Management Plans for all Southern Oregon Cascade Mardon Skipper (*Polites mardon*) sites on the Bureau of Land Management's Hunter Creek Area of Critical Environmental Concern (ACEC)

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Interagency Special Status and Sensitive Species Program

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Section 1: Status and Threats

Background

The mardon skipper, *Polites mardon* (U.S. Federal Species of Concern, Washington State Endangered Species, Global Heritage Status Rank of G2G3, United States National Heritage Status Rank of N2N3, state rank of S1 in Washington and California, and S2 in Oregon, Forest Service Region 6 Sensitive Species, and a BLM Special Status Species), is a rare butterfly in the Pacific Northwest of the United States of America. Mardon skippers are grassland and open meadow obligates endemic to the states of Washington, Oregon, and California. Historic mardon skipper ranges are not known, as historical documentation of this butterfly is scarce, with most population surveys only occurring in the past decade (Black & Vaughan 2005). Mardon skippers were likely more widespread and abundant prior to the past 150 years of human development, livestock grazing, fire suppression, and invasion of grassland habitat by native and non-native vegetation.

The mardon skipper is known from four geographic areas: (1) southern Puget Sound, (2) the east side of the Cascade Mountains (Mt. Adams area and the Okanogan-Wenatchee National Forest) in Washington, (3) the Cascade Mountains in southern Oregon, and (4) Del Norte (north-coastal) County, California and the southern coast of Oregon.

History and Taxonomy of Mardon skipper in Southern Oregon

Mardon skippers were first described by W. H. Edwards (1881) from specimens taken near Tenino, Thurston County, Washington by H. K. Morrison (Dornfeld 1980). For nearly 100 years the only known populations were in Washington State. In June 1979, Sterling and Eileen Mattoon discovered a population on High Divide Ridge in Del Norte County, California. The first confirmed records for Oregon came in the late 1980's when John Hinchliff found three male specimens in collections held at the American Museum of Natural History in New York City. These specimens were collected by W.E. Lawrence in 1931 at Lake of the Woods, Klamath County. After Hinchliff's discovery, John Vernon and Mike Richard found a population on Dead Indian Road, Jackson County in 1990. Then, in 1991, Sterling Mattoon and others working on The Xerces Society Mount Ashland butterfly count added three additional populations in Jackson County, including the Soda Mountain Road population (now called the Hobart Peak complex) that eventually became the type specimen for the subspecies *Polites mardon* ssp. *klamathensis* in 1998 (Mattoon *et al.* 1998).

There are two described subspecies of Mardon skipper. Mattoon *et al.* (1998) proposed that the Oregon Cascades population be given subspecies status of *Polites mardon* ssp. *klamathensis,* and that the Washington and Northern California populations be given the subspecies status of *P. m.* ssp. *mardon*. The coastal Oregon population's subspecies has not been determined, but it is most likely associated with the Del Norte population of Northern California. However *P. m.* ssp. *mardon* from Del Norte County populations have not yet been carefully compared to series of typical *P. m.* ssp. *mardon* from Washington and the use of the name *P. m.* ssp. *mardon* for Californian and Southern Oregon coastal populations should be considered tentative (Warren 2005).

Coastal Oregon Mardon skipper populations are closely associated with serpentine based soils that include plentiful bunchgrasses and varied nectar sources. Specimens of *Polites mardon* from coastal Oregon were first discovered at The McGuire Center for Lepidoptera and Biodiversity (Gainesville, Florida) by Andrew Warren with the label data "2 miles N of Gold Beach", suggesting the locality of collection to be the serpentine-bunchgrass hillsides to the north of the Rogue River near Wedderburn. In 2007 Dana Ross found a single male Mardon skipper at the base of a bunchgrass hillside at Lone Ranch State Beach near Cape Ferrelo. The following year, in 2008, Dana Ross discovered a larger population at the Hunter Creek ACEC. In 2009, Dana Ross observed a single male in a small moist meadow at a new location on the Rogue River-Siskiyou National Forest (Road #100 Meadow). In 2010, Dana Ross discovered two additional populations on the Rogue River-Siskiyou National Forest, one in the Signal Buttes meadows adjacent to the Hunter Creek ACEC, and the other site in the Windy Valley Meadow (See Map 1).

Aside from the single sighting near Cape Ferrelo, all confirmed coastal *Polites mardon* populations occur in a small geographic area to the east of the city of Gold Beach in the coast range of Southwest Oregon. All of the sites are encompassed in an area that is approximately 12 miles (N-S) by 12 miles (E-W) (see map 1). All of the sites are relatively small [1 to 10 ha (2.5 to 25 ac)] and between the elevations of 595 and 900 m (1,952 to 2,952 ft).

Species Life History

Mardon skippers are part of the grass feeding butterfly family Hesperiidae, meaning the larvae feed exclusively on graminoids. Recent studies have revealed some of the ways in which Mardon skippers utilize their habitat.

Mardon skippers are univoltine, completing one life cycle annually (James & Nunnallee 2011). Individuals live between five days and two weeks. Adults do not all emerge on the same date, so the duration of flight period at a given site depends, in part, on the population size at that site (pers. obs.). Sites with large populations may have a flight period that extends for more than a month, whereas sites with small populations may have adults present for only ten or fewer days. Weather influences emergence and flight period duration. Wet or cold conditions delay emergence and conversely, warm, dry conditions promote earlier emergence (Potter *et al.* 2002).

We have little information on specific life history traits on the southern Oregon coast but we can make some inferences from what we know from other areas. In the Oregon Cascades, adult Mardon skippers eclose from late May to early July. Adults actively nectar throughout their flight period, and seek refuge from adverse weather low in the vegetative turf under grasses and forbs. Females lay eggs singly into graminoid bunches while perched (Beyer & Black 2007, Beyer & Schultz 2010, Henry & Schultz 2012). Eggs are thought to hatch within seven days (Black & Vaughan 2005), and larvae feed through the late summer into the fall.

It was previously believed that pupae hibernate through the winter (Potter *et al.* 1999, Dornfeld 1980, and Newcomber 1966 in Potter *et al.* 1999), but preliminary studies of flagged Mardon skipper larvae in the field by Beyer and Black (2007, See Figure 2) suggests that Cascade populations overwinter in the larval life stage. Studies from lower elevation sites in the South Puget Sound also indicate that the species overwinters as larvae (Henry & Schultz 2012). In addition, in captive rearing studies, some mardon skippers appear to enter diapause and overwinter as larvae, although some do enter diapause as pupae in captivity (Kerwin & Huff 2011; Mary Jo Anderson, pers. comm.).

