Dakota Skipper Conservation Guidelines

Background

Dakota skippers (*Hesperia dacotae*) occur only in remnants of the native grassland that once covered vast areas of the north-central United States and nearby Canada and are now listed as threatened under the Endangered Species Act (U.S. Fish and Wildlife Service 2014). To recover the species, its' remaining habitats must be managed with grazing, fire, or haying to maintain the diversity of native prairie plant species on which Dakota skipper relies. Unless implemented appropriately, however, these practices may also result in levels of mortality that are not sustainable or they may degrade habitat conditions to the degree that the species is extirpated.

Within a management area, effective conservation of Dakota skipper often relies on a thorough understanding of the species' distribution and the current condition of the species' habitat. In addition, it is important to consider the effects of management on Dakota skipper larvae (caterpillars) because the species remains in the larval stage for most of its life cycle. The adult flight period, however, is also crucial – widespread failure to reproduce in any single year may result in extirpation of populations, especially in isolated habitat patches that are unlikely to be recolonized.

Recommended Conservation Measures

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

Effective implementation of the following conservation measures relies on a thorough and accurate understanding of the distribution and status of Dakota skipper and its habitat within a management area.[1] Dakota skippers are likely to be non-uniformly distributed within habitat areas (Rigney 2013, p. 140). Therefore, it is essential to have a species expert assess and map habitat and Dakota skipper distribution within management areas as frequently as is feasible to ensure that plans are based on information that is correct and up-to-date.

Prescribed Fire

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

- Divide Dakota skipper habitat at the site into as many burn units as is feasible – at least three – and burn no more than one unit in any single year. Units should be approximately equal in size to

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

maximize the likelihood that they will produce enough adults to compensate for larvae killed in the burned unit. If it is not practicable to divide Dakota skipper habitat into at least three burn units within a management area, then we recommend managing the site with haying or grazing, if feasible. In cases where there are nearby local populations of Dakota skipper that will provide immigrants from outside of the management area it may also be feasible to conserve a Dakota skipper population with less than three burn units, but that may require close coordination with neighboring landowners (see **Coordinated Management**, below).

- Use the maximum length fire return interval that is adequate to maintain or restore high-quality native prairie habitat on each unit. Allow *at least* 3 years to elapse without fire (i.e., minimum 4-year rotations) before re-burning any area.

- If feasible to achieve management objectives, allow fires to burn in a patchy (”fingering”) pattern within units. Do not make a concerted effort to burn ‘every square inch’; leave fire “skips” unburned. Burning under cool or damp conditions may increase survival of insects present in the litter layer within the burned unit (Panzer 2003).

- Map the extent of each fire in Dakota skipper habitat to ensure that future fire planning is based on an accurate understanding of prior fire history.

- Consider the use of proactive techniques to increase the patchiness of fires, especially if habitats that would serve as sources of recolonizing adults are small or not contiguous with the burn unit.

- Conduct pre-burn surveys and evaluate other applicable information to understand the distribution and relative abundance of Dakota skippers within and among burn units. Poor weather or other conditions (e.g., persistent high winds) may reduce the likelihood of adequate survey conditions during the flight period in any given year. Therefore, it may be prudent to plan surveys for at least two consecutive years before a planned burn.

- If feasible to achieve management objectives, conduct spring burns as early as is feasible – this may limit larval mortality because larvae may still be in shelters at or below the ground surface. Late spring burns may also delay flowering of early and midsummer blooming forbs, which may limit nectar sources for Dakota skippers during their flight period (Dana 1991:56). Fall burns may result in higher soil temperatures than early spring burns and greater mortality of larvae, even after they have retreated for the season to shelters at or below the ground surface. In addition, the removal of plant material by fall burns may expose larvae to greater temperature extremes during winter.

- If fires may need to be conducted in late spring to address a particular management need (e.g., control of smooth brome, *Bromus inermis*), other precautionary measures will be especially important. These include the division of occupied Dakota skipper habitat into as many burn units as is practicable; ensuring that fires do not escape from burn units; maximizing the number of years between fires; and, reducing fuel loads (e.g., by haying or grazing) in Dakota skipper habitat in units where frequent or intense fire is not necessary.

- Be sure to consider any other rare, prairie-dependent species present on sites when designing burn plans. Other species of butterflies that rely on native prairie and are of significant conservation concern (e.g., Iowa skipper, *Atrytone arogos iowa*) may still be vulnerable to high fire mortality even during early spring fires because these species' diapausing (dormant) larvae are present above the ground surface (e.g., in the foliage). Moreover, subsurface temperatures may reach lethal levels where fuel loads are especially high (see below) reducing any mitigating effect of burning early in the spring.

- If you plan to change the configuration of burn units or make other changes to your prescribed fire plan, review the location and timing of recent burns to understand the potential effects of these previous fires on the current abundance and distribution of Dakota skippers on the management area.

