

Pawnee Montane Skipper
(Hesperia leonardus montana)

**5-Year Review:
Summary and Evaluation**



Credit: USFWS

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

December 2011

5-YEAR REVIEW

Pawnee montane skipper (*Hesperia leonardus montana*)

1. GENERAL INFORMATION

1.1 Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (Service/USFWS) is required by Section 4(c)(2) of the Endangered Species Act (ESA) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since the time it was listed or since the most recent 5-year review. Based on the outcome of the 5-year review, we recommend whether the species should: 1) be removed from the list of endangered and threatened species; 2) be changed in status from endangered to threatened; 3) be changed in status from threatened to endangered; or 4) remain unchanged in its present status. Our original decision to list a species as endangered or threatened is based on the five threat factors described in Section 4(a)(1) of the ESA. These same five factors are considered in any subsequent reclassification or delisting decisions. In the 5-year review, we consider the best available scientific and commercial data on the species, and we review new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process that includes public review and comment.

1.2 Reviewers

Lead Regional Office: Mountain-Prairie Regional Office
Michael Thabault, Assistant Regional Director, Ecological Services
Bridget Fahey, Regional Endangered Species Chief, 303/236-4258
Seth Willey, Regional Recovery Coordinator, 303/236-4257

Lead Field Office: Colorado Ecological Services Field Office
Susan Linner, Field Supervisor, 303/236-4774
Leslie Ellwood, Biologist, 303/236-4747

1.3 Methodology Used to Complete the Review

The 5-year review was conducted by Leslie Ellwood, the lead USFWS biologist for the Pawnee montane skipper (*Hesperia leonardus montana*) (skipper). On October 6, 2008, we published an announcement initiating the 5-year review process and seeking new information on the skipper (73 FR 58261). One response was received from the Center for Native Ecosystems. This document 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 – 2010) (ENSR International Corporation (ENSR) 2001, 2003b, 2003c; Natural Perspectives 2004, 2005, 2007, 2008, 2009, 2010). 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; Colorado Natural Heritage Program (CNHP) 2005, 2006, 2007, 2009, 2010, 2011). 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).

1.4 Background

1.4.1 Federal Register Notice Citation Announcing Initiation of This Review

73 FR 58261; October 6, 2008.

1.4.2 Listing History

Original Listing

FR notice: 52 FR 36176

Date listed: September 25, 1987

Entity listed: Subspecies

Classification: Threatened rangewide

1.4.3 Review History

In 1991, the Service conducted a 5-year review for species listed prior to that year (56 FR 56882; November 6, 1991). This notice summarized the listing status of these species but did not further discuss species status nor did it propose or change the status of any species, including the skipper. The species’ status was considered in the 1998 Pawnee Montane Skipper Butterfly Recovery Plan (Recovery Plan) (USFWS 1998).

1.4.4 Species’ Recovery Priority Number at Start of 5-year Review

At the start of the 5-year review, the Recovery Priority Number for the Pawnee montane skipper was 9C, as shown in Table 1. This number indicated that: 1) populations faced a moderate degree of threat; 2) recovery potential was high; 3) the skipper was listed at the subspecies level; and 4) recovery of the skipper may be in conflict with construction or other development projects.

TABLE 1. Ranking System for Determining Recovery Priority Numbers.

Degree Of Threat	Recovery Potential	Taxonomy	Priority	Conflict
High	High	Monotypic Genus	1	1C
		Species	2	2C
		Subspecies/DPS	3	3C
	Low	Monotypic Genus	4	4C
		Species	5	5C
		Subspecies/DPS	6	6C
Moderate	High	Monotypic Genus	7	7C
		Species	8	8C
		Subspecies/DPS	9	9C
	Low	Monotypic Genus	10	10C
		Species	11	11C
		Subspecies/DPS	12	12C

Degree Of Threat	Recovery Potential	Taxonomy	Priority	Conflict
Low	High	Monotypic Genus	13	13C
		Species	14	14C
		Subspecies/DPS	15	15C
	Low	Monotypic Genus	16	16C
		Species	17	17C
		Subspecies/DPS	18	18C

The above ranking system for determining Recovery Priority Numbers was established in 1983 (48 FR 43098; September 21, 1983, as corrected in 48 FR 51985; November 15, 1983).