Occupancy by Mardon skippers in meadow habitats is patchy; distribution is rarely homogeneous across an entire site (Beyer & Black 2007). This is likely dependent upon microclimatic conditions (e.g. Ehrlich 1992), and may be associated with palatability of the host plant due to proximity to a water source. Butterfly populations are constrained by temperature (Crozier 2003, 2004) and are restricted to especially warm macro- and microhabitats in temperate climates (Thomas *et al.* 2001). The small tufts of vegetation and open habitat structure selected by ovipositing females are likely to correspond to the warmest locations in the prairie or meadow (Forsberg 1987, Stoutjesdijk & Barkman 1992).

Figure 1: Mardon skipper (*Polites Mardon* ssp. *klamathensis*). Photo by Donald H. Gudehus.

Female *P. mardon* have been observed ovipositing on multiple graminoid species, indicating that the larvae may be generalists (Beyer & Schultz 2010). Although *P. mardon* do not select for specific graminoids during oviposition, they do exhibit plant specificity within localities. In Washington State, for example, *P. mardon* exhibits oviposition

preferences for *Carex* spp. at one location and *Danthonia* spp. at another nearby location (Beyer & Schultz 2010). Yet, when Idaho fescue (*Festuca idahoensis)* is present in the southern Puget Trough, it is generally preferred by ovipositing females (Beyer & Schultz 2010). At the two sites studied in Oregon, California oatgrass (*Danthonia californica*) was the most frequently utilized oviposition plant, although Mardon skippers also fed on Roemer's fescue (*Festuca idahoensis* ssp. *roemeri*) when available (Beyer & Black 2007). Variables such as graminoid structure and tree shading also influence oviposition behavior. The degree to which these preferences are shown depends on the specific habitat available to each Mardon skipper population (Beyer & Schultz 2010, Henry & Schultz 2012).

Figure 2: Mardon skipper larva in fescue. Photograph by Loni Beyer.

Recent Searches for Mardon Skipper in Coastal areas of Southern Oregon and Northern California.

The Xerces Society has completed dozens of surveys in areas of Northern California near extant sites (Jepsen *et al.* 2007, Black *et al.* 2008) and Dana Ross has completed some surveys along the coast in southern Oregon. The Xerces Society has also completed limited surveys in in the Illinois Valley looking to see if populations of Mardon exist between the coastal and inland Cascade sites. Since all sites in this region have low population sizes and have been found within the last 5 years, it seems that additional surveys are warranted. Dana Ross makes recommendations about potential habitat in his reports to the Rogue River – Siskiyou National Forest (Ross 2007, 2008, 2009, 2010). Additionally, Kip Wright (Wildlife Biologist-BLM) notes that there are several lower elevation meadows within the

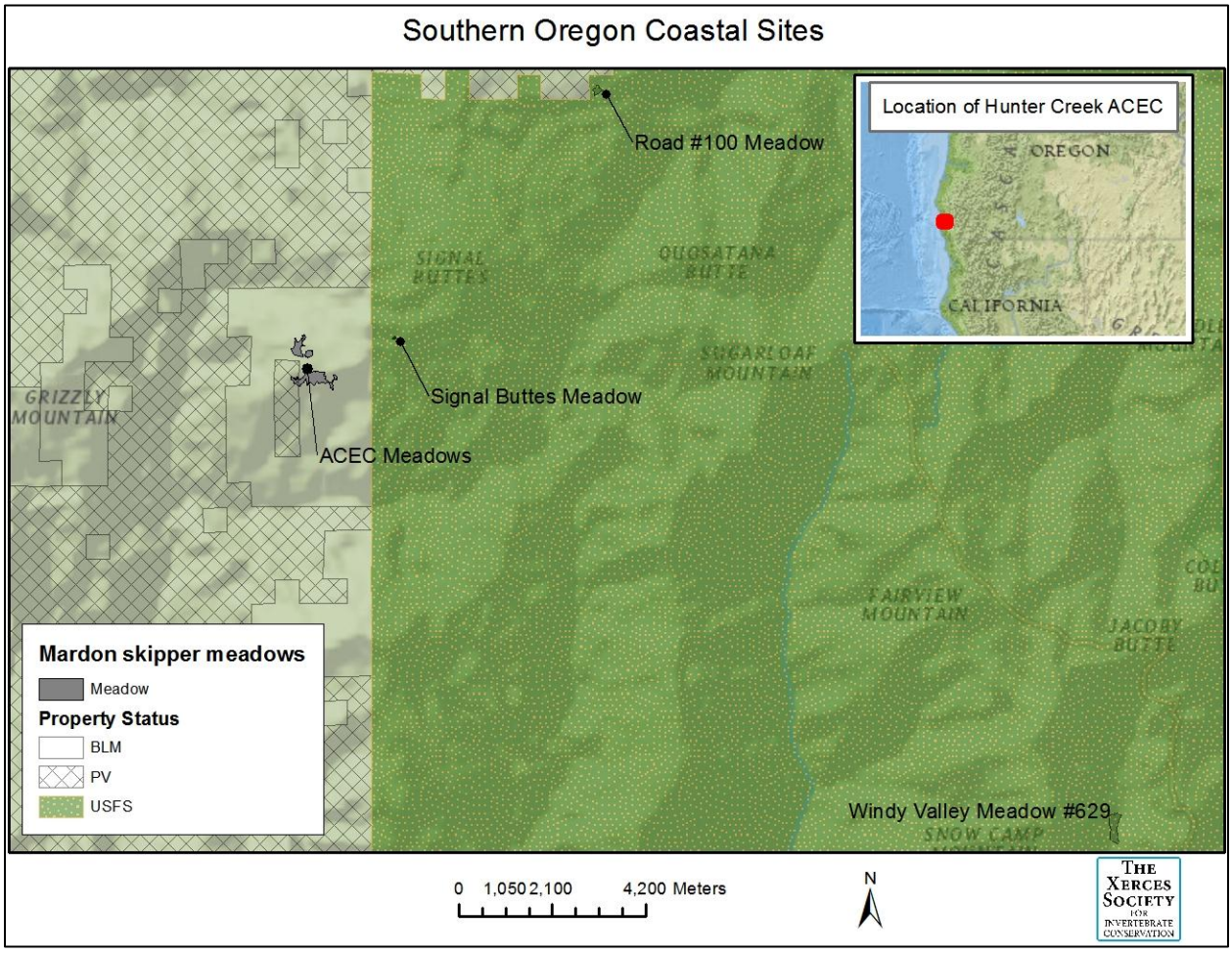
Hunter Creek ACEC that may warrant searching (Kip Wright, pers. comm.).

Status on the Hunter Creek ACEC

Two sites are known from the Hunter Creek ACEC and both of these sites had extant populations during our site visits in 2012. Our one-day counts (minimum population estimates) near the peak of Mardon skipper flight season were: Meadow 3 had 9 Mardon skippers and Meadow 5 had 3 Mardon skippers (Table 1).

Table 1: One day population counts at all known Hunter Creek BLM Mardon skipper sites from surveys. Surveys in 2008 and 2009 were not done by The Xerces Society.