- Plan for escape of fires out of burn units if that is a reasonable possibility. That is, plan for the contingency that a prescribed fire will escape a burn unit and burn one or more additional units that contain Dakota skipper habitat. If this is reasonably likely, determine how the Dakota skipper population would persist despite such a scenario.

- High fuel levels increase the likelihood that fires will kill Dakota skippers, even during early spring burns when larvae are still in their subsurface shelters. Therefore, consider reducing fuel levels (e.g., by haying the previous fall) before conducting burns where fuel levels seem to be high – if that would not interfere with the burn objectives.

Haying and Native Seed Harvest

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

- In at least most of the Dakota skipper habitat within a site, hay or collect seed as late as is practicable to reduce the likelihood of removing or destroying Dakota skipper eggs and to avoid removing nectar sources or killing adults during the flight period. Delay haying at least until the Dakota skipper flight has ended locally to ensure that reproductive activity of adults is not affected. Contact the Ecological Services Field Office in your state (see Appendix) if you are uncertain whether the Dakota skipper flight has ended. The flight period shifts slightly each year in response to annual weather patterns. In general, hay or mow as late as is feasible to reduce the likelihood of adverse effects to any life stage.

- Leave at least 20 cm (8 inches) of stubble to provide habitat for over-wintering larvae. The ideal time to mow may be after Dakota skipper larvae have entered diapause (i.e., have become dormant in preparation for winter). Although there is no convenient method to know when this has occurred, the senescence of native warm-season grasses may be a good indication that Dakota skippers have entered diapause.

- As with annual burning, annual haying may reduce plant diversity in tallgrass prairie. Therefore, rest hayed areas at least occasionally as suggested by Royer et al. (2014, p. 16). Resting hay units may also reduce the impacts of any adverse effects that may occur from haying that is conducted

early enough to adversely affect Dakota skippers or other species dependent on native prairie (e.g., Ottoe skipper, *H. ottoe*).

Grazing

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

The 4(d) rule for Dakota skipper exempts incidental take of the species that may be caused by grazing on non-federal lands. This provides an opportunity to experiment with grazing techniques that may result in some take of Dakota skippers, but that have the potential for long-term benefits to the species. Experimentation may be most appropriate and useful in areas that have been degraded due to prior management or other factors and that are near enough to existing populations of Dakota skipper that immigration is likely occur if habitat conditions are sufficiently improved.

The following are recommendations that may apply generally or as a starting point for developing a site specific plan.

- Beyond a certain level, grazing is likely to adversely affect Dakota skipper populations in proportion to its intensity because it removes nectar sources and degrades native prairie plant communities by, for example, increasing coverage of invasive species and reducing density of larval food plants (Smart et al. 2011; Rigney 2013, p. 143 and 153). Therefore, limit the duration and intensity of grazing for the conservation of the Dakota skipper and the native prairie ecosystem.

- Avoid grazing regimes that remove a significant proportion of floral nectar resources during the flight period. To protect nectar resources and vegetation for egg deposition and larval food (warm season grasses) in South Dakota, for example, "it may only be feasible to graze dry-mesic prairie slopes in the spring (April – May) before the growth of warm season grasses and forbs begins, with a minimum one-year rest period between rotations" (Skadsen 2003). This is an example of a hypothesis that could be tested in the context of a site-specific grazing plan.

- Include at least one period of rest during the growing season and do not graze a site during the same time each year.

- Purple coneflower (*Echinacea angustifolia*) and other important nectar species *may* be good indicators of grazing effects. For example, declines in purple coneflower may be indicative of current or pending adverse effects to Dakota skippers due to reduction in nectar sources and general degradation of the prairie plant community.

- Adverse effects may occur at lower grazing intensities in the wet-mesic prairies that Dakota skippers inhabit in parts of North Dakota and Manitoba than in the dry-mesic habitat type. Virtually all of the sites with the wet-mesic habitat type at which Dakota skippers still occur are managed with fall or late-summer haying. To ensure the persistence of Dakota skippers at these

sites, they should not be grazed unless grazing methods are carefully developed that are shown to not threaten the Dakota skipper populations in this habitat type.

Habitat Preservation and Restoration

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

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

Weed/Invasive Species Control

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

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

Coordinated Management among Nearby Sites

- Conduct surveys or review available data to understand nearby local populations of Dakota skippers and habitats. This may facilitate coordination and management of populations that may cross between management units and ownerships.

- Coordinate management activities with property owners and managers of nearby Dakota skipper habitats. For example, plan burns and other temporarily adverse management activities during years when nearby habitats will not be burned.

Maintain Genetic Diversity within Populations

- Dakota skipper populations show signs of inbreeding (Britten and Glasford 2002). Manage Dakota skipper habitat to maximize genetically effective population sizes – i.e., the number of individuals reproducing each year. For example, do not disturb habitats during the Dakota skipper flight period, restore degraded habitat to connect isolated populations, expand suitable habitat patches, etc.

- Consider how various management practices may affect the number of breeding adults in both the short- and long-term. For example, activities that kill Dakota skippers during larval or pupal stages will also affect the number of breeding adults.

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