1.3.5 Recovery Plan

Name of plan: Pawnee Montane Skipper Butterfly Recovery Plan

Date issued: September 1998

2. REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment Policy

This section of the 5-year review is not applicable to the skipper because the ESA precludes listing Distinct Population Segments (DPSs) of invertebrates. For more information, see our 1996 DPS policy (61 FR 4722; February 7, 1996).

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes

No - The criteria identified in the Recovery Plan are not objective and are not measureable. For example, Criterion 1 states that the species “will be considered for delisting when it is demonstrated that there is a high probability of long-term persistence;” however, the phrase “high probability of long-term persistence” is not defined and, as such, is not measureable.

2.2.2 Adequacy of Recovery Criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

Yes

No - We would like to revise the recovery criteria to include new information from recent studies on post-fire analysis and forest thinning, population status, updated threats, and climate change concerns.

2.2.2.2 Are all of the five listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

 Yes

 X No - The recovery criteria do not adequately address all the threats identified in the five listing factors because there is new information to consider regarding existing threats. Specifically, the existing threats of habitat alteration and risk of large-scale, stand-replacing wildfires, both a factor of fire suppression over the past 100 years, were not sufficiently addressed in the 1998 Recovery Plan. Additionally, the effects of climate change were not evaluated in the 1998 Recovery Plan.

2.2.3 Progress Toward Achieving the Recovery Criteria: Based on the above, it is clear that the Recovery Plan and its delisting criteria require revision. However, it is still instructive to consider progress toward the delisting criteria. These criteria from the current Recovery Plan are unmet but are included here to provide background information.

Criterion 1: The skipper will be considered for delisting when it is demonstrated that there is a high probability of long-term persistence of the species and its preferred habitat. Because a 20-fold fluctuation in butterfly numbers is commonly encountered, the focus of recovery must be on habitat protection, not population numbers, at any given time.

The condition specified in Criterion 1 has not been met. As noted in the criterion, the key to achieving this criterion is the protection and management of habitat. As demonstrated in section 2.3.2 below, significant threats remain to the persistence of the species and its habitat.

Criterion 2: The skipper will be considered for delisting when it is demonstrated that skipper habitat on public land is protected and maintained within the defined habitat of the South Platte River. Fragmentation of habitat must be avoided and skippers must be distributed throughout the range. Populations in both the South and North Forks must be protected to buffer against a single event that might eliminate the butterfly from one of these areas.

The condition specified in Criterion 2 has not been met. As demonstrated in section 2.3.2 below, significant threats remain related to habitat degradation, habitat fragmentation, and risk from stochastic events.