Site	2008	2009	2012
Meadow 3	10	2	9
Meadow 5	1	No data	3



Map 1: Mardon skipper (*Polites mardon*) sites in the southern Oregon coast region.

Threats

Mardon skipper populations face a variety of threats, including: issues related to small population size and stochastic events; climate change; grazing by domestic livestock; conifer, shrub, and grass encroachment; prescribed and natural fire; off road vehicle (ORV) use in meadows; recreation (including camping); and applications of Btk.

Small Populations

Small and fragmented populations are generally at greater risk of extinction from normal population fluctuations due to predation, disease, and changing food supply; as well as, from natural disasters such as droughts (*reviewed in* Shaffer 1981). Small populations are also threatened with extinction from a loss of genetic variability and reduced fitness due to the unavoidable inbreeding that occurs in such small populations (*reviewed in* Shaffer 1981). The mardon skipper is known from a total of 9 sites in Southwest coastal Oregon and Northwest California – most separated by a distance of over two miles. During adult flight, mardon skippers avoid heavily forested habitats and are assumed to have limited dispersal abilities (Beyer & Schultz 2010, Beyer & Black 2007, Runquist 2004). Therefore, there is little opportunity for the individual populations to intermix.

Climate Change

Global climate change could threaten the mardon skippers' survival. Assessment of climate change trends in North America has already revealed changes in precipitation patterns, hydrology, and plant bloom time (Intergovernmental Panel on Climate Change 2007). Overall, annual mean air temperature increased in North America from 1955-2005 (Intergovernmental Panel on Climate Change 2007). The effects of global climate change are projected to include warming in the western mountains, causing snowpack and ice to melt earlier in the season (Field *et al.* 2007), which will have an impact on mardon skipper sites as all are associated with permanent, ephemeral, or subsurface water. These climatic changes may lead to drier summer conditions, particularly in arid western areas where snowmelt is important to maintaining ephemeral water sources. Spring and summer snow cover have already been documented as decreasing in the western United States, and drought has become more frequent and intense (Intergovernmental Panel on Climate Change 2007, Saunders *et al.* 2008). Because the mardon skipper is associated with wet areas, its survival may be threatened by climate change induced habitat impairments. Moreover, since fewer seedlings and saplings will die in warmer winter and spring temperatures, and models predict an increase in fall precipitation, climate change seems to improve conditions for increased shrub and tree encroachment in open meadow habitats (Widermaier & Strong 2010). Although management at the population scale cannot directly address global climate change, providing quality habitat at multiple sites across the landscape may make this species more resilient to climate change impacts.

Threats Related to Management Activities and General Recommendations

Below we provide information on threats and general recommendations for managing grazing, conifer encroachment, prescribed fire, ORV use, invasive plants and Btk applications. For information on management at the BLM Hunter Creek Management Unit, please see site specific information in Section 2 of this document. Mardon skippers persist

in open prairie and meadow ecosystems. These ecosystems are naturally maintained by disturbance (Coop & Givinish 2007). Yet, a delicate balance is needed to create sufficient disturbance to restore and maintain the system without creating so much disturbance that the habitat is further degraded (Schultz & Crone 2008).

Livestock Grazing

Graminoid cover, composition, and structure are important for Mardon skippers (Beyer & Schultz 2010) as they provide larvae with adequate food, microclimate, and protection from predation and parasitism. Livestock grazing can adversely impact butterfly populations directly by trampling during immobile life stages (egg, larvae, pupae), or during cool temperatures when adult movement is restricted (Warren 1993). Grazing can also be detrimental to butterfly populations indirectly by altering plant community composition (Stoner & Joern 2004) and stripping habitat of vegetation, removing adult nectar resources, introducing invasive weeds (Hayes & Holl 2003) and changing meadow hydrology (Belsky *et al.* 1999). In a study on the Dakota skipper (*Hesperia dacotae*), Dana (1997) found that grazing cattle reduced skipper numbers in direct proportion to grazing intensity. However, light-rotational grazing can maintain vegetation heights and habitat heterogeneity favorable to some butterflies (Ravenscroft 1994). For instance, the silver spotted skipper has not only shown a positive response to moderate grazing, but depends on it to maintain the structure of its host plant (Davies *et al.* 2005, Thomas & Jones 1993). In order for grazing to have a minimal impact on the Mardon skipper, the combination of timing, intensity, and duration must be found that is best suited for the specific ecology of the butterfly. In some sites the correct solution may be to eliminate grazing, while in other sites some grazing at the appropriate time of the year may not negatively impact the site. The timing and frequency of livestock rotation depends on both the size of the herd and the size of the grazed area (Schtickzelle *et al.* 2007). Generally speaking, grazing periods should be short with relatively long recovery periods for the habitat, and grazing should not take place during the adult flight period since butterflies are utilizing nectar sources and looking for oviposition sites during this time.

In southern Oregon, adult Mardon skippers require plentiful floral nectar for survival, successful reproduction, and adequate egg production from late-May through early July. Livestock grazing during this period reduces or altogether removes key nectar resources. Likewise, grazing when butterfly larvae are active on host plants can result in direct mortality or removal of important larval vegetation (Smallidge & Leopold 1997). In Oregon, Mardon skipper larvae are believed to be active from approximately late April through October, although this window of activity varies, and is probably influenced by the microclimate of each site.

Since grazing has already been removed from the Hunter Creek ACEC, we provide this information for future reference. There is some site specific evidence that an absence of grazing can lead to an increase in tall stature grasses, and therefore exclude Mardon skippers (Runquist 2011). We did not see any threat of this within the Hunter Creek ACEC, but deserves consideration during future monitoring.

General Recommendations

- Management that eliminates the threats from livestock grazing is best.
- If livestock grazing is unavoidable, follow the recommendations below:
    - Do not allow grazing within Mardon skipper habitat during the flight period of the adult Mardon skipper. August 15th would be the earliest acceptable start time and ideally after October 1.
    - Keep grazing periods short, with recovery periods for the habitat relatively long.

Forest Encroachment

Due to the local (cluster of habitat patches) and regional (four disjunct populations in WA, OR and CA) distribution of mardon sites, there is considerable evidence that the mardon skipper exhibits metapopulation dynamics. Metapopulations are defined as regionally distributed populations that are interdependent over time. There are many models of metapopulations, but a central theme to all of them is frequent local extirpations of individual habitat patches and subsequent recolonization, or rescuing, from nearby successful populations. In order for metapopulations to survive over time, there must be some opportunity for connectivity between patches of habitat. Considering changes in fire regime and land use, the connectivity of the landscape has changed significantly since 1950 (Coop & Givinish 2007, Norman & Taylor 2005). A 1995 study noted a 39% decrease in forest openings (meadow habitat) in the Klamath Mountains between 1944 and 1985 indicating significant forest encroachment in this time (Skinner 1995). Much of this forest encroachment happened along meadow connections, leading to further isolation of individual forest openings. Skinner (1995) also found that the median distance to the nearest forest break had doubled between 1944 and 1985. A similar analysis in the Oregon Cascades found that the proportion of meadows occupied by trees increased from 8% to 35% between 1950 and 2007 (Zald *et al.* 2012).

