

Pawnee Montane Skipper
(*Hesperia leonardus montana*)

5-Year Status Review



Credit: USFWS

U.S. Fish and Wildlife Service
Colorado Ecological Services Field Office
Lakewood, Colorado

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW for
Pawnee montane skipper (*Hesperia leonardus montana*)

Species Reviewed: Pawnee montane skipper (*Hesperia leonardus montana*)

Federal Register Notice of Listing Determination: September 25, 1987. Endangered and Threatened Wildlife and Plants; Final Rule To Determine Pawnee Montane Skipper (*Hesperia leonardus montana*) To Be Threatened Species (52 FR 36176).

Federal Register Notice Announcing Initiation of this Review: April 12, 2019. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 6 Species in the Mountain-Prairie Region (84 FR 14965).

Lead Region: Interior Region 7, Colorado Ecological Services Field Office, Liisa Schmoele, 303-236-4774

Classification: Threatened

Recovery Priority Number: 9C (populations faced a moderate degree of threat; recovery potential is high; the skipper is listed at the subspecies level; and recovery of the Pawnee montane skipper may be in conflict with construction or other development projects.)

Methodology Used to Complete the Review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year status review is to assess each threatened species and endangered species to determine whether its status has changed and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. On April 12, 2019, we published an announcement initiating the 5-year review process and seeking new information on the Pawnee montane skipper (84 FR 14965). No responses were received regarding our request for new information on the skipper. This 5-year review summarizes and evaluates information provided in the recovery plan, current scientific research, and surveys related to the species. An important study used for this review was the U.S. Forest Service (USFS) Upper South Platte Watershed Protection and Restoration Project Monitoring Study (2000 – 2019) (ENSR International Corporation (ENSR) 2001, 2003b, 2003c; Natural Perspectives 2004, 2005, 2007, 2008, 2009, 2010); Colorado Natural Heritage Program (CNHP) 2020a). Another important study used for this review was the USFS-USFWS-Denver Water Post-Fire Pawnee Montane Skipper Monitoring Study (2002 – 2010) (ENSR 2003a, 2003d; CNHP 2005, 2006, 2007, 2009, 2010, 2011, 2019). All pertinent literature and documents on file at the Colorado Ecological Services Field Office were used for this review (See References section below for a list of cited documents).

REVIEW ANALYSIS

Updated Information and Current Species Status

Biology and Habitat:

The Pawnee montane skipper (skipper) is a small, brownish-yellow butterfly with a wing span slightly over 1 inch. The skipper is dependent on two host plants, namely dotted gayfeather (*Liatris punctata*), previously known as prairie gayfeather, and blue grama grass (*Buteloua gracilis*), within a ponderosa pine (*Pinus ponderosa*) woodland. The dotted gayfeather is the primary nectar plant for adult skippers while the blue grama grass is the primary plant for ovipositing (egg laying), larvae feeding, larvae overwintering, and pupation. The dotted gayfeather generally occurs in small openings in the forest and within more open ponderosa stands. The skipper has a narrow range that is defined by the area of overlap between the northern extension of the ponderosa pine/blue grama grass community and the southern extension of the dotted gayfeather. The flight period for adult skippers (August and September) closely corresponds with the main flowering time of the dotted gayfeather, with the primary flight period occurring from late August to early September.

The range of the skipper is restricted to four Colorado counties (Teller, Park, Jefferson, and Douglas) within an area approximately 23 miles long and 5 miles wide along the South Platte River drainage system (Environmental Research and Technology, Inc. (ERT) 1986a), as shown in Figure 1. The total area of skipper habitat is 24,830 acres, of which 70 percent occurs on the Pike and San Isabel National Forests (Banks 2009, pers. comm.).

The skipper's range can be divided into three subpopulations (USFWS 1998): 1) Mainstem South Platte subpopulation (12,787 acres), which includes the mainstem of South Platte River from the North Fork/South Fork confluence up to Deckers, including Horse Creek; 2) Cheesman Reservoir subpopulation (5,758 acres); and 3) North Fork subpopulation (6,285 acres) (Banks 2009, pers. comm.). Due to the relatively close proximity of these subpopulations (i.e., Cheesman subpopulation and Mainstem South Platte subpopulation are contiguous near Cheesman Dam; Mainstem South Platte subpopulation and North Fork subpopulation are contiguous at North Fork/South Fork confluence of South Platte River), there appears to be some opportunity for exchange of individuals between the subpopulations.

In general, the range and areas of occupation of the skipper does not appear to have changed following habitat mapping that occurred in the mid-1980s, with a few exceptions. These exceptions include occasional observations of skippers outside of, but in close proximity to, the mapped skipper range. The most notable observations of skippers outside the mapped range include the detection in 2015 and 2016 of at least three skippers in a pocket of remaining unburned (or low severity burn) forest woodland habitat within the Hayman Fire perimeter along the South Platte River near Wildcat Creek. This area of remaining habitat near Wildcat Creek includes approximately 33 acres (Painter 2018, pers. comm.).

Other changes to the skipper's occupied range include areas of skipper habitat that experienced a moderate-to-high severity burn in the 2002 Hayman/Schoonover Fires, and the vegetation at these sites has been severely altered (i.e., loss of ponderosa/Douglas-fir (*Pseudotsuga menziesii*)).