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

2.3.1.1 Distribution, Abundance, and Trends

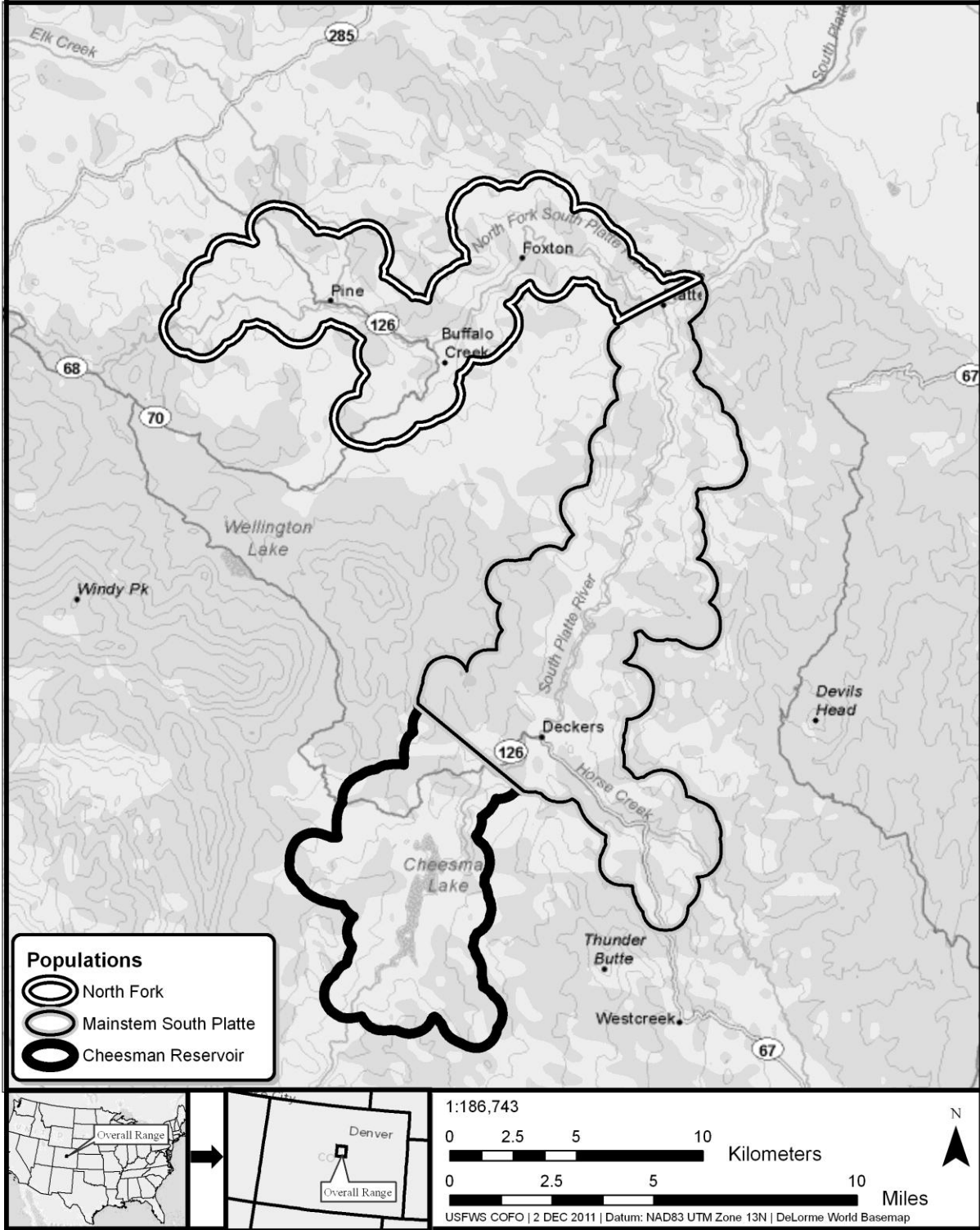
Distribution

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% occurs on the Pike and San Isabel National Forests (Banks 2009, pers. comm.). The skipper is dependent on two host plants, namely prairie gayfeather (*Liatris punctata*) and blue grama grass (*Buteloua gracilis*), within a ponderosa pine (*Pinus ponderosa*) woodland. The prairie 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 prairie gayfeather generally occurs in small openings in the forest and within more open ponderosa stands. The skipper's narrow range 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 prairie gayfeather. The flight period for adult skippers (August and September) closely corresponds with the main flowering time of the prairie gayfeather, with the primary flight period occurring from late August to early September.

The skipper's range can be divided into three populations (USFWS 1998): 1) Mainstem South Platte population (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 population (5,758 acres); and 3) North Fork population (6,285 acres) (Banks 2009, pers. comm.). Due to the relatively close proximity of these populations (i.e., Cheesman population and Mainstem South Platte population are contiguous near Cheesman Dam; Mainstem South Platte population and North Fork population are contiguous at North Fork/South Fork confluence of South Platte River), there appears to some opportunity for exchange of individuals between the populations.