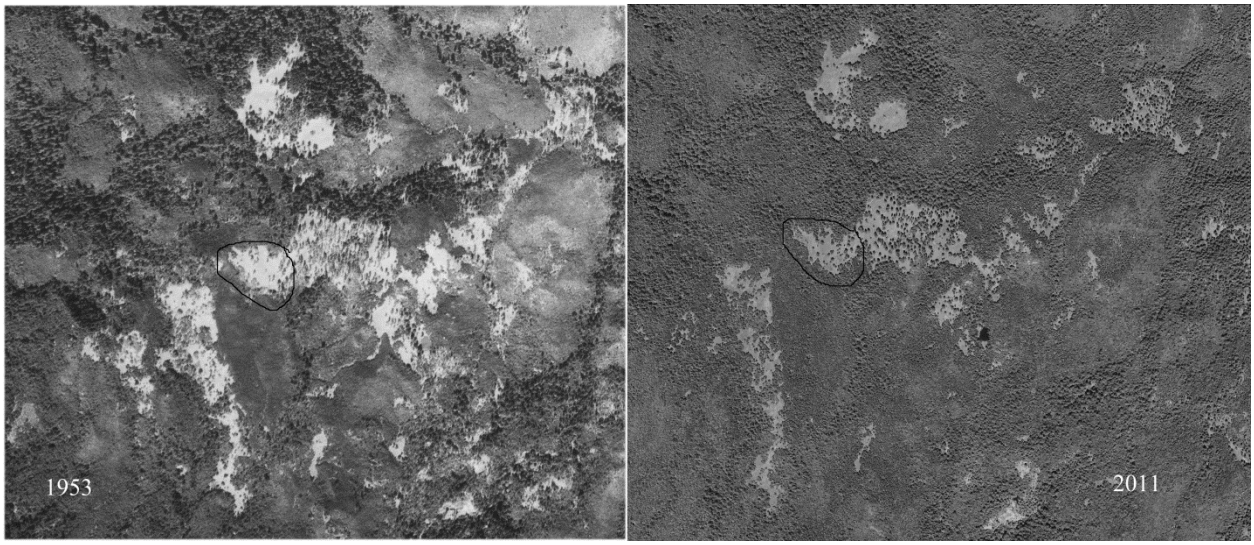


Figure 3: Aerial photographs of Hunter Creek ACEC from 1953 (left) and 2011 (right). Note the openness of the habitat in 1953 and the level of forest encroachment by 2011.

During the adult flight, mardon skippers avoid heavily forested habitats, avoid forest edges and trees during oviposition, and are assumed to have limited dispersal abilities (Beyer & Schultz 2010, Beyer & Black 2007, Runquist 2004). Large dense shrubs likely have a similar adverse impact as encroaching trees to the habitat and behaviors of this butterfly. Because of the limited dispersal abilities of mardon skippers, these changes have likely isolated remnant populations and reduced the probability of recolonization in the event of a local extirpation (Roland & Matter 2007). The lack of genetic interchange and movement of individuals between populations will likely lead to lower overall fitness and extinctions of local populations. A better understanding of the feasibility and the effects of reconnecting neighboring mardon skipper populations that have been isolated by forest and shrub encroachment is warranted (Bergman 1999, Dennis *et al.* 2006).

General Recommendations

In areas where tree and shrub encroachment are occurring, small trees and problematic shrubs should be removed as soon as possible, before they grow larger and reproduce. A plan should be developed that removes trees using methods that incorporate sensitivity to the butterflies' life history. Ideally, the plan would include the following:

- Remove all small trees under 4 inches Diameter at Breast Height (DBH) from the open meadow portion of the site.
- Wherever possible, cut by hand with chainsaws or handsaws.
- Remove all downed wood and branches from the meadow area.
- Take care to avoid actions that could degrade habitat and kill individual skippers as a result of heavy equipment use, people trampling meadows, scattering or piling of trees or branches in meadows, or burning of piles in or adjacent to the core area of the site.
- Maintain a buffer of large trees at the edges of meadow since they may play an important role in maintaining the microclimate and hydrology of the local habitat. If thinning is needed for fuels and/or ecosystem needs only remove small diameter trees. If additional tree removal is needed consult with someone familiar with the effects of habitat restoration, mardon skipper biology, and their distribution within the meadow.
- If openings between meadows have closed off due to encroachment, ideally a plan would be developed to improve connectivity, especially if adjacent or nearby meadows have suitable Mardon skipper habitat and/or are known occupied sites.
    - If plans for opening meadow connections are pursued, pay careful attention to the hydrology within and between meadows, and where possible, do not alter the current situation. A change in meadow hydrology could dramatically affect Mardon skipper habitat.

An issue within the ACEC meadows that could be addressed is the general reduction of meadow size and connectivity that has occurred within the last 100 years (see figure 3). This would involve a site specific management plan to select larger trees for removal. Consult a habitat restoration specialist familiar with mardon skipper biology and

distribution in the meadow to develop any management plan that would involve removing larger trees.

Prescribed fire

Due to the importance of fire in maintaining many native ecosystems, the use of controlled burning as a management tool has become increasingly common. The effects of fire on vegetation and vertebrate communities are more widely understood than the effects of fire on invertebrates. Fire can benefit, harm, or have no significant effect on invertebrates depending on the biology of the specific taxa (Gibson *et al.* 1992). Burning of meadows with populations of butterflies, such as the Mardon skipper, could extirpate the population if not done with careful consideration of butterfly behavior and life stage at time of burn, and knowledge of where the skipper population is distributed across the meadow. In addition, with isolated populations, there are often no source populations available for re-colonization once a population has been locally extirpated.

A recent study on prescribed burning and the Mardon skipper in California showed substantially fewer butterflies in the burned areas of meadows compared to unburned areas after one, two, and three years following the burn event (Black *et al.* 2011). Counts for all four zones across all survey dates in 2009, 2010, and 2011 showed mardon numbers that ranged from 2 to 27 times higher in unburned zones compared to burned zones on the same dates (Black *et al.* 2011).

Burning meadows that contain populations of Mardon skippers may kill all butterflies within the fire area, as this species is thought to overwinter as a caterpillar at the base of its host plant, and is thus highly susceptible to ground fires. If controlled use of fire within a Mardon skipper occupied site is feasible, and there is a management goal that can be best accomplished with controlled burning, then specific steps must be employed in order to protect the Mardon skipper.

Figure 4: Controlled burn at a Mardon skipper site in California. By Brenda Devlin

General Recommendations *(Note: Develop management plans for each site before implementing a prescribed burn)*
A careful and well-researched prescribed burning regimen should provide the correct combination of timing, intensity, and size that is appropriate for the management area and will result in long-term stability of Mardon skipper populations.