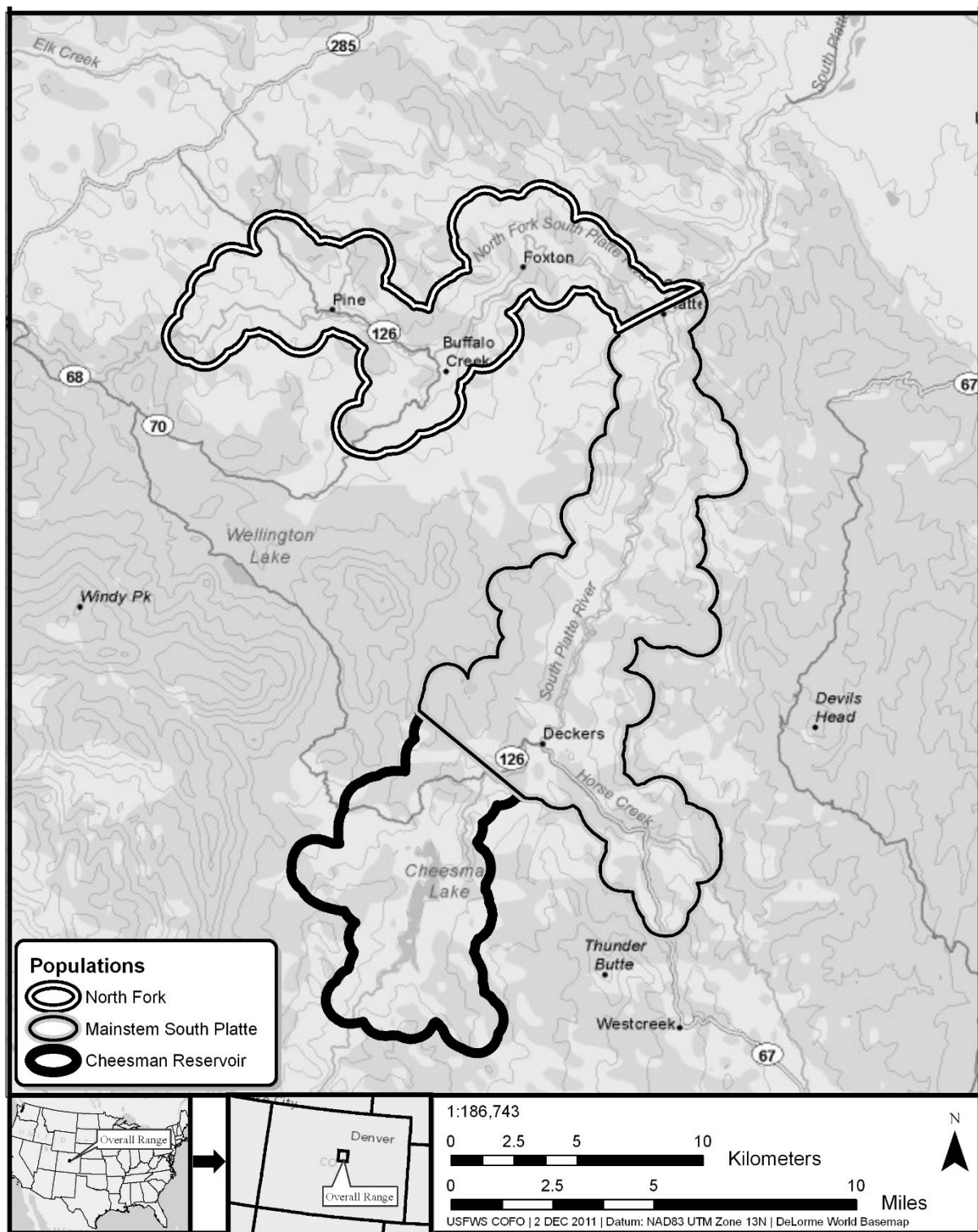


Figure 1. Overall range of the Pawnee montane skipper.

overstory). These sites appear to no longer be occupied by the skipper, with the exception of the edges of the burn areas that are in close proximity (i.e., within approximately 200 yards) to unburned and low severity burn habitat (CNHP 2010). At this time, it is not clear if these areas will provide skipper habitat in the near future (see further discussion in the *Threats Analysis* section, *Factor A, Increased Risk of Large-Scale, Stand-Replacing Fires Due to Fire Suppression*).

Abundance and Population Trends:

Prior to the surveys conducted in the 1980s, little information was available on skipper population estimates and trends. However, based on the denser, more uniform forest conditions that are currently present, primarily as a result of fire suppression over the past 100 years, we believe that there is a general trend towards less suitable habitat conditions for the skipper due to denser forest stand conditions, as discussed in the *Threats Analysis* section, *Factor A, Alteration of Forest Conditions Due to Fire Suppression*.

Population estimates were conducted in 1985, 1986, and 1987 as part of the environmental analyses for Denver Water's proposed Two Forks Dam. Studies were based on census survey transects and distribution survey counts (ERT 1986a, 1986b, 1988). The 1985 population estimate was 80,000 to 140,000; in 1986, the estimate was 67,900 to 166,100; and in 1987, the estimate was 116,000. The range in the population estimate relates to the use of both census survey data and the distribution survey data to develop the total population estimate (ERT 1986b). These population estimates correlate to skipper densities of 2.1 to 3.6 per acre (ERT 1986b, 1988; ENSR 1989). Current population estimates have not been calculated but are considered to be lower than those developed in the mid-1980s, primarily as a result of a number of wildfires and periods of drought that have occurred in skipper habitat since 1996.

More recent population data has been provided by two long-term skipper monitoring studies that include information on skipper abundance and population trends. These studies monitor the effects of: 1) a large-scale forest restoration and fuels reduction project (Upper South Platte Restoration and Protection Project); and 2) the 2002 Hayman/Schoonover Fires and drought. Additionally, new skipper monitoring transects were added in 2017 in order to monitor the skipper and its habitat within the portions of its range that are not being evaluated in the ongoing forest restoration/fuels reductions study or the post-fire/drought monitoring study; this new monitoring study is referred to as the North Unit Study (CNHP 2020b). All of these studies are continuing to the present time and are discussed in the following text.

Monitoring of Forest Restoration and Fuels Reduction Treatments – As part of the requirements of the biological opinion for the Upper South Platte Restoration and Protection Project (initiated in 2000), the USFS has monitored skippers and skipper habitat on treated (forest thinning) and control areas. Skipper densities reached a low during the drought of 2002, but have generally increased since that time. Areas where forest thinning has occurred have experienced an improvement in skipper habitat and an increase in skipper numbers (Natural Perspectives 2008) (see additional project discussion and results in the *Threats Analysis* section, *Factor A, Alteration of Forest Conditions Due to Fire Suppression*).

