipper on grazed sites. This activity includes both the initial development of water sources and their maintenance. Dugout ponds, for example, typically require a cleanout after 15 to 20 years.

(4) Noxious Weed Control: State and county laws require landowners to control noxious weeds on their property, and the timing of control actions is usually dependent on phenology (growth stage) of the weed species. Control of noxious weeds may also be important to protect Dakota skipper habitat because native plant diversity may decline when nonnative plant species invade tallgrass prairie (Boettcher *et al.* 1993, p. 35). Broadcast application of herbicides, however, may result in significant deterioration of habitat quality for Dakota skippers (Smart *et al.* 2011, p. 184). Therefore, incidental take of Dakota skipper that may result from spot-spraying of herbicides would be allowed.

(5) Haying: Stock cows need to be maintained through the non-growing season; thus, haying is a critical component of ranch activity. Dakota skippers occur on several native hayland sites—sites where the native-prairie vegetation is mowed for hay. For the purposes of this rule, native hayland does not include lands that had previously been plowed and were then replanted to native or nonnative vegetation. Native haylands are typically cut in August, after the needlegrass (*Hesperostipa spp.* or *Nassella viridula,* or both) awns drop. Incidental take of Dakota skippers that occurs as a result of haying no earlier than July 16 (after July 15) is allowed. Dakota skippers are unlikely to occur in replanted grasslands (grasslands replanted on formerly plowed or cultivated lands) or in tame hayland (grassland comprised primarily of nonnative grass species, such as smooth brome (*Bromus inermis inermis*)). Therefore, mowing before July 16 is allowed on replanted and tame grasslands.

(6) Mowing Rights of Way and Recreational Trails: Section line rights of way and some recreational trails need to be mowed several times during the growing season to ensure that winter snow will not catch and block vehicle access and that they are suitable for hiking and other intended recreational activities, respectively. These areas typically comprise disturbed soil that has been contoured for a roadway and are likely to contain only small proportions of Dakota skipper habitat at any affected site. Therefore, impacts to Dakota skipper populations are likely to be minimal, and any incidental take that is caused by mowing of section line rights of way and recreational trails is allowed.

(7) Livestock (*e.g.,* cattle or bison) grazing, except on lands where Dakota skipper occurs in the following states and counties: Minnesota—Kittson; North Dakota—Eddy, McHenry, Richland, Rolette, Sargent, and Stutsman. In those counties Dakota skippers inhabit relatively flat and moist habitats where they may be especially sensitive to effects of grazing (Royer *et al.* 2008, pp. 11, 16), including trampling, soil compaction, and loss of important nectar sources; haying conducted after the Dakota skipper flight period is the predominant management on sites inhabited by the species in these counties. In all other states and counties, incidental take of Dakota skippers that may result from grazing is allowed under this rule.

In the drier and hillier habitats that the species inhabits outside of the counties listed above, grazing may benefit Dakota skipper depending on its intensity. Moreover, in contrast to the permanent habitat destruction caused by plowing, mining, and certain other activities, native plant diversity in tallgrass prairie may recover from overgrazing if it has not been too severe or prolonged. In eastern South Dakota, Dakota skipper populations were deemed secure at some sites managed with rotational grazing that was sufficiently light to maintain native plant species diversity (Skadsen 1997, pp. 24–29) and grazing may also benefit Dakota skippers by reducing the area dominated by tall native grasses, such as big bluestem and Indiangrass (Dana 1991). Nevertheless, grazing can also have significant deleterious effects on Dakota skipper; for example, a strong population of the species at a grazed site in South Dakota was extirpated after a change in ownership resulted in significant overgrazing (Skadsen 2006, p. 5). Therefore, we intend to cooperate with ranchers and our state and tribal conservation partners to identify, test, and implement grazing practices that effectively conserve Dakota skipper populations. By allowing grazing in the geographic areas where the Dakota skipper primarily inhabits dry-mesic prairie, we may slow the loss of native prairie conversion for crop production and also maintain partnerships that are critical for conserving the species.

In the counties where this rule would not allow take caused by livestock grazing, Dakota skipper almost exclusively inhabits relatively flat and moist prairie habitats that are mowed for hay. These habitats, referred to as calcareous or ''alkaline prairies'' by McCabe (1979, p. 17; 1981, p. 179); ''wet mesic'' by Royer and Marrone (1992, p. 21); and, ''Type A'' by Royer *et al.* (2008, p. 14), are distinguished from other Dakota skipper habitats by relatively flat topography and certain plant community and soil characteristics (Lenz 1999, pp. 5–7; Royer *et al.* 2008, pp. 14–15). Dakota skippers appear to be generally absent from this type of habitat in North Dakota when it is grazed due to a shift away from a plant community that is suitable for the species (McCabe 1979, p. 17; 1981, p. 179). The shift in plant community composition and adverse effects to Dakota skipper populations may occur rapidly (McCabe 1981, p. 179; Royer and Royer 1998, p. 23). The conversion of similar habitats in Manitoba from haying to grazing may be a major threat to the Dakota skipper there (Webster 2007, pp. i–ii, 6). In contrast, limited or ''light rotational grazing'' of habitats on steep dry-mesic slopes in Saskatchewan may not conflict with Dakota skipper conservation (Webster 2007, p. ii).

