

## DEPARTMENT OF THE INTERIOR

## Fish and Wildlife Service

## 50 CFR Part 17

[Docket No. FWS-R3-ES-2013-0043;  
4500030113: 4500030113]

RIN 1018-AY01

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

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Final rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), determine threatened species status under the Endangered Species Act of 1973 (Act), as amended, for the Dakota skipper (*Hesperia dacotae*), a butterfly currently found in Minnesota, North Dakota, South Dakota, Manitoba, and Saskatchewan and endangered species status for the Poweshiek skipperling (*Oarisma poweshiek*), a butterfly currently found in Michigan, Minnesota, Wisconsin, and Manitoba. The effect of this regulation will be to add these species to the List of Endangered and Threatened Wildlife.

**DATES:** This rule becomes effective November 24, 2014.

**ADDRESSES:** This final rule is available on the internet at <http://www.regulations.gov> and <http://www.fws.gov/midwest/Endangered/>. Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at <http://www.regulations.gov>. All of the comments, materials, and documentation that we considered in this rulemaking are available by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Twin Cities Field Office, 4101 American Boulevard East, Bloomington, Minnesota 55425; (612) 725-3548; (612) 725-3609 (facsimile).

**FOR FURTHER INFORMATION CONTACT:** Peter Fasbender, Field Supervisor, Twin Cities Field Office, 4101 American Boulevard East, Bloomington, Minnesota 55425; (612) 725-3548; (612) 725-3609 (facsimile). 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, a species may warrant protection through listing if it is endangered or threatened throughout all or a significant portion of its range. Listing a species as an endangered or threatened species can only be completed by issuing a rule.

*This rule will finalize the listing of the Dakota skipper (*Hesperia dacotae*) as a threatened species and the Poweshiek skipperling (*Oarisma poweshiek*) as an endangered species.*

*The basis for our action.* Under the Endangered Species 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. 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, direct mortality from fire and other management activities or natural occurrences, direct or indirect mortality from indiscriminate use of pesticides, and other unknown stressors.
- Existing regulatory mechanisms are inadequate to mitigate these threats to both species.

*Peer review and public comment.* We sought comments from independent specialists to ensure that our designation is based on scientifically sound data, assumptions, and analyses. We invited these peer reviewers to comment on our listing proposal. We also considered all other comments and information received during the comment period.

## Previous Federal Action

Please refer to the proposed listing rule for the Dakota skipper and Poweshiek skipperling (78 FR 63574; October 24, 2013) for a detailed description of previous Federal actions concerning this species.

## Background

Please refer to the proposed listing rule for the Dakota skipper and the Poweshiek skipperling (78 FR 63574; October 24, 2013) for a summary of species information.

**Status Assessments for Dakota Skipper and Poweshiek Skipperling Dakota Skipper**

*Species Description*

The Dakota skipper (*Hesperia dacotae*) is a member of the skipper family Hesperidae 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 Hesperidae comprises seven subfamilies worldwide, four of which occur in North America, north of Mexico (Brower and Warren at <http://tolweb.org/Hesperidae>). There are 21 recognized species in the genus *Hesperia* (ibid). 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 Hesperidae 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 Ottoo skipper (*H. ottoo*), 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 (e.g., Rigney 2013a, p. 138), depending on temperature patterns (Bink and Bik 2009, Koda and Nakamura 2012). Females emerge slightly later than males (Dana 1991, p. 15, Rigney 2013a, p. 138), 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 2 to 4 weeks, and mating occurs throughout this period (Braker 1985, p. 46; McCabe and Post 1977, pp. 36–38; McCabe 1979, p. 6; McCabe 1981, p. 180; Dana 1991, p. 15; Swengel and Swengel 1999, p. 282; Rigney 2013a, p. 138). 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. Recent research at the Minnesota Zoo demonstrated that, under controlled conditions in the laboratory, Dakota skippers eggs hatched after 11 to 16 days, and the majority of the caterpillars hatched on the 13th and 14th days (Runquist 2014, pers. comm.). 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*), blanketflower (*Gaillardia aristata*), black-eyed Susan (*Rudbeckia hirta*), purple locoweed (*Oxytropis lambertii*), bluebell bellflower (*Campanula rotundifolia*), prairie milkvetch (*Astragalus adsurgens*) (*syn. A. laxmannii*), and yellow sundrops (*Calylophus serrulatus*) (Dana 1991; McCabe and Post 1977, pp. 36–38; Royer and Marrone 1992a, p. 21; Rigney 2013a, p. 142). 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). Nectar source preferences are typically indicated as the relative proportion of plants selected for nectaring among all the available species in a particular area. Swengel and Swengel (1999, pp. 280–281) observed nectaring at 25 plant species, however, most of the nectaring was at purple coneflower and blanketflower. 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. Dakota skippers in Manitoba were recently observed nectaring on 12 species of plants, primarily black-eyed Susan, but also including 6 species that were previously unrecorded as nectar flowers: White sweetclover (*Melilotus alba*), purple prairie clover (*Petalostemon purpureus*), yellow evening-primrose (*Oenothera biennis*), palespike lobelia (*Lobelia spicata*), fiddleleaf hawkbeard (*Crepis runcinata*), and upland white aster (*Solidago ptarmicoides*) (Rigney 2013a,

pp. 4, 57). 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.). Some plant species listed in some studies as nectar flowers are likely used for perching and patrolling rather than as nectar sources.

The flight of the adult female typically extends beyond that of males (Dana 2014, pers. comm.; Dana 1991, pp. 1, 15; Rigney 2013a, p. 138); therefore the two sexes can visit the same nectar plant species at different rates (e.g., if the flowering period is more coincident with either the male or the female flight period). For example, Dana (1991, p. 21) observed a greater number of males than females visiting purple locoweed—this plant is already past its flowering peak at the beginning of the male flight and nearly finished flowering by the peak female flight (Dana 2014, pers. comm.).

Dakota skipper larvae feed 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 *Dichanthelium spp.*, and other native grasses (Royer and Marrone 1992a, p. 25). When presented with no other choice, Dakota skipper larvae may feed on a variety of native and nonnative grasses (e.g., Kentucky bluegrass (*Poa pratensis*)) at least until diapause (Dana 1991, p. 17). The timing of growth and development 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, particularly at younger larval stages (Dana 1991, p. 46). In captivity, Dakota skipper larvae ate big bluestem (*Andropogon gerardii*), at older larval stages, and prairie dropseed (*Sporobolus heterolepis*) (Runquist 2014, pers. comm.). Captive larvae also fed on smooth brome (*Bromus inermis*) (Dana 1991, p. 17), but this was not tested in a natural setting and the structural features of this grass would hinder or prevent larval survival (Dana 2013, pers. comm.). The tight empirical correlation between occurrence of Dakota skippers and the dominance of native grasses in the habitat, indicates that population persistence requires native grasses for survival (Dana 2013, pers. comm.).

### 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 dominated by exotic grasses compared with movements in adjacent widespread prairie habitat. Roads and crop fields were suspected as impediments for movement among prairie patches along two sites of the main valley (Dana 1997, p. 5), although movements beyond the study area were beyond the scope of the 1997 mark-recapture study (Dana 2013, pers. comm.). 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, the best information we have suggests that 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 1999, 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 anemone (*Anemone cylindrica*), although purple coneflower was rare in these habitats (Lenz 1999, 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 (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 1999, 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 (*Hesperostipa spartea*) 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 (*Hesperostipa comata*), and prairie dropseed, and a high diversity and abundance of forbs, including purple coneflower, purple prairie clover, white prairie clover, yellow sundrops, prairie groundsel (*Packera plattensis*), prairie milkvetch, eastern pasqueflower (*Pulsatilla patens*), old man's whiskers (prairie smoke, *Geum triflorum*), western silver aster (*Symphotrichum sericeum*), dotted blazing star (*Liatris punctata*), tall blazing star (*L. asper*), meadow zizia (*Zizia aptera*), blanket flower, prairie lagewort (*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 often inhabit Type B habitats, however, the species has been documented in Type A habitats, particularly in Kittson and Stearns counties. 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 12 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 skipper habitat has been described as Type A prairies, where the species tends to occupy the slightly higher, drier areas of wet-mesic prairie where nectar sources are more abundant (Webster 2003, p. 7). Recent studies classify Dakota Skipper sites in Manitoba as tallgrass or medium to tallgrass prairies that have been subject to minimal disturbance, generally consisting of higher, dryer prairies adjacent to lower areas with sedges (Rigney 2013a, p. 155). Inhabited areas are dominated by native grasses and sites are generally characterized as having the following plant species: Big bluestem, little bluestem (*Schizachyrium scoparium*), tufted hair grass (*Deschampsia caespitosa*), switchgrass (*Panicum virgatum*), Cusick's bluegrass (*Poa cusickii*), porcupine grass, common spikerush (*Eleocharis palustris*), wood lily (*Lilium philadelphicum*), wild onion (*Allium stellatum*), mountain death camas (*Zygadenus elegans*), death camas (*Zygadenus gramineus*), common gold star (*Hypoxis hirsute*), wild prairie rose, American licorice (*Glycyrrhiza lepidota*), white prairie clover (*Petalostemon candidum*), purple prairie clover, Seneca snake root (*Polygala senega*), meadow zizia, northern bedstraw (*Galium boreale*), harebell, palespike lobelia, common yarrow (*Achillea millefolium*), pale agoseris (*Agoseris glauca*), heath aster (*Aster ericoides*) or white prairie aster (*A. falcatus*), smooth aster (*Aster laevis*), Flodman's thistle (*Cirsium flodmanii*), fiddle leaf hawksbeard, eastern daisy fleabane (*Erigeron annuus*), Maximilian sunflower (*Helianthus maximiliani*), Nuttall's sunflower (*Helianthus nuttallii*), meadow blazing star, black-eyed Susan, upland white aster, and stiff goldenrod (*Solidago rigida*) (Rigney 2013a, pp. 155–156).

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, 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 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 and occupied by the species included a bulk density (an indicator of soil compaction) that ranged from 0.9g/cm<sup>3</sup> to 1.3 g/cm<sup>3</sup> 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; occupied Minnesota sites generally had higher soil temperatures at all

depths than occupied sites in North Dakota or South Dakota (Royer *et al.* 2008, p. 11). Royer did not measure these parameters in unoccupied sites.

Rigney (2013a, pp. 108–109) measured edaphic features at 8 sites in Manitoba occupied by the species and broadly characterized the soil compaction (at 10 cm) as 570 to 990 kPA, bulk density ranging from 0.75 to 1.30 kg/L, mean soil surface air temperature at 18 °C during Julian weeks 28–39 (continuous count of weeks since the beginning of the calendar year), and mean relative humidity at 85 percent during the same time period. Soils were classified as clay loams and sandy loams, with generally low to moderate compaction (<1375 kPA) and bulk densities, which is indicative of little or no compacting forces from cattle grazing, tilling, or agricultural vehicles (Rigney 2013a, pp. 104, 119).

Royer (2008, pp. 2, 16) hypothesized that 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. 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 microclimological levels (climate in a small space, such as at or near the soil surface) within “primary larval nesting zones” (0 to 2 cm (0 to 0.8 inches) above the soil surface) 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. Royer (2008) only examined occupied areas for these parameters; therefore, the statistical and biological significance of these edaphic variables cannot be determined from his study.

#### *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 four 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 Dakota skipper to be present at one site (Chanarambie Creek in Minnesota) where the most recent survey was from 1994. 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 (Dana 2013, pers. comm.). 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). 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.

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 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, no matter what years they were conducted, 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. If the species is considered to be extirpated from a site, the occupancy status would not change unless the species is detected at that location during future surveys.

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 81 percent of known Poweshiek skipperling sites and more than 86 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 (outside of June or July) or under unsuitable conditions (*e.g.*, high wind speeds over approximately 16 miles-per-hour). We accepted survey data from those surveyors with whom we were confident in their ability to identify the species in the field.

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 (preferably, each year has more than one survey date).

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 (the species was detected during a survey) every survey since that date. The most recent detection was in 2013. 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. Surveys were conducted using various protocols (*e.g.*, Pollard walks (Pollard 1975), modified Pollard walks, wandering transects, timed transects) depending on the objective of the survey, funding or available resources, and staff. 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 Poweshiek skipperling sites with a present status have had a positive detection in 2008, 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 2013, except four sites where the species was detected in 2008, 2010, 2011, or 2012, and no further surveys have occurred. Likewise, in general, most Dakota skipper sites with a present status have had a positive detection in 2002, or more recently, with a few exceptions. 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 1994, and two sites with 1996 records. 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: 17 sites in Canada that were surveyed most recently 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; 1 site with a 2006 detection; 19 sites in Canada that were surveyed most recently in 2007; 2 additional sites with a 2007 detection; 1 site with a positive detection in 2008; 3 sites with a positive detection in 2009; 23 sites with positive detections in 2012; and 10 sites with positive detections in 2013.

#### *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 found in eastern

Minnesota. Populations persist in a few locations in western Minnesota, northeastern South Dakota, North Dakota, southern Manitoba, and southeastern Saskatchewan. Royer and Marrone (1992a, p. 5) speculated 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 no actual records have been found in Montana and Royer (2002, pers. comm.) no longer thinks that the species ever occurred 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 1999c, 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 264 historically documented sites, there are 83 sites where we consider the Dakota skipper to be present, 88 sites with unknown status, 41 possibly extirpated sites, and 52 that are considered extirpated (Table 1). Approximately 47 percent (39 of 83) of the sites where the species is considered to be present are located in Canada, mostly within three isolated complexes, and were observed in 2002, or in 2007 with no subsequent surveys. Four additional locations where we consider the species to be present in Manitoba had positive detections of the species as recently as 2012 (Rigney 2013a, p. 117). The remaining 42 sites where the species is considered to be present are about equally distributed among Minnesota (11 sites), North Dakota (16 sites), and South Dakota (14 sites). Researchers made positive detections of the species in 10 of these sites in 2013. The species was observed at 19 of these sites in 2012. Other U.S. sites with a present status with relatively older positive detections and no subsequent surveys for the species include one site with a positive detection in 1994, two sites with positive detections in 1996, one site with a positive detection in 2002, one site with a positive detection in 2005, one site with a positive detection in 2006, two sites with a positive detection in 2007, one site with a positive detection in 2008, and three 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	State's percentage of the total number of historical sites	Present	Unknown	Possibly extirpated	Extirpated	Total
Illinois .....	0.4	.....	.....	.....	1	1
Iowa .....	1.1	.....	.....	.....	3	3
Minnesota .....	26.1	11	28	18	12	69
North Dakota .....	20.5	16	14	11	13	54
South Dakota .....	32.6	14	45	10	17	86
Manitoba .....	14.0	28	1	2	6	37
Saskatchewan .....	5.3	14	0	0	0	14
Total Number of Historically Documented Sites .....	.....	83	88	41	52	264
Percent of the Total Number of Historical Sites by Occupancy .....	.....	32	33	15	20	.....

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 in the period 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 2014, 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 2014, unpubl. geodatabase). Of the 69 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 28 others (Service 2014, unpubl. geodatabase). The Dakota skipper is considered to be present at 11 sites in Minnesota in 3 counties: Clay, Lincoln, and Murray, although 2 of those sites have not been surveyed since 1996, and 1 site has not been surveyed since 1994.

McCabe (1981, p. 187) observed very stable population numbers in Minnesota prairies that he visited repeatedly 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, 56 percent (10 of 18 sites) in 2008, 6 percent (1 of 16 sites) in 2012, and to 7 percent (1 of 15 sites) in 2013 (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.). Dakota skippers were detected at 1 site in Minnesota during 2013 surveys, which included 15 sites with previous records and 12 prairie remnants without previous records for the species (Runquist 2014, pp. 3–6; Selby 2014, pp. 2–5; Rigney 2013b, p. Appendix B; Service 2014, unpubl. geodatabase.). The cause for this sharp decline is unknown.



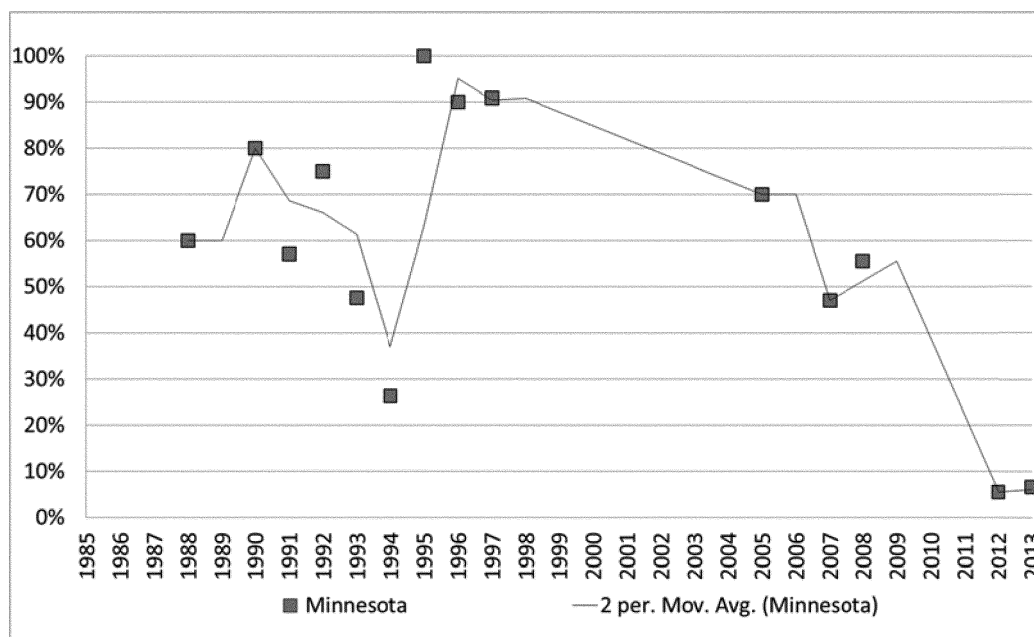


Figure 1: Percent of surveyed sites with positive detections of Dakota skipper for years with at least 5 surveys in Minnesota since 1985 with line showing the moving average over time. These data exclude new sites in the first year of discovery, as well as sites that were surveyed but where the species 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 2014, 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 2014, 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 2014, unpubl. geodatabase). Of the 18 sites where the species is possibly extirpated, 4 have not been surveyed since the species was last seen in 1989 or earlier. Dakota skippers at two of the sites

where the species is possibly extirpated have not been observed since 1991 (Service 2014, unpubl. geodatabase). One site, with a positive detection in 1998, was ranked as “possibly extirpated” based on expert opinion. The remaining 11 sites had positive observations prior to 1993, were surveyed once more recently, and had a negative observation (Service 2014, unpubl. geodatabase).

The status of the Dakota skipper is unknown at 28 sites; Dakota skipper have not been observed at 14 of these sites since the mid- to late 1990s, despite one or two years of survey effort at several sites. The remaining 14 sites with unknown status have had positive observations in 2007 or more recently, but are given this designation due to one or two subsequent negative surveys. 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 or 2013 (Selby 2009a, p. Appendix 5 li, xxxiii and Appendix 4 xlix; Selby 2014, p. 5).

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 or 2013 flight periods (Runquist 2012, pp. 13–14, 18–20; Runquist 2012a, pers. comm., Selby 2014, p. 5); 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 and 2013 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 or 2013 flight periods (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 1-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 was resurveyed in 2013, and no Dakota skippers were observed (Service 2014, 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 40 km (25 mi) 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. 1 and 1iv) 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 7 hours of surveys in and around the park (Selby 2009a, p. 1 and 1iv). Glacial Lakes State Park surveys conducted in 2012 were outside of the Dakota skipper flight period (Runquist 2012a, pers. comm.), and the species was not detected in 2013 (Selby 2014, p. 5).

In summary, the Dakota skipper is now considered to be extirpated or possibly extirpated from at least 30 of the 69 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 12 and 27 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. Only 6 individual Dakota skipper were observed in 2013 surveys in Minnesota,

which included 15 sites with previous records; 2013 surveys for undiscovered populations were also carried out on 12 prairie remnants without previous records for the species (Service 2014, unpubl. geodatabase). 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 2014, unpubl. geodatabase). The Dakota skipper is currently present at 16 sites in 5 North Dakota counties, of these, 11 occur within the Towner-Karlsruhe complex in McHenry County, 1 is within the Sheyenne National Grasslands complex in Ransom County, 2 are in northern McKenzie County, and 1 site is in Wells County. Of the 16 sites where we consider the Dakota skipper to be present, 15 sites had positive observations of the species in 2012. The remaining site had positive observations in 2002. The status of the species is unknown at 14 sites; 10 of these sites have not had positive records since the mid- to late 1990s, and the other 4 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 11 additional sites and 3 additional counties.

Researchers 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). Three sites with previous Dakota skipper records in North Dakota were surveyed during the 2013 flight period; the species was not detected in any of those surveys (Fauske 2013 data (in ND National Guard 2013, in litt.; HDR Engineering 2013, pp. 10–11).

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, pp. 21–22; Royer *et al.* 2008, pp. 14–16). Three sites within the Towner-Karlsruhe complex are owned by the North Dakota State Land Department, and the remaining nine 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 1999, 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. The population at Garrison Training Area in McLean County is now considered unknown due to negative surveys in 2004 and 2013 (Fauske 2004, p. 1; Fauske 2013 in ND National Guard 2013, in litt.).

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 3 sites outside of the Towner-Karsruhe Complex and Sheyenne National Grasslands complexes are thought to have extant (present) Dakota skipper populations. 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). Only three sites with previous records were surveyed in North Dakota during the 2013 flight period, and the Dakota skipper was not observed (Fauske 2013 in ND National Guard 2013, in litt.; HDR Engineering 2013, pp. 10–11).

In summary, North Dakota contains approximately 21 percent ( $N = 54$ ) of all known historical locations of the species rangewide; however, the current occupancy status of the Dakota skipper is unknown at 14 sites, and it is considered to be extirpated or possibly extirpated from at least 24 of the 54 known sites in the State (Table 1). The species is considered to be present at 16 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 State-wide surveys (ND State average = 17.4 encounters per hour) using the same methodology. The species was not detected at the three sites surveyed in 2013.

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 108 additional locations in North Dakota that were surveyed for the species in the period 1991–2013 (USFWS 2014, unpubl. geodatabase). Many of these sites have been surveyed multiple times over multiple years (USFWS 2014, 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 appears suitable for the species and has a good potential of hosting the species, in other words, sites are not randomly selected across the landscape. Therefore, researchers have a higher likelihood of detecting the species at these sites 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) in South Dakota, 86 sites have been documented across 11 counties in the State, but recent surveys indicate that the species is declining in the State (Service 2014, unpubl. geodatabase). Of the 86 historical sites, Dakota skipper is presumed extirpated from 17 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 45 sites. Twenty-seven sites in South Dakota with previous Dakota skipper records were surveyed in 2012; the species was detected at 9 of those sites (Service 2014, 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 2014, unpubl. geodatabase; Skadsen 2012a, pers. comm.). Twenty-eight sites in South Dakota with previous Dakota skipper records were surveyed in 2013; the species was detected at 9 of those sites (Service 2014, unpubl. geodatabase). Ten additional sites within the species' historical range were surveyed during the 2013 flight period, which resulted in no new Dakota skipper sites discovered (Service 2014, unpubl. geodatabase). The proportion of positive surveys at known sites has fluctuated over time; however, the 2012 and 2013 surveys had the lowest positive detection rate (35 percent and 32 percent, respectively) 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 2012b, 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 2012b, 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 2014, 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; two or three new sites have been discovered each survey year since 2005 (three sites in 2005, two sites in 2006, two sites in 2007, zero sites in 2010, two sites in 2012, and zero sites in 2013). 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 2014, unpubl. geodatabase)), a significant proportion of the un-surveyed area may not be suitable for the Dakota skipper, based on surveys in

additional areas of possible habitat where the species was not detected. For example, there is an estimated 1,620,549 acres (ac) (655,813 hectares (ha)) of unbroken (untilled) grasslands that may provide habitat for the Dakota skipper in the nine 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, it is not known if these unbroken grasslands 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 79 additional locations in South Dakota that were surveyed from 1991 through 2013 (USFWS 2014, unpubl. geodatabase). Several of these sites have been surveyed multiple times in one year or during multiple years (USFWS 2014, 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. Only sites with landowner permission are accessed for surveys, however, new potential sites surveyed are generally focused on prairie habitat that appears suitable for the species and has a good potential of hosting the species, in other words, sites are not randomly selected across the landscape. Therefore, researchers have a higher likelihood of detecting the species at

these sites 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, 35 percent (9 of 26 sites) in 2012, and 32 percent (9 of 28 sites) in 2013 (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.

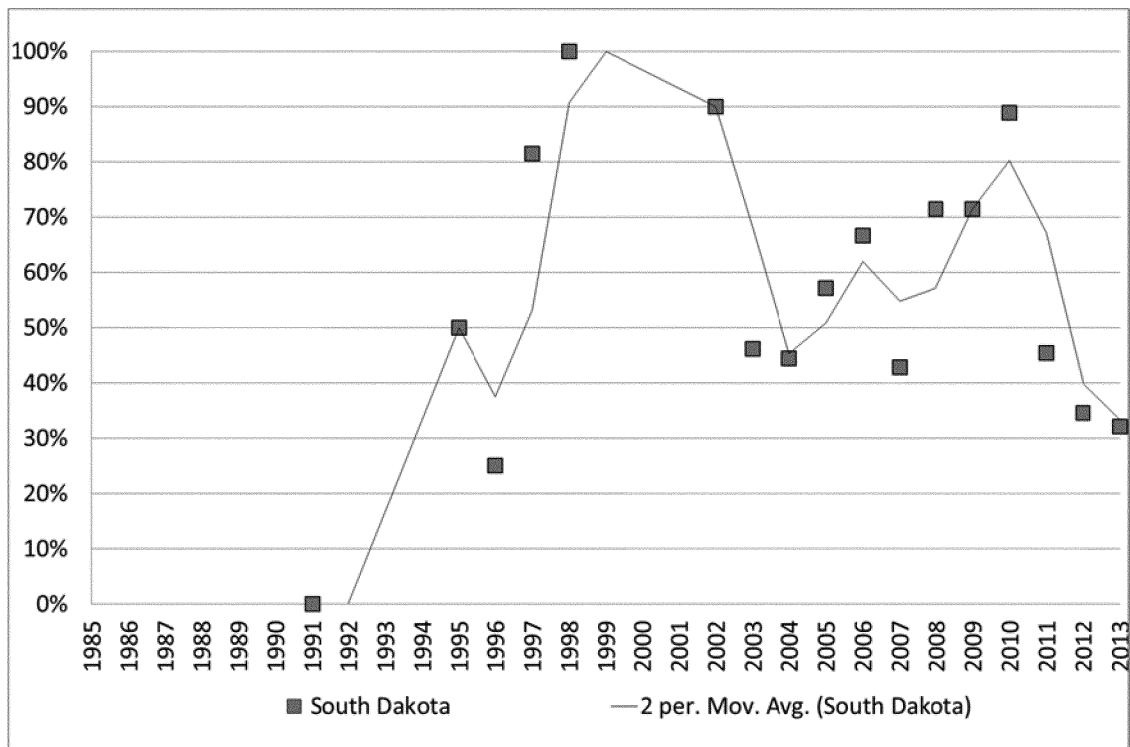


Figure 2: Percent of surveyed sites with positive detections of Dakota skipper for years with at least 5 surveys in South Dakota since 1985 with line showing the moving average over time. These data exclude new sites in the first year of discovery as well as sites that were surveyed, but where the species 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 34 percent of the total documented Dakota skipper sites are within that subsection (89 of the 264 documented sites—Service 2014, unpubl. geodatabase). Most of these Outer Coteau des Prairie sites are in South Dakota; 73 of the 86 Dakota skipper sites in South Dakota are within the Outer Coteau des Prairies subsection (Service 2014, unpubl. geodatabase). Dakota skipper is considered to be present at only 9 of those 73 sites—the species status is unknown at 40 of those sites, possibly extirpated at 8 sites, and extirpated at the remaining 16 sites within that ecoregion subsection in South Dakota (Service 2014, 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 45 sites, and it is considered to be extirpated or possibly extirpated from at least 27 of the 86 known sites in the State, although large

areas of grasslands remain in South Dakota we don't expect significant additional populations 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 86 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. Twenty-eight sites in South Dakota with previous Dakota skipper records were surveyed in 2013; the species was detected at 9 of those sites (Service 2014, unpubl. geodatabase). Ten additional sites within the species' historical range were surveyed during the 2013 flight period, which resulted in no new Dakota skipper sites discovered (Service 2014, unpubl. geodatabase). The proportion of positive surveys at known sites has fluctuated over time; however, the 2012 and 2013 surveys

had the lowest positive detection rate (35 percent and 32 percent, respectively) for the last 16 years (since 1996)—much less than comparable survey years in South Dakota.