Post-Drought/Fire Monitoring Study in Skipper Habitat – In 2002, this region experienced a severe drought. The accumulated precipitation for the 2002 water year (October 2001 to September 2002) at the National Oceanic and Atmospheric Administration National Weather Service’s Cheesman Weather Station was the lowest ever recorded (8.49 inches) during the period of record keeping at that site (1904 to 2008) (Western Regional Climate Center 2008). The 2002 Hayman Fire, which occurred during this severe drought, burned over 138,114 acres, of which 8,978 acres were skipper habitat. The 2002 Hayman Fire was the largest fire recorded in Colorado history (Graham 2003).

Immediately following the 2002 Hayman/Schoonover Fires, a multi-agency team (USFS, USFWS, and Denver Water) initiated a skipper study within burned and unburned areas of skipper habitat for the purposes of assessing the status of the skipper and to monitor its recovery. The study was conducted annually from 2002 to 2010, and then every other year since then, and involved 55 transects (13 transects on unburned habitat, 25 transects on low severity burn areas, and 17 transects on moderate-to-high severity burn areas), although the number of transects on unburned sites has been reduced slightly in recent years. The methodology is similar to the skipper studies in the 1980s (ERT 1986a, 1986b, 1988; ENSR 1989) and provides a comparison to those earlier studies. Transects are monitored during the primary adult flight period (late August – early September) for the presence of adult skippers, flowering stems of dotted gayfeather, and blue grama grass (Natural Perspectives 2008).

Results of skipper counts from post-Hayman/Schoonover Fire monitoring are shown in Table 1. Of the 55 transects surveyed in 2002, no skippers were observed within burned transects and only 2 individuals were observed on unburned transects (ENSR 2003a). The results of the 2003 field work, which identified only 10 skippers, showed that the skipper population was “still remarkably low – between 5 to 10 percent of the population density estimated nearly two decades ago (1986 to 1988)” (ENSR 2003d). Annual monitoring indicated that skipper and dotted gayfeather densities, and blue grama grass occurrences increased since 2002, although skipper densities continued to remain low in areas of moderate-to-high severity burn. Since 2005, there was no consistent difference in dotted gayfeather densities and blue grama grass frequencies between the different burn severities (CHNP 2010).

The skipper densities within the burn area through 2018 (1.11 skippers per acre) remained well below the skipper densities of 2.1 to 3.6 per acre that were recorded in the mid-1980s (ERT 1986b, 1988; ENSR 1989). At this time, it is uncertain if the skipper will persist in the areas of moderate-to-high severity burns, given the anticipated long-term absence (approximately 70 years) of the ponderosa pine and Douglas-fir overstory.

Genetic Evaluation – A genetic study was conducted to evaluate the population structure of the skipper throughout the three subpopulations (Pilgrim et al. 2018). A total of 63 skipper samples were collected in 2015 and 2016, and were analyzed using the cytochrome c oxidase subunit I (COI) region of mitochondrial DNA, and were further analyzed for SNP (single nucleotide polymorphism) genotyping by using tunable genotyping by sequencing. The results of the genetic study indicate that the grouping, or population structure, of the skippers is best explained by separation into three different groups that are distributed throughout the range of the skipper. These population groups suggest that there is some interaction of individuals between the different subpopulations (Mainstem South Platte, Cheesman Reservoir, and North Fork of South

Platte), perhaps with the exception of the newly identified individuals near Wildcat Creek, which is located at the south end of Cheesman Reservoir; these individuals appear to exhibit a more unique genome.

Table 1. Comparison of Pawnee montane skippers observed from 2002-2019 in different burn severities within the Hayman/Schoonover Fire burn areas (CNHP 2019).

YEAR	NUMBER OF SKIPPERS PER ACRE			
	Unburned	Low Burn Severity	Moderate to High Burn Severity	Mean Total Skipper/Acre
2002	0.08	0	0	0.02
2003	0.18	0.08	0.03	0.10
2004	0.83	0.66	0	0.47
2005	1.65	1.23	0.08	0.94
2006	1.01	0.67	0.12	0.51
2007	1.64	0.83	0.61	0.84
2008	1.64	0.87	0.90	0.98
2009	1.52	1.08	0.51	0.89
2010	4.43	3.84	0.84	2.83
2011*	-	-	-	-
2012	0.89	1.45	0.33	0.89
2013	-	-	-	-
2014	2.53	1.27	0.22	0.97
2015	-	-	-	-
2016	0.51	0.47	0.25	0.38
2017	-	-	-	-
2018	2.28	1.45	0.43	1.11
2019	-	-	-	-

*Note that monitoring of burn areas transitioned to every other year after 2010.

North Unit Transects – In 2017, 15 new monitoring transects were created to monitor the skipper in the northeastern part of their range. These new transects are located near the confluence of the South Platte River and the North Fork of the South Platte River, as well as along the North Fork of the South Platte River. The addition of the North Unit Transects will improve the overall understanding of the skipper throughout its range. Monitoring will occur during odd numbered years. Monitoring results from 2017 and 2019 indicated that vegetation at the north unit sites is similar to the control sites for the Upper South Platte Restoration and Protection Project, while skipper numbers are similar to slightly below those of the control sites (CNHP 2020b).

Taxonomy – There have been no changes to the taxonomic classification or changes in nomenclature for the skipper since listing.

Threats Analysis (threats, conservation measures, and regulatory mechanisms):

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

At the time of listing, the final rule (52 FR 36176; September 25, 1987) identified the following threats to skipper habitat: (1) past construction of the Cheesman Reservoir on the South Fork of the South Platte River (Factor A); (2) past and ongoing residential and commercial development (Factor A); (3) off-road vehicle (ORV) use; (Factor A) and (4) proposed construction of Two Forks Dam and Reservoir and associated roads and recreational facilities (Factor A).

