DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2012–0060]

[4500030113]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Mardon Skipper as Threatened or Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the mardon skipper (*Polites mardon*) as a threatened or endangered species under the Endangered Species Act of 1973, as amended (Act). After review of the best available scientific and commercial information, we find that listing the mardon skipper is not warranted at this time. However, we ask the public to submit to us any new information that becomes available concerning the threats to the mardon

skipper or its habitat at any time. At our discretion, after additional review of the subspecies *Polites mardon mardon* and *Polites mardon klamathensis*, we find that listing for these subspecies is also not warranted at this time.

DATES: The finding announced in this document was made on September 4, 2012..

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number **FWS–R1–ES–2012–0060**. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, 510 Desmond Drive SE, Suite 102, Lacey, WA 98503. Please submit any new information, materials, comments, or questions concerning this finding to the above address.

FOR FURTHER INFORMATION CONTACT: Ken Berg, Field Supervisor, Washington Fish and Wildlife Office (see **ADDRESSES**); by telephone at 360-753-9440; facsimile at 360-753-9008; or Paul Henson, Field Supervisor, Oregon Fish and Wildlife Office, 2600 SE 98th Avenue, Suite 100, Portland, OR 97266; by telephone at 503-231-6179; facsimile at 503-231-6195mailto:. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the Federal Lists of Endangered and Threatened Wildlife and Plants that contains substantial scientific or commercial information that listing the species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we will determine that the petitioned action is: (1) Not warranted, (2) warranted, or (3) warranted, but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are threatened or endangered species, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register**.

Previous Federal Actions

On October 25, 1999, the Service identified the mardon skipper (*Polites mardon*) as a candidate species for listing under the Act (64 FR 57539). The identification of the mardon skipper as a candidate species was based on information compiled in the Washington State Status Report for the Mardon Skipper (Potter *et al*. 1999, entire).

On December 11, 2002, we received a petition dated December 10, 2002, from The Xerces Society, Gifford Pinchot Task Force, The Northwest Environmental Defense Center, Center for Biological Diversity, Oregon Natural Resources Council, Friends of the San Juans, and Northwest Ecosystem Alliance (petitioners), requesting that the mardon skipper be listed as an endangered species, and that critical habitat be designated under the Act (Black *et al*. 2002, entire). Included in the petition was supporting information regarding the species' taxonomy and ecology, historical and current distribution, present status, and actual and potential causes of decline. We acknowledged the receipt of the petition in a letter to the petitioners, dated January 22, 2003. In that letter we also stated that the Service considered the mardon skipper as having been subject to both a positive 90-day finding and a "warranted but precluded" 12-month finding, with the Candidate Notice of Review constituting publication of these required findings. The Service's "warranted but precluded" finding was based on limited funding that was dedicated to court-ordered or other higher-priority listings.

From 2003 to 2011, the Service continued to work with Federal, State, and private parties to compile information on the status and distribution of the mardon skipper, which is documented in the Service's candidate species assessment forms for those years. Substantial new information was collected regarding mardon skipper populations, distribution, and habitat requirements. In 2009, we changed the listing priority number for the mardon skipper from 5 to 8 (lower priority) due to the documentation of many new populations and increased protections for the species and its habitat provided by

State and Federal special status species programs.

In a settlement agreement with plaintiff WildEarth Guardians, on May 10, 2011, the Service submitted a workplan to the U.S. District Court for the District of Columbia in *re Endangered Species Act Section 4 Deadline Litigation*, No. 10–377 (EGS), MDL Docket No. 2165 (D. DC May 10, 2011), and obtained the court's approval to systematically, over a period of 6 years, review and address the needs of more than 250 candidate species to determine if they should be added to the Federal Lists of Endangered and Threatened Wildlife and Plants. The mardon skipper is one of 251 candidate species identified in the May 2011 workplan. On October 26, 2011, the Service published the intent to develop a proposed listing for several candidate species in the Puget Sound prairie region (including the mardon skipper) with funding allocated in Fiscal Year 2011 (76 FR 66830). We have since determined that, as the distribution of the mardon skipper includes additional habitat other than prairie, the public would be better served evaluating this information and the species, separately.

This notice constitutes our 12-month finding on the mardon skipper. Substantial new information regarding the mardon skipper has been compiled since we originally advanced the species to candidacy. Therefore, this finding considers information presented in the 2002 petition, as well as new information compiled over the past decade.

Species Information

The mardon skipper is a small (20 to 24 millimeters; less than 1 inch), tawny-orange butterfly with a stout, hairy body. The upper surface of the forewings and hindwings is orange with broad dark-brown borders, and the ventral hindwings have a distinctive pattern of light yellow to white rectangular spots (Pyle 2002, p. 88). Males are smaller than females, and have a small, dark-brown, slender and branched streak (stigma) on the upper surface of the forewing. Females have a more distinct ventral hindwing pattern. The mardon skipper is differentiated from other closely related *Polites* species by its short, rounded wings, reduced stigmal elements, and other distinctive morphological features (MacNeill 1993, p. 179). Like most Hesperiinae butterflies, mardon skippers have bent antennae clubs and a characteristic basking posture in which the forewings are held at a 45-degree angle and the hind wings are fully spread (Potter *et al.* 1999, p. 1).

Taxonomy and Species Description

The mardon skipper is a butterfly in the Order Lepidoptera (butterflies and moths), superfamily Hesperioidae, and family Hesperiidae (skippers), subfamily Hesperiinae (grass skippers). It was originally described by W. H. Edwards (1881, pp. 47–48) as *Pamphila mardon* from three males and three females collected by H.K. Morrison in 1880. The original type locality, stated by W.H. Edwards as Mount Hood, Oregon, was later correctly designated as small prairies near Puget Sound, Washington (Morrison 1883, p. 43). This type location was further defined as "Tenino Prairie, Thurston County, Washington" by Brown and Miller (1980, p. 53). The mardon skipper

is a rare species that occurs in four disjunct areas that include locations near the coast in northwestern California and southwestern Oregon, the southern Oregon Cascades, the southern Washington Cascades, and prairies in the south Puget Sound region (James and Nunallee 2011, p. 388).

In 1998, Mattoon *et al.* (p. 768) proposed that the Oregon Cascade populations be given subspecies status as *Polites mardon klamathensis*, and the Washington and northern California populations be given subspecies status as *Polites mardon mardon*. Adults of *P.m. klamathensis* are described as having a consistently tawnier dorsal and ventral coloration when compared to adults from other populations (Mattoon *et al.* 1998, pp.771–772).

The distinction between *Polites mardon klamathensis* and *P.m. mardon* was based largely on comparisons between specimens collected in northwestern California and the southern Oregon Cascades. According to Warren (2005, p. 49), the use of the name *P.m. mardon* for California populations should be considered tentative because the series of *P.m. mardon* from the northwestern California (and coastal southwestern Oregon) populations have not yet been carefully compared to the series of *P.m. mardon* from Washington due to the small number of specimens available for evaluation (Mattoon *et al.* 1998, p. 771). The Catalogue of the Butterflies of the United States and Canada (Pelham 2008, p. 78) lists the full species followed by both subspecies. However, in the introduction of his Catalogue, Pelham (2008, p. VII) notes that the subspecies category is used without regard to its validity. No additional taxonomic work or genetic analyses

have been done to clarify the subspecific designations described above (Kerwin 2011, p. 10). *Polites mardon* is recognized as a valid species by the Integrated Taxonomic Information System (ITIS) while *P.m. klamathensis* and *P.m. mardon* are recognized as valid subspecies (ITIS 2011, *P. mardon*, entire). For the purposes of this finding, we first analyzed the threats to the species *Polites mardon* as a whole. We then, at our initiative, further considered the threats to each of the currently recognized subspecies: *P.m. mardon* and *P.m. klamathensis*.

Distribution

The mardon skipper is a rare northwestern butterfly with a remarkably disjunct range. The species' current range is known from four widely separated locations: the south Puget Sound region of Washington, the southern Washington Cascades, the Cascade Mountains of southern Oregon, and coastal hills in northwestern California and southwestern Oregon (Kerwin 2011, pp. 8–9). The historical range and abundance of mardon skippers are unknown. The species was originally described from specimens collected at a south Puget Sound prairie site in 1880 (Morrison 1883, p. 43), but there are few historical records or museum collections of this species (Potter *et al.* 1999, p. 3). No estimates of abundance are available from any site prior to 1980 (Potter *et al.* 1999, p. 5).

The mardon skipper's disjunct distribution and strong association with early-seral, semi-mesic grassland habitats in the Pacific Northwest suggest a relict distribution that was likely much more widespread in the past. Both Pyle (2002, p. 89) and Runquist

(2004a, p. 6) suggest that the mardon skipper is an ancient species. The species' short, rounded wing morphology is not adapted to long-distance dispersal. The apparent lack of intervening populations between the distinct geographic areas suggests the species probably evolved under more open, contiguous environmental conditions (Runquist 2004a, p. 6). Populations in each disjunct geographic region have likely become isolated over long geologic time scales, as evidenced by the subspecies distinction between *Polites mardon mardon* and *P. m. klamathensis*. It is likely that mardon skippers were historically more widespread within each disjunct geographic region prior to the widespread loss of grassland and montane meadow habitats due to fire suppression, invasive species, and development over the past century (Potter *et al.* 1999, p. 5, Beyer and Schultz 2010, p. 863; Schultz *et al.* 2011, p. 370).

In this assessment we use the term "site" to indicate a specific location with species presence. Sites are usually mapped as distinct habitat patches, such as individual meadows in summary reports (e.g., Black *et al.* 2010, p. 25). Sites may include locations with a single mardon skipper observation, or locations that support many mardon skippers observed over multiple years. Sites are variable, and not all reports define sites the same way. For purposes of estimating the number of populations, occupied meadows can be considered to belong to the same population if the sites are within the annual dispersal distance for the species, generally assumed to be 0.5 mi (0.8 km) or less (Potter and Fleckenstein 2001, p.6). In this assessment we use the term "populations" to represent local clusters of sites that we assume are likely to be associated and function as a local population.

Summary of Mardon Skipper Current Range and Distribution

In 1999, the mardon skipper was known from approximately 14 extant sites located in four distinct geographic areas (Potter *et al.* 1999, p.5). Targeted surveys from 2000 through 2011 have documented a total of 165 sites with mardon skipper presence representing approximately 66 populations (Table 1). New sites or populations have been documented in each year that surveys have been completed. For example, five new sites were documented in 2011, including four sites in the Washington Cascades, and one site in the southern Oregon Cascades. It is very likely that additional undocumented sites exist, particularly in the Washington Cascades and possibly in southwestern Oregon or northwestern California, because not all of the potential habitat areas have been surveyed. The increase in known populations since 1999 is due to increased survey effort in areas not previously surveyed, rather than to increased habitat or expanding populations (Kerwin 2011, p. 18). The majority (76 percent) of the sites throughout the species' range occur on Federal lands managed by the Forest Service, Bureau of Land Management (BLM), National Park Service, Fish and Wildlife Service, and the Department of Defense, as well as Tribal lands owned by the Yakama Indian Reservation (17 percent). Due to the species' disjunct distribution, the populations in different geographic regions are relatively isolated, with two recognized subspecies *Polites mardon mardon* and *P.m. klamathensis,* occurring within the species' range.

Table 1. Summary of known populations of the mardon skipper by subspecies. Multiple sites may be considered to comprise a single population, depending on proximity (see Note, below).

Geographic Region	Site Ownership	Approximate Number of Documented Sites with Species Presence (2000-2011)	Approximate Number of Populations (local clusters of sites)
Polites mardon mardon			
Washington – South Puget Sound Prairies (Pierce and Thurston Counties)	Joint Base Lewis McChord – Dept. of Defense	4	1
	Washington Dept. of Fish & Wildlife	2	2
Washington – South Cascades (Yakima, Klickitat, and Skamania Counties)	Wenatchee National Forest	36	15
	Gifford Pinchot National Forest	43	13
	Conboy Lake National Wildlife Refuge	3	3
	Yakama Indian Reservation	23	11
	Private ownership	6	4
Southwest Oregon – Curry County	BLM – Coos Bay District	2	1
	Rogue River Siskiyou National Forest	3	1
	Oregon State Parks	1	-
Northwest California – Del Norte County	Six Rivers National Forest	8	2
	Redwood National Park	9	1
	Private ownership	3	1
Polites mardon klamathensis			
Oregon – South Cascades Jackson County	BLM Medford District	15	9
	Rogue River Siskiyou National Forest	4	2
	Private ownership	3	-
TOTALS		**165 Sites**	**66 Populations**

Note: In this assessment we use the term "sites" for specific locations with documented species presence (some of which are single observations) and "populations" to represent local clusters of sites that we assume are likely to be closely associated and function as a local population.

Summary of Mardon Skipper Population Estimates and Trends

Estimates of population sizes or population trends over time for mardon skippers

are generally not available. Surveys to estimate relative abundance of mardon skippers are conducted by systematically walking transects through a site and counting the number of adult mardon skippers encountered (Seitz *et al.* 2007, p. 11). The majority of survey efforts have been 1-day counts, so it is not known if they were conducted early or late in the adult flight period. Multiple surveys during the flight season and across a number of years are required to assess population sizes because the timing and length of adult flight periods can vary widely from year to year (Kerwin 2011, p. 19).

A few surveyors have used line-transect distance-sampling methods to estimate mardon skipper populations, but these techniques have generally failed to provide statistically reliable estimates at sites with small populations (Runquist 2004b, p. 4, Arnold 2006, p. 6). Runquist (2004a, pp. 4–5) used both line-transect sampling and mark-recapture sampling techniques to estimate a mardon skipper population in a small complex of three meadows in the Oregon Cascades. Researchers counted a total of 172 mardon skippers on all line-transects over all days, compared with a total of 238 mardon skippers that were captured and marked in the same meadows during the same period (Runquist 2004a, p. 5). No statistically reliable estimates of the actual population size were derived from this effort, but the author opines that a total population estimate of 350–400 individuals would be reasonable at this site based on his observations (Runquist 2004a, p. 5).

Line-transect distance sampling was used to census mardon skippers across approximately 800 acres (ac) (324 hectares (ha)) of Puget prairie habitat in 2009, and

provided the first statistically reliable estimates of the mardon skipper populations at these sites (Potter 2010, p. 4). At the Scatter Creek Wildlife Area in 2009, the population estimate during the peak of the adult flight period was 801 mardon skippers at the South Unit (95 percent confidence interval = 399–1,286 skippers) and 204 at the North Unit (95 percent confidence interval = 84–360) (Potter 2010, p. 4). These estimates were derived from actual counts of 312 skippers on the South Unit and 93 skippers on the North Unit (Potter 2009, p. 1). This was the most comprehensive survey effort at this site to date, so the results of the survey are not directly comparable to previous monitoring efforts at this site (Potter 2009, p. 2), but this population appears to be relatively stable based on counts conducted between 1997 and 2009 (Potter *et al*. 1999, p. 6; Harke 2001, p. 12; Potter 2009, p. 1).