#### Manitoba

Manitoba historically contained approximately 14 percent ( $N = 37$ ) of the known locations of the Dakota skipper rangewide. The Dakota skipper is considered present at 1 isolated site and 28 sites split between 2 distinct complexes, 12 sites near Griswold and 16 sites along Lake Manitoba. The 12 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 considered to be unknown at one site near Griswold where the species was detected in 2007 and 2011, but not during the most recent survey year (2012) (Rigney 2013a, p.117). The species is presumed extirpated or possibly extirpated from eight 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).

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). Four of these sites were resurveyed in subsequent years (2010, 2011, and 2012)—the species is considered to be present at two sites, is unknown at one site due to a recent negative survey, and extirpated at the fourth site due to 3 consecutive negative survey years (Rigney 2013a, p. 117; Service 2014 unpublished database). The species is considered to be present at the remaining 10 sites that have not been surveyed since 2007.

Until recently, population estimates and trends at the sites near Griswold in south west Manitoba have not been examined quantitatively; however, the population appears to be relatively stable at one site, may be declining at a second site, and is considered extirpated from 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). Survey methodology changes in the years since 2007 (two to five surveys per site per flight period in the timeframe 2009–2013 compared to single site visits per year prior to 2008) have provided more rigorous population estimates at four Manitoba sites near Griswold and have shown a marked reduction in densities since 2002 or 2007 at three of the four sites (Rigney 2013a, p. 117). The Dakota skipper is present at two of the four sites near Griswold with repeated survey years. The estimated densities (mean number of individuals observed per hour) at one site remained at 1/hour in 2011 and 2012 and was approximately 30/hour in 2011 and 33/hour in 2012 at a second site. The species is considered extirpated at one of these sites, because it was not detected during 2010, 2011, and 2012 surveys. The status of the species is

unknown at another site where the estimated numbers fell from 2/hour to zero detected in 2012 (Rigney 2013a, p. 117).

The Dakota skipper was first recorded near Winnipeg in 1933 and near Miniota in 1944 and then at two additional sites in the early 1990s. The species is considered to be extirpated or possibly extirpated at all of these sites (Service 2014 unpubl. geodatabase).

In 2002, the species was observed at 19 sites near Lundar, within about 25 km (16 mi) east of Lake Manitoba (Interlake region) (Webster 2003, p. 4); however, most of these sites have not been surveyed since. Similar to the Griswold sites, the survey methodology changes in years since 2007 (two to five surveys per site per flight period during 2009–2013 compared to single site visits per year prior to 2008) have provided more rigorous population estimates at four Manitoba sites near Lake Manitoba (Interlake region) and have shown a marked reduction in densities since 2002 or 2007 at two of the four sites (Rigney 2013a, p. 117). The species is considered present at two of four sites that have been surveyed since 2002 in this area; the species is considered extirpated from the other two sites due to three consecutive negative survey years (2010, 2011, and 2012) (Rigney 2013a, p. 117). The mean number of individuals observed per hour at one site has declined from 2/hour in 2011 to 1/hour in 2012 (Rigney 2013a, p. 117). The mean number per hour increased from approximately 1/hour to 6/hour at another site (Rigney 2013a, p. 117). The species is considered to be present at the remaining 14 Interlake sites that have not been resurveyed since 2002 (Service 2014, unpublished database).

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). In 2007, the areas near Brandon and the high ground within the wetland complexes near Oak Lake still contained potentially 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 111 km (69 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 1 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, Hesperidae, 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 2000, p. 7). Poweshiek skipperlings have also been documented laying eggs on the entire length of grass leaf blades and on low-growing deciduous foliage (Dupont 2013, p. 133). McAlpine (1972, pp. 85–92) described the various life-history stages of Poweshiek skipperling, and recent studies of captive Poweshiek skipperlings at the Minnesota Zoo provide additional information (Runquist 2013, pers. comm.). McAlpine (1972, pp. 85–93) observed hatching of larval Poweshiek skipperling after about 9 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). Captive Poweshiek skipperling eggs hatched 8 to 9 days after oviposition (Runquist 2013, pers. comm.). After hatching, Poweshiek skipperling larvae crawl out near the tip of grasses and may remain stationary, with their head usually pointing downward (McAlpine 1972, pp. 88–92). Unlike Dakota skippers, Poweshiek skipperling do not form shelters underground (McAlpine 1972, pp. 88–92; Borkin 1995, p. 9; Borkin 2008, pers. comm.), 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. Mature Poweshiek skipperling caterpillars reared in captivity ranged in size from approximately 22 to 25 mm (0.9 to 1 inch) in length just prior to pupation (Runquist 2013, pers. comm.).

#### Food and Water

For the Poweshiek skipperling, nectar plants vary across its geographic range. Smooth ox-eye (*Heliopsis helianthoides*) and purple coneflower were noted as the frequently visited nectar plants in Iowa, Minnesota, and North Dakota (Swengel and Swengel 1999, p. 280). Other nectar species used were stiff tickseed (*Coreopsis palmata*), black-eyed Susan, and palespike lobelia (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). Recent studies in Manitoba indicate that the most frequently used nectar plants are black-eyed Susan, upland white aster, and self-heal (*Prunella vulgaris*) (Dupont 2013, pp. 70–71). 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 (Borkin 1995, p. 6); larvae have also been observed feeding on little bluestem (*Schizachyrium scoparium*) (Borkin 1995, pp. 5–6) and sideoats grama (*Bouteloua curtipendula*) (Dana 2005a, pers. comm.). Poweshiek skipperling larvae have been observed feeding on *Carex sp.* (Borkin 1994, p. 6; Borkin 1996, p. 2), although not through the entire larval development (Borkin 2014, 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). Captive-reared caterpillars fed most successfully on prairie dropseed, and older caterpillars (late 2-day instar and older) successfully fed on little bluestem, big bluestem, and side-oats gramma (Runquist 2013, pers. comm.). One post-diapause Poweshiek skipperling was successfully reared to adulthood on Pennsylvania sedge (*Carex pensylvanica*) (Runquist 2013, pers. comm.).

In southwestern Minnesota dry hill prairies, Poweshiek skipperling oviposition was observed on prairie dropseed, little bluestem, big bluestem, porcupine grass, 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 1995, p. 6). Borkin (1995, p. 4) also observed oviposition on an unidentified sedge (*Eleocharis sp.*), but only 2 eggs were found on the sedge in comparison to more than 100 eggs found on prairie dropseed. In Manitoba, Poweshiek skipperlings were observed ovipositing on big bluestem, white sweet clover, an unidentified goldenrod (*Solidago spp.*), and juvenile bur oak (*Quercus macrocarpa*) leaves (Dupont 2013, p. 73). Poweshiek skipperlings have also been documented laying eggs on the entire length of grass leaf blades, including the tips, and on low-growing deciduous foliage (Dupont 2013, p. 133). Dana (2013, pers. comm.) noted that larvae seem to begin feeding at a very fine, threadlike blade tip and females placed eggs on fine blade tips of grasses during some observed ovipositions. Consistent with field observations of female oviposition on fine blades of grass, captive-reared caterpillars (early instars) preferred feeding on finer leaf blades (Runquist 2013, pers. comm.).

#### 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 mark-recapture study was conducted in

Manitoba in 2008 and 2009; however, only 2 of the 56 marked individuals in 2008 were recaptured and none of the 16 marked individuals in 2009 were recaptured, so available data are insufficient to examine within and between site dispersal (Dupont 2013, pp. 68–70). After 2 days, the two recaptured individuals were within 50 m (165 ft) of their initial capture location (Dupont 2013, p. 69).

Besides this study in Manitoba, which had too few recaptures to make any statistically significant conclusions, we are unaware of any other studies that documented the dispersal distance of the species. Therefore, we used the Dakota skipper as a surrogate species to estimate the maximum dispersal distance of Poweshiek skipperlings and verified our assumptions with expert review. In a mark-recapture study, average adult movements of Dakota skippers were less than 300 meters (m) (984 feet (ft)) during a period of 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 dominated by exotic grasses with roads and crop fields compared with movements in adjacent widespread prairie habitat. Roads and crop fields were suspected as impediments for movement among prairie patches along two sites of the main valley (Dana 1997, p. 5), although movements beyond the study area were beyond the scope of the 1997 mark-recapture study (Dana 2013, pers. comm.). Skadsen (1999, p. 2) reported possible movement of Dakota skippers in 1998 from a known population at least 800 m (2,625 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.

Based on expert opinion, a maximum dispersal distance of 1.6 km (1.0 mi) was 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) (Westwood 2012a and 2012b, pers. comm.; Dana 2012b, pers. comm.). 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 and 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 the Poweshiek skipperling (mean mobility of 2) (Burke *et al.* 2011, p. 2279; Fitzsimmons 2012, pers. comm.), we used the estimated dispersal distance of the Dakota skipper, approximately 1 km (0.6 mi) (Cochrane and Delphey 2002, p. 6), which is more conservative than the 1.6 km (1.0 mi) estimated for the Poweshiek skipperling by expert opinion (Westwood 2012b, pers. comm., Dana 2012b, pers. comm.). One kilometer is a reasonable maximum dispersal distance, since no data documents the species that document a greater distance travelled.

In summary, using the best information available, 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, sedge meadow, and wet-to-dry prairie. McCabe and Post (McCabe and Post 1977, pp. 36–38) 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 1977, pp. 36–38). 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 prairie, wet-mesic, and dry-mesic prairie habitats (Borkin 1995, p. 6; Swengel 2013, pers. comm.). The dry-mesic habitats in the Scuppernong Prairie contain “extensive patches of prairie dropseed and little bluestem grasses” (Borkin 1995, 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 1995, p. 7). Puchyan Prairie consists of wet-mesic prairie that grades lower into sedge meadow (WI DNR Web site <http://dnr.wi.gov/topic/Lands/naturalareas/index.asp?SNA=172>; Swengel 2013, pers. comm.) and adult Poweshiek Skipperlings have been observed in wet prairie there, although it is not known if these areas function as successful

larval habitat (Swengel 2013, pers. comm.).

Like the Dakota skipper, it has been hypothesized that 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 microclimatological (climate in a small space, such as at or near the soil surface) levels within “larval nesting zones” (0 to 2 cm above the soil surface) 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. Royer (2008) examined only occupied areas for these parameters; therefore, the statistical and biological significance of these edaphic variables cannot be determined from his study.

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). The wet-mesic tallgrass prairies in Manitoba vary in size and occur along bluffs of Bur oak and trembling aspen (*Populus tremuloides* Michx.) (Catling and Lafontaine 1986; Dupont 2013, p. 17). Little bluestem, big bluestem, and Indian grass were the three most common grasses in managed study plots in Manitoba (Dupont 2013, p. 85). Plant species generally associated with upland, drier portions of the mesic tallgrass prairies in Manitoba include: Big bluestem, pale-spike lobelia, prairie dropseed, mountain death camas, stiff goldenrod, black-eyed Susan, and meadow blazing-star (Environment Canada 2012, p. 6). In lower, wetter

prairies with Poweshiek skipperlings, the following species are listed as often seen: Willow (*Salix spp.*), sedges (*Carex spp.*), rushes (*Juncus spp.*), groundsels (*Pakera spp.*), tufted hairgrass, creeping bentgrass (*Agrostis stolonifera*), mat muhly, elliptic spike-rush, four-flowered yellow loosestrife (*Lysimachia quadriflora*), and common self-heal (Environment Canada 2012, p. 6). Most of these plants were also commonly observed in study plots surveyed in 2008–2009 (Dupont 2013, p. 86). The soils where the Poweshiek skipperling occurs in Manitoba are described as shallow, rocky, and highly calcareous (Westwood and Borkowsky 2004 in Dupont 2013, p. 19).

Prairie fen habitat soils in Michigan are described as saturated organic soils (sedge peat and wood peat) and marl, a calcium carbonate (CaCO<sub>3</sub>) 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 96 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 approximately 48 percent of all known Poweshiek skipperling locations rangewide. Numbers and distribution dropped dramatically in subsequent years, however, and the species was not

seen in Minnesota from 2007 through 2012. Two individuals were observed at one site in 2013 (Weber 2014, in litt.; Dana 2014, pers. comm.). 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 23 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. Surveys conducted in 2009–2013 flight seasons in South Dakota resulted in zero detections of the species. 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 and 2013 flight seasons in North Dakota 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. One population of Poweshiek skipperlings in Wisconsin had fairly consistent numbers observed over the last 5 years (17 to 63 individuals counted using modified Pollard transect covering 15 ac (6 ha) in approximately 40 minutes), but the species was not observed in 2013 surveys. One population in Manitoba has fairly consistent numbers (typically hundreds of individuals observed each year). To summarize, of the 298 documented sites, there are 12 sites where we consider the Poweshiek skipperling to be present, 111 sites with unknown status, 96 possibly extirpated sites, and 79 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	State's percentage of the total number of historical sites	Present	Unknown	Possibly extirpated	Extirpated	Total
Illinois .....	1.3	.....	.....	.....	4	4
Indiana .....	0.3	.....	.....	.....	1	1
Iowa .....	13.8	.....	4	24	13	41
Michigan .....	5.7	9	2	.....	6	17
Minnesota .....	48.3	1	58	64	21	144
North Dakota .....	5.7	.....	8	6	3	17
South Dakota .....	23.2	.....	36	2	31	69
Wisconsin .....	1.3	1	3	.....	.....	4
Manitoba .....	0.3	1	.....	.....	.....	1
Total Number of Historically Documented Sites .....	.....	12	111	96	79	298
Percent of the Total Number of Historical Sites by Occupancy .....	.....	4%	37%	32%	27%	.....

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.). One additional record, housed at University of Wisconsin–Oshkosh, was collected in DuPage County in 1968 and was recently identified as a Poweshiek skipperling. The location where the specimen was collected has since been converted and is no longer a prairie, and it is presumed that the species is extirpated from that location (Borkin 2014, 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. No Poweshiek skipperlings were observed in surveys in 2013 at two sites with relatively recent records of the species (2005 and 2008) (Olsen 2013, p. 2).

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) or 2013 (Olsen 2013, p. 2). 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 the Hoffman Prairie site because the species had not been seen in the 2009 and 2010 survey years; however, Selby believes that the species may be extirpated from this site (Selby 2012a, pers. comm.), so we assigned a status of extirpated to this site, which was confirmed with negative surveys in the 2013 flight season (Olsen 2013, p. 2).

To summarize, the 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 nine sites (Table 2) in four counties in Michigan: Jackson, Lenawee, Oakland, and Washtenaw. The species has been observed recently (2008–2013) 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 two sites; Bullard Lake in Livingston County, where Poweshiek skipperlings were last seen in 2007, but not in subsequent surveys in 2008 and 2009 (Cuthrell 2012a, pers. comm.), and Liberty Fen (Grand River Fen) in Jackson County, where Poweshiek skipperlings were observed in 2012 but not in 2013 surveys

(Cuthrell 2013, 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 nine extant (present) Poweshiek skipperling occurrences were recently considered to have at least good viability (Michigan Natural Features Inventory 2011, unpubl. data); however, 2013 survey results have put the viability in question. Three of these sites, Buckhorn 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.). In 2013, however, 2 individuals (0.008/hr.) were recorded at Buckhorn Lake, which was down from 84 individuals (0.35/hr.) recorded the previous survey year (2012) with similar effort, and 53 individuals (0.33/hr.) were recorded at Brandt Road in 2013, down from 71 individuals (0.59/hr.) recorded the previous survey year (2012) with similar effort. The largest extant (present) Poweshiek skipperling population in Michigan may be at Long Lake Fen, where 25 individuals (0.2/hr.) were counted during 2013 surveys, down from 389 individuals (2.2/hr.) and 225 individuals (1.3/hr.) observed in the previous two survey years (2011 and 2012, respectively) with similar sampling effort. In 2012, Long Lake Fen was thought to be the largest population

of Poweshiek skipperling in the United States. However, it is subjected to intense development pressure, and results from 2013 surveys show low numbers. A fourth site, Grand River Fen (also known as Liberty Fen) in Jackson County, is approximately 100 km (62 mi) from the other three sites, and was also considered to have good viability in 2011, but the viability is questionable since 2013 surveys for the species were negative. 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 and zero in 2013 (Cuthrell, 2012a, pers. comm.; 2012b, pers. comm.; 2013, 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 skipperlings were recorded at Park Lydon in Washtenaw County; 12 individuals were counted in 2011 (0.1/hr.), 22 were counted in 2012 (0.2/hr.), and 1 individual was counted in 2013 (Cuthrell 2012a, pers. comm.; 2013, 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, and nine (0.07/hr.) were seen in 2011 (Cuthrell 2012a, pers. comm.; 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 2012b, pers. comm.). The Eaton Road site is approximately 0.6 km (1 mi) from the Long Lake Fen site and is considered a sub-site within Long Lake Fen (Cuthrell 2012b, 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 9 of the sites, although the numbers observed in 2013 were substantially less than in previous years with similar survey effort. The occupancy is unknown at 2 sites, and the species is considered to be extirpated at 6 sites.

#### Minnesota

Minnesota historically contained approximately 48 percent (N=144) 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 144 distinct historical site records in the State (Dana 2012d, pers. comm.; Service 2014, unpubl. geodatabase). Poweshiek skipperling are presumed extirpated or possibly extirpated from at least 85 of these known sites. The status of the species is unknown at 58 sites, although 27 of those locations have not been surveyed since 2003, and the species has undergone a sharp decline in the State since then.

An extensive survey effort was 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 the species 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).

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). No Poweshiek skipperlings were observed on any of the 58 sites surveyed during the 2008 flight period (Selby 2009a, p. 1).

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 the 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.). Twenty-one sites with previous records of the species were resurveyed in 2013 and 7 additional sites, with no previous records, were also surveyed for the species (Runquist 2014, pp. 3–6; Selby 2014, pp. 2–5; Rigney 2013b, p. Appendix B). Three individual Poweshiek skipperlings were observed at one site in Polk County—this is the first credible sighting of the species in the State since 2007 (Webster 2013, pers. comm.; Dana 2014, pers. comm.; Service 2014, unpub. database).

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, 2012, or 2013) 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). Three individuals were sighted at one location in 2013 (Webster 2013, pers. comm.; Dana 2014, pers. comm.).

To summarize, Poweshiek skipperling was historically documented in approximately 144 sites in Minnesota (Table 2). The species is not considered to be present at any of these sites, except at one location (Table 2). The occupancy is unknown at 58 sites, and the species is considered to be extirpated or possibly extirpated at 21 and 64 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 2014, 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 nine sites and four counties (Cass, Dickey, LaMoure, and Grand Forks) in North Dakota. The status of the species is unknown at 8 sites, where the species was last observed between 1996 and 2001, but not during the most recent 1–2 year(s) surveyed. 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 species was not observed at six sites with previous records of Poweshiek skipperlings that were surveyed in 2013. The species occupancy at two of these sites with 2013 surveys was updated from unknown to extirpated based on three consecutive years of negative surveys (Service 2014, unpubl. geodatabase).

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 3 years of survey work (1995–1997) in southeastern 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 6 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 eight sites, and the species is considered to be extirpated or possibly extirpated at three and six sites, respectively (Table 2).

#### South Dakota

South Dakota historically contained approximately 24 percent (N=69) of all known records of Poweshiek skipperlings rangewide (Table 2). The Poweshiek skipperling has been historically documented at approximately 69 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 36 sites, possibly extirpated at 2 sites, and presumed extirpated at the remaining 31 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 2013: 6 sites in 2009, 10 sites in 2010, 1 site in 2011, 10 sites in 2012, and 25 sites in 2013 (Skadsen 2009, p. 12; Skadsen 2011, p. 5; Skadsen 2010, pers. comm.; Skadsen 2012a, pers. comm.; Skadsen 2012b, p. 3; Skadsen 2013, pp. 3–4). The 2009 to 2013 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). In 2012 and 2013, five and nine additional sites, respectively, with potentially suitable native-prairie habitat but with no previous records of the species were surveyed, but no Poweshiek skipperling were observed (Service 2014, unpubl. geodatabase).

#### 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 one site in Wisconsin (Table 2); 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 three sites within the Southern Unit of the Kettle Moraine State Forest in Waukesha County. 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.). Up until 2013, the largest population in Wisconsin was within a 6-ha (15-ac) prairie remnant on Scuppernong Prairie SNA at Kettle Moraine State Forest, which had record counts exceeding 100 individuals in 1994, 1995, 1998, and 1999 (Borkin 1995, p. 10; Borkin 1996, p. 7; Borkin 2000, 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.). The relatively low maximum count in 2010 may be due to the timing of the flight (early) and the timing of the survey effort (late); therefore, the peak flight may have been missed (Borkin 2013, pers. comm.). A controlled burn in late March of 2012 may correlate with lower numbers observed during the 2012 flight (Borkin 2012a, pers. comm.). While this difference may be within the range of variation observed over the previous 4 years (Wisconsin DNR 2012, in litt.), the range in variation may be skewed due to the low numbers observed in 2010 due to the timing of the flight and the survey effort (Borkin 2013, pers. comm.). No Poweshiek skipperlings were observed at Scuppernong during repeated surveys in 2013 (Borkin 2013, pers. comm.)—this is the first time no individuals have been observed there since regular surveys began in the 1990s (Borkin 2014 pers. comm.). Each year, surveys were conducted with similar effort—modified Pollard transect covering 15 ac (6 ha) in approximately 40 minutes (Borkin 2014, pers. comm.).

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.). No Poweshiek skipperlings were observed in 2013 (Borkin 2013, 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 wildfire (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 DNR 2012, in litt.); however, no photographs or voucher specimens 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 3 days. In 2013, Swengel (2013, pers. comm.) found a total of three individuals during 2 days of searching.

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 2000, 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 one site and the occupancy is unknown at three sites (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 of Canada 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). Poweshiek skipperling sites in Manitoba are often surveyed up to 7 times during the flight period each year (Westwood 2013, pers. comm.). 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 Nature Conservancy of Canada Tall Grass Prairie Preserve (Environment Canada 2012, p. ii).

#### Summary of Comments and Recommendations

In the proposed rule published on October 24, 2013 (78 FR 63574), we requested that all interested parties submit written comments on the proposal by December 23, 2013, during which we held public meetings on November 5, 2013, in Minot, North Dakota; November 6, 2013, in Milbank, South Dakota; November 7, 2013, in Milford, Iowa; November 13, 2013, in Holly, Michigan; and November 14, 2013, in Berlin, Wisconsin. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. Newspaper notices inviting general public comment were published in the following papers: Detroit Free Press, Detroit, MI; The Detroit News, Detroit, MI; Berlin Journal, Berlin, WI; The Forum of Fargo-Moorhead, Fargo, ND; Minneapolis Star-Tribune, Minneapolis, MN; Mukwonago Chief, Mukwonago, WI; The Des Moines Register, Des Moines, IA; Bismark Tribune, Bismark, ND; The Argus Leader, Sioux Falls, SD. We did not receive any requests for a public hearing. All substantive information provided during comment periods has either been incorporated directly into this final determination or addressed below. Comments specific to the proposed designation of critical habitat for the two species (78 FR 63625) will



be addressed in the final critical habitat determination.

#### Peer Reviewer Comments

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinion from ten knowledgeable individuals with scientific expertise that included familiarity with the Dakota skipper or the Poweshiek skipperling and its habitat, biological needs, and threats. We received responses from seven of the peer reviewers.

We reviewed all comments received from the peer reviewers for substantive issues and new information regarding the listing of the Dakota skipper or the Poweshiek skipperling. The peer reviewers generally concurred with our methods and conclusions and provided additional information, clarifications, and suggestions to improve the final rule. Peer reviewer comments are addressed in the following summary and incorporated into the final rule as appropriate.

#### General

(1) *Comment:* Peer reviewers thought that the Service's interpretation of literature addressing threats to these species was well researched. However, some peer reviewers suggested that further research would strengthen or refine our understanding of these butterflies.

*Our Response:* The Act requires us to make a determination on the status of species based on the best available information. However, we agree that that further studies of these species would further our understanding and help us with the recovery planning and implementation. We will consider further research needs in our recovery planning efforts.

(2) *Comment:* One peer reviewer stated that, in the Executive Summary, the Service did not describe the effects of habitat management on butterflies, but rather focused on the impacts to native vegetation.

*Our Response:* We have updated the executive summary to include the direct mortality that may occur due to management activities or natural occurrences. This subject is discussed in further detail in the Background section of this final listing rule.

#### Taxonomy

(3) *Comment:* One peer reviewer provided a correction to the number of subfamilies in the family Hesperidae and the number of species in the genus *Hesperia*. Specifically, the family comprises 7 subfamilies world-wide, 4 of which occur in North America, north

of Mexico. There are 21 recognized species in the genus *Hesperia* (ibid), not 18 as cited in the proposal.

*Our Response:* We corrected the statements in the Background section of this final listing rule.

#### Species Biology

(4) *Comment:* One peer reviewer provided details on Dakota skipper and Poweshiek skipperling biology, specifically, information pertaining to early life stages and larval food choices, which were learned from captive-rearing trials at the Minnesota Zoo.

*Our Response:* We have incorporated the updated information into the Background section of this final listing rule.

(5) *Comment:* Two peer reviewers suggested that we incorporate the findings of two recently published Master's theses (Dupont 2013, Rigney 2013a) that have new information on the Dakota skipper and Poweshiek skipperling, including data from surveys at several locations for both species in Manitoba. These studies also show a greater decline in both species in Canada over the last 10 years than is indicated in the proposed listing rule.

*Our Response:* We incorporated data from the referenced Master's theses in the Dakota skipper Background section in this final listing rule. The new information, although important to our full understanding of the status of the species throughout their ranges, does not change our listing determinations for the two species.

(6) *Comment:* A peer reviewer stated that based on personal observations and McAlpine's 1972 report, upon hatching, Poweshiek skipperling larvae crawl out near the tip of grasses, and do not crawl to the base of grasses, as was stated in the proposal.

*Our Response:* We corrected the statement regarding Poweshiek skipperling larval behavior in the Background section of this final listing rule.

(7) *Comment:* A peer reviewer noted that a species' nectar preference is usually indicated by selection in greater frequency rather than the proportion of the species among all available nectar sources (because random selection would be expected to result in selection frequency equal to the species' proportion of the available choices). All of the references cited in the rule report nectar preferences as the relative proportion among observed choices.

*Our Response:* We clarified this point in the Background section of this final listing rule.

#### Food and Water

(8) *Comment:* Peer reviewers provided corrections to the lists of flowers used as nectar sources and the importance of several plants as nectar sources for the butterflies.

*Our Response:* We corrected the nectar flowers for Dakota skipper accordingly in the Background section of this final listing rule. Also, we removed upright prairie coneflower, fleabane, and white prairie clover from our list of important nectar species. We did not remove black-eyed Susan, because Rigney (2013a, p. 142) reported Dakota skippers were frequently observed nectaring on that species in Canada.

(9) *Comment:* One peer reviewer stated that the assertion that Dakota skipper larvae feed only on native grasses has not been established, and further stated that when confined with no other choice, Dakota skipper larvae may feed on a variety of native and nonnative grasses. Exotic cool-season grasses, such as Kentucky bluegrass and smooth brome are available, and generally of good nutritional quality, when overwintering larvae emerge from hibernation and begin feeding. The tight empirical correlation between occurrence of this skipper and the dominance of native plants in the habitat, however, indicates that the species requires native grasses.

*Our Response:* We have incorporated this information into the final listing rule, and recognize that Dakota skipper larvae can use both native and nonnative plants as food during certain stages of larval development. Some exotic cool-season grasses may be suitable larval food plants during limited times of larval development; however, the morphology and growth of these grasses may determine the suitability for the species, and if those grasses dominate a site, the chances for larvae finding suitable food sources is decreased.

(10) *Comment:* One peer reviewer provided additional information on observations of Poweshiek skipperling oviposition and larval food use in Wisconsin.

*Our Response:* We have incorporated the information into the Background section of this final listing rule.