- Do not burn more than one-third of the core habitat in any given year, and less if possible.
- As a fire moves through an area it may leave small patches unburned. Leave these skips intact as potential micro-refuges.
- Develop a comprehensive monitoring program to accompany any plans for continuing burns to determine the immediate and long-term impacts on Mardon skipper populations. Delay additional burns until there is full re-colonization of burned areas by mardon skippers.
- While implementing a burn plan, measures must be taken to avoid actions that could degrade existing habitat and kill individual skippers, including heavy equipment use and additional or excessive foot traffic by burn staff in mardon meadows.
- Since mardon skipper larvae are active April through October, the best time of year to conduct a burn is after October 15.

Off Road Vehicles

Mardon skipper eggs, caterpillars, pupae, and adults are killed by recreational activities such as off-road vehicle (ORV) driving (Potter *et al.* 1999). These activities can also damage native host plants and may lead to an invasion of non-native plant species. ORVs aid the dispersal of invasive non-native species deep into forestlands. One study found that in just one trip on a 10 mile course, an ORV dispersed 2,000 spotted knapweed seeds (MSU 1992). In Wisconsin, a survey of seven invasive plant species along ORV routes found at least one of these (exotic) plant species on 88 percent of segments examined (Rooney 2005).

Figure 5: Off road vehicle signage in the adjacent Rogue – Siskiyou National Forest. Photo by Rich Hatfield.

General Recommendations

In areas with ORV traffic, colse off access to Mardon skipper habitat areas and educating the public on the detrimental impacts of this form of recreation to sensitive habitats.

Use of Btk

Btk *(Bacillus thuringiensis* var. *kurstaki*), a Lepidoptera-specific insecticide, has been widely used to treat defoliators in western forests (Wagner & Miller 1995). Btk is a bacterium which, when ingested, is lethal to

butterfly and moth larvae.

Species such as the Mardon skipper that are univoltine with spring-active larvae, that feed during the application period for the target species are especially vulnerable to Btk (Wagner & Miller 1995). Because of the Mardon skipper's current patchy distribution on isolated sites and low vagility, its populations are even more threatened by Btk applications due to the decreased probability of re-colonization.

The threat of Btk is heightened because Btk has been shown to drift at toxic concentrations for distances greater than two miles from target spray areas (Barry 1993 and Whaley *et al.* 1998). As a result, aerial spraying with Btk can have significant adverse effects on Mardon skippers in the general area of an aerial Btk spray project.

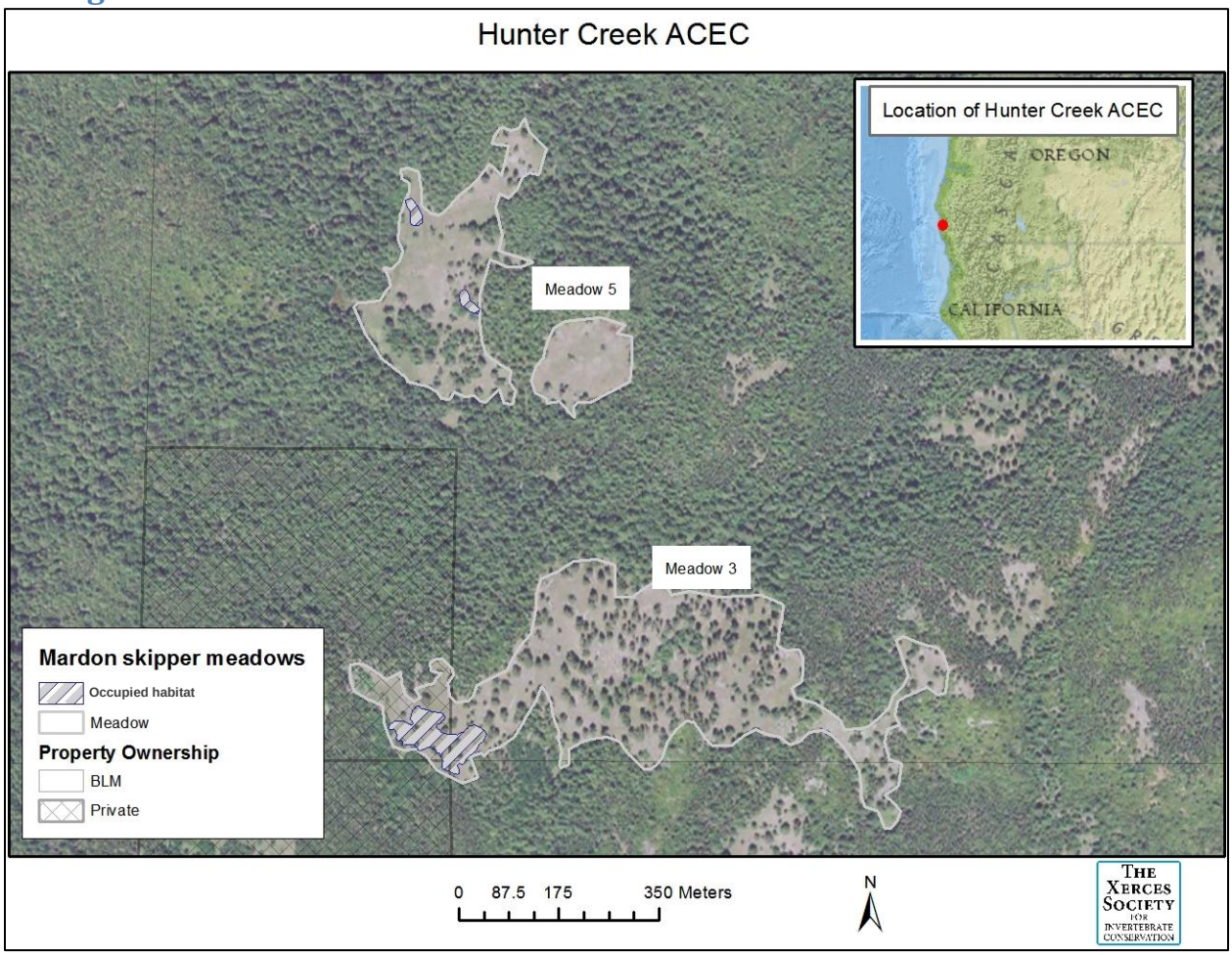
General Recommendations

Do not spray Btk on forested areas within two miles of any Mardon skipper population.

Section 2: Management Plans

Suggested management at each site is detailed below. In the case of forest encroachment, more than one alternative is given to managers to allow for some flexibility. We did not include a no-action alternative in these plans as the available information suggests that action is needed at these sites to ensure survival of the rare butterfly.

Management Unit 1: Hunter Creek ACEC – BLM



Map 2: Overview of the Mardon skipper habitat in the Hunter Creek ACEC management unit.