Only one site (in Washington) has had a full spectrum of censuses that have covered the entire adult flight period (Beyer and Black 2007, p. 8). In 2006, the counts at this site (Grapefern Meadow) went from 0 mardon skippers counted on July 6, to 135 on July 9; 345 on July 16; 128 on July 23; and 2 on August 4 (Beyer and Black 2007, p. 8). These counts demonstrate that the number of mardon skippers present at a site can fluctuate significantly over a few days. The observed mardon skipper population at this site has fluctuated greatly over the past decade, with peak counts ranging from 420 butterflies in 2004 to 34 in 2011. Although there have been high counts of butterflies from time to time, overall the populations on the Wenatchee National Forest and Gifford Pinchot National Forest appear to be relatively stable. Data from the Wenatchee National Forest show some evidence of trends related to elevation, with lower elevation population

sites (less than 3,300 feet (ft) [1,000 meters (m)]) appearing to be stable, and mid-elevation sites (3,500–4000 ft [1,067–1,220 m]) showing some local declines, likely associated with cool, wet summer conditions (St. Hilaire *et al.* 2010, p. 2).

In the Oregon Cascades, limited population information for *Polites mardon klamathensis* is available, as few multiple-day surveys have been conducted here. Black *et al*. (2010, Appendix 1) report single-day counts for multiple *P.m. klamathensis* sites over a 5-year period, spanning 2005–2010 (there were no counts for most sites in 2008). In 2011, one new *P.m. klamathensis* site was located on Bureau of Reclamation Lands managed by BLM (Black 2012, pers. comm.). Although several of the *P.m. klamathensis* sites appear to be small in size (fewer than 20 individuals), only a handful of these sites had counts on more than a single day in a year, and even in these few cases there were never more than 2 days of counts in any single year (Black *et al*. 2010, Appendix 1). Furthermore, the dates for these counts range quite widely from one year to the next, from early or mid-June through the first week of July, so whether these counts occurred within the peak flight period is unclear. For example, as described above for Grapefern Meadow in Washington, the only site where we have data from mardon skipper counts over the entire adult flight period, the numbers of skippers counted on any single day ranged anywhere from 0 to 345 over a 10-day period (Beyer and Black 2007, p. 8). This high variability in potential counts shows why single-day counts are not a credible means of determining population abundance or trend. Of the known sites for the subspecies, most have had relatively few individuals counted on any single day over the period 2005 through 2010, but it is not known whether the observed numbers may represent an

increase or decrease over historical levels. One site, Pumpchance 125 Meadow, has generally had relatively high numbers of *P.m. klamathensis* over 5 years of single-day counts (up to 304 individuals counted in 2009); historical abundance of mardon skippers is not known at this site. On the other hand, the three sites that make up the Hobart Peak complex, the one site where historical abundance information is available, appear to have lower numbers of *P. m. klamathensis* than observed in the past (Black *et al*. 2010, Appendix 1). In general, however, based on the lack of historical abundance information and the uncertainty accompanying individual day counts, we are unable to determine population trends for *P.m. klamathensis*.

Recent monitoring at Coon Mountain in California found lower numbers of mardon skippers in areas treated with prescribed burning compared to unburned areas in 2008. Three years after the burn event, mardon skipper numbers were still lower in burned areas than in unburned areas, but the overall population at this site appears to be stable (Black *et al.* 2011, p. 13). Monitoring efforts at other sites in California have been inconsistent, but the limited data for the historical sites at High Divide Ridge indicate this population is potentially stable within the limited suitable habitat areas present at these sites.

Mardon skippers can be locally abundant where the species is present (Pyle 1989, p. 28) with day counts of greater than 100 individuals documented at several sites across the species' geographic range (Black *et al.* 2010, pp. 70–71; St. Hilaire *et al.* 2010, pp. 10–12; Black *et al.* 2011, p. 13). Conversely, populations at many locations within the

species' range are apparently persisting at very low levels with consistent peak counts of fewer than 20 individuals.

Documented extirpations occurred at five Puget Prairies sites from 1985 through 1999, resulting in a local contraction of the species' range in that region (Potter *et al.* 1999, p. 6). Extirpation at one historical site in the Washington Cascades has been documented (Potter *et al.* 1999, p. 4), but there are at least three other extant populations in the vicinity of this historical site at the Conboy Lake National Wildlife Refuge, including a newly documented population in 2011 (USFWS unpublished data). Black *et al*. (2010, p. 7) state that some *Polites mardon klamathensis* sites in the Oregon Cascades may possibly be extirpated; however, they also stress that more monitoring is needed to confirm this supposition. No historical data is available at these sites prior to 2005, and many of these sites appear to have always had very low numbers of individuals according to single-day counts (Black *et al*. 2010, pp. 70–72). Black *et al*. (2010, p. 7) additionally note that there are cases where one individual mardon skipper may have been found in past years but not in subsequent surveys, but such instances may represent errant findings and are not indicative of sites or popultions that have become extirpated.

With the apparent exception of a few *Polites mardon klamathensis* populations where more monitoring is needed, and a few higher-elevation *P. m. mardon* sites in the Washington Cascades, most mardon skipper populations now appear to be stable across the species' range.

Habitat

Mardon skippers are grass skippers in the subfamily Hesperiinae, meaning the larvae feed strictly on graminoids (grasses and sedges) (Scott 1986, p. 424). The mardon skipper's habitat requirements include food resources for adults (flower nectar), larval host plants (grasses and sedges), and site-specific environmental and structural conditions that support successful reproduction and survival. This includes patches of early-seral open grassland habitat that are dominated by short-statured grasses or sedges and forbs that are generally free of overstory trees and shrubs. Mardon skippers generally avoid areas with tall grasses, shrubs, or trees (Henry 2010, p. 44). Grassland patches that are as small as 0.5 ac [0.2 ha] are capable of supporting small populations of mardon skippers. However, most areas that support populations of mardon skippers consist of mixed forest-grassland complexes that support multiple occupied "sites" with some connectivity between habitat patches for successful dispersal and movement of individuals among sites.

The species' larval development is prolonged, lasting for 3 months or more prior to diapause (Newcomer 1966a, p. 246; Henry 2010, p. 5). During this time the larvae require succulent grasses for successful development. Occupied sites retain sufficient moisture to maintain host plant palatability (green leaves) for larval development (Beyer and Black 2007, p. 18; Kerwin 2011, p. 21). Meadows that are too wet or too dry do not support mardon skippers. Site conditions and host plants selected by mardon skippers vary across sites, indicating the species is capable of using multiple graminoids as larval

food (Beyer and Schultz 2010, p. 867). Although mardon skippers are not selective for a specific grass species, they do exhibit host plant specificity within some localities (Beyer and Schultz 2010, p. 869; Henry 2010, p. 15).

South Puget Sound Prairies

In the south Puget Sound region of Washington, mardon skippers are found in low-elevation (200–300 ft [60–90 m]), glacial outwash grasslands (prairies) with abundant *Festuca roemeri* (Roemer's fescue) interspersed with *Viola adunca* (early blue violet) (Potter *et al.* 1999, p. 5). Occupied prairies range in size from 300 to greater than 1,000 ac [120 to more than 400 ha]. Mardon skippers oviposit (lay eggs) on Roemer's fescue almost exclusively at Puget prairie sites, indicating a very strong association with this grass species (Henry 2010, p. 13). Roemer's fescue is a perennial bunchgrass native to the Pacific Northwest. Although Roemer's fescue accounted for 50 percent of the total grass cover at the sampled locations, mardon skippers selected this species in 86 out of 88 observed ovipositions (Henry 2010, p. 13.). In addition to the presence of the host plants, the structure of the surrounding plant community is also important for oviposition selection (Henry 2010, p. 16). Mardon skippers selected small, green (live) fescue tufts in areas with at least 50 percent open moss cover on the surrounding ground (Henry 2010, p. 16). Mardon skippers avoid areas that are heavily invaded with *Arrhenatherum elatius* (tall oatgrass) and *Cytisus scoparius* (Scot's broom) (Henry 2010, p. 44). The oviposition habitat requirements of mardon skippers in Puget prairies are distinct from those of populations in the southern Washington Cascades (Henry 2010, p. 19).

At Puget prairie sites, early blue violet and *Vicia sativa* (common vetch) are strongly preferred as nectar sources, and Scot's broom is strongly avoided (Hays *et al.* 2000, p. 14). Nectaring was also observed on *Camassia quamash* (common camas), *Lomatium utriculatum* (fine-leaved desert parsley), *Teesdalia nudicaulis* (barestem teesdalia), and *Ranunculus occidentalis* (western buttercup) (Hays *et al.* 2000, p. 24).

Southern Washington Cascades

In the southern Washington Cascades, the mardon skipper is found in open grasslands and small montane meadows within *Abies grandis* (Grand fir), *Psuedotsuga menziesii* (Douglas-fir), or *Pinus contorta* (lodgepole pine)/mixed-conifer woodlands at mid to high elevations (1,800 to 5,600 ft [549 to 1,707 m]) (Potter *et al.* 2002, p. 12). Occupied sites in the Washington Cascades vary in size from small (0.5 ac [0.2 ha]) meadows to large forest/meadow complexes encompassing hundreds of acres. Site conditions range from relatively dry, ridgetop meadows to small montane meadows associated with wetlands, springs, or riparian habitat (Potter *et al.* 2002, p. 13). Wetland areas that are perennially submerged do not support mardon skippers, but the species is often found in dry transitional zones along the margins of wetlands. Water features such as small streams or wetlands are common at many Washington Cascades sites (Kerwin 2011, p. 20). Alpine meadows (more than approximately 6,000 ft [1,829 m] elevation) apparently do not support this species, perhaps due to the relatively short season these areas are free from snow cover. Sites with grassland vegetation, including grassy forest

openings, roadside meadows, and young, grass-dominated tree plantations support mardon skipper populations (Potter *et al.* 2002, pp. 12–13).

In the Washington Cascades, oviposition has been documented on 23 different graminoid species (Beyer and Schultz 2010, p. 866). However, this analysis indicated that mardon skippers are selective for certain grass species within different meadows. The most frequently used oviposition plants include *Festuca idahoensis* (Idaho fescue), *Poa pratensis* (Kentucky bluegrass), *Danthonia intermedia* (timber oatgrass), *Carex inops* (long-stolen sedge), and *Festuca rubra* (red fescue) (Beyer and Schultz 2010, p. 866). *Danthonia unispecta* (one-spiked oatgrass) appears to be an important grass species at sites on the Wenatchee National Forest. Females have been observed ovipositing on this species (Jepsen *et al.* 2008, p. 3), and higher densities of adult butterflies are commonly associated with patches of *D. unispecta* (St. Hilaire *et al.* 2009, p. 7). The variety of identified oviposition plants suggests that females may not always oviposit on specific host plants, but within a community of possible species that can be used by the larvae (Beyer and Black 2007, p. 5). These findings are significantly different from the observations at Puget prairies sites, which indicated mardon skippers were strongly associated with a single grass species (Henry 2010, p. 19).

Due to the range of plant communities present at Washington Cascades sites, there were no common habitat features across all study sites other than the presence of short-statured grasses and sedges (Beyer and Schultz 2010, pp. 869–870). Mardon skippers selected for larger graminoids with greater total cover and less bare ground

selection was also negatively influenced by the presence of trees, indicating a preference for selecting oviposition sites away from trees and forest edges (Beyer and Schultz, p. 869). Studies of mardon skipper densities within individual meadows also demonstrated that mardon skippers are patchily distributed within occupied sites, with the highest densities tending to occur near the center of a meadow away from forested edges (Beyer and Black 2007, p. 18).

In the Washington Cascades, adults have most frequently been observed nectaring on vetch, *Fragaria* spp. (strawberry), and *Trifolium* spp. (clover) (Beyer and Black 2007, p. 15). *Erysimum asperum* (wallflower), *Erigeron peregrinus* (fleabane), *Calochortus* spp. (sego lily), and *Achillea millefolium* (yarrow) are also reported as nectar sources from this region (Beyer and Black 2007, p. 15; Potter and Fleckenstein 2001, p. 6).

Southern Oregon Cascades

Populations of *Polites mardon klamathensis* in southern Oregon occupy small (0.5 to10 ac [0.25 to 4 ha]), high-elevation (4,500 to 5,100 ft [1,372 to 1,555 m]) grassy meadows within mixed-conifer forests that are associated with an ephemeral or permanent water source such as a stream or wetland (Black *et al.* 2010, pp. 6–7). As seen at many sites in Washington, mardon skippers in the Oregon Cascades are typically found along the margins of forest wetlands in the narrow transitional zone along the edge of a water feature and the adjacent dry uplands (Kerwin 2011, p. 21).

Occupied sites are dominated by short-statured grass/sedge communities. In the Oregon Cascades, the most common oviposition plant was *Danthonia californica* (California oatgrass) (Beyer and Black 2007, p. 6). Other species selected for oviposition were red fescue, Roemer's fescue, Kentucky bluegrass, *Deschampsia cespitosa* (tufted hairgrass), and *Carex* spp. (sedges) (Beyer and Black 2007, p. 6). The primary nectar plants being utilized are *Potentilla diversifolia* (diverse-leaved cinquefoil), *Wyethia angustifolia* (narrow-leaved mule's ears), *Penstemon procerus* (small-flowered penstemon), and *Plectritis congesta* (sea blush) (Beyer and Black 2007, p. 16).

Coastal Northwest California/Southwest Oregon

The coastal populations of *Polites mardon mardon* are found in small meadows (0.5–5 ac [0.2–2 ha]) dominated by Idaho fescue in sparse *Pinus jeffreyi* (Jeffrey pine) forests in extreme northwestern California and southwestern Oregon. Sites are located in coastal hills approximately 7 to 15 miles (11 to 24 km) inland from the Pacific coast, at elevations ranging from approximately 1,500 to 3,000 ft (427 to 854 m). These sites are within the coastal fog belt (Mattoon *et al.* 1998, p. 771). Meadow habitats at these sites are associated with the western extent of serpentine-based soils in the region (Imper 2003, p. 4), and are more mesic (moist) than typical serpentine grasslands found in northwestern California (Imper 2003, p. 4). Ross (2010, p. 1) notes that the coastal Oregon mardon skipper sites are associated with serpentine-based soils supporting moist-to-dry transitional meadow habitats with abundant bunchgrasses.