(11) *Comment:* One peer reviewer corrected our interpretation of his observations on Poweshiek skipperling oviposition (egg-laying) to state that larvae need to begin feeding on very fine, threadlike blade tips, and that females placed eggs on fine blade tips of grasses during some observed ovipositions.

*Our Response:* We have incorporated this information into the Background section of this final listing rule.

(12) *Comment:* One peer reviewer stated that the summary of the best available information for Dakota skipper dispersal is adequate and incorporates all of the information of which the reviewer is aware. The reviewer did correct our interpretation of Dana's 1997 mark-and-recapture study. The reviewer stated that roads and crop-fields were suspected to be impediments to Dakota skipper movement; however, this was not explicitly tested during the study. Another reviewer wanted clarification on our basis for the estimated maximum dispersal distance of the Poweshiek skipperling.

*Our Response:* We corrected the dispersal section of this final rule to accurately present Dana's 1997 mark-and-recapture study findings, and added information from an additional study. In one mark-and-recapture study in Manitoba, the Poweshiek skipperling was found within 50 m (165 ft) of its original capture location (Dupont 2013, p. 69). Besides this study in Manitoba, which had too few recaptures to make any statistically significant conclusions, we are unaware of any other dispersal studies for the species. Therefore, we used Dakota skipper (and dispersal studies on this species) as a surrogate species to estimate the maximum dispersal distance of the Poweshiek skipperling (e.g., Dana 1991, Dana 1997, Skadsen 1999a), and verified our assumptions with expert opinion and Burke (2011). Experts generally agreed that 1.6 km (1.0 mi) was a reasonable estimate for Poweshiek skipperling dispersal distance (Westwood 2012b, pers. comm.; Dana 2012b, pers. comm.). However, according to Burke *et al.* (2011), the Poweshiek skipperling was less mobile than the Dakota skipper. Since experts generally assumed the maximum dispersal distance of the Dakota skipper was 1 km (0.6 mi), we used 1 km (0.6 mi) as a conservative maximum dispersal distance for the Poweshiek skipperling.

(13) *Comment:* One peer reviewer questioned the accuracy of the mobility value assigned to the Dakota skipper from the Burke *et al.* (2011) publication. The reviewer suggested that the strongest evidence for limited dispersal capabilities is the absence of observations outside of native-prairie habitat. Butterflies that are highly mobile are occasionally observed in unsuitable habitat; however, factors such as the rarity of the species, its small size and inconspicuous appearance, and the rarity of observers that are both interested in skippers and

capable of identifying them, makes the absence of observations in unsuitable habitats weak evidence for the absence of movement over long distances. The reviewer further stated that, since we have little basis for measuring dispersal in this species, but we have no evidence that it does much dispersing, we should assume that dispersal is very limited.

*Our Response:* The Burke *et al.* (2011) paper was published in a peer-reviewed scientific journal (using expert interviews); however, we recognize the limitations of the data therein and, therefore, have arrived at our conclusion that the Dakota skipper has low dispersal capability based on this paper in conjunction with other reports and observations.

#### Habitat

(14) *Comment:* One peer reviewer corrected the statement that Type B habitat (as explained in the Background section above) was the only habitat type inhabited by the Dakota skipper in Minnesota, as the species has been documented in other habitat types, particularly in Type A habitat in Kittson and Stearns Counties.

*Our Response:* We corrected the statement regarding Dakota skipper habitat types in Minnesota in this final listing rule. It should be noted, however, that there is only one recent (2009) record of a Dakota skipper in Kittson County, Minnesota, and two sites in Stearns County where the species is possibly extirpated.

(15) *Comment:* One peer reviewer stated that the assertion in our proposed rule that Dakota skipper larvae are "particularly vulnerable to desiccation during dry summer months" was a hypothesis, with no confirming evidence. The paper cited only surveyed occupied habitat and did not test unoccupied areas for the same parameters.

*Our Response:* We realize the limitations of Royer's 2008 study, and have corrected our interpretations accordingly in this final rule; specifically, the sampling design (edaphic parameters were measured only in occupied areas, and no unoccupied areas were examined to test the significance of the findings) does not allow for statistically significant conclusions.

(16) *Comment:* One peer reviewer corrected the definition given for "larval nesting zones" measured for edaphic characteristics in Royer (2008). The "primary larval nest zone" in which they measured temperature and humidity is described as 0–2 cm above the soil surface, not between the soil

surface and 2 cm deep as stated in the proposed rule.

*Our Response:* We have corrected the statement regarding larval nesting zones in the Background section of this final rule.

#### Occupancy

(17) *Comment:* A peer reviewer commented on the adequacy of the categorization of population status, and stated that it was done in an appropriately conservative way, but did not think this would affect the ultimate decision for either species.

*Our Response:* We developed the occupancy criteria to be as objective as possible in light of the information we had, which was complicated by the variability of the frequency and lack of error quantification of the survey data. We applied the occupancy rules consistently, in the same way throughout the range of each species, with discretion given to species experts who were familiar (e.g., who had conducted relatively recent site visits or butterfly surveys) with the sites within their State. Using the best information available, we attempted to balance our determination as to whether the species was likely present or not at a particular location. We determined that at sites where the species was detected during the most recent survey, if the survey was conducted in 2002 or more recently, this was a reasonable timeframe to assume its presence, if there was no evidence of habitat destruction or significant degradation of the habitat. Some other comments, however, indicated that the 10-year timeframe was too long to assume presence of an annual species, such as these butterflies, while others thought we should still be assuming presence at locations with detections much farther back (prior to 1993), if we had no evidence that the habitat hadn't been destroyed there. However, we believe that we have taken the most reasonable approach to defining occupancy, used the best available scientific information appropriately, and have been consistent in making this determination.

(18) *Comment:* One peer reviewer noted that it would be useful to clarify the importance of unknown sites and to determine if habitat in "unknown" sites, and sites where extirpation has presumed to have occurred, is actually in a condition to support future populations, particularly for future reintroductions.

*Our Response:* It is important to distinguish among sites where the species is likely extirpated, where the species is still present, and where we are unsure of the species' presence, in

order to determine the current status of these species. The habitat at individual sites varies, but where we had evidence that the habitat was destroyed, we considered those sites to be extirpated (and, thus, unsuitable for future reintroductions). The habitat at other sites may still be suitable for one or both species, and its role in future recovery efforts, such as reintroductions, will be considered during the recovery planning and implementation phase for these species.

(19) *Comment:* One peer reviewer requested that we define some terms used in the proposed rule; in particular, the terms “positive detections,” “detection rate,” and “liv”.

*Our Response:* Positive detections refers to the number of times the species was detected during a survey. Detection rate is calculated as the number of times the species was detected (at a singular site or groups of sites), divided by the number of surveys (at a singular site or groups of sites). Finally, “liv” refers to the page number in the preface of a cited publication (Roman numeral for page 54).

(20) *Comment:* Does the definition of species extirpation from a site apply to surveys conducted in 1993, or to those done more recently?

*Our Response:* We considered the species to be extirpated from a site if there were at least three sequential years of negative surveys, no matter the year those sites were surveyed, and the species has not subsequently been documented at the site. For example, if a site was only surveyed in 1991, 1995, and 1999, and there were no positive detections of the species during all 3 years, we assumed that the species is extirpated from that site. The species occupancy at that site would not change unless the species is detected at that site in the future. We have clarified this definition in the Background section of this final listing rule.

(21) *Comment:* One peer reviewer wanted further clarification on our justification for including four Dakota skipper sites with older records in the present occupancy category. The reviewer suggested we review the previous densities of the species at the four sites and the proximity of nearby sites from which individuals could recolonize the sites in question.

*Our Response:* The species occupancy at one of four South Dakota sites has been updated to “unknown” after further review of the information available for the site, including 2013 survey data that were not available to us at the time we drafted the proposed rule. However, there is no evidence to suggest that the species is not still

present at the remaining three sites (all in Minnesota), because the best information indicates that the sites’ habitats are still suitable for the butterfly, and, therefore, despite the lack of recent surveys, the species may still be present there.

(22) *Comment:* A peer reviewer noted that at several points the proposed rule indicates that survey efforts may vary in number of visits, but that certain survey results were not considered, because they were not conducted at the appropriate time. The peer reviewer questioned whether we can presume that the surveys that were considered are comparable, regardless of the number of visits, whether those surveys all meet some minimum criteria, and whether there was a standard survey effort measurement.

*Our Response:* Since the purpose of site surveys differed by site, the amount of effort also varied. For example, if the goal of the survey was to verify if the species was present at a particular location, a surveyor may have stopped the survey effort as soon as the first individual was detected, which may have occurred after a short, one-time visit. On the other hand, if the survey purpose was to count individuals during the peak flight of a species, the site may have been visited every day throughout the adult flight period, and more quantitative measurements, such as number of individuals observed per hour, may have been recorded. We used all types of surveys, as long as they were conducted during the appropriate time of the year (mid-June through mid- to late July), and during appropriate conditions (e.g., generally wind speeds less than 16 mph, unless the species was detected at higher speeds). Furthermore, we only considered surveys from individual surveyors who are able to reliably identify the species in the field.

(23) *Comment:* A peer reviewer noted that the proposed rule states that existing models are unable to identify specific plant species, invasive species, and floristic quality, and the Service concludes that unbroken grasslands “may not contain the specific native prairie plants that the Dakota skipper requires. . . .” This statement appears to be contradicted later in the document.

*Our Response:* We clarified the statements in this final listing rule. The intent of the first statement is to acknowledge that existing habitat models cannot identify specific species or determine floristic quality necessary to support Dakota skipper populations. The models may be useful in narrowing down areas that may contain the

necessary nectar plants and larval food plants, but presence of specific plant species and suitability for the Dakota skipper must be verified by other means (e.g., on the ground plant surveys). The second statement refers to the possibility of yet undiscovered areas of suitable habitat where the Dakota skipper may exist, because not every area that is suitable has been surveyed for the species.

(24) *Comment:* A peer reviewer noted that survey site selection may be influenced by the expert’s knowledge of potential habitats, land ownership, and the ability to gain landowner permission to access areas for surveys.

*Our Response:* We acknowledge that survey sites may be selected for a variety of reasons. A site may be surveyed because there is known suitable prairie habitat in an area, but the exact survey location may depend on other variables, such as the ability to gain landowner permission to survey.

#### Status and Trends

(25) *Comment:* One peer reviewer provided additional 2009 data for the Felton Prairie site in Minnesota.

*Our Response:* We incorporated this data into this final listing rule.

(26) *Comment:* One peer reviewer requested clarification on the butterfly survey methodology and how floristic diversity was rated at some of the survey locations.

*Our Response:* The survey methodology varied among locations, years, surveyors, and by other factors, and it is difficult to succinctly describe the methodology used for more than 20 years of surveys for hundreds of survey sites. For that reason, we examined the data in terms of the rate of positive detections over the years at each survey location as a way to compare data across multiple survey methods and years. We applied certain standards that each survey must meet (see response to comment 22, above). In this final listing, we describe survey methods or floristic quality determination methods for specific locations when it is necessary to understand the results for a particular survey, and describe typical survey and floristic methodologies in the Background section of this final rule.

(27) *Comment:* A peer reviewer commented that the number of historical populations of Dakota skipper that remain extant is probably overestimated, given the results of recent resurvey efforts. In particular, this peer reviewer questioned whether it was realistic to assume species presence at five Minnesota sites, given the dramatic declines and apparent extirpation of populations at some of the

best sites within recent years. The reviewer suggested assigning those sites as “possibly present” or “status unknown” category, and targeting these sites for future surveys to determine the species’ presence, particularly because recent declines do not appear to be due to habitat degradation or loss.

*Our Response:* Based on 2013 survey data, we changed the occupancy for several sites. When determining species occupancy at a site, we balanced information on habitat succession with the available survey data to avoid falsely assuming the species is absent from less-surveyed sites that still have suitable habitat.

(28) *Comment:* A peer reviewer commented that, based on surveys conducted in 2013, the status of both the Dakota skipper and the Poweshiek skipperling in Minnesota is likely more dire than suggested in the proposal. No Dakota skippers or Poweshiek skipperlings were observed during duplicate surveys conducted at 13 sites. During single surveys conducted later in the flight period (the time when adult butterflies are able to fly) at two additional sites in Clay County, MN, six Dakota skippers were seen at one of those sites and no Poweshiek skipperling were observed at either site. Both sites had fairly good numbers during 2008 surveys. Additionally, one peer reviewer suggested that we incorporate results from 2013 surveys of sites in Kittson County, Minnesota. No Dakota skippers were observed at Lake Bronson in 2013; however, there was one highly likely sighting, and the area contains moderate-quality habitat. The Frenchman’s Bluff sites in Minnesota were surveyed on July 11, 2013, which was during the period of peak abundance in the phenologically (relationship between a periodic biological phenomenon and climatic conditions) delayed year, but the Dakota skipper was not observed. The estimated probability of the species presence at the site is 90 percent, based on the abundance of habitat and purple coneflower in bloom.

*Our Response:* We incorporated the 2013 data into this final listing rule. Due to several negative results from 2013 surveys, particularly in Minnesota, the occupancy status at several sites has been updated in this final listing rule. We still determine that the Dakota skipper should be listed as threatened, and provide justification for our determination in this final listing rule.

(29) *Comment:* One peer reviewer suggested that we incorporate information from a 2013 report of butterfly surveys in South Dakota.

*Our Response:* We incorporated 2013 survey results in this final listing rule.

(30) *Comment:* A peer reviewer suggested that the Dakota skipper population densities as described in 2003 and 2007 status assessments may no longer accurately describe the populations and the threats causing population declines. For example, reported sightings of Dakota skippers within the Riding Mountain National Park in Manitoba (Walley 2002) are likely not valid; there are no voucher specimens to confirm the report. There are no known sites that are owned by the Government in Canada.

*Our Response:* We incorporated updated information regarding several sites in Manitoba and Saskatchewan. We have no records of any confirmed Dakota skipper sites within the Riding Mountain National Park in Manitoba.

(31) *Comment:* One peer reviewer noted that there has been a decline in the number of individual Dakota skippers observed during the flight period compared to the populations observed in 2002 and 2007. The current population estimates are much lower than those described in Webster’s 2002 and 2007 reports. Furthermore, the methods for estimating densities have changed; survey methodology has become more rigorous, with 2 to 5 visits per site per year from 2009–2013 compared to single visits prior to 2008.

*Our Response:* We incorporated 2013 data into this final listing rule. Due to largely negative results from 2013 surveys, the occupancy status of the species at several sites has been updated in this final listing rule.

(32) *Comment:* One peer reviewer stated that there is a DuPage County, Illinois, record of a Poweshiek skipperling—the specimen was collected in 1968 near the DuPage River, and was only recently identified as a Poweshiek skipperling.

*Our Response:* We have added the DuPage County record to the Illinois status and distribution section of this final listing rule.

(33) *Comment:* One peer reviewer stated that, because no Poweshiek skipperlings were observed in 2013 at Scuppernong Scientific and Natural Area (SNA) in Wisconsin, nor at the nearby Wilton Road site, those populations may be extirpated. The peer reviewer also stated that the apparent decline in numbers was also observed in Michigan.

*Our Response:* We have updated the Background section of this final listing rule to include the 2013 data for those two locations. Because there are just one or two years of negative data at the Scuppernong SNA and Wilton Road

sites, the occupancy status at both sites is unknown.

(34) *Comment:* A peer reviewer commented that the low numbers of Poweshiek skipperling observed in 2012 at Scuppernong SNA were at least partially due to the spring burns of 25–30 percent of their prime breeding habitat at that location. The range of variation of the maximum numbers observed in 2009–2012 may be skewed due to the low numbers observed in 2010, when the peak flight may have been missed due to an early flight and late survey effort. The anticipated increase in the population in 2012 due to a mild winter and early spring phenology was not observed, which may indicate that the burn killed a high number of larvae.

*Our Response:* We clarified the statements regarding the uncertainty of the effect that the 2012 spring burn had on the Poweshiek skipperling population at that location. It is difficult to make cause-and-effect statements without direct measures of larvae mortality following a burn.

(35) *Comment:* A peer reviewer stated that the same protocol has been used for Poweshiek skipperling surveys in Wisconsin since the early 1990s—a modified Pollard transect count with a set transect pattern covering 6 ha (15 ac) of area and 40 minutes to complete.

*Our Response:* We clarified the methodology used at the Scuppernong SNA sites in the Background section of this final listing rule.

#### Factors Affecting the Species

(36) *Comment:* A peer reviewer suggested that it would be useful to rank or evaluate risks to the butterfly populations as they relate to management recommendations. For example, would haying carry a lower risk of causing extirpations? The level of risk, however, would depend on the type, duration, and timing of haying activities versus the type of fire management applied to sites.

*Our Response:* Ranking management methods goes beyond the scope of this final listing document and is more appropriate for recovery planning. Furthermore, management recommendations may vary for each location, based on the habitat type and condition; therefore, it may not be possible to generalize the level of risk associated with various management types.

(37) *Comment:* One peer reviewer commented on the level of private landowner awareness of the species and its status on their lands. Specifically, in Canada, most private landowners are unaware of the presence of the Dakota

skipper, and this may also be true for private landowners in the United States. Even where current management on lands may be conducive to the species, it is not typically due to a conscious effort to conserve the species. Landowner apathy should be considered a threat of considerable concern.

*Our Response:* We agree that some landowners may not be aware of the presence of either butterfly on their lands and that land may not be intentionally managed for the conservation of the species, but rather used in ways that are inadvertently favorable to the species. We have discussed this issue further in *Factor E* of this final listing rule. In the United States, we have notified private landowners of most of the sites where we believe the species is still present or its status is unknown, and many of the sites where the species is extirpated or possibly extirpated, but where the habitat may still be suitable for the species. We will continue to focus on public awareness and work cooperatively with landowners following listing.

*(38) Comment:* One peer reviewer asked for clarification on the reduction of Dakota skipper range, specifically what was meant by our statement of “an approximately 690-km (430-mi) reduction of its range”

*Our Response:* We have removed this phrase from this final listing rule, because it was unclear. The Dakota skipper is considered to be extirpated from Illinois and Iowa and no longer occurs in eastern Minnesota.

#### Factor A

*(39) Comment:* One peer reviewer recommended that the date of first allowable haying be after July 22, because some adult flight has been documented after the date of July 16, which was our recommendation for the earliest haying. Another peer reviewer noted that in Manitoba, August 1 is the recommended earliest haying date at Dakota skipper and Poweshiek skipperling sites, although little haying is occurring where the Poweshiek skipperling is present. Sites should not be hayed within 3 to 4 weeks of the beginning of the adult flight period to prevent destruction of nectar plants. While there may be situations in the United States where sites undergo haying “no more than every other year,” most sites in Manitoba are hayed for several years in a row, but there are no studies on the impact of repeat annual haying.

*Our Response:* Our categorization of stressors as having high, medium, or

low impacts on the species, and the criteria we use to define those categories, were developed specifically to guide our analysis of the factors affecting the species, and are not intended as guidelines for conservation efforts. Conservation guidelines for the Dakota skipper are available (online at <http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines.html>), and we are developing similar guidelines for the Poweshiek skipperling. In those guidelines, we recommend that haying activities occur after the adult flight period.

*(40) Comment:* A peer reviewer asked whether, in the grazing section of the proposed rule, did the Service mean that even when grazing is hard enough to eliminate the skipper, the habitat potential isn't completely destroyed, as it is by mining or plowing, and can be restored?

*Our Response:* This is correct, and we clarified the language in this rule to more clearly state that, unlike habitat destroyed by mining or plowing, for example, intensely grazed habitat has potential to recover or be restored. Attempts have been made to restore prairie remnants that have been plowed or mined (where significant soil disturbance has occurred), but such restorations have not been successful for the Dakota skipper or Poweshiek skipperling, at least in observable timeframes.

*(41) Comment:* A peer reviewer noted that the proposal asserts that “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.” The peer reviewer stated that the assertion goes beyond anything in the cited document (Service 2006). There is no supporting research for grazing reducing brome, while at the same time maintaining or improving the native species composition. There is, however, support for the opposite—that grazing can stimulate brome and reduce native diversity. Smart *et al.* (2011) discuss grazing as a promising possibility, based on inferential, circumstantial, and anecdotal information, and the group agreed that experimental investigation is a big need. More accurately, the citation would support this statement: “grazing may be a valuable tool for controlling smooth brome invasion and maintaining native diversity in prairies, especially where circumstances make the use of fire difficult.”

*Our Response:* We clarified the statement regarding grazing as a potential management tool for invasive

species control to more accurately reflect the proceedings of the Service workshop (Service 2006) and Smart *et al.* (2011). Smart *et al.* (2011) used repeated clipping methods to simulate intensive early-season grazing and discusses the potential for using grazing as a tool to improve native prairie under certain conditions.

*(42) Comment:* One peer reviewer said that recent statistics related to habitat conversion show that the statement, “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” is out-of-date, and said this sentence contributes little to the argument that remaining habitat is secure.

*Our Response:* We clarified the statement on conversion in this final rule to reflect the current economic conditions that row crop agriculture is generally more economically profitable than light grazing.

*(43) Comment:* A peer reviewer noted that the proposed rule includes little discussion of soil compaction as a result of grazing. A field demonstration by Natural Resources Conservation Service (NRCS) staff showed that soil compaction on a heavily grazed pasture was almost as hard as a brick, and very little of the water falling on it soaked in. Soil of this character would be quite difficult for the larvae of Dakota skipper to penetrate for shelter construction, causing them to be more exposed to predators, parasitoids, and other environmental stresses. The Poweshiek skipperling would not be affected by compaction, as it doesn't burrow.

*Our Response:* We agree that soil compaction due to heavy grazing may cause the Dakota skipper to be more exposed to predators, parasites, and other environmental stresses, such as fire, than if they were able to build underground shelters, and we have taken this into consideration in our evaluation of the threats to the species.

*(44) Comment:* A peer reviewer commented that the effects of grazing in Manitoba and Saskatchewan, as stated in Webster (2007), may not be applicable under current population scenarios. Even light grazing may be detrimental on dry short-grass prairie sites prior to and during the adult flight period.

*Our Response:* We incorporated this information into the *Factor A* threats analysis of this final listing rule, below.

*(45) Comment:* A peer reviewer stated that potash mining, gravel mining, flooding, and associated flooding protection activities may be significant threats to these species in Canada.

*Our Response:* We incorporated this information into the *Factor A* threats analysis of this final listing rule, below.

(46) *Comment:* One peer reviewer recommended that we not include the research from an unpublished paper by Schlicht (2001a), due to serious flaws in the methodology.

*Our Response:* Because of serious concern over the methods used in this unpublished paper, we removed the information from Schlicht (2001a) from this final listing rule (under *Factor A—Fire*), below.

(47) *Comment:* A peer reviewer stated that the discussion on threats from fire in the proposed rule focuses on controlled burns, but wildfires are a serious problem in Manitoba and previously inhabited sites in northwestern Minnesota. Due to the highly fragmented nature and comparatively small size of sites, wildfire may be a greater threat than either haying or grazing activities.

*Our Response:* We considered wildfires to have moderate to high impacts to Dakota skipper and Poweshiek skipperling populations; the impacts would depend on the timing, intensity, and extent of the burn. We discuss wildfires in Manitoba in the Background (population distribution and status) section and in *Factor E* of this final rule, and considered that fragmentation due to stochastic events, such as wildfires, may lead to extinction at isolated sites (*Factor E*).

(48) *Comment:* One peer reviewer provided a link to the Northern Tallgrass Prairie Lepidoptera Conservation Conference Working Group Reports Synthesis.

*Our Response:* We added the reference to the discussion regarding conservation efforts under *Factor A* in this final listing rule, below.

(49) *Comment:* A peer reviewer noted that, in the Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range section of the proposed rule, there was reference to a 1995 expert panel and plan. The peer reviewer asked whether an actual plan was developed.

*Our Response:* 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; however, this plan was not drafted or finalized.

(50) *Comment:* A peer reviewer noted that, in a number of incidences within the last decade in Canada, sites have had general population declines or sites have been lost to intense agricultural use.

*Our Response:* We are aware of four sites in Canada where the Dakota skipper is now extirpated or possibly extirpated due to habitat destruction. Only sites where we believed the species is currently present or possibly present (unknown) were evaluated in our threats assessment.

(51) *Comment:* One peer reviewer provided details on Poweshiek skipperling populations following prescribed burns in Manitoba (based on Dupont 2013). Specifically, Poweshiek skipperling populations were most numerous in sites burned 5 to 8 years previously. The species was absent in sites that were burned the previous year, in small numbers in areas that were burned 2 to 4 years prior, and absent from areas that were burned 10 or more years before the survey.

*Our Response:* We have incorporated this information under *Factor A* of this final listing rule, below.

#### Factor C

(52) *Comment:* One peer reviewer provided additional information on Wolbachia, a bacteria affecting many butterfly species.

*Our Response:* We incorporated the new information into our discussion on Wolbachia under *Factor C* of this final listing rule, below.

(53) *Comment:* A peer reviewer commented that parasitism, predation, and disease may be significant stressors to Poweshiek skipperlings and Dakota skippers. A hypothesis in the rapid decline of the Poweshiek skipperling, and possibly the Dakota skipper, is that a newly virulent pathogen or a new parasitoid has increased mortality above normal levels. The small number of predation and parasitization events that were observed is evidence only of the difficulty in documenting such events. Dana (1991, pp. 26–27) reported observing predation on the butterfly by arthropods and large robber flies (Asilidae), which are common in upland prairie habitats. The peer reviewer also cited and discussed several studies that pertain to predation on butterflies.

*Our Response:* We reviewed the McCabe (1981) and Dana (1991) reports again and considered additional information on the normal population dynamics of insects, how these factors may explain the rapid decline of the Poweshiek skipperling, and perhaps the Dakota skipper, and how these factors may affect small, isolated populations in the future. We cannot conclude with certainty that parasitism and predation are significant stressors, because these occurrences are extremely difficult to observe, and only a few studies document these events. Therefore, we

conclude that the level of impact from disease, parasitism, and predation is uncertain, but do not dismiss the possibility that these factors may become significant in the future.

#### Factor D

(54) *Comment:* A peer reviewer commented that, in North Dakota, the fundamental purpose of management of State School lands is economic, not scientific or environmental. Consequently, if such land does not produce income for the State, it may be subjected to deliberate change in management strategy, including sale at auction. The Dakota skipper's security at no fewer than two sites in North Dakota, therefore, depends on the economic value of hay, because those sites are on North Dakota Trustlands and are currently under haying management.

*Our Response:* We have incorporated this information into *Factor D* of this final listing rule.

(55) *Comment:* A peer reviewer stated that the Poweshiek skipperling was listed as State-endangered in Minnesota on August 19, 2013.

*Our Response:* We have updated the State status of the Poweshiek skipperling in Minnesota in this final rule.

#### Factor E

(56) *Comment:* One peer reviewer stated that, although the Service has not collected much direct evidence of threats to populations of the Poweshiek skipperling in North Dakota compared to Dakota skippers in the State, it is reasonable to assume that the same factors that affect the Dakota skipper have similarly affected the Poweshiek skipperling, because the two species share a preponderance of habitat characteristics, and often are sympatric (have overlapping ranges).

*Our Response:* The Service agrees with the reviewer's statement. We also think that the reverse is true: It is reasonable to assume that Dakota skipper may be vulnerable to the factors that have caused dramatic declines in the Poweshiek skipperling, but perhaps with a delay in timing. We consider this possibility in our analysis.

(57) *Comment:* One peer reviewer provided detailed information on the size and isolation of Dakota skipper sites in central Manitoba. These sites are generally greater than 158 ac (64 ha), and all are separated by 1 km (0.6 mi). Several sites are separated by many kilometers (miles). The reviewer also suggested that the Service consider the implications of the separation of the U.S. and Canada sites.

*Our Response:* We have incorporated this information, supplemented by information in two recently published Master's theses (Dupont 2013, Rigney 2013a), to update our threats analysis for Canadian populations. Although we were unsure of the size of many sites in Canada, most sites were separated by more than 1 km (0.6 mi); therefore, approximately 25 of the sites evaluated in Canada were thought to be at least moderately affected by small size and isolation. The Canada sites where Dakota skippers are considered to be present are approximately 115 km (71 mi) from the nearest U.S. sites, and the Manitoba site is approximately 166 km (103 mi) from the nearest Poweshiek skipperling site in Minnesota.

*(58) Comment:* A peer reviewer noted that South Dakota State University conducted a climate change analysis, with an emphasis on terrestrial habitats, in association with the revision of the South Dakota Wildlife Action Plan.