Site Priorities

All of the remaining extant Mardon skipper sites on the Hunter Creek ACEC lands are critical to the survival of this rare butterfly, thus all extant sites are considered high priority (Table 2).

Table 2: Site priority of Mardon skipper sites on The Hunter Creek ACEC in Southern OR, based on a scale of 1-4, with 1 indicating the highest priority. Priority is based on population size and opportunity for management that may help populations.

Management Unit	Site	Priority
MU1	Hunter Creek ACEC MDW 3	1
	Hunter Creek ACEC MDW 5	1

Site Name: Meadow 3

Coordinates (centroid of occupied area): -124.315903 W, 42.396613 N

Goal of the Site Management Plan

Sustain extant Mardon skipper populations by ensuring that existing ORV use closures are effective, monitoring for forest encroachment, removing invasive species, and developing a site specific management plant to remove some large trees to provide connectivity to nearby sites.

Site Distribution, Abundance, and Trends

Mardon skippers are distributed in small patches of habitat in the western portion of meadow 3. A private property boundary runs through this portion of the meadow and much of the mardon habitat occurs on private land. The upland area of this meadow is mostly comprised of taller stature grasses, however, there does appear to be some suitable habitat. However, the upland habitat is sparsely populated with large trees, which makes the movement of Mardon skippers to these habitat patches unlikely.

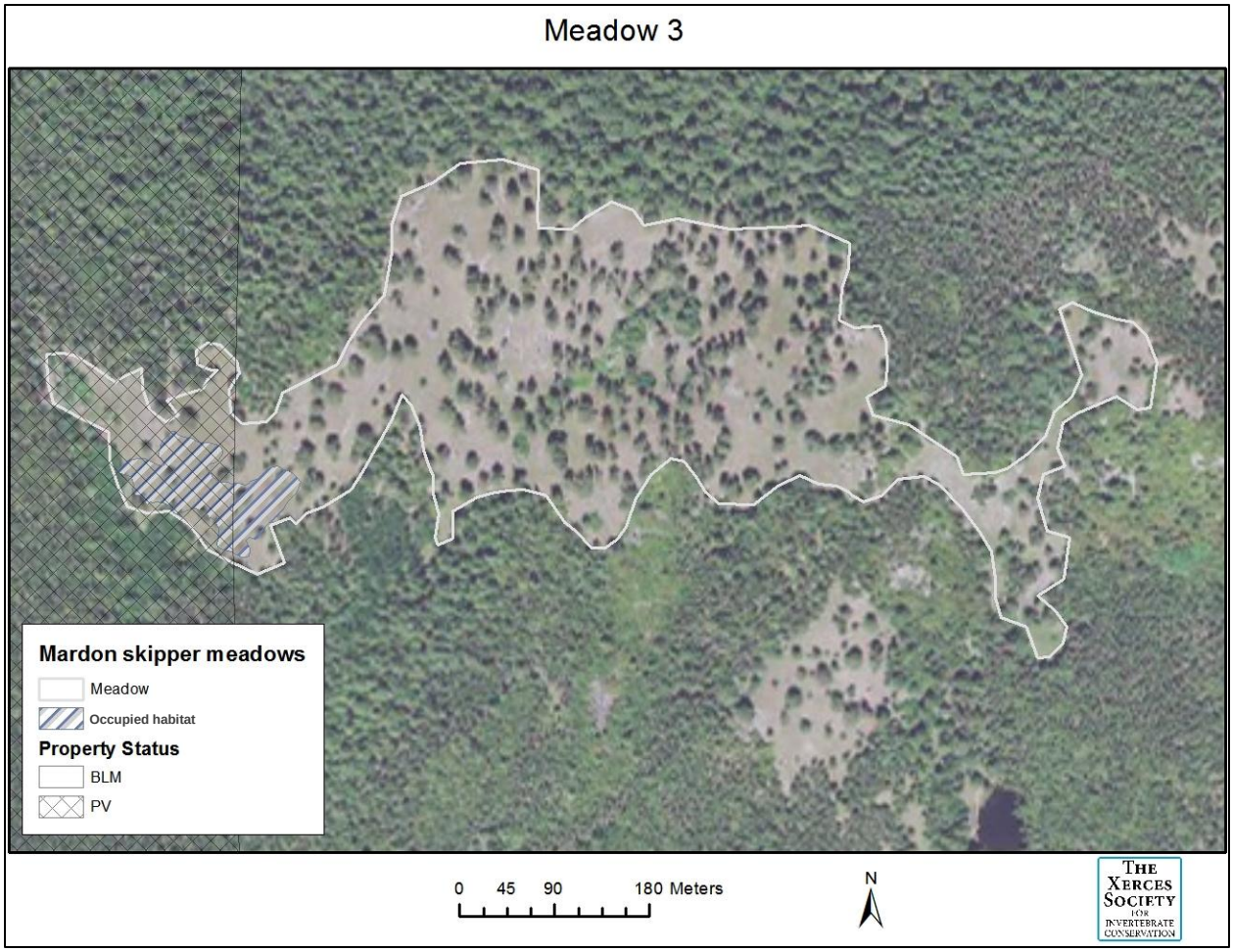
It is not possible to estimate the maximum population size from one day counts that only occur once per season, but the population at the site appears to be relatively small. The highest one day count was 10 individuals (2008) and the lowest one day count was 2 individuals (2009). Nine individuals were counted in 2012 (See Table 1).

Site Description

Meadow 3 is a relatively large meadow, but it appears that only a small portion is used by Mardon skippers. The portion of the meadow that is used by Mardon skippers is interspersed with wet patches that have small tufts of grasses interspersed with forbs, exposed rock and bare soil. The upland portion of this meadow is savanna-like with taller stature grasses underneath an understory of Jeffrey pines. Among this upland portion of meadow, there are patches of open habitat that look suitable for Mardon skippers, but none have ever been located there. Future surveys seem worthwhile, as would efforts to establish corridors for travel between these habitat patches through the savanna-like matrix. The western portion of the meadow, which contains much of the core mardon skipper habitat, is on private land.

Site Threats

Many of the site threats have already been mediated at this site. Grazing has been eliminated and efforts to clear encroaching trees have been accomplished through removal and the girdling of trees. Two minor threats at this site are the possibility of the spread of invasive species (e.g. Canada thistle) and potential ORV use.



Map 3: Mardon skipper habitat and occupied area in Meadow 3 in the Hunter Creek ACEC.