Cheesman Reservoir – No early distribution or range information exists to determine the extent of the past skipper habitat destruction from Cheesman Reservoir, which was completed in 1905. The current operation and maintenance activities at Cheesman Reservoir generally result in minimal impacts to the remaining skipper habitat.

Residential and Commercial Development – No early distribution or range information exists to determine the extent of the past skipper habitat destruction from residential and commercial development. The recovery plan (USFWS 1998) identified the types of residential and commercial development that would be of greatest concern to skipper habitat, namely large, paved parking lots, subdivisions with large lawns, ball fields, cultivated plots, and wide, paved roads. Development of this scale and extent does not appear to be occurring in skipper habitat at this time to any great extent. Habitat impacts from developments in skipper habitat are primarily in the form of rural residential driveways and buildings along the Mainstem and North Fork of the South Platte River. This type of impact from residential and commercial development is anticipated to continue at the current level and, as such, is not considered to be a significant threat to skipper habitat. In the absence of listing, impacts to skipper habitat would likely continue to occur on a small scale in the form of residential developments and is not considered to be a significant threat to the skipper. In addition, the creation of defensible space around structures and communities in the wildland urban interface may develop more suitable habitat (i.e., more open forest conditions) for the skipper while providing wildfire protection around structures.

Off-road Vehicle Use – Some ORV use continues to occur within skipper habitat and is causing some damage to habitat, although impacts have been reduced by the USFS Travel Management Rule (36 CFR, part 212, 251, and 261), effective December 9, 2005, which restricts vehicle use to designated roads. The existing level of ORV use is not considered to be a significant threat to skipper habitat. ORV use is probably restricted more by the USFS Travel Management Rule than by protection afforded by the ESA. Therefore, in the absence of listing, the impact to skipper habitat from ORVs is not likely to change and is not considered to be a significant threat to the skipper.

Two Forks Dam and Reservoir – The Two Forks Dam and Reservoir, which was proposed by the Denver Metro water boards in the 1980s, was not approved by the U.S. Environmental Protection Agency (USEPA) in 1990 (USEPA 1990) and was never constructed. If the dam had been built as originally proposed, it would have resulted in the direct loss (through inundation) of approximately 22 percent of suitable skipper habitat and would have resulted in a loss of 23 to 42

percent of the population, based on skipper populations at that time, due to higher skipper densities below the inundation line (USFWS 1998). Denver Water and other water users have consented to the dismissal of the larger Two Forks water rights filing (780,000 acre-feet capacity); however, a smaller Two Forks dam could still be constructed (345,000 acre-feet capacity) because the 1931 South Platte Right-of-Way (ROW) is still in effect. The 1931 South Platte ROW gives the right to build a dam for water storage at the confluence of the South Platte River and the North Fork of the South Platte River (USFS 2004a). As specified in the South Platte Protection Plan, Denver Water has voluntarily imposed a moratorium on applications for development of the Two Forks ROW until 2024 (USFS 2004b). Denver Water may relinquish the 1931 South Platte ROW if development of the ROW becomes impractical because alternative development of the Two Forks waters has reduced the economic value of the ROW below meaningful value (USFS 2004b). The smaller Two Forks Dam and Reservoir, if built, would also result in the direct loss of skipper habitat with additional impacts resulting from associated roads and development. The potential construction of the smaller Two Forks Dam and Reservoir continues to be considered a threat to the skipper.

Since the listing of the skipper in 1987, two additional threats to skipper habitat have been identified: the alteration of forest conditions due to fire suppression and the increased risk of large-scale, stand-replacing fires due to fire suppression; both of these threats are considered to be significant to the skipper.

Alteration of Forest Conditions Due to Fire Suppression – Fire suppression, along with timber harvest and grazing, over the past 100 years has altered the ponderosa pine forest stand conditions and has reduced the quality of the skipper habitat by creating more uniform and denser forests with fewer forest openings, as compared to historical forests that had a greater mosaic of tree densities and different-aged trees across the landscape (USFS 2000). The typical crown closure in the area under pre-European conditions is estimated to have averaged around 30 percent while currently much of the USFS land within the skipper's range has a canopy of 40 percent or greater (USFS 2000). The optimum conditions for skipper habitat include a tree canopy cover of 25 percent from ponderosa pine and 5 percent from Douglas-fir (USFWS 1998).

For the purposes of improving forest stand conditions and reducing the risk of large-scale, stand-replacing wildfires, the USFS, Denver Water, and Colorado State Forest Service initiated the Upper South Platte Watershed Protection and Restoration Project in 1999 (USFS 2008). Approximately 17,000 acres of ponderosa pine and Douglas-fir forest were treated over a 10-year period. Treatments included thinning and prescribed burning in skipper habitat on approximately 3,486 acres of USFS lands and 3,319 acres of non-Federal lands (primarily Denver Water land) for a total of 6,805 acres of skipper habitat (27 percent of skipper habitat) (USFS 2008). The project included measures to minimize impacts to skipper habitat, such as reducing ground disturbances and avoiding large concentrations of dotted gayfeather, as well as restrictions on the acres of skipper habitat undergoing prescribed burning each year.

As part of the conditions specified in the biological opinion for Upper South Platte Watershed Protection and Restoration Project (USFWS 2003), the USFS initiated a monitoring study in 2000 that will continue until 2024 that compared skipper and host plant numbers on treated (thinned) and untreated skipper habitat. The study involved monitoring 12 treatment transects and 3 control transects within the South Platte mainstem subpopulation, where the majority of

the treatments occurred. Transects are monitored annually during the main flight period for the presence of adult skippers, flowering stems of dotted gayfeather, and blue grama grass (Natural Perspectives 2009). More recently, the Service completed section 7 consultation on Phase II of the Upper South Platte Watershed Protection and Restoration Project. Phase II will result in the additional thinning of 953 acres of skipper habitat (approximately 4 percent of skipper habitat) on USFS lands. Phase II was initiated in 2009 and will be implemented for a total of 15 years (USFWS 2009). The total area of skipper habitat treated for the Upper South Platte Watershed Protection and Restoration Project Phases I and II will be 7,758 acres (31 percent of skipper habitat).