*Our Response:* We reviewed that report and incorporated relevant information into *Factor E* of this final listing rule. We will also consider this report during recovery planning for the two species.

*(59) Comment:* One peer reviewer queried as to whether either species has been evaluated using NatureServe's Climate Change Vulnerability Index (<https://connect.natureserve.org/science/climate-change/ccvi>)?

*Our Response:* The Service has not evaluated either species using NatureServe's Climate Change Vulnerability Index, but will consider using this tool in the recovery phase. We used several studies specific to the Dakota skipper and Poweshiek skipperling, as well as general studies of climate-related changes in the Midwest and throughout North America. See the Climate Change section of this final rule for more details on the studies used.

*(60) Comment:* A peer reviewer suggested that the Service should provide more detail on the need for future planning, potential dispersal corridors, restoration of existing sites, and potential reintroduction and augmentation sites. The high degree of habitat fragmentation and isolation of sites combined with the limited dispersal ability of these species have potential for long-term implications, and management actions, even if effective in short-term conservation of local populations, may not be enough to prevent the species from extirpation.

*Our Response:* We agree with the peer reviewer that detailed planning will be needed to recover the Dakota skipper and Poweshiek skipperling. The Service

will begin the recovery planning process once the final listing becomes effective.

*(61) Comment:* One peer reviewer wanted to know how the species would be treated for law enforcement purposes, in order to ensure that private landowners and others that may have these species on their land would comply with section 9 of the Act. The reviewer asked specifically about unauthorized collection, handling, and possession that could result in a violation of section 9 of the Act, as listed in the "Available Conservation Measures" section of the proposed listing rule. The reviewer stated that it may be likely that private citizens have specimens of these species in their possession.

*Our Response:* If private citizens hold specimens of either species that have been collected in the past, they should report these specimens to their local conservation officer or Service enforcement official to receive the appropriate documentation that they were collected prior to listing. Collecting either the Dakota skipper or Poweshiek skipperling after they are listed would be a violation of section 9 of the Act, unless the collector held an appropriate permit from the Service.

*(62) Comment:* One peer reviewer noted that the list of nonnative species in the "Available Conservation Measures" section of the proposed listing rule are already well-established species. A more meaningful list would include species that are not already established, to prevent future invasive species issues that negatively impact these and other native species, and that would inform land managers of plant selection for grassland or wildlife-related plantings.

*Our Response:* We agree that glossy buckthorn, reed canary grass, and leafy spurge are well established in many areas within the range of the species. It is still important for landowners to know that these nonnative species are detrimental to the butterflies and their habitat, so they may avoid introducing them to additional areas or conduct activities that would spread their growth. We added purple loosestrife to the list of invasive plants as well. Purposeful introductions of any of the above species would be detrimental to the butterflies and their habitats. This list is not exhaustive, and other nonnative species may be destructive to the butterflies or their habitats.

*(63) Comment:* A peer reviewer asked how the habitats in which the Poweshiek skipperling or Dakota skipper is known to occur will be defined, and whether that information will be available to the public, such that

landowners can comply with section 9 of the Act.

*Our Response:* The Service maintains a list of counties that are within the current range of the species on publicly accessible Web sites. We suggest that project proponents contact their State's U.S. Fish and Wildlife Service Ecological Services Field Office for specific information on their area. The species are likely to be present only in areas with suitable native-prairie habitat, and may be present in nearby grass-dominated areas suitable for dispersal during the adult flight period. Suitable habitats are further described in the Background section of this final listing rule.

#### 4(d) Rule

*(64) Comment:* A peer reviewer suggested that the 4(d) rule should exempt take caused by haying only after July 22, because the Dakota skipper flight period extends until after July 15 at some sites in some years.

*Our Response:* We acknowledge that extending the earliest date of haying from July 15 to July 22 may further minimize the likelihood of adverse effects to the Dakota skipper, but we will retain the July 15 date for the following reasons: First, factors other than the date in the 4(d) rule will likely play a greater role in determining actual haying dates, and those factors are likely to cause much of the haying conducted in areas where the Dakota skipper occurs to be carried out later than the July 22 date suggested by the commenter. Second, the July 15 date has been used for many years in a variety of conservation agreements as a date to ensure that the effects of haying on nesting birds is minimized. It is typically included, for example, as a required provision in grassland conservation easements purchased on private lands by the Service. By retaining the July 15 date, we minimize the likelihood of causing confusion, and encourage greater cooperation with our conservation partners. Third, even if haying is conducted immediately after July 15, it may be sufficient to minimize adverse effects to Dakota skippers at most sites and in most years. Moreover, in years when the flight period is ongoing past July 15, the Service can work voluntarily with landowners and land managers to delay haying until the flight period is over.

#### Comments From Federal Agencies

*(65) Comment:* The National Guard in North Dakota (NDARNG) commented on their concern that training activities on the Camp Grafton South (CGS) and Garrison Training Area (GTA) will be



restricted and that the NDARNG would be overwhelmed with new permitting and reporting requirements due to the listing of the Dakota skipper. The NDARNG requested that either State-owned or federally-owned land that is operated and managed by the NDARNG be exempt from these proposed rules per proposed § 17.47(b)(3) for military training conducted on lands covered under an Integrated Natural Resources Management Plan (INRMP).

*Our Response:* Neither the CGS nor the GTA was included in the proposed critical habitat designation. However, according to section 4(b)(B)(iii) of the Act, the Department of Defense must still comply with section 9 of the Act, including the prohibition preventing extinction and taking of endangered species and threatened species.

(66) *Comment:* The NDARNG provided additional reports by Fauske for surveys conducted in the CGS and GTA in 2003 and 2004. The National Guard also mentioned surveys that were conducted by Fauske in 2013 at those locations. Dakota skipper was not observed at those sites in those years.

*Our Response:* We incorporated the data from the 2003 and 2004 reports into this final listing rule. We have not been able to obtain the data from Fauske's 2013 surveys, but did incorporate the National Guard's claim of negative surveys in 2013 into this final listing rule.

(67) *Comment:* One commenter stated that two publications (Grant *et al.* 2009, DeKeyser *et al.* 2009) that discuss management of prairies show that sometimes prescriptions for long-term management of habitat are at odds with short-term management of the species. For example, no or light grazing or late-season haying may lead to invasion of cool-season exotic grasses and loss of native forb and grasses. Thus no management could sometimes be considered a threat, just as prairie conversion may cause take.

*Our Response:* We agree that no management or lack of disturbance may be a threat to Dakota skipper and Poweshiek skipperling habitat and that haying, grazing, and fire may be an important management tool for these butterflies, if carried out appropriately. These topics are discussed further in *Factor A* in this final listing rule, below. Adaptive management may be necessary at many locations to take into account the underlying causes of habitat degradation and the long-term and short-term consequences of management to the habitat and the species. We will be addressing management at specific locations during recovery planning for both species.

(68) *Comment:* A Federal agency commented that some native-prairie plant species decrease without proper grazing management, and long-term monitoring is needed to properly examine plant species declines. Furthermore, plant species declines may be due to other factors, such as landscape position, climatic factors, historical and current management, and other ecological site conditions. Several papers cited in the proposed rule incorrectly identify forb species that decrease due to grazing, such as the purple coneflower.

*Our Response:* We acknowledge that long-term monitoring data would be a valuable indicator of important plant species declines. Unfortunately, we do not have long-term monitoring established at most sites; therefore, we must rely on the best information available. Most references to grazing impacts on prairie butterflies are based on ancillary observations made during research focused on other management impacts. Some of these may be observational data of changes in site conditions at a particular site from one year to the next following changes in management regimes. We cite a few studies that show that certain levels of grazing remove nectar sources and are, therefore, likely to adversely affect Dakota skipper populations (*e.g.*, Rigney 2013a, pp. 143, 153). We discuss grazing, including the effects of grazing management in different habitat types, further in *Factor A* of this final listing rule, below.

(69) *Comment:* A Federal agency noted that the proposed listing rule states that a large portion of the Dakota skipper habitat should remain ungrazed or lightly grazed during the adult flight period. Management focused on preserving every life stage of the butterflies will actually lead to their demise by inadvertently destroying their habitat.

*Our Response:* Britten and Glasford (2002) recommend 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). All life stages are essential to the survival of the species, including the adult flight stage, which is when breeding occurs. Removal of important nectar sources during the short adult flight period can adversely affect the Dakota skipper (*e.g.*, Rigney 2013a, pp. 143, 153). Thus, it is equally important

to minimize disturbance of Poweshiek skipperling habitat during their adult flight period for the same reasons.

(70) *Comment:* A Federal agency noted that Britten and Glasford (2002, p. 373), cited in the proposed rule, does not identify grazing as a disturbance, as the proposed rule indicates.

*Our Response:* Although Britten and Glasford (2002) did not specifically identify grazing as a disturbance, other information sources indicate that grazing can disturb adult Dakota skippers and Poweshiek skipperlings, because it may remove important nectar sources (*e.g.*, Rigney 2013a, pp. 143, 153). Both the beneficial and negative effects of grazing are further discussed in *Factor A* of this final listing rule, below.

#### *Comments From States*

(71) *Comment:* A State commented that a comprehensive survey effort throughout the range of the two species is prudent, if not necessary, before any listing can occur.

*Our Response:* Under the Act, we are obligated to use the best available scientific and commercial information in decisions on whether to list a species. In this case, the best available information included results from surveys, reports by scientists and biological consultants, natural heritage data, and expert opinion from biologists with extensive experience studying the Dakota skippers and Poweshiek skipperling and their habitats, whether published or unpublished. We are required to make a decision based on that available data. Also, see response to comment 76.

(72) *Comment:* The Minnesota Department of Natural Resources (MN DNR) agrees with the Service's conclusion that these species warrant protection under the Act and fully supports the proposed threatened status for the Dakota skipper and the proposed endangered status for the Poweshiek skipperling. The MN DNR has a long history of commitment to the conservation of these species and has been an active participant in recent efforts to assess their status in Minnesota. The MN DNR agrees with the Service's conclusions regarding factors affecting the species and their resulting status. In light of recent findings, the MN DNR has reclassified both species as endangered under Minnesota's Endangered Species Statute, effective August 19, 2013.

*Our Response:* We appreciate our partnership with MN DNR and their supporting comments, and have updated the information regarding the reclassification of both species under

Minnesota's Endangered Species Statute in *Factor D* of this final listing rule.

#### Habitat

(73) *Comment:* The North Dakota Game and Fish Department suggests that the Service use NRCS Ecological Sites of North Dakota as a means to describe specific potential habitat, rather than Type A and Type B habitat as described in the proposed rule. The ecological site descriptions and transition models would help direct the proper grazing prescription to promote and achieve the plant species composition appropriate for the given site and requisites for these two butterfly species.

*Our Response:* We are considering using NRCS ecological site descriptions as a tool for managers and others to narrow down potential habitat for one or both species. However, NRCS ecological site descriptions have not been developed for all areas where the species may be present. For the purposes of this final listing, we found that Type A and Type B habitat descriptions were descriptive of the habitat and flowering forbs and grasses necessary for the two butterflies.

(74) *Comment:* North Dakota commented that, based on the specific precipitation and evaporation rates of Dakota skipper habitat that McCabe suggests, the western area of North Dakota should not be considered as part of the range for the Dakota skipper, as those areas do not meet those specific rates.

*Our Response:* We have determined that the Dakota skipper is threatened throughout its range, which includes the 18 counties where the species has been documented in North Dakota. The Dakota skipper is historically known from several counties in western North Dakota (e.g., McKenzie, Burke, Montrail, and Dunn counties) and is considered to be present in at least two locations in McKenzie County. The Dakota skipper may still occur in areas of western North Dakota that may have conditions that are different from what McCabe (1981) describes for some of the eastern counties. See the Background section of this final listing rule for a list of counties in each State.

(75) *Comment:* North Dakota commented that it appears that any native grassland in North Dakota that has not been cultivated is potential Dakota skipper habitat.

*Our Response:* To more clearly define what constitutes Dakota Skipper habitat and where take of Dakota skippers may occur, the Service developed tools to help determine whether the species may be present in specific areas, which are available on the Internet at <https://>

[www.fws.gov/midwest/Endangered/section7/s7process/s7guid\\_cons.html#dask](http://www.fws.gov/midwest/Endangered/section7/s7process/s7guid_cons.html#dask). We will continue to refine these materials to help reduce uncertainty as to where Dakota skippers may occur. Dakota skippers are present on only a subset of native grassland and are unlikely to be present in areas where key habitat features are lacking. Those features are described in the Background section of this rule and in the materials available on the Internet. As we work to conserve Dakota skippers, we will provide landowners and land managers with information that is as accurate and up-to-date as possible to describe the areas where the species is likely to be present. In addition, we will also work with these parties to ensure that they understand what activities are likely to cause take of the species, whether or not the take would be exempted under the 4(d) rule, and what actions may be implemented to conserve the species.

#### Population Status and Distribution

(76) *Comment:* A State commented that surveys appear to be focused on repeated visits to sites that were previously inventoried, and a systematic search for additional sites has not been conducted. Furthermore, a few new sites have been discovered since 1996 without such a systematic search for new sites, which suggests that many new sites may be found with a systematic search. Additionally, roadside searches for habitat are not a scientifically valid method for identifying potential habitat.

*Our Response:* The search for additional locations of both species has been conducted using a variety of approaches over the years, and potential sites have been narrowed down on the landscape using topographic and aerial maps, State natural heritage habitat mapping data, aerial surveys, roadside surveys, and other methods. Other sites have been surveyed because of a proposed project and the known potential for suitable habitat in the area or proximity to other known locations of the butterflies. Many sites are repeatedly surveyed to understand long-term trends in the presence of the species or to quantify other population parameters. Although only a small fraction of all grassland in North Dakota, South Dakota, and Minnesota has been surveyed, a significant proportion of the un-surveyed area is likely not suitable for the species. For example, the species was not detected at approximately 108 additional locations in North Dakota that were surveyed for the species in the period 1991–2013 (USFWS 2014, unpubl. geodatabase). Similarly, in

South Dakota and Minnesota, 79 and 148 additional locations, respectively, were surveyed for the species in the period 1991–2013 (USFWS 2014, unpubl. geodatabase).

Many of these sites have been surveyed multiple times over several years. Surveys for the Dakota skipper are typically conducted only in areas that have the particular plant species the skipper requires. New potential sites surveyed are generally focused on prairie habitat that appears suitable for the species and has a good potential of hosting the species. Therefore, researchers have a higher likelihood of detecting the species at these sites 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, South Dakota, or Minnesota is low. We acknowledge that there may be some undiscovered populations, however, and are exploring using spatially explicit modeling to develop probability occurrence maps of both species, to help direct future surveys and conservation efforts.

(77) *Comment:* Since the Poweshiek skipperling has not been detected in South Dakota since 2002, South Dakota should not be included in the listing proposal. Further research needs to be conducted to determine if this species is present in South Dakota before it is listed.

*Our Response:* According to our data and analysis, the species' presence is unknown at 36 of the total 69 sites where the species has been documented in South Dakota. The species was detected at least once at all 36 of these sites in 1993 or later; 19 of these sites had positive detections of the species in 2002 or later. The most recent detection of the species in South Dakota was at two sites in 2008. Surveys for the species were not conducted at any of the 36 sites with unknown occupancy between the years 2007 and 2011, and we cannot presume that the species is not persisting at a site only because there have not been consistent annual surveys. At several sites, the species has persisted for longer than 20 years; for example, the Dakota skipper was first recorded at Scarlet Fawn Prairie in South Dakota in 1985 and the species was detected during every survey since that date. Similarly, the Poweshiek skipperling was first recorded at Waubay National Wildlife Refuge in 1969 and was recorded during every year the site was surveyed through 2003. South Dakota is in the range of the Poweshiek skipperling, and the species is listed throughout its range. See our

response to comment 76 regarding additional surveys or research.

#### Factor A

(78) *Comment:* A State commented that careful implementation of grazing and prescribed fire can be an effective management tool in prairie remnants. The Service should provide clear and practical HMGs/BMPs (Habitat Management Guidelines/Best Management Practices) for acceptable use of prescribed fire and grazing implementation.

*Our Response:* We developed Dakota skipper conservation guidelines (<http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines.html>) that address grazing, prescribed fire, weed/invasive species control, and other topics, and are preparing similar guidelines for the Poweshiek skipperling. While some detail is provided in terms of timing, periods of rest, and number and size of burn units, the Service stresses that effective implementation of the conservation measures relies on a thorough and accurate understanding of the distribution and status of the Dakota skipper and Poweshiek skipperling and their habitat within a management area. These two species are likely to be non-uniformly distributed within habitat areas (e.g., Rigney 2013a, p. 140). Therefore, a species expert should frequently assess and map habitat and distribution of the species within management areas to ensure that managers may act based on correct and up-to-date information.

(79) *Comment:* A State asked whether grazing of potential butterfly habitat other than low mesic sites will constitute take.

*Our Response:* Such decisions will require site-specific information. If a project occurring in potential butterfly habitat may affect one or both species or its habitat, we suggest contacting the Service's Ecological Service Office in your State.

(80) *Comment:* A State commented that habitat modification and fragmentation may be a large threat to many grassland species. While other factors may need to be addressed to protect the species, conversion of grasslands is the largest single issue. Once land conversions have occurred, the land cannot be restored to match the specific requirements of these specialist species. Listing can be viewed by private landowners as an encumbrance and a disincentive to conserve grassland; hence privately owned grassland could be converted, due to the

current crop commodity environment and demand for additional cropland.

*Our Response:* We agree that conversion of remnant prairies is a significant concern. Conversion of land to agricultural and other uses is discussed in *Factor A* of this final listing rule, below.

#### Factor E

(81) *Comment:* South Dakota commented that, as part of the South Dakota Wildlife Action Plan Revision, experts at South Dakota State University conducted a climate change analysis with an emphasis on terrestrial habitats.

*Our Response:* The Service appreciates this information. We reviewed the climate report and included information from it into *Factor E* of this final listing rule. This report will also help inform recovery planning and implementation.

#### Economic Concerns

(82) *Comment:* A State questioned how a private landowner would be compensated if, during the course of the Service's activities for monitoring the critical habitat areas, the private landowner's land or property is damaged.

*Our Response:* Surveys for either species on private lands would only be conducted with landowner permission. Surveys for the species and its habitat are not destructive in nature and have little, if any, impact on the land.

(83) *Comment:* North Dakota commented that listing these two species will add a substantial workload relative to highway improvement project development, construction, and maintenance, due to additional section 7 consultations with the Service. This increased workload could add months to project timelines and would cause a major and unnecessary disruption to the highway and road systems in North Dakota.

*Our Response:* Although an increased workload for section 7 consultations may be associated with listing these two species, section 4 of the Act requires species to be listed as endangered or threatened solely on the basis of their biological status and threats to their existence. Section 7 of the Act requires Federal agencies to use their legal authorities to promote the conservation purposes of the Act and to consult with the Service to ensure that effects of actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species. During consultation, the action agency receives a biological opinion or concurrence letter addressing the proposed action. In the relatively few

cases in which the Service makes a jeopardy determination, the agency offers reasonable and prudent alternatives for how the proposed action could be modified to avoid jeopardy. The Service will work with the consulting agency as expeditiously as possible to complete the section 7 consultation process in a timely manner.

(84) *Comment:* A State asked, what would happen should a private landowner incidentally take either species during the course of routine farming operations on private land.

*Our Response:* Under the Act, it is unlawful for a person to take a listed animal without a permit. Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Through regulations, the term "harm" is defined as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." Section 10 of the Act may be used by landowners including private citizens, corporations, Tribes, States, and counties who want to develop property inhabited by listed species. Landowners may receive a permit to take such species incidentally to otherwise legal activities, provided they have developed an approved habitat conservation plan (HCP). HCPs include an assessment of the likely impacts on the species from the proposed action, the steps that the permit holder will take to avoid, minimize, and mitigate the impacts, and the funding available to carry out the steps. HCPs may benefit both landowners and the species by securing and managing important habitat, and by addressing economic development with a focus on species conservation.

We recognize that the Dakota skipper and Poweshiek skipperling remain only on lands where management has allowed them to survive. This is due to good land-stewardship, and we want to encourage management practices that support the butterflies. To minimize impacts to landowners and promote continued cooperation with them while recovering the Dakota skipper, the Service developed a 4(d) rule under the Act for that species. This 4(d) rule exempts incidental take of Dakota skippers caused by certain routine livestock operations and mowing recreational trails. Any "take" that results from private landowner activities not exempted under the 4(d) rule would require a permit from the Service. Therefore, private landowners with

Dakota skippers on their property should become familiar with the contents of the 4(d) rule and contact the Service if they have questions. Actions that may cause “take” and require a permit from the Service include prescribed burns, haying before the adult flight period ends, broadcast herbicide treatments, some insecticide treatments, and permanent conversion of the Dakota skipper’s grassland habitats. The 4(d) rule does not apply to take of the Poweshiek skipperling because it is listed as endangered, and the Act does not allow 4(d) rules for endangered species. Any activity that would result in take of Poweshiek skipperlings would first require a permit from the Service.

*(85) Comment:* A State commented that where section 7 consultations will be required is unclear. What areas would have to be surveyed to determine whether the species is present? A large amount of potential habitat may need to be surveyed during the short adult flight period, and there are a limited number of qualified entomologists to conduct the surveys.

*Our Response:* The Dakota skipper and the Poweshiek skipperling are both closely tied to native-prairie habitats and are unable to inhabit areas such as nonnative grasslands, weedy roadsides, or tame haylands. In addition, these butterflies are not likely to inhabit reconstructed prairies (e.g., former cropland replanted to native-prairie species). Therefore, the Service recommends that, to determine whether a section 7 consultation may be required or recommended, action agencies should first coordinate with their local U.S. Fish and Wildlife Service Ecological Services field office and provide a description of the area that would be affected, directly or indirectly, by the proposed or ongoing action. If survey data are unavailable or inconclusive for the action area, and features of Dakota skipper or Poweshiek skipperling habitat are predominant in at least part of the area, a survey by a qualified individual may be recommended. The Service is developing a list of qualified surveyors, which will be available through the field offices in each State.

*(86) Comment:* North Dakota expressed concern that any impact to native grasslands in North Dakota will be considered take and require an incidental take permit. Adjusting the timing of construction activities will not avoid take because of the species’ biology.

*Our Response:* The Dakota skipper and Poweshiek skipperling historically occurred in 18 and 7 counties in North

Dakota, respectively, and unless the species are discovered in additional counties, section 7 consultation would be required only in those counties and on a subset of lands within those counties where the species may occur or where critical habitat has been designated. You may obtain a list of counties in which the species may occur from the U.S. Fish and Wildlife Service Ecological Services field office in your State. Furthermore, these two species have specific habitat requirements (native, unbroken prairies), and it is likely that many action areas will not contain those types of prairie habitats. Therefore, project proponents should first provide the field office with a description of the area that would be affected by the proposed or ongoing action to determine whether a section 7 consultation may be required or recommended. See our response to comment 85 and the Background of this final listing rule for additional information regarding the habitats these two species inhabit.

*(87) Comment:* A State asked whether reinitiation under section 7 of the Act will need to occur, or will any new restrictions be recommended when new projects begin or existing projects are renewed.

*Our Response:* Section 7(a)(2) of the Act requires Federal agencies to consult with the Service to ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitat. Therefore, reinitiation of section 7 consultations may be required for ongoing, new, or revised actions that may affect the Dakota skipper or Poweshiek skipperling or their designated critical habitat. We recommend contacting the U.S. Fish and Wildlife Service Ecological Services field office in your State to determine the need for section 7 consultations on specific projects.

*(88) Comment:* A State asked what types of conservation or mitigation measures would be needed to offset potential impacts to the species or designated critical habitat, and how will the Service ensure timely approval of mitigation measures.

*Our Response:* The Service developed conservation guidelines for the Dakota skipper that are available online (<http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines.html>) and is developing similar guidelines for the Poweshiek skipperling. We suggest that private landowners implement applicable guidelines to assist species and habitat conservation efforts and

contact their local Service Ecological Services field office if they are planning an activity that may affect one of these species. For actions with a Federal nexus, action agencies should contact their local field office to discuss the timeliness of our section 7 consultation process. For example, from the date that formal consultation is initiated, the Service is allowed 90 days to consult with the agency and applicant (if any) and 45 days to prepare and submit a biological opinion. Biological opinions may include reasonable and prudent measures and terms and conditions, both intended to minimize the impact of incidental take.

*(89) Comment:* A State asked whether State natural resource agencies be expected to restore the species to State-owned lands where they are considered to be extirpated.

*Our Response:* The Service will work with the State agencies and other stakeholders through recovery planning to identify areas that would aid in recovery of these species, and determine appropriate actions to take on those lands.

*(90) Comment:* A state commented that incentive-based voluntary programs work well for other species and may be a better solution to conserving the species than listing and critical habitat designations. The State would like to provide potential voluntary methods and programs to assist and incentivize landowners to implement conservation measures and practices that enhance butterfly habitat.

*Our Response:* We appreciate any assistance to incentivize landowners to conserve these species. Voluntary actions can have a significant contribution to conservation. If such measures are in place when we are evaluating a species for listing, we consider those measures and how they affect the status of the species in our determination. The Service’s policy regarding voluntary prelisting conservation actions (79 FR 42525, July 22, 2014), encourages voluntary conservation actions for non-listed species. However, a species may still warrant listing if such voluntary actions are not in place when we are evaluating a species for listing, or if those actions are not sufficient to affect the need to list a species. We suggest you contact the Service’s Ecological Services Field Office in your State to discuss voluntary conservation programs in detail.

*(91) Comment:* A State suggested that the Service should develop habitat management guidelines and best management practices (HMGs/BMPs) in close collaboration with State agencies and others knowledgeable about

effective prairie management. Many State-owned prairies are managed with the support of Federal funding, and HMGs/BMPs are needed immediately in order for the State agencies to comply with the Act. Such HMGs/BMPs should include clear guidance on: Prescribed fire; grazing; appropriate use of herbicides on occupied sites; pesticide buffers around occupied sites and notice to landowners adjacent to occupied sites; adherence to and enforcement of pesticide labels; available tools and incentives, including incentives and management practices for expanding prairie restoration to adjacent restorable lands; distinct measures for occupied habitat and unoccupied habitat, including lands targeted for restoration or enhancement; measures for restored habitat, and the point at which habitat is considered restored; and importance of effectiveness monitoring and adaptive management practices in ensuring that HMGs/BMPs produce the desired benefits to the species and their habitat.

*Our Response:* We appreciate this comment and look forward to working with our State partners in implementing conservation and providing assistance. The Service has developed conservation guidelines for the Dakota skipper that are available online (<http://www.fws.gov/midwest/angered/insects/dask/conservationguidelines.html>) and is developing similar guidelines for the Poweshiek skipperling. The Dakota skipper conservation guidelines address: Prescribed fire management, grazing, haying and native seed harvest, habitat preservation, habitat restoration, weed/invasive species control, maintenance of genetic diversity within populations, and coordinated management. The Service looks forward to continued collaboration with State agencies and other stakeholders to further develop and refine these conservation guidelines. These guidelines will be used as a basis to begin a discussion of HMGs/BMPs development.

*(92) Comment:* A State suggested that, if HMGs/BMPs cannot be completed before the effective date of the listing, the final rule should be delayed until the necessary guidance is available.

*Our Response:* Section 4(b)(6)(A) of the Act establishes that the Service must make a final determination as to its proposed action within 1 year of publishing the proposal, unless there is substantial disagreement about the sufficiency or accuracy of the available data on which that decision is based, for which the Service may seek up to a 6-month extension.

#### 4(d) Rule

*(93) Comment:* A state suggested that the 4(d) rule be expanded to exempt take caused by prescribed burns, as it is a valuable habitat management tool.

*Our Response:* Although we can establish general guidelines for managers and landowners who are planning prescribed burns in Dakota skipper habitats, we determined that it would not be advisable to broadly exempt take caused by burning in the 4(d) rule. The impacts of prescribed fires on Dakota skipper populations depend on numerous factors that warrant site-specific evaluation, including the number, proximity, and size of populations in nearby unburned areas; fuel loads; timing of the fire; likelihood of escape from fire units; and post-fire management of unburned units. If fires are proposed in areas where they are likely to result in take of Dakota skippers, individual reviews should be conducted to determine potential effects to the species.

