Mardon Skipper (*Polites mardon mardon*) Management Plans for Okanogan-Wenatchee National Forest, South Fork Tieton Subwatershed Sites on Forest Service Lands

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Photo by Joan St. Hilaire.

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SECTION 1: STATUS AND THREATS

Much of the information and some of the photographs in Section 1 were taken from the Management Plans for all Southern Oregon Cascade Mardon Skipper sites on BLM lands written by The Xerces Society (Black *et al.* 2010).

Background

The Mardon skipper (*Polites mardon)* was recently removed from the list of Federal candidate species under the Endangered Species Act (ESA) of 1973, as amended (U.S. Fish and Wildlife Service 2012). It is listed as a state endangered species by the Washington Fish and Wildlife Commission (WAC 232-12-014). The Mardon skipper is a Forest Service Region 6 and BLM Oregon/Washington Sensitive species; a rare butterfly in the Pacific Northwest of the United States. Mardon skippers are grassland and open meadow obligates endemic to the states of Washington, Oregon, and California (Kerwin 2011, U.S. Fish and Wildlife Service, 2012). Both Pyle (2002) and Runquist (2004) suggest that the Mardon skipper is an ancient species, although historic population data does not exist. The species' current range is known from four widely separated locations: (1) coastal northwest California (Del Norte County) and coastal southwest Oregon (Curry County); 2) Cascade Mountains of southern Oregon; 3) southern Washington Cascades; and 4) in the south Puget Sound of western Washington (Kerwin 2011, U.S. Fish and Wildlife Service, 2012). 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 *Polites mardon* ssp. *mardon*. The remainder of this review focuses on the subspecies *Polites mardon* ssp. *mardon.*

The Mardon skipper's disjunct distribution and strong association with early-seral, semi-mesic grassland habitat in the Pacific Northwest suggest a relict distribution that was likely much more widespread within each disjunct geographic region prior to the past 150 years of human development, livestock grazing, fire suppression and invasion of grassland habitat by native and non-native vegetation (Black *et al.* 2010, U.S. Fish and Wildlife Service 2012, Potter *et al.* 1999, Beyer and Schultz 2010, Schultz *et al.* 2011).

History and Taxonomy of Mardon Skipper in Southern Washington

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 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 a museum collection (Kerwin 2011). Until 1979, there were few known Mardon skipper locations in Washington: Gifford Pinchot National Forest; Yakama Indian Reservation-Mount Adams; and Seattle and Grand Mound in Western Washington (Kerwin 2011). In 1998, Washington's total population was estimated to comprise a few hundred individuals at nine occupied sites (Potter *et al.* 1999). In 2006, David James found the first Mardon skipper site on the Okanogan-Wenatchee National Forest, Naches Ranger District, which expanded its distribution an additional six miles north (St.Hilaire *et al.* 2008).

Species Biology

Mardon skippers are univoltine, completing one life cycle annually. Adults typically emerge between May and July, depending upon location and elevation of the site, with adults in higher elevation sites emerging later (U.S. Fish and Wildlife Service 2012). Individual adults 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 (Potter *et al.* 2002, Beyer and Black 2007). In large populations the flight period extends for more than a month, while small populations may have adults present for only ten or fewer days (Potter *et al.* 2002). 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).

Figure 1. Mardon skipper (*P. m. mardon*) pair. Photo by Carla Jaeger

Mardon skippers are non-migratory. Adults generally disperse distances of up to 0.25 mile (mi) or 0.4 Kilometers (km) over relatively short periods, but there appears to be very little dispersal beyond their natal meadow complexes (Runquist 2004). On occasion, individual males have been detected up to 1 mi (1.6 km) away from their original location (Runquist 2004). Mardon skippers have not been observed flying through closed-canopy forests, but they have been observed along open corridors such as powerlines or roads with nectar sources (Potter and Fleckenstein 2001).

It was believed that pupae hibernate through the winter (Dornfeld 1980 and Newcomer 1996 in Potter *et al*. 1999). However, preliminary field observations indicate that the larvae overwinter in diapause, and feed again in the spring before pupating (Henry 2009; Henry 2010; Beyer and Black 2007). Some capture reared larvae went into diapause in the larval stage, while others

diapaused as pupae (Kerwin 2011). This aspect of Mardon skipper life history is not well understood.

Recent studies have revealed some of the ways in which Mardon skippers utilize their habitats. Adults actively nectar throughout their flight period, and seek refuge from adverse weather low in the vegetative turf under grasses and forbs. After mating, females deposit single eggs into tufts of low growing grasses or sedges (host plants) (James and Nunnalle 2011). Eggs hatch in 7 to 10 days (Newcomer 1996, Henry 2010, Black and Vaughan 2005), and feed through the late summer into the fall. Larvae use silk to construct a tube-like structure "nest" at the base of the host plant (Beyer and Black 2007). They emerge from this shelter to feed on tender edges of leaf tips of host grasses (James and Nunalle 2011).

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

Species Habitat

Mardon skippers are part of the grass feeding butterfly family Hesperiidae, meaning the larvae feed exclusively on graminoids (grasses and sedges) (Scott 1986). The Mardon skipper's habitat requirements include food resources for adult (flower nectar), larval host plants (grasses and sedges), and site specific environmental and structural conditions that support successful reproduction and survival (U.S. Fish and Wildlife Service 2012). 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 (U.S. Fish and Wildlife Service 2012). Grassland patches that are as small as 0.5 ac (0.2 ha) are capable of supporting 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 (U.S. Fish and Wildlife Service 2012). Occupied sites generally retain sufficient moisture to maintain green leaves, for larval development (Beyer and Black 2007; Kerwin 2011). Meadows that are too wet

or dry do not support Mardon skippers. Mardon skipper adults have been observed to patchily occupy meadow sites; distribution is rarely homogeneous across an entire site (Beyer and Black 2007). This is likely dependent upon microclimate conditions (Ehrlich 1992), and may be associated with palatability of the host plant due to proximity to a water source. Site conditions and host plant selected by Mardon skippers vary across sites, indicating that the larvae may be generalist; capable of using multiple graminoids as larval food (Beyer and Schultz 2010). Although Mardon skippers are not selective for a specific grass species, they do exhibit host plant specificity at some localities (Beyer and Schultz 2010; Henry 2010).

In the southern Washington Cascades, the Mardon skipper is found in open grasslands and small mountain meadows within grand fir (*Abies grandis)*, Douglas-fir (*Psuedotsuga menziesii*), or lodgepole pine (*Pinus contorta*)/mixed conifer woodlands at mid to high elevation of 1,800 to 5,600 ft (549 to 1,707 m) (Potter *et al*. 2002). Occupied sites in the SF Tieton vary in size from small (0.42ac or 0.17ha) meadows to large forest/meadow complexes over 100 acres (St. Hilaire *et al.* 2010); occurring in montane meadows associated with wetlands, springs or riparian habitat (St. Hilaire *et al*. 2007, 2008, 2009 & 2010; Jepsen *et al*. 2007 and 2008). Elevation at these sites varies from 3,350 ft (1021 m) to 5,237 ft (1596 m) (St. Hilaire *et al*. 2008) (Appendix 1).

The short, open structure of the native bunchgrass plant community is important to adults in allowing egg deposition and access to nectar sources (Kerwin 2011). Henry (2010) found that Mardon skippers in Puget prairies preferred oviposition locations on widely spaced fescue bunchgrasses. In a study conducted by Beyer and Schultz (2010) of the Washington Cascades, female Mardon skippers were observed ovipositing on 23 different graminoid species. However, this analysis indicated that Mardon skippers are selective for certain grass species within different meadows. In Beyer's and Schultz's (2010) study, the most frequently used oviposition plant species included Kentucky bluegrass (*Festuca idahoensis*), timber oat grass (*Danthonia intermedia*), long-stolen sedge *(Carex inops*), and red fescue (*Festuca rubra*), with Kentucky bluegrass (*Festuca idahoensis*) used disproportionately more when present. The variety of identified oviposition plants in the Washington Cascades suggest 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). Due to the range of plant communities present at the Washington Cascade sites, there were no common habitat features across all study sites other than the presence of short-statured grass, and sedges (U.S. Fish and Wildlife 2012). In the SF Tieton sites, Mardon skippers have been observed ovipositing on onespike oatgrass (*Danthonia unispicata*), fescue (*Festuca* sp.) and sedge (*carex* sp.) (Erica Henry, Ann Potter and Sarina Jepsen, personal communication). Some or all of these grasses/sedges have been observed at all of the occupied sites in the SF Tieton. The following plant communities have been documented to occur within the Conrad Meadow Complex (this complex host the highest density Mardon skipper population known in the SF Tieton):

- western needlegrass (*Stipa occidentalis*)/ Kentucky bluegrass (*Poa pratensis*)/slender cinquefoil (*Potentilla gracilis*)
- Kentucky bluegrass (*Poa pratensis*)/hood sedge (*Carex hoodia*)/white clover (*Trifolium repens*)
- onespike oatgrass (*Danthonia unispicata*)/ hood sedge (*Carex hoodia*)/white clover (*Trifolium repens*)/ longstalk clover (*Trifolium longipes*)

In the SF Tieton sites, adult Mardon skippers have been observed nectaring on cat's ears *(Calochortus* sp.), yarrow (*Achillea millefolium*), vetch (*Vicia* sp.), strawberry (*Fragaria sp*.), and *Trifolium repens* (white clover), *Trifolium longipes* (longstalk clover), *Lupinus* sp. (lupin),

beard-tongue (*penstemon* sp.), cinquefoil (*Potentilla* sp.), and larkspur (*Delphinium* sp.) (St. Hilaire *et al.* 2007-2010; Jepsen *et al.* 2007 & 2008; U.S. Forest Service 2007-2012)

Species Range, Distribution, Abundance, and Trends

Historic Mardon skipper ranges and abundance are not known, as historical documentation of this butterfly is scarce, with most population surveys only occurring in the past decade (Black & Vaughan 2005). No estimates of abundance are known to have been made at any site prior to 1980 (Kerwin 2011, Potter *et al.* 1999). Mardon skipper abundance within a site, between sites and between years varies considerably (Kerwin 2011). Population estimates have been made for several Washington sites. However, abundance counts have not been conducted long enough nor has there been adequate population monitoring to determine population trends at any of the sites. Additionally, it is very difficult to conduct censuses during the entire flight period at multiple sites because of the variation in flight periods, even among sites near each other (Kerwin 2011). In 1998, the Washington Mardon skipper population consisted of a few hundred individuals present at only nine geographically isolated sites; three in Puget Sound and six in the southern Cascades (Potter *et al.* 1999). Between 2007 and 2010, extensive surveys in areas adjacent to known Mardon skipper sites have expanded the known range of the species along the northern California and southern Oregon coasts and on the Okanogan-Wenatchee National Forest and Yakama Reservation (Kerwin 2011). As of fall of 2010, due to the increased survey effort in areas not previously surveyed, the total number of known sites has increased to 145, encompassing 66 known populations (Kerwin 2011). Mardon skippers can be locally abundant where the species is present (Pyle 1989) with day counts of greater than 100 individuals documented at several sites across the species' geographic range (Black *et al.* 2010, St. Hilaire *et al.* 2010, Black *et al.* 2011). One day counts exceeding 1,000 individuals have been documented at one site on the Okanogan-Wenatchee National Forest (St. Hilaire *et al.* 2009). 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 (U.S. Fish and Wildlife Service 2012). All Washington confirmed *P. m. mardon* populations occur in the southern portion of the state; from the far west Puget Sound to eastern edge of the Cascades (U.S. Fish and Wildlife Service 2012).

Recent Searches for Mardon Skipper on Okanogan-Wenatchee National Forest

In 2006 David James found the first Mardon skipper site on the Okanogan-Wenatchee National Forest, Naches Ranger District, which expanded the distribution approximately six miles north of the nearest known population (St.Hilaire *et al.* 2008). On the Okanogan-Wenatchee National Forest, surveys between 2006 and 2012 located Mardon skippers at 39 sites including two sites with over 900 individuals each in 2008 and 2009 and three sites with at least 600 individuals in 2012.

Work by the US Forest Service, Washington State Department of Fish and Wildlife, The Xerces Society and others have added to our knowledge of the species distribution on Okanogan-Wenatchee National Forest (St. Hilaire *et al.* 2007, 2008, 2009, 2010; Jepsen *et al.* 2007, 2008). Since 2007, The Xerces Society has worked with the US Forest Service to survey over 50 potential sites on the Naches Ranger District of the Okanogan-Wenatchee Nation Forest. New sites or populations have been documented during each year that surveys have been completed. Three new sites were discovered during the 2012 field season, two of these sites were visited previous years and documented as not occupied by Mardon skippers. It is very likely that additional undocumented sites exist on the Naches Ranger District.

Status of Polites mardon ssp. mardon *on the Okanogan-Wenatchee National Forest*

Although the distribution is known and we have minimum population estimates for most sites, the status of *P. m. mardon* on the Okanogan-Wenatchee National Forest is unknown.

Status of Sites on the Okanogan-Wenatchee National Forest

In this plan, the term "site" indicates a specific location with species presence. Sites are usually mapped as distinct habitat patches, such as individual meadows in a summary report. Sites may include locations with a single Mardon skipper observation, or locations that support many Mardon skippers observed over multiple years. For the purpose of estimating the number of distinct 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). However, population delineation may be influenced by barriers to dispersal (e.g., dense forest) or other factors which could make occupied meadows separated by less than 0.5 mi not connected (Kerwin 2011). Management Units (MU) have been assigned to each population and listed below in Table 1. In this plan, we define "populations" as one to several sites depending on distance and dispersal capabilities between sites.

Of the 39 known sites on the Okanogan-Wenatchee National Forest, 21 occur within the South Fork Tieton Subwatershed. This plan will address 18 of the 21 sites within the South Fork Tieton Subwatershed; those 18 occur on land managed by the US Forest Service, whereas the remaining 3 sites occur on privately owned land (Map 1). These 18 sites make up 9 populations listed in Table 1.

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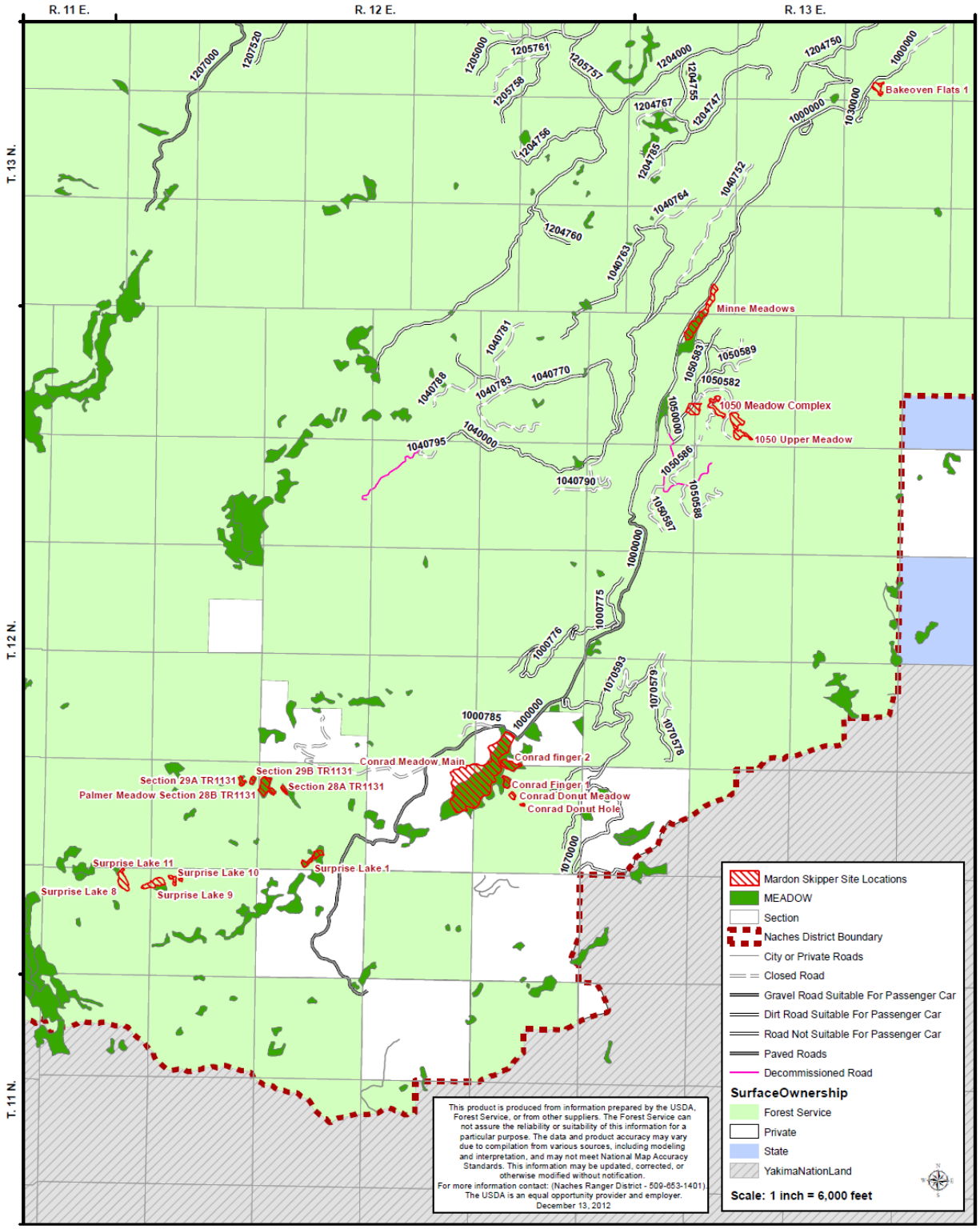
Map 1: Mardon Skipper Sites ("Polites Mardon") and Habitat in the SF Tieton, Naches Ranger District



The meadows in this map were delineated from aerial photography (ocular estimate). The Mardon skipper sites were accurately delineated in the field by gps units. Although this map shows some sites extend beyond the meadow boundary and some not within meadows, Mardon skipper sites do not extend beyond meadow edges and all are within meadow habitat. Some of the occupied meadows were too small to be detected from an aerial photo.

Table 1 displays one-day minimum population estimate results of adult Mardon skippers at known sites in the South Fork Tieton Subwatershed; here in referred to as SF Tieton. Surveys are conducted by systematically walking transects through a site, and counting the number of adult Mardon skippers encountered (Seitz *et al.* 2007, p. 11). All surveys covered the entire habitat feature (meadow), unless otherwise indicated by footnote. The one-day minimum population counts provide a minimum population estimate. Gathering population size and trends from this data is not possible; as it cannot be determined at what stage of the adult flight period the count occurred. 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). A few of the counts in Table 1 were determined to occur near peak flight period based on multiple visits per site during the flight season.

Table 1: One-day minimum population estimates at the 18 known Forest Service Mardon skipper sites in the SF Tieton; surveys conducted June 1 through July 18 during 2007-2012.