In general, the range of the skipper does not appear to have changed following the 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. However, areas that experienced a moderate-to-high severity burn in the 2002 Hayman/Schoonover Fires have been severely altered (i.e., loss of ponderosa/Douglas-fir (*Pseudotsuga menziesii*) overstory) and, at this time, it is not clear if these areas will provide skipper habitat in the near future. These burn areas receive some use by skippers, but the sites are usually in close proximity to unburned and low severity burn habitat (CNHP 2010). We do not know if these moderate-to-high severity burn sites provide only foraging habitat or provide for the full life cycle of the skipper (see further discussion in section 2.3.2 on impacts from wildfires).

Figure 1: Overall Range of the Pawnee Montane Skipper



Abundance and Population Trends

Prior to the surveys conducted in the 1980s, little information is available on skipper population estimates and trends. However, based on the denser, more uniform forest conditions that are currently present, primarily resulting from fire suppression over the past 100 years, we believe that the general habitat conditions for the skipper are currently less suitable than those conditions prior to these practices, as discussed in section 2.3.2 below.

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 as a result of wildfires that occurred in skipper habitat since 1996 and the severe drought in 2002.

Additionally, two long-term skipper monitoring studies provide information on skipper abundance and population trends. These studies monitor the effects of: 1) a large-scale forest restoration and fuels reduction project; and 2) the 2002 Hayman/Schoonover Fires and drought. Both of these studies are continuing to the present time and are discussed below.

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 in 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 section 2.3.2).

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 U.S. Geological Survey 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 138,000 acres, of which 8,978 acres were skipper habitat, and 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 has been conducted annually from 2002 to the present (2010) 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 annually during the primary adult flight period (late August – early September) for the presence of adult skippers, flowering stems of prairie gayfeather, and blue grama grass (Natural Perspectives 2008).

Results of skipper counts from post-Hayman/Schoonover Fire monitoring are shown in TABLE 2. 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 indicates that skipper and prairie gayfeather densities, and blue grama grass occurrences have increased since 2002, although skipper densities continue to remain low in areas of moderate-to-high severity burn. Since 2005, there has been no consistent difference in prairie gayfeather densities and blue grama grass frequencies between the different burn severities (CHNP 2010).

The skipper densities through 2009 (0.89 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), although densities recorded in 2010 showed considerable improvement (2.83 skippers per acre). At this time, it is uncertain if the skipper will persist in the areas of moderate-to-high severity burns, given the long-term absence (approximately 70 years) of the ponderosa pine and Douglas-fir overstory.

TABLE 2. Comparison of Pawnee montane skippers observed from 2002-2010 in different burn severities within the Hayman/Schoonover Fire burn areas.

YEAR	NUMBER OF SKIPPERS PER ACRE			
	Unburned	Low Burn Severity	Moderate to High Burn Severity	Average
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

(CNHP 2011)

2.3.1.2 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.).

Genetic studies have not been conducted on the skipper. Genetic studies comparing the Mainstem South Platte, Cheesman, and North Fork populations would be useful to determine the extent of gene flow between the populations.

2.3.1.3 Taxonomic classification or changes in nomenclature.

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

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range.

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; 2) past and ongoing residential and commercial development; 3) off-road vehicle (ORV) use; and 4) proposed construction of Two Forks Dam and Reservoir and associated roads and recreational facilities.

Cheesman Reservoir - No early distribution or range information exists to determine the extent of the past habitat destruction from Cheesman Reservoir, which was completed in 1905. The current operation and maintenance of Cheesman Reservoir 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 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 for the skipper while providing protection around structures.