*(94) Comment:* A state suggested that the 4(d) rule should specifically exempt mowing and haying of road rights-of-way under all jurisdictions (State, county, or township). Exemptions should apply in the area from the road surface to the right-of-way boundary.

*Our Response:* We modified the 4(d) rule to exempt take of Dakota skippers caused by mowing native grassland for hay after July 15 within transportation rights-of-way. Except for mowing of section line rights-of-way and recreational trails, the 4(d) rule only exempts take of Dakota skippers that occurs as a result of mowing or haying that is part of routine livestock ranching activities. Except for the two specific cases mentioned above—mowing section line rights-of-way and recreational trails—the 4(d) rule does not exempt take of Dakota skippers caused by mowing that does not produce hay for livestock consumption. Regardless, the 4(d) rule exempts take of Dakota skippers only if the haying is carried out after July 15. We also further clarified that Dakota skippers do not inhabit tame hayland or grassland (hayland or grassland planted to, and composed primarily of, nonnative grass species, such as smooth brome).

*(95) Comment:* One commenting agency indicated its support for the 4(d) rule, but also stated that it does not support the exemption of the listed activities for purposes other than ranching and trail maintenance, and requested that the Service clarify that the listed activities would not be permitted if used for other categories of actions. These activities include haying

and spot application of herbicides to control noxious weeds.

*Our Response:* In the final 4(d) rule, the Service clarifies that take would be exempted for certain activities listed in the 4(d) rule when carried out in relation to routine livestock operations. We did, however, also clarify that take that occurred as a result of mowing native grassland for hay would be exempted if conducted after July 15 in transportation rights-of-way.

*(96) Comment:* A State commented that, in the 4(d) rule, only exempting spot spraying of weeds is overly restrictive. Leafy spurge, for example, cannot be effectively controlled at the seedling stage by spot spraying.

*Our Response:* We understand that there may be cases where spot-spraying is insufficient to control outbreaks of noxious weeds. Frequent herbicide applications, however, have been associated with reduced diversity of native flowering plants in native rangelands (e.g., Smart *et al.* 2011, p. 184). Therefore, take caused by broadcast herbicide applications is not exempted by the 4(d) rule. In many cases, Dakota skippers may not be present in areas where broadcast applications are necessary. The Service can provide technical assistance to help determine whether Dakota skipper may be present. If noxious weed control is needed where the Dakota skipper is likely to be present, the Service will work with landowners or land managers to identify techniques that avoid take.

*(97) Comment:* One commenter requested guidance on whether prescribed fire and the activities described under the 4(d) rule could be implemented “on sites that might have historically supported” Dakota skipper.

*Our Response:* Take of Dakota skipper is prohibited under the Act, unless it is a specific action that is exempted under the 4(d) rule, which applies to all State, private, or tribal lands. If an action is implemented on a site where the Dakota skipper is no longer present, then take is unlikely. An action could result in take of Dakota skippers at sites where the species has been extirpated if key habitat features are still present and an extant population inhabits a nearby area. In those cases, Dakota skipper may have reoccupied the site, and we recommend coordinating with the Service to ensure that a proposed activity is not likely to result in take of Dakota skippers.

*(98) Comment:* One commenter stated that the list of counties in which the proposed 4(d) rule did not exempt take caused by grazing (Eddy, McHenry, Richland, Rolette, Sargent, and Stutsman) did not directly correspond

to the list of counties in which critical habitat was proposed (McHenry, McKenzie, Ransom, Richland, Rolette, and Wells).

*Our Response:* We revised the 4(d) rule to exempt take caused by grazing throughout the range of the species, and not limited to certain counties. Thus, the final 4(d) rule exempts take of Dakota skippers caused by livestock grazing on all private, State, tribal, and other non-Federal (e.g., county) lands.

#### Public Comments

##### General

*(99) Comment:* A number of public comments opposed the listing of the Dakota skipper and Poweshiek skipperling as federally threatened or endangered species, but provided no substantive scientific or commercial evidence suggesting that listing is not warranted.

*Our Response:* While we appreciate the opinion of all interested parties, the Service must base its decision of whether to list the Dakota skipper and Poweshiek skipperling solely on the basis of the best scientific and commercial data available.

*(100) Comment:* Several comments stated that listing these species will interfere with private property rights and cause economic impacts, such as reduction in land values, fines to citizens, prohibitions to development, wasteful use of taxpayer money, and intrusion to grazing and farming operations.

*Our Response:* For listing actions, the Act requires that we make determinations “solely on the basis of the best available scientific and commercial data available” (16 U.S.C. 1533(b)(1)(A)) regarding the status of the species. Therefore, we do not consider any information concerning potential economic or other possible impacts when making listing determinations. We will work with entities to conserve the butterflies and develop workable solutions. Furthermore, in this rule, we have included a 4(d) rule for the Dakota skipper that exempts take from certain routine grazing activities. The presence of a listed species does not give government employees or representatives any rights to access private property.

*(101) Comment:* A commenter stated that the Service did not use the best available science in the proposal. There is a lack of evidence to justify the proposed actions.

*Our Response:* The comment did not provide details on what scientific information we failed to consider in our proposal. In preparation of the proposal

and this final rule, we used the best available scientific and commercial information of which we are aware. We sought comments from independent peer reviewers to ensure that our determination is based on scientifically sound data, assumptions, and analysis. The peer reviewers stated that our proposed rule was based on the best available scientific information. Additionally, the results of 2013 surveys conducted throughout the range of both species in the United States and information from recently published research conducted in Saskatchewan and Manitoba were considered in our final listing rule.

*(102) Comment:* A commenter stated that listing under the Act and critical habitat designations are intertwined and cannot be separated, as the Service has done with these proposals.

*Our Response:* When a species is proposed for listing as endangered or threatened under the Endangered Species Act (Act), we must consider whether there are areas of habitat we believe are essential to the species’ conservation. The listing determination and critical habitat determination for the Dakota skipper and Poweshiek skipperling were conducted at the same time and in coordination with each other. The proposed rules for each action were published on the same date, but in separate documents. We are currently working to finalize the critical habitat determination for these two species, which will be published shortly.

*(103) Comment:* A commenter requested that we clarify the status that is proposed for each species, as it is confusing which is proposed as threatened and which as endangered.

*Our Response:* The Dakota skipper is listed in this rule as a threatened species, and the Poweshiek skipperling, as an endangered species.

*(104) Comment:* A commenter requested that the listing and critical habitat designations for these species will create an adversarial atmosphere between the Service and the agricultural community, and punish producers, who are the best stewards of habitat for a variety of species.

*Our Response:* We based our listing decisions on the basis of biological information and have determined that the Dakota skipper is threatened and the Poweshiek skipperling is endangered under the Act. The Service is committed to working with private landowners, public land managers, conservation agencies, nongovernmental organizations, and the scientific community to conserve the Dakota skipper and Poweshiek skipperling and

their habitats. For example, 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 developed a 4(d) rule that outlines the prohibitions, and exceptions to those prohibitions, necessary and advisable for the conservation of the Dakota skipper. We believe that exempting 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 will facilitate the coordination and partnerships needed to recover the species.

*(105) Comment:* The North Dakota Stockman’s Association commented that they have policy supporting the use of sound science in decisionmaking. Much of the science used to develop these proposals was not peer-reviewed or published, and was largely based on internal documents. The Service’s own “Information Standards Under the Endangered Species Act” policy calls for “review of all scientific and other information used by the Services to prepare biological opinions, incidental take statements, and biological assessments to ensure that any information used by the Services to implement the Act is reliable, credible, and represents the best scientific and commercial data available.” Sound, peer-reviewed science needs to be the foundation of any proposal, but particularly of those with such serious implications for citizens.

*Our Response:* Under the Act, we are obligated to use the best available scientific and commercial information, which in this case included results from surveys, reports by scientists and biological consultants, natural heritage data, and expert opinion from biologists with extensive experience studying the Dakota skipper and Poweshiek skipperling and their habitats, whether published or unpublished. The Service’s databases were also referenced several times within the document (e.g., Service 2014, unpublished geodatabase). These databases were built using hundreds of sources, including unpublished reports, published papers, and State heritage data. We referenced these databases in the proposed and final listing document, in places where we summarized data across many sources. All of the reports utilized in these databases are publically available, upon request.

Additionally, we sought comments from independent peer reviewers to ensure that our determinations are based on scientifically sound data,

assumptions, and analysis. We solicited information from the general public, nongovernmental conservation organizations, State and Federal agencies that are familiar with the species and their habitats, academic institutions, and groups and individuals that might have information that would contribute to an update of our knowledge of the species, as well as the activities and natural processes that might be contributing to the decline of either species. The existing body of literature on the Dakota skipper and Poweshiek skipperling, including results from surveys, reports by scientists and biological consultants, natural heritage data, and expert opinion from biologists with extensive experience studying the Dakota skipper and Poweshiek skipperling and their habitats, whether published or unpublished, is the best available information.

*(106) Comment:* A commenter noted that the Dakota skipper listing priority number indicating threats of moderate to low magnitude.

*Our Response:* The Service believes that the Dakota skipper warrants protection under the Act, as a threatened species, as discussed in detail in this final listing rule. The listing priority number was changed 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 through October 26, 2011 (76 FR 66370). The listing priority numbers range from 1 to 12, indicating the relative urgency for listing plants or animals as threatened or endangered. The criteria used to assign this number reflect the magnitude and immediacy of threat to the species, as well as the relative distinctiveness or isolation of the genetic material they possess. This latter criterion is applied by giving a higher priority number to species that are the only remaining species in their genus, and a lower priority number to subspecies and varieties. The listing priority number assigned to a species, however, does not necessarily reflect the classification the Service ultimately determines is appropriate for a species when making a listing determination, as new information may become available that affects that decision.

*(107) Comment:* A commenter questioned how this listing would adversely affect other species.

*Our Response:* We are unaware of any adverse effects that these listings would have on other native species of plants or animals. Nonnative or invasive plant species and species of woody plants encroaching into prairie habitats may be

managed to maintain or increase the quality of native-prairie habitats.

*(108) Comment:* Commenters asked whether those who are enrolled in the Conservation Reserve Program, Environmental Quality Incentive Program, or other U.S. Department of Agriculture programs would be subject to special requirements. How will the listing affect those who have Federal crop insurance, have received a Federal loan or Federal disaster assistance, or own property that has a Federal easement? If a landowner is required to seek consultation before requesting Federal funding or authorization for an action that may affect a listed species or critical habitat, what cost will be involved, both in terms of money and time? Will this be reflected in the economic impact analysis the Service is preparing?

*Our Response:* Proposed projects in areas where one or both species may be present or on designated critical habitat that has a Federal nexus (in other words, funded, authorized, or carried out by a Federal agency) will be required to undergo consultation with the Service under section 7 of the Act. In such cases, it is the responsibility of the Federal agency involved to complete the consultation. In those instances, the action agency should contact the Service's Ecological Services Office in their State if they are planning an activity that may affect the species or its critical habitat. For more information about section 7 consultations, visit the Service's Web site (<http://www.fws.gov/endangered/what-we-do/consultations-overview.html>). In accordance with the Act, we cannot consider possible economic impacts in making a listing determination. However, section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat.

*(109) Comment:* One commenter recommended that better documentation is needed when Landowner Incentive Program grants or other government funding is used.

*Our Response:* Government-funded grant accomplishment reports are typically available online. Information on our grant programs available to aid species recovery can be found at <http://www.fws.gov/grants>.

*(110) Comment:* Private landowners who are participating in the Service's recovery program for the Karner blue butterfly commented that private landowners are critical to the protection

of endangered and threatened species. Private landowners often provide suitable 'stepping stone' habitat otherwise unavailable to public agencies. The Federal status of the Karner blue butterfly facilitated habitat improvements and public awareness that may not have occurred but for the protection of that species. The commenter believes that listing the Dakota skipper and Poweshiek skipperling will similarly benefit these two species.

*Our Response:* We thank you for your comment and participation in species recovery efforts. The Service understands the importance of private landowner participation and support in recovery of the Dakota skipper and Poweshiek skipperling and will continue to work with all stakeholders to this end.

*(111) Comment:* One commenter expressed disappointment with the Service stating that other Service projects that are of great benefit to society, the commenter did not believe that listing the butterflies was one of them. The commenter questioned why these two butterflies are of such importance that they should be listed.

*Our Response:* In the preamble to the Endangered Species Act of 1973, Congress recognized that endangered and threatened species of wildlife and plants "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." In this statement, Congress summarized convincing arguments made by scientists, conservationists, and others who are concerned by the disappearance of unique creatures. The Service is responsible for implementing the Act, and as such, must determine whether any species is an endangered or threatened species, based on the best scientific and commercial data available regarding the status of that species, not based on a certain benefit to society or importance.

Although the Service does not consider the value of a particular species when making a listing determination, these butterflies are important and do provide a societal benefit. Humans depend on the variety of life for food, clothing and medicines. When we lose species we lose their potential for the future and we lose their effect on other species which, in turn, have ecosystem roles and future value. Continued degradation of our lands and waters that reduces our biological diversity—the variety of life—is important. Habitat and water degradation, and maybe even climate change, can be reversed, but the loss of a species and its genes are irreversible.



Further, the prairie ecosystem is not completely gone, yet, but it will be if we do not take measures to save its plants and animals. Protecting these small butterflies means protecting their habitats, so that some of this ecosystem, with all its variety of life, remains. Humans depend on the variety of life for food, clothing and medicines. The variety of life that we have in this country, including functioning ecosystems, is our natural heritage.

*(112) Comment:* One commenter stated that change, both desired and undesired, is a natural part of the evolutionary cycle.

*Our Response:* Although extinctions occur naturally, scientific evidence strongly indicates that the current rate of extinction is much higher than the natural or background rate of the past. The main force driving this higher rate of loss is habitat loss. Over-exploitation of wildlife for commercial purposes, the introduction of harmful exotic (nonnative) organisms, environmental pollution, and the spread of diseases also pose serious threats to our world's biological heritage. None of these creatures exists in a vacuum. All living things are part of a complex, often delicately balanced, network called the biosphere. The earth's biosphere, in turn, is composed of countless ecosystems, which include plants and animals and their physical environments. No one knows the myriad ways the extinction of organisms will affect the other members of its ecosystem, but the removal of a single species can set off a chain reaction affecting many others. Furthermore, many individual species are uniquely important as indicators of environmental quality. The rapid decline of the Poweshiek skipperling and Dakota skipper may be an indicator of a greater environmental problem. Regardless of the reason for the species' decline, it meets the definitions of a threatened or endangered species under the Act, we are obligated list it under the Act.

*(113) Comment:* A commenter noted that prairie ecosystems are one of the most endangered ecosystems of the world. Currently only 4 percent of remnant tallgrass prairie remains in the United States, and the loss in habitat has led to the declines in the Poweshiek skipperling and Dakota skipper. Furthermore, these two species play an important role in the prairie ecosystem, and by protecting them, we also protect other prairie plants and animals.

*Our Response:* Native tallgrass and mixed-grass 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). Even further destruction of remnant prairies has occurred since Samson and Knopf's study. Conversion is discussed in *Factor A* of this final listing rule, below.

*(114) Comment:* A commenter stated that the limits and prohibitions on land uses like grazing and haying that are a result of this listing will negatively affect livestock producers. For example, the areas in North Dakota within the range of the butterflies are significant beef-producing counties. Limiting grazing or haying on those lands will have serious economic ramifications for the cattle-ranching landowners. Because of the terrain, some of these lands are suited only for livestock grazing. If those lands cannot be used for that purpose, their value will largely be diminished. Under the Service proposals, six North Dakota counties are deemed too sensitive for grazing, and it appears that grazing will be prohibited there altogether.

Landowner concerns about compliance could influence those impacted to convert their grass and haylands to other uses before a final rule is in effect. This would be detrimental to both the livestock industry and the butterflies the Service is aiming to protect.

*Our Response:* Through public meetings, meetings with private landowners, and outreach efforts, the Service has attempted to reduce the concerns of private individuals. It is important for private individuals to know that only those projects or actions that occur in areas where the butterflies may be present or on designated critical habitat and that have a Federal nexus (in other words, funded, authorized, or carried out by a Federal agency) must undergo consultation with the Service under section 7 of the Act. In such cases, it is the responsibility of the Federal agency involved to complete the consultation. We suggest that private landowners contact their local Service Ecological Services Office if they are planning an activity with a Federal nexus that may affect the species or its critical habitat. For more information about section 7 consultations, visit the Service's Web site (<http://www.fws.gov/angered/what-we-do/consultations-overview.html>). Under the 4(d) rule for the Dakota skipper, take of Dakota skippers caused by certain routine livestock operations on all non-Federal lands is exempt from the prohibitions under section 9 of the Act. For more information on the 4(d) rule for the Dakota skipper, refer to the Provisions of the 4(d) Rule for the Dakota Skipper section of the preamble to this final rule.

*(115) Comment:* A commenter stated that livestock owners are the original stewards of this land and other natural resources, and the general management practices utilized by these owners are ecologically sound and enhance the productive capabilities of the land. These practices may even be enhancing the habitat for these two butterflies. As private landowners and stewards of livestock, land, and other natural resources, we look for policies that allow coexistence and do not threaten our livelihood.

*Our Response:* We appreciate your comment. Landowners deserve great credit for their land stewardship, and we want to continue to encourage those management practices that support the butterflies. The Service also strives to find ways to work with people while protecting imperiled species. To this end, the Act allows for some flexibility for species that are listed as threatened; the Service is able to tailor the protections of the Act to what it deems as necessary and advisable to provide for the conservation of such species. We have developed a 4(d) rule for the Dakota skipper that provides for the conservation of the species while allowing some flexibilities for landowners. This 4(d) rule exempts incidental take of Dakota skippers that is caused by certain routine livestock operations and mowing of recreational trails. For more information on the 4(d) rule for the Dakota skipper, refer to the Provisions of the 4(d) Rule for the Dakota Skipper section of this final rule, below.

#### Biology and Habitat

*(116) Comment:* A commenter stated that the Service is correct to rely on Royer *et al.* (2008) for understanding and describing Dakota skipper habitat. Dakota skipper data in Minnesota are overwhelmingly attributable to Type B (upland prairie: Dry-mesic or dry). However, type A and B habitats can blend into each other. As correctly described by the Service here, upland and lowland prairie are often intermixed in both habitat types (A and B).

*Our Response:* We describe prairie types as Type A or Type B habitat, but realize that the two habitat types may be intermixed, there may be smaller patches that may be better categorized, or specific microhabitats that the species uses at various times to fulfill their biological needs.

#### Occupancy

*(117) Comment:* A commenter stated that the definition of occupancy is

difficult to understand and should be clarified.

*Our Response:* We clarified the definition of occupancy in this final rule by adding language that clarifies that the three sequential years of negative surveys necessary to consider the species extirpated from a site could be from any survey year. We also clarified that the occupancy status of an extirpated site would not change unless the species was detected at that location during future surveys. We strove to be as accurate as possible in defining occupancy for the purposes of the listing and critical habitat determinations. If you are unsure whether either species may occur on your property, we suggest you contact the Service's Ecological Services Field Office in your state.

*(118) Comment:* A commenter stated that the Service's methodology for classifying occupancy is well supported. Given the difficulties of detecting these small butterflies most observable in the brief period per year when it is in the adult life stage, a conservative approach is justified. The timing of the adult flight period and the species' abundance varies greatly among years, due to climatic variation. At least 3 years of surveys are needed before an area should be considered extirpated.

Furthermore, those 3 years of surveys need to be detailed efforts per survey, with multiple dates of surveys per year.

*Our Response:* We appreciate your comment in support of our occupancy rationale. We agree that multiple dates of surveys per year are desired to verify non-detection of the species in a given year. We have added language to clarify that point in the Background section of this final listing rule, above.

*(119) Comment:* A commenter stated that the determinations to list these two butterflies are based on historical declines, although significant documentation of butterfly fauna did not occur until 1960, and it is, therefore, impossible to determine anything about the historical range or any possible historical declines. How are past declines relevant to the species now, and why is the Service listing these species now, as opposed to when those declines were occurring? It is not possible to characterize the magnitude of threats to these species without knowing what has caused the historical decline and understanding what constitutes natural levels of inter-annual population fluctuation.

*Our Response:* We consider historical declines, and the ongoing effects of those historical declines, as well as current and recent declines, in our determinations. Significant population

declines have occurred in both species very recently and are still ongoing, and the effects of historical declines continue to impact both species today. Populations that were historically fragmented by habitat destruction continue to be isolated from one another, which may have negative genetic consequences or increased vulnerability to stochastic events, for example.

#### Population Status and Distribution

*(120) Comment:* A commenter stated that the survey methods are inadequate and poorly described. In particular, it appears that a high percentage of survey sites are in close proximity to roads. These sites may be disturbed sites, and some literature indicates Dakota skippers do not occupy formerly disturbed and subsequently restored sites.

*Our Response:* As described in the Background section of this final listing rule, above, Dakota skippers occupy native-prairie sites that have never been plowed. During the adult flight period, it is possible that Dakota skipper may use lesser quality grassland dominated areas to travel (disperse) from one native-prairie site to another nearby native-prairie site. Surveys were conducted using various protocols (for example, Pollard walks (Pollard 1975), modified Pollard walks, wandering transects, and timed transects) depending on the objective of the survey, funding, or available resources and staff. Describing the details of survey methods for each site is beyond the scope of this rule, however, those details are described in the survey reports that are cited within this final rule. We added some brief examples of commonly used survey methodologies in the Background section of this final listing rule.

*(121) Comment:* A few commenters suggested that there are multiple approaches to interpreting data and conducting trend analyses. One such suggested approach is to use the concepts of Schlicht *et al.* (2009, Table 10, p. 439) and Swengel and Swengel (2012b, Table 2). The observed timing of population declines may differ depending on the approach used. As such, the commenter cautions that the information included in Figures 1 and 2 of the proposed listing rule should be interpreted carefully, and provides specific suggestions for an alternate approach.

*Our Response:* We acknowledge that there are other ways to look at the data and the approach suggested by the commenter would be a good way to determine the apparent disappearance

(either absence or undetectable levels) of a species at each particular site. These types of analyses may be an appropriate approach for recovery planning and implementation, and we will consider their utility at that time. We believe the way we interpreted the data in the listing rule is appropriate for looking at the overall trends in detections and non-detections of the species through the years across all of the known sites, without relying on the numbers of individuals observed at each site during each survey year, since we often do not have those data. Although many of the skipper sites have been surveyed over multiple years, the frequency and type of surveys varied among, and sometimes within, sites and years. Surveys may have been conducted using various protocols and with varied objectives and, therefore, had varying results. For instance, some surveys focused simply on documenting species presence while others documented the numbers observed in a certain area, distance, or period of time. Whether or not the species was detected in a given year is the only common result of all the surveys, so that is the data we used to evaluate trends through time.

*(122) Comment:* One private citizen commented that he has never observed the Dakota skipper and the Poweshiek skipperling on his property or anywhere else.

*Our Response:* Dakota skippers and Poweshiek skipperlings have a single adult flight period per year that typically occurs from the middle of June through the end of July. The actual flight period varies somewhat across the range of each species and can also vary significantly from year-to-year, but typically lasts 2 to 4 weeks. Both the Dakota skipper and Poweshiek skipperling are small and cryptic species. Therefore, it is unlikely someone will observe these two species unless they are actively searching for the species in suitable habitat within their ranges during the short adult flight period. The likelihood of observing these species recently is low, because these two species have reached undetectable levels, even by experienced observers, at most of their known locations.

*(123) Comment:* One commenter recommended that surveying and monitoring protocols be developed for the two species.

*Our Response:* Because the objectives of surveys may vary across the range of these species, we recommend contacting the Service's Ecological Services Field Office in your State to discuss the appropriate survey protocol to use for

particular projects, habitat types, and geographic areas. To facilitate effective cooperation among agencies, organizations, and individuals interested in the distribution of these species, the Service will maintain a list of individuals who meet certain qualifications for conducting reliable surveys for the target species.

(124) *Comment:* One commenter provided results from butterfly surveys conducted for the past 19 years (1995–2013) in Clay and Polk counties, Minnesota. Low numbers of Dakota skippers were observed in 1996, 2006, 2007, and 2010. The Poweshiek skipperling was observed in 1997–2002, 2004–2006, and two individual Poweshiek skipperlings were observed in 2013.

*Our Response:* We appreciate receiving the new information on Dakota skipper and Poweshiek skipperling occurrences in Minnesota. We verified the information with Minnesota Department of Natural Resources staff (a qualified surveyor), who confirmed the validity of the data. We confirmed that the individual was capable of identifying the Poweshiek skipperling and that the 2013 observations were valid. This information was incorporated into this final listing rule. The Service has prioritized the Polk County location for surveys in future years.

(125) *Comment:* A commenter noted that the Service included two graphs indicating a decline in Dakota skipper sites in Minnesota and South Dakota, but did not include a graph for North Dakota. The 2012 abstract by Royer indicates that “essentially the same proportion of count locations hosted detectable Dakota skipper populations . . .” in 1996, 1997 and 2012, but that the encounters per hour had decreased. The commenter contend that fewer “encounters per hour” could be the result of many factors, including the very specific conditions necessary to do an accurate sampling. The summary data does not provide the necessary background to determine other factors that could have influenced the “encounters per hour” count.

*Our Response:* The detection versus non-detection data for Dakota skippers in North Dakota produced no clear trend. If we examine years with more than 10 sites surveyed, for example, we find that in 1991, the species was detected at 19 of the 31 sites surveyed (61 percent); in 1995, the species was detected at 5 of the 10 sites surveyed (50 percent); in 1996, the species was detected at 13 of the 18 sites surveyed (72 percent); in 1997, the species was detected at 10 of the 25 sites surveyed

(40 percent); in 1998, the species was detected at 11 of the 17 sites surveyed (65 percent); and in 2012, the species was detected at 15 of the 27 sites (56 percent) surveyed (where the species had previously been observed). Royer (2012) was correct that the proportion of sites with detections versus non-detections of Dakota skippers were similar (e.g., statewide proportions in 1996 (72 percent), 1997 (40 percent), and 2012 (56 percent)). Therefore, we examined the results of sites that Royer (2012) surveyed using methods that quantified results such that they could be compared among years.

Royer used the same survey protocol, timed transect searches (where the number of individuals observed per hour were recorded), for the surveys conducted in 1996–1997, 1998, and 2012 (Royer 1997, Royer and Royer 2012b). Furthermore, Royer’s 1996, 1997, 1998, and 2012 surveys (Royer 1997, Royer and Royer 2012b) adhered to our acceptable survey standards (e.g., wind speeds, time of day). Therefore, the variation in numbers observed attributable to survey error is expected to be negligible. Average encounter frequencies observed across the State in 2012 (10.7 encounters per hour) were lower than during the 1996–1997 and 1998 statewide surveys (North Dakota State average = 16.94 encounters per hour and 22.67 encounters per hour, respectively). At the site level, sites surveyed in 1996–1997 or 1998 generally had higher numbers of Dakota skippers encountered per hour than in 2012.

(126) *Comment:* A commenter stated that the proposed listing of the Dakota skipper as a threatened species is unwarranted at this time. In North Dakota, surveys show that essentially the same proportion of locations had detectable levels of Dakota skipper in 1996–1997 (46 percent) as in 2012 (46 percent). Additionally, new sites have been discovered in North Dakota, even though a systematic survey has not been conducted. A substantially lower encounter rate in 2012 compared to historical surveys was reported, but one year of data does not justify listing.

*Our Response:* Although the proportion of sites surveyed with positive detections of the species is similar when comparing sites surveyed in North Dakota in 1996–1997 with those surveyed in 2012, the numbers of individuals observed recently were substantially lower than in previous surveys; see our response to Comment 125. In addition to the survey data and population trend information, the Service also considers listing species based on an analysis of threats,

described in detail in this final listing rule. The results of that threat analysis indicates that all of the Dakota skipper sites where the species is considered to be present or unknown in North Dakota have one or more documented threat of moderate to high levels. At least one moderate- to high-level threat is documented in all Minnesota, North Dakota, South Dakota, and Canada Dakota skipper sites with present or unknown occupancy.

(127) *Comment:* A commenter stated that the Service rightly states that most Poweshiek skipperling decline likely went unrecorded because most prairie destruction occurred prior to 1960, but most prairie butterfly surveys post-date those declines. Most decline during 1960–2000 also went largely undocumented. This is evidenced by the large number of sites in Minnesota that fall into an uncertain occupancy category. Longer term Poweshiek skipperling decline has been masked by data paucity and turnover in sites surveyed.