Manage-ment Unit	Site	Date-Nu Mardon Skippers		Manage-ment Unit	Site	Date-Nu Mardon Skippers
MU1	Bakeoven Flats 1	6/17/08-**7** 6/24/08-**53** 5/22/09-**0** 6/1/09-**0** 6/17/09-**59** 6/26/09-**35** 6/22/10-**1** 6/25/10-**9** 7/7/10-**3** 6/12/12-**1** 7/9/12-**15**[1]		**MU7**	Surprise Lake Tr 1	7/7/07-**25** 7/18/12-**46**
MU2	Minnie Meadows	6/20/07-**38** 6/17/08-**0** 6/24/08-**52** 6/30/08-**187*** 7/9/08-**51** 6/17/09-**5** 6/26/09-**6** 7/1/09-**62*** 6/25/10-**5** 6/28/10-**26*** 7/7/10-**14** 6/12/12-**0** 7/6/12-**68** 7/9/12-**10**[1]		**MU8**	Surprise Lake Tr 8	7/10/07-**2**
MU3	Conrad Meadows Main 1	6/2/07-**1** 6/20/07-**195**[1] 6/25/08-**20** 6/30/08-**516** 7/9/08-**929*** 6/25/09 -**20** 7/02/09-**1,195*** 7/9/09-**10** 6/28/10-**30**[1] 7/7/10-**50**[1] 7/15/10-**149**[1] 7/6/12-**886**			Surprise Lake Tr 9	7/10/07-**153** 7/18/12-**42**
	Conrad Finger 2	6/27/07-**457** 7/10/07-**3**			Surprise Lake Tr 10	7/10/07-**8** 7/18/12-**1**[1]

		6/25/08-**45** 6/30/08-**654** 7/9/08 -**911*** 7/16/08-**201** 7/2/09-**931** 7/15/10-**124**[1] 7/6/12-**590**				
	Conrad Finger 1	6/27/07-**0** 7/9/09-**0** 7/9/12-**2**[1]			Surprise Lake Tr 11	7/10/07-**16** 7/18/12-**1**[1]
MU4	Conrad Donut Meadow	7/9/09-**15**[1] 7/9/12-**25**[1]		**MU9**	Trail 1131-sec 28A	7/10/08-**25**
MU5	Conrad Donut Hole	7/9/2012-**10**			Trail 1131-sec 29A	7/10/08-**7**
MU6	1050 Upper Meadow	7/9/09 - **2** 7/13/09 – **0** 7/9/12-**15**[1]			Trail 1131-sec 29B	7/10/08-**1**
	1050 Meadow Complex	7/9/09-**0** 7/13/09-**0** 7/9/12-**10**[1]			Trail 1131-Palmer Meadow	7/10/08-**176** 7/18/12-**643**
***Near peak flight period based on three separate one-day counts conducted per flight season.** **[1]Survey did not cover the entire habitat within the meadow. This count cannot be compared to systematical walking transects that covered the entire habitat at the site.**						

Threats and General Management Recommendations

Pyle (1989) characterized threats to the Mardon skipper as any factor that degrades its obligate grassland habitats. Mardon skipper populations face a variety of threats; including encroachment by native conifers, grasses, and shrubs; encroachment of invasive plants; grazing; recreation [including camping, off road vehicle use (ORV), and off trail use by horseback riders and hikers], prescribed and natural fires; the use of herbicides and Btk; climate change; and issues related to small population size and stochastic events.

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). Mardon skipper are weak fliers and usually unable to disperse more than a few hundred yards (Runquist 2004). Therefore, there is little opportunity for the individual populations to intermix. 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 extirpation of individual habitat patches and subsequent re-colonization, 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 (Kerwin 2011).

Considering changes in fire regime and land use, the connectivity of the landscape has changed significantly since 1950. Although pre-1962 photos are not available for the SF Tieton sites, it is fairly likely that Mardon skipper sites in the SF Tieton were historically surrounded by a more

open landscape, when fires were more prevalent. This conclusion is based on findings from a number of meadow-conifer invasion studies that have occurred in the Oregon and Washington Cascades (Zald *et al.* 2012). 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. Using historical aerial photography, researchers at the PNW Research Station laboratory in Corvallis, Oregon, performed retrospective analysis of meadow extent in a portion of the western Cascades between 1946 and 2000. They found that half of the nonforested areas present in 1946 now support conifers and that three times more mesic meadows contracted than xeric meadows between this time period (Takaoka and Swanson 2008). 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). A study conducted by Franklin *et al.* (1971) in the forest-tundra ecotone region of the Washington and Oregon Cascades, found massive conifer invasion into subalpine meadows with the most intense period of establishment between 1928 and 1937. They considered the decrease in fires, grazing, forest edge, and climatic change as the possible factors influencing this massive establishment of trees.

Over the next century, climate change at global and regional scales is predicted to change butterfly species distributions and alter life histories (McLaughlin *et al.* 2002; Hill *et al.* 2002). 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). Assessment of climate change trends in North America has already revealed changes in precipitation patterns, hydrology, and plant bloom time. In the Pacific Northwest, mean annual temperatures rose 0.8° Celsius (°C) [1.5° Fahrenheit (°F)] in the 20th century and are expected to continue to warm from 0.1 to 0.6° C (0.2 to 1° F)] per decade (Mote and Salathe 2010). 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 changing conditions 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 has 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. Although management at the population scale cannot directly address global climate change, providing quality habitat spread in multiple sites across the landscape is thought to insulate species from climate change impacts. 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 (Franklin *et al.* 1971).

Predicted climate changes in the Pacific Northwest have implications for forest disturbances that are important for maintaining montane meadow habitats. Both frequency and intensity of wildfires and mountain pine beetle (*Dendroctonus ponderosae*) outbreaks are expected to increase over the next century in the Pacific Northwest (Little *et al.* 2010). Fire is an important

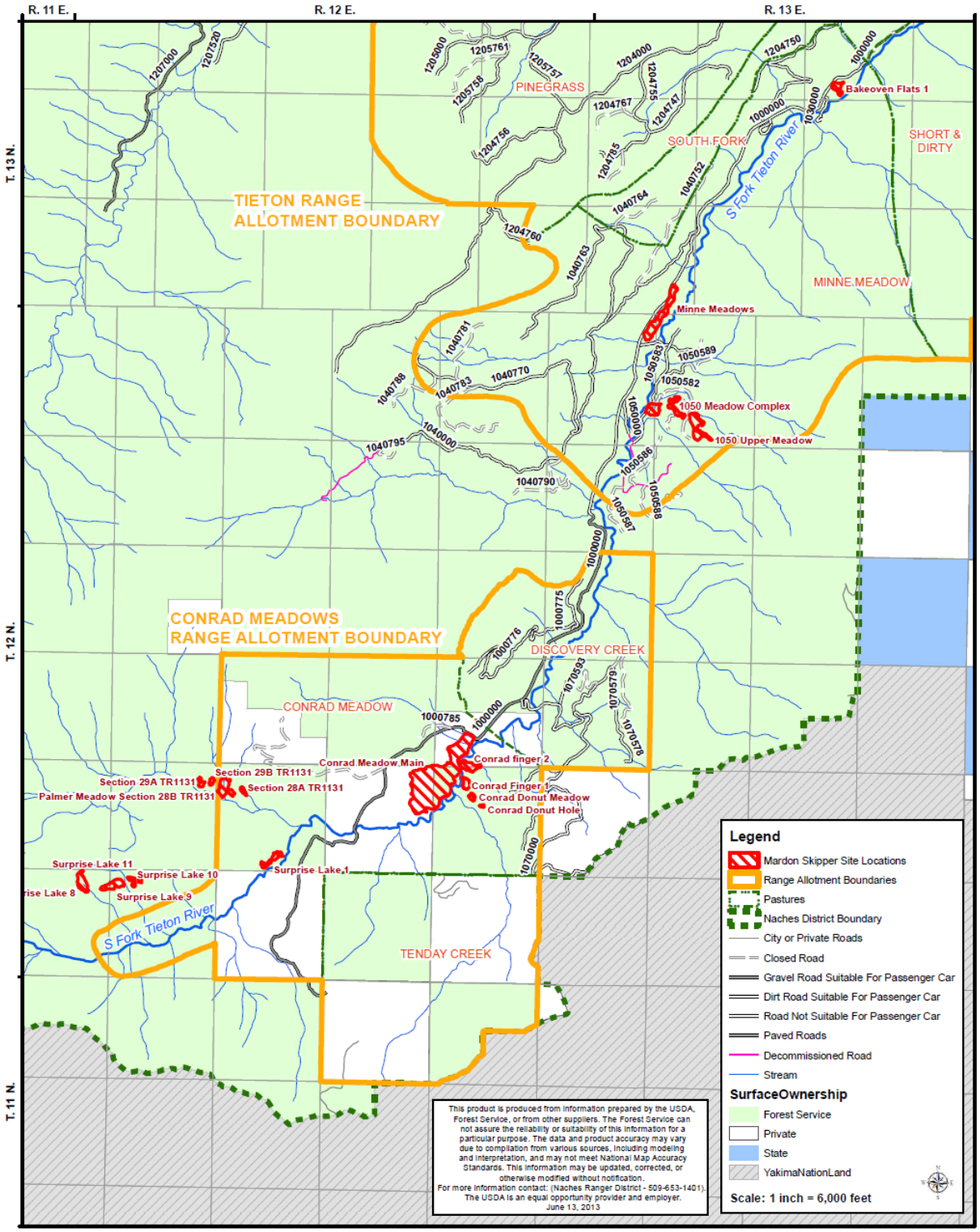
source of disturbance that reduces conifer encroachment and maintains meadow and grassland habitats (U.S. Fish and Wildlife 2012). Although Mardon skippers occur in landscapes that have historically burned, Mardon skipper populations may be vulnerable to local extirpation if a fire burns the entire occupied habitat at a population site (Black *et al.* 2011). 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 (U.S. Fish and Wildlife 2012). The Windy Valley in southwestern Oregon is an 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 (Kerwin 2011).

While beetles and fire are linked in complicated ways, the one does not cause the other (Simard *et al.* 2011). There are substantial disagreements on the effects of beetle-caused tree mortality on fire behavior. One conclusion in a recent study that analyzed 39 other published works about the effects of bark beetles on wildland fire behavior, was active crown fire potentially increases for the first four years after tree mortality, and then decreases dramatically (Hick *et al.* 2012). A 2011 study in the Greater Yellowstone resulted in the finding that mountain pine beetle outbreaks may reduce the probability of active crown fire by thinning lodgepole pine canopies (Simard *et al.* 2011). A recent literature review by Black *et al*. (2012) found most available evidence indicates that bark beetle outbreaks do not substantially increase the risk of active crown fire in conifer forest under most conditions. Both fire disturbance and beetle damage are an integral process in natural ecosystems (Agee 1993, Lynch *et al*. 2006), and have played a pivotal role in maintaining Mardon skipper habitats. Increased wildfire or insect disturbances associated with climate change are likely to have long-term beneficial effects for Mardon skippers due to resultant increases in early seral habitat (U.S. Fish and Wildlife 2012).

Below is a brief discussion of potential threat and general recommendations for managing grazing, forest encroachment, invasive plants, prescribed fire, recreational use, and Btk applications. For information on management of the 18 sites or 9 Mardon skipper Management Units, please see site specific information in Section 2 of this document. For definition of site and management unit, refer to page 12.

The following discussion of guidelines for management can only be understood and implemented when used in conjunction with site specific threat information that is available in Section 2. 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 and Crone 2008).

Map 2: Mardon Skipper Sites ("Polites Mardon") and Grazing Allotments in the SF Tieton Naches Ranger District



Large Ungulate Grazing

Large ungulate use, including elk and cattle, has been documented at all known Mardon skipper sites in the South Fork Tieton Subwatershed. Graminoid cover, composition, and structure are important for Mardon skippers (Beyer and 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; Potter *et al.* 1999). Grazing can also be detrimental to butterfly populations indirectly by altering plant community composition (Stoner and Joern 2004) and removing adult nectar resources, introducing invasive weeds (Ellis 2003; Hayes and 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 be advantageous; maintaining 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). Livestock grazing was also found to reduce or prevent forest encroachment (Takaoka and Swanson 2008). 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 but may actually provide favorable conditions for the Mardon skipper. 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 should allow recovery periods for the habitat, and grazing should not take place during the adult flight period since butterflies are utilizing nectar sources that could be removed by grazing. Runquist (2011) found that butterfly species that utilize grass for their host plants declined in abundance when the number of cattle utilizing an area increased.

Figure 3. Anecdotal observations within a 1m x 1m grazing exclosure suggest a change in species composition from a *Danthonia unispicata* dominant plant community to a plant community dominated by forbs June 2009 (St. Hilaire *et al.* 2010). Photo by Joan St. Hilaire.

On the SF Tieton sites, adult Mardon skippers require plentiful floral nectar for survival, successful reproduction, and adequate egg production from June through late July, depending on the site. Larvae are believed to be active from approximately July through October, although this window of activity varies, and is probably influenced by the microclimate of each site. Elk and/or cattle use (in the form of droppings, grazing, tracks, beds and/or presence) has been documented at all of the SF Tieton Mardon skipper sites (St. Hilaire *et al.* 2007, 2008, 2009 & 2010, Jepsen *et al.* 2007, 2008).

All of the SF Tieton Mardon skipper sites occur within the Conrad Meadows Range Allotment or the Tieton Range Allotment (Map 2). The Conrad Meadows Range Allotment is 8,654 acres; of which 5,501 acres are Forest Service land and 3,153 acres are private land. Three pastures make up this allotment: Discovery Creek, Conrad Meadows and Tenday Creek. Fourteen of the SF Tieton Mardon skipper sites occur within Conrad Meadows Pasture: Conrad Meadows Main 1, Conrad Finger 2, Conrad Finger 1, Conrad Donut Meadow, Conrad Donut Hole, Surprise Lake Tr 1, Surprise Lake Tr 8, Surprise Lake Tr 9, Surprise Lake Tr 10, Surprise Lake Tr 11 and Trail 1131-Sec 28A, Trail 1131-Sec 29A, Trail 1131-Sec 29B and Trail 1131 28B Palmer Meadow (see Map 2). The Tieton Range Allotment is 49,463 acres; made up of 45,384 acres of Forest Service land and 4,079 acres of private land. Four pastures occur within this allotment: Short and Dirty, Minnie Meadows, South Fork and Pinegrass. Four of the SF Tieton Mardon skipper sites occur within Minnie Meadows Pasture: Bakeoven Flats 1, Minnie Meadows, 1050 Upper Meadow and 1050 Meadow Complex (see Map 2). These 18 Mardon skipper sites are addressed in this Management Plan

Grazing history by domestic ungulates within the Conrad Meadows Range Allotment and the Tieton Range Allotment is not well documented, particularly in the early years (U.S. Forest Service 2007). Historic references suggest that as early as the 1840s herds of cattle and horses roamed across the landscape. From the mid and late- 1800s large numbers of sheep grazed the mountainous terrain on the forest (U.S. Forest Service 2007). Prior to 1929 the Conrad Meadows Range Allotment was grazed by milk cows. In 1929 the current land owner purchased the private land within this allotment. An unknown number of sheep grazed the area from 1929 through mid- 1960s. In general both livestock numbers and season of use continued to decline on the Conrad Meadows Range Allotment until the 1960's; when they reached the numbers and season of use permitted today, (100 cow/calf pair, July 1st through September 30th) (U.S. Forest Service 2007). The season of use changed slightly between the late- 1970s through 2007 from July 1 to October 15th (Carla Jaeger, personal communication). The Conrad Meadows Pasture currently has a 100 cow/calf pair turnout with a period of use from July 1st through July 31st; a 90 cow/calf pair turnout with a period of use from August 1st through August 31st; and 40 cow/calf pair turnout with a period of use from September 1st through September 30th. The first authorized turnout date is July 5th and is dependent on plant phenology and soil moisture.

More recent documentation relative to permitted animals on the Tieton Range Allotment indicate that, in general both livestock numbers and season of use continued to decline until approximately 1992; when they reached the numbers and season of use permitted today, (348 cow/calf pair, June 1 through October 10th) (U.S. Forest Service 2007). At the present time, Minnie Meadows Pasture has a 130 cow/calf pair turnout with a period of use from July 1st through August 15th. Prior to 2008, 130 cow/calf pair grazed Minnie Meadow Pasture from July 16th through August 31st (U.S. Forest Service 2007). The cattle's grazing period was changed to address spawning bull trout concerns.

The history of wild ungulate (elk) use on the Naches Ranger District began in the early 1900's. In the late 1913, approximately one dozen elk were released near the Naches Ranger District boundary; mouth of Rattlesnake Creek. Between 1921 and 1942, the elk population had grown from an estimated 245 to about 3,200 animals (U.S. Forest Service 2007). The Yakima elk herd was estimated at 9,300 animals in 2005 (U.S. Forest Service 2007). The increase in elk numbers brought with it new sources of grazing pressure on meadow habitat (U.S. Forest Service 2007).

Although elk have been identified as large ungulates contributing towards grazing threats at the South Fork Tieton Mardon skipper sites, the U.S. Forest Service has no legal authority to manage elk numbers. This management plan lists recommendations the U.S. Forest Service has the authority to manage.

General Recommendations

- Restrict livestock use within Mardon skipper core use areas during the flight period of the adult Mardon skipper. The timing of the flight period varies by site and by year; depending on weather.
- Livestock grazing should allow recovery periods for the habitat; which could include short grazing periods with recovery periods for habitat relatively long.
- Design and conduct a comprehensive study on the effects of grazing on Mardon skipper populations in order to make more informed management recommendations in regards to grazing. A grazing study is one key priority for management. As was stated earlier, balancing the level of disturbance is critical; there may be need for some level of grazing to maintain or restore the system without creating too much disturbance that further degrades habitat (Schultz and Crone 2008). It is interesting to note that Mardon skippers have been detected at high abundances at sites that experience heavy grazing pressures, although long term trends at these sites are unknown. A grazing study is needed to elucidate how the timing, intensity and duration of grazing influences Mardon skipper abundance and occurrence on the Okanogan-Wenatchee National Forest. Understanding the relationship between Mardon skippers and grazing levels is important as a change in grazing practices has the potential to benefit or impact Mardon skipper populations on the Forest. Other than restricting cattle use during the Mardon skipper flight period, it is extremely difficult to prescribe additional meaningful management recommendations with regards to cattle grazing at this time.
    - One possibility of a grazing study is to use a PhD student in conjunction with the Forest Service Wenatchee Forest Sciences Research Lab, The Xerces Society, and/or Cheryl Schultz to help design a meaningful study. Sites that could be used in this study include: Conrad Meadows Main 1, Conrad Finger 2, Minnie Meadows, Palmer Meadow and 1050 Upper Meadow 1.

Forest Encroachment

The removal and alteration of the natural disturbance regimes (such as fire suppression), that once maintained low shrub and conifer seedling establishment rates, has led to the loss and degradation of forest-meadow ecosystems (Coop & Givinish 2007; Norman & Taylor 2005). Forest encroachment not only reduces the amount of open habitat, but closes off corridors between meadows, which limits butterfly dispersal (Roland & Matter 2007). During the adult flight period, 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 affect the habitat and behaviors of this butterfly in a manner similar to that of encroaching trees.

Figure 4. Conifer encroachment at Bakeoven Flats 1. Photo by Sarina Jepsen July 2012.

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). Careful consideration should be given to the genetic and behavioral implications of local habitat preferences (Kuussaari *et al.* 2000; Moreau *et al.* 2008), as Mardon skippers have displayed site specific selectivity (Beyer & Schultz 2010).

Conifer encroachment is negatively impacting all the sites on the SF Tieton, although some sites have higher levels of encroachment than other sites. For level of encroachment refer to site specific information in Section 2 of this document.

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. Removal methods should incorporate sensitivity to butterflies in the egg and larval state underfoot (Kerwin 2011). Maintaining or increasing meadow opening size is encouraged. Removal of conifer encroachment is one key priority for management.

- Remove all conifers under 4" Diameter at Breast Height (DBH) from the open meadow portion of the site. An Upper limit of 7" DBH at some sites may be needed.
- Wherever possible hand cutting with chainsaws or handsaws is optimal.
- Care must be taken to avoid actions that could degrade habitat and kill individual 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 core area of the site.

- Time activity outside the adult flight period.
- Leave conifers over 4" (DBH) at the site unless a butterfly habitat restoration expert is consulted.
- 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 remove smaller diameter trees. If additional tree removal is needed consult with a butterfly habitat restoration expert.

Invasive Plants

Invasive, nonnative plants have historically resulted in habitat loss and degradation at a number of Mardon skipper sites, primarily in the Puget prairies. As with conifer removal, the management of invasive plants must be carefully planned to avoid negative impacts to local butterfly populations (Schultz *et al.* 2011).

Small populations of invasive plants were observed at some of the Mardon skipper sites in the SF Tieton. For sites refer to site specific information in Section 2 of this document.

General Recommendations

Control invasive plants in a way that improves habitat, while minimizing impact to local populations as outlined in the revised Forest Service/BLM Conservation Assessment for the Mardon Skipper (Kerwin 2011) and listed below.

- Remove invasive weeds as soon as noticed. Implement EDRR (Early Detection Rapid Response). EDRR allows treatment of invasive plant infestations located outside the known infestation; treating small infestations early to prevent establishment and spread.
- Hand control is the preferred method
- If chemical applications are necessary, protect non-target vegetation consistent with *Pacific Northwest Region Invasive Plant Program* (USDA Forest Service 2005 ROD).
- Care must be taken to avoid actions that could degrade habitat and kill individual skippers as a result of heavy equipment use and people trampling meadows.

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 (Black *et al.* 2011).

Swengel (1996) and Swengel and Swengel (2001) found that fire had consistent negative effects on prairie specialist butterfly species, and that these effects persisted for three to five years post-burning.

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 (Black *et al*.

2009). Population estimates showed that Mardon skipper numbers were 3-27 times higher in unburned areas compared to burned areas on the same dates (mean = 12 times greater).

Figure 5. A Controlled burn at a Mardon skipper site in California. Photo by Brenda Devlin

It is also important to note that some areas where Mardon skippers were found in The Xerces Society's 2008 surveys lacked Mardon skippers completely or nearly so in the burned areas in 2009. 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 should be employed in order to protect the Mardon skipper.

There are no plans for prescribed fire at any of the Mardon skipper SF Tieton sites. If prescribed burning is planned, develop a site-specific burn plan which incorporates the ecology of the species (Kerwin 2011):

General Recommendations

- Do not burn more than 1/5 of the core habitat in any given year, and less if possible.
- Burn during cool periods
- Encourage a patchy, mosaic burn, maintaining underburned areas within the fire perimeter. 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.

- Develop and implement measures to avoid actions that could degrade existing habitat and kill individual skippers in the course of implementing a burn plan, as a result of heavy equipment use, and additional or excessive foot traffic in Mardon skipper meadows.
- Timing, intensity and completeness of burn need to be considered in light of life stage of the butterfly.
- A diversity of methods (fire, mowing, and removal of encroaching vegetation) may mitigate the negative impacts of any one approach and address logistical constraints.
- Monitoring results are essential to measure and improve success.

Recreational Use

Recreational activities, including off-trail hiking, off-trail horseback riding, and off-road vehicle (ORV) use, may directly kill Mardon skippers; including eggs, larvae, pupae and adults (Potter *et al.* 1999). Of these activities, off-road vehicle use tends to have the greatest impact on Mardon skipper habitat because vehicle tires can destroy native plants and disturb soil, leading to invasion by nonnative plants (U.S. Fish and Wildlife Service 2012). ORVs can 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).

Camping (including tent camping) may directly kill Mardon skippers; including eggs, larvae, pupae and adults. Camping could potentially trample individuals at Mardon skipper use areas. Tent camping was observed at Surprise Lake Tr 1 site. Dispersed camping was observed just outside of Bakeoven Flats 1 site. Damage from ORVs has been observed at 1050 Upper Meadow and Bakeoven Flats 1. Minor habitat degradation resulting from off-trail hiker, horse and/or camping use was observed at Surprise Lk Tr 1, Conrad Main Meadow 1, Conrad Finger 1 and Conrad Finger 2, Conrad Donut, Conrad Donut Hole and Palmer Meadow.

Figure 6. Off road vehicle damage at Upper Meadow 1050 site. Photo by Joan St. Hilaire

General Recommendations

The following recommendations apply at occupied Mardon skipper sites:

- In areas with ORV traffic, it is recommended that access to Mardon skipper habitat areas be closed in conjunction with public education on the detrimental impacts of this form of recreation to sensitive habitats.
- In areas with off-trail use by horses and hikers, it is recommended that public education (in the form of interpretive signs) be used to discourage detrimental impacts to Mardon skipper habitat.
- In areas of camping (including tent camping), it is recommended that public education, in the form of interpretive signs, be used to discourage detrimental impacts to Mardon skipper habitat.
- Monitor the effectiveness of closures and restoration of the sites.

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.

Btk use is not common on the Okanogan-Wenatchee National Forest; the last time Btk was used on the Naches Ranger District was 1987. Therefore it is not a concern that will be address in this document.

General Recommendations

- If Btk application is planned, develop a management plans specific to Btk application for each site
- If Btk use is warranted, recommend not spraying Btk on forested areas within two miles of any Mardon skipper population (Kerwin 2011).

Site Priorities

The SF Tieton sites having large Mardon skipper populations include Conrad Meadows Main, Conrad Finger 2 and Trail 1131-Palmer Meadow (Table 2). It is important to maintain these large populations and therefore they have been rated as the highest priority sites to accomplish proposed management/restoration actions outlined in this document. Immediate action is recommended to manage cattle use at these sites; particularly for Conrad Meadows Main and Conrad Finger 2. A grazing study is needed to help evaluate the effects of various grazing regimes on Mardon skipper site occupancy and abundance. Impacts of grazing are largely unknown and therefore it is difficult to make additional recommendations on how to manage grazing. A well designed study would result in detailed recommendations and help inform management. These three sites are regularly grazed during the growing season by elk and cattle. Other high priority sites include Bakeoven Flats 1, Minnie Meadows and Surprise Lk Tr 9. They are in need of management actions in order to stop the spread of conifers into these open meadows. All of the high priority sites (1 and 2) are likely critical to the survival of this subspecies and continued existence on the Okanogan-Wenatchee NF. A long-term monitoring strategy is recommended for all sites, but particularly for all priority 1 and 2 sites as these most likely host Mardon skipper source populations. The implementation of a range-wide monitoring

protocol and strategy for the Mardon skipper would be an important step towards the conservation of this butterfly.

Table 2: The following table illustrates site priority of Mardon skipper sites on SF Tieton, Okanogan-Wenatchee National Forest in Southern WA. Highest priority sites are listed with a 1 and lowest with a 4. Priority was based on population size and imminent threats. Priorities 1 and 2 are thought to be source populations.

Management Unit	Site	Priority		Management Unit	Site	Priority
MU1	Bakeoven Flats 1	2		**MU7**	Surprise Lk Tr 1	3
MU2	Minnie Meadows	2		**MU8**	Surprise Lk Tr 8	4
MU3	Conrad Meadow Main 1	1			Surprise Lk Tr 9	2
	Conrad Finger 2	1			Surprise Lk Tr 10	4
	Conrad Finger 1	4			Surprise Lk Tr 11	4
MU4	Conrad Donut Meadow	3		**MU9**	Trail 1131-sec 28B (Palmer Meadow)	1
MU5	Conrad Donut Hole	4			Trail 1131-sec 28A	4
MU6	1050 Upper Meadow	3			Trail 1131-sec 29A	4
	1050 Meadow Complex	4			Trail 1131-sec 29B	4

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SECTION 2: MANAGEMENT PLANS BY UNIT

Suggested management at each Management Unit is detailed below. For definition of Management Unit refer to page 12. In some cases, more than one alternative is given. In other cases, only one alternative is given. Each site map shows the "site", and "use area" boundaries. Only some of the sites have the "core use area" identified. The "site boundary" is the outline of the whole meadow; the "use area boundary" is around the general use area where adult Mardon skippers have been seen; and the "core use area" is the area of highest adult concentrations. "Core use area" was only determined for sites where multiple years of data were collected.

Management Unit: 1 Bakeoven Flats 1 (Priority 2)

Site Name: Bakeoven Flats 1
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0636688 N5161279

Goal of the Site Management Plan

Maintain an open meadow condition by removing encroaching conifers. Maintain existing Mardon skipper population by managing recreation use (including camping and OHV use) at site.

Site Distribution, Abundance, and Trends

Mardon skippers were found primarily along the southern driest portion of the meadow. The minimum population estimate of individuals at Bakeoven Flats 1 were 7 on June 17th 2008, 53 on June 24th 2008, 0 on May 22nd 2009, 0 on June 1st 2009, 59 on June 17th 2009, 35 on June 26th 2009, 1 on June 22nd 2010, 9 on June 25th 2010, 3 on July 7th 2010, 1 on June 12th 2012, and 15 on July 9th 2012 (Table 1). We were unable to determine population trends with less than 3 visits per flight season, for several years in a row. This is considered to be a small population and to be isolated since it is located more than 2 miles from its nearest known occupied site. From 2008 through 2012 the flight period ranged from early June through early July (Table 1). The core use area is located at the southern portion of the site; within the highest and driest area (Map 3).

Figure 7. Photo of "core use area" in July 2012. Photo by Sarina Jepsen.

Site Description

Bakeoven Flats 1 is the lowest elevation meadow of the SF Tieton sites; located off of Forest Service Road 1000 (SF Tieton) at 3,330 ft. It is made up of an old log landing adjacent to a small meadow; approximately 4.43 acres in size. Evidence of old cow patties and fresh elk pellets, tracks and beds were documented during survey visits to Bakeoven Flats 1 site. Threats resulting from grazing are not apparent; larval host plants and floral resources are abundant here. False hellebore (*Veratrum californicum*) is present at the lower eastern end of the meadow. There are small patches of fescue (*Festuca*) spp. and abundant sedges (*Carex*) spp. with several small patches of bare ground scattered throughout. Larkspur (*Delphinium* spp.) and common camas (*Camassia quamash*) are present in the southeast (wetter) portion of the meadow. A popular dispersed camp site is located in the northwest, forested portion of this site. There is a large rock barrier place along the parking area to prevent motor vehicle access. For the most part, this barrier has been effective at keeping motorized use out of the meadow. OHV tire tracks were observed June 2010 when some of the large rocks were moved. Rocks were moved back in place within a week of observation and no further disturbance by OHV has been documented. Adjacent to the meadow is a popular dispersed camp site, with no evidence of damaged habitat caused by campers at this time.

Figure 8. Patches of fescue and sedges with bare ground scattered throughout July 2012. Photo by Sarina Jepsen.

Figure 9. Large rock barrier in the foreground and dispersed camping in the background July 2012. Photo by Sarina Jepsen.

Site Threats
Small conifers are starting to encroach on the edges of the meadow (Figure 4).

Site Management History and Current Land Allocations
The Bakeoven Flats 1 site fall within the Tieton Range Allotment; Minnie Meadow Pasture (see Map 2). Cattle turnout period is between July 1st and August 15th. For additional information about the grazing allotment refer to Section 1 "Large Ungulate Grazing" discussion. Although the cattle turn-out day for the Minnie Meadow Pasture occurs during the Mardon skipper flight period, no cattle or fresh sign have been observed during the four years of visits. Livestock grazing does not appear to be an immediate threat at this time. This site is located in Late-Successional Reserve (LSR)/Scenic Travel-Partial Retention (ST2) NWFP/WFP Land Management Allocations.

Management Needs
(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from the open meadow portion of the site with a priority on the Mardon skipper use area (Map 3).
    - Cut trees flush with the ground to minimize visual impacts.
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - If pile burning, burn outside of site (see Map 3 for site boundary).
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 years.

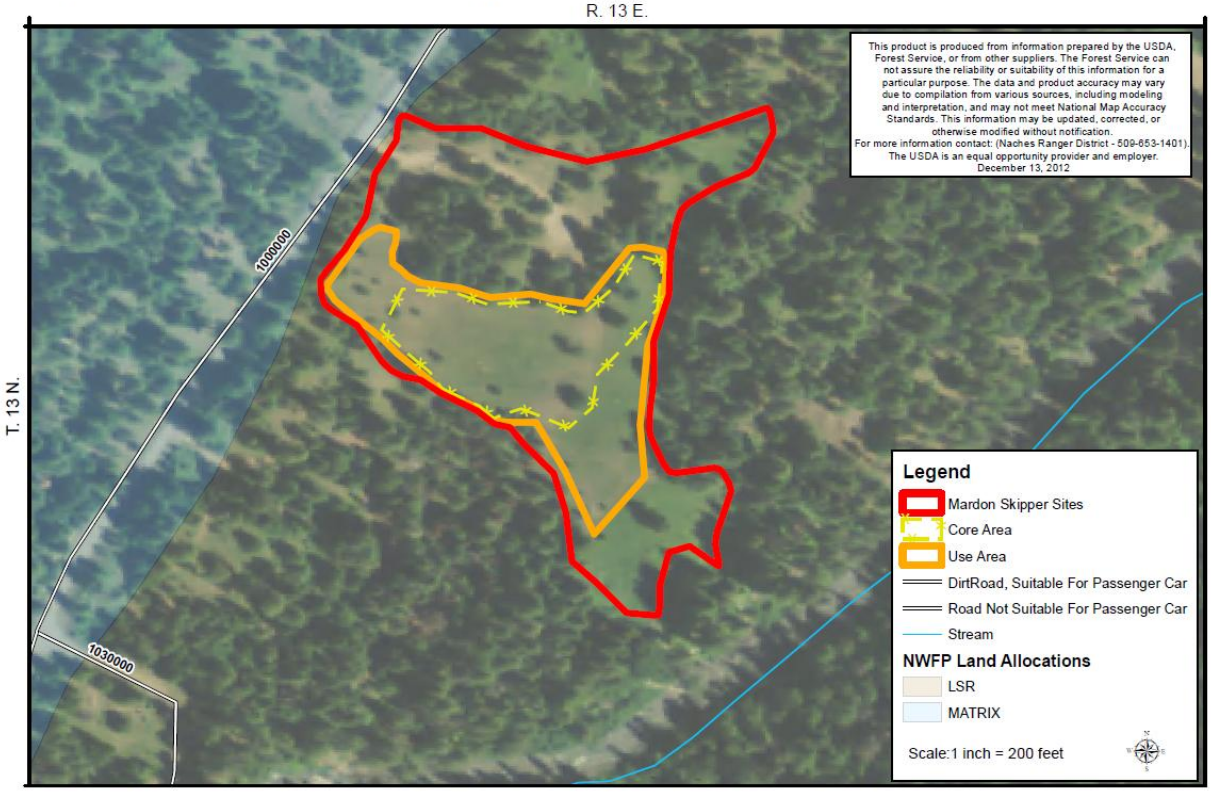
(*Monitoring*)

- Continue presence/absence surveys for Mardon skippers every 2 or 3 years. Include this site in a long-term monitoring strategy.

(*Recreation-OHV and camping*)

- Continue monitoring the effectiveness of the rock barrier at keeping motorized use out of the meadow and monitor potential threats of nearby camping.
- Signs will be placed at the parking/dispersed camp site area educating the public on the detrimental impacts of camping and OHV use to sensitive meadow habitat. The signs will ask recreationist to not camp or drive in the meadow.

Map 3: Bakeoven Flats 1 Mardon Skipper Site Location - 4.43 acres



Management Unit: 2 Minnie Meadows (Priority 2)
Site Name: Minnie Meadows
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0634394 N5158677

Goal of the Site Management Plan
Maintain existing Mardon skipper populations by managing cattle grazing on the site. Better understand the effects that grazing has on Mardon skipper populations in order to make more informed management recommendations. Maintain an open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
The minimum population estimates of individuals were 38 on June 20th 2007, 0 on June 17th 2008, 52 on June 24th 2008, 187 on June 30th 2008, 51 on July 9th 2008, 5 on June 17th 2009, 6 on June 26th 2009, 62 on July 1st 2009, 5 on June 25th 2010, 26 on June 28th 2010, 14 on July 7th 2010, 0 on June 12th 2012, 68 on July 6th 2012 and 10 on July 9th 2012 (Table 1). Population estimates of 187 individuals on June 30th 2008, 62 on July 1st 2009, 26 on June 28th 2010 and 68 on July 6th 2012 are considered to be near peak flight period; based on multiple one-day visits per flight period (Table 1). The Mardon skipper population at this site is considered to be small and isolated due to its distance (>0.5 miles) and presence of forest cover between it and the nearest occupied site. Adult Mardon skippers have primarily been seen within the southern, drier portion of the meadow.

Figure 10. Minnie Meadows with research exclosure in the background July 2012. Photo by Sarina Jepsen.

Site Description

This site is runs parallel to Forest Service Road 1000. It is a long linear meadow of about 20 acres located approximately 4 miles north of Conrad Meadows. A research exclosure is located at the south end on this site, which excludes elk and cattle from a 50m x 50m area with an adjacent cattle exclosure that just excludes cattle from another 50m x 50m area. Both exclosures were repaired in 2008. The elk exclosure still functions but the cattle exclosure has been broken since 2011. In 2007 Harke and St. Hilaire noted a higher density of flowering forbs occur inside the elk exclosure then outside (Figure 11). In 2009 and 2010 a buck and pole fence was constructed around the exterior of this meadow, tying into the SF Tieton River. This fence discourages cattle use, yet allows elk use of the meadow. This fence also limits direct access by motorized vehicles. A taller buck and pole fence was constructed around the aspen stands within Minnie meadows to discourage elk use (Figure 12). When this site was first discovered in 2007 there was evidence of high levels of ungulate grazing. During the 2012 survey visit, grazing use appears to be minimal; grasses are the highest we have seen at this site in 6 seasons. Prior to the installation of the buck and pole fence, cattle were observed in Minnie Meadows during the Mardon skipper flight period. With the installation of the buck and pole fence grazing threats have reduced to minimal; larval host plants and floral resources are abundant. Mardon skippers have been documented nectaring on penstemon (*Penstemon*) sp. flowering within the elk exclosure (Harke and St. Hilaire 2007). Outside the exclosure, Mardon skippers were observed nectaring primarily on white clover (*Trifolium repens*); there were no flowering penstemon (*Penstemon*) sp. seen outside the elk exclosure (St. Hilaire *et al.* 2007, 2008, 2009, 2010; Jepsen *et a*l. 2007, 2008).

Figure 11. Minnie Meadows research-elk & cattle exclosure 2007; note the higher abundance of flowering plants within exclosure (right) than outside of the exclosure (left). Also note patches of bare soil outside the exclosure. Photo by Sarina Jepsen.

Minnie Meadows is located in the valley bottom of the South Fork Tieton drainage and is relatively flat. It grades from xeric at the south end to wet in the north central portion of the meadow. The majority of the xeric portion (Mardon skipper habitat) is dominated by Kentucky bluegrass (*Poa pratensis*) with a small amount of western needlegrass (*Stipa occidentalis*). Four plant communities were delineated for Minnie Meadows: western needlegrass (*Stipa occidentale*)/hood sedge (*Carex hoodii*); Kentucky bluegrass (*Poa pretensis*)/hood sedge (*Carex hoodii*)/white clover (*Trifolium repens*), and Lakeshore sedge (*Carex lenticularis*)/ white clover (*Trifolium repens*), and Baltic rush (*Juncus baliticus*)/ Lakeshore sedge (*Carex lenticularis*). The majority of Mardon skippers were observed in the Kentucky bluegrass (*Poa pretensis*)/ hood sedge (*Carex hoodii*)/white clover (*Trifolium repens*) plant communities and secondarily observed in the western needlegrass (*Stipa occidentale*)/ hood sedge (*Carex hoodii*) plant community (St. Hilaire *et al*. 2009).

Figure 12. Minnie Meadows with buck and pole fence around the perimeter of the meadow in July 2010. A taller buck and pole fence can be seen around the aspen stand in the background. Photo by Carla Jaeger.

Site Threats
Small conifers are encroaching on the site.

Site Management History and Current Land Allocations
Minnie Meadows is within the Tieton Range Allotment; Minnie Meadow Pasture (see Map 2). Cattle turnout period is between July 1st and August 15th. For additional information about the grazing allotment refer to Section 1 "Large Ungulate Grazing" discussion. This site is located in Late-Successional Reserve (LSR)/Scenic Travel-Partial Retention (ST2) NWFP/WFP Land Management Allocations (Map 2).

Management Needs

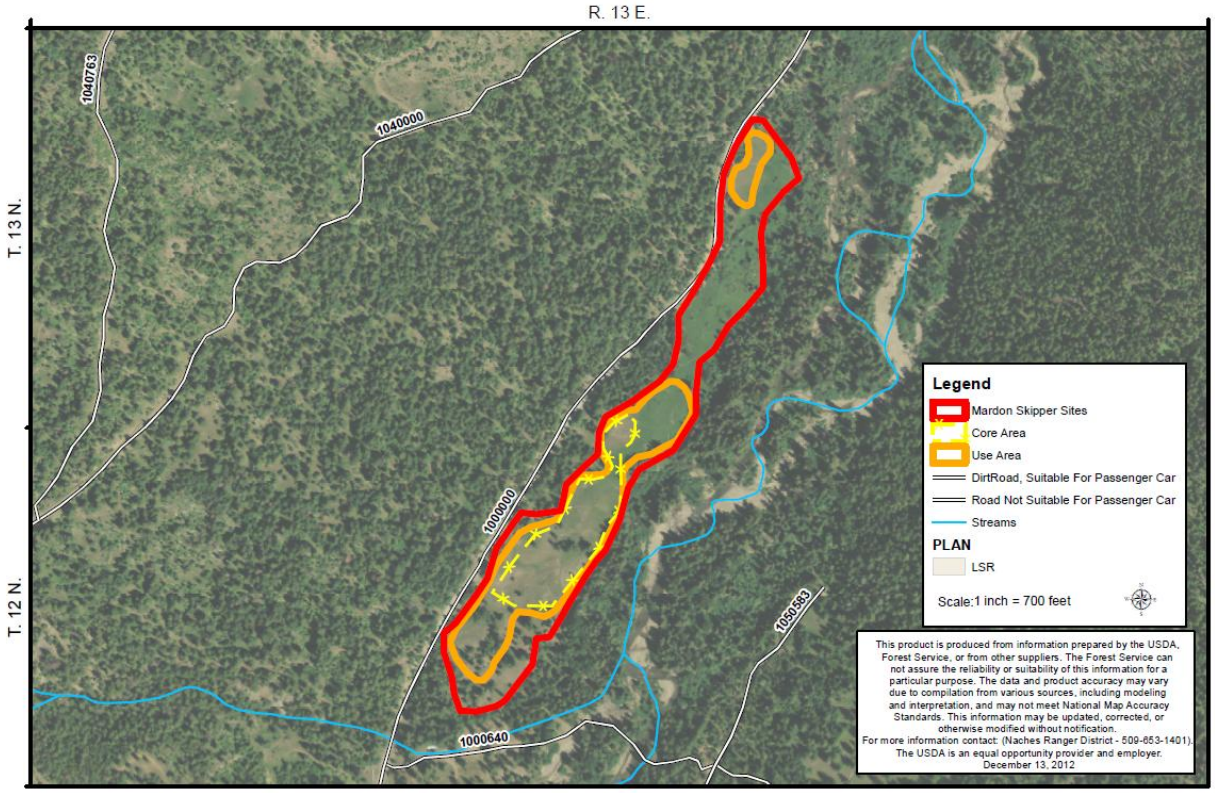
(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from the open meadow portion of the site with a priority on the Mardon skipper use area (Map 4).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site (see Map 4 for site boundary).
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 2 to 3 years with maintenance expected to occur every 5 years.

(Cattle grazing)

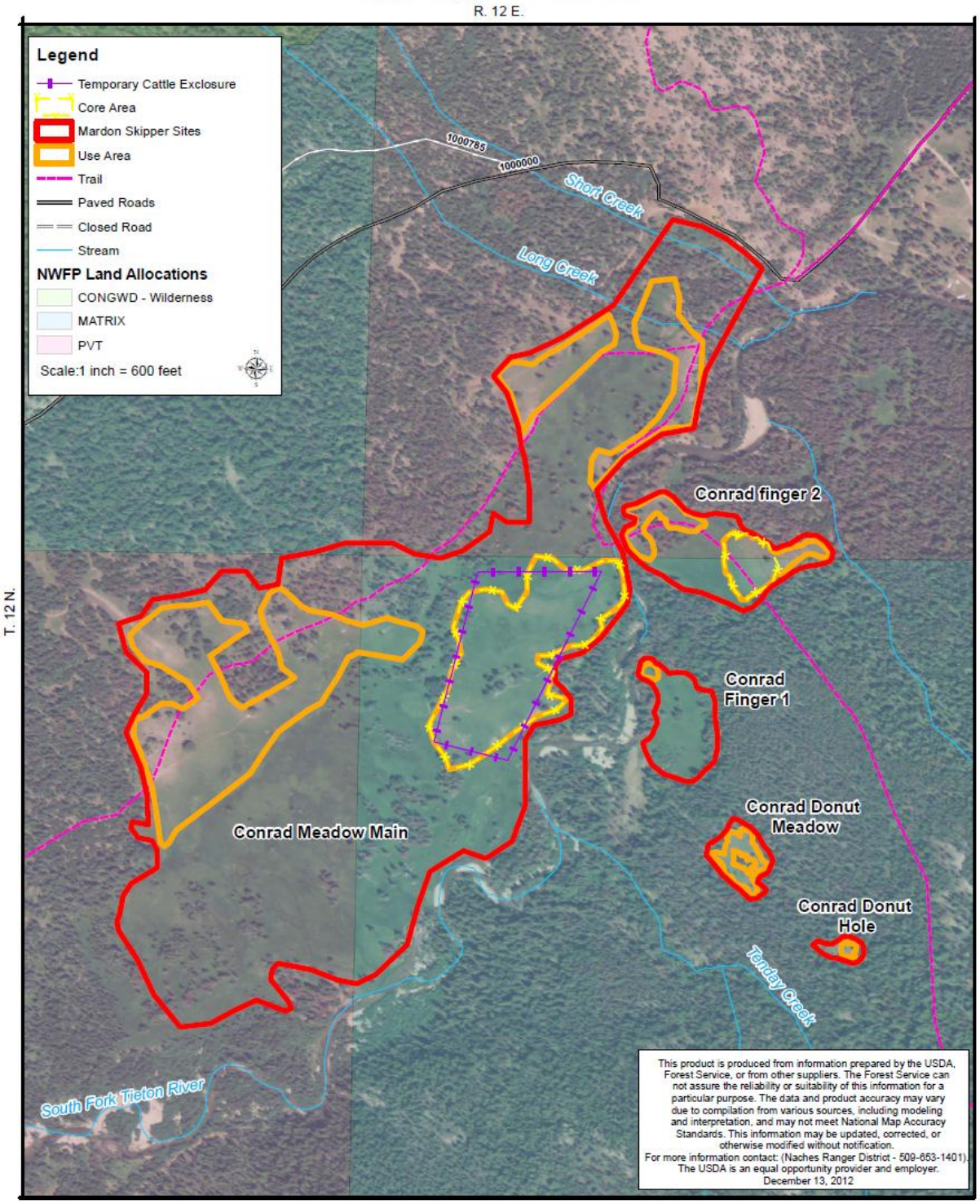
- Monitor site to determine trends associated with management activities; include this site in a long-term monitoring strategy.
- Include this site in a grazing study; need additional information on the effects of cattle grazing prior to making further recommendations.

Map 4: Minne Meadows Mardon Skipper Site Location - 19.56 Acres



Management Unit: 3 Conrad Meadow Complex

Map 5: Conrad Finger 2 (7 Acres), Conrad Donut Meadow (1.71 Acres), Conrad Finger 1 (3.53 Acres), Conrad Donut Hole (0.46 Acres) and Conrad Main Meadow (113.14 Acres)
Mardon Skipper Site Location



Map 5 include Conrad Meadow Complex as well as Conrad Donut Meadow and Conrad Donut Hole sites

Management Unit: 3 Conrad Meadow Complex (Conrad Meadows Main 1, Conrad Finger 2, Conrad Finger 1)

Conrad Meadow Complex Description
Conrad Meadow complex includes Conrad Meadows Main 1, Conrad Finger 2, and Conrad Finger 1. These three sites are all located past the gate at the end of Forest Service Rd 1000; within or near Conrad Meadows. This meadow complex is located approximately 4 miles south of Minnie Meadows. A mountain pine beetle outbreak has killed several hundred acres of lodgepole pine surrounding the meadow complex; creating the potential for future openings adjacent to this meadow complex.

Site Distribution, Abundance, and Trends
These three sites are all considered one population due to the potential for dispersal between sites; close proximity to one another (<0.25 miles) and open (nonforested) corridors. This complex contains the largest known Mardon skipper population on the Okanogan-Wenatchee National Forest.

Site Management History and Current Land Allocations
The Conrad Meadow Complex is within the Conrad Meadows Range Allotment Boundary, within the Conrad Meadows Pasture. Cattle turnout period is between July 1st and September 30th. For additional information about the grazing allotment refer to Section 1 "Large Ungulate Grazing" discussion. There have been past timber sale activity on private lands in the area, although none of this activity has directly impacted the meadow. There are no anticipated threats from future timber sale activities near the meadow as most of the marketable timber has died from the mountain pine beetle outbreak. Land allocations vary by site.

Management Unit: 3a Conrad Meadows Main 1 (Priority 1)
Site Name: Conrad Meadows Main 1
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0631235 N5151121

Goal of the Site Management Plan
Maintain existing Mardon skipper populations by managing cattle grazing on the site. Better understand the effects that grazing has on Mardon skipper populations in order to make more informed management recommendations. Maintain an open meadow condition by removing encroaching conifers.

Figure 13. Conrad Meadows Main 1 meadow July 9, 2012; *Danthonia unispicata* (onespike oatgrass) patch in the background and wet, sedge habitat in the foreground. Abundant flowering clover can be seen mixed with the oatgrass in the mesic/xeric habitat. Photo by Sarina Jepsen.

Site Distribution, Abundance, and Trends

Conrad Meadow Main 1 is a large meadow made up of private and Forest Service lands. The Mardon skippers are located on the drier areas distributed along the northern, eastern and western portions of the site. One of these locations is on Forest Service land; southwestern portion of the site and is considered the "core use area". It is where the following population counts were collected. The minimum population estimates of individuals were 1 on June 2nd 2007, 195 on June 20th 2007, 20 on June 25th 2008, 516 on June 30th 2008, 929 on June 9th 2008, 20 on June 25th 2009, 1,195 on July 2nd 2009, 10 on July 9th 2009, 30 on June 28th 2010, 50 on July 7th 2010, 149 on July 15th 2010 and 886 on July 6th 2012. Some of these counts did not cover the entire "core use area"; 195 on June 20th 2007, 30 on June 28th 2010, 50 on July 7th 2010, and 149 on July 15th 2010. Population estimates of 929 on June 9th 2008, 1,195 on July 2nd 2009 are considered to be near peak flight period; based on multiple one-day visits per flight period (Table 1). Mardon skippers appear to concentrate in onespike oatgrass (*Danthonia unispicata*) patches. Female Mardon skippers have been observed ovipositing on onespike oatgrass (*Danthonia unispicata*) and sedge (*Carex*) spp. (Ann Potter, Erica Henry, Sarina Jepsen personal communication). Through the years Mardon skippers have been observed nectaring on white clover (*Trifolium repens*) and longstalk clover (*T. longipes)* within the oatgrass patches (personal observation).

Site Description

This site is located approximately 0.25 miles past the gate at the end of Forest Service Road 1000, off of Forest Service system Trail 1120 and was the second site discovered on the Okanogan-Wenatchee National Forest (June 2007). This meadow contains both Forest Service and private lands; approximately ¾ of the meadow is located on private land (see map 5). Conrad Meadows Main 1 is approximately 113 acres in size, containing wet, mesic and xeric meadow habitat. Large sedge-marsh areas are located in the central and southern portion of the meadow which transitions to mesic/xeric meadow areas around the edges. Larval host plants and floral resources are abundant during the flight period (Figure 13 and 14). Five plant communities were identified in Conrad Meadow Main 1 (St. Hilaire *et al*. 2009). High Mardon skippers butterfly densities were observed in two of these communities: onespike oatgrass (*Danthonia unispicata*)/hood sedge (*Carex hoodii*)/white clover (*Trifolium repens*)/longstalk clover (*Trifolium longipes*) and Kentucky bluegrass (*Poa pratensis*)/hood sedge (*Carex hoodii*)/white clover (*Trifolium repens*). These two communities make up the mesic and xeric meadow areas. Flowering plants such as common camas (Camassia quamash), meadow death camas (*Zigadenus venenosus*), elephant's head (*Pedicularis groenlandica*) and cinquefoil (*Pontentilla*) sp. are abundant in the wet and mesic meadow habitats (Figure 14). Flowering white clover (*T. repens*) and longstalk clover (*T. longipes*) are abundant in the onespike oatgrass (*D. unispicata*) patches (Figure 13). Islands of large conifers are scattered throughout this site (see map 5, Figure 13).

Site Threats

There is evidence of substantial grazing at this site; indicated by short grass levels observed later in the summer (Figure 15). The current grazing allotment allows cattle on the site during the adult flight period. Elk arrive at Conrad Meadow Main 1 in late April and cattle arrive early July. There is a low threat level resulting from conifer encroachment; small conifers are starting to encroach on the edges of the meadow and along the island of conifers.

Figure 14. Conrad Meadows Main 1 with occasional vehicle use June 25, 2009. Abundant flowering forbs can be seen in the mesic/wet habitat.
Photo by Joan St. Hilaire.

Figure 15. Conrad Meadows Main 1 with oatgrass patch grazed heavily on the left half of photo and the mesic/wet sedges on the right half of photo September 25, 2009.
Photo by Joan St. Hilaire.

Figure 16. Conrad Meadows Main 1 July 9, 2012 with buck and pole drift fence. A temporary fence will be stabilized by attaching to permanent buck and pole corners.
Photo by Sarina Jepsen.

Site Management History and Current Land Allocations
There is infrequent vehicle and OHV use in the meadow primarily on private land. Forest Service system Trail 1120 bisects the meadow from north to south resulting in moderate foot and horse traffic through the meadow as well. The majority of this traffic is on the Forest Service system Trail 1120 with little to no evidence of additional threats to habitat caused from off-trail use at this time. In 2011 a temporary fence was constructed around the Mardon skipper "core use area" located on Forest Service land (Figure 16, Map 5). This temporary fence is intended to exclude cattle during the butterfly's flight period. Once the flight period has ended the temporary fence will be removed. Fence will be operational for the 2013 Mardon skipper flight period. This site is located in Matrix/GF NWFP/WFP Land Management Allocations and private land holdings.

Management Needs
This site contains one of the largest Mardon skipper populations and thus should be considered a very high priority.

Alternative 1
(Cattle grazing)

- Turn cattle out on the Conrad Meadows Pasture using the current schedule. Exclude cattle grazing from the "core use area" during the Mardon skipper flight period by using the existing temporary exclosure. Flight period generally ends by July 15th. This time period is dependent on weather and fluctuates each year. After the flight period, remove fence and allow cattle full access.
- Monitor site to determine trends associated with management activities. Include this site in a long-term monitoring strategy.
- Include this site in grazing study (The exact study design to be determined). Refer to Section 1 "Large Ungulate Grazing" for additional grazing study discussion. Grazing is the primary potential threat at this site and the main target for management decisions (high priority). Additional information is needed on the effects of cattle grazing prior to making further recommendations.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site that occurs on Forest Service Lands. Priority of removal will be on the Mardon skipper use areas (Map 5).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site on Forest Service lands (see Map 5 for site boundary).
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 to 10 years.

Alternative 2

(Cattle grazing)

- Excluding cattle grazing from the "core use area" during the Mardon skipper flight period by delaying cattle turnout date until after the adult flight period. Flight period generally ends by July 15th. This time period is dependent on weather and fluctuates each year. After the flight period allow cattle full access. Changing the cattle turnout date requires NEPA analysis. This option will be considered within the next range allotment environmental analysis.
- Monitor site to determine trends associated with management activities. Also monitor to determine end of flight period at this site. Include in a long-term monitoring strategy.
- Include this site in grazing study (The exact study design to be determined). Refer to Section 1 "Large Ungulate Grazing" for additional grazing study discussion. Grazing is the primary potential threat at this site and the main target for management decisions (high priority). Additional information is needed on the effects of cattle grazing prior to making further recommendations.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site that occurs on Forest Service Lands. Priority of removal will be on the Mardon skipper use areas (Map 5).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site on Forest Service lands.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 to 10 years.

Management Unit: 3b Conrad Finger 2 (Priority 1)
Site Name: Conrad Finger 2
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0631516 N5151480

Goal of the Site Management Plan
Maintain existing Mardon skipper population by managing cattle grazing on the site. Better understand the effects that grazing has on Mardon skipper populations in order to make more informed management recommendations. Maintain open meadow conditions by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Mardon skippers are distributed to the western and eastern portion of this site, within the drier meadow habitat. This site was discovered in 2007 and is one of the largest and highest concentrations of Mardon skippers on the Okanogan-Wenatchee National Forest. Minimum population estimate counts of individuals were 457 on June 27th 2007, 3 on July 10th 2007, 45 on June 25th 2008, 654 on June 30th 2008, 911 on July 9th 2008, 201 on July 16th 2008, 931 on July 2 2009, 124 on July 15th 2010, and 590 on July 6th 2012. The population estimate on July 9th 2008 of 911 is believed to be near peak flight period; based on multiple one-day visits per flight period (Table 1). The "core use area" is considered to be in the eastern portion of the meadow, in an

area dominated by onespike oatgrass (*Danthonia unispicata*). The "core use area" was defined using several one-day visits over 5 seasons of monitoring.

Site Description

Conrad Finger 2 is located across the South Fork Tieton River from the larger Conrad Meadow Main 1 site (map 5). Approximately half of this meadow is on Forest Service and half on private lands (see map 5). Conrad Finger 2 is approximately 7 acres in size and made up of about half wet and half mesic/xeric meadow habitat. Larval host plants and floral resources are abundant during the flight period (Figure 13 and 14). Three plant communities were identified for Conrad Finger 2. Mardon skippers were primarily observed in the mesic/xeric habitat made up of these two plant communities: onespike oatgrass (*Danthonia unispicata*)/hood sedge (*Carex hoodii*)/white clover (*Trifolium repens*)/longstalk clover (Trifolium longipes) and Kentucky blugras (*Poa pratensis*)/ hood sedge (*Carex hoodii*)/white clover (*Trifolium repens*) (Figure 17). Mardon skippers were observed nectaring on clover (personal observations over 5 seasons of monitoring). Flowering plants such as common camas (*Camssia quamash*), meadow death camas (*Zigadenus venenosus*), elephant's head (*Pedicularis groenlandica*) and cinquefoil (*Pontentilla*) sp. are abundant in the wet and mesic meadow habitat. Flowering white clover (*T. repens*) and longstalk clover (*T. longipes*) are abundant in the onespike oatgrass (*D. unispicata*) patches (Figure 17). There is an ephemeral stream that runs through this meadow, as well. An island of large conifers divides the site from east to west (Map 5).

Figure 17. Conrad Finger 2 with the xeric habitat (onespike oatgrass patch) on the right and mesic habitat on the left. Also concentrations of dead lodgepole pine can be seen in the background. Photo by Sarina Jepsen.

Site Threats

There is evidence of substantial grazing at this site; indicated by short grass levels observed later in the summer. The ephemeral stream that runs through the meadow appears eroded, suggesting heavy ungulate activity (Figure 18). The current grazing allotment allows cattle on the site

during the adult flight period (Figure 19). Elk arrive at Conrad Finger 2 in late April and cattle arrive early July. Small conifers are starting to encroach on the edges of the meadow and along the island of large conifers.

Figure 18. Down-cut ephemeral stream in the middle of the meadow (not Trail 1134) on 7/9/2012. Photo by Sarina Jepsen.

Site Management History and Current Land Allocations

Forest Service system Trail 1134 runs through the middle of the meadow with majority of foot and horse traffic occurring on the trail. There is little to no evidence of additional threats to habitat caused from off-trail use at this time. This site is located in Matrix/GF NWFP/WFP Land Management Allocations and private land holdings.

Figure 19. Cattle in Conrad Finger 2 on 7/10/2007. Photo by Sarina Jepsen.

Management Needs

This site contains one of the largest Mardon skipper populations and thus should be considered a very high priority.

Alternative 1
(Cattle grazing)

- Turn cattle out on the Conrad Meadows Pasture using the current schedule. Exclude cattle grazing from the "core use area" during the Mardon skipper flight period by building a temporary exclosure around the "core use area" that occurs on Forest Service lands. Use a temporary exclosure design similar to what is used at Conrad Meadow Main 1. Mardon skipper flight period at this site generally ends by July 15th. This time period is dependent on weather and fluctuates each year. The temporary fence will be removed after flight period and cattle will be allowed full access. Trail 1134 runs through the "core use area". Maintaining a closed fence may be problematic as hikers and horseback riders frequent this trail. This option needs additional analysis to determine its viability. It will be considered within the next range allotment environmental analysis.
- Monitor site to determine trends associated with management activities. Also monitor to determine end of flight period at this site. Include this site in a long-term monitoring strategy.
- Include this site in grazing study (The exact study design to be determined). Refer to Section 1 "Large Ungulate Grazing" for additional grazing study discussion. Grazing is the primary potential threat at this site and the main target for management decisions (high priority). Additional information is needed on the effects of cattle grazing prior to making further recommendations.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site that occurs on Forest Service Lands. Priority of removal will be on the Mardon skipper use areas (Map 5).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site on Forest Service lands (see Map 5 for site boundary).
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 to 10 years.

Alternative 2
(Cattle grazing)

- Exclude cattle grazing from the "core use area" during the Mardon skipper flight period by delaying cattle turnout date until after the adult flight period. Flight period generally ends by July 15th. This time period is dependent on weather and fluctuates each year. After the flight period allow cattle full access. Changing the cattle turnout date requires NEPA analysis. This option will be considered within the next range allotment environmental analysis.
- Monitor site to determine trends associated with management activities. Also monitor to determine end of flight period at this site. Include this site in a long-term monitoring strategy.
- Include this site in grazing study (The exact study design to be determined). Refer to Section 1 "Large Ungulate Grazing" for additional grazing study discussion. Grazing is the primary

potential threat at this site and the main target for management decisions (high priority). Additional information is needed on the effects of cattle grazing prior to making further recommendations.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site that occurs on Forest Service Lands. Priority of removal will be on the Mardon skipper use areas (Map 5).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site on Forest Service lands.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 to 10 years.

Figure 20. Conrad Finger 2 with a 1m x 1m grazing exclosure; species composition has appeared to have changed and is no longer dominated by oatgrass (personal observation). Photo by Sarina Jepsen on 7/9/2012.

Management Unit: 3c Conrad Finger 1 (Priority 4)
Site Name: Conrad Finger 1
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0631510 N5150978

Goal of the Site Management Plan
Determine the size and distribution of the population at this site. Maintain open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Conrad Finger 1 is a small meadow, approximately 3.5 acres with very few Mardon skippers. This site was visited June 24th 2007 and July 9th 2007 and no Mardon skippers were seen (St. Hilaire *et al.* 2007; Jepsen *et al.* 2007). Approximately 2 Mardon skippers were seen as we traveled through the meadow July 9th 2012. Further work is needed to determine population size and distribution through the meadow.

Site Description
Conrad Finger 1 is located across the South Fork Tieton River from the larger Conrad Main Meadow site and adjacent to Conrad Finger 2 (Map 5). A large stand of conifers separates Conrad Finger 1 and 2 (Map 5). Conrad Finger 1 is made up of mostly wet meadow habitat with very little suitable Mardon skipper habitat (mesic or xeric habitat) present (Figure 21). No oatgrass was observed but several species of sedges were.

Figure 21. Conrad Finger 1 made up primarily of wet meadow habitat July 2012. Photo by Sarina Jepsen.

Site Threats
An eminent threat identified at this site is conifer encroachment. Small conifers are starting to encroach on the edges of the meadow. Grazing concerns are most likely similar to Conrad Finger 2 but lack documentation of cattle use at site. During the July 9th 2012 visit we did not observe imminent grazing threats to Mardon skipper habitat. Further work is needed to determine if there are grazing risks.

Site Management History and Current Land Allocations
This site is located in Matrix/GF NWFP/WFP Land Management Allocations.

Management Needs
This is considered low priority because very few Mardon skippers have been observed at this site. It most likely is a site made up of dispersing or overflow of individuals from Conrad Finger 2 and Conrad Meadow Main 1 (See Map 5).

(Cattle grazing)
- Conduct additional presence/absence surveys to determine Mardon skipper population size and distribution. Once size and distribution have been determined, monitor every 5 years.
- Monitor cattle use of meadow to determine if it is a potential threat.

(Conifer encroachment)
- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site with priority on the Mardon skipper use area (Map 5).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site boundary on Forest Service lands.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 to 10 years.

Management Unit: 4 Conrad Donut Meadow (Priority 3)
Site Name: Conrad Donut Meadow
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0631641 N5150968

Goal of the Site Management Plan
Maintain open meadow condition by removing encroachment by conifers. Improve habitat conditions by removing nonnative plants. Determine the size and distribution of the population at this site.

Site Distribution, Abundance, and Trends
This site was visited twice with a minimum population estimate count of 15 individuals on July 9th 2009 and over 25 individuals on July 9th 2012. Both counts were taken while walking through the site; surveys to protocol were not conducted. We were unable to determine "core use area" due to lack of one-day visits.

Figure 22. Conrad Donut is a mostly xeric site July 2012. Photo by Sarina Jepsen.

Site Description

To access this site from Road 1000, one must walk through Conrad Meadow then wade across the South Fork Tieton River. Although this meadow is less than ¼ mile from the Conrad Meadow complex it is considered a different Mardon skipper population due to the lack of dispersal potential between Conrad Donut and the Conrad Meadow complex. The only thing that connects this meadow to Conrad Finger 1 is a game/cattle and user built trail (see Map 6). The meadow is surrounded by heavy timber, with an island of heavy timber in the middle (so this meadow forms a donut shape). There may be barriers to Mardon skipper dispersal due to the heavy timbered stand that surrounds it with no open travel corridor. It is small, less than 2 acres. Conrad Donut is a dry site with no evidence of a permanent water source, atypical of the Okanogan-Wenatchee NF sites. Larval host plants and floral resources are abundant at this site (Figure 22, 23). Fescue (*Festuca*) sp. occurs at the northwest end with a variety of sedges (*Carex*) sp. scattered throughout the site. Beard-tongue (*Penstemon*) sp., pearly everlasting (*Anaphalis margaritacea*) and clover (*Trifolium*) sp. were flowering at the time of our 2012 visit. A mountain pine beetle outbreak has killed several hundred acres of lodgepole pine surrounding the meadow; creating the potential for future openings adjacent to this site. A user built trail ran north to south through the middle of meadow. Most foot/horse traffic appeared to be focused primarily on this trail, with no immediate threats to Mardon skippers or their habitat. Although cattle were not seen at this site during the two survey visits, there was evidence of previous use by cattle. Grazing does not appear to be an immediate threat at the Conrad Donut site at this time.

Site Threats

The primary threat identified at this site was the presence of invasive plants, and conifer encroachment.

Figure 23. Note the trail and young conifers encroaching on this meadow July 2012. Photo by Sarina Jepsen.

Site Management History and Current Land Allocations

Conrad Donut site is within the Conrad Meadows Range Allotment Boundary, within the Conrad Meadows Pasture. Cattle turnout period is between July 1st and September 30th. For additional information about the grazing allotment refer to Section 1 "Large Ungulate Grazing" discussion. Although the cattle turn-out day for the Conrad Meadow Pasture occurs during the Mardon skipper flight period, no cattle or fresh sign were observed during the 2009 and 2012 visits. Livestock grazing does not appear to be an immediate threat at this time.

There have been past timber sale activity on private lands in the area, although none of this activity has directly impacted the meadow. There are no anticipated threats from future timber sale activities near the meadow as most of the marketable timber has died from the mountain pine beetle outbreak.

This site is located in Matrix/GF NWFP/WFP land management allocations.

<u>Management Needs</u>

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site with a priority on the Mardon skipper use area (Map 6).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site (see Map 6 for site boundary).
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 to 10 years.

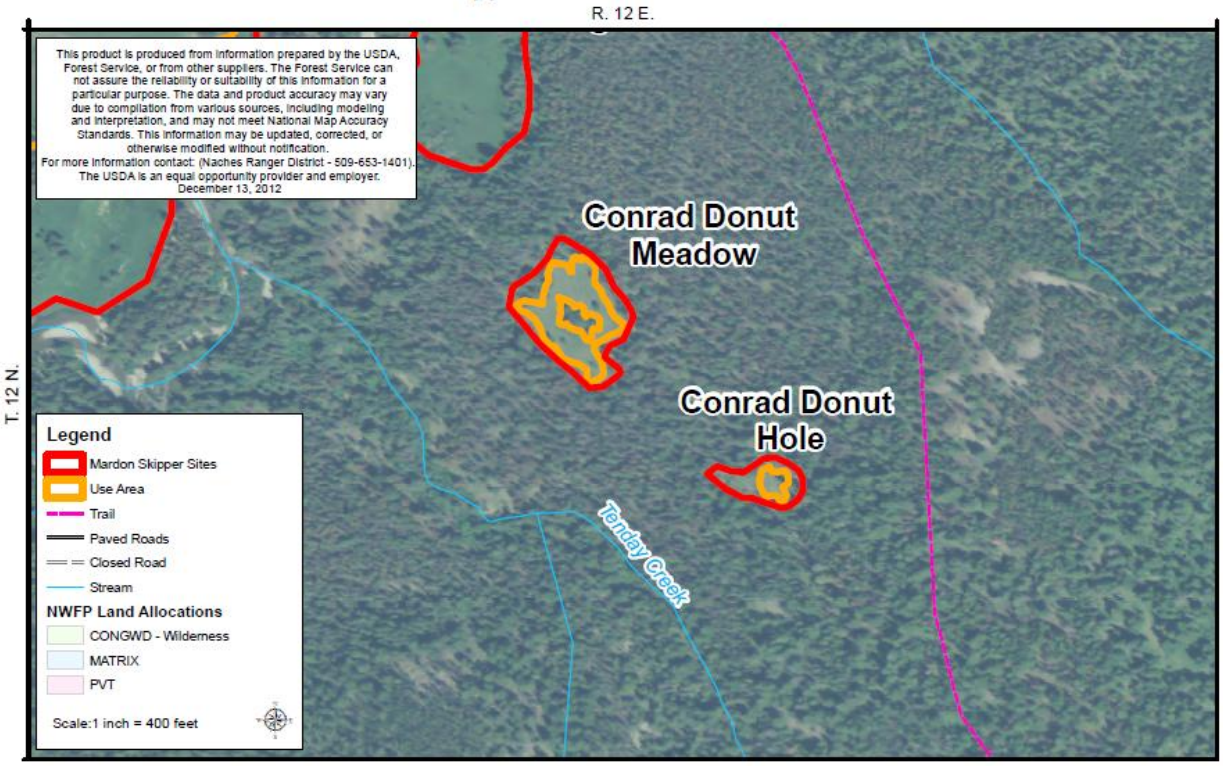
(Invasive plants)

- Remove invasive plants from the site (use site boundary shown on Map 6).
    - Hand control is the preferred removal method
    - Avoid degrading habitat; don't use motorized vehicles.
    - If chemical applications are necessary, protect non-target vegetation.
    - Avoid use of ester formulations of herbicide and NPE-based surfactants.
    - Treat no more than 50% of a site at one time, in any year.
    - Time treatment outside the adult flight period (most years end of July at this site)

(*Monitoring*)

- Conduct additional presence/absence surveys at site to determine population size and distribution. Once population size and distribution is determined monitor every 5 years.

Map 6: Conrad Donut Meadow (1.71 Acres) and Conrad Donut Hole (0.46 Acres)
Mardon Skipper Site Location



Management Unit: 5 Conrad Donut Hole (Priority 4)
<u>Site Name</u>: Conrad Donut Hole
<u>Coordinates:</u> Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0631821 N5150817

Goal of the Site Management Plan
Maintain open meadow condition by removing encroaching conifers. Improve habitat conditions by removing nonnative plants. Determine the size and distribution of the population at this site.

Site Distribution, Abundance, and Trends
Conrad Donut Hole is a small meadow, approximately 0.46 acre with very few Mardon skippers present. This is a new site, discovered July 9th 2012. Less than 5 Mardon skippers were

observed at this site. We were unable to determine trends or "core use area" due to lack of one-day visits.

Figure 24. Conrad Donut Hole with user built trail running through it July 2012. This is a xeric site with very little Mardon skipper habitat available. Photo by Sarina Jepsen.

Site Description

Conrad Donut Hole is an isolated site. Although it is within 500 yards of the Conrad Donut, there are no open travel corridors between them (see Map 5). A well-defined user built trail connects the two; however this trail is covered by a dense conifer overstory. It is a dry site with no evidence of a permanent water source, atypical of the Okanogan-Wenatchee NF sites. There is a small, dry, heavily incised channel of an ephemeral creek located at the southern edge of the meadow. There are a lot of annual plants and bare soil and gopher/mole activity throughout the meadow, indicative of heavy grazing activities (figure 25). Larkspur (*Delphinium*) sp., vetch (*Vicia*) sp., fescue (*Festuca)* sp. and yarrow (*Achillea millefolium*) are present at this site. Oatgrass is absent from this site, and thin patches of sedges (*Carex*) sp. are distribution throughout site (Figure 25). Overall there was low plant diversity and few floral resources at this location. There is a small dry, heavily incised creek bed a southern edge of the meadow. A user built trail runs north to south through the middle of meadow. Most foot/horse traffic appeared to be focused primarily on this trail, with no immediate threats to Mardon skippers or their habitat. A mountain pine beetle outbreak has killed several hundred acres of lodgepole pine surrounding the meadow; creating the potential for future openings adjacent to this site.

Figure 25. Highly disturbed site; gopher use, forbs and bare soil present throughout site July 2012. Photo by Sarina Jepsen.

Site Threats

This site appears to be heavily grazed and highly disturbed, based on the presence of nonnative plant species and the heavily incised creek bed. We were unable to determine if elk, cattle or both caused the grazing threat. An eminent threat identified at this site was conifer encroachment. Small conifers are encroaching on the meadow.

Site Management History and Current Land Allocations

The Conrad Donut Hole is within the Conrad Meadows Range Allotment Boundary, within the Conrad Meadows Pasture. Cattle turnout period is between July 1st and September 30th. For additional information about the grazing allotment refer to Section 1 "Large Ungulate Grazing" discussion

There have been past timber sale activity on private lands in the area, although none of this activity has directly impacted the meadow. There are no anticipated threats from future timber sale activities near the meadow as most of the marketable timber has died from the mountain pine beetle outbreak. This site is located in Matrix/GF NWFP/WFP land management allocations.

Management Needs

Because the size and number of mardon skippers observed at this meadow are small and the site is already heavily disturbed, it is considered low priority.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of the site with priority on the Mardon skipper use areas (Map 6).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site (see Map 6 for site boundary).

- Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
- Maintenance expected to occur every 3 to 5 years.

(Invasive plants)

- Remove invasive plants from the site (see Map 6 for site boundary).
  - Hand control is the preferred removal method
  - Avoid degrading habitat; don't use motorized vehicles.
  - If chemical applications are necessary, protect non-target vegetation.
  - Avoid use of ester formulations of herbicide and NPE-based surfactants.
  - Treat no more than 50% of a site at one time, in any year.
  - Time treatment outside the adult flight period (most years end of July at this site)

(*Monitoring*)

- Conduct additional presence/absence surveys at site to determine population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 6 1050 Meadows (1050 Meadow Complex and 1050 Upper Meadow)
1050 Meadows Description

The 1050 Meadows include 1050 Meadow Complex and 1050 Upper Meadow. These two sites are considered one population due to the ability for adult dispersal between sites; close proximity and open travel corridors. They are located off Forest Service 1050 Road system; approximately a mile southeast of Minnie Meadows site (Map 1, 2 and 7).

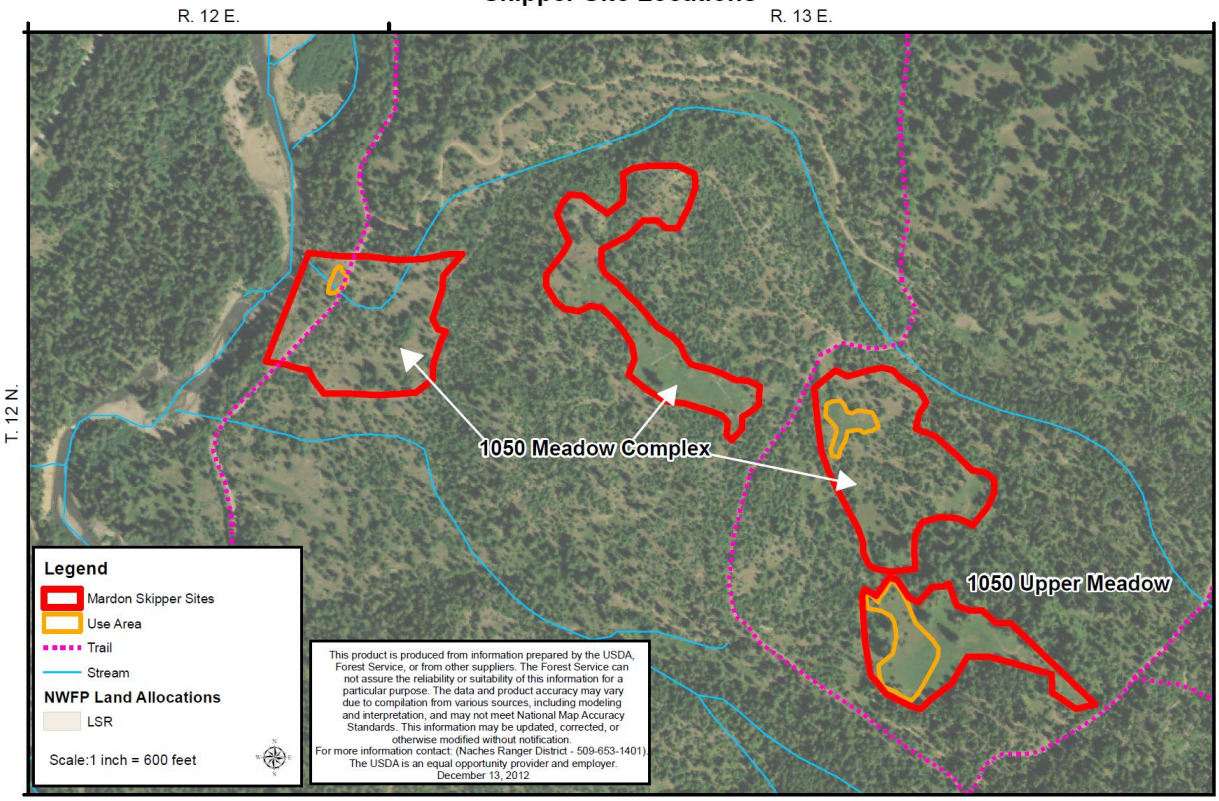
Site Distribution, Abundance, and Trends

Low numbers of Mardon skippers were counted at both the 1050 Meadow Complex and 1050 Upper Meadow. Very little survey data has been collected at these sites. They are located adjacent to one another with little heavy timber between sites. Although little is known about movement between these sites; it is suspected due to the potential for dispersal.

Site Management History and Current Land Allocations

The 1050 Meadows occurs within the Tieton Range Allotment in the Minnie Meadow Pasture (Map 2). Cattle turnout period is between July 1st and August 31st. For additional information about the grazing allotment refer to Section 1 "Large Ungulate Grazing" discussion. Although the cattle turn-out day for the Minnie Meadow Pasture occurs during the Mardon skipper flight period, no cattle or fresh sign were observed during the 2009 and 2012 visits. Livestock grazing does not appear to be an immediate threat at this time. The 1050 Meadows are located in Late-Successional Reserve (LSR)/Scenic Travel-Partial Retention (ST2) NWFP/WFP Land Management Allocations.

Map 7: 1050 Upper Meadow (4.95 Acres) and 1050 Meadow Complex (20.83 Total Acres) - Mardon Skipper Site Locations



Management Unit: 6a 1050 Meadow Complex (Priority 4)
Site Name: 1050 Meadow Complex
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T; 10T UTM E0634746 N5156708 (1050 Meadow Complex). Mardon skippers were observed at these three points: 10T E0634822 N5156420 (upper site); 10T E0634756 N5156717 (middle site); 10T E634112 N5156868 (lower site, by Forest Service Rd 1050) (see Map 7).

Goal of the Site Management Plan
Maintain an open meadow condition by removing encroaching conifers. Develop a better understanding of the Mardon skipper population size and distribution at this site through additional monitoring.

Site Distribution, Abundance, and Trends
This site was newly discovered in 2012. Approximately 10 Mardon skippers were observed throughout the 1050 Meadow Complex on July 9th 2012 as we walked through the site; surveys to protocol were not conducted. This site was visited July 9th and 13th of 2009 and no Mardon skippers were observed. Sonora skippers were seen during both days in 2009. These were minimum population estimates; we were unable to determine population size and distribution due to limited number of visits at this site. Further investigations for occupied sites are warranted.

Figure 26. 1050 Meadow Complex made up of old logging units and mesic meadow habitat scattered throughout July 2012. Note the stumps remaining from past logging activity. Photo by Sarina Jepsen.

Site Description

The 1050 Meadow Complex is made up of pockets of habitat scattered throughout a young conifer regeneration unit. Although the regeneration unit is over 100 acres, there is approximately 21 acres of actual Mardon skipper habitat. There is evidence of past logging activity; old stumps are scattered throughout this site (Figure 26). One of the locations Mardon skippers were seen at is a dispersed camp site next to OHV Tr 583. Some sedge (*Carex*) species were present, but overall there was low plant diversity and few floral resources at this location. The two other locations were within meadow type habitat (Map 7). Larval host plants and floral resouces were abundant within these small pockets of habitat. White clover (*Trifolium repens*), false hellebore (*Veratrum califonicum*), sedge (*Carex*) sp. and onespike oatgrass (*Danthonia unispicata*) were present. This appears to be a popular area for elk as a lot of elk sign was observed throughout the 1050 Meadow Complex during the 2009 and 2012 visits (St. Hilaire *et al.* 2009).

Site Threats

An eminent threat identified at this site was conifer encroachment. Small conifers are encroaching throughout the site.

Management Needs

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from meadow habitat with priority on the Mardon skipper use areas (Map 7).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site (see Map 7 for site boundary).

- Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
- Maintenance expected to occur every 5 years.

- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 6b 1050 Upper Meadows (Priority 3)
Site Name: 1050 Upper Meadow
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0634822 N5156420 (1050 Upper Meadow)

Goal of the Site Management Plan
Maintain an open meadow condition by removing encroaching conifers and false hellebore. Develop a better understanding of the Mardon skipper population size and distribution at this site.

Site Distribution, Abundance, and Trends
1050 Upper Meadow was visited twice in 2009; 2 Mardon skippers were found on July 9th and 0 on July 13th. Sonora skippers were also seen at this site during 2009 but not during the 2012 visit. Approximately 15 Mardon skippers were observed July 9th 2012 as we walked through site; surveys to protocol were not conducted. Mardon skippers were observed at the southern end of the 1050 Upper Meadow. These were minimum population estimates; we were unable to determine population size and distribution due to limited number of visits at this site.

Site Description
This site is located approximately ¼ mile west of Forest Service Rd 1050; OHV Tr 589 is located just outside of this meadow to the south (Map 7). The 1050 Upper Meadow is a small meadow (5 acres) surrounded by heavy timber to the north, south and east. A large patch of false hellebore (*Veratrum californicum*) is present at the southern end. Larval host plants and floral resources are abundant at this site. Onespike oatgrass (*Danthonia unispicata*) was the dominant grass species with white clover (*Trifolium repens*) present throughout. Habitat is similar to other larger Mardon skipper populations in the SF Tieton, such as Conrad Main Meadow 1, Palmer Meadow and Conrad Finger 2. Since the habitat appeared to be so similar to these sites, we expected to see a larger population of Mardon skippers at the 1050 Upper Meadow. This is a popular area for elk as a lot of elk sign was observed throughout the site during the 2009 and 2012 visits (St. Hilaire *et al.* 2009).

Figure 27. Little evidence left of an OHV Tr. 589 that was diverted out of the 1050 Upper Meadow in 2010. The patch of oatgrass and clover in the foreground is where the Mardon skippers were seen July 2012. Photo by Sarina Jepsen.

Site Threats
Small conifers are starting to encroach on the edge of the meadow. There is also a large patch of false hellebore at this site that appears to be encroaching on the meadow habitat.

Site Management History and Current Land Allocations
Forest Service designated OHV Tr. 589 was rerouted around the 1050 Upper meadow in 2010 (Figure 27). Presently there is little evidence left of this trail within the meadow (Figure 27).

Management Needs
(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 7).
    - Carrying trees to piles, or distribute material outside of site. Do not drag trees through site.
    - Cut trees flush with the ground to minimize visual impacts.
    - If pile burning, burn outside of site (see Map 7 for site boundary).
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.

(Invasive plants)

- Remove a portion of the invader plant (false hellebore) from site.
    - Remove no more than 30% of the false hellebore from this site (false hellebore is encroaching on the meadow; limit amount removed at one time to reduce potential change to microclimate)
    - Hand control is the preferred removal method

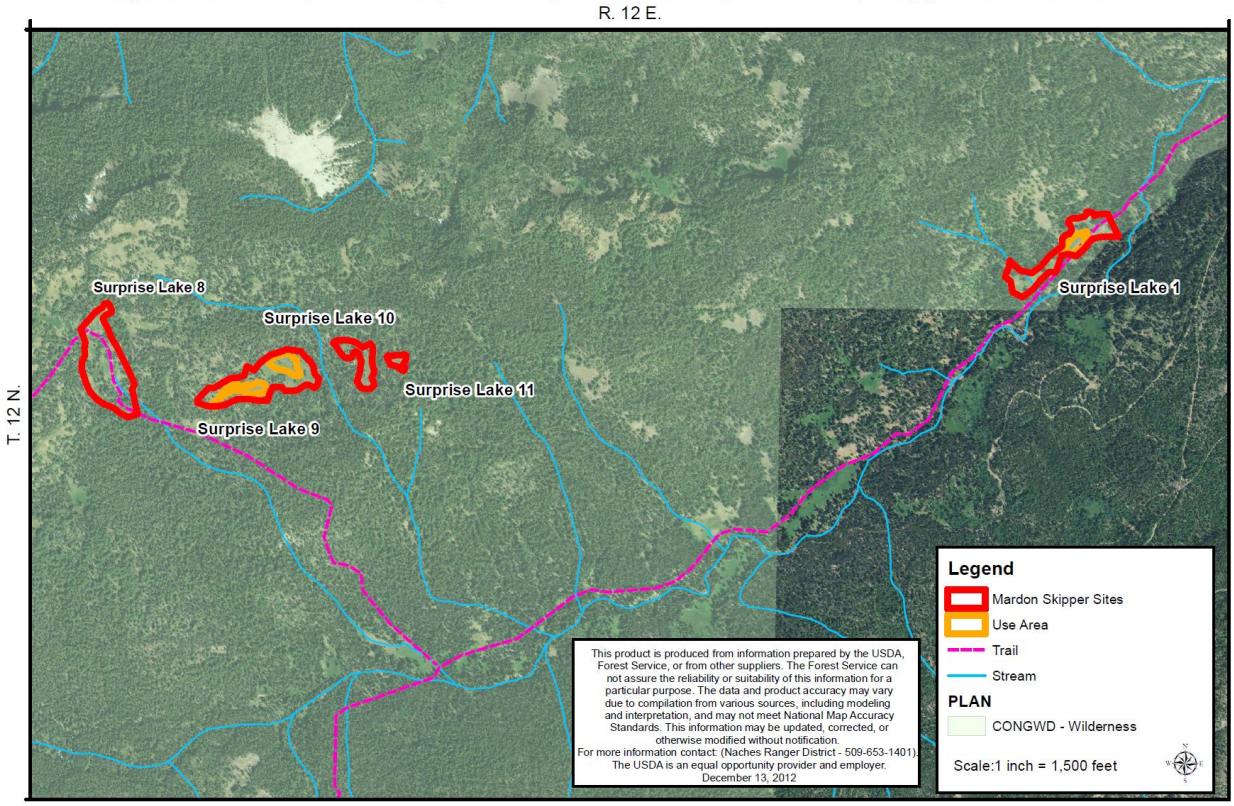
- Avoid degrading habitat; don't use motorized vehicles.
- If chemical applications are necessary, protect non-target vegetation.
- Avoid use of ester formulations of herbicide and NPE-based surfactants.
- Treat no more than 50% of a site at one time, in any year.
- Time treatment outside the adult flight period (most years end of July at this site)
- Maintenance expected to occur every 5 years.

(Monitoring)

- Continue monitoring every 3 years to determine if OHV reroute is still effective.
- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 3 to 5 years.

Map 8 is of all the Surprise Lake Trail Mardon skipper sites.

Map 8: Surprise Lake 1 (5.27 Acres), Surprise Lake 8 (7.65 Acres), Surprise Lake 9 (7.31 Acres), Surprise Lake 10 (1.92 Acres) and Surprise Lake 11 (0.42 Acres) Skipper Site Locations



Management Unit: 7 Surprise Lake Tr 1 (Priority 3)
Site Name: Surprise Lake Tr 1
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0628807 N5149981

Goal of the Site Management Plan
Maintain an open meadow condition by removing encroaching conifers. Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain existing Mardon skipper population by managing recreation use (tent camping) at site.

Site Distribution, Abundance, and Trends
In past surveys, Mardon skippers were found within the northern half of this site. Minimum population estimates of individuals at Surprise Lake Tr 1 were 25 on July 7th 2007 and 46 on July 18th 2012. Further work is needed to determine population size, trends and "core use area". This is considered to be a small population and to be isolated since it is located about one mile from the nearest known occupied sites (Conrad Meadow Main 1 and Surpise Lake Tr 11 (Map 1 and Map 8).

Site Description
This Meadow is located along the Surprise Lake Loop trail (Tr 1120) (see Map 8 and 9). This is a non-motorized trail that accesses the Goat Rocks Wilderness and runs through a portion of the meadow. The meadow at Surprise Lake Tr 1 site appears to be a popular camping spot for hikers as we saw approximately 10 tents during our 2012 visit. It is a long, linear, flat meadow, a little over 5 acres in size; located in a valley bottom. Larval host plants and floral resources were abundant. Grass species such as fescue (*Festuca*) sp., sedge (*Carex*) sp. and other grasses were present. False hellebore (*Veratrum californicum*) was present along with flowering plants such as wild strawberry (*Fragaria*) sp., lily (*Calochortus*) sp., western yarrow (*Achillea millefolium*) clover (*Trifolium*) sp., vetch (*lathyrus*) sp., snapdragon (*penstemon*) sp., dandelion (*Taraxacum*), wild carrot (*Daucus carota)*, and cinquefoil (*potentialla*) sp.

Figure 28. Surprise Lake Tr 1 July 2012. Trail in photo is where Tr. 1120 used to occur. It has been rerouted outside (above) the meadow, but the old trail is still visible.
Photo by Sarina Jepsen.

Site Threats
Small conifers are starting to encroach on the edges of the meadow. Tent camping also poses threats to individual Mardon skippers. An abandoned portion of Tr. 1120 is still apparent and runs through the Mardon skipper use area; having minor impacts to Mardon skipper habitat.

Figure 29. One of several tents observed on July 18th 2012 visit. Photo by Sarina Jepsen.

Site Management History and Current Land Allocations

This site falls within the Conrad Meadows Range Allotment, Conrad Meadows Pasture. Cattle turnout period is typically between July 1st and September 30th. Although the July 1st turnout date overlaps with Mardon skipper adult flight period, no cattle were observed in the meadow during the 2007 and 2012 visits. Only fresh elk sign was observed at the site along with older cattle sign. Most likely there is a lag time between when the cattle are turned out in this pasture and when they actually arrive at this meadow. Grazing levels appears to be minimal and not an immediate threat at the Surprise Lake Tr 1 site at this time. The Surprise Lake Tr 1 is located in Congressional Withdrawn or Wilderness land allocation (Goat Rocks Wilderness). Management of cattle within wilderness includes moving and breaking groups of cattle to no more than 6 cow/calf pairs seen at one time.

Management Needs

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 9).
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is

needed for all wilderness sites. Additional design criteria may be added as a result of that analysis.

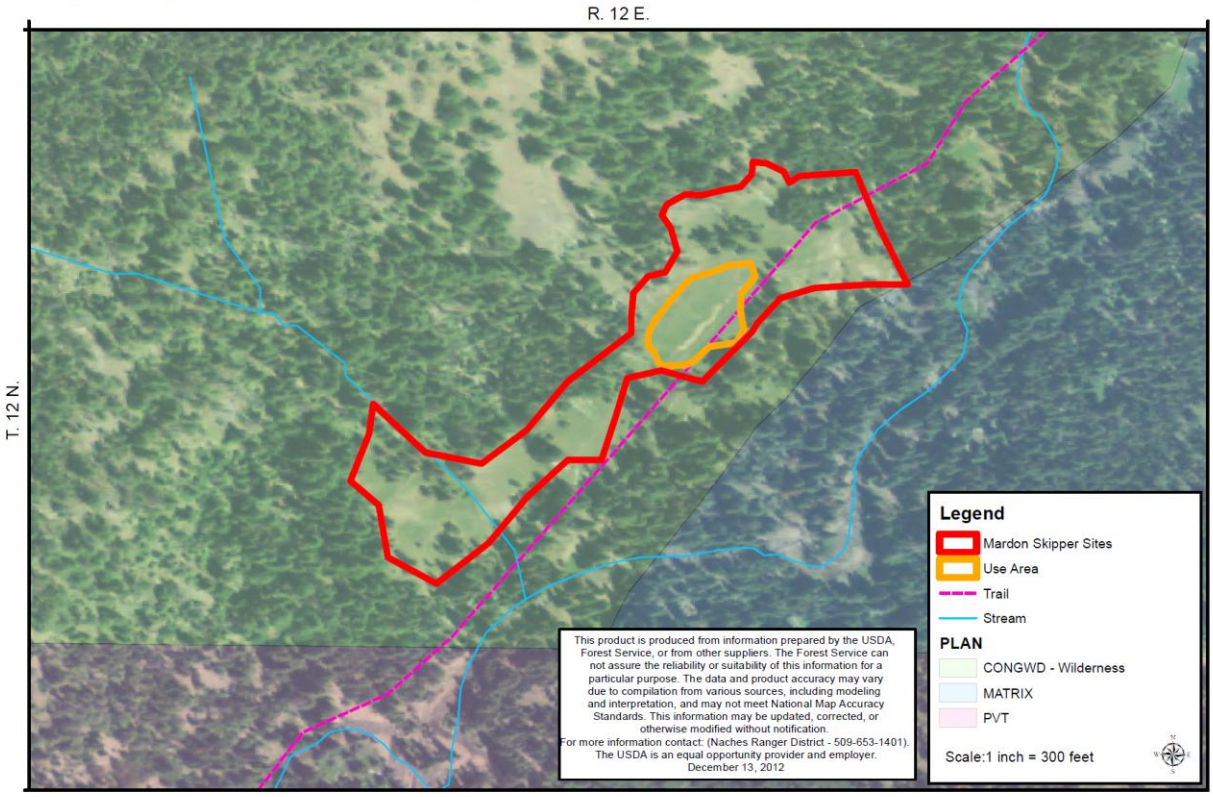
(Monitoring)

- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 3 to 5 years.

(*Recreation-tent camping*)

- Install signs in the meadow to establish a camping area outside of Mardon skipper habitat. Signs will educate the public on the detrimental impacts of camping use to sensitive habitat. The signs will ask recreationists to camp in a designated area.
- Revisit the abandoned trail that runs through the use area and determine why it still has a footprint in the meadow. Pending on that finding it may be possible to rehabilitate the trail with Mardon skipper larval host plants and potentially build a drift fence diverting large ungulate use. A Minimum Requirements Analysis will need to be completed for this activity.

Map 9: Surprise Lake 1 Mardon Skipper Site Location - 5.27 Acres



Management Unit: 8 Surprise Lake Trail Meadow Complex (Surprise Lake Tr 8, Surprise Lake Tr 9, Surprise Lake Tr 10, Surprise Lake Tr 11)

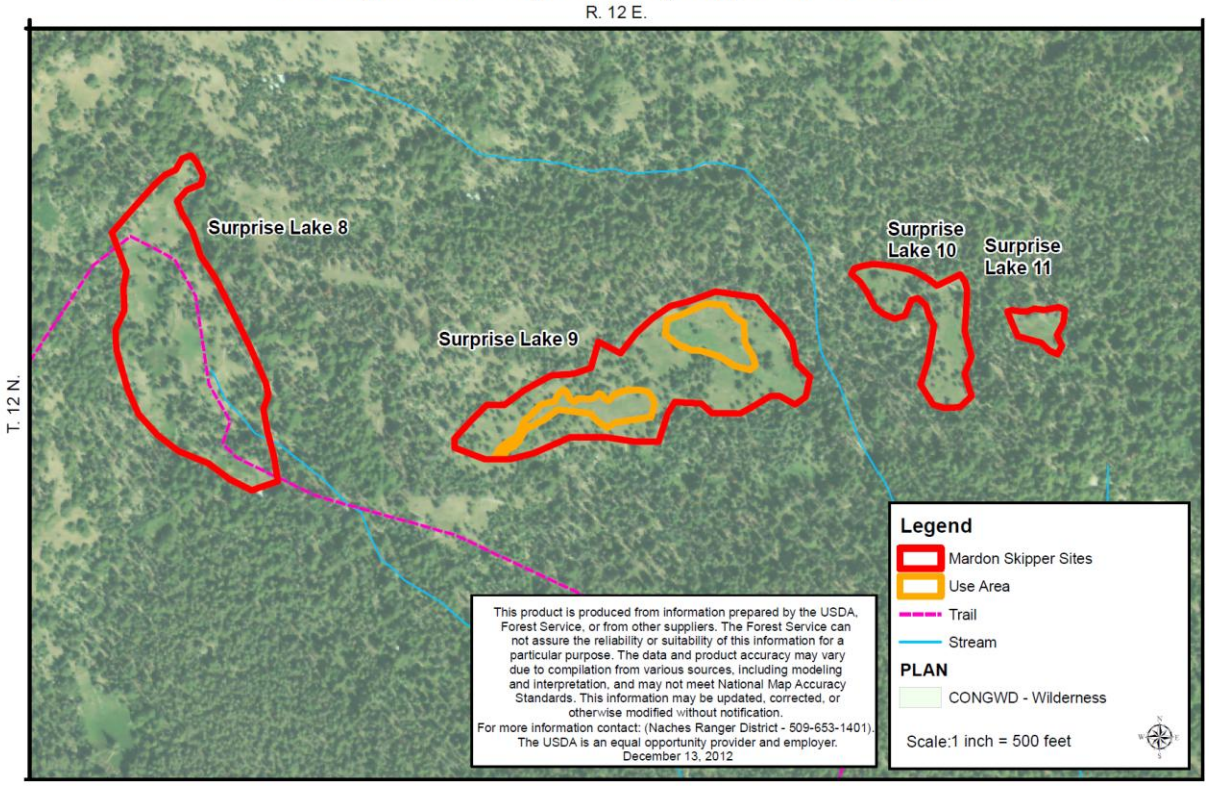
Surprise Lake Trail Meadow Complex Description

The Surprise Lake Trail Meadow Complex includes Surprise Lake Tr 8, Surprise Lake Tr 9, Surprise Lake Tr 10 and Surprise Lake Tr 11. These four sites are all located off of the Surprise Lake Loop Trail (Tr. 1120). They are all located over 2 miles southwest of Conrad Main Meadow 1. Although Surprise Lake Tr 1 is located off Tr. 1120 it was not included in this MU as it is located over 1.5 miles from these four sites; and therefore probably represents a distinctly separate population (see Map 9). A mountain pine beetle outbreak has killed several hundred acres of lodgepole pine surrounding this meadow complex; creating the potential for future open corridors between these meadows**.**

Site Distribution, Abundance, and Trends

A moderate size Mardon skipper population was noted at Surprise Lake Tr 9, while low numbers were counted at Surprise Lake Tr 8, Surprise Lake Tr 10 and Surprise Lake Tr 11. Surprise Lake Tr 8, Surprise Lake Tr 9, Surprise Lake Tr 10 and Surprise Lake Tr 11 may all be one population (Map 10). Little is known about movement between these sites due to lake of surveys. Although these sites are all located close to one another (less than 1/8th mile), there is heavy timber between sites which may be a barrier for adult dispersal.

Map 10: Surprise Lake 8 (7.65 Acres), Surprise Lake 9 (7.31 Acres), Surprise Lake 10 (1.92 Acres) and Surprise Lake 11 (0.42 Acres) Skipper Site Locations



Site Management History and Current Land Allocations

This complex falls within the Conrad Meadows Range Allotment, Conrad Meadows Pasture. Cattle turnout period is between July 1st and September 30th. Although the July 1 cattle turnout date overlaps with Mardon skipper adult flight period, no cattle were observed in the meadow during the 2007 and 2012 visits. Only fresh elk sign was observed at the site along with older cattle sign. Most likely there is a lag time between when the cattle are turned out in the low elevations of the Conrad Meadow Pasture and when they actually arrive at these high elevation meadows, and therefore we suspect that cattle are not present on these meadows during the Mardon skipper adult flight period. Grazing levels appear to be minimal; currently there are no immediate grazing threats at these sites. The Surprise Lake Trail Meadow Complex sites are located in Congressional Withdrawn or Wilderness land allocation (Goat Rocks Wilderness). Management of cattle within wilderness includes moving and breaking groups of cattle to no more than 6 cow/calf pairs seen at one time.

Management Unit: 8a Surprise Lake Tr 8 (Priority 4)

Site Name: Surprise Lake Tr 8

Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0625923 N5149573

Goal of the Site Management Plan

Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain and improve habitat for Mardon skippers by managing conifer encroachment.

Site Distribution, Abundance, and Trends

Minimum population count was 2 individuals on July 10th 2007. It is unknown if this survey was conducted during the peak flight period. Population size and trend along with "core use area" were undetermined due to lack of surveys at this site.

Site Description

Surprise Lake Tr 8 is the highest elevation site known for Mardon skippers in Washington (5,237 feet). Surprise Lake Loop Trail (Tr. 1120) runs through this meadow. The majority of foot and horse traffic occurs on Tr. 1120 with little to no evidence of additional threats to habitat caused from off-trail use at this time. Surprise Lake Tr 8 is the last Mardon skipper site along Tr. 1120. This site is over 2 miles SW of Conrad Meadow Main 1, and less than ¼ mile west of Surprise Lake Tr 9 (see Maps 1 and 10). There was fescue (*Festuca*) sp. and abundant sedge (*Carex*) sps. noted at this meadow. There was also false hellebore (*Veratrum californicum*), lupine (*Lupinus*) sp., cow parsnip (*Heracleum maximum*), and other grasses and forbs present.

Site Threats

Conifer encroachment was an eminent threat identified at this site. Small conifers are encroaching throughout the site (Figure 30).

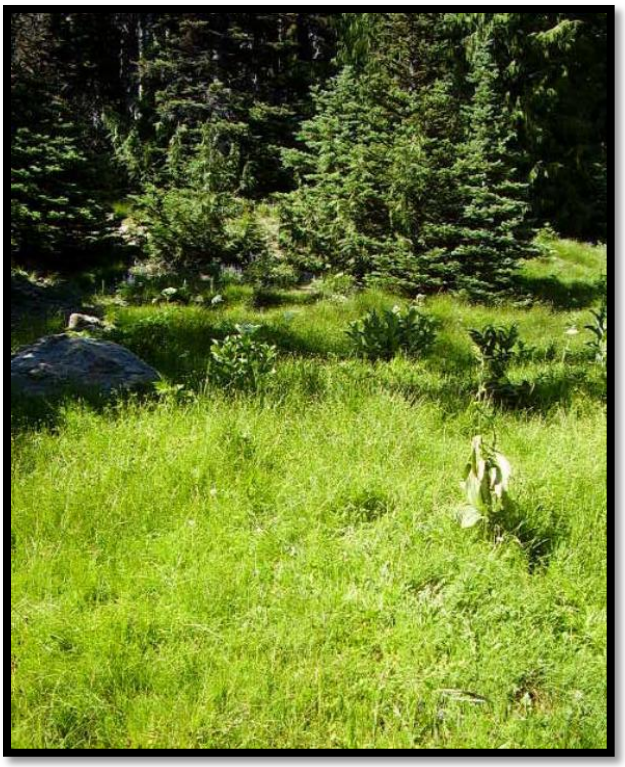


Figure 30. Surprise Lake Tr 8 on July 10, 2007. Photo by Sarina Jepsen.

Management Needs

This is considered low priority because very few Mardon skippers have been observed at this site.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 10). Conifer removal may occur within meadow habitat between the Surprise Lake Trail sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 3 to 4 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 8b Surprise Lake Tr 9 (Priority 2)
Site Name: Surprise Lake Tr 9
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0626387 N5149485

Goal of the Site Management Plan
Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain an open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Minimum population counts were 153 individuals on July 10th 2007 and 42 individuals on July 18th 2012. It is unknown if we conducted these surveys during the peak flight period either year, as the site was only visited one time each year. Population size and trend along with "core use area" were undetermined due to lack of surveys at this site. This site is average in size.

Site Description
Surprise Lake Loop Trail (Tr 1120) runs just outside this site along the top end of the meadow. The majority of foot and horse traffic occurs on Tr. 1120 with little to no evidence of additional threats to habitat caused from off-trail use at this time. Surprise Lake Tr 9 is the second to last Mardon skipper site along Tr 1120 (See Map 10). It is over 2 miles SW of Conrad Meadow Main 1, but within 1/8th mile of Surprise Lake Tr 8 and 10. Surprise Lake Tr 9 is a damp, southeast sloping meadow of approximately 7 acres with a small, mossy creek running through the middle of it. Some of the plants observed at this site include: cow parsnip (*Heracleum maximum*), false hellebore (*Veratrum californicum*), grasses, blue-eyed iris (*Sisyrinchium*), yarrow (*Achillea millefolium*), and clover (*Trifolium* sp.). Mardon skippers were observed nectaring on lupin (*Lupinus*) sp., vetch (*Lathyrus*) sp., penstemon (*Penstemon*) sp. and mariposa lily (*Calochortus* sp.). There was also abundant sedge (*Carex*) sps. but oatgrass *(Danthonia*) was not present at this site (Jepsen *et al.* 2007).

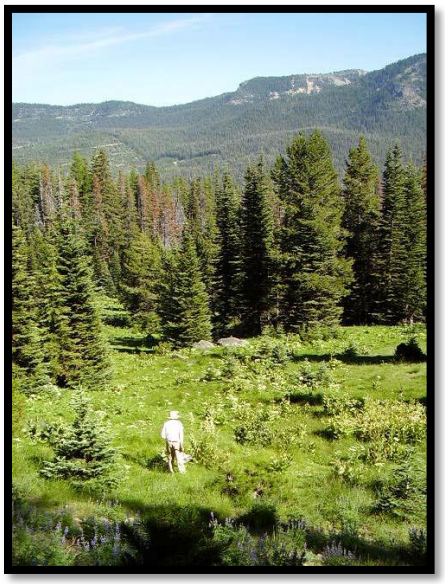


Figure 31. Surprise Lake Tr 9 in July 2007. Photo by Sarina Jepsen.

Site Threats
Conifer encroachment was an eminent threat identified at this site. Small conifers are encroaching throughout the site.

Management Needs
(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 10). Conifer removal may occur within meadow habitat between the Surprise Lake Trail sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Include this site in a long-term monitoring strategy, monitor every 3 to 5 years.

Management Unit: 8c Surprise Lake Tr 10 (Priority 4)
Site Name: Surprise Lake Tr 10
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0626624 N5149572

Goal of the Site Management Plan
Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain an open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Minimum population counts were 8 individuals on July 10th 2007 and 1 individual on July 18th 2012. It is unknown if we conducted these surveys during the peak flight period either year, as the site was only visited one time each year. Population size and trend along with "core use area" were undetermined due to lack of surveys at this site.

Site Description
Surprise Lake Loop Trail (Tr. 1120) runs just outside this site along the top end of the meadow (see Map 10). The majority of foot and horse traffic occurs on Tr. 1120 with little to no evidence of additional threats to habitat caused from off-trail use at this time. Surprise Lake Tr 10 is over 2 miles SW of Conrad Meadow Main 1, but within 1/8th mile east of Surprise Lake Tr 9 and 11. This site consists of two interconnected meadows (totaling about 5 acres) that are predominately on the south side of Tr. 1120. Fescue (*Festuca*) sp. and other grasses; vetch (*Lathyrus*) sp, lily

(*Calochortus*) sp., lupin (*Lupinus*) sp., phlox (*Phlox*) sp., and false hellebore (*Veratrum californicum*) were observed at this site.

Figure 32. Surprise Lake Tr 10 in July 2007. Photo by Sarina Jepsen.

Site Threats

Conifer encroachment was an eminent threat identified at this site. Small conifers are encroaching throughout the site.

Management Needs

This is considered low priority because very few Mardon skippers have been observed at this site.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 10). Conifer removal may occur within meadow habitat between the Surprise Lake Trail sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 8d Surprise Lake Tr 11 (Priority 4)
Site Name: Surprise Lake Tr 11
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, Zone 10T UTM E0626718 N5149519

Goal of the Site Management Plan
Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain an open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Minimum population counts were 16 individuals on July 10th 2007 and 1 individual on July 18th 2012. It is unknown if we conducted these surveys during the peak flight period either year, as the site was only visited one time each year. Population size and trend along with "core use area" were undetermined due to lack of surveys at this site.

Site Description
Surprise Lake Loop Trail (Tr. 1120) runs just outside this site along the top end of the meadow. The majority of foot and horse traffic occurs on Tr. 1120 with little to no evidence of additional threats to habitat caused from off-trail use at this time. Surpise Lake Tr 11 is over 2 miles SW of Conrad Meadow Main 1, but within 1/8th mile east of Surprise Lake Tr 9 and 10. There is a fair amount of moss present on the ground at this site, although this site is somewhat drier than Surprise Lk 9 and 10. Some of the plants in this meadow include: vetch (*Lathyrus*) sp., yarrow (*Achillea millefolium*), lupine (*Lupinus*) sp., lily (*Calochortus*) sp., and sedges (*Carex*) sp.

Figure 33. Surprise Lk Tr 11 July 2007. Photo by Sarina Jepsen.

Site Threats
Conifer encroachment was an eminent threat identified at this site was conifer encroachment.

Management Needs

This is considered low priority because very few Mardon skippers have been observed at this site.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 10). Conifer removal may occur within meadow habitat between the Surprise Lake Trail sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

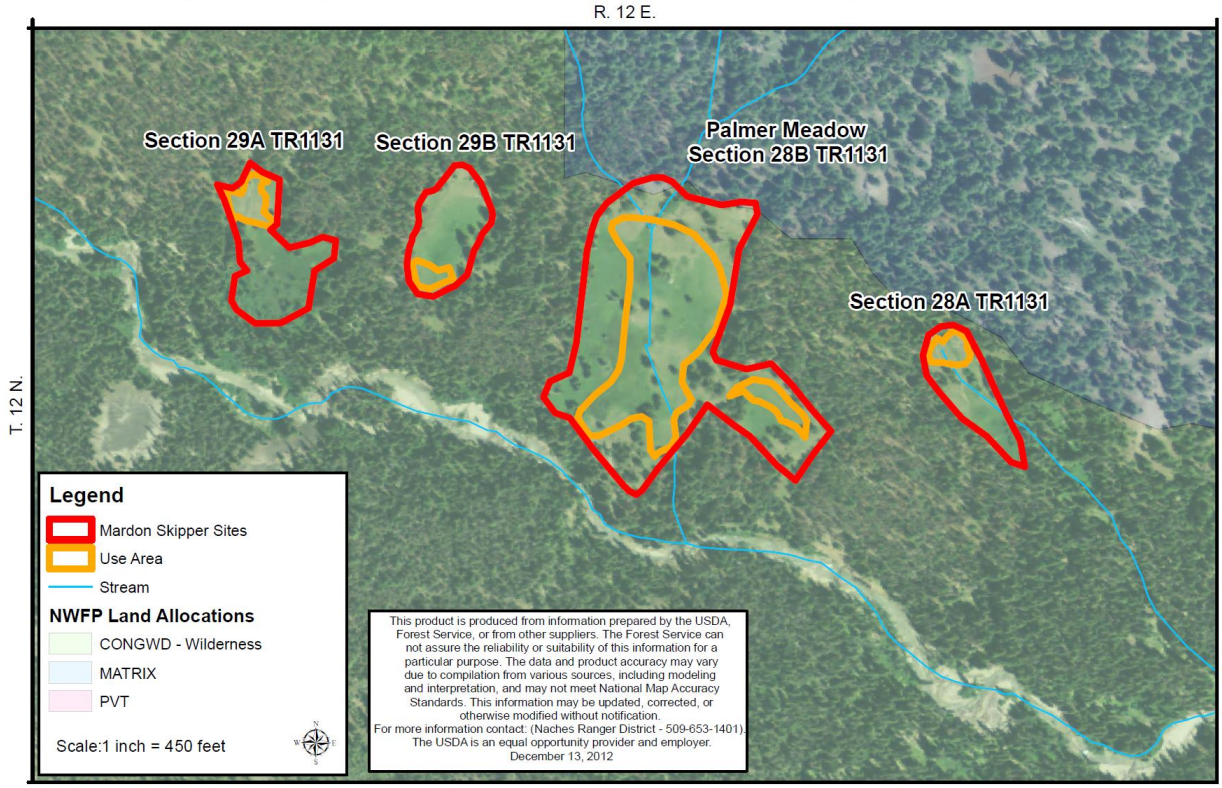
- Conduct additional presence/absence surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 9 Trail 1131 Meadow Complex (Trail 1131-sec 28B Palmer Meadow, Trail 1131-sec 28A, Trail 1131-sec 29A, Trail 1131-sec 29B)

Trail 1131 Meadow Complex Description

This complex is made up of a series of meadows off of Trail 1131. This user built trail at one time was a Forest Service system trail that is no longer maintained. It runs through all four sites, bisecting them north and south. This trail is undefined within portions of these sites; having little to no evidence of additional threats to habitat caused from off-trail use at this time. The Trail 1131 meadow complex is located about 2 miles west of Conrad Main Meadow 1. A mountain pine beetle outbreak has killed several hundred acres of lodgepole pine surrounding this meadow complex; creating the potential for future open corridors between these meadows**.** A large size Mardon skipper population was noted at Trail 1131-28B Palmer Meadow, while smaller counts were documented at Trail 1131-sec 28A, Trail 1131-sec 29A, and Trail 1131-sec 29B.

Map 11: TR1131 - Section 28A (1.23 Acres), Palmer Meadows Section 28B (9.41 Acres), Section 29A (1.89 Acres) and Section 29B (1.46 Acres) Mardon Skipper Site Locations



Site Distribution, Abundance, and Trends

Trail 1131-sec 28A, Trail 1131-sec 29A, Trail 1131-sec 29B and Trail 1131-sec 28B Palmer Meadow have never been monitored more than one time during a single season. It is unknown if surveys were conducted during the peak flight period, so an accurate estimate of population size, trends and "core use areas" are unknown. Little is known about movement between these sites as well. Although these sites are all located close to one another (less than 1/8th mile), there is heavy timber between sites which may be a barrier for adult dispersal.

Site Management History and Current Land Allocations

This complex falls within the Conrad Meadows Range Allotment, Conrad Meadows Pasture. Cattle turnout period is usually between July 5th and September 30th. Although the July 1st cattle turnout date overlaps with Mardon skipper adult flight period, no cattle were observed in the meadow during the 2007 and 2012 visits. Only fresh elk sign was observed at the sites along with older cattle sign. It is unknown whether cattle grazing overlaps with the adult flight period. The Surprise Lake Trail Meadow Complex sites are located in Congressional Withdrawn or Wilderness land allocation (Goat Rocks Wilderness). Management of cattle within wilderness includes moving and breaking groups of cattle to no more than 6 cow/calf pairs seen at one time.

Management Unit: 9a Trail 1131-sec 28B Palmer Meadow (Priority 1)

Site Name: Trail 1131-sec 28B Palmer Meadow

Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, 10T UTM E0628059 N5150849

Goal of the Site Management Plan
Develop a better understand the effects that grazing has on Mardon skipper populations in order to make more informed management recommendations. Maintain an open meadow condition by removing encroaching conifers. Develop a better understanding of the Mardon skipper population size and distribution at this site. Determine whether the timing of cattle grazing overlaps with the adult flight period.

Site Distribution, Abundance, and Trends
Minimum population counts of individuals were 176 on July 10th 2008 and 643 on July 18th 2012. The count on July 18th 2012 was done late in the day, so it is not comparable to other site counts. Concentrations of Mardon skippers were seen in patches of mesic and xeric meadow habitat types. The Mardon skipper use area was located along the eastern portion of the meadow (Map 11).

Site Description
Trail 1131-sec 28B Palmer Meadow consists of two interconnected meadows which are a little over 9 acres in size, containing wet, mesic and xeric meadow habitat. A large marsh area is located in the western portion of the meadow which transitions to mesic/xeric meadow areas to the east. There is a small, shallow stream running through part of this meadow (see Map 11). Larval host plants and floral resources are abundant (Figure 34). The mesic/xeric meadow portion is made up of large patches of onespike oatgrass (*Danthonia unaspicata*), sedges (*Carex*) sp., and flowering clover (*Trifolium* sp.). Clover (*Trifolium*) sp. was the abundant flowering plant, with lesser amounts of vetch (*Lathyrus*) sp., lupin (*Lupinus*) sp. and penstemon (*Penstemon*) sp. during our 2012 visit. This site appears to be similar to Conrad Meadow Main 1 and Conrad Finger 2; the two sites have similar plant species, moisture gradient, and moderate to high grazing levels. Concentrations of Mardon skippers were seen on the patches of sedges (*Carex*) sp., onespike oatgrass (*Danthonia unaspicata*) and clover (*Trifolium*) sp. that appeared to be more heavily grazed.

Figure 34. Palmer Meadow. Photo by Sarina Jepsen July 18th 2012

Threats
There is evidence of substantial grazing at this site; indicated by short grass levels. There is a low threat level resulting from conifer encroachment; small conifers are starting to encroach on the edges of the meadow and islands of conifers.

Management Needs
This site contains one of the largest Mardon skipper populations and thus should be considered a very high priority.

(Cattle grazing)

- Determine when cattle arrive at this site in order to evaluate whether cattle grazing overlaps with the Mardon skipper flight period; if grazing occurs during the Mardon skipper adult flight period, consider restricting cattle grazing during that time by installing a temporary fence. This option needs additional analysis to determine its viability. It will be considered within the next range allotment environmental analysis.
- Include this site in grazing study (The exact study design to be determined). Refer to Section 1 "Large Ungulate Grazing" for additional grazing study discussion. Grazing is the primary potential threat at this site and the main target for management decisions (high priority). Additional information is needed on the effects of cattle grazing prior to making further recommendations.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 11). Conifer removal may occur within meadow habitat between the Trail 1131 sites to improve adult dispersal potential.
    - Trees less than or equal to 7" DBH could be removed after a site assessment that confirms that removal of those trees won't change the microclimate or hydrology of the site, and only from the middle of the meadow.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Monitor for forest encroachment threats every 3 to 5 years with maintenance expected to occur every 5 to 10 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional surveys at this site to determine Mardon skipper population size and distribution. Once core use area and population size are defined, monitor site with presence/absence surveys every 2 to 3 years. Include in a long-term monitoring strategy.

Management Unit: 9b Trail 1131-sec 28A (Priority 4)
Site Name: Trail 1131-sec 28A
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, 10T UTM E0628204 N5150950

Goal of the Site Management Plan
Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Minimum population count was 25 individuals on July 10th 2008. It is unknown if this survey was conducted during the peak flight period. Population size and trend along with "core use area" were undetermined due to lack of sufficient data. Most of the Mardon skippers were found in the drier, upland area or northern portion of this meadow (see Map 11).

Site Description
Section 28A is a small meadow (approximately 1 acre) with abundant sedges (*Carex*) sp. present in the drier area. Meadow is mostly made up of wet meadow habitat; not typically used by Mardon skippers on the Okanogan-Wenatchee National Forest (Jepsen *et al*. 2007, 2008, St. Hilaire *et al.* 2007-2010). Bog orchid (*Habenaria*) sp. and Indian paintbrush (*Castilleja*) sp. were also noted at this site. It is the first occupied site on FS Trail 1131 as you travel west of Conrad Meadows Main1 (see Map 1).

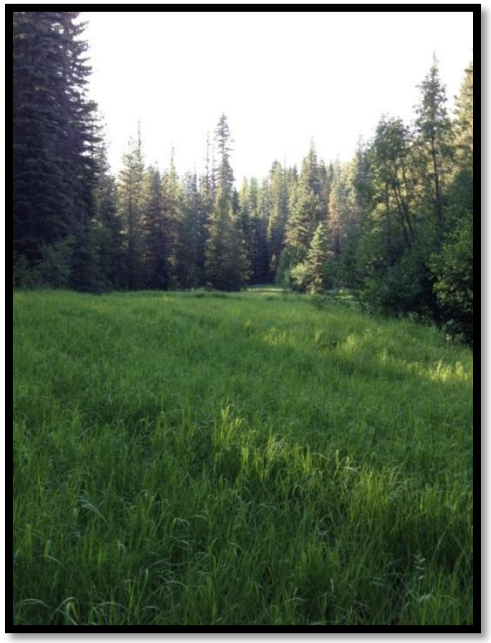


Figure 35. Trail 1131-Sec 28A showing majority of meadow made up of wet meadow habitat July 2012. The drier, upland (suitable) habitat is in the background at the top end or northern portion of this meadow. The suitable habitat makes up less than ½ acre of the site. Photo by Sarina Jepsen.

Threats
An eminent threat identified at this site was conifer and alder encroachment. Small conifers and alders are starting to encroach on the edges of the meadow.

Management Needs
This is considered low priority because very few Mardon skippers have been observed at this site.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 11). Conifer removal may occur within meadow habitat between the FS Trail 1131 sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 9c Trail 1131-sec 29A (Priority 4)
Site Name: Trail 1131-sec 29A
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, 10T 10T UTM E0627807 N5150986`

Goal of the Site Management Plan
Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Minimum population count was 7 individuals on July 10th 2008. It is unknown if this survey was conducted during the peak flight period. Population size and trend was undetermined due to lack of sufficient data. The Mardon skippers were found in the damp area in the upper, north end of meadow (see Map 11).

Site Description
Section 29A is a small meadow (approximately 2 acres) of which most of it is wet meadow habitat (Figure 37). FS Trail 1131 runs through the wet meadow habitat in the southern portion of the meadow.

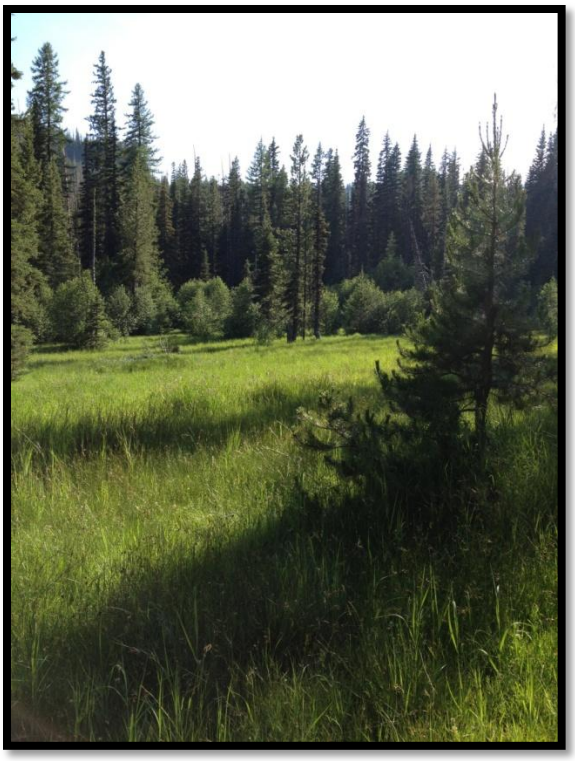


Figure 37. Trail 1131-Sec 29A. Photo shows wet meadow habitat in the foreground and encroaching alders in the background. Habitat where Mardon skippers were seen is in the upper portion of meadow, not in view. Photo by Sarina Jepsen July 2012.

Threats

An eminent threat identified at this site was conifer and alder encroachment. Small conifers and alders are starting to encroach on the edges of the meadow.

Management Needs

This is considered low priority because very few Mardon skippers have been observed at this site.

(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 11). Conifer removal may occur within meadow habitat between the Trail 1131 sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

Management Unit: 9d Trail 1131-sec 29B (Priority 4)
Site Name: Trail 1131-sec 29B (**Priority 4**)
Coordinates: Naches Ranger District, South Fork Tieton Subwatershed; Datum NAD83, 10T 10T UTM E0627829 N5151027

Goal of the Site Management Plan
Develop a better understanding of the Mardon skipper population size and distribution at this site. Maintain open meadow condition by removing encroaching conifers.

Site Distribution, Abundance, and Trends
Minimum population count was 1 individual on July 10th 2008. It is unknown if this survey was conducted during the peak flight period. Population size and trend was undetermined due to lack of sufficient data. The Mardon skipper was found in the dry area of this meadow (see Map 11).

Site Description
Section 29B is a small meadow (approximately 1 acre) of which half is wet meadow habitat and the other half is dry to mesic meadow habitat. Larval host plants and floral resources are abundant (Figure 36). Grasses such as onespike oatgrass (*Danthonia unaspicata*), and sedges (*Carex*) sp., are abundant along with flowering clover (*Trifolium*) sp. and lupine (*Lupinus*) sp. in the dry-mesic habitat.

Figure 36. Trail 1131-Section 29B showing the habitat Mardon skippers were seen in the foreground with wet meadow habitat in the background. Photo by Sarina Jepsen July 2012.

Threats
Small conifers are starting to encroach on the edges of the meadow.

Management Needs
This is considered low priority because very few Mardon skippers have been observed at this site.
(Conifer encroachment)

- Remove all conifers less than 4" Diameter at Breast Height (DBH) from open meadow portion of this site with priority on the Mardon skipper use areas (Map 11). Conifer removal may occur within meadow habitat between the Trail 1131 sites to improve adult dispersal potential.
    - Carry, not dragging trees and distributes material outside of Mardon skipper site.
    - Do not pile material, but leave a natural appearance to minimize visual impacts.
    - Cut trees flush with the ground to minimize visual impacts.
    - Perform work in the fall (September and October), following skipper adult emergence and egg deposition, and subsequent larval emergence.
    - Maintenance expected to occur every 5 years.
    - A Minimum Requirements Analysis will need to be completed prior to conifer removal, use the 2012 Minimum Decision Requirements Decision Guide. This is needed for all wilderness sites. Additional design criteria may be added as a result of this analysis.

(Monitoring)

- Conduct additional surveys at this site to determine Mardon skipper population size and distribution. Once population size and distribution have been determined, monitor every 5 years.

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Appendix 1: Summary of all known Mardon skipper sites in South Fork Tieton, Okanogan-Wenatchee National Forest with all associated one day counts.

Site Name	Geographic Location	Elevation	Date - Day Counts
Management Unit 1			
Bakeoven Flats 1	E0636688 N5161279	3350	6/17/08 – **7** 6/24/08 – **53** 5/22/09-**0** 6/1/09 – **0** 6/17/09 – **59** 6/26/09 **– 35** 6/22/10-**1** 6/25/10-**9** 7/7/10-**3** 6/12/12-**1** 7/9/12-**15**[1]
Management Unit 2			
Minnie Meadows	E0634394 5158677	3500	6/20/07 – **38** 6/17/08 - **0** 6/24/08 – **52** 6/30/08 – **187** 7/9/08 **– 51** 6/17/09-**5** 6/26/09-**6** 7/1/09-**62** 6/25/10-**5** 6/28/10-**26** 7/7/10-**14** 6/12/12-**0** **7**/6/12-**68** 7/9/12-**10**[1]
Management Unit 3 **Conrad Meadow Complex**			
Conrad Meadows Main 1	E0631235 N5151121	4000	6/2/07 - **1** 6/20/07 – **195**[1] 6/25/08 – **20** 6/30/08-**516** 7/9/08 – **929** 6/25/09 -**20** 7/02/09 **–1,195** 7/9/09-**10** 6/28/10-**30**[1] 7/7/10-**50**[1] 7/15/10-**149**[1] **7**/6/12-**886**
Conrad Finger 2	E0631516 N5151480	4060	6/27/07 – **457** 7/10/07 – **3** 6/25/08 – **45** 6/30/08 – **654** 7/9/08 – **911** 7/16/08-**201** 7/2/09-**931** 7/15/10-**124**[1] **7**/6/12-**590**
Conrad Finger 1	E0631510 N5150978	4050	6/27/07-**0** **7**/9/09-**0** 7/9/12-**2**[1]

Site Name	Geographic Location	Elevation	Date - Day Counts
Management Unit 4			
Conrad Donut Meadow	E0631641 N5150968	4100	7/9/09-**15**[1] 7/9/12 – **25**[1]
Management Unit 5			
Conrad Donut Hole	E0631821 N5150817	4150	7/9/2012 - **10**
Management Unit 6 **1050 Meadows**			
1050 Upper Meadow	E0634822 N5156420	4100	7/9/09 - **2** 7/13/09 – **0** 7/9/12-**15**[1]
1050 Meadow Complex	E0634746 N5156708	3880	7/9/09-**0** 7/13/09-**0** 7/9/12-**10**[1]
Management Unit 7			
Surprise Lake Tr 1	E0628807 N5149981	4181	7/7/07 – **25** 7/18/12-**46**
Management Unit 8 **Surprise Lake Trail Complex**			
Surprise Lake Tr 8	E0625923 N5149573	5237	7/10/07-**2**
Surprise Lake Tr 9	E0626387 N5149485	5048	7/10/07-**153** 7/18/12-**42**
Surprise Lake Tr 10	E0626624 N5149572	5001	7/10/07-**8** 7/18/12-**1**[1]
Surprise Lake Tr 11	E0626718 N5149519	5069	7/10/07-**16** 7/18/12-**1**[1]
Management Unit 9 **Trail 1131 Meadow Complex**			
Trail 1131-Sec 28A	E0628204 N5150950	4365	7/10/08 – **25**
Trail 1131-Sec 29A	E0627807 N5150986	4390	7/10/08-**7**
Trail 1131-Sec 29B	E0627829 N5151027	4503	7/10/08 – **1**
Trail 1131-Palmer Meadow	E0628059 N5150849	4321	7/10/08-**176** 7/18/12-**643**

[1]survey did not cover the entire habitat within the meadow. This count cannot be compared to systematic walking transects that covered the entire habitat at the site.