Monitoring of treated (thinned) and control stands indicate an increase in dotted gayfeather densities in treated stands, as shown in Table 2, and an increase in skipper densities in treated stands, as shown in Table 3. Densities of dotted gayfeather flowering stems in the treated transects had a greater increase than did the densities of dotted gayfeather in the control transects (CNHP 2020a). Results also indicate a significant positive correlation between dotted gayfeather flowering stem densities and skipper densities (Natural Perspectives 2008). Data from the control sites at the forest restoration treatments show that skipper populations reached a low during the drought in 2002, but have been increasing since that time (CNHP 2020a). Although some of the annual increases in dotted gayfeather densities can be attributed to increased soil moisture in the years following the 2002 drought, much of the increase seems to be in response to the thinning treatments as control transects did not show a similar increase in dotted gayfeather densities (Natural Perspectives 2008).

Fuels reduction treatments appear to improve skipper habitat by reducing the forest stand density and creating more forest openings, which in turn creates higher dotted gayfeather densities. In the absence of listing, fuels reduction and forest restoration treatments in skipper habitat are likely to continue by the USFS and other land management agencies for the purposes of forest restoration and to reduce the risk of large-scale, stand-replacing fires. These actions should continue to improve skipper habitat. In the absence of listing, the future management of forests on public lands to reduce the risk of catastrophic wildfires will improve skipper habitat by creating more open forest conditions and will substantially reduce the chance of large-scale, stand-replacing fires; therefore, future alteration of forest conditions is not considered a significant threat to the skipper.

Increased Risk of Large-Scale, Stand-Replacing Fires Due to Fire Suppression – The skipper is adapted to a fire-dependent habitat type, occurring in open ponderosa pine woodlands that would typically experience frequent, low severity surface wildfires (Natural Perspectives 2008). These types of fires allow for the persistence of the skipper and its host plants by maintaining a more open forest condition. With fire suppression and the resulting higher fuel loading, the lower montane ponderosa and Douglas-fir forests (6,000 to 7,500 feet elevation) are experiencing larger, more severe fires than typically occurred (USFS 2000), often resulting in the loss of the ponderosa pine overstory. “The current forested landscape condition does not reflect the historic disturbance regime and is not sustainable” (USFS 2000, p. 10).

Table 2. Comparison of dotted gayfeather densities (average number of flowering dotted gayfeather stems per acre) by year between the four treatment areas (CNHP 2020a).

YEAR	AVERAGE NUMBER OF FLOWERING STEMS/ACRE			
	Control Area	2000 Treatment Area	2002 Treatment Area	2004 Treatment Area
2000	47.6	80.0 ^b	20.2 ^a	*
2001	12.8	253.0	22.8 ^a	*
2002	2.0	55.0	0.50 ^b	*
2003	55.0	822.2	56.5	*
2004	220.3	585.0	152.0	*
2005	142.0	635.3	312.6	108.0 ^b
2006	58.7	361.6	107.0	24.9
2007	212.9	1,377.9	398.5	71.2
2008	47.2	612.4	126.1	210.4
2009	360.0	1360	462.0	420.0
2010	133.5	837.7	321.7	254.9
2011	60.7	473.1	132.2	261.3
2012	62.1	280.2	132.5	159.5
2013	156.5	477.5	190.2	203.7
2014	147.0	441.1	197.0	201.0
2015	111.6	471.5	167.4	169.3
2016	130.2	194.6	277.7	276.1
2017	61.5	50.2	154.8	266.1
2018	56.3	44.2	77.2	117.7
2019	99.5	552.1	195.1	202.0

^a Monitoring occurred prior to the treatment.

^b Monitoring occurred immediately after the treatment and habitat disturbance.

* No monitoring occurred.

TABLE 3. Comparison of skipper densities (average number of skippers per acre) by year between the three treatment areas and control (CNHP 2020a).

YEAR	AVERAGE NUMBER OF SKIPPERS PER ACRE			
	Control Area	2000 Treatment Area	2002 Treatment Area	2004 Treatment Area
2002	0.23	0.90	0.56	*
2003	0.11	1.57	0.17	*
2004	0.56	1.12	0.73	*
2005	0.56	1.24	0.51	0.45
2006	1.57	2.25	0.62	0
2007	1.91	3.26	2.36	0.45
2008	0.00	1.12	0.56	0.56
2009	0.68	2.59	0.96	0.56
2010	4.05	2.59	1.69	1.57
2011	4.16	3.15	1.69	0.56
2012	4.50	2.14	0.83	0.56
2013	5.40	3.48	2.53	0.56
2014	3.71	1.57	1.24	0.00
2015	3.48	1.24	0.39	1.34
2016	1.46	1.12	0.62	0.11
2017	3.15	0.22	0.62	0.11
2018	6.18	1.46	1.91	1.46
2019	12.03	4.05	2.70	1.80

Note - Data on Pawnee montane skippers densities are not available for 2000 and 2001 since data were only collected for the combined skippers present in the area, namely the Pawnee montane skipper and the common branded skipper (*Hesperia comma*) during that period.

* No monitoring occurred.

This risk is illustrated by more recent wildfires that have severely impacted a large amount of skipper habitat. Since 1996, a total of 11,296 acres of skipper habitat have burned in four separate fires, comprising 46 percent of the total 24,830 acres of skipper habitat, as shown in Table 4. Of these fires, the 2002 Hayman/Schoonover Fires caused the greatest damage to skipper habitat, burning 8,978 acres of skipper habitat (approximately 36 percent of the total habitat) (Banks 2009, pers. comm.). Of the skipper subpopulations, the Cheesman subpopulation has experienced the greatest impact from these fires, within which the Hayman Fire burned 5,511 acres of skipper habitat (96 percent of Cheesman subpopulation).