*Our Response:* We agree that there is a paucity of data at many sites in recent years (1960–1993). However, most Poweshiek skipperling sites and Dakota skipper sites have been surveyed at least once in 1993 or more recently. The lack of surveys at a given site since 1993 does mean that we are uncertain of the occupancy at many sites. We used a cautious approach; by assigning sites unknown status, we cannot say that the species is truly absent or extirpated from a site, while acknowledging that the species may still be present, possibly at undetectable levels, if suitable habitat is still present. More surveys are needed at these sites to determine if the species is present.

(128) *Comment:* A commenter stated that, at the time of Swengel’s (1992) review, Poweshiek skipperlings had fewer known populations, were more highly concentrated in preserves (a single kind of ownership and land use category), were in a narrower range, were more concentrated in a highly destroyed ecosystem (tallgrass prairie), and had a worse immediate response to typical preserve management (fire) than Karner blue butterflies, which were federally listed in 1992. Poweshiek skipperlings are capable of high local abundance in a few sites, but these population numbers are highly volatile, and so extremely low numbers also occur during these abundance fluctuations. Compared to Dakota skipper incidence within Poweshiek skipperling range, Poweshiek skipperlings occurred on relatively more preserves, but Dakota skippers had a range further west, including mixed-

grass prairie, less of which has been destroyed. Also, the Dakota skipper is more compatible with agricultural uses on ranch land (e.g., Royer 1992; Marrone 1992). Thus, the Dakota skipper had relatively more habitat, even if there were fewer known sites specifically in Minnesota. Furthermore, there is a tendency to assume that habitat protection (making a site a preserve) means the skippers in the preserve are secure; thus, if few are found on a given survey, the assumption is that this is due to the surveys being conducted at the wrong time, or due to fluctuations in abundance resulting from climatic variation. It is only through consistent long-term monitoring with the sites held constant (as in Swengel and Swengel 2013) that trend can be distinguished from those issues.

*Our Response:* Because of the number of historical sites and the various ways that data were collected at those sites, we examined the range-wide data using detections and non-detections. We agree that there are few sites with consecutive years of data, and even fewer that have data over the long term. We have examined the data at individual sites where we had several consecutive years of data, and found that Poweshiek skipperling numbers have appeared to decline, along with the number of sites with positive detections (vs. non-detections) of the species.

*(129) Comment:* A commenter stated that the sudden recent decline in Poweshiek skipperlings over the last 10 years is likely because there are few new populations being discovered to replace the already undetectable, previously known populations. Furthermore, conservationists identified the best sites first; thus, more recently discovered populations were not as large and robust as the earlier discovered populations. Those more fragile populations would have less favorable prospects for long-term persistence. This also contributes to the sense that decline is now occurring everywhere. In addition, in some places, such as North Dakota, the dramatic population declines of the Poweshiek skipperling primarily occurred prior to 2000 (see Royer and Marrone 1992a, b; and Orwig 1994; 1995; 1996; and 1997).

*Our Response:* We acknowledge that there are documented declines in Poweshiek skipperling populations prior to 2000. However, in our comprehensive review, it appears that many sites with known populations of Poweshiek skipperlings have simultaneously declined to undetectable levels across much of the species' range in the early 2000s.

#### Factors Affecting the Species—General

*(130) Comment:* A commenter stated that, throughout the proposed listing rule, the Service attributes perceived threats to the Dakota skipper as threats to the Poweshiek skipperling or vice versa. The Service must independently evaluate threats to each species and may not assume that a threat to one species is necessarily a threat to the other.

*Our Response:* We have conducted the analysis of factors affecting the species separately for the two species. Since these two species have similar biology and are often found in the same locations, they face similar or identical threats at many locations. Therefore, when describing the factors, we discuss their effects to both species together when they are the same or similar. For example, if a remnant (untilled) native tallgrass prairie is being considered for a housing development, the resulting habitat conversion would affect both species by removing suitable habitat from the landscape.

*(131) Comment:* A commenter stated that listing these species will impede the use of certain grassland management tools such as grazing, haying, burning, and chemical spraying that are necessary to meet the desired habitat for these butterflies.

*Our Response:* The listing of these two butterflies will not necessarily impede the use of these grassland management tools. The Service recognizes that management, including grazing, haying, prescriptive fire or targeted herbicide treatments, may be needed to benefit the species and their habitats, as discussed in *Factor A* and *Factor E* of this final listing rule, below. The types, extent, duration, and intensity of various management regimes that would benefit the butterflies may depend on the specific past, present, or future threats at that location. The success of management regimes will need to be monitored and adjusted accordingly.

*(132) Comment:* A commenter noted that suggestions of “light,” “limited” and “no” grazing and “late-season haying” are mentioned in the proposed rule to support rebuilding the butterfly populations. However, such practices have proven to have long-term implications that will actually do the opposite. For instance, limiting or eliminating grazing and haying is likely to promote invasion by exotic grasses, such as smooth brome grass and Kentucky bluegrass, which will compete with the very same native species that the butterflies require for habitat. The Service should encourage and incentivize grazing and haying

approaches, such as rotational grazing, that would support both the economic viability of livestock operations and butterfly population growth.

*Our Response:* Conservation of Dakota skipper and Poweshiek skipperling populations relies on careful implementation of management practices that conserve its habitat while minimizing adverse effects to reproduction and survival. Rotational late-season haying after the adult flight period, for example, can be beneficial to the species' habitat. We have developed Dakota skipper conservation guidelines (<http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines.html>), which describe those practices in more detail, and are developing similar guidelines for the Poweshiek skipperling. We discuss both the harm and the benefits that various management practices may have on prairie habitats in *Factors A* and *E* of this final listing rule (below).

*(133) Comment:* A commenter stated that grassland easements are a broad-brush approach to conserve native prairies, but there is no targeted program or recovery plan specific to the Dakota skipper that would provide financial incentives and technical information for ranchers and farmers to manage habitat in a way that would expand the population of Dakota skippers.

*Our Response:* Service programs, including Partners for Fish and Wildlife and State and tribal grant programs, are available to develop projects and partnerships to conserve these and other species. Following listing, the Service will develop a recovery plan for these two species.

*(134) Comment:* A commenter stated that beaver dams can cause water level fluctuations in some Poweshiek skipperling areas in Michigan. The commenter asked whether these fluctuations, or the act of returning the water level to its normal level, harm Poweshiek skipperling larvae or habitat.

*Our Response:* It is possible that higher than normal water levels, for an extended amount of time, may harm larvae. We discuss fluctuating water levels in *Factor E* of this final listing rule, below.

#### Factor A

*(135) Comment:* A commenter stated that current Dakota skipper population sites are already protected, and the imminent threat to the species is deemed to be on “remnant habitat.”

*Our Response:* While some Dakota skipper sites are on land that is protected from some threats, such as

conversion of remnant prairies to other uses, the Dakota skipper populations at these sites are still exposed to other stressors, as we detailed in the Summary of the Factors Affecting the Species section of this final listing rule, below.

(136) *Comment:* A commenter stated that the Dakota skipper and Poweshiek skipperling do not warrant listing because the Service improperly characterized oil and gas development as a threat to the Dakota skipper and Poweshiek skipperling, overstated the amount of oil and gas development occurring in the ranges of the Dakota skipper and Poweshiek skipperling, incorrectly assumed that the level of oil and gas development seen in western North Dakota will occur throughout the species' ranges, and erred by concluding that impacts from oil development in western North Dakota to the two butterflies are similar to impacts from coal-bed natural gas in Wyoming on the greater sage-grouse. Accordingly, the Service should withdraw the listing and critical habitat rules.

*Our Response:* The Act directs us to determine whether a species is an endangered species or a threatened species because of any factors affecting its continued existence. Listing actions may be warranted based on any of the five factors, singly or in combination. We completed a comprehensive assessment of the biological status of the Dakota skipper and Poweshiek skipperling, and all factors that might affect its existence. The effects from oil and gas activities are just one of the factors we considered. Our determinations that the Dakota skipper is a threatened species and the Poweshiek skipperling is an endangered species are based on numerous threats, acting individually and synergistically, that are leading to substantial population declines.

Specifically with regard to our evaluation of impacts from oil and gas activities, much of this activity is currently occurring in areas of native prairie overlying the Bakken and Three Forks formations, to the west of known locations for both butterfly species. However, current Bakken oil and gas development is occurring in two counties that have records of Dakota skippers (McKenzie and McLean counties in North Dakota). In those areas, oil and gas development is a stressor to the populations that may be present. Because there are few locations where the butterflies may still be extant, significant stressors to these few populations can be threats to the species as a whole. Furthermore, although oil and gas development is unlikely to

occur throughout the entire range of the two butterflies in the foreseeable future, there may be future development or increases in current activities associated with the shale-oil formations (such as the Bakken formation in North Dakota) that may affect butterfly populations in those areas. Finally, we used the Naugle *et al.* (2011) study and its impacts to sage grouse as a surrogate to estimate the impacts of similar energy development projects to the butterfly habitat. Because the Powder River Basin development varies from the development in the Bakken formation, we have corrected our estimations and analysis in this final listing rule (see Destruction and Conversion of Prairies to Nonagricultural Development, below).

(137) *Comment:* A commenter noted that wind energy is not a threat to the species in North Dakota. The Service's conclusion that wind energy development will expand into the ranges of the Dakota skipper and Poweshiek skipperling, and thus is a threat to the species, is based on outdated data and is poorly supported. The Service must justify its assumptions that wind energy will expand into Dakota skipper and Poweshiek skipperling range and consequently be a threat to the species.

*Our Response:* We have evaluated the stressors to populations at sites where we had sufficient information to do so. Generally, we consider that wind development will have localized impacts in a few sites. We know of at least one site where a proposed wind development project poses a threat to the Dakota skipper and its habitat. Another wind farm is proposed within 2 miles of areas we proposed as critical habitat, with expansion phases that could overlap that critical habitat. Both of these projects are in the draft Environmental Analysis stage of development. See Destruction and Conversion of Prairies to Agricultural Land, below, for a full discussion on impacts from wind energy development.

(138) *Comment:* The proposed listing determination relies heavily on the work of McCabe and Royer for North Dakota, who have both published generalized statements about impacts of grazing on the Dakota skipper. These authors do not discuss the types of animals, season of use, intensity of grazing, or whether a grazing system is involved.

*Our Response:* The Service used butterfly surveys and habitat reports written by Royer, McCabe, Spomer, and others to inform our determination on the status of the species in North Dakota. These authors also often

reported stressors they observed at sites, such as invasive species encroachment or intensive grazing practices. We also used other reports and publications to inform the discussion regarding grazing effects on the butterflies, which included a discussion regarding types of animals, intensity of grazing, habitat type, proximity of nearby populations, associated herbicide use, and timing. In the conservation guidelines for the Dakota skipper (<http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines2013.html>), we further discuss grazing in terms of intensity, duration, season of use, and type of habitat.

(139) *Comment:* A commenter stated that invasive plant control needs to be done very carefully and in small-scale treatments to ensure any adverse effects on the Poweshiek skipperling, or the vegetative conditions they specifically require, are minimized, as invasive plant and brush control is not automatically beneficial to the butterfly. Specifically, at the Puchyan Prairie site, there is greater risk of unintended negative side effects of invasive plant control on Poweshiek skipperlings themselves, or the specific types and structures of vegetation they require, than risk of habitat deterioration in the next several years, if a more cautious approach is used. More time should be allowed to assess and describe the full extent of the kinds of microhabitats used by the Poweshiek skipperling, which likely differ among years due to climatic variation, and the extent of any change or deterioration in the vegetation in their core habitat areas.

The commenter also stated that the Service is also correct that fire management, without careful planning, may have significant adverse effects on these skippers; however, the Service understates the risks of fire. A number of areas of good Dakota skipper and Poweshiek skipperling habitat have been converted by fire management over the last several decades from light agricultural land uses to areas lacking the features needed by the butterflies. These converted areas in Iowa, Minnesota, and westward have few recent records of either species. Fen wetland preserves in Michigan do have recent Poweshiek skipperling records, but some of these sites have new, not long-term, fire management. The Poweshiek skipperling has not fared well in the working landscape; thus, deliberate conservation effort is needed.

*Our Response:* We agree that conservation of Poweshiek skipperling populations relies on careful implementation of management practices that conserve its habitat, while

minimizing adverse effects to reproduction and survival, including invasive species control at the few sites where the Poweshiek skipperling remains, such as Puchyan Prairie. As discussed in *Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*, below, encroaching invasive plants may replace or reduce the coverage of native forbs and grasses used by adults and larval butterflies and, therefore, need to be controlled. However, we further discuss that control methods (such as fire and herbicide spraying) may have their own unintended consequences, such as reduced native forbs and grasses and direct mortality of the butterflies, if not conducted carefully. Furthermore, various habitat types at these sites may respond differently to various types of control treatments. Therefore, when considering recovery planning for the species, it will be important to continue to individually assess sites to determine the need to control invasive species, exercise caution when implementing treatments, monitor the response to any treatments over the long-term, and refine or modify treatments as needed to get desired outcomes. Similarly, assessment and long-term monitoring of the species' needs, such as microhabitat use, will help inform conservation efforts at specific locations.

*(140) Comment:* One commenter recommended that land managers be advised as to the appropriateness of prescribed burns in Poweshiek skipperling habitat.

*Our Response:* The Service contacted all of the landowners within proposed critical habitat designations as part of this rulemaking process. We have developed conservation guidelines for the Dakota skipper (online at <http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines.html>), and are developing similar guidelines for Poweshiek skipperling. Contact the Service's Ecological Services Field Office in your State to discuss prescribed burn practices on land where one or both species may be present.

*(141) Comment:* One commenter recommended that sites with Dakota skipper populations where fire management is not already occurring should remain fire-free, and that fire management should cease in core habitat for the Dakota skipper. Instead, cautious rotational haying or grazing regimes should be used to rehabilitate grassland vegetation to the shorter turf height that Dana (1991) recommends for the species.

*Our Response:* We have developed conservation guidelines for the Dakota

skipper (<http://www.fws.gov/midwest/endangered/insects/dask/DASKconservationguidelines.html>), and are developing similar guidelines for Poweshiek skipperling. The recommendations will be reviewed for possible incorporation as we continue to refine these guidelines.

*(142) Comment:* A commenter noted that the proposed rule states that the negative effects of fire persist for 1 to 5 years, citing Swengel (1996, pp. 73, 79, 81) and Panzer (2002, pp. 1302–3). These papers, however, include a range of butterfly species found in prairies, not just localized prairie specialists like the Dakota skipper and Poweshiek skipperling. Panzer's study contains no data on the Poweshiek skipperling or Dakota skipper. Swengel (1996) includes specific analysis of both species, but no explicit predictions are made. Swengel (1996, pp. 73, 79) describes that the negative effects of fire persist for specialists for 3 to 5 or more years. Swengel (1996) does not indicate an expectation of recovery 1–2 years post-burn for these species. Thus, Swengel's analysis is better used to define when recovery has certainly not occurred (within years 0–3), but not when recovery actually has occurred.

*Our Response:* We corrected our interpretation of the Swengel (1996) and the Panzer (2002) papers as discussed under *Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*, below, to better reflect the included data and information. We also changed our use of the word "recovery" in this context to the term "rebound," which more accurately describes an upward trend, but does not imply a stable recovered trend in populations.

*(143) Comment:* A commenter noted that Dana (1991, pp. 55–56) discusses concern about grass growth structure and height, namely that fire encourages taller grass growth, but that Dakota skippers prefer shorter grass. Therefore, effectively controlling weeds and brush does not necessarily mean that the management is creating suitable habitat for skippers. In the long run, fire does not produce a suitable vegetative structure for skippers. The long-term compounding indirect effect of fire on the vegetation (increasing grass height and thickness) may have a more lasting impact on the species and be more difficult to manage.

*Our Response:* We will consider the longterm effect of fire on native vegetation growth and structure when developing and refining conservation guidelines for the Dakota skipper and Poweshiek skipperling.

*(144) Comment:* The data used for North Dakota in the proposed listing rule relies heavily on the work of McCabe and Royer, who have both published generalized statements about grazing and its effects on the Dakota skipper. These authors do not discuss the types of animals, season of use, intensity of grazing or whether a grazing system is involved.

*Our Response:* The Service relied on butterfly surveys and habitat reports written by Royer, McCabe, Spomer, and others to inform species and habitat data in North Dakota. These authors also often reported stressors they observed at sites, such as invasive species encroachment or intensive grazing practices. We used various other reports and publications to inform the discussion regarding grazing in *Factor A* of this final listing rule and included a discussion regarding types of animals, intensity of grazing, habitat type, proximity of nearby populations, associated herbicide use, and timing. In our conservation guidelines for Dakota skipper, we further discuss grazing in terms of intensity, duration, season of use, and type of habitat.

*(145) Comment:* A commenter noted that low-intensity grazing is mentioned as a potential management tool to help maintain habitat and abate other threats to these two species. In some cases, high-intensity, short-duration grazing may have a role in providing the disturbance that prairies require to prevent them from being overrun by woody plants, and invasive species.

*Our Response:* We have developed conservation guidelines for the Dakota skipper's specific needs. These guidelines include some grazing recommendations; however, we are interested to learn more details about the effects of grazing practices implemented in various areas as we continue to refine our recommendations, and will take this information into consideration.

*(146) Comment:* A commenter noted that data suggest Poweshiek skipperling populations at sites that were hayed prior to preservation did not recover to the same level following any subsequent fire.

*Our Response:* We acknowledge that fire management may be detrimental to the Poweshiek skipperling, if not conducted properly. We are developing conservation guidelines for the Poweshiek skipperling that will address fire management and other actions, and are interested to learn more about the implications of fire practices as we continue to develop and refine our conservation recommendations.

(147) *Comment:* A commenter stated that the Service should provide data to support that fire management, even if applied to most or all of the patch occupied by the Dakota skipper or Poweshiek skipperling, has a low effect on the long-term persistence of these populations. The Service does not cite long-term studies of impacts from fire, but instead provides a list of assumptions, such as the following: (1) Fire happens in prairie (although the extent of that in a natural context is open to great debate; see literature review in Swengel and Swengel 2007, p. 264); (2) these skippers live in prairie; (3) fire has various effects on prairie plants (although it should not be assumed that fire controls brush and weeds; see Swengel *et al.* 2011, p. 535); (4) those floristic effects are assumed to be beneficial to these skippers (although vigorous tall grass growth caused by fire may not be; see Dana 1991, pp. 5–56). Based on these assumptions, the Service concludes that fire should be fine for these skippers. The Service needs to provide direct positive evidence indicating that the skippers, especially the larvae, actually succeed in the long term following a fire.

*Our Response:* We will consider all factors and data regarding the effects of fire on the species during recovery planning and implementation and in developing and refining the conservation guidelines for these two species. We acknowledge that there are no long-term (more than two decades) studies of fire management that provided data showing long-term persistence of the populations. We based our threats analysis and ranking of stressors as high, medium, and low based on the studies cited in our discussion of impacts from fire under the Summary of the Factors Affecting the Species section of this final rule, below. The possibility that we may have underestimated the stressors of fire management on the species further supports our determinations that fire can be a significant stressor to populations of Poweshiek skipperlings.

(148) *Comment:* A commenter stated that there are problems with some reports that use McCabe's 1981 management recommendations, because McCabe's paper reflects a point-in-time. Prairie ecology requires long-term observations and knowledge of how past and current management activities impact plant community dynamics. Further, prairie management conclusions based upon observations made in 1981 are no longer valid, due to changes in ecological drivers caused by broad-scale invasion of exotic cool-season grasses and forbs.

*Our Response:* McCabe's 1981 report is used as a reference to prairie conditions prior to much habitat degradation or exotic species invasions that are common in many locations today. We acknowledge that an understanding of prairie ecology requires long-term observations, as well as knowledge of how past and current management activities have impacted and continue to impact plant community dynamics.

(149) *Comment:* One commenter agreed that annual haying on or after August 1 presents little or no stress to Dakota skippers. However, the commenter went on to point out that Swengel (1998b) found that Poweshiek skipperling abundance was strongly correlated with increasing number of years since the last management action, of any management type, including haying. Thus, annual haying of the entire habitat patch should be considered a high stressor for the Poweshiek skipperling. The Service is correct that alternate-year haying is better than annual haying, but it's even better when the haying is done rotationally (half per year, instead of all every other year). Additionally, the moderate stressor category for haying is confusing. As it currently reads, a site could fall in the moderate category because you do not know the timing of the haying, but if you did know the timing, you would place it in the high category.

*Our Response:* We developed the stressor categories for the purposes of the threats analysis to inform our listing determinations; these categories are not intended to be prescriptive conservation measures or guidelines. We acknowledge that there is some uncertainty in the 'moderate' stressor category for haying, but we wanted to fairly capture sites where we were unsure of the timing of haying activities, but that showed signs indicative of reduced nectar sources. It is true that these sites could be moved into the low or high category if we received more specifics on the timing of haying in those locations, and those details will be more important during the recovery planning stages for these species.

#### Factor B

(150) *Comment:* A commenter noted that recent publications report that nonlethal sampling of genetic material adds an immeasurable or minor effect on survival or reproductive success of butterflies compared to handled individuals that were not also genetically sampled (Marschalek *et al.* 2013; Crawford *et al.* 2013). However, there is abundant literature on how

handling has adverse effects on butterflies, documented for a wide range of species (*e.g.*, Benson and Emmel 1973; Singer and Wedlake 1981; Lederhouse 1982; Morton 1984). It is possible that some types of nonlethal sampling do not significantly increase the harm to the butterfly from capture and handling, but the handling for such sampling still causes harm compared to the butterfly not being handled. Thus, the benefits of such sampling should be weighed against the harm caused to individuals.

*Our Response:* As stated under *Factor B* of this final rule, handling stress during scientific study may affect individuals of both species. Adverse effects on butterflies have been documented for a wide range of species (*e.g.*, Benson and Emmel 1973, p. 329; Singer and Wedlake 1981, pp. 215–216; Lederhouse 1982, pp. 381–382; Morton 1984, pp. 56–57; Mallet *et al.* 1987, pp. 380–383). The Service will consider stress and other impacts to the butterflies from handling when issuing scientific permits for genetic sampling and other sampling efforts.

(151) *Comment:* A commenter noted that reliably effective captive propagation has not been demonstrated for either of these species. However, the Service should consider and assess the effect on wild populations of either species before attempting to develop captive propagation.

*Our Response:* The Service will consider incidental take for otherwise legal activities in our permitting (*e.g.*, section 10 recovery permits) process.

#### Factor D

(152) *Comment:* A commenter stated that as of August 2013, the Minnesota Department of Natural Resources listed both the Dakota skipper and the Poweshiek skipperling as endangered. The Dakota skipper is also an "endangered" species under Iowa law.

*Our Response:* We have updated the State-level protections for Dakota skipper and Poweshiek skipperling in *Factor D* of this final listing rule.

#### Factor E

(153) *Comment:* A commenter stated that herbicides applied in skipper habitat can negatively affect nectar resources for the species. However, herbicide use can have benefits if carefully targeted to treating brush and weeds, so long as bare ground does not subsequently result from the treatment, as bare ground greatly facilitates recruitment of new weed and brush growth.

*Our Response:* We acknowledge that carefully targeted herbicide treatments



may result in the beneficial control of nonnative or invasive plants and brush, and have clarified our statements in *Factor E* of this final listing rule, below.

(154) *Comment:* A commenter noted that results of a preliminary analysis of the genetic diversity of the Poweshiek skipperling show limited levels of genetic diversity in the Wisconsin, Michigan, and Manitoba populations. Demographic factors are of greater concern, specifically, small population sizes and numbers of populations are more likely to lead to extinction than loss of genetic diversity. The widespread and intensive survey effort showing continual extirpation of populations and reduced population sizes supports the listing of Poweshiek skipperling as endangered.

*Our Response:* We have incorporated information from the preliminary results of Saarinen (2013, pers. comm.) under *Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence*, in the discussion on Habitat Fragmentation and Population Isolation, below, and look forward to receiving final results from this research to inform future conservation efforts for this species.

(155) *Comment:* A commenter stated that weather and climate events, such as the persistent drought in the Midwest, and their effects on the Dakota skipper and Poweshiek skipperling require further study. Funding and staff are needed to accomplish these efforts.

*Our Response:* In this rule, we used the best available information on climate and climate change, however we agree that more study of weather and climate events will help us with recovery planning and implementation for these two species, and will consider new information when developing the recovery plan.

(156) *Comment:* A commenter stated that, in its assessment of impacts to the butterflies from climate change, the Service ignores model uncertainty that the Intergovernmental Panel on Climate Change (IPCC) acknowledges.

*Our Response:* We appreciate your comment and understand that there are uncertainties in the climate modeling. We consider climate change to be a potential threat to the species, while acknowledging uncertainty of how changes may specifically impact these species or their habitats.

(157) *Comment:* A commenter stated that, while it is possible that unknown threats to the species exist, it is inappropriate to focus too much effort on the search for unknown stressors. This distracts from addressing the challenges of dealing with the stressors that have been known for decades

(isolated populations in fragmented habitats that are under pressure from habitat degradation and land management practices).

*Our Response:* We acknowledge that multiple stressors are acting on populations of both species, and have been so for many years. In our review, however, it appears that many sites with known populations of the Poweshiek skipperling appear to have simultaneously declined to undetectable levels. A similar, but perhaps delayed, decline is being observed in Dakota skipper populations. We did not want to rule out the possibility that this decline may be due to some unknown cause. However, we will focus on all potential factors affecting the species in recovery planning and implementation, not simply on any single factor.

#### Determinations

(158) *Comment:* A commenter stated that the Dakota skipper and Poweshiek skipperling are both threatened by loss of native prairie vegetation to agriculture, development, altered fire patterns, and groundwater depletion. The Dakota skipper and Poweshiek skipperling are also threatened by pesticides, drought, and climate change. In light of the population declines and ongoing threats, both butterflies should be protected as endangered rather than as threatened.

*Our Response:* The Dakota skipper is experiencing population declines and facing multiple threats. A few populations in the United States are doing relatively well, however, and are in habitats that have low or non-immediate threats. Furthermore, Canada has an estimated 15 populations on lands that are being utilized in a manner conducive to the conservation of Dakota skipper, and the threats at those sites are not imminent. Based on our review of the best available scientific and commercial information, we conclude that the Dakota skipper is likely to become in danger of extinction in the foreseeable future throughout all of its range and, therefore, meets the definition of a threatened species. For a detailed discussion, see the Determination section of this final rule, below.

(159) *Comment:* A commenter stated that the Service should list the Dakota skipper as endangered, as it is “in danger of extinction throughout all or a significant portion of its range.” The species is present at 91 sites, at least 83 “are subject to one or more threats that have a moderate to high impact on those populations.” The Service does not explain why 8 sites that are presumably secure outweigh 83 sites that are

experiencing moderate to high threat levels, especially since “Dakota skipper . . . habitat is highly fragmented and because the species are subject to local extinction . . . and approximately 84 percent of Dakota skipper sites with present or unknown status are effectively isolated.”

*Our Response:* We agree that the Dakota skipper is imperiled, which is why we determined that the species warrants listing under the Act. However, we believe that the Dakota skipper is not in immediate danger of going extinct at this point in time. Instead, we believe that, if trends continue as they currently are, the species is likely to get to that point in the foreseeable future. Because there are stable populations of the Dakota skipper that do not appear to be currently suffering from high-magnitude threats, and the declining trends are happening at a slower pace, we determined that threatened species status is appropriate for the Dakota skipper (see Determination, below, for a full discussion).

(160) *Comment:* A commenter stated that the Service determines that the Dakota skipper is a threatened species because “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.” A “fair number” is not a biologically meaningful measure. The Service needs to explain this contention in a measurable manner.

*Our Response:* We are aware of 14 sites in Canada where the species is considered to be present and one site where the occupancy is unknown. Those sites are managed by late-season haying (after August 1) that is conducted at least every other year, and there is no indication that native plant diversity is declining due to timing or frequency of mowing.

(161) *Comment:* A commenter stated that the Canadian populations are functionally isolated from each other and from U.S. populations. The distance between all these metapopulations makes interaction or recolonization unlikely, as Dakota skippers may be incapable of moving greater than 1 km (0.6 mi) between patches of prairie habitat separated by structurally similar habitats. The Service did not conduct an adequate analysis of “significant portion of range,” to determine if the three metapopulations (U.S., Manitoba, and Saskatchewan) should each be considered “significant,” and if one is “in danger of extinction,” then the species as a whole should be listed as endangered. The Service must

separately analyze threats to each isolated metapopulation because population isolation and accompanying loss of genetic diversity are acknowledged to have significant impacts on the species.