Off-road Vehicle Use - Some ORV use continues to occur within skipper habitat causing damage to habitat, although impacts have been reduced by the recent 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, 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% of suitable skipper habitat and would have resulted in a loss of 23 to 42% 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 below 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, also would 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 significant 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 changed 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% while currently much of the USFS land within the skipper’s range has a canopy of 4% or greater (USFS 2000). The optimum conditions for skipper habitat include a tree canopy cover of 25% from ponderosa pine and 5% 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% 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 prairie 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 for the life of the project (approximately 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 population, 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 prairie 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% 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% of skipper habitat).

Monitoring of treated (thinned) and control stands indicate an increase in prairie gayfeather densities in treated stands, as shown in TABLE 3, and an increase in skipper densities in treated stands, as shown in TABLE 4. Densities of prairie gayfeather flowering stems increased in the treated transects (between 2.8- to 19.7-fold increase) while densities in the control transects only increased in the range of 1.2- to 4.6-fold (Natural Perspectives 2008). Results also indicate a significant positive correlation between prairie 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 (Natural Perspectives 2008). Although some of the annual increases in prairie gayfeather densities can be attributed to increased soil moisture in the years since 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 prairie 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 prairie 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. For example, the USFS has recently signed a long-term stewardship contract for fuels reduction treatments along the Front Range of Colorado. 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.

TABLE 3. Comparison of prairie gayfeather densities (average number of flowering prairie gayfeather stems per acre) by year between the four treatment areas.

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

(Natural Perspectives 2010; Drummond 2011, pers. comm.)

^a Monitoring occurred prior to the treatment.

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

* No monitoring occurred.

TABLE 4. Comparison of skipper densities (average number of skippers per acre) by year between the four treatment areas.

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	4.07	2.59	1.69	1.57

(Natural Perspectives 2010; Drummond 2011, pers. comm.)

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.

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).

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

Low severity fires generally result in the mortality of individual skippers (adults, larvae, and eggs) and their host plants, namely the prairie gayfeather and blue grama grasses 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, prairie gayfeather, blue grama grass, as well as much of the ponderosa pine/Douglas-fir overstory.

Although skippers densities and prairie gayfeather and blue grama plants are showing some recovery following the recent fires, our greatest concern remains the moderate-to-high severity burns that removed the ponderosa pine/Douglas-fir overstory and have resulted resulting in the long-term (i.e., approximately 70 years) alteration of the habitat. As shown in TABLE 5, approximately 29% of the total skipper habitat has burned under a moderate-to-high severity since 1996, including the Cheesman population, of which 69% of the population burned under moderate-to-high severity in the Hayman Fire (Banks 2009, pers. comm.).

TABLE 5. Acres of skipper habitat burned in wildfires (since 1996) per skipper populations.

FIRE	ACRES BURNED			Total Acres of Habitat Burned
	Mainstem South Platte Population	Cheesman Population	North Fork Population	
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 (% of population burned)	3,713 (29%)	5,511 (96%)	2,072 (33%)	11,296 (46%)
Acreage Burned Under Moderate-to-High Severity (% of population burned)	1,159 (9%)	3,985 (69%)	2,072 (33%)	7,216 (29%)

(Banks 2009, pers. comm.)

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 butterflies 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. Hayman Fire burn studies have documented some skipper presence in moderate-to-high severity burn areas, although it is not known if these areas provide only foraging habitat or also provide for the full life cycle (i.e., ovipositioning [egg laying], larval stages, and pupation) (CNHP 2009). Skippers in the moderate-to-high severity burn areas are generally in close proximity (i.e., less than 0.3 mile) to unburned and low severity burn areas (CNHP 2010). Ponderosa pine seedlings have been planted in skipper habitat on USFS and Denver Water lands in moderate-to-high severity burn areas in the Hayman Fire area to restore 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% of the skipper's habitat and resulted in the loss of 23 to 42% of the population (USFWS 1998). While this dam was not constructed, a smaller dam could still to 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 nearly a century of fire suppression. Fire suppression in the ponderosa pine/Douglas-fir forests has resulted in denser, more uniform forest conditions with a greater canopy cover. This change in forest structure has reduced the amount of suitable 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% of habitat). Fuels reduction treatments designed to reduce the risk of large-scale, stand-replacing fires have improved skipper habitat, increasing the densities of prairie gayfeather and skippers. Approximately 27% of the skipper's habitat has received fuels reduction and forest restoration treatments, with an additional 4% 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 a high fuel loading; these areas are still at risk for wildfires. In conclusion, fire suppression within the montane forest has resulted in an altered forest condition that affects the skipper both through a 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.

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes.

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 species has 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.

2.3.2.3 Disease or predation.

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 believed to pose a serious threat to the species’ populations or continued existence. We have no newer information to suggest that disease or predation is a threat to the skipper.

2.3.2.4 Inadequacy of existing regulatory mechanisms.

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 the

skipper habitat (70%) 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. 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 species were delisted.

2.3.2.5 Other natural or manmade factors affecting its continued existence.

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 population. 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 prairie 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 on 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, based on observations of increases in air and ocean temperatures, widespread melting of snow and ice, and rising sea levels (Field et al. 2007). Average Northern Hemisphere temperatures during the second half of the 20th century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1,300 years (Field et al.

2007). It is very likely that over the past 50 years, cold days, cold nights, and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent (Field et al. 2007). It is likely that heat waves have become more frequent over most land areas, and the frequency of heavy precipitation events has increased over most areas (Field et al. 2007).

In Colorado, widespread warming is evident across most climate divisions during the period from 1977 to 2006. Temperatures in Colorado have increased by approximately 2°F during this 30-year period, although Colorado's climate is highly variable due to high elevation and its complex topography (Ray et al. 2008). While temperatures in Colorado have increased, the annual amount of precipitation is highly variable, which makes it difficult to detect any long-term trends (Ray et al. 2008). However, warmer springtime temperatures in the Western United States are causing earlier snowmelt, resulting in peak streamflows occurring about two weeks earlier in Colorado (Ray et al. 2008).

The IPCC predicts that changes in the global climate system during the 21st century are likely to be larger than those observed during the 20th century, and the IPCC projects a warming of about 2 to 5°F per decade for the next 2 decades (Field et al. 2007). Afterwards, temperature projections increasingly depend on specific emission scenarios with predictions of global average surface temperatures during the 21st century increasing between 2.0 and 11.5°F, depending on the emissions scenario used (Field et al. 2007). Within Colorado, climate prediction models for the State project a warming of 2.5°F by 2025 and 4°F by 2050 (Ray et al. 2008). Efforts to improve climate modeling, including finer spatial resolution, should improve these projections in future years. While uncertainty remains about global and regional temperature predictions, projections consistently show a steep decline in snowpack below 8,200 feet across much of the west (Ray et al. 2008).

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 2002a). 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 did not return to the pre-listing densities until 2010.

Earlier snowmelt at elevations below 8,200 feet could affect soil moisture and reduce the abundance of the prairie gayfeather flowers. Warmer summer temperatures also could 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. Warmer temperatures and drier conditions also are predicted to result in more wildfires, creating greater impacts to skipper habitat, which is already a concern given its restricted range (Field et al. 2007). Warmer summer temperatures are expected to extend the annual window of high fire ignition risk by 10 to 30% (Field et al. 2007).

Warmer temperatures also are likely to increase the number of mountain pine beetles (*Dendroctonus ponderosae*), whose infection of lodgepole pine forests (*Pinus contorta*) in Colorado is currently at an epidemic level and 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. Higher densities in ponderosa pine stands correlate with an increased likelihood of pine beetle infestation and associated mortality on the Front Range of Colorado (Negron and Popp 2004).

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

2.4 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 (i.e., prairie gayfeather) and the distribution of its larval host plant, blue grama grass (USFWS 1998). The skipper population is currently recovering both from recent fires and the severe drought of 2002. Recent fires have burned approximately 46% of the skipper's habitat since 1996, while the 2002 drought further reduced population numbers in unburned habitat. In the 8 years following the 2002 drought and Hayman/Schoonover Fires, skipper densities remained

quite low and did not return to prelisting densities until 2010 (2.83 skippers per acre). Prior to 2010, skipper densities were in the range of 0.20 to 0.89 skippers per acre, as compared to the skipper densities of 2.1 to 3.6 skippers per acre that were recorded in the 1980s when the skipper was listed (ERT 1986a, 1988; ENSR 1989).

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% of the skipper's habitat and the loss of 23 to 42% 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) also would 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 due to the Hayman Fire, which was the largest recorded wildfire in Colorado's history. The 2002 Hayman/Schoonover Fires burned more than 36% 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. The forest canopy has been lost in 30% of the skipper habitat affected by 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% of the skipper habitat has received fuels reduction treatments, with additional forest thinning planned on 4% 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 Pawnee montane skipper continues to have a high vulnerability to a variety of threats and continues to warrant listing as a threatened species. 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.

3. RESULTS

3.1 Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

3.2 New Recovery Priority Number: No change is needed (Remains a 9C).

Brief Rationale

A moderate degree of threat means that “the species will not face extinction if recovery is temporarily held off, although there is continual population decline or threat to its habitat” (48 FR 43104; September 21, 1983). While the primary threats identified at the time of listing are greatly reduced, we have identified new threats that continue to pose a threat to the Pawnee montane skipper. Currently, the greatest threat to the skipper is forest health, which has been negatively affected in the past by a century of fire suppression and may be negatively impacted in the future by climate change. Although the threats associated with forest health (i.e., closed canopy and large-scale, stand-replacing fires) remain, recent fuels reduction and forest restoration treatments have improved skipper habitat. These treatments are likely to continue in the future as a strategy to reduce the risk of undesirable fires; these treatments also will benefit skippers.

A high recovery potential means: 1) the biological and ecological limiting factors and threats to the species’ existence are well understood; 2) threats are easily alleviated; and 3) intensive management is not needed, or techniques are well documented with high probability of success (48 FR 43104; September 21, 1983). Skippers and their host plants have responded positively to fuels reduction and restoration treatments designed to improve forest health and reduce large-scale, stand-replacing wildfire; therefore, with proper, ongoing management of the forest, recovery potential remains high, though the impact of climate change remains uncertain. Some conflict remains due to the possible future construction of a smaller reservoir and dam.

The skipper remains listed at the subspecies level.

4. RECOMMENDATIONS FOR FUTURE ACTIONS

4.1. Administrative Actions

- 4.1.1. Revise the Recovery Plan for the Pawnee montane skipper so that it reflects the best scientific and commercial information available. The revised Recovery Plan should include objective, measurable criteria

which, when met, will result in a determination that the species be removed from the Federal List of Endangered and Threatened Plants. Recovery criteria should address all threats impacting the species.

- 4.1.2. 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.

4.2 Management/Threats Abatement Actions

- 4.2.1. Continue forest thinning and restoration activities in skipper habitat.
- 4.2.2. Continue planting of ponderosa pine seedlings where recent moderate-to-high severity burns occurred in skipper habitat.

4.3 Monitoring and Research Actions

- 4.3.1. Continue quantitative population and habitat monitoring in forest thinning areas and recent burn areas to improve trend analyses and support adaptive management decisions.
- 4.3.2. Conduct genetic sampling and analyses on the Mainstem South Platte, North Fork, and Cheesman skipper populations to determine extent of gene flow between the populations.

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

Current Classification: Threatened range-wide

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Review Conducted By: Leslie Ellwood, Ecological Services, Colorado Field Office


FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 1/3/12
Field Supervisor, Colorado Field Office

REGIONAL OFFICE APPROVAL:

Assistant Regional Director, Fish and Wildlife Service

Approve  Date 1/3/12
Assistant Regional Director, Region 6