Low severity fires generally result in the mortality of individual skippers (adults, larvae, and eggs) and their host plants, namely the dotted gayfeather and blue grama grasses, which are directly affected by the flames. However, because the low severity fires often occur in a mosaic of burned and unburned areas and do not remove the entire forest canopy, it is likely that some skippers and host plants, as well as most of the ponderosa pine/Douglas-fir overstory, survive in small patches in a low severity burn area (CNHP 2005). In contrast, moderate-to-high severity fires likely result in the mortality of skippers, dotted gayfeather, blue grama grass, as well as much of the ponderosa pine/Douglas-fir overstory.

Although skipper densities, dotted gayfeather, and blue grama plants are showing some recovery following these fires, our greatest concern remains with the moderate-to-high severity burns that removed the ponderosa pine/Douglas-fir overstory and resulted in the long-term (i.e., approximately 70 years) alteration of the habitat. As shown in Table 4, approximately 29 percent of the total skipper habitat has burned under a moderate-to-high severity since 1996.

Table 4. Acres of skipper habitat burned in wildfires (since 1996) per skipper subpopulations (Banks 2009, pers. comm.).

FIRE	ACRES BURNED			Total Acres of Habitat Burned
	Mainstem South Platte Subpopulation	Cheesman Subpopulation	North Fork Subpopulation	
2002 Hayman/Schoonover	3,467	5,511	0	8,978
2000 Hi Meadow	0	0	1,594	1,594
1997 Buffalo Creek	246	0	478	724
Total Acreage Burned (percent of subpopulation burned)	3,713 (29%)	5,511 (96%)	2,072 (33%)	11,296 (46%)
Acreage Burned Under Moderate-to-High Severity (percent of subpopulation burned)	1,159 (9%)	3,985 (69%)	2,072 (33%)	7,216 (29%)

While we do not fully understand the role that the ponderosa pine/Douglas-fir overstory provides as skipper habitat, we believe that live trees likely provide a microhabitat required by the skippers to thermoregulate during hot afternoons and cool mountain nights. We are concerned that the loss of the ponderosa pine overstory in burn areas may change local temperature and humidity regimes to an extent that it is no longer suitable for skippers (CNHP 2006). With the loss of the ponderosa pine/Douglas-fir overstory in areas of moderate-to-high severity burns, the future of these areas as skipper habitat is uncertain. Ponderosa pine seedlings have been planted in some of the skipper habitat on USFS and Denver Water lands in moderate-to-high severity burn areas in the Hayman Fire perimeter to accelerate restoration of the burned ponderosa pine forests. These plantings should provide improved skipper habitat in the future. Some of the Hayman Fire monitoring transects overlap the planted areas of ponderosa pine seedlings and will provide an opportunity to monitor skipper occupation and habitat over time.

In the absence of listing, fuels reduction and forest restoration treatments in skipper habitat are likely to continue by the USFS and other land management agencies in the interest of reducing the risk of large-scale, stand-replacing fire and forest restoration. These treatments will likely improve forest stand conditions for the skipper.

Conclusion – At the time of listing, the greatest potential threat identified for the skipper was the proposed construction of the Two Forks Dam, which would have inundated 22 percent of the skipper’s habitat and would have resulted in the loss of 23 to 42 percent of the population (USFWS 1998). While this dam was not constructed, a smaller dam could still be constructed at the same location, which also would inundate skipper habitat and would likely result in additional impacts from associated roads and development of recreational facilities. Other threats to the skipper’s habitat and range at the time of listing included residential and commercial development and ORV use. However, impacts from these activities have not had a substantial impact on the skipper and are not considered to be a significant threat to the skipper as we anticipate that the present practices are likely to continue at the same scale.

Two additional threats to skipper habitat, identified subsequent to listing, relate to the changes in forest structure resulting from over 100 years of fire suppression. Fire suppression in the ponderosa pine/Douglas-fir forests has resulted in denser, more uniform forest conditions with greater canopy cover. This change in forest structure has reduced the amount of suitable skipper habitat and has increased the risk of large-scale, stand-replacing fires. Since 1996, wildfires have burned 11,296 acres of skipper habitat (approximately 46 percent of habitat). Fuels reduction treatments designed to reduce the risk of large-scale, stand-replacing fires have improved skipper habitat, resulting in increased densities of dotted gayfeather and skippers. Approximately 27 percent of the skipper’s habitat has received fuels reduction and forest restoration treatments, with an additional 4 percent of habitat planned to be treated in the near future. The recent wildfires that have burned large areas within the skipper’s range also have resulted in a reduction in fuels, particularly in the areas of moderate-to-high severity burns. However, low severity burns were sufficiently light in some areas such that there is still high fuel loading; these areas are still at risk of high-severity wildfires. In conclusion, fire suppression within the montane forest has resulted in an altered forest condition that affects the skipper both through reduced habitat quality and a higher risk of large-scale, stand-replacing fires. Fuels reduction and forest restoration actions implemented by the USFS and other agencies have reduced these threats where treatments have occurred.

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

As stated in the listing rule (52 FR 36176), collection is not as large a problem for skippers as it is for some butterfly groups. Some collection of this subspecies occurred prior to listing, primarily for scientific studies. Overutilization for commercial, recreational, scientific, or educational purposes is not expected to affect recovery in the future.

Disease or predation (Factor C).

As stated in the listing rule (52 FR 36176), various predators and parasitoids are considered to hold insect populations under “natural control,” and several are known to feed on various *Hesperia* butterflies; however, no such agents are known to pose a serious threat to the subspecies’ populations or continued existence. We have no newer information to suggest that disease or predation is a threat to the skipper.

Inadequacy of existing regulatory mechanisms (Factor D).