The most detailed description of vegetation for sites in this area is for the High Divide Ridge sites (Imper 2003, pp. 4–5). Both Idaho fescue and California oatgrass are common at these sites (Imper 2003, p. 5) and are likely used as host plants for oviposition and larval food. No oviposition or habitat selection studies have been completed for these populations, but Runquist (2004b, p. 2) observed females ovipositing on *Festuca* spp. at High Divide sites. The most commonly selected nectar plants at California sites are *Phlox diffusa* (spreading phlox) and *Viola adunca* (early blue violet; Arnold 2006, pp. 6–7). Detailed observations of mardon skipper behavior including oviposition, plant selection, and adult nectar species have not been reported for the coastal Oregon sites. Ross (2008, p. 9) noted observing mardon skippers nectaring on *Viola* spp. and *Calochortus* spp. at a coastal Oregon site.

Biology

Mardon skippers are univoltine, completing one life cycle annually (i.e., egg–larva–pupa–adult). Adults typically emerge between May and July, depending upon location and elevation of the site, with adults in higher elevation sites emerging later. Adults do not all emerge on the same date, so flight period duration at any given site depends in part on the number of skippers present. In 2007, at one Washington site, Beyer and Black (2007, p. 8) note that adult emergence went from 0 adults on July 6 to 135 adults on July 9. In large populations the flight period may extend for over a month, while small populations may have adults present for only 10 or fewer days (Potter *et al.* 2002, p. 11). Within the same geographic area, emergence dates vary with elevation,

with emergence occurring earlier at lower elevations. Weather influences emergence and flight period duration. Wet or cold conditions delay emergence; conversely, warm, dry conditions promote earlier emergence, and both may affect the duration of the adult flight period (Potter *et al.* 2002, p. 11).

Mark-recapture experiments indicate adults can live up to 3 weeks (Runquist 2004a, p. 5), but most adults live only 7 to 9 days (Scott 1986, p. 25). During their brief life as adult butterflies, mardon skippers feed on flower nectar, mate, and lay eggs on grasses or sedges (see Habitat Requirements for details). As with many butterfly species, males are often observed "puddling" or congregating on wet soils (Scott 1986, p. 68). During periods of adverse weather, mardon skippers seek shelter low in the vegetation, under grass or forbs. Mardon skippers generally fly low to the ground, often hovering over low grasses and forbs, or darting from place to place with a fast skipping flight. Mardon skippers are non–migratory. Adults generally disperse distances of up to 0.25 mile (mi) (0.4 kilometers [km]) over relatively short periods, but there appears to be very little dispersal beyond their natal meadow complexes (Runquist 2004a, p. 5). On occasion, individual males have been detected up to 1 mi (1.6 km) away from their original location (Runquist 2004a, p. 5). Mardon skippers have not been observed flying through closed-canopy forest, but they have been observed along open corridors such as powerlines or roads with nectar sources (Potter and Fleckenstein 2001, p. 6).

After mating, females deposit their eggs (oviposit) singly into tufts of low-growing grasses or sedges (host plants) (James and Nunnalle 2011, p. 388). The total

number of eggs laid in the wild is unknown, but Newcomer (1966a, p. 243) observed about 25 eggs per female for captive *Polites,* and James and Nunnallee (2011, p. 388) note that two captive females produced 21 eggs total. Eggs hatch in 7 to 10 days (Newcomer 1966a, p. 244; Henry 2010, p. 5). After hatching, the larvae feed on host grasses or sedges throughout the summer and into the fall months (Beyer and Black 2007, p. 19, Henry 2010, p. 14). Larvae use silk to construct a grass "nest" and emerge from this shelter to feed on the tender edges or leaf tips of host grasses (James and Nunallee 2011, p. 388). These nests are tube-like structures up to 0.78 inches (in) (2 centimeters [cm]) long that are oriented either vertically or horizontally at the base of the host plant (Beyer and Black 2007, p. 17). It does not appear that the larvae disperse away from the oviposit location (Beyer and Black 2007, p. 17). Henry (2010, p. 14) found six larvae at a Puget prairie site in September 2009, confirming that larvae feed on the same plants that the females had selected during oviposition (Henry 2010, p. 14). There are five instars (stages) of larval development, followed by the formation of a pupa and emergence as an adult butterfly (James and Nunallee 2011, p. 388).

Captive-rearing efforts suggest that mardon skipper larvae overwinter as pupae (Newcomer 1966a, p. 246; James and Nunalle 2011, p. 388), but field observations indicate that the larvae overwinter in diapause, and feed again in the spring before pupating (Henry 2009, p. 2; Henry 2010, p. 5). Beyer and Black (2007, p. 19) found larvae present at a Washington Cascades site as late as October 21, and Henry (2009, p. 2) found larvae at a Puget prairie site in November and February. This aspect of mardon skipper life history is not well understood. Some captive-reared larvae developed

quickly, forming a pupa and eclosing (emerging) as adults in the fall (which is not known to occur in the wild), while other captive-reared larvae overwintered as pupa (James and Nunallee 2011, p. 388). Other *Polites* species have been recorded as overwintering as larvae (*P. mystic*), pupae (*P. sabuleti*), or both (*P. peckius*) (Scott, 1986, pp. 443–445).

Conservation Measures

When the mardon skipper was first identified as a Federal candidate for listing in 1999 (64 FR 57539; October 25, 1999), the species was known from approximately 14 extant sites located in 4 distinct geographic areas—south Puget Sound prairies, the southern Washington Cascades, the southern Oregon Cascades, and northwestern California (Potter *et al.* 1999, p. 5). At that time, the species was not afforded any special status or protections from existing regulatory mechanisms (Potter *et al.* 1999, p. 15). However, the subsequent designation of the mardon skipper as a State-listed endangered species in Washington and as a Federal candidate species has raised awareness of the need for the species' conservation. The species is now designated as a Sensitive Species or Special Status Species on Federal lands within its range (discussed below), and State natural resource agencies have identified mardon skippers as a priority species for conservation.

State Laws and Conservation Plans

The mardon skipper is listed as an endangered species in the State of Washington by the Washington Fish and Wildlife Commission (Washington Administrative Codes

232-12-014, Endangered Species; 232-12-011, Threatened Species, Appendix D). The Washington Department of Fish and Wildlife (WDFW) has prepared a Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005). The CWCS identifies the mardon skipper as a "species of greatest conservation need" and identifies specific conservation actions for the species, including the protection of known sites and potential habitats and the investigation of limiting factors, and identifies development of a recovery plan for the species as a priority (WDFW 2005, p. 326). The conservation plan provides recommended management actions that have contributed to the amelioration of threats to the mardon skipper where they are found on State lands. Ongoing management for mardon skipper habitat on State lands in the Puget Prairie region is occurring through partnerships between the Department of Defense, The Nature Conservancy (now Center for Natural Lands Management), Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife Service among others. These treatments have been effective for restoring or maintaining mardon skipper habitat at managed sites. Mardon skippers have been documented using many areas that were previously unsuitable due to the presence of invasive weeds after the habitat was restored with herbicides to eliminate tall oat grass, followed by management (mowing, pulling) to control Scot's broom (Hays 2008, pp 1–2).

There are also a number of small Prairie sites in the region that are currently in protected status and are actively being managed to maintain butterfly habitats that may serve as potential future reintroduction sites for mardon skippers (Anderson 2008, p. 2, Henry 2010, pp.3-4). Beginning in 2007, the Fort Lewis Army Compatible Use Buffer (ACUB) initiative has supported the convening of a cooperative, interdisciplinary and

interagency Butterfly Habitat Enhancement Team to develop and implement habitat improvements for mardon skipper and other rare butterflies on formerly occupied sites off of the Fort Lewis reservation (Anderson 2008, p. 1). This interagency team is a source of funding for mardon skipper habitat management, population assessments, and mardon skipper life history research at Puget prairie sites. These projects continue to maintain habitat and mardon skipper populations at the Scatter Creek Wildlife Area through prescribed fire, direct seeding of native species, mowing, and herbicide control of Scotch broom *(Cytisus scoparius*) and exotic grasses and forbs (WDFW 2011, p.79). The ongoing management to maintain mardon skipper populations and habitat at Puget prairie sites afford the species a high level of protection against further losses of habitat or populations.

Oregon has a State Endangered Species Act, but the law does not cover invertebrate species. The Oregon Department of Fish and Wildlife (ODFW) has prepared a Comprehensive Conservation Strategy (ODFW 2006). The strategy identifies the mardon skipper as a "strategy species." Strategy species are found in low numbers at few locations and are considered to be at-risk species. The plan targets conservation actions for the most at-risk species. The strategy generally identifies special habitat needs, limiting factors, and data gaps for the mardon skipper (ODFW 2006, p. 351).

California has a State Endangered Species Act, but the law does not apply to insects. The State Comprehensive Wildlife Action Plan (CDFG 2006) does not specifically address the conservation needs of the mardon skipper, but the plan

emphasizes conservation of invertebrate species listed on the State "special animal" list.

Special Status Species Policies on National Forest and BLM Lands

The mardon skipper is listed as a Sensitive Species by the U.S. Forest Service in Washington and Oregon (Forest Service Region 6), and in California (Forest Service Region 5), and as a Special Status Species by the Bureau of Land Management (BLM) in Oregon and Washington. For Oregon and Washington BLM-administered lands, Special Status Species policy (BLM 6840) details the need to conserve those species and the ecosystems on which they depend. Conservation is defined as the use of all methods and procedures which are necessary to improve the condition of Special Status Species and their habitats to a point where their Special Status recognition is no longer warranted. Policy objectives also state that actions authorized or approved by the BLM do not contribute to the need to list Special Status Species under the Endangered Species Act (Interagency Special Status/Sensitive Species Program [ISSSSP] 2011, entire).

On National Forest lands, Sensitive Species are defined as those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density and habitat capability that would reduce a species' existing distribution (Forest Service Manual [FSM] 2670.5). Management of Sensitive Species "must not result in a loss of species viability or create significant trends toward federal listing" (FSM 2670.32). The Regional Forester is responsible for identifying Sensitive Species and is

directed by policy to coordinate with Federal and State agencies and other sources, as appropriate, in order to focus conservation management strategies and to avert the need for Federal or State listing as a result of National Forest management activities (ISSSSP 2011, entire).

The Pacific Northwest Regional Office of the Forest Service and Oregon/Washington State Office of the BLM established the Interagency Special Status/Sensitive Species Program (ISSSSP) to facilitate the conservation and management of rare species on Federal lands. This interagency collaboration focuses on regional-level conservation approaches for Sensitive and Special Status Species lists (ISSSSP 2011, entire).

With dedicated funding from the ISSSSP, the Forest Service/BLM have:

(1) Formed the inter agency Mardon Skipper Work Group, which meets semi annually to share information and ideas and to plan future conservation work for mardon skippers;

(2) Developed a mardon skipper survey protocol (Seitz *et al.* 2007, entire);

(3) Funded multiple seasons of mardon skipper surveys across Forest Service, BLM, and other lands in Oregon and Washington;

(4) Funded an oviposition habitat study in cooperation with the Xerces Society and Washington State University to determine plants that mardon skippers choose for egg laying and larval hosts (Beyer 2009, entire);

(5) Contracted with the Xerces Society to develop site-specific management plans

for all mardon skipper sites on BLM lands in the southern Oregon Cascades (Black *et al.* 2010, entire);

(6) Completed a Conservation Assessment for the mardon skipper in 2007 (Kerwin and Huff 2007, entire); and

(7) Revised and updated the Conservation Assessment in 2011 (Kerwin 2011, entire).

Additional site-management plans are currently under development in 2012 with dedicated funding from the ISSSSP for Forest Service mardon skipper sites on the Wenatchee, Gifford Pinchot, and Rogue River–Siskiyou National Forests, as well as additional sites on the Coos Bay BLM District.

The Forest Service/BLM Conservation Assessment is a comprehensive review of the mardon skipper's status, threats, and conservation needs, and provides specific management guidance and recommendations for protecting and maintaining the species' habitat on Federal lands (Kerwin 2011, pp. 30–35). The management considerations in the Conservation Assessment provide general guidance to Forest Service/BLM administrative units for managing mardon skipper sites and addressing potential threats such as conifer encroachment, invasive weeds, livestock grazing, and off-road vehicles (Kerwin 2011, pp. 31–33). The listing of the mardon skipper as a Forest Service Sensitive/BLM Special Status species ensures that the species is considered and addressed during the planning and implementation of Forest Service and BLM land management activities. The Sensitive/Special Species status has resulted in direct protection or restoration of mardon skipper habitat at many sites on Federal lands across

the species range. Examples include conifer removal projects and placement of boulders to block off-road vehicle access (Kogut 2008, pp. 4–9), building grazing exclosures to exclude cattle from mardon skipper habitat (e.g., USFS 2003, p. 185); or eliminating grazing impacts by closing grazing allotments or reducing use (e.g., BLM 2008, p. 6). In California, both the Forest Service and the National Park Service have included mardon skipper habitat protections in the planning and implementation of prescribed burn projects (e.g., Black *et al.* 2011, p. 3; NPS 2010, pp. 26–27).

In summary, the majority of the known occurrences of the mardon skipper throughout its range are located on Federal or State lands where the species is assured a high level of protection through existing regulations or conservation management associated with special status species programs. Federal and State agencies have been proactive in implementing effective conservation measures for the mardon skipper throughout its range. These protective measures are currently in place and are not dependent upon the species being listed under the Act.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations (50 CFR 424) set forth procedures for adding species to, removing species from, or reclassifying species on the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, a species may be determined to be an endangered or threatened species based on any of the following five factors:

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

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

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

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

In making this finding, information pertaining to the mardon skipper in relation to the five factors provided in section 4(a)(1) of the Act is discussed below. In considering what factors might constitute threats, we must look beyond the mere exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species warrants listing as a threatened or endangered species as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. The mere identification of factors that could impact a species negatively is not sufficient to compel a finding that listing is appropriate; we require evidence that these factors are operative threats that act on the species to the point that the species meets the definition of a threatened or

endangered species under the Act.

In making our 12-month finding on the petition, we considered and evaluated the best available scientific and commercial information. Here we evaluate the factors affecting the petitioned species *Polites mardon*. In addition, the Service has elected, at our own discretion, to additionally evaluate the two subspecies *Polites mardon mardon* and *Polites mardon klamathensis*. For the sake of brevity, we analyze the subspecies separately from the species rangewide only in those cases where the factors affecting the subspecies are unique, or where potential threats to the subspecies differ in severity or scope of impact from those affecting the species in the remainder of its range. The evaluation of the five factors, below, should thus be interpreted as applying equally to the species as a whole as well as to its constituent subspecies, unless indicated otherwise.