*Our Response:* 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. Because we have determined that the Dakota skipper is a threatened species throughout all of its range, no portion of its range can be “significant” for purposes of the definitions of “endangered species” and “threatened species.” See the Final Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definitions of “Endangered Species” and “Threatened Species” (79 FR 37577, July 1, 2014).

*(162) Comment:* A commenter stated that the Service has an obligation to make available the studies that form the basis of its action. The Service failed to provide any materials other than its own draft species assessment and textual descriptions of proposed critical habitat for either the proposed listing or critical habitat designation in the regulations.gov docket or on its Web sites. The Service did provide a bibliography; however, many references cited were unpublished reports or internal documents.

*Our Response:* One element of the transparency and open government directive encourages executive departments and agencies to make information about operations and decisions readily available to the public. Supporting documentation used to prepare the proposed and final rules is available for public inspection, by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Twin Cities Ecological Services Field Office, 4101 American Boulevard East, Bloomington, Minnesota 55425.

#### 4(d) Rule

*(163) Comment:* One commenter said that the 4(d) rule proposed for the Dakota skipper should be extended to remove prohibitions for take incidental to lawfully conducted oil and gas operations and that this would not undermine the goal of promoting the healthy growth of these populations throughout their entire range. The commenter indicated that the activities that were addressed by the proposed 4(d) rule—a variety of routine livestock ranching activities and mowing of recreational trails—were far more widespread in the region and contribute more directly to the threats listed in the

proposed rule than were oil and gas related activities.

*Our Response:* Although livestock ranching activities and mowing of recreational trails may be more widespread throughout the species range, livestock grazing also can be a key factor in the conservation of Dakota skipper habitat, by helping to ensure that the species’ habitats are not subjected to activities that result in their permanent destruction. That is, lands are likely to remain unplowed as long as the landowner chooses to continue to use them for grazing. In addition, grazing may also be implemented in a manner that provides significant benefits to the species. In these ways oil and gas production and grazing are fundamentally different with respect to Dakota skipper conservation. Regardless, the Service recognizes that a variety of interests, including oil and gas activities, may hold the potential to contribute to Dakota skipper conservation.

*(164) Comment:* One commenter stated that the 4(d) rule would provide an important incentive to continue late-summer haying where that practice is currently being implemented.

*Our Response:* We agree that the 4(d) rule will provide this incentive, as intended. Late-summer haying is currently the primary management on numerous sites inhabited by Dakota skipper that are important for the species’ conservation.

*(165) Comment:* One commenter requested that we also exempt take caused by “construction with minimal disturbance, such as that for transmission lines, that occurs after July 15th” in the 4(d) rule. The same commenter requested that the Service “give consideration to exempting transmission line maintenance activities and existing right-of-way maintenance in the same way that section line maintenance is exempted in the proposed 4(d) rule.”

*Our Response:* It is unclear which populations could be affected by these activities, what the effects might be, and how the effects might be minimized. Therefore, we have not included these activities in the 4(d) rule.

*(166) Comment:* One commenter stated that “the proposed 4(d) rule will undermine, not advance, conservation of the species” and that the 4(d) rule was not needed to prevent habitat destruction because it would already be illegal under section 9 of the Act and uninhabited areas at risk for conversion would be protected by designating them as critical habitat.

*Our Response:* It is true that take of Dakota skippers that results from

destruction of its habitat would be prohibited under section 9 of the Act, but there are other reasons to promulgate the 4(d) rule. As we stated in the proposed rule, the 4(d) rule will facilitate cooperation with private landowners that will be needed to recover the species. About 47 percent of the sites where the Dakota skipper has been recorded in the United States and that may still harbor the species are on private land. Almost all of these sites are working lands managed with grazing or haying. Conservation of the Dakota skipper on these sites, and in general, will require the Service and other conservation agencies and groups to develop and maintain cooperative partnerships with private landowners. Without that cooperation, we are unlikely to realize the substantial improvements in habitat conditions and public-private partnerships necessary to conserve the species.

*(167) Comment:* A commenter stated that the proposed 4(d) rule does not provide details as to how the Service intends to ensure that infrastructure, such as corrals, loading chutes, and other livestock working facilities, are carefully sited so that impacts to the species are minimized.

*Our Response:* These types of facilities are unlikely to have significant impacts to Dakota skipper populations, except where the species has been reduced to only very small areas. In grazed lands that are typically inhabited by Dakota skipper, these facilities affect only small proportions of the available habitat. Therefore, we do not think that the small degree of impact posed by placement of livestock working facilities would merit site-specific approval and review by the Service. Instead, by foregoing any requirement for landowners to seek Service approval for siting these facilities, we are likely to further facilitate continued development of positive working relationships that will be essential for recovering the species. In addition, we can work with landowners on voluntary methods to minimize any impacts that might result from installation of facilities associated with grazing.

*(168) Comment:* One commenter stated that the protections afforded the Dakota skipper through the 4(d) rule are not sufficient to reverse the trend toward extinction because they do not ensure that the grazing practices exempted under the rule will benefit the Dakota skipper.

*Our Response:* It may not be practicable to expect broad implementation of specific mandated grazing practices on private land to conserve the Dakota skipper without the

willingness of the landowner to implement those practices. Conservation of Dakota skippers on grazed lands will require several steps that include the development of site-specific grazing recommendations, monitoring the effects of the recommended practices on the Dakota skipper and its habitat, and science-based adaptive management. Each step will require access to private and other non-Federal lands by persons with expertise in identifying and describing the Dakota skipper and its key habitat components and, in at least some cases, by grazing experts and conservation partners. Landowners and land managers may be less likely to grant access for these activities if we broadly mandate specific grazing practices. Furthermore, although the incidental take permitting process would also provide an avenue by which to work with private landowners and is often the best available option for some species, there is no clear avenue that is immediately available by which to engage the large and geographically widespread group of landowners in such a process for Dakota skippers. A permitting process that would involve more than a few landowners is likely to take years and would have significant potential to become contentious and unwieldy.

*(169) Comment:* One commenter suggested that, instead of listing counties in which take caused by grazing would not be exempted under the 4(d) rule, the Service should base this on habitat.

*Our Response:* We decided that it is more appropriate to exempt take of Dakota skippers caused by grazing on all non-Federal lands in the United States, regardless of geographic area, and have made this change in the final 4(d) rule. We recommend, however, that lands where native prairie is currently maintained by haying continue to be hayed, and that any change to grazing on these lands only be done with the prior input from experts in Dakota skippers and range conservation. We suggest contacting the Service's Ecological Services Office in your State for more information.

*(170) Comment:* A commenter asked what areas can be treated for weeds or pests and still be exempted by the 4(d) rule.

*Our Response:* The 4(d) rule does not address control of animal pests; therefore, it does not exempt take that may result from treatments that are applied to control animal pests. The 4(d) rule also does not exempt take of Dakota skippers that would result from the broadcast application of herbicides—that is, application of

herbicides evenly across all or a portion of an area. Take of Dakota skippers that is caused by applications of herbicide that do not meet this definition of broadcast spraying would be exempted by the 4(d) rule.

Take of Dakota skippers is unlikely if they do not inhabit an area where broadcast application of herbicides is proposed. If the presence of Dakota skippers is suspected in an area where broadcast application of herbicides is proposed, we recommend that the Service be contacted to determine whether the action may be likely to cause take of the species, and if reasonable measures may be adopted that would avoid take.

#### Summary of Changes From the Proposed Rule

Based on our review of the public comments, comments from other Federal and State agencies, peer review comments, issues addressed at the public hearing, and any new relevant information that may have become available since the publication of the proposal, we reevaluated our proposed rule and made changes as appropriate.

During the comment periods, the Service received additional survey information, minor clarifications, and additional information on the species biology. New survey information has changed the occupancy status at several sites, for example a site that we considered to be “unknown” in the proposed rule may now be considered “extirpated” due to three sequential years of negative survey data. Consequently, some sites were dropped from our analysis of factors affecting the species because we no longer consider the species to be present or possibly present (unknown) at a particular location. In addition, we included new information into our analysis of the factors affecting the species. Neither the new information nor the updated occupancy at some sites has significantly changed our analyses such that it changed our determinations of status under the Act for either species.

The 4(d) rule now exempts take of Dakota skippers caused by grazing on all non-federal lands in the United States; the proposed 4(d) rule did not apply to certain lands in Minnesota and North Dakota. The final 4(d) rule no longer exclude some counties from the part of the rule that exempts take caused by grazing. Other minor changes to the 4(d) rule include: Clarifying broadcast versus spot-spraying of herbicides; defining “recreational trail”; and, that take of Dakota skipper caused by haying in transportation rights-of-ways and corridors after July 15 is exempt under

the 4(d) rule, as long as it is associated with livestock ranching activities. The 4(d) rule exempts take of Dakota skippers caused by mowing recreational trails, a term that is defined in the rule, even when it is not associated with livestock grazing.

#### Summary of the Factors Affecting the Species

##### *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 163 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 final rule (Table 3, above). These 163 sites are found across the current range of the

species in Minnesota, North Dakota, and South Dakota. Eight 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 2014, 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 60 Poweshiek skipperling

sites with present or unknown status (Table 4). Although we did not evaluate Factor A stressors at all 87 Poweshiek skipperling sites with present or unknown occupancy, the 60 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 (58 sites for Dakota skipper and 26 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 163 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 2014, unpubl. geodatabase]

Stressor	High level of impact	Medium level of impact	Low level of impact	Total number of rated sites
Destruction & Conversion (Agricultural & Nonagricultural Development) .....	3	83	58	144
Wind Development .....	1	0	8	9
Flooding .....	2	6	6	14
Invasive Species .....	12	33	20	65
Fire .....	10	4	6	20
Grazing .....	9	29	14	52
Haying & Mowing .....	1	11	29	41
Lack of Management .....	9	5	3	17
Size/Isolation .....	50	50	63	163
Herbicide and/or Pesticide Use .....	5	2	8	15

**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 60 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.; Service 2014, 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) .....	2	11	28	41
Wind Development .....	0	0	5	5
Flooding/Hydrology .....	2	3	14	19
Invasive Species .....	6	29	11	46
Fire .....	4	2	10	16
Grazing .....	4	10	2	16
Haying & Mowing .....	0	3	3	6
Lack of Management .....	4	6	2	12
Size/Isolation .....	21	22	11	54
Herbicide and/or Pesticide Use .....	3	1	5	9

**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 impacts of such conversion on extant populations is not well known. 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 stressor to Dakota skippers in the important Towner-Karlsruhe complex (Royer and Royer 1998, p. 22; Lenz 1999, 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 144 Dakota skipper and 41 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 2014, 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 stressor 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 mining is a stressor to populations of Dakota skipper in central Manitoba (Rigby 2013a, p. 28). 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.

Potash (salt that contains potassium) mining is a stressor to Dakota skipper populations in some Saskatchewan sites (Westwood 2013, pers. comm.), although the exact number of sites that are being considered for potash mining is unknown and were not included in our stressor evaluation.

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.). Major areas of recent oil and gas development, such as that occurring in the Bakken formation, overlaps with parts of the Dakota skipper's range in North Dakota. 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, may be a future stressor to Dakota skipper populations in McKenzie County (Royer and Royer 2012b, p. 16). Oil production is anticipated to 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). Energy development can double the density of roads on range lands (e.g., Naugle *et al.* 2011, pp. 493–494), increase pipelines, and increase the number of gravel pits to accommodate the increased road construction (Mueller 2013, pers.

comm.). Development for coal-bed natural gas (as described in Naugle 2011), for example, 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.* 2011, p. 493). 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.* 2011, p. 493). These coal-bed natural gas developments can be densely located (e.g., 8 wells per 640 acres) and are drilled vertically, whereas shale-oil wells in the Bakken formation are drilled horizontally and “relatively far apart” (Conoco Phillips 2013, in litt.). The habitat fragmentation associated with oil and gas development may amplify other stressors 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. The likelihood, however, 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, unpaginated). 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 stressor 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 transmission 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 impacts also result from 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 Michigan, at least one Poweshiek skipperling site and its habitat has been negatively affected by recreational ‘mud bogging’, which destroys vegetation and creates conditions conducive to invasive species (Hicks 2014, pers. comm.).

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 144 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 83 sites, and 58 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, 41 Poweshiek skipperling sites with present or unknown status were assessed that had sufficient information: The level of threat was high at 2 sites and moderate at 11 sites, and 28 sites are protected from destruction or conversion through a conservation easement or fee title ownership by a conservation agency (Table 4). At least 6 of the 12 sites where the Poweshiek skipperling is considered to still be present have a medium or high 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 stressor 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). The loss of a large area of habitat at two sites in Manitoba, which were previously suitable for Dakota skipper, was caused by prolonged inundation of water that likely caused larval mortality and mortality of suitable nectar and larval food plants (Rigney 2013a, pp. 28, 153). In addition, flood protection activities

and associated alteration of the landscape (e.g., road work that causes changes to overland drainage) is a stressor to the species at some sites in Manitoba (Rigney 2013a, p. 28).

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 14 Dakota skipper sites with present or unknown status and 19 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 9 of the Michigan prairie fen Poweshiek skipperling sites where the species is present and high at one site with unknown occupancy. 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 2014, 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 2014, unpubl. data). Similarly, we assessed 19 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). Water fluctuations is a stressor with moderate impact to the populations at 3 Poweshiek skipperling sites (including a site in Wisconsin—one of the 12 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 9 of 12 Poweshiek skipperling sites that have a present status) and 1 site in North Dakota (Service 2012 unpubl. data; Service 2014, unpubl. geodatabase).

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 stressor 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). Kentucky bluegrass and leafy spurge (and the persistent efforts for chemical control of leafy spurge) have been cited as one of the major stressors 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.; Royer 2013, 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 available when Dakota skipper and Poweshiek skipperling larvae begin feeding; however, the morphology and growth habit of these grasses are likely major determinants of their unsuitability to support Dakota skippers (Dana 1991, pp. 46–47). 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 65 Dakota skipper sites and 46 Poweshiek skipperling sites that had sufficient information to evaluate the stressor (Table 3 and Table 4; Service 2012 unpubl. data; Service 2014, 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 12 of the 65 assessed Dakota skipper sites, a moderate level of impact to populations at 33 sites, and low impact to populations at 20 sites. Sites with high and moderate level of impact occur throughout the species range in Minnesota, and North and South Dakota (Service 2012 unpubl. data; Service 2014, unpubl. data). Similarly, invasive species are a stressor of high level of impact to populations at 6 of the 46 evaluated Poweshiek skipperling sites, moderate level of impact to populations at 29 sites, and low level of impact to populations at 11 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 9 of the 12 sites where the species is still present (Service 2014, 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 The Nature Conservancy of Canada's Tall Grass

Prairie Preserve in Manitoba (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 Nature Conservancy of Canada's 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. 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 stressor 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 stressor 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

inhabitation (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). While not specifically included in his study, 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 2000, p. 2), where they are exposed to fires during their larval stages. Poweshiek skipperlings have also been documented laying eggs on the entire length of grass leaf blades and on low-growing deciduous foliage (Dupont 2013, p. 133). 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 1995, 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 increases 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 subsurface 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<sup>2</sup>) 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 4 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 1 year post-fire, exceeded expectations after 2 years, and declined slightly after 3 years (Swengel 1996, p. 83). In habitats that had not been burned for 4 or more years, Poweshiek skipperling abundance was about as low as in habitats sampled less than 1 year after being burned (Swengel 1996, p. 83). The 2012 spring burn that comprised approximately 25–30 percent of the breeding habitat at Scuppernong SNA may have contributed to the apparent absence of the species in 2013—the relatively small population that was also affected by the 2012 summer drought and the cold wet spring of 2013 (Borkin 2014, pers. comm.)

Poweshiek skipperling numbers decline in burned areas for at least 1–2 years after the burn, and may take several years to rebound, but may decline again if management does not maintain the habitat (Skadsen 2001, p. 37; Webster 2003, p. 12). In general, rebound times of 1–5 years postburn have been predicted (Panzer 2002, pp. 1302–1303); however, Vogel *et al.* (2010, p. 671) found that habitat-specialist butterfly abundance rebound time was approximately 50 months after prescribed fires. Swengel (1996, pp. 73, 78–79) describes that the negative effects of fire persist for prairie specialists for 3 to 5 plus years, and these species were collectively the most abundant after 5 or more years since the last fire. In Manitoba, Poweshiek skipperling populations were most numerous in sites burned 5–8 years previously—the species was absent in sites that were burned the previous year, in small numbers in areas that were burned 2–4 years prior, and absent from areas that were burned 10 or more years previous to the survey (Dupont 2013, pp. 4, 86–87). 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 post-fire rebound.

We assessed the stressor posed by fire at 20 Dakota skipper sites with present or unknown status and 16 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 2014, unpubl. data). We considered fire a stressor of high level of impact to populations at 10 of the 20 evaluated Dakota skipper sites and 4 of the 16 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 3 years; or, habitat is divided into two or more burn units, each unit is burned no more frequently than once every 3 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 stressor of moderate severity at 4 of the 20 evaluated Dakota skipper sites and 2 of the 16 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 4 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 4 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 20 evaluated Dakota skipper sites and 10 of the 16 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, fire 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. In contrast to the permanent habitat destruction and larval mortality caused by plowing or mining, for example, some habitats can remain suitable for the Dakota skipper and Poweshiek skipperling 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 may be a valuable tool for controlling smooth brome invasion and maintaining native diversity in prairies, especially where circumstances make the use of fire difficult or undesirable (Service 2006, p. 2; Smart *et al.* 2013, pp. 685–686). Conversely, grazing may stimulate brome growth and reduce native plant diversity.

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). Dakota skippers were relatively abundant on prairies subjected to light grazing regimes, but absent on nearby idle prairies that were no longer used for grazing; moreover, more Dakota skippers were observed 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; however, recent

evidence indicates that conversion is more economically viable (Dowd 2013, pers. comm.).

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. In Manitoba, *certain* levels of grazing are likely to adversely affect Dakota skipper populations in proportion to its intensity because it removes nectar sources (*e.g.*, Rigney 2013a, pp. 143 and 153).

The intensity at which grazing occurs may dictate the level of impact to the Dakota skipper and Poweshiek

skipperling, and grazing may have a larger impact on the Poweshiek skipperling than the Dakota skipper (Westwood 2013, pers. comm.). 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 2 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 native 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 2014, 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 1977, pp. 36–38; 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 stressor to Dakota skipper in the wet-mesic habitats of Manitoba (Webster 2007, pp. i–ii, 6). More recently, it is thought that the effects of grazing in Manitoba and Saskatchewan, as stated in Webster (2007, entire), may not be applicable under current population sizes, and that even light grazing may be detrimental on dry short grass prairie sites prior to and during the Dakota skipper flight period (Westwood 2013, pers. comm.).

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 stressor to Dakota skippers and Poweshiek skipperlings, but that occasional light grazing is not a long-term stressor 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 final 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) and may inhibit subsurface shelter construction, potentially increasing larval vulnerability to predators, parasites, and other environmental stressors (Dana 2013, pers. comm.). 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 stressor 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 52 Dakota skipper sites and 16 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 2014, 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 4 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 stressor, 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 leads to further management actions (see Invasive Species and Secondary Succession).

Of the 52 Dakota skipper sites assessed, we found the level of impact to Dakota skipper populations from grazing to be high at 9 sites, moderate at 29 sites, and low at 14 sites (Service 2012 unpubl. data; Service 2014, unpubl. data). Moderate- to high-level impacts to populations were primarily at South Dakota sites (N=27)—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 9 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 16 Poweshiek skipperling sites for which we had sufficient information to assess grazing, the level of impact to populations from grazing is high at 4 sites, moderate at 10 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 10 sites where grazing is a moderate level of impact to Poweshiek skipperling populations, 8 have habitat rated as fair to excellent. The habitat quality was rated as poor at 2 of the 4 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.). Grazing management recommendations may not be universally applicable to all locations, and may depend on the habitat type and other ecological and physical conditions

of the site. For instance, stubble heights of 6–8 inches may be difficult to attain in certain dry-mesic sites (ND NRCS 2013, 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 is 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)—this increased plant diversity was likely an expression of plants that were already at that location.

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 1999, 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 41 Dakota skipper sites and 6 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 2014, 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 exact 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 stressors, 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 3 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 29 of the 41 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 11 of the 41 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 1 of the 41 Dakota skipper sites assessed and a stressor of moderate-level impacts to the populations at 11 of the 41 Dakota skipper sites assessed. Of the 6 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 6 sites.

In summary, haying is a current and ongoing stressor 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 the flight period (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.

Populations of Dakota skippers and Poweshiek skipperlings may also be at risk at sites where a private landowner is not aware of the presence or potential presence of the species, but would conserve the land if they were made aware. The land use in some areas in Canada, for example, are currently inadvertently used in ways that are favorable to the species (for example, fall haying), but the land use may change in the future (Westwood 2014, pers. comm.). In the United States, the Service has notified private landowners of the presence or potential presence of one or both species on their land at most sites with present or unknown occupancy and many sites that are considered extirpated or possibly extirpated but still may have suitable habitat.

We assessed the stressor posed by lack of management for populations at 17 Dakota skipper sites and 12 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 2014, 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).

Nine of the 17 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. Four of the 12 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 stressors 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 160 Dakota skipper sites we evaluated for one or more habitat stressors, at least 131 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 2014, unpubl. data). Fifty-eight sites have 2 or more documented stressors of moderate to high levels of impact to populations, and 24 sites have 3 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 2014, 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 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 60 Poweshiek skipperling sites with present or unknown status that we analyzed for one or more habitat stressors, 46 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 2014, unpubl. data). Twenty-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 2014, unpubl. data). Eleven 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, South Dakota, and Manitoba (Service 2014, 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 skipperling 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 mitchelli*), 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; however, this plan was not drafted or finalized. 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—the Northern Tallgrass Prairie Lepidoptera Conservation Conference Working Group Report Synthesis is posted at <http://www.mnzo.org/PrairieLepidopteraConference/Northern%20Tallgrass%20Prairie%20Lepidoptera%20Conservation%20Conference%20Working%20Group%20Reports%20-%20Synthesis.pdf>.

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 1978 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 2003, entire; Selby 2006b, entire); however, skipper numbers were too low to collect sufficient data to test hypotheses (Selby 2006b, 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 2014, 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 2014, 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 (NRCS) 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 impacts of conversion and may provide dispersal corridors or buffer sites from external stressors (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 NRCS 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 (HAPET 2012, unpubl. data). 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 (HAPET 2012, unpubl. data; 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 (HAPET 2012, unpubl. data; 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 171) 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 2012b, 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 2012b, 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 2012b, 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 five 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 24 Dakota skipper sites in Day County: 3 sites where the species is considered to be present, 11 sites that have an unknown occupancy, and the remaining are extirpated or possibly extirpated. 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 Dakota 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.

In Manitoba, August 1st is the recommended earliest haying and grazing date at Dakota skipper sites. The recommended intensity of grazing is to be as low as economically feasible to prevent permanent damage to sites (e.g., destruction of nectar plants). In Manitoba, it is recommended that sites that have burned or have been impacted by other factors such as extensive flooding, should not be grazed for at least one year following these events.

#### 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 these and other species in the future. If this program is successful, a conservation benefit could be possible if the program could facilitate reintroduction and augmentation efforts into areas where the species has

declined or disappeared. Furthermore, this propagation effort may lead to increased 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; an additional 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). Collection is not known to be a stressor for the Poweshiek skipperling (Royer and Marrone 1992b, p. 16). Collection is not currently a stressor 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.

Handling stress during scientific study may be stressors to individuals of

both species. Adverse effects on butterflies have been documented for a wide range of species (e.g., Benson and Emmel 1973, p. 329; Singer and Wedlake 1981, pp. 215–216; Lederhouse 1982, pp. 381–382; Morton 1984, pp. 56–57; Mallet *et al.* 1987, pp. 380–383).

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. Disease and predation are part of the natural population dynamics of any insect, including the Dakota skipper and Poweshiek skipperling—without high rates of mortality before reproduction, populations would increase exponentially. The small amount of observations of predation and parasitism makes documenting those phenomena difficult (Dana 2013, pers. comm.). Only a few studies have attempted to document parasitism and predation. 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 1995, 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 species and predation by various insects, such as ants, but escaping his observation would have been predation by birds and small mammals on these immature stages (Dana 2013, pers. comm.).

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. An infection of Wolbachia may reduce already small population sizes and increase the probability of extirpation (Nice *et al.* 2009, pp. 3137–3138), particularly if the population is infected with a novel strain (Runquist 2013, pers. comm.). The Minnesota Zoo

plans to conduct Wolbachia screening and strain identification of genomic DNA samples that the University of Michigan (at Dearborn) extracted from both species. The effects of predation by birds or insects on Dakota skipper or Poweshiek skipperling population dynamics are not known and may impact the species.

McCabe (1981, p. 187), noted three kinds of predators to Dakota skippers, including Ambush bugs (Hemiptera: *Phymata* sp.), flower spiders (Aranaea: *Misumena* spp.), and orb weavers (various Araneidae). Flower spiders and ambush bugs are effective predators of nectar-feeding insects (McCabe 1981, pp. 187–188) and may cause mortality to some individuals, but it is difficult to quantify the population-level impacts of predators to either the Dakota skipper or Poweshiek skipperling. Dana documented predation on adult skippers by robber flies (Asilidae), which are common in upland prairie habitats, and noted the incidence of wing damage indicative of an unsuccessful attack by a bird or similar predator (Dana 1991, pp. 26–27; Dana 2013, pers. comm.). Several incidences of predation by crab spiders and robber flies on both the Dakota skipper and Poweshiek skipperling have been documented in Canada, although it is not thought to be a common occurrence (Westwood 2013, pers. comm.). McCabe (1981) failed to observe bird or dragonfly predation; however these events are difficult to observe (Dana 2013, pers. comm.). Orb weaver spiders appear to be successful predators of “old, worn individuals” (McCabe 1981, p. 188), but bird and other animal predation on young and old adults likely occurs when the butterflies are roosting or torpid and unable to escape (Dana 1991, p. 27).

Disease, parasitism, and predation are important parts of population dynamics of normal populations of insects, but may have an amplified effect on small populations. Furthermore, as we discuss in the possibility of unknown factors that may be affecting the species (in *Factor E* of this final rule), it is possible that a new virulent pathogen or parasitoid may have increased mortality above normal levels and may be causing the rapid decline in the Poweshiek skipperling and possibly also the Dakota skipper (Dana 2013, pers. comm.).

Disease and parasitism are a serious hypothesis that may explain the rapid decline of the Poweshiek skipperling, and perhaps the Dakota skipper, and these factors, along with predation, are extremely difficult to observe. Therefore, we are unsure if either disease, parasitism, or predation are

significant stressors to the Dakota skipper or Poweshiek skipperling populations at this time, and we are not certain if these stressors will contribute to significant population-level impacts in the future. However, in the future, disease, parasitism, and predation may have an amplified effect on these small and isolated populations.

#### *Factor D. The Inadequacy of Existing Regulatory Mechanisms*

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

#### State Regulations

The Dakota skipper is listed as endangered 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 was listed as State-endangered in Minnesota, and the status of Dakota skipper was changed from threatened to endangered on August 19, 2013 (Minnesota DNR 2013). The Poweshiek skipperling is listed as threatened under State endangered species statutes in Iowa and Michigan and as endangered in Wisconsin. The Dakota skipper is listed as endangered under State endangered species statutes in Iowa. 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 and Iowa), 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 stressors may result in direct mortality of both species, such as ill-timed fires, most stressors to the species are indirect and State laws that regulate direct harm to the species do not address these factors. In Iowa, for example, Poweshiek skipperling populations are likely now extirpated due to habitat destruction and conversion and other undetermined stressors, despite the species' presence on the State's list of threatened species since 1994. In Wisconsin, where stressors 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 stressors to the State's small and isolated populations.