Site Management History and Current Land Allocations

Since 1995 this area has been designated as an Area of Critical Environmental Concern (ACEC). The original designation came because there were 9 documented special status plant species and 4 special status animal species and the region contains the only Jeffrey pine-Oregon white oak forest within 10 miles of the ocean. The designation as an ACEC means that a dedicated management plan has been drafted, and careful management is evident within the ACEC. However, the management plan was written before the mardon skipper was discovered on the land, and additional management considerations are listed below. The Hunter Creek ACEC is designated as Administratively Withdrawn within a Late-Successional Reserve as defined in the Northwest Forest Plan. Limited silvicultural treatments are permitted when they will benefit late successional characteristics, or reduce the risk of catastrophic fire. There are also specific plans to consider sensitive species in all management activities and a plan to control noxious weeds (USDI, BLM 1996). The Hunter Creek ACEC has never formally been part of a grazing allotment, however, as the ACEC is adjacent to both USFS land (Rogue River-Siskiyou National Forest) and private land, cattle have occasionally made their way onto the ACEC, but are aggressively moved off of the land if they are discovered (Kip Wright, pers. comm.).

Management Needs

Alternative 1 (Recommended Alternative)

Surveys

- The population of mardon skippers at this meadow is small and the distribution within the meadow is not fully known. Annual surveys for 3 years with multiple visits to each meadow per year during the adult flight period would help map the distribution of the mardon skipper within the meadow, and perhaps identify other patches of occupied habitat.

Cattle Grazing

- Maintain the current prohibition of livestock grazing on the Hunter Creek ACEC.
- Monitor vegetation for potential changes in structure and species composition.

Forest Encroachment

- Recommendation 1: Develop a site specific management plan to create habitat corridors within meadow 3, but outside of the occupied habitat, to allow movement for Mardon skippers.
    - Since this would involve the removal of large trees and has the potential to negatively impact Mardon skipper habitat, pay particular attention to hydrology and microhabitat conditions throughout the meadow system. It would be best to have the site specific management plan reviewed by a biologist familiar with mardon skipper biology, distribution within the meadow, and the effects that tree removal has on habitat.
- Recommendation 2: There are several large conifers that have encroached in the meadow within the occupied mardon skipper habitat (See Map 3). In the occupied habitat, remove or girdle all trees less than 8" DBH.
    - Consult with a biologist familiar with mardon skipper biology, distribution within the meadow, and the effects that tree removal has on habitat to mark specific trees for girdling or removal.
    - A site specific plan that ensures that care is taken to avoid actions that could degrade habitat and kill individual mardon skippers as a result of heavy equipment use, people trampling meadows, piling of trees in meadows, or burning of piles in or adjacent to the mardon skipper habitat area identified in Map 3.
    - If the trees are removed, rather than girdled, follow these recommendations:
        - *Remove trees with chainsaws or handsaws.*
        - *Care must be taken to avoid actions that could degrade habitat and kill individual mardon skippers as a result of heavy equipment use, people trampling meadows, piling of trees in meadows, or burning of piles in or adjacent to the mardon skipper habitat area identified on Map 3.*

- *Maintain a buffer of large trees at the edges of the meadow since they may play an important role in maintaining the microclimate and hydrology of the local habitat. If thinning is needed for fuels and or ecosystem needs, remove only small diameter trees If additional tree removal is needed consult with someone familiar with the effects of habitat restoration, mardon skipper biology, and their distribution within the meadow.*

Figure 6: Small burn pile within the ACEC with encroaching Canada thistle.

Invasive species

- Limited patches of Canada thistle were observed in the meadow and along the trail leading to the meadow from the east (see Figure 6).
- Actively and aggressively control this invasive species before it spreads throughout the meadow and into mardon skipper habitat.
- Use herbicide applications that are specific enough to avoid spraying non-target forage plants and host plants.

Off Road Vehicles (ORVs)

- The road closure on the adjacent Rogue River-Siskiyou National Forest is insufficient to prevent vehicular access to the ACEC, especially motorcycles [see Figure 7 (left)].
- Place boulders, a gate, or logs at the trail entrance [Figure 7 (right)] to the ACEC to prevent ORV access.

Alternative 2

Surveys

- Follow the recommendations in Alternative 1.

Cattle Grazing

- Follow the recommendations in Alternative 1.

Forest Encroachment

- **Follow only recommendation 2 in Alternative 1.**

Invasive Species

- Follow the recommendations in Alternative 1.

Off Road Vehicles (ORVs)

- Follow the recommendations in Alternative 1.

Figure 7: Road near parking area, with closure sign (left) and signage leading into the ACEC (right). Note the obvious signs that ORVs are ignoring the road closure and driving directly over the sign (left).

Site Name: Meadow 5

Coordinates (Centroid of occupied area): -124.316286 W, 42.402726 N and -124.315446 W, 42.401683 N

Goal of the Site Management Plan

Sustain extant Mardon skipper populations by ensuring that existing ORV use closures are effective, monitoring for forest encroachment, removing invasive species and, if possible, developing a site specific management plan to remove some large trees to provide connectivity to nearby sites. Since the population at this site is so small, and mardon skipper appear to be using more than one part of the meadow, additional effort is needed to map the extent of the mardon skipper habitat. The recommendations below are based on our best knowledge to date; gathering more thorough population information through surveys in this meadow will better inform management recommendations.