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

Pyle (1989, p. 28) characterized threats to the mardon skipper as any factor that degrades its obligate grassland habitats, including development or land conversion, overgrazing, the use of herbicides and pesticides, encroachment by native and invasive nonnative vegetation, and succession from grassland to forest. In addition to the threats listed above, Black and others (2010, p. 12) identify climate change, stochastic weather events, and small, isolated populations as threats for *Polites mardon klamathensis*. Here we discuss the potential threats associated with habitat loss or degradation; the additional

threats identified by Black *et al*. (2010, p. 12) are discussed under Factor E, below.

Habitat Loss Associated with Land Conversion

Prairies, which historically covered over 145,000 ac (60,000 ha) of the south Puget Sound region, have largely been lost over the past 150 years (Crawford and Hall 1997, p. 11). The primary causes of historical prairie habitat loss in the region are attributed to the conversion of prairie habitat to urban development and agricultural uses (over 60 percent of losses), and succession to Douglas-fir forest (32 percent) (Crawford and Hall 1997, p. 11). Today approximately 8 percent of the original prairies in the south Puget Sound area remain, but only about 3 percent contain native prairie vegetation (Crawford and Hall 1997, p. 11). Today approximately 8 percent of the original prairies in the south Puget Sound area remain, but only about 3 percent contain native prairie vegetation.

Puget prairie sites with extant populations of mardon skippers are protected from further development through either State or Federal ownership. Habitats at these sites have been degraded by invasive species and competing uses such as recreation or military training (Schultz *et al.* 2011, pp. 370–371), but these threats are now being addressed through active management, as referenced above under "Conservation Measures" and as discussed further below.

Remaining prairie habitats in the south Puget Sound region are relatively small,

isolated patches with little potential connectivity between patches (Schultz *et al.* 2011, p. 371). Because of this, historical prairie sites where mardon skippers have been extirpated are unlikely to be re colonized naturally due to isolation from extant populations (Schultz *et al*. 2011, p. 371). However, there are a number of small prairie sites in the region that are currently in protected status and are actively managed to maintain butterfly habitats that may serve as potential future reintroduction sites for mardon skippers (Anderson 2008, p. 2; Henry 2010, pp. 3–4).

In other portions of the mardon skipper's range, outside of the south Puget prairie region, habitat loss due to urban development or land conversion has not been a significant threat due to their locations primarily on Federal or Tribal lands, in remote areas that have historically been managed for grazing, timber production, or recreation. There have been minor historical losses of mardon skipper habitat from the placement of roads, trails, or buildings in occupied meadow sites (Potter *et al.* 1999, p. 12), but these losses have not been quantified and are relatively small. There are no reported examples of recent habitat loss from new road construction or developments in mardon skipper habitats on Federal lands. Because of the protections the mardon skipper receives as a Federal special status/sensitive species (described above under "**Conservation Measures**") the threat of additional habitat loss due to land conversion on Forest Service or BLM lands is very low. Twelve out of the 165 sites known for mardon skipper are found on private lands; the potential for future development at these privately owned sites is unknown. However, most of these sites on private lands are located near other extant populations on neighboring Federal lands, indicating that private lands sites are likely

subpopulations of these larger populations on Federal lands. It is therefore unlikely that any of the few mardon skipper sites on private lands support source populations of the species.

Summary: The historical loss of native prairie habitats to urban development and agriculture in the south Puget Sound region has likely resulted in a contraction of the species' distribution within that portion of the species' range. However, Puget prairie sites currently occupied by mardon skippers are protected from further loss due to development by State or Federal ownership. Land conversion for roads and other uses has historically resulted in only minor losses of mardon skipper habitat on Federal lands in all other portions of the species' range. Additional habitat losses due to land conversion or development on Federal lands that support populations of *Polites mardon mardon* and *Polite mardon klamathensis* are not anticipated. Very few of the known mardon skipper sites are found on private lands, and most of these sites are believed to be subpopulations of larger populations found on Federal lands that are protected from converstion or development. Therefore, continued habitat loss due to land conversion is not a significant threat to the mardon skipper at the species or subspecies levels.

Habitat Loss and Fragmentation Associated with Forest Succession

Throughout the Pacific Northwest the invasion of meadow or grassland habitats by conifers represents a recent and widespread phenomenon potentially triggered by changes in climate, the cessation of intensive grazing, and wildfire suppression (Haugo

and Halpern 2007, pp. 285–286). In Redwood National Park in California, meadow habitats have declined due to forest encroachment over the past century (NPS 2010, pp. 44–45). At Joint Base Lewis-McChord in Washington, approximately 39 percent (over 16,200 ac [6,560 ha]) of the original prairie habitat has transitioned to Douglas-fir forest, and only a fraction of the original prairie habitat remains as small, isolated prairies (Tveten 1997, p. 124)

The loss of meadow habitats in the Cascades is also well documented. At one study site in the Oregon Cascades, the area associated with mesic meadows declined from 328 ac (133 ha) to 163 ac (66 ha) during the period from 1946 to 2000 (Takaoka and Swanson 2008, p. 521). This represents a loss of approximately 50 percent of the mesic meadow habitat over a period of 54 years. Most xeric (dry) meadows were fairly stable over the study period, indicating that patterns of forest succession in montane meadows are complex and that diverse factors influence these processes (Takaoka and Swanson 2008, p. 521). The contraction of mesic meadow habitats was strongly associated with a lack of fire disturbance over the past half century (Takaoka and Swanson 2008, p. 538).

Aerial photographs taken on the Gifford Pinchot National Forest in the southern Washington Cascades indicate that the mardon skipper sites located within a historical (1918–1919) burn area were larger with much greater potential for connectivity between sites than exists today (Foster 2010, p. 3). Forest succession over the past 60 years has reduced the meadow habitats in this landscape to a few isolated patches ranging in size from 2 to 8 ac (0.8 to 3.2 ha) (Foster 2010, p. 2).

The loss of meadow habitats from forest succession not only reduces the amount of suitable grassland habitat available for mardon skippers, it also closes off potential dispersal corridors between meadows, potentially resulting in remnant, isolated populations (Beyer and Schultz 2010, p. 870). In addition to natural meadow habitats, many mardon skipper sites in the Washington Cascades are located in areas that were clearcut for timber harvest in 1960s through 1980s (Price and Mendez-Treneman 2000, p. 6; St. Hilaire *et al.* 2008, p. 5), and subsequently were colonized by mardon skippers. Open grass habitats in many of these old clearcuts are now rapidly declining. Because the mardon skipper requires early seral habitats, conifer encroachment is a potential threat at all mardon skipper sites located on National Forest or BLM lands in Washington, Oregon, and California. However, actual habitat degradation as a result of this threat is ranked as high at only a few mardon skipper sites, primarily on the Wenatchee National Forest, and a few in the range of *P.m. klamathensis* (Kerwin 2011, pp. 49–60).

Land managers across the range of the mardon skipper recognize conifer encroachment as impacting meadow habitats, and many local districts have undertaken projects to reduce conifer encroachment at mardon skipper meadows. For example, Kerwin (2011, p. 31) notes the implementation of "considerable meadow restoration efforts for mardon skippers" on the Gifford-Pinchot National Forest. Examples of restoration activities range from hand-cutting and removal of small conifers on the Gifford Pinchot National Forest in Washington (Kogut 2008, pp. 4–7) to prescribed

burning projects on the Six Rivers National Forest in California (Black *et al.* 2011, p. 3). Some level of grazing is also recognized as a potential management tool for reducing conifer encroachment (Kerwin 2011, p. 27). Habitat management activities can be beneficial to the species, although site disturbance from these actions can result in negative impacts to mardon skipper populations if they are not carefully planned and implemented (Black 2011, p. 385).

Although conifer encroachment has the potential to negatively impact meadow habitats required by the mardon skipper, Federal land managers are actively managing sites to reduce conifer encroachment and maintain meadows to improve habitat for the mardon skipper throughout its range, as outlined in the management provisions in the revised Forest Service/BLM Conservation Assessment for the Mardon Skipper (Kerwin 2011, pp. 30–33), and in Management Plans for all Southern Oregon Cascades Mardon Skipper *(Polites mardon klamathensis)* Sites on BLM Lands (Black *et al.* 2010, pp. 15–17). Therefore, the impacts of conifer encroachment do not presently represent a threat to the mardon skipper across its range, and continued active management is expected to control this threat in the future.

Discussion Specific to *Polites mardon klamathensis*

Little information exists about vegetation change over time in the grasslands, shrublands, and woodlands of southwestern Oregon (Hosten *et al.* 2007b, p. 1). A comparison of historical and current photos shows a general loss of high-elevation

grassland to woody shrub and tree domination, and transition from shrubland and woodland to conifer domination (Hosten *et al.* 2007b, p. 31). The encroachment of shade-tolerant conifers into non-conifer vegetation, reduced reproduction by pine, and the loss of meadows support the generally accepted belief that fire suppression has negatively impacted historically open vegetation types in the southern Oregon Cascades (Hosten *et al.* 2007b, p. 1). Historical anecdotes also identify livestock grazing as playing a role in the depletion of native perennial bunchgrasses and subsequent invasion of woody species (Hosten *et al.* 2007b, p. 31).

The loss of open grassland habitats from conifer succession has the potential to impact populations of *Polites mardon klamathensis* through the gradual reduction and loss of suitable habitat patches and by closing off corridors between meadows, reducing the potential for successful dispersal to suitable habitat patches. Studies with other butterfly species have demonstrated that conifer encroachment reduces dispersal between populations and reduces gene flow, resulting in small, isolated populations with a greater risk of local extirpation (Roland and Matter 2007, p. 13702). Although identified as a potential threat at some sites, conifer encroachment within meadows is currently being addressed through management plans developed for *P.m. klamathensis* sites on BLM lands (Black *et al.* 2010, pp. 21–61). In 2011, the BLM staff at the Medford District implemented small conifer removal projects at most of the sites identified for this work, which has reduced the imminency of continued habitat loss within meadows (Mardon Skipper Work Group [MSWG] 2011, in litt.). Present management of these areas to reduce conifer encroachment and enhance meadow habitats appears to have ameliorated

this threat for *P.m. klamathensis*.

Summary: The potential loss of meadow habitats due to forest succession is a concern at most mardon skipper sites across the species' range. However, habitat loss due to succession is a gradual process that occurs on a scale of decades and can be checked with appropriate low-impact management methods, which is presently occurring at many key sites across the species' and subspecies' range. Because Federal managers have implemented actions to substantially ameliorate this threat, forest succession, while still affecting habitat, is no longer considered to be a threat to the mardon skipper at the species or subspecies levels.

Habitat Modifications Associated with Fire

Fire is an important source of disturbance that reduces conifer encroachment and maintains meadow and grassland habitats. Prescribed fire is a tool that is often used by land managers to maintain meadows or other fire-adapted habitats (e.g., NPS 2010, p. 4). Although mardon skippers occur in landscapes that have historically burned, mardon skipper populations may be vulnerable to local extirpation if a fire burns all of the occupied habitats at a population site (Black 2011, p. 384). The use of prescribed fire is implicated in the extirpation of mardon skippers from one historical Puget Prairie site in 1992 (Stinson 2005, p. 10).

In California, the Coon Mountain mardon skipper site on the Six Rivers National

Forest is being managed with prescribed fire to maintain the meadow habitat at the site and, consequently, mardon skipper habitat. Working in cooperation with the Xerces Society, the Forest Service modified their original plans to burn the entire site, and established four experimental burn plots with corresponding unburned areas. The experimental plots were burned in the fall of 2008 (Black *et al*. 2011, pp. 3–4). Monitoring at the site in 2009 indicated mardon skippers were 3–27 times more abundant in unburned areas compared to burned areas (Black 2011, p. 384). Continued monitoring at the site in 2010 and 2011 indicate that mardon skipper densities in unburned patches were consistently higher than in burned patches (Black *et al.* 2011, p. 14); however, mardon skippers are gradually recolonizing the burned patches from the adjacent unburned areas at the site as their preferred habitat increases (Black 2011, p. 384). Although peak counts of mardon skippers in subsequent years after the burn have not been as high as they were prior to burning in 2008, the authors note that the overall population appears to be stable, and is still considered the largest known population in California (Black *et al.* 2011, p. 13). As their preferred habitat increases at these sites, the mardon skipper population may expand into the burned areas and increase over time. Continued monitoring is needed to fully assess the population response at Coon Mountain.

A large wildfire burned over 8,000 ac (3,238 ha) at Mt. Adams in Washington in 2008, including burning the forest around at least one known mardon skipper site (Eureka Meadow). Although the fire burned the surrounding forest, the meadow itself did not burn (likely because it was still snow-covered at the time of the fire), and 135 mardon

skippers were counted at the site in 2010 (Wainwright 2010, p. 1). The Windy Valley site on the Rogue River-Siskiyou National Forest in southwestern Oregon is another example of a mardon skipper population surviving a recent wildfire event. Much of the forest around this meadow/wetland complex burned as part of the Biscuit Fire in 2002, but the site continues to support a large population of mardon skippers that was discovered in 2010 (Kerwin 2011, p. 51). Wildfires are likely to have beneficial effects for mardon skippers due to resultant increases in early seral habitat, although large wildfires also pose a risk to mardon skippers if all occupied habitat in a local area is burned. Because wildfires typically result in a mosaic of burned and unburned areas, it is unlikely that wildfires would result in the loss of multiple populations across large areas within the species' or subspecies' range.

Assessing whether wildfires or prescribed fire used to manage mardon skipper habitats poses a threat to the species is a complex undertaking. Fire disturbance is an integral process in natural ecosystems (Agee 1993, p. 3), and has certainly played a pivotal role in maintaining mardon skipper habitats. Conservation scientists as well as Federal land managers recognize that the habitat benefits gained from using prescribed fire to maintain mardon skipper habitat must balance the lethal effects fire can pose to mardon skippers (Black 2011, p. 384; Kerwin 2011, p. 33). The Coon Mountain experiment demonstrates that prescribed fire can be used to restore mardon skipper meadow habitat and maintain a population at the site, but the fire must be carefully managed so that only a portion of the occupied areas at a site is burned (Black 2011, p. 384).