In North Dakota, the fundamental purpose of the North Dakota Trustlands (e.g., State school lands) management is to obtain a "fair market" return from the lands while maintaining or improving their condition and value (ND Department of Trustlands Web site <http://www.land.nd.gov/surface/About.aspx>). Consequently, if such land does not produce income for the State, it may be subjected to deliberate change in management strategy or ownership (e.g., sale at auction). The major source of income on the North Dakota Trustlands is from grazing and agricultural leases, with additional revenue generated from rights-of-way, salt water disposal, and gravel and scoria mining (ND Department of Trustlands Web site <http://www.land.nd.gov/surface/About.aspx>). At least two Dakota skipper sites are under North Dakota State School management and are managed as hay lands.

#### 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 Shyenenne 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](http://www.registrelep-sararegistry.gc.ca/sar/index/default_e.cfm)>. Accessed September 19, 2014). 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, such action has not been taken for either of these species. In May 2014, the COSEWIC status designation of Dakota skipper was changed from threatened to endangered ([http://www.cosewic.gc.ca/rpts/detailed\\_species\\_assessments\\_e.html](http://www.cosewic.gc.ca/rpts/detailed_species_assessments_e.html) accessed September 19, 2014). 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](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.

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 171 separate sites where the species is known to be or may still be present (sites with present (83) or unknown (88) 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).

Preliminary results of genetic studies on the Poweshiek skipperling show that there appears to be limited levels of genetic diversity in the 32 tissue samples that were collected from the Scuppernong Prairie site in Wisconsin, 7 samples from Manitoba, and 93 from 6 Michigan populations in 2012 (Saarinen 2013, pers. comm.). Of greater concern than loss of genetic diversity, however, may be demographics, specifically the limited number of populations and population sizes that may be too small to persist (Saarinen 2013, pers. comm.) compounded by other stressors.

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, adult 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 2014, unpubl. data). Using a more conservative maximum dispersal of 1.0 km (0.6 mi), approximately 55 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 2014, unpubl. geodatabase). For Dakota skipper, if we use a maximum dispersal distance of 1 km (0.6 miles), approximately 63 percent of Dakota skipper sites with present or unknown status are effectively isolated (Service 2014, unpubl. geodatabase).

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, and the species was not observed in 2013 (See *Population Distribution and Status*). Numbers at Wilton Road are currently too small (fewer 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 115 km (71 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 at the time and the species was not observed at either location in 2013. Only 2 of the 9 Poweshiek skipperling sites with present status in Michigan are located within 1.6 km (1 mi) 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; Cuthrell 2013, pers. comm.) 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 at individual sites, 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 163 Dakota skipper sites and 54 Poweshiek skipperling sites with present or unknown status (Service 2012 unpubl. data; Service 2014, 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 stressor 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 the 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.

Although we were unsure of the size of many sites in Canada, most sites were separated by more than 1 km (0.6 mi). Dakota skipper sites in central Manitoba

are generally greater than 158 ac (64 ha), but all of the sites are separated by more than 1 km (0.6 mi), and many sites are separated by many kilometers (Westwood 2013 pers. comm.). Therefore, about 25 of the sites evaluated in Canada were thought to have at least a moderate level of stressor from size and isolation. The Canada sites where Dakota skippers are considered to be present are approximately 200 km (125 mi) from the nearest North Dakota site, and the Manitoba site is 166 km (103 mi) from the nearest Poweshiek skipperling site in Minnesota.

Dakota skipper populations on about 31 percent of the evaluated sites (50 of 163 sites) face a high level of impact due to a combination of size and isolation (Service 2012 unpubl. data, 2014 unpubl. data). Approximately 31 percent of evaluated sites (50 sites) face a moderate level of impact to populations due to small size and isolation. About 39 percent of Dakota skipper sites (63 of the 163 evaluated sites) in the United States 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 39 percent of rated sites (25 of 54 sites), on 22 sites (41 percent) the stressor is considered to have a moderate level of impact to populations, and on 20 percent (11 of the 54 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 4 sites are within 1 km (0.6 mi) of another site where the species is present (Service 2014, 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 4 of the 12 Poweshiek sites with present status are within the estimated maximum dispersal distance from one another as are about 40 percent (64–69 of 171 sites) 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, all but one site surveyed in 2012, and all sites surveyed in 2013.

#### Climate Change

Our analyses under the Act include consideration of the likely effects of ongoing and projected changes in climate. The terms “climate” and “climate change” are defined by the Intergovernmental Panel on Climate Change (IPCC). “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 2013, p. 1450). 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 2013, p. 1450). Various types of changes in climate can 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 the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). 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 stressor 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), South Dakota (Cochrane and Moran 2011, entire), 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 stressor 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 will experience the effects of climate change, but how those effects will be manifested is uncertain.

#### Prairie Plant Harvesting

A potential, future stressor to the Dakota skipper and Poweshiek skipperling is collection of purple coneflower (also known as black samson 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, such as 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 southwestern 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.).

Although carefully targeted herbicide treatments result in beneficial control of undesired plants, 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 stressors 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 stressor 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 stressors 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 impact 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 stressor 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 use of neonicotinoids on agricultural crops has dramatically increased in the last ten years and they are now the most widely used group of insecticides in the world (Jeschke *et al.* 2011, pp. 2897–2898; Main *et al.* 2014, p. 2; Goulson 2013, pp. 1–2).

Neonicotinoids persist in the environment (Goulson 2013, p. 1) and are thought to accumulate in the soil from repeated applications over time (Hopwood *et al.* 2013, p. 4). Insects can be exposed through multiple routes—neonicotinoids are used in seed dressings, foliar spray, soil irrigation water, soil drench, granular in pastures, tree injections, and topical applications to pets.

In the United States, six neonicotinoids are approved for use—imidacloprid, thiamethoxam, clothianidin, dinotefuran, thiacloprid, and acetamiprid (EPA 2014 Web site)—and it is estimated that more than 3.5 million pounds (56 million ounces) of neonicotinoids were applied to nearly 127 million acres (51 million hectares) of agricultural crops each year from 2009 to 2011. The presence and concentrations of neonicotinoids at Dakota skipper and Poweshiek skipperling sites or nearby agricultural fields that use neonicotinoid seed treatments or other such treatments has not been assessed, however, in general, nearly 100 percent of corn is known to be treated, and about 75 percent of soybean seeds are known to be treated with neonicotinoids, for example. Similarly, soybean aphid spraying occurs during the adult flight period, is widespread, and applied aerially—this spray can drift to nearby Dakota skipper or Poweshiek skipperling habitat. The presence and concentrations of insecticides at Dakota skipper and Poweshiek skipperling sites or nearby agricultural fields that utilize soybean aphid spraying has not been assessed. The Minnesota Zoo has proposed a study to investigate the levels of neonicotinoids, aphid pesticides, and other insecticides that may be present at several skipper sites in Minnesota and South Dakota.

The spread of nonnative gypsy moths (*Lymantria dispar dispar*) has increased efforts to control this damaging species and may also be a stressor, 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 15 present and unknown Dakota skipper sites and 9 Poweshiek skipperling sites occupied with present or unknown occupancy where we had sufficient information to evaluate the stressor (Service 2012 unpubl.; 2014, unpubl. data). We considered the level of impact to populations posed by herbicide and pesticide use to be low if the site is only spot sprayed with herbicides or pesticides when and where necessary (Smart *et al.* 2011, p. 182) and their use is not expected to change in the future. The level of stressor 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 4 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—1 in North Dakota and 1 in South Dakota. The level of impact to populations posed by herbicide and pesticide use was considered to be high at 3 of the 9 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 stressor 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 stressors described throughout Factors A, C, and E of this final 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 hypothesis to explain the rapid decline of the Poweshiek skipperling, and possibly the Dakota skipper, is that a newly virulent pathogen or a new parasitoid has increased mortality above normal levels (Dana 2013, pers. comm.).

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 factor 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, with the exception of 2 individuals observed at one location in 2013 (Weber 2014, in litt.; Dana 2014, pers. comm.). 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. Only six individual Dakota skippers were detected at one site in Minnesota during 2013 surveys, which included 15 sites with previous records and 12 prairie remnants without

previous records for the species (Service 2014, unpubl. geodatabase.). 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 and 2013 surveys had the lowest positive detection rate (38 percent and 32 percent, respectively) 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 State-wide surveys (ND State average = 17.4 encounters per hour). The Dakota skipper was not detected at the three sites that were surveyed in 2013 in North Dakota with previous records of the species. 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 factors and indicate that they are a current stressor 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 largely 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 stressors 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 stressor with the most significant impacts to the Poweshiek skipperling are one or more unknown factors 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 insecticide, herbicide, and pesticide use are also stressors to both species, and unregulated prairie plant harvest has the potential to become a stressor in the future (See *Factor E*). Collectively, these stressors 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. Similarly, only six individuals were observed at one Minnesota site in 2013. 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 2012b, p. 7).

The Minnesota Zoo has also begun a study to investigate the levels of neonicotinoids, aphid pesticides, and other insecticides present at several skipper sites in Minnesota and at least one site in South Dakota.

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 stressors described in this final rule may cumulatively or synergistically impact the Dakota skipper and Poweshiek skipperling beyond the scope of each individual stressor. 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 stressors are likely acting

cumulatively to further increase impacts on the already vulnerable, small, and isolated populations of Poweshiek skipperling and Dakota skipper.

#### Determination

##### *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 two 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 77 percent of sites where it had been recorded rangewide. It is presumed extirpated from Illinois and Iowa and no longer occurs in eastern Minnesota.

Much of the rangewide decline in the species has been observed in the last few years. Since 1988, researchers have surveyed 10 or more sites in 25 years; the average positive detection rate for those years is 63 percent rangewide. Since 2009, the percent of surveyed sites with positive detections of the species has dropped from 63 percent in 2009, to 41 percent in 2010, 36 percent in 2011, 37 percent in 2012, and 22 percent in 2013. 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 2013 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 264 historical locations, the species is presumed extirpated or possibly extirpated from at least 93 (35 percent) of those sites, and the occupancy of the species is unknown at approximately 88 (33 percent) sites. Of the 88 sites where the occupancy is unknown, at least 78 sites are subject to

one or more stressors that have a moderate to high impact on those populations—these sites are distributed across Minnesota, North Dakota, and South Dakota. Three sites with unknown occupancy were not evaluated for stressors, due to lack of information. The 7 sites with unknown occupancy without moderate- to high-level stressors are scattered in various counties in Minnesota and South Dakota, and the skipper is thought to still be present at approximately 83 (31 percent) of the 264 historical locations, although 22 of these sites have not been surveyed since 2002. Of those 83 sites, at least 73 sites are subject to one or more stressors that have a moderate to high impact on those populations, such as conversion to agriculture, lack of management, and small size and isolation. Four sites were not evaluated due to lack of information, and the remaining six 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 (40 of 83) of the locations where the species is considered to be present are primarily located on privately owned fall-hayed prairies in Canada, mostly within 2 isolated complexes, and have not been surveyed since 2007. All 40 of those Canadian sites have one or more stressors of moderate to high level of impact to populations. Approximately 15 populations in Canada are on lands that are being used in ways that are favorable to the Dakota skipper (*i.e.*, late-season haying conducted at least every other year and there is no indication that native plant species diversity is declining due to timing or frequency of mowing), and the stressors at those sites are not immediate. However, we are aware of only one of these Canadian populations that is protected (on Federal land). The remaining sites where the species is considered to be present are about equally distributed among Minnesota (11 sites), North Dakota (16 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 factors, acting individually or synergistically, continue today (see Summary of Factors Affecting the Species). We identified many stressors to the species, some of which rise to the level of threats that contribute to the listing status for each 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 factors 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 factors, and may only be a few years behind those declines experienced by other species, such as the 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 approximately 15 populations on lands that are being utilized 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, landowners may not be aware of the species presence and may change 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 Minnesota, North Dakota, and South Dakota, is likely to continue. Therefore, on the basis of the best available scientific and commercial information, we are listing the Dakota skipper as a threatened species in accordance with sections 3(20) 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 (populations detected during the last survey year, numbers appear stable, lower levels of threats and stressors)—primarily in North Dakota, South Dakota, Manitoba, and Saskatchewan. About 14 to 15 sites in Manitoba are used in a manner conducive to the conservation of Dakota skipper (haying after the adult flight period), and the threats at those sites are not imminent. Furthermore, we believe the species to be present in at least 6 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. Because we have determined that the Dakota skipper is a threatened species throughout all of its range, no portion of its range can be "significant" for purposes of the definitions of "endangered species" and "threatened species." See the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37577).

#### *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 96 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 31 percent each year (2004–2013), with a low of 12 percent at sites surveyed in 2012 and 2013. 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 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. The Poweshiek skipperling was observed at one site in Minnesota in 2007 and there was a sighting of a Poweshiek skipperling at one site in 2013, although no photographs or specimens were taken to confirm the sighting. Iowa sites were not surveyed in 2012, and the species was not detected in 2013. Poweshiek skipperling have historically been documented at approximately 296 sites; now we consider the species to be present at only 12 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 1 small and isolated native-prairie remnant in Wisconsin, 9 small and isolated prairie fen remnants in Michigan, and a prairie complex in Manitoba. The species may also be present at one site in Minnesota. These sites represent less than 5 percent of the total number of sites ever

documented for the species. The numbers observed at these sites are relatively small (fewer than 100 individuals at all sites surveyed in 2013), and all of these sites have at least one documented threat that has 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 0.2 to 2.2 during the last 6 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 75 sites—throughout the range of the species (Iowa, Michigan, Minnesota, North Dakota, and South Dakota), 49 of these sites were included in the threats assessment. Of the 49 sites where the occupancy is unknown that had sufficient information to assess, at least 42 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.

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 factors 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 12 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 threats that have moderate- to high-level effects on those populations. Therefore, on the basis of the best available scientific and commercial information, we are 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 factors 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 threats that have 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 factors 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. Because we have determined that the Poweshiek skipperling is an endangered species throughout all of its range, no portion of its range can be



“significant” for purposes of the definitions of “endangered species” and “threatened species.” See the Final Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definitions of “Endangered Species” and “Threatened Species” (79 FR 37577).

#### 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, Tribes, 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.

When 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>.

Please let us know if you are interested in participating in recovery efforts for the Dakota skipper or Poweshiek skipperling. Additionally, we invite you to submit any new information on these 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. 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 NRCS; 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.

#### *Poweshiek Skipperling*

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.

### Dakota Skipper

Under section 4(d) of the Act, the Service has discretion to issue regulations that we find necessary and advisable to provide for the conservation of threatened wildlife. We may also prohibit by regulation with respect to threatened wildlife any act prohibited by section 9(a)(1) of the Act for endangered wildlife. Exercising this discretion, the Service has developed a 4(d) rule containing all the general prohibitions and exceptions to those prohibitions; these are found at 50 CFR 17.31 and 50 CFR 17.32. For the Dakota skipper, the Service has developed a 4(d) rule that is tailored to the specific threats and conservation needs of this species. As a means to promote conservation efforts on behalf of the Dakota skipper, we are finalizing a 4(d) rule for this species that modifies the standard protections for threatened wildlife found at 50 CFR 17.31. In the case of a 4(d) 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 4(d) rule contains the prohibitions necessary and advisable to conserve that species.

As discussed above, the primary factors supporting the 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 the 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 factors.

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 rule under section 4(d) of the Act, but the section 4(d) 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, this 4(d) rule outlines the prohibitions, and exceptions to those prohibitions, necessary and advisable for the conservation of the Dakota skipper.

Conversion of grasslands for the production of agricultural crops poses a threat to the Dakota skipper because it may directly destroy the species' habitat, increase isolation of populations by impeding dispersal, and increase the risk posed by drift of herbicides and pesticides. A wide variety of peer-reviewed publications and government reports have documented recent conversion of native grassland. In addition, 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); Sylvester *et al.* 2013, p. 13; Rashford *et al.* 2011, p. 282; Stephens *et al.* 2008, p. 6; (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 the Dakota skipper (Wright and Wimberly 2013, p. 2). In northeastern South Dakota, one of the few remaining strongholds for the Dakota skipper, about 269,000 acres (108,907 ha) of grassland was lost—primarily to

cropland—between 2006 and 2012 (Reitsma *et al.* 2014, p. 3).

As with agricultural policies (Doherty *et al.* 2013, p. 15), prohibitions against take of Dakota skippers 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 (“grass-based farming”) is frequently a priority of programs to conserve native grassland ecosystems in the northern Great Plains (*e.g.*, U.S. Fish and Wildlife Service 2011, p. 5). Exempting incidental take of Dakota skippers that may result from grazing and other routine livestock ranching activities will afford us more time to protect the species' habitats in these areas and will facilitate the cooperation and partnerships with livestock producers necessary to recover the species.

Three primary factors have led us to determine that it is necessary and advisable to exempt take of Dakota skippers caused by certain ranching activities, including grazing. First, a variety of socioeconomic and policy factors are leading to the conversion of native grasslands for the production of agricultural crops, as summarized above. Whereas conversion of native grassland for crop production would result in a permanent loss of Dakota skipper habitat and may also exacerbate other threats (*e.g.*, pesticide drift) to the species, grasslands can remain suitable for Dakota skippers when grazed (see below and Dana 1991, p. 54; Schlicht 1997, p. 5; Skadsen 1997, pp. 24–29). By exempting take of Dakota skippers caused by grazing, we acknowledge the positive role that some ranchers have already played in conserving Dakota skippers and the importance of preventing any additional loss and fragmentation of native grasslands as the result of activities in areas that could support the species.

Second, although some grazing practices pose a threat to Dakota skipper, grazing may also be an effective tool to improve Dakota skipper habitat when carefully applied in cooperation and consultation with private landowners, public land managers, and grazing experts. 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 increasing coverage of mid-height grasses, such as little bluestem, relative to tallgrasses, such as big bluestem and Indiangrass (Dana 1991, p. 54). Intensive early-season grazing can reduce the extent of Kentucky bluegrass, a nonnative species that invades prairie habitats and competes with native plant species (DeKeyser *et al.* 2013, p. 86). In addition, grazing may also inhibit the establishment of smooth brome and help to enhance coverage and diversity of native plants in prairies that have been invaded by nonnative cool-season grasses (U.S. Fish and Wildlife Service 2006, p. 2; DeKeyser *et al.* 2009, p. 18; Smart *et al.* 2013, p. 686). Because grazing can lead to adverse conditions for the Dakota skipper, however, the Service encourages collaboration with private landowners, public land managers (*e.g.*, Skadsen 2006, p. 5), State and Federal conservation agencies, and nongovernmental organizations to identify, implement, monitor, and refine grazing practices that are conducive to the species' conservation.

Third, recovery of the Dakota skipper will depend on the protection and restoration of high-quality habitats for the species on private lands and on public lands that are grazed or hayed by private individuals under lease or other agreements. Conservation of Dakota skippers on these lands will require the development and implementation of complex, individualized, and long-term management agreements that rely on robust monitoring of Dakota skipper populations and habitat features. All of these agreements will require a willingness on the part of the private ranchers to collaborate with the Service and our partners to implement, monitor, and adapt conservation grazing practices in a manner that allows for stable or growing Dakota skipper populations. This type of cooperative approach is more likely to take place and to be successful if we exempt take caused by grazing and the other activities that we specify in the 4(d) rule.

In some geographic areas, such as McHenry County, North Dakota, the Dakota skipper almost exclusively inhabits relatively flat and moist prairie habitats that are mowed for hay. In these areas we do not encourage a switch to grazing without careful consideration of the potential consequences to the Dakota skipper. 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 where 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 as well (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 skippers 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 the Dakota skipper, for example, habitat on steep slopes was “in good condition,” whereas “lesser slopes” were “moderately grazed” and some areas were “overgrazed” (Skadsen 1999a, p. 29).

In the proposed rule, we cited the lack of any examples of strong populations of Dakota skippers where the relatively moist and flat (“Type A”) habitats are grazed as evidence that it would not be necessary and advisable to exempt take caused by grazing in certain counties where “Type A” habitats are found. As stated above, we still do not recommend a change to grazing on “Type A” habitats occupied by the Dakota skipper unless a cooperative plan is developed to ensure that it will be done in a manner that conserves the species in the affected habitats. Nevertheless, in light of the great importance that cooperative relationships with certain public land management agencies and private livestock producers will play in conserving the Dakota skipper, we find that it is necessary and advisable to exempt take that may be caused by grazing on non-Federal lands regardless of geographic area. We do not expect this to result in a significant change in management from haying to grazing because other factors, such as the costs

of building fences and developing livestock watering facilities, are more important factors that will influence this land management decision.

#### Provisions of the 4(d) Rule for the 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 *Alesea 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). Through this 4(d) rule, all prohibitions in 50 CFR 17.31(a) and (b) apply to the Dakota skipper except in the specific instances as outlined below. The 4(d) 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 and Rights-of-Way*

Incidental take that is caused by the routine livestock ranching and other specified trail and rights-of-way maintenance activities described below and that are implemented on private, State, and tribal lands and on other lands not under Federal jurisdiction (e.g. lands owned by county governments or local governments) 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 4(d) rule, routine livestock ranching and recreational trail and rights-of-way maintenance activities include the items listed below. Except as explicitly stated below, these activities must be associated with livestock ranching for this 4(d) rule to apply.

(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 provide a conservation benefit to Dakota skipper habitat.

(2) *Livestock Gathering and Management*: The installation and maintenance of corrals, loading chutes, and other livestock working facilities 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

habitat and to provide a conservation benefit to the species 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 the growth stage of the weed species. Control of noxious weeds may also be important to protect Dakota skipper habitat because native plant diversity declines when nonnative plant species invade and become established in prairies (Boettcher *et al.* 1993, p. 35). Broadcast application of herbicides, however, may result in significant deterioration of native plant diversity in prairies (Smart *et al.* 2011, p. 184). Therefore, incidental take of Dakota skipper that may result from spraying of herbicides would be exempt except as a result of broadcast spraying, which we define as the application of herbicides evenly across the entire application area. Note that herbicide applications would not affect the Dakota skipper if they do not affect the limited areas where the species is present. Broadcast applications of herbicides that do not affect habitats occupied by the Dakota skipper would not result in take of the species, and thus would not result in violation of section 9 of the Act. Take that may occur as a result of mowing that is carried out for the purpose of controlling one or more noxious weed species is also exempted from the take prohibitions under section 9 of the Act by issuance of this 4(d) rule.

(5) *Haying*: Stock cows need to be maintained through the non-growing season though supplemental feeding with hay; thus, haying (cutting grass and other vegetation for drying and use as livestock feed) 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 hayland may include, however, areas within transportation (e.g., road, highway, railroad) rights-of-ways and corridors where native grassland is mowed for hay. 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 exempted from the take

prohibitions under section 9 of the Act by issuance of this 4(d) rule. Dakota skippers are unlikely to occur in replanted grasslands (grasslands replanted on formerly plowed or cultivated lands) or in tame hayland or grassland (hayland or grassland planted to and comprising primarily nonnative grass species, such as smooth brome (*Bromus inermis inermis*)). Therefore, mowing replanted and tame grasslands before July 16 would not result in take of Dakota skippers and would thus not result in a violation of section 9 of the Act.

(6) *Mowing Section Line 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 snow will not catch and block vehicle access and that they are suitable for hiking and other intended recreational activities, respectively. Section line rights-of-way 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 a result of mowing of section line rights-of-way and recreational trails will be exempt from the take prohibitions of section 9 of the Act. Recreational trails are travel ways established either through construction or use that are intended for and passable by at least one or more of the following: foot traffic, bicycles, in-line skates, wheelchairs, or cross-country skis. Incidental take that may be caused by mowing recreational trails does not need to be associated with livestock ranching for the 4(d) rule to apply.

(7) *Livestock (Cattle, Bison, or Horse) Grazing*: Incidental take of Dakota skippers that may result from grazing on private, State, or tribal land is exempt from the take prohibitions of section 9 of the Act.

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.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), 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 final listing on proposed and ongoing activities within the range of a listed species. Based on the best available information, the following actions are unlikely to result in a violation of section 9, if these activities are carried out in accordance with existing regulations and permit requirements; 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) Unauthorized modification, removal, or destruction of the prairie vegetation, soils, or hydrology in which the Dakota skipper and Poweshiek skipperling are known to occur;

(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) 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; 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).

### Required Determinations

#### *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.

The Sisseton-Wahpeton Oyate, Flandreau Santee Sioux Tribe, Turtle Mountain Band of Chippewa, Three Affiliated Tribes, Spirit Lake Sioux Tribe, and Standing Rock Sioux Tribe are the main Tribes affected by this final rule. We began government-to-government consultation with these tribes prior to the publication of the proposed rule, through the public comment period, and during the development of the final listing determination.

We sent letters in September 2012 to each Tribe seeking early input regarding the species status review and to offer government-to-government consultation. We sent notification letters in October and November of 2013 to each Tribe describing the critical habitat exclusion process under section 4(b)(2) of the Act, and we engaged in conversation with the Tribes about the proposed listing and critical habitat

rules to the extent possible. We have maintained contact with Flandreau Santee Sioux Tribe, Turtle Mountain Chippewa, Three Affiliated Tribes, Spirit Lake Sioux Tribe, and Standing Rock Sioux Tribe through letters, phone calls, and emails, and we notified each tribe when documents pertaining to the listing and critical habitat rules were made available.

We have coordinated several survey efforts with Sisseton-Wahpeton Oyate since 1995 and held an informational meeting for the Tribe in April 2014, to better explain the proposed listing and designation of critical habitat. We met with representatives from the Turtle Mountain Chippewa in May 2014, and conducted a site visit at that time to evaluate areas proposed for designation as critical habitat. We did not receive comments from the Sisseton-Wahpeton Oyate, Three Affiliated Tribes, Standing Rock Sioux Tribe, Flandreau Santee Sioux Tribe, Turtle Mountain Chippewa, or the Spirit Lake Nation. However, notification of the available economic analysis screening memorandum for the critical habitat proposal was provided to all Tribes in the species' ranges at the time it was made available to the public.

### 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 Twin Cities Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

### Authors

The primary authors of this final rule are the staff members of the Twin Cities Ecological Services Field Office.

### List of Subjects in 50 CFR Part 17

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

### Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

#### **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. Amend § 17.11(h) by adding entries for “Skipper, Dakota” and “Skipperling, Poweshiek” to the List of Endangered and Threatened Wildlife in alphabetical order under “Insects” to read as follows:

§ 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 ...	<i>Hesperia dacotae</i>	U.S.A. (IA, IL, MN, ND, SD); Canada (Manitoba, Saskatchewan).	NA	T	851	NA	17.47(b)
* * * * *							
Skipperling, Poweshiek.	<i>Oarisma poweshiek.</i>	U.S.A. (IA, IL, IN, MI, MN, ND, SD, WI.); Canada (Manitoba).	NA	E	851	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 the following activities (except where explicitly stated otherwise, these activities must be associated with livestock ranching):

(i) Fence construction and maintenance.

(ii) Livestock gathering and management. The installation and maintenance of corrals, loading chutes, and other livestock working facilities must be carefully sited with respect to

the location and distribution of important Dakota skipper habitat.

(iii) Development and maintenance of livestock watering facilities.

(iv) Noxious weed control. Incidental take of Dakota skipper that results from spraying of herbicides is not a violation of section 9 of the Act, except such take that results from broadcast spraying, which is the application of herbicides evenly across the entire application area. Incidental take that results from mowing to control one or more noxious weed species would also not be a violation of section 9 of the Act.

(v) Haying. For the purposes of this rule, native haylands do not include lands that had previously been plowed and were then replanted to native or nonnative vegetation, but native haylands do include areas within transportation (e.g., road, highway, railroad) rights-of-ways and corridors where native grasses are mowed for hay. Haying of native haylands no earlier than July 16 (after July 15) would not be a violation of section 9 of the Act. Mowing of replanted grasslands (grasslands replanted on formerly plowed or cultivated lands) or tame

haylands or grasslands (planted hayland or grassland comprising primarily nonnative grass species, such as smooth brome (*Bromus inermis inermis*)) would also not be a violation of section 9 of the Act at any time of the year.

(vi) Mowing section line rights-of-way and recreational trails. Mowing of section line rights-of-way (typically disturbed soil that has been contoured for a roadway) would not be a violation of section 9 of the Act. Mowing of recreational trails (travelways established either through construction or use that are intended for and passable by foot traffic, bicycles, in-line skates, wheelchairs, or cross-country skis) would not be a violation of section 9 of the Act, regardless of whether the trails are associated with livestock ranching.

(vii) Livestock (cattle, bison, or horse) grazing on private, State, or tribal land.

Dated: October 15, 2014.

**Stephen Guertin,**  
Acting Director, U.S. Fish and Wildlife Service.

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