The reduced vulnerability of habitats on dry-mesic slopes to the effects of grazing may be due, in part, to the tendency for grazing pressure to be lighter in sloped areas. The steepness of habitats occupied by Dakota skipper in Saskatchewan, for example, limits their use for grazing (Webster 2007, p. ii). Steep slopes may also play a role in reducing the adverse effects of grazing at some sites in South Dakota—at one grazed site inhabited by Dakota skipper, for example, habitat on steep slopes was ''in good condition'', whereas ''lesser slopes'' were ''moderately grazed'' and some areas were ''overgrazed'' (Skadsen 1999, p. 29).

The best available information indicates that in the counties where this rule would not allow take caused by livestock grazing the species may be extant at 19 sites and only 1 of those is currently grazed. The single grazed site is in McHenry County, North Dakota, and is owned by the State of North Dakota. The habitat at the site is described as ''marginal'' for Dakota skipper and there ''has never been a strong'' presence of the species, based on surveys of the site conducted since about 1991 (Royer 2013, pers. comm.). Since Dakota skipper was recorded there in 1998, only one survey has been conducted—in 2012 (Royer and Royer 1998, p. 9; Royer and Royer 2012, p. 3). No Dakota skippers were found there during two surveys in 2012, although they were present at a hayed site across the road (Royer and Royer 2012, p. 42). At three other sites in the counties where this rule would not allow take caused by grazing, grazing was likely the primary factor that led to the species' extirpation. At each of these sites grazing was described as ''heavy'' or ''substantial'', the habitat was degraded, and important nectar sources were lacking or depleted (Royer and Royer 2012, pp. 9, 12, 27).

The lack of any examples of sites where strong populations of Dakota skippers occur in concert with grazing indicates to us that it would not be advisable at this time to allow take caused by grazing in the counties listed above—Kittson County, Minnesota, and Eddy, McHenry, Richland, Rolette, Sargent, and Stutsman Counties in North Dakota. In these counties, Dakota skipper primarily inhabits wet-mesic prairie habitats that support plant communities that are distinct from those that occur on dry-mesic prairie elsewhere in the species' range.

The Service is committed to working with private landowners, public land managers, conservation agencies, nongovernmental organizations, and the scientific community to determine whether any grazing of Dakota skipper habitat in any of the counties may be conducted in a manner that is conducive to the species' conservation. We are seeking public comments on this topic. In the meantime, the continuation of hay production as the primary use of these habitats—with mowing occurring no earlier than July 16—is the most compatible land use activity for the Dakota skipper and would contribute substantially to the conservation of the species.

Peer Review

In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), we will seek the expert opinions of at least three appropriate and independent specialists regarding this proposed rule. We have invited these peer reviewers to comment during this public comment period on our specific assumptions and conclusions in this proposed rule.

We will consider all comments and information received during this comment period on this proposed rule during our preparation of a final determination. Accordingly, the final decision may differ from this proposal.

Public Hearings and Informational Meetings

Section 4(b)(5) of the Act provides for one or more public hearings on this proposal, if requested. Requests must be received within 45 days after the date of publication of this proposed rule in the **Federal Register**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule public hearings on this proposal, if any are requested, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** and local newspapers at least 15 days before the hearing.

We have scheduled informational meetings regarding the proposed rule in the locations specified in **ADDRESSES**. Any interested individuals or potentially affected parties seeking additional information on the public informational meetings should contact the Twin Cities Ecological Services Office (See **FOR FURTHER INFORMATION CONTACT**). The U.S. Fish and Wildlife Service is committed to providing access to this event for all participants. Please direct all requests for interpreters, closed captioning, or other accommodation to the Twin Cities Ecological Services Office (See **FOR FURTHER INFORMATION CONTACT**).

Required Determinations

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed above in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.), need not be prepared in connection with listing a species as an endangered or threatened species under the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes.

References Cited

A complete list of references cited in this rulemaking is available on the Internet at *http://www.regulations.gov* and upon request from the Field Supervisor, Twin Cities Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this package are the staff members of the Twin Cities Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; 4201–4245, unless otherwise noted.