Summary: Wildfires or prescribed fires that maintain and restore meadow habitats can be either beneficial or lethal to mardon skippers, depending on the timing and severity of the fire and the condition of the habitat. Fire is an important disturbance agent for maintaining the early-seral habitats mardon skippers require. Managers using fire to restore habitat can and have modified burn plans to meet both fire objectives and protect mardon skippers, which greatly reduces the potential threat associated with prescribed fires. Therefore, the use of prescribed fires for habitat management is not considered to be a threat to mardon skippers at either the species or subspecies level. Wildfires are also a potential threat on a local scale, but it is unlikely that wildfires would result in the loss of multiple populations across large areas within the species' or subspecies' range; therefore, we do not consider it to be a threat to mardon skippers at the species or subspecies level.

Habitat Loss Associated with Invasive, Nonnative Plants

The invasion and subsequent dominance of nonnative plant species in native grassland habitats is common and has occurred rapidly at several current and historical mardon skipper locations associated with Puget prairies (Potter *et al.* 1999, p. 10). Invasive grasses such as tall oatgrass and the invasive shrub Scot's broom drastically alter the short-grass/forb habitat structure that mardon skippers select for oviposition or nectaring sites (Hays *et al.* 2000, p. 28; Schultz *et al.* 2011, p. 371). Habitat utilization studies have demonstrated that mardon skippers actively avoid areas invaded by these

species (Hays *et al.* 2000, p. 28; Henry 2010, p. 44), but will recolonize sites where these invasive species have been removed (Hays *et al.* 2000, p. 16). Scot's broom and tall oatgrass are present at south Puget Sound prairie sites occupied by mardon skippers, but significant portions of these sites are managed annually to control these species (Hays 2010, p. 1). The Washington State Department of Natural Resources, for example, recommends restoration techniques including mowing, hand pulling, herbicide application, and prescribed burning to restore or maintain prairie habitats for the mardon skipper (Potter *et al*. 1999, p. 8) . Mardon skippers have been documented using many areas that were previously unsuitable due to the presence of invasive weeds after the habitat was restored with herbicides to eliminate tall oatgrass, followed by management (mowing, pulling) to control Scot's broom (Hays 2008, pp. 1–2).

Continued site management is required to maintain mardon skipper habitat and populations at south Puget prairie sites (Schultz *et al.* 2011, p. 375). Ongoing management for mardon skipper habitat is occurring through partnerships between the Department of Defense, The Nature Conservancy (now Center for Natural Lands Management), Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife Service among others. The prairie sites with extant populations of mardon skippers also support a number of other high-priority prairie species, including Taylor's checkerspot butterfly (*Euphydryas editha taylorii*), a candidate for listing under the Act (Stinson 2005, p. 6). Based on the importance of these sites for multiple prairie-associated species, we expect that State, Federal, and nongovernmental organizations will continue to place a high priority on

maintaining prairie habitats at these sites for the benefit of mardon skippers and other prairie species.

Not all mardon skipper sites have been evaluated for the presence of invasive, nonnative plants; however, the problem is increasingly common (Potter *et al.* 1999, p. 10). At least two sites (Cave Creek and Lost Meadows) on the Gifford Pinchot National Forest are being actively managed to reduce invasive *Cirsium arvense* (Canada thistle) which has formed dense patches and has been spreading throughout the mardon skipper habitat (Kogut 2008, p. 9). Managing for invasive species is required at a number of sites to maintain mardon skipper habitat, but, as with managing for conifer removal, the management must be carefully planned to avoid negative impacts to local butterfly populations (Schultz *et al.* 2011, p. 373). We expect that Federal land managers will continue to manage sites to control invasive weeds and will do so in a way that improves habitat for the mardon skipper, while minimizing impacts to local populations as outlined in the revised Forest Service/BLM Conservation Assessment for the Mardon Skipper (Kerwin 2011, pp. 30–33), and in site-specific plans such as those developed on the Gifford Pinchot National Forest (USFS 2008, p. 57).

Summary: Invasive nonnative plants have historically resulted in habitat loss and degradation at a number of mardon skipper sites, primarily in the Puget prairies. Federal, State, and private land managers have been actively managing invasive weeds at the most degraded sites to restore and maintain mardon skipper habitat, and are likely to continue to do so under their current management plans, which substantially reduces this potential

threat. Based on the ongoing partnership and commitment of private, State, and Federal entities to manage invasive nonnative plants and restore prairie habitats, the impact of invasive nonnative plants appears to have been sufficiently ameliorated throughout the range of the mardon skipper such that it does not pose a threat to the species or either subspecies.

Habitat Modifications Associated with Livestock Grazing

Current or historical livestock grazing has occurred at essentially all mardon skipper sites in the Washington and Oregon Cascades. Historically (1900–1930s), many areas in the Cascades were intensively grazed by sheep (Miller and Halpern 1998, p. 267), including several known mardon skipper sites on the Gifford Pinchot National Forest (USFS 2007a, p. 30; Foster 2010, p. 2). Sheep grazing was largely replaced by cattle grazing after the 1930s. Grazing allotments at Mt. Adams in Washington have been grazed for over 100 years (USFS 2007a, pp. 30–31).

Long-term grazing can alter both the structure and composition of plant communities, rendering them unsuitable to some butterfly species (Dana 1991, p. 54; Ellis 2003, p. 292), while benefiting other species, depending on the specific habitat requirements of each species (Kruess and Tshcharntke 2002, p. 1575; Poyry *et al.* 2005, p. 469; Vogel *et al.* 2007, pp. 81–82). Grazing can impact mardon skipper populations by (1) direct trampling of eggs, larvae, pupae, and adults (Potter *et al.* 1999, p. 13; Black *et al.* 2010, pp. 13–14); (2) removal of both larval and adult food sources, and (3)

disturbing the soil, which allows weeds to invade (Ellis 2003, pp. 292–293; Schtickzelle *et al.* 2007, p. 657). One grazing study found that both the abundance and recruitment of the bog fritillary butterfly (*Proclossiana eunomia*) were reduced by as much as 74 percent in grazed areas compared to ungrazed sites (Schtickzelle *et al.* 2007, p. 657). Dana (1991, p. 54) notes that both the Dakota skipper (*Hesperia dacotae*) and the ottoe skipper (*Hesperia ottoe*) apparently decline or can be extirpated in response to intensive grazing, likely due to changes in the composition and structure of the plant communities at intensively grazed sites.

Although intensive livestock grazing can be detrimental to many butterfly species, moderate to light grazing can be a useful method for halting succession and maintaining butterfly habitats where other habitat management methods are impractical (Schtickzelle *et al.* 2007, p. 658; Ellis 2003, p. 293). The silver-spotted skipper (*Hesperia comma*) is one species that has shown a positive response to moderate grazing, and depends on continued grazing to maintain the short-statured grassland habitats the species requires (Thomas and Jones 1993, p. 473).

The impact of cattle grazing to mardon skipper populations is likely relative to the timing, duration, and magnitude of the grazing at the site (Black *et al.* 2010, p. 13). Large mardon skipper populations are able to persist in some heavily grazed habitats. Conrad Meadows on the Wenatchee National Forest is subjected to native ungulate (deer and elk) grazing in the spring, and then intensive cattle grazing during the summer months. Conrad Meadows is a large system of interconnected meadows, wetlands, and

forested areas with complex vegetative structure and site conditions. The meadow complex supports the largest known population of mardon skippers, with minimum population counts of over 1,000 mardon skippers in some years (St. Hilaire *et al.* 2010, p. 11). Conrad Meadows has been in an active cattle grazing allotment for 80 years, and there continues to be a robust population of mardon skippers at this site (St. Hilaire *et al.* 2008, p. 15). Because the timing of the onset of livestock grazing tends to occur towards the end or after the adult flight period at Conrad Meadows, the grazing at this site may not affect mardon skipper populations to the same degree as sites that are grazed throughout the flight period (St. Hilaire *et al.* 2008, p. 14).

Ongoing monitoring at grazing exclosures (2007–2010) on the Wenatchee National Forest has shown no clear pattern between mardon skipper populations in grazed versus ungrazed areas (St. Hilaire *et al.* 2010, p. 7). The authors note that there are a number of confounding variables associated with this monitoring project and more research at these sites is recommended. Anecdotal observations within grazing exclosures indicate a much higher abundance and diversity of flowering forbs (adult nectar sources) compared to outside the exclosures (Jepsen *et al.* 2007, p. 17), but there appears to be no clear pattern in the number of mardon skippers within exclosures versus outside exclosures (St. Hilaire *et al.* 2010, p. 7). Mardon skipper densities at sites grazed by cattle on the Wenatchee National Forest are comparable or higher than densities observed at sites on the adjacent Gifford Pinchot National Forest that are subjected only to light native ungulate grazing.

Because mardon skippers have specific habitat requirements related to graminoid cover, composition, and structure (Beyer and Schultz 2010, pp. 867–868), it appears likely that intensive livestock grazing that occurs before or during the adult flight period would have a negative effect on mardon skipper reproductive success and larval survival due to the loss of adult nectar sources and larval host plants, and the introduction of nonnative grasses, forbs, or shrubs that do not meet the structural requirements of mardon skippers. The grasses most commonly used by mardon skippers for oviposition and larval food (e.g., Roemer's fescue, California oatgrass, Kentucky bluegrass (nonnative), and sedges) (Beyer and Black 2007, p. 6) are also some of the most preferred forage species used by cattle (Hosten *et al.* 2007, p. 20). These effects are likely to be most profound at sites where grazing impacts are intensified due to the presence of surface water or wet soils that attract livestock (Hosten and Whitridge 2007, p. 1), and the grazing use entirely overlaps the adult flight period (Black *et al.* 2010, p. 13). However, the removal of livestock from sites that have historically been grazed for decades does not automatically restore degraded habitats or improve mardon skipper populations.

There are a number of sites that are no longer in active grazing allotments that continue to have chronically low or declining populations of mardon skippers, most likely due to degraded habitat conditions associated with the plant community composition (Black *et al.* 2010, pp. 60–63; USFWS unpublished data). The short-grass/forb habitats preferred by mardon skippers can become quickly degraded in the absence of livestock grazing due to presence of tall-structured nonnative grasses and shrubs (Black *et al.* 2010, p. 61). The use of short-duration, low-intensity grazing may

prove to be beneficial or necessary for maintaining mardon skipper habitat in some situations (e.g., Black *et al.* 2010, p. 38).

Over the past 5 years, a number of grazing allotments on both Forest Service and BLM lands in both Oregon and Washington have been retired. Grazing allotments at most of the southern Oregon Cascades BLM mardon skipper sites for *Polites mardon klamathensis* were retired in 2009 (Black *et al*. 2011, pp. 14–15). A major grazing allotment (Ice Caves) on the Gifford Pinchot National Forest was discontinued in 2009, and was officially closed in 2011. On the Wenatchee National Forest, the Forest Service has installed a number of grazing exclosures to reduce grazing impacts and protect key mardon skipper habitat areas (St. Hilaire *et al.* 2010, p. 5). In general, grazing impacts on Federal lands are decreasing, with fewer animals being allowed onto grazing allotments, with shorter grazing periods, and placement of exclosures in key locations to protect sensitive habitats (e.g., USFS 2007b, p. 2). Active grazing allotments are still present at several mardon skipper sites within the range of the species, and continued monitoring is needed to assess the impact that grazing has on these populations. Under current management conditions, light to moderate grazing can be potentially beneficial in maintaining the habitat structure preferred by mardon skippers, and based on the most recent conservation assessment for the mardon skipper, intensive grazing does not appear to be a significant factor in habitat degradation for the species across its range (Kerwin 2011, Appendix A).

Summary: Cattle grazing can have either negative or beneficial effects to mardon skippers depending upon the timing, duration, and intensity of the grazing. Robust mardon skipper populations are able to persist in some heavily grazed habitats, while other areas that have been heavily grazed have generally poor habitat conditions and support only low numbers of mardon skippers. Grazing is likely to be beneficial for maintaining mardon skipper habitat at sites that are vegetated with tall-statured nonnative grasses and shrubs. Potential negative impacts from grazing on Federal lands have been substantially reduced due to the closure of a number of grazing allotments in key areas, as well as changes in management practices to reduce grazing intensity and protect key habitat areas. Therefore, livestock grazing does not represent a threat to the mardon skipper at the species level at this time, nor is it likely to be so in the future due to current management efforts. We have no information to indicate that it is a threat to the subspecies *Polites mardon mardon*.

Discussion specific to *Polites mardon klamathensis*:

Current or historical livestock grazing has occurred at all *Polites mardon klamathensis* sites in the Oregon Cascades for over 100 years (Hosten *et al.* 2007, p. 13), and habitat conditions at some sites have been excessively degraded by grazing (Black *et al.* 2010, pp. 22–23). Until recently all of the occupied sites were located in active grazing allotments. With the recent designation of the Cascades-Siskiyou National Monument (Monument) in 2000, the BLM initiated a review of grazing impacts on Federal lands within the Monument. This review determined that four grazing allotments

within the Monument failed to meet BLM standards for maintaining populations of threatened and endangered and other locally important species (BLM 2008, p. 6). The major reasons for not meeting this standard included the threat to special status species including the mardon skipper, the favoring of noxious weeds (e.g., Canada thistle at high elevations) over native plants; and the invasion of the nonnative *Poa bulbosa* (bulbous bluegrass) (BLM 2008, p. 6). Although overgrazing is considered to have had negative impacts on several *P.m. klamathensis* sites in the past (Black *et al.* 2010, p. 14), some of these sites have now been retired from grazing, and others are now being managed in accordance with a management plan developed by The Xerces Society for Invertebrate Conservation for all *P.m. klamathensis* sites on BLM lands in southern Oregon, including provisions specific to grazing, such as avoiding grazing during the flight period of adults and keeping grazing periods short and interspersed with long recovery period for the habitat (Black *et al*. 2010, entire).

In 2009, grazing allotments at 10 mardon skipper sites located on BLM lands within the Monument were retired (Black *et al.* 2010, pp. 14). The remaining sites on BLM lands that are still within active grazing allotments have existing or planned grazing exclosures to protect core mardon skipper habitat areas (Black *et al.* 2010, pp. 23–61). Four *Polites mardon klamathensis* sites located on the Rogue River–Siskiyou National Forest are in active grazing allotments, and Jepsen *et al.* (2007b, pp. 24–25) reported that grazing had degraded habitat at three of these sites. However, more recently Kerwin (2011, pp. 49–60) reviewed the *P.m.klamathensis* sites in his conservation assessment and found that none faced a serious threat from grazing (with exception of Hobart Peak,

where effects from grazing were considered "unknown"), and additionally noting that several of the grazed sites are in excellent condition. Remaining sites in active grazing allotments on Federal lands are expected to continue to exhibit reduced grazing impacts due to the placement of existing or planned grazing exclosures around core habitat areas (Black *et al.* 2010, pp. 23–61; Kerwin 2011, p. 32).

Summary: The threats from active livestock grazing have been substantially reduced from all Federal lands sites within the range of *Polites mardon klamathensis*. Planned or existing grazing exclosures are likely to protect core habitat areas at some key sites, but the effectiveness of grazing exclosures for maintaining mardon skipper habitat structure and populations remains unknown. We expect that mardon skipper habitat conditions within exclosures will generally improve with the removal of livestock grazing, but these areas will require monitoring and possible management actions to insure that invasive weeds or tall-statured nonnative grasses do not become a secondary threat in the absence of grazing, as recommended in the revised Forest Service/BLM Conservation Assessment for the Mardon Skipper (Kerwin 2011, pp. 30–33), and in Management Plans for all Southern Oregon Cascades Mardon Skipper *(Polites mardon klamathensis)* Sites on BLM Lands (Black *et al.* 2010, pp. 15–17). The potential negative impacts of grazing on Federal lands within the range of *P.m.klamathensis* have been substantially reduced due to the closure of a number of grazing allotments in key areas, as well as changes in management practices to reduce grazing intensity and protect key habitat areas. Therefore, we do not consider the effects of livestock grazing to be a threat to *P.m. klamathensis*.

Habitat Loss Associated with Off-Road Vehicles and Recreation

Recreational activities, including off-trail walking, off-trail horseback riding, and off-road vehicle use, may directly kill some mardon skippers by trampling and crushing larvae (Potter *et al.* 1999, p. 12). Off-road vehicle use has the greatest impact on mardon skipper habitat because vehicle tires can destroy native plants and disturb soils, leading to invasion by weeds. Small, roadside meadows are vulnerable to damage or destruction associated with off-road vehicle use. Currently, this threat applies to a few locations across the range of the species (Kerwin 2011, pp. 37–41). In 2008, a mardon skipper site located on private lands in Del Norte County, California, was partially destroyed when the site was used as a dump for logging slash and debris (Ross 2008a, p. 5; Devlin 2009, pers. comm.). At least one historical locale in the southern Washington Cascades was destroyed by this practice in 1997 or 1998 (Potter *et al.* 1999, p. 11). Military training activities at Joint Base Lewis-McChord have also resulted in damage to mardon skipper habitat (Potter *et al*. 1999, p. 12), but the majority of the prairie habitat at this site is protected from vehicle damage due to the presence of unexploded ordnance (Stinson 2005, p. 12). Over the past 10 years, Federal land managers have installed access barriers (e.g., placement of road-side boulders, gates, or exclosures) and posted educational signs in attempts to reduce illegal off-road vehicles and other recreational uses at almost all mardon skipper sites where these problems have been noted (Kogut 2008, p. 8). These measures have substantially reduced these threats on Federal lands, which constitutes the majority of the range occupied by the species. Therefore, habitat loss associated with off-

road vehicles and recreation is not a significant concern for the mardon skipper at the species level at this time, nor is it likely to become so. In addition, we have no information to indicate that it has a significant impact on the subspecies *Polites mardon mardon*.

Discussion specific to *Polites mardon klamathensis*:

Management plans developed for *Polites mardon klamathensis* sites on BLM lands identified off-road vehicle use and recreation (camping) within meadows as a potential threat at several sites (Black *et al.* 2010, pp. 21–61). In 2011, both BLM staff at Medford District and Forest Service staff on the Rogue River–Siskiyou National Forest implemented a number of projects to reduce these impacts at *P.m. klamathensis* sites through the strategic placement of boulders to block vehicle access, and by posting signs at most of the sites identified for this work (MSWG 2011, in litt.). These measures are expected to substantially reduce any potential impacts from off-road vehicles and other recreational uses.

Summary: Off-road vehicles and other recreational activities have historically resulted in minor habitat losses and degradation at a number of sites across the range of the mardon skipper. However, this threat has been substantially reduced on Federal lands where the majority of these activities occur through the placement of access barriers and signs. Because private lands comprise an insubstantial portion of the species' range, we do not consider any such activities on private lands, if they should occur, to pose a threat

to the mardon skipper. Therefore, habitat loss or degradation as a consequence of off-road vehicles and other recreational uses is not considered to be a threat at either the species or subspecies levels.

Summary of Factor A

In summary, the potential negative impacts to mardon skipper habitat associated with forest succession, fire, invasive nonnative plants, livestock grazing, and off-road vehicle use have been substantially reduced or eliminated on Federal and State lands through the development and implementation of conservation plans and habitat restoration projects. Habitat degradation associated with intensive livestock grazing continues to occur at a few sites, but grazing impacts have been substantially reduced or eliminated at many key sites across the species' range with recent closures of Federal grazing allotments and the implementation of site-specific conservation plans for the benefit of the mardon skipper. Habitat degradation from off-road vehicle use has been reduced or eliminated at many sites by installing vehicle barriers or closing roads. Meadow habitat restoration activities (prescribed burning, herbicide treatments) can be lethal to mardon skippers, but careful planning and implementation of habitat restoration projects designed with these concerns in mind have minimized the risks associated with these positive efforts for skipper conservation. Because the vast majority of mardon skipper sites are found on Federal or State lands, and most of the sites that are found on private lands are subpopulations of larger populations on Federal lands, we do not consider habitat degradation that may occur on private lands to pose a threat to the

mardon skipper. Based on these ongoing conservation actions on Federal and State lands, we do not consider Factor A, the present or threatened destruction, modification, or curtailment of its habitat or range, to pose a threat to the mardon skipper as a species now or in the future, nor do we have any information to indicate that it is a threat to either subspecies *Polites mardon mardon* or *Polites mardon klamathensis*, now or in the future.

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

Insect collecting is a valuable component of research, including systematics work, and is often necessary for documenting the existence of populations (Potter *et al.* 1999, p. 14). Rare butterflies, such as the mardon skipper, could be potentially desirable. Most mardon skipper populations are easily accessible and could be vulnerable to collectors (Potter *et al.* 1999, p.14). However, we currently have no information indicating that mardon skipper populations at either the species or subspecies level have been negatively affected by collection or scientific research activities (Kerwin 2011, p. 26), and therefore have determined that overutilization for commercial, recreational, scientific, or educational purposes is not a threat to the mardon skipper at the species or subspecies level now or in the future.

Factor C. Disease or Predation

Disease and predation are usually naturally occurring factors that may pose a

heightened threat to populations that are vulnerable due to other factors, but no specific examples are known for the mardon skipper. Predatory insects (ants, wasps, spiders, etc.) commonly prey on butterfly eggs, larvae, and pupae (Scott, 1986, p. 70), but no studies have specifically researched this aspect of mardon skipper ecology. At Puget Prairie sites, mardon skipper larvae were found only in the smallest tufts of bunchgrass, while potential larval predators (spiders, ants) were commonly observed in larger clumps of bunchgrass (Henry 2010, p. 18). The author suggests that larval survival rates from predation are likely influenced by the fine-scale structure of individual host plants and the density of vegetation surrounding host plants, but acknowledged that more research is needed to understand how these factors influence mardon skipper survival rates (Henry 2010, p. 18). We currently have no information indicating mardon skipper populations have been negatively affected by disease or predation outside the normal range of variability; therefore, we do not consider disease or predation to pose a threat to the mardon skipper at the species or subspecies levels.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

State Laws

The mardon skipper is listed as an endangered species in the State of Washington by the Washington Fish and Wildlife Commission (Washington Administrative Codes 232-12-014, Endangered Species; 232-12-011, Threatened Species, Appendix D). This designation provides protection from directly harming the species (e.g., collecting)

(Black *et al.* 2002, p. 19).

State regulatory mechanisms in the States of Oregon and California do not apply to the mardon skipper, as Oregon‘s State Endangered Species Act does not cover invertebrate species, and California’s State Endangered Species Act does not apply to insects.

We have no information to indicate that the inadequacy of existing State regulatory mechanisms may pose a threat to the mardon skipper, rangewide or at the subspecies level.

Special Status Species Policies on National Forest and BLM Lands

As discussed above under “Conservation Measures,” the mardon skipper is listed as a Sensitive Species by the U.S. Forest Service in Washington, Oregon (Forest Service Region 6), and California (Forest Service Region 5) and as a Special Status Species by the Bureau of Land Management (BLM) in Oregon and Washington. We have no information to indicate that the inadequacy of existing Federal regulatory mechanisms may pose a threat to the mardon skipper, rangewide or at the subspecies level.

Summary of the Inadequacy of Existing Regulatory Mechanisms

When the mardon skipper was originally identified as a Federal candidate in

1999, the species had no protection mechanisms under the auspices of either State or Federal agencies. Since that time, both Federal and State land managers have developed conservation plans and policies that provide a high level of protection for the species. Existing laws and regulations do not protect mardon skipper habitats where they occur on private land. However, there are few mardon skipper populations known to occur on private lands. The majority of the species' occurrences are on Federal or State lands where the species is assured a high level of protection through its recognition as a Sensitive Species or Special Status Species (Federal lands) or through State Conservation Plans (California, Oregon, and Washington). We did not identify any threats to the mardon skipper at either the species or subspecies levels that existing regulatory mechanisms have failed to address. Therefore, we have no information to indicate that the inadequacy of existing regulatory mechanisms is a threat to the mardon skipper at either the species or subspecies levels.

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

Application of Pesticides and Herbicides

Aerial applications of pesticide pose a potential threat to mardon skippers. The lepidopteran-specific insecticide*, Bacillus thuringiensis* var. *kurstaki* (Btk), has been aerially applied to control the Asian gypsy moth (*Lymantria dispar*) in the Puget Sound region, and in the Washington Cascades to control spruce budworm (*Choristoneura occidentalis*) (Potter *et al.* 1999, p. 13). Although grasslands are not targeted for

application, small meadows may receive aerial applications due to the location of these habitats within the wooded target area or from aerial drift. Drift from aerial applications can be lethal to non target butterflies up to 1.8 miles (3 km) away from the target area in steep, mountainous terrain (Whaley *et al.* 1998, p. 539). Lepidoptera, such as the mardon skipper, that are single-brooded, spring-active species with caterpillars actively feeding during the application period of Btk are especially vulnerable (Wagner and Miller 1995, p. 21).

Several of the southern Washington Cascade mardon skipper sites are located in areas where widespread applications of Btk were used on State, tribal, and private lands to control spruce budworm outbreaks in the late 1990s (Potter *et al.* 1999, p. 13). Btk application is implicated in the local decline of at least one mardon skipper population on non-Federal lands from 1998 to 2000 (Potter and Fleckenstein 2001, pp. 7–8). The use of Btk has diminished in the southern Cascades over the past decade as spruce budworm populations have declined. There have been no reported applications of Btk on Federal lands in close proximity to mardon skipper sites. The risks associated with Btk application can be greatly reduced with adequate buffers to avoid pesticide drift into sensitive habitats (Black *et al.* 2010, p. 19). Although Btk application poses a potential threat to mardon skipper populations, we are not aware of any Btk applications over the past 10 years that would have had the potential to affect mardon skipper populations. The aerial application of pesticides remains a potential threat, but any local application of lepidopteran-specific pesticides on Federal lands will be subject to environmental review consistent with National Environmental Policy Act procedures, and existing special

status/sensitive species policies of the Forest Service and BLM are likely to provide for a high level of protection.

Herbicides are commonly used to manage mardon skipper habitat and control invasive nonnative plants in south Puget Sound prairies (Schultz *et al.* 2011, p. 373); and have been used at mardon skipper sites on the Gifford Pinchot National Forest. Herbicide use may affect mardon skippers by damaging larval or adult food sources, or through the direct ingestion of a toxic substance. Loss of non target plants can be avoided by using grass-specific herbicides, such as sethoxydim, which has been used effectively to control invasive grasses such as tall oatgrass, while having minimal impacts on native bunchgrasses and forbs (Schultz *et al.* 2011, p. 373).

There are currently dozens of herbicide formulations that are available for general use. The toxicity of an herbicide to butterflies varies from non toxic to potentially lethal depending upon the compounds used. All herbicides are required to be tested on honeybees (*Apis* spp.) as part of registration requirements (USFS 2005, p. 252), but there are relatively few studies that evaluate the effects of herbicides on butterflies (Russell and Schultz 2010, p. 53). One study with the Karner blue butterfly (*Lycaeides melissa samuelis*) found that direct applications of some herbicide compounds with glyphosate had no apparent effect on egg survival and larval development (Sucoff *et al.* 2001, p. 18). However, treatments with a glyphosate-triclopyr mix did significantly lower egg hatching rates (Sucoff, *et al.* 2001, p. 18). Use of the grass-specific herbicide compounds

sethoxydim or fluazifop-p-butyl with the non-ionic surfactant Preference can stress butterflies, resulting in reduced survival and increased rates of development from larvae to adult, as well as decreased wing area in some species of butterflies (Russell and Schultz 2010, p. 53). Stark and others (2012, pp. 26–27) found that Behr's metalmark butterfly (*Apodemia virgulti*) exposed to field rates of triclopyr, sethoxydim, and imazapyr reduced the number of adults that emerged from pupation, perhaps due to effects from inert ingredients or indirect effects on food plant quality. These studies indicate that direct applications of herbicides can result in reduced survival in some butterfly species, emphasizing the need for careful management using selective applications in habitats occupied by mardon skippers.

Herbicides are recognized as an important tool for managing invasive plants and maintaining habitat for butterflies. Potential adverse effects of herbicides to mardon skippers can be minimized through selective applications. Federal and State land managers currently using herbicides to manage invasive plants at mardon skipper sites are using best management practices to minimize effects to non target plant species and to butterflies (Hays 2010, p. 1; USFS 2008, p. 57). These methods include using selective herbicide treatments and only treating a small portion of the habitat area within the site in any given year (USFS 2008, p. 57; Schultz *et al.* 2011, p. 373). We expect Federal and State land managers will continue to manage sites to control invasive weeds and to do so in a way that improves habitat for the mardon skipper, while minimizing impacts to local populations as outlined in the revised Forest Service/BLM Conservation Assessment for the Mardon Skipper (Kerwin 2011, pp. 30–33), and in site-specific plans

such as those developed on the Gifford Pinchot National Forest (USFS 2008, p. 57). Based on this information, we do not consider the use of herbicides to be a threat to mardon skipper at either the species level or subspecies levels.

Summary: The widespread application of pesticides and herbicides may affect the mardon skipper and its habitat. However, there are no documented instances of Btk applications occurring on Federal lands in close proximity to mardon skipper sites. Further, Federal and State land managers have successfully used herbicides to restore and maintain mardon skipper habitat at a number of sites in Washington. Based on this information, we do not consider the use of pesticides or herbicides to be a threat to the species or either subspecies.

Climate Change

Over the next century, climate change at global and regional scales is predicted to result in changes in butterfly species distributions and altered life histories (McLaughlin *et al.* 2002, p. 6074; Hill *et al.* 2002, p. 2163; Singer and Parmesan 2010, p. 3161). Rare butterflies, including the mardon skipper, may be vulnerable to climate change, as their populations are often fragmented due to habitat losses that restrict the species' ability to adapt to changing environmental conditions (Schultz *et al.* 2011, p. 375). Likewise, butterflies with limited dispersal capability, such as the mardon skipper, may be vulnerable to climate change if suitable alternative habitats are not located within the dispersal distance for the species.

Changes in regional climate can benefit some butterfly species. The habitat-generalist Sachem skipper (*Atalopedes campestris*) has expanded its range more than 435 mi (700 km) northward from California into central Washington in the last 50 years (Crozier 2004, p. 231). Crozier's (2004, p. 231) study suggested that the range expansion has been due to a warming trend, and each step in the range expansion coincided with warmer winters (which affects larval survival rates). Similarly, populations of the silver-spotted skipper (*Hesperia comma*) in southern England have increased over the past 20 years, due in part to warmer summer temperatures, which have increased the availability of thermally suitable habitats for the species (Davies *et al.* 2006, p. 247). Recent butterfly range expansions linked to climate change are generally limited to highly mobile, habitat-generalist species, while many habitat-specialist butterfly species have declined due to complex interactions of climate, habitat loss, and fragmentation (Warren *et al.* 2001, p. 65; Hill *et al.* 2002, p. 2170).

In the Pacific Northwest, mean annual temperatures rose 0.8 ^{o}Celsius (^{o} C) (1.5 ^{o}Fahrenheit (^{o} F)) in the 20th century and are expected to continue to warm from 0.1 to 0.6 ^{o}C (0.2 to 1 ^{o}F) per decade (Mote and Salathe 2010, p. 29). Global climate models project an increase of 1 to 2 percent in annual average precipitation, with some models predicting wetter autumns and winters with drier summers (Mote and Salathe 2010, p. 29). Regional models of potential climate changes are much more variable, but the models generally indicate a warming trend in mean annual temperature, reduced snowpack, and increased frequency of extreme weather events (Salathe *et al.* 2010, pp.

72–73). Downscaled regional climate models, such as those presented by *http://www.climatewizard.org* have tremendous variation in projections for annual changes in temperature or precipitation depending upon the climate model or scenario. Averaged values across large areas generally indicate a general warming trend in mean annual temperature consistent with the climate projections reported by Salathe and others (2010, pp. 72–73).

Predicted climate changes in the Pacific Northwest have implications for forest disturbances that are important for maintaining montane meadow habitats. Both the frequency and intensity of wildfires and mountain pine beetle (*Dendroctonus ponderosae*) outbreaks are expected to increase over the next century in the Pacific Northwest (Littell *et al.* 2010, p. 130). The gradual loss of montane meadow habitats over the past century is linked to fire suppression and lack of disturbance. One study in the Cascades found that the majority of mesic meadow habitats that were historically burned (1880–1946) have contracted over the past half century (Takaoka and Swanson 2008, p. 539). Increased fires over the next century are likely to result in increased meadow habitat and improved connectivity between meadows occupied by mardon skippers. Similarly, mountain pine beetle outbreaks can result in the widespread mortality of lodgepole pine trees, a common tree species that is invading meadow habitats at many mardon skipper sites. Where invading trees are killed, marginal areas along the edges of existing meadows are likely to revert rapidly back to dominance by meadow species (Haugo *et al.* 2011, p. 17).

Climate change is also likely to affect the rate of conifer succession in montane

meadow habitats. A decrease in summer precipitation and soil moisture may reduce the rate of conifer encroachment in montane meadows at mesic sites (Haugo *et al.* 2011, p. 17), which may prove beneficial to mardon skippers by increasing available meadow habitats. Increased wildfire or insect disturbances associated with climate change are likely to have beneficial effects for mardon skippers due to increases in early seral habitat, although large wildfires also pose a risk to mardon skippers if all occupied habitat in a local area is burned. Because wildfires typically result in a mosaic of burned and unburned areas, it is unlikely that increased incidence of wildfires associated with climate change would result in the loss of multiple populations across large areas within the species' or subspecies' range.

How mardon skipper populations will respond to future climate change is unknown. There are no retrospective studies for the species that have examined how annual weather patterns such as annual or seasonal precipitation, snowpack, and temperature have influenced mardon skipper populations from year to year. We do know that prolonged periods of cool, wet weather during the spring or summer months can delay adult emergence and reduce the abundance of mardon skippers. Because the mardon skipper at the species level is distributed across a broad range of elevations and habitat types, and has documented use of several host-plant species, it may not be as vulnerable to climate change as some other narrowly distributed butterfly species. In the Washington Cascades the majority of mardon skipper sites occur in the mid-elevation montane zone, where there is a potential for upslope movement and colonization of higher elevation habitats in response to climate change over time. Based on the above

information, we do not have data to suggest that climate change poses a threat to the species *Polites mardon*, or the subspecies *Polites mardon mardon*.

Discussion specific to *Polites mardon klamathensis*

Populations of *Polites mardon klamathensis* may be vulnerable to the effects of climate change due to the subspecies' limited distribution, apparently smaller populations, and limited dispersal capability. All *P.m. klamathensis* sites are located in the high-elevation montane zone of the southern Oregon Cascades, where there is little potential for upslope movement or colonization of higher elevation habitats in response to climate change over time. Regional models of potential climate changes in the Pacific Northwest are variable, but the models generally indicate a warming trend in mean temperature, reduced snowpack, and increased frequency of extreme weather events (Salathe *et al.* 2010, pp. 72–73). All *P.m. klamathensis* sites are associated with mesic soils and permanent or ephemeral water sources (Black *et al.* 2010, p. 12).

Black *et al.* (2010, p. 60) notes that habitat within portions of the meadow complex are marginal for *P.m. klamathensis* because the sites are currently too dry, but the habitat may have been wetter in the past. Runquist (2004a, p. 5) observed over 200 skippers at this complex in 2002. Although multi day surveys have not been completed here, the population at this meadow complex appears to have declined (Black *et al.* 2010, pp. 60–61).

Given the restricted distribution of *P.m. klamathensis*, and the strong association of the subspecies with mesic sites, a projected warming trend in regional climate is a

potential concern for *P.m. klamathensis*, depending on the changes in the environment that may manifest as a result. We acknowledge this concern and the need for monitoring of these populations in the face of climate change. However, at the present time, due to the multiple uncertainties associated with regional climate models, the actual changes that may be realized and how they would impact the species, the timeframes involved, and the questions surrounding *P.m. klamathensis* abundance information, we can not conclude that climate change is a threat to *P.m. klamathensis* or likely to become so.

Summary: Because the mardon skipper is distributed across a range of elevations and habitat types, and has documented use of several host-plant species, it may not be as vulnerable to climate change as some other narrowly distributed species. Despite the potential for future climate change in the Pacific Northwest as discussed above, we have not identified, nor are we aware of, any data on an appropriate scale to evaluate habitat or population trends for the mardon skipper or to make reliable predictions about future trends and whether the species will be significantly impacted. Due to the uncertainty associated with regional climate models and how any potential environmental changes may possibly impact the species, we conclude that climate change is not a threat to mardon skippers at the species or subspecies levels or likely to become so.

Stochastic Weather Events and Small, Isolated Populations

Adverse weather (freezing temperatures, heavy rain events, or prolonged drought) can extirpate local butterfly populations by killing adults, larvae, or larval food plants (Guppy and Shephard 2001, p. 59). Even large populations of butterflies (greater than

5,000 individuals) can rapidly decline in response to successive seasons of unfavorable weather conditions during reproduction and larval development (Ehrlich *et al.* 1980, pp. 102–103). The decline in mardon skipper numbers at some Washington Cascades sites in 2009 is an example of how variations in seasonal weather can have a profound effect on local mardon skipper populations. The exact weather event that caused the decline is unknown, but unseasonably warm weather in May and June caused a rapid snowmelt to occur in these high-elevation meadows, followed by at least 4 days of freezing temperatures in late June during the period when mardon skipper adults typically emerge (Kogut 2009, p. 1). The adult flight period in 2009 occurred later, in mid-July, and was very brief, and the total numbers of adults were approximately 80 to 95 percent less than what had typically been counted at these sites during the previous 6 years (Kogut 2009, p. 1).

The weather effect was not limited to mardon skippers; other butterfly species were also affected, including the closely related Sonora skipper (*Polites sonora*), which was apparently absent from all sites where the species commonly co-occurs with mardon skippers at Cowlitz Valley (Kogut 2009, p. 1). The apparent weather-related effect was also noted at sites on the adjacent Wenatchee-Okanogan National Forest, where the emergence of adults occurred later, and the adult flight period was shorter than in previous years (St. Hilaire *et al.* 2009, p. 2), although the effect to the populations was not as severe as that seen on the Gifford Pinchot National Forest. Populations at lower elevation sites did not appear to be affected by these same weather events (St. Hilaire *et al.* 2009, p. 3). Subsequent years (2010 and 2011) have generally been cool and wet during the mardon skipper flight season, so the populations at the Cowlitz Valley sites

have not recovered and have continued to gradually decline since 2009, but populations at other locations in the Washington Cascades have not shown a similar pattern of decline and are apparently stable. It is evident that adverse weather conditions can profoundly impact local mardon skipper populations. Because the species occurs across a broad range of elevations and habitat types, it is unlikely that a stochastic weather event is likely to affect all populations simultaneously.

Butterfly populations with very low numbers of individuals (e.g., fewer than 20 butterflies) are vulnerable to extirpation from random events such as inclement weather, wildfire, or other potential threats identified above (e.g., Schtickzelle *et al.* 2005, p. 578). There are a number of studies that demonstrate that habitat patch size, local population size, and proximity to adjacent populations have important implications for the long-term persistence of butterfly populations with limited dispersal capabilities (e.g., Thomas and Jones, 1993, p. 472; Hanski *et al.* 1995, p. 618; Saccheri *et al.* 1998, p. 492; Maes *et al.* 2004, pp. 234–235). Studies that examined butterfly population dynamics generally define "small" populations as having fewer than 500 adults and "very small" as having fewer than 100 adults at peak emergence (e.g., Maes *et al.* 2004, p. 232; Davies *et al.* 2005, p. 192). (As described below, for mardon skippers, counts of at least 100 individuals are generally considered to be large). Extremely small butterfly populations (fewer than 20 individuals) are not only highly vulnerable to environmental factors such as adverse weather conditions (Schtickzelle *et al.* 2005, p. 578), but such small populations are also at increased risk of extinction due to genetic effects associated with inbreeding (Saccheri *et al.* 1998, p. 491; Nieminen *et al.* 2001, p. 243). Inbreeding in small populations of the Glanville fritillary butterfly (*Melitaea cinxia*) resulted in reduced

egg hatching rates, larval survival, and adult longevity (Nieminen *et al.* 2001, p. 243).

Long-term studies of the silver-spotted skipper (*Hesperia comma*) in England have documented a series of local population extinctions and colonizations over a 20-year period (Thomas and Jones 1993, p. 472; Davies *et al.* 2005, p. 189). These studies found that large habitat patches tended to support large populations of skippers, and that no extinctions occurred in habitat patches that supported populations of greater than 225 individuals; sites with 10 populations of fewer than 225 skippers, however, went extinct and the probability of extinction increased with isolation from the nearest population (Thomas and Jones 1993, pp. 476–478). Populations of silver-spotted skipper have expanded in recent years, and most of the sites that had documented extinctions in 1991 have subsequently been recolonized by dispersing individuals from adjacent sites (Davies *et al.* 2005, p. 195).

Most populations of mardon skippers consist of a series of one or more occupied meadows located within close proximity to each other. These populations or local "clusters" of sites likely function as small metapopulations with some dispersal of individuals between local sites (Kerwin 2011, pp. 21–23). Mardon skipper "metapopulations" likely experience local site-scale extinctions and recolonizations as local populations expand and contract in response to changing climate or habitat conditions, such as with the silver-spotted skipper in England (Davies *et al.* 2005, p. 195), although on a smaller scale, as silver-spotted skippers likely have greater dispersal capability than mardon skippers (Kerwin 2011, p. 23). However, there is strong evidence

that mardon skippers exhibit similar metapopulation dynamics. The large number of mardon skipper sites in the Washington Cascades that are located in young clearcuts or roadside areas that were previously forested demonstrate that the species is capable of dispersing away from their core habitats and colonizing adjacent early-seral habitats that support host grasses and forbs (e.g., Kerwin 2011, p. 14).

Mardon skippers can be locally abundant where the species is present (Pyle 1989, p. 28) with single-day counts of greater than 100 individuals documented at many sites across the species' entire geographic range (for the mardon skipper, populations in the hundreds are relatively large) (Black *et al.* 2010, pp. 70–71; St. Hilaire *et al.* 2010, pp.10–12; Black *et al.* 2011, p. 13). Conversely, there are a number of apparently very small populations within the species' range with peak counts of fewer than 20 individuals. Because the number of mardon skippers present at a site can vary tremendously over the course of a few days (Beyer and Black 2007, p. 8), and the timing of the flight period can vary due to a variety of conditions, including elevation and weather conditions, there is little certainty of actual population sizes associated with these individual day counts. A single day, peak count of 100 skippers potentially represents a total population of more than 200 skippers based on observations during an experimental mark-recapture study (Runquist 2004a, p. 5), because not all butterflies emerge on the same date, and not all butterflies present at a site are likely to be counted during a survey.

Since 1999, mardon skippers have been documented at approximately 165 sites across the species' range. Considering that local clusters of sites likely function as small

metapopulations, there are approximately 66 populations of mardon skippers currently known, and, with the exception of the Puget prairies, it is likely that there are additional undocumented populations present in all portions of the species' range because not all suitable habitats have been searched for mardon skippers (Kerwin 2011, p. 18). Each region within the species' range supports one or more "large" populations of mardon skippers (in the case of the mardon skipper, "large" is defined as single-day counts of more than 100 individuals, which likely represents a much larger total population).

All extant Puget prairie sites likely support total populations from more than 100 up to 1,000 individuals (Schultz *et al*. 2011, p. 370). The largest mardon skipper populations occur in the Washington Cascades, with at least 2 populations of greater than 1,000 individuals, and at least 11 other populations that have supported populations from 100 to 400 skippers over the past decade (unpublished data). In the Oregon Cascades, there are 2 populations that number from 100 to 300 individuals, and in the coastal areas of northwest California/southwestern Oregon, there are at least 3 populations with more than 100 individuals. In total, at least 22 of the approximately 66 populations rangewide support large populations of mardon skippers, and these sites represent the majority of the species' total populations.