Site Distribution, Abundance, and Trends

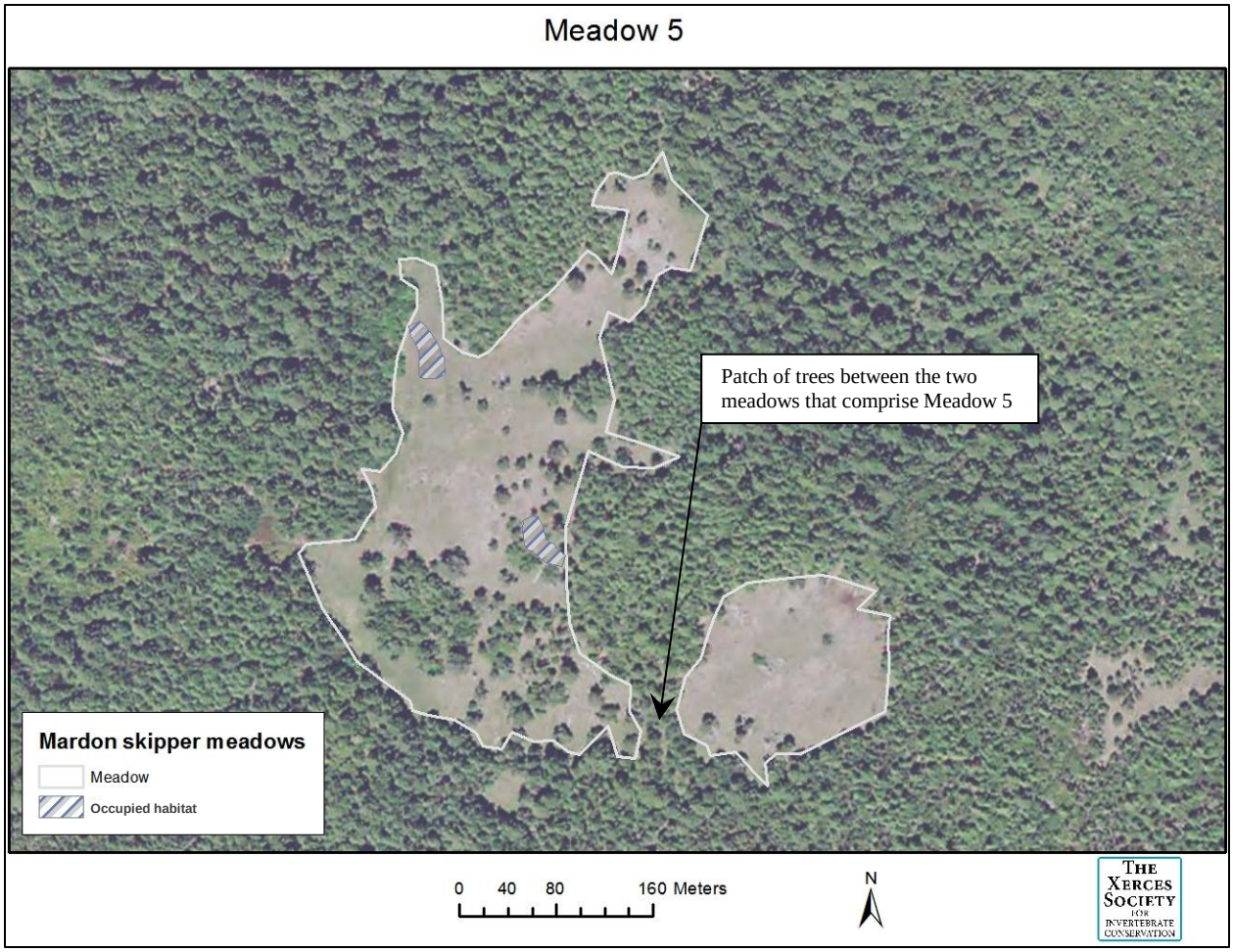
The Mardon skipper population at Meadow 5 appears to be quite small, although the infrequent observations and one-day counts do not allow for an estimate of the total population size or trends. Mardon skippers have been found in two separate locations in Meadow 5, both at about the same elevation near opposite ends of the meadow (see Map 4).

Site Description

Meadow 5 is a fairly large site that slopes from NNE down to SSW. Meadow 5 is actually broken up into two separate meadows, a small circular meadow and a larger triangular meadow separated by a distinct band of trees. The distance between the two meadows is about 40 meters. Mardon skippers have never been located in the smaller, circular, more northeastern of the two meadows, although there appears to be suitable habitat with plenty of suitable host and nectar plants available. Further searches in this smaller meadow, as well as an effort to reconnect the two meadows so that Mardon skippers can more easily move between them are warranted. There are several additional areas in the larger, triangular-shaped meadow that appear to provide suitable habitat conditions (short stature grass, a moisture gradient, and abundant nectar and host plants) as well.

Site Threats

The threats at Meadow 5 appear to be largely mediated. Grazing has been eliminated, which is important for this species. Efforts have also been made to curb conifer and tree encroachment through girdling and tree removal; although there is still work that can be done. Remaining threats appear to be the potential for ORV use, forest encroachment closing connections between meadows, invasive Canada thistle, and downed wood in the lower portions of the meadow.



Map 4: Mardon skipper habitat and occupied areas in Meadow 5 of the Hunter Creek ACEC Management Unit.

Site Management History and Current Land Allocations

Since 1995 this area has been designated as an Area of Critical Environmental Concern (ACEC). The original designation came because there were 9 documented special status plant species and 4 special status animal species and the region contains the only Jeffrey pine-Oregon white oak forest within 10 miles of the ocean. The designation as an ACEC means that a dedicated management plan has been drafted and careful management is evident within the ACEC. However, the management plan was written before the mardon skipper was discovered on the land, and additional management considerations are listed below. The Hunter Creek ACEC is designated as Administratively Withdrawn within a Late-Successional Reserve as defined in the Northwest Forest Plan. Limited silvicultural treatments are permitted when they will benefit late successional characteristics, or reduce the risk of catastrophic loss. There are also specific plans to consider sensitive species in all management activities and a plan to control noxious weeds (USDI, BLM 1996). The Hunter Creek ACEC has never formally been part of a grazing allotment, however, the ACEC is adjacent to both USFS land (Rogue River-Siskiyou National Forest) and private land, cattle occasionally have historically made their way onto the ACEC, but are currently aggressively moved off of the land if they are discovered (Kip Wright, pers. comm.).

Figure 8: Mardon skipper habitat in Meadow 5.

Management Needs

Alternative 1

Surveys

- The population of mardon skippers at this meadow is small and the distribution within the meadow is not fully known. Annual surveys for 3 years with multiple visits during the adult flight period to each meadow per year would help map the distribution of the mardon skipper within the meadow, provide a better estimate of population size, and perhaps identify other patches of occupied habitat.

Forest Encroachment

1. Develop a site specific management plan to recreate (see Figure 3) the habitat corridor between the two meadows that make up the Meadow 5 site of the Hunter Creek ACEC by removing larger trees to allow movement for Mardon skippers (See Map 4).
    - Consult someone familiar with the effects of habitat restoration, mardon skipper biology, and their distribution within the meadow when designing the specific management actions since it would involve the removal of large trees and has the potential to negatively impact Mardon skipper habitat if done incorrectly.
2. Remove downed wood (from previous efforts to curb forest encroachment) from the open meadow site and scatter into the nearby forest (see Figure 9). Downed

wood can change the growth structure of grasses, often encouraging taller stature grass (see Figure 9), which can exclude Mardon skippers.

Figure 9: Grass around downed wood changes its growth pattern and becomes taller stature, potentially excluding Mardon skippers.

Invasive species

- Limited patches of Canada thistle were observed in the meadow and along the trail leading to the meadow from the east (see Figure 6).
- Actively and aggressively control this invasive species before it spreads throughout the meadow and into mardon skipper habitat.
- Use herbicide applications that are specific enough to avoid spraying non-target forage plants and host plants.

Off Road Vehicles (ORVs)

- The road closure on the adjacent Rogue River-Siskiyou National Forest is insufficient to prevent vehicular access to the ACEC, especially motorcycles [see Figure 7 (left)].
- Place boulders, a gate, or logs at the trail entrance [Figure 7 (right)] to the ACEC to prevent ORV access.

Cattle Grazing

- Maintain the current prohibition of livestock grazing on the Hunter Creek ACEC.
- Monitor vegetation for potential changes due to a change in the grazing regime.

Alternative 2

Surveys

- Follow the recommendations in Alternative 1.

Forest Encroachment

- **Follow only recommendation 2 in Alternative 1.**

Invasive Species

- Follow the recommendations in Alternative 1.

Off Road Vehicles (ORVs)

- Follow the recommendations in Alternative 1.

Cattle Grazing

- Follow the recommendations in Alternative 1.

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