■ 2. In § 17.11(h), add entries for ''Skipper, Dakota'' and ''Skipperling, Poweshiek'' to the List of Endangered and Threatened Wildlife in alphabetical order under ''Insects'' to read as set forth below:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*		*
INSECTS							
*	*	*	*	*	*		*
Skipper, Dakota	*Hesperia dacotae* ...	U.S.A. (IL, IA, MN, ND, SD); Canada (Manitoba, Saskatchewan).	NA	T	.....	NA	17.47(b)

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	
Skipperling, Poweshiek.	*Oarisma poweshiek*	U.S.A. (IL, IA, IN, MI, MN, WI, ND, SD); Canada (Manitoba).	NA	E		NA	NA
*	*	*	*	*	*	*	

■ 3. Amend § 17.47 by adding paragraph (b) to read as follows:

§ 17.47 Special rules—insects.

* * * * *

(b) Dakota skipper (*Hesperia dacotae*).

(1) *Which populations of the Dakota skipper are covered by this special rule?* This rule covers the distribution of Dakota skipper in the United States.

(2) *Prohibitions.* Except as noted in paragraph (b)(3) of this section, all prohibitions and provisions of §§ 17.31 and 17.32 apply to the Dakota skipper.

(3) *Exemptions from prohibitions.* Incidental take of Dakota skipper will not be a violation of section 9 of the Act if it occurs as a result of:

(i) Recreational trail maintenance activities;

(ii) Mowing of section line rights of way; and

(iii) Routine livestock ranching activities that are conducted in accordance with applicable State, Federal, tribal, and local laws and regulations. For the purposes of this rule, routine livestock ranching activities include:

(A) Fence construction and maintenance.

(B) Activities pertaining to livestock gathering and management, such as the installation and maintenance of corrals, loading chutes, and other livestock working facilities.

(C) Development and maintenance of livestock watering facilities.

(D) Spot-spraying of herbicides for noxious weed control (Broadcast application of herbicides is not allowed.).

(E) Haying, as set forth in this paragraph (b)(3)(i)(E):

(1) In native haylands, which are typically cut in August after the needlegrass (*Hesperostipa* spp. or *Nassella viridula*) awns drop, haying after July 15 is allowed.

(2) In replanted grasslands (grasslands replanted on formerly plowed or cultivated lands) or in tame haylands (grasslands comprising primarily nonnative grass species, such as smooth brome (*Bromus inermis inermis*)), mowing may occur at any time.

(F) Grazing of cattle, bison, or horses, except in Kittson County, Minnesota, and Eddy, McHenry, Richland, Rolette, Sargent, and Stutsman Counties, North Dakota, where the Dakota skipper inhabits areas that may be especially sensitive to the effects of grazing by these types of livestock.

* * * * *

Dated: September 23, 2013.

Rowan W. Gould,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2013–24175 Filed 10–23–13; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R3–ES–2013–0017; 4500030113]

RIN 1018–AZ58

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Dakota Skipper and Poweshiek Skipperling

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to designate critical habitat for the Dakota skipper and Poweshiek skipperling under the Endangered Species Act of 1973, as amended. The Endangered Species Act requires that critical habitat be designated to the maximum extent prudent and determinable for species determined to be endangered or threatened species. The effect of this regulation is to designate critical habitat for the Dakota skipper and Poweshiek skipperling under the Endangered Species Act.

DATES: *Written Comments:* We will accept comments received or postmarked on or before December 23, 2013. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** section, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in **ADDRESSES** by December 9, 2013.

Public Informational Meetings: To better inform the public of the implications of the proposed listing and to answer any questions regarding this proposed rule, we plan to hold five public informational meetings. We have scheduled informational meetings regarding the proposed rule in the following locations:

(1) Minot, North Dakota, on November 5, 2013, at the Souris Valley Suites, 800 37th Avenue SW;

(2) Milbank, South Dakota, on November 6, 2013, at the Milbank Chamber of Commerce, 1001 East 4th Avenue;

(3) Milford, Iowa, on November 7, 2013, at the Iowa Lakeside Laboratory, 1838 Highway 86;

(4) Holly, Michigan, on November 13, 2013, at the Rose Pioneer Elementary School, 7110 Milford Road; and

(5) Berlin, Wisconsin, on November 14, 2013, at the Berlin Public Library, 121 West Park Avenue.

Except for the meeting in Berlin, Wisconsin, each informational meeting will be from 5:30 p.m. to 8:00 p.m.; the meeting in Berlin, Wisconsin will be from 4:30 p.m. to 7:00 p.m.

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Search box, enter FWS–R3–ES–2013–0017, which is the docket number for this rulemaking. You may submit a comment by clicking on ''Comment Now!'' If your comments will fit in the provided comment box, please use this feature of *http://www.regulations.gov,* as it is most compatible with our comment review procedures. If you attach your comments as a separate document, our preferred file format is Microsoft Word. If you attach multiple comments (such as form letters), our preferred format is a spreadsheet in Microsoft Excel.

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments