White-tailed Ptarmigan (*Lagopus leucurcus*)

INDICATOR SPECIES HABITAT

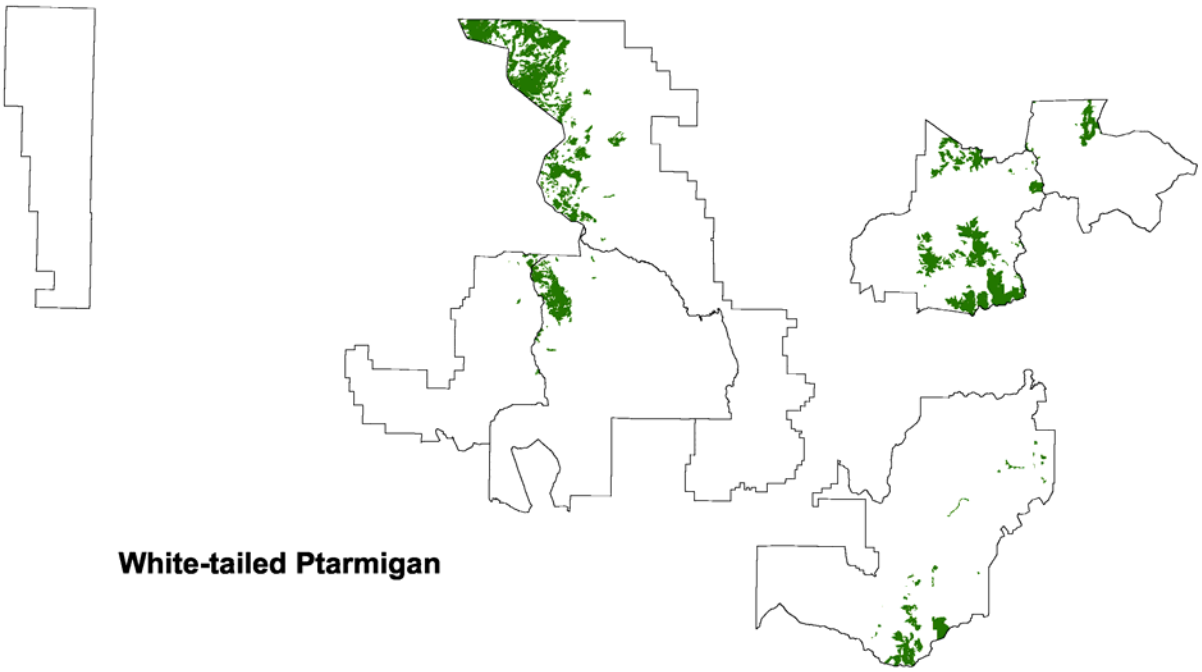
The white-tailed ptarmigan is an indicator species for the presence of alpine tundra and subalpine deciduous shrub (USDA 1986a, p.97). The white-tailed ptarmigan is the only ptarmigan confined to North America. Little is known about this avian species in New Mexico, for it lives on the windswept tundra, above 11,000 feet (3350 meters). Hens have been observed wintering as low as 8,500 feet (2590 meters). The presence of high elevation shrubby willows (*Salix* spp.) is likely the most important factor for successful overwintering of the species (Hoffman 2006). Buds and twigs of various species of *Salix* provide the bulk of the food eaten by white-tailed ptarmigan. The shrubs should reach a minimum height of 0.5 meters. In areas where *Salix* is not readily available, alder catkins (*Alnus* spp.) become the dominant dietary component, along with some needles of spruces, pines, and firs.

Habitat distribution should include soil map units 340 and 341 of the Terrestrial Ecosystem Survey for the Carson National Forest (USDA 1987). Key habitats include krummholz (stunted forest characteristic of timberline) thickets and boggy meadows. Important willow species should include gray-leaf willow (*S. glauca*) and plane-leaf willow (*S. planifolia*). Ptarmigan can easily be overlooked in the dwarf willow communities of skyland willow (*S. petrophila*), arctic willow (*S. artica*), and snow willow (*S. nivalis*) that create tiny, low mats on wet, rocky habitats.

Most plant communities in the alpine zone are used by ptarmigan at some time during the year, suggesting the species has a wide habitat tolerance in this zone. However, certain habitat features must be present to ensure continued use. The two most important features of all vegetation types are the presence of willow and rocky areas. Willow is the key factor affecting ptarmigan distribution from late fall through early summer. During this time, this shrub species is the primary source of food for the ptarmigan. Rocky areas near late-lying snowfields or other moist sites become important from mid-summer to early fall. Rocks provide protection from the weather and hiding cover from avian predators (Hoffman 2006).

Nesting habitat varies significantly. Some birds will use the cover of various shrubs and trees, while others will nest in the alpine meadows. After completing breeding activities in early July, most males and unsuccessful females move upslope from breeding areas to high, rocky, and frequently exposed ridges. Feeding often occurs along the edges of melting snow packs. *Trifolium* and *Carex* are important forage during the summer months.

Winter ranges are at or near timberline and preferably consist of a willow-sedge (*Salix* spp. and *Carex* spp.) marsh, hairgrass (*Deschampsia*) meadow, sedge-grass (*Carex-Poa*) wet meadow and krummholz mosaic dominated by willow and dwarf Engelmann spruce (Braun et al. 1976). Summer ranges are areas above timberline that ptarmigan move to in early July. Typically they are windswept ridges, with rocky 50 percent ground cover, with short grass-sedge meadows adjacent to late-lying snowfields (Braun 1971). Both genders show a high fidelity to wintering areas similar to their attachment to breeding sites. Studies indicate about 60 percent of the birds return to the same wintering area (Hoffman 2006), with adults exhibiting a greater affinity for wintering areas than subadults. If suitable winter habitat occurs closer to the subadults' territory than where they wintered the previous year, they will use the closest habitat and not return to the area used the previous winter (Hoffman 2006).



Map 1. White-tailed Ptarmigan Potential Habitat Distribution on the Carson National Forest (USDA 1987)

Management Activities or Natural Events That May Affect Habitat

Negative: Loss of willow component, usually associated with domestic sheep grazing; use of tundra habitats by livestock (particularly sheep), elk, and wilderness users (humans).

Positive: Fire use (prescribed natural fire); good grazing practices.

Plans, Regulations and Guidelines Supporting, Maintaining or Improving Habitat

- *Carson National Forest Land and Resource Management Plan – Management Area 9 (High Elevation Grassland)* (USDA 1986c) says to "provide quality habitat for ptarmigan" and "willow is in the ptarmigan range and has a height of at least 0.5 meter."
- *Wilderness Act* (1964) – Potential habitat for the ptarmigan is located entirely within the Pecos, Wheeler Peak and Latir Peak wilderness areas and the Columbine-Hondo Wilderness Study Area, and to some extent security of ptarmigan habitat falls within the protections provided by the Wilderness Act.

HABITAT CONDITION AND TREND ON THE CARSON NATIONAL FOREST

This species is associated with the alpine tundra and subalpine deciduous shrub. The Carson Forest Plan EIS identifies 6,400 acres of habitat (USDA 1986a, p. 97). It also states habitats are marginal compared to areas further north in Colorado, and localized extinctions of populations could occur when densities are low. Map 1 depicts habitat on the west-side of the forest, however Braun (1971 and 1979) notes the area near Chama could be used as wintering habitat, but does not provide breeding or summer habitat.

No management actions have changed since the time of the Forest Plan that would cause a change in the number of acres of available habitat on the Carson National Forest. The Terrestrial Ecosystem Survey data layer identifies 10,106 acres of alpine tundra on the Forest (USDA 1987). This does not mean there is any change in the trend of available habitat, but is a result of a variation in habitat mapping. Incidental observations show portions of these habitats are still occupied. The most recent photo verification is in the Pecos Wilderness in 2002 (Gardiner 2002).

Figure 1 displays the approximate distribution of seasonal ranges of white-tailed ptarmigan in Colorado in relation to elevation, topographic position, and major alpine vegetation types (Hoffman 2006). The actual distribution of seasonal ranges will vary depending on the aspect and the elevations may be slightly different for New Mexico.