Conversely, there are many individual "sites" with single-day counts of fewer than 20 individuals. Most of these sites are closely associated with larger local populations. A few sites may represent small, isolated populations that are vulnerable to local extirpation associated with stochastic weather events, but these generally represent only a small portion of the total species' populations. Because the mardon skipper has presumably limited dispersal capabilities, if an isolated population were to become

extirpated, some isolated sites are unlikely to be reestablished due to long distances or physical barriers (e.g., extensive forested areas) between extant populations (Kerwin 2011, p. 23).

The mardon skipper is a naturally rare species across its disjunct range. Given the limited information concerning mardon skipper population trends rangewide, and the presence of multiple "large" populations in each distinct region within the species range, the majority of the species' total populations appear to be relatively secure from threats associated with small populations.

Discussion specific to *Polites mardon klamathensis:*

The distribution of *Polites mardon. klamathensis* appears to be restricted to 22 sites likely representing approximately 11 populations in the southern Oregon Cascades. Surveys in recent years have searched over 200 sites in the vicinity of these known populations and have failed to detect the species, indicating the subspecies is highly restricted in its distribution to a few small meadow complexes within a small geographic area (Black *et al*. 2010, p. 7). However, one small site was documented on Bureau of Reclamation lands managed by BLM in 2011 (Black 2012, pers. comm.), indicating it is possible that additional undocumented *P.m. klamathensis* sites may exist in the area. Although populations of *P.m. klamathensis* appear to be relatively small, it is difficult to draw any reliable conclusions on population sizes based on the limited data available, since the majority of sites have only been visited once during the flight season in recent years (Black *et al*. 2010, pp. 70–72). Additional multiple-day surveys are needed to

confirm if populations are as small as they appear based on the limited survey data collected thus far, or whether past single-day counts may have just missed the peak flight period. As discussed earlier, due to the variability of mardon flight periods between sites and years, as well as extreme fluctuations in numbers of individuals that may be present from day to day, a single-day survey in a year is insufficient to indicate trends or abundance.

In summary, total population sizes at all *Polites mardon klamathensis* sites are unknown due to limited surveys, although counts at most sites indicate that populations of this subspecies may be relatively small. Unfortunately the high variability in potential counts from day to day for this subspecies undermines the credibility of any single-day counts for the purpose of determining population status or trend, and raises questions as to whether counts of zero or few individuals on any one day accurately reflect population numbers or abundance. Based on the lack of historical abundance information and the uncertainty accompanying the numbers of individuals associated with individual day counts, we do not have reliable information to suggest that *P.m. klamathensis* is such a small isolated population that stochastic weather events would pose a significant threat to the subspecies as a whole.

Summary: Prolonged periods of cool wet weather during the spring and summer months are known to negatively affect mardon skipper populations. Small butterfly populations are particularly vulnerable to these effects. Given the limited information concerning mardon skipper population trends rangewide, and the presence of multiple

"large" populations in each distinct region within the species' range, the majority of the species' total populations and those of the subspecies *Polites mardon mardon* appear to be relatively secure from threats associated with small populations. Additionally, due to the limited population and abundance information we have for the the subspecies *Polites mardon klamathensis*, we conclude that we do not have reliable information to indicate that populations of this subspecies are so small or isolated as to represent a threat to *P.m. klamathensis* as a whole.

Finding

As required by the Act, we considered the five factors in assessing whether the mardon skipper is a threatened or endangered species throughout all of its range. We additionally considered whether either of the two recognized subspecies comprising the species mardon skipper may be a threatened or endangered species throughout all or a significant portion of their ranges. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the mardon skipper and its subspecies. We reviewed the petition, information available in our files, other available published and unpublished information, and consulted with recognized mardon skipper experts and other Federal, State, and tribal agencies.

The Species Mardon Skipper (Polites mardon)

The mardon skipper is a little-studied species; however, the species has received

considerable attention and funding for surveys since becoming a Federal candidate species in 1999. The number of documented locations of mardon skippers has expanded from fewer than 10 in 1998 to 165 in 2011; this increase in known occurrences of the species is largely due to increased survey effort. Since 1999, new site locations have been documented each year that targeted surveys have been conducted. In the past 5 years, significant new populations have been located in the Washington Cascades and in coastal areas of Oregon and California, with local sites supporting populations of hundreds of mardon skippers. It is likely that there are additional, undocumented populations, particularly in the Washington Cascades, and possibly in southwestern Oregon and northern California because not all available habitat for the species has yet been surveyed. The majority of the sites throughout the species' range occur on Federal lands managed by the Forest Service, Bureau of Land Management, National Park Service, Fish and Wildlife Service, and the Department of Defense (76 percent).

Current management actions, policies, and protections associated with State and Federal special-status-species programs now afford the species a high level of security from habitat loss or destruction across the species' range. Potential threats to mardon skipper habitat associated with forest succession, fire, invasive nonnative plants, livestock grazing, and off-road vehicle use have been substantially reduced or eliminated on State and Federal lands through the development of conservations plans and implementation of habitat restoration projects. Habitat degradation associated with intensive livestock grazing continues to occur at some sites, but grazing impacts have been substantially reduced or eliminated at many key sites across the species' range with

recent closures of Federal grazing allotments. Habitat degradation from off-road vehicle use has been reduced or eliminated at many sites by installing vehicle barriers or closing roads. Meadow habitat restoration activities (prescribed burning, herbicide treatments) can be lethal to mardon skippers if not conducted properly, but these risks have been minimized through careful planning and implementation of habitat restoration projects. Ongoing threats that are not currently addressed by existing conservation plans include potential habitat loss on private lands, but there are relatively few known mardon skipper sites on private lands. Climate change may affect the mardon skipper and its habitat. Because the mardon skipper is distributed across a range of elevations and habitat types, and has documented use of multiple host-plant species, it may not be as vulnerable to climate change as some other more narrowly distributed specialist species.

Based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the threats are not so severe or broad in scope as to indicate that the mardon skipper is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened), throughout all of its range. Therefore, we find that the mardon skipper does not meet the definition of an endangered or threatened species throughout its range.

The mardon skipper is listed as endangered by the State of Washington. Washington's listing of the mardon skipper was based on a status assessment of the species conducted in 1999 (Potter 1999), and relied on much of the same information that the Service considered in placing the mardon skipper on the candidate list that same year. A

substantial amount of new information has become available since that time, however, which we have evaluated in making the present finding. Although the State of Washington has updated information on new population data and conservation efforts for the mardon skipper in their annual reports, they have not reconsidered the listed status of the species based on this information. Our analysis of the best available information considers the many positive conservation measures that have been implemented by both Federal and State agencies throughout the range of the mardon skipper, including actions by the State of Washington, to recover the species and ameliorate the threats that initially led to its State listing and Federal candidacy 13 years ago. In addition, we considered the numerous additional populations of the species (and subspecies) that have been documented since the mardon skipper first became a Federal candidate and was listed by the State. Our current evaluation of the best available information according to the Federal Endangered Species Act, as detailed in this finding, does not lead us to conclude that the mardon skipper meets the definition of an endangered species or threatened species throughout all or a significant portion of its range.

The Subspecies Polites mardon mardon *and* Polites mardon klamathensis

Polites mardon mardon

Polites mardon mardon faces the same threats as discussed in the rangewide evaluation previously, and we consider all conclusions reached regarding the degree of threat for the species as a whole to apply equally to the subspecies *P. m mardon*. As a

result, we find that this subspecies does not meet the definition of an endangered or threatened species throughout its range.

Polites mardon klamathensis

Polites mardon klamathensis faces the same threats as discussed in the rangewide evaluation previously; however, where relevant we have assessed threats specific or unique to the subspecies *Polites mardon klamathensis* separately throughout the rangewide evaluation. In general, we consider all conclusions reached regarding the degree of threat for the species as a whole to apply equally to the subspecies *P. m klamathensis*. As a result, we find that this subspecies does not meet the definition of an endangered or threatened species throughout its range.

Significant Portion of the Range

Having determined that the species *Polites mardon* and the subspecies *Polites mardon. mardon* and *Polites mardon klamathensis* do not meet the definition of a threatened or endangered species, we next consider whether there are any significant portions of the range where the mardon skipper is in danger of extinction or is likely to become in danger of extinction in the foreseeable future.

In determining whether a species is a threatened or endangered species in a significant portion of its range, we first identify any portions of the range of the species

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

If we identify portions that warrant further consideration, we then determine whether the species is threatened or endangered in these portions of its range. Depending on the biology of the species, its range, and the threats it faces, the Service may address either the significance question or the status question first. Thus, if the Service considers significance first and determines that a portion of the range is not significant, the Service need not determine whether the species is threatened or endangered there. Likewise, if the Service considers status first and determines that the species is not threatened or endangered in a portion of its range, the Service need not determine if that portion is significant.

Applying the process described above for determining whether a species is threatened or endangered in a significant portion of its range, we considered the status question first to determine if any threats or potential threats acting individually or collectively threaten or endanger the species in some portion of its range. In analyzing the status of the mardon skipper across its range, the only area we identified where threats may be concentrated is the Puget prairies. We therefore considered whether the threats to the Puget prairie populations of *Polites mardon* or *Polites mardon mardon* are such that the species may be in danger of extinction there, now or within the foreseeable future, such that the Puget prairie populations may warrant further consideration as a potential significant portion of the range.

Although the rangewide mardon skipper population is relatively secure under current conditions, the Puget prairies represent the only portion of the species' historical and current distribution where there are confirmed extirpations of historical populations, and we can reasonably infer that the species' range has contracted due to the historical loss of Puget prairie habitat over the past century. We therefore considered the likely future condition of the Puget prairie populations under the presently observed rates of population change. Historically, mardon skippers were known to be present at eight Puget prairie sites, and are currently restricted to three known populations. The trends of the remaining populations are unknown due to limited and inconsistent monitoring data, but appear to have been relatively stable over the past decade, with 2 populations estimated to consist of hundreds of mardon skippers, and 1 population with likely over 1,000 skippers (Schultz *et al*. 2011, p. 370). Puget prairie sites with extant populations of

mardon skippers are protected from further development through either State or Federal ownership. Mardon skipper habitat at these sites is: (1) actively being managed to restore and maintain mardon skippers and other prairie species; or (2) at Joint Base Lewis-McChord being maintained by regular wildfires, and large areas of habitat are protected from development, off-road vehicle use, and military training due to the presence of unexploded ordnance. In addition, Joint Base Lewis-McChord is cooperating in an interagency effort to restore and maintain prairie habitats for the mardon skipper and other prairie species, discussed below.

Remaining prairie habitats in the south Puget Sound region are relatively small, isolated patches with little potential connectivity between patches (Schultz *et al*. 2011, p. 371). Because of this, historical prairie sites where mardon skippers have been extirpated are unlikely to be recolonized due to isolation from extant populations (Schultz *et al*. 2011, p. 371). There are a number of small prairie sites in the region that are currently in protected status and are actively being managed to maintain butterfly habitats that may serve as potential future reintroduction sites for mardon skippers (Anderson 2008, p. 2; Henry 2010, pp. 3–4). Beginning in 2007, the Joint Base Lewis-McChord Army Compatible Use Buffer (ACUB) initiative has supported the convening of a cooperative, interdisciplinary and interagency Butterfly Habitat Enhancement Team to develop and implement habitat improvements for mardon skipper and other rare butterflies on formerly occupied sites off the military reservation (Anderson 2008, p. 1). This interagency team is a source of funding for mardon skipper habitat management, population assessments, and mardon skipper life-history research at Puget prairie sites.

These projects continue to maintain habitat and mardon skipper populations at the Scatter Creek Wildlife Area. The ongoing management to maintain mardon skipper populations and habitat at Puget prairie sites afford the species a high level of protection against further losses of habitat or populations. Because these conservation efforts have been implemented, are effective, and are expected to continue, we consider the Puget prairie population of the mardon skipper as not likely to become in danger of extinction within the foreseeable future.

As the best available information indicates that the Puget prairie population of mardon skipper at either the species or subspecies level is not likely to become in danger of extinction within the foreseeable future, we conclude that Puget prairie does not warrant further consideration as a potential significant portion of the range at this point in time. We did not identify any other potential significant portions of the range of the mardon skipper (*Polites mardon, Polites mardon mardon*, or *Polites mardon klamathensis*) that may meet the definition of a threatened or endangered species .

In *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136, 1145 (9th Cir. 2001), the court ruled that a species may be an endangered species in a significant portion of its range ‘‘if there are major geographical areas in which it is no longer viable but once was.’’ Where the area in which the species is expected to survive is ‘‘much smaller than its historical range,’’ the determination of whether the species warrants listing turns on whether the lost portion of the range would be significant. As discussed above, the Puget Prairie population of the mardon skipper is the only portion of the species’ range that is known

to have contracted from the historical distribution. We conclude that current and future conservation efforts are expected to maintain mardon skippers and restore the species to additional Puget prairie habitats. Therefore, we have determined that neither the full species mardon skipper, nor the subspecies *Polites mardon mardon* or *Polites mardon klamathensis*, is an endangered or threatened species in a significant portion of its range.

We do not find that the mardon skipper, or the subspecies *Polites mardon mardon* or *Polites mardon klamathensis,* are in danger of extinction now, nor are they likely to become in danger of extinction within the foreseeable future throughout all or a significant portion of their range. Therefore, listing the mardon skipper *Polites mardon*, the subspecies *P. m. mardon,* or the subspecies *Polites mardon klamathensis*, as a threatened or endangered species under the Act is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, the mardon skipper to our Washington Fish and Wildlife Office (see **ADDRESSES** section) whenever it becomes available. New information will help us monitor the mardon skipper and encourage its conservation. If an emergency situation develops for the mardon skipper or any other species, we will act to provide immediate protection.

We will continue to monitor the condition of the mardon skipper throughout its range. In the event that conditions or threats change and the species becomes imperiled, we could again consider whether it is appropriate to list the species as endangered or

threatened under the Act. We will continue to provide technical assistance to Federal, State, and other entities and encourage them to address the conservation needs of the mardon skipper. We will continue to work with these agencies and entities to collect additional biological information, monitor the status of the mardon skipper, and monitor the progress of its conservation efforts.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the Washington Fish and Wildlife Office (see **ADDRESSES** section).

Author(s)

The primary authors of this notice are staff members of the Washington Fish and Wildlife Office.

Authority

The authority for this section is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.).

Dated: August 20, 2012

Benjamin N. Tuggle

Acting Director, Fish and Wildlife Service

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