The listing rule (52 FR 36176) did not identify the inadequacy of existing regulatory mechanisms as a threat to the skipper. Prior to listing, few regulatory measures were in place that provided protection for the skipper because it was not a USFS Sensitive Species or a State-listed Threatened or Endangered Species.

The Land and Resource Management Plan (LRMP) for the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands, which was written before the skipper was listed and has not been revised, directs that the Pike and San Isabel National Forests should “maintain habitat for viable populations of all existing vertebrate wildlife species” (USFS 1984, pp. 3-32), but it does not address invertebrate species. In the absence of specific guidance that would protect skipper habitat, some retention of skipper habitat will occur through the management of ponderosa pine stands on the Pike and San Isabel National Forests. General guidance provided in the 1984 LRMP included a provision to maintain structural diversity in ponderosa pine forests (USFS 1984, pp. 3-12) and included specific guidance that created forest openings should not exceed 40 acres, unless approved by the Regional Forester (USFS 1984, pp. 3-45). Therefore, the LRMP appears to provide for the basic maintenance of ponderosa pine/Douglas-fir forests, but does not provide specific measures that avoid or minimize impacts to skipper habitat.

The National Environmental Policy Act (42 USC 4371 *et seq.*) (NEPA) provides some protections for listed species that may be affected by activities undertaken, authorized, or funded by federal agencies. For activities with a federal nexus, NEPA requires an agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where the analysis reveals significant environmental effects, the federal agency must discuss mitigation that could offset those effects (50 CFR 1502.16). These mitigations usually provide some protection for listed species; however, NEPA does not require federal agencies to mitigate adverse impacts, instead it only directs agencies to assess impacts and disclose them to the public. The majority of skipper habitat (70 percent) occurs on federally managed lands (Banks 2009, pers. comm.). While the skipper remains listed, activities with a federal nexus will continue to require NEPA evaluation and section 7 consultation under the ESA, where appropriate. However, in the absence of the ESA’s protections, it is unclear what level of consideration and protection federal agencies would provide through the NEPA process, as any measures to avoid and minimize impacts to the skipper would be voluntary.

In the absence of listing, the current regulatory mechanisms provided by the existing Pike and San Isabel National Forests’ LRMP will provide a general level of maintenance of ponderosa pine/Douglas-fir forests, but is not adequate to protect the skipper from projects that could alter or destroy habitat. In conclusion, the current regulatory mechanisms that exist are not adequate to protect the skipper if the subspecies were delisted.

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

Herbicide and Insecticide Use – The South Platte Ranger District of the Pike and San Isabel National Forests treats noxious weeds each year; some of the noxious weed occurrences overlap with skipper habitat, primarily in the Mainstem skipper subpopulation. Noxious weeds on the forest typically occur in small patches, typically less than 1/1000 of an acre, and are spot-treated with a backpack sprayer, or where possible, with an All-Terrain Vehicle or other vehicle (Bohon 2009, pers. comm.). Minimal amounts of herbicide and carrier are used. Herbicides used are selective for the targeted weed species. Plateau®, which is used to treat leafy spurge, has no effect on warm season grasses such as blue grama grass or on dotted gayfeather (Bohon 2009, pers. comm.). Treatment of invasive plant species is not considered to have a significant effect to skippers or skipper habitat. No insecticide use is known to occur in skipper habitat on USFS lands (Bohon 2009, pers. comm.) or Denver Water lands (Kennedy 2011, pers. comm.). Given this level of use, we do not consider the use of herbicides or insecticides to be a significant threat to the skipper.

Climate Change – The recovery plan (USFWS 1998) did not address the threat of climate change. Since the recovery plan was written, an increasing amount of information on climate change has become available. According to the Intergovernmental Panel on Climate Change (IPCC), warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented, over decades to millennia (IPCC 2014). In Colorado, most of the state has warmed one or two degrees Fahrenheit in the last century (USEPA 2016). Colorado is expected to warm even more by the mid-21st century, pushing temperatures beyond the range of the past century. However, the outlook for future precipitation in Colorado is less clear, as overall increases or decreases are possible (Lukas 2014). Future warming is projected to generally reduce Colorado's spring snowpack, cause earlier snowmelt and runoff, reduce annual streamflow volumes, and increase water use by crops, landscaping, and natural vegetation. The risk of severe, sustained soil-moisture drought in Colorado and the West during the 21st century is projected to be much higher than during the 20th century, due mainly to warmer temperatures causing enhanced drying of soils. By the mid-21st century, the fire season is expected to be longer, the annual area burned will be much greater, and the risk of very large wildfires will be much higher than in recent decades (Lukas 2014).

Drought could be detrimental to the skipper, as demonstrated by the severe drought experienced in 2002. Monitoring during the drought of 2002 detected only 2 skippers on 13 transects (each 0.5 mile in length) (ENSR 2003a). These low skipper numbers are believed to be a result of the low numbers of nectar plants to attract adult skippers or by potentially causing diapause (i.e., physiologically-induced dormancy) in larvae that would have normally pupated and emerged as adults (ENSR 2003a). Field work in 2003 showed that the skipper population was “still remarkably low – between 5 to 10 percent of the population density estimated nearly two decades ago (1986)” (ENSR 2003d, p. 8-1). In the years following the drought, skipper densities have slowly increased, but have not returned to the pre-listing densities.

Earlier snowmelt could affect soil moisture and reduce the abundance of dotted gayfeather flowers. Warmer summer temperatures could also affect the skipper's ability to effectively thermoregulate during the adult flight period in August and September, either directly or by modifying microhabitats within ponderosa pine and Douglas-fir stands. The prediction for a

longer fire season with larger burned areas and the increased risk of very large fires in Colorado could result in greater impacts to the skipper and its habitat, which is a concern given its restricted range.

Warmer temperatures also are likely to increase the number of mountain pine beetles (*Dendroctonus ponderosae*), whose infection of lodgepole pine forests (*Pinus contorta*) has resulted in the large scale mortality of lodgepole pine forests in Colorado. With a warming climate, winter temperatures can be mild enough to allow substantial survival of all bark beetle life stages (Leatherman et al. 2007). While the mountain pine beetle is primarily affecting lodgepole pine stands at this time, the beetle also can cause extensive mortality in ponderosa pine stands as well (Negron and Popp 2004). Previous infestations of mountain pine beetle in ponderosa pine stands were observed in Colorado's northern Front Range in the 1970s (McCambridge et al. 1982). Predictions of likely levels of mountain beetle infestation of ponderosa pine forests in Colorado are uncertain, although infestations appear to be primarily affecting ponderosa pine forests on the northern Front Range and generally have not extended to the area of skipper habitat.

In conclusion, climate change is considered to be a threat to the skipper as increasing temperatures and soil moisture levels are likely to result in: 1) more frequent and more severe droughts; 2) alteration of its habitat (i.e., potentially fewer dotted gayfeather plants due to changes in soil moisture); and 3) more frequent and severe wildfires.

Synthesis

The Pawnee montane skipper has an extremely small range that is inherently restricted by the overlap of the distribution of its primary nectar plant, dotted gayfeather, the distribution of its larval host plant, blue grama grass, and the ponderosa pine overstory (USFWS 1998). The skipper population is currently recovering both from recent fires and the severe drought of 2002. Wildfires have burned approximately 46 percent of the skipper's habitat since 1996, while the 2002 drought further reduced population numbers in unburned habitat. In the years following the 2002 drought and Hayman/Schoonover Fires, skipper densities remain low and have not returned to prelisting densities.

The primary threat at the time of listing in 1987 was the construction of the Two Forks Dam and Reservoir, which would have resulted in the inundation and destruction of 22 percent of the skipper's habitat and the loss of 23 to 42 percent of the population (USFWS 1998). While this larger dam was not constructed as proposed, the potential remains for a smaller Two Forks dam to be constructed. A smaller Two Forks dam (345,000 acre-feet) would also inundate skipper habitat. Denver Water has voluntarily placed a moratorium on applications for development of the Two Forks ROW through 2024 (USFS 2004). Other threats identified at the time of listing included residential and commercial development and ORV use. These threats have not resulted in significant impacts to skipper populations or habitat, and are not expected to do so in the near future given the current levels of development.

Additional threats have been identified that were not described at the time of listing and are related to forest health conditions. Fire suppression over the past 100 years has created more uniform and denser forest conditions in the lower montane forest, resulting in an increased risk

of large-scale, stand-replacing fires and a reduced quality of habitat for the skipper (USFS 2000). Concerns over the risk of such wildfires in the lower montane forests in Colorado were realized in 2002 with the Hayman Fire, which was the largest recorded wildfire in Colorado's history. The 2002 Hayman/Schoonover Fires burned more than 36 percent of the skipper's habitat. While skipper populations and habitat are showing recovery on the low severity burn areas, the future of the skipper is uncertain in the moderate-to-high severity burn areas as these areas are generally no longer occupied by the skipper. The forest canopy has been lost in 29 percent of the skipper habitat due to moderate-to-high severity burns.

In areas not affected by fires, recent fuels reduction projects by land management agencies have demonstrated that skipper habitat and skipper densities can be improved by forest thinning treatments (Natural Perspectives 2008). A total of 27 percent of skipper habitat has received fuels reduction treatments, with additional forest thinning planned on 4 percent of skipper habitat. An additional threat not identified at time of listing is the effect of climate change, which has the potential to result in increased periods of drought and the intensity and frequency of wildfires, both likely to negatively affect the skipper.

In conclusion, the skipper continues to have a high vulnerability to a variety of threats and continues to be in danger of extinction within the foreseeable future throughout all of its range. Recent fires have severely altered a large amount of its habitat, fire suppression within the skipper's range has reduced the quality of its habitat, skipper population numbers are generally lower than at the time of listing, and the potential remains for a smaller Two Forks Dam and Reservoir to be constructed. Furthermore, the potential impacts of climate change, if realized, could result in additional impacts to the skipper's habitat. In the absence of listing, threats to the skipper would likely be greater than presently experienced.

RECOMMENDATION ON SPECIES STATUS

The Act defines an endangered species as any species that is "in danger of extinction throughout all or a significant portion of its range" and a threatened species as any species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." After evaluating threats to the species and assessing the cumulative effects of the threats under the section 4(a)(1) factors, we conclude that the skipper is not currently in danger of extinction, but is likely to become in danger of extinction within the foreseeable future throughout all of its range.

Although the current risk of extinction throughout all of its range is low, there is enough risk associated with ongoing threats such that the species is vulnerable and likely to become endangered throughout all of its range within the foreseeable future. Therefore, the skipper continues to meet the Act's definition of a threatened species, and we recommend no change in status.

RECOMMENDATIONS FOR FUTURE ACTIONS

- Update the map of the range of occupied skipper habitat.
- Continue cooperation and consultation with land management agencies on habitat management, including fuels reduction treatments, recreation activities, road building and

other physical ground disturbance, noxious weed control, and other management activities that might impact skipper habitat.

- Continue forest thinning and restoration activities in skipper habitat.
- Continue planting of ponderosa pine seedlings where recent moderate-to-high severity burns occurred in skipper habitat.
- Continue quantitative population and habitat monitoring in forest thinning areas and recent burn areas to improve trend analyses and support adaptive management decisions, including within moderate-to-high severity burn areas.
- Evaluate the potential for persisting skipper populations within unburned forested “islands” within the Hayman Fire burn area, including an evaluation of the retention of individuals relative to the size of the “islands”.
- Continue genetic analyses on the Mainstem South Platte, North Fork, and Cheesman skipper subpopulations to better understand extent of gene flow between the subpopulations. Further evaluate extent of range of individuals with more unique genome that are located south of Cheesman Reservoir in the vicinity of Wildcat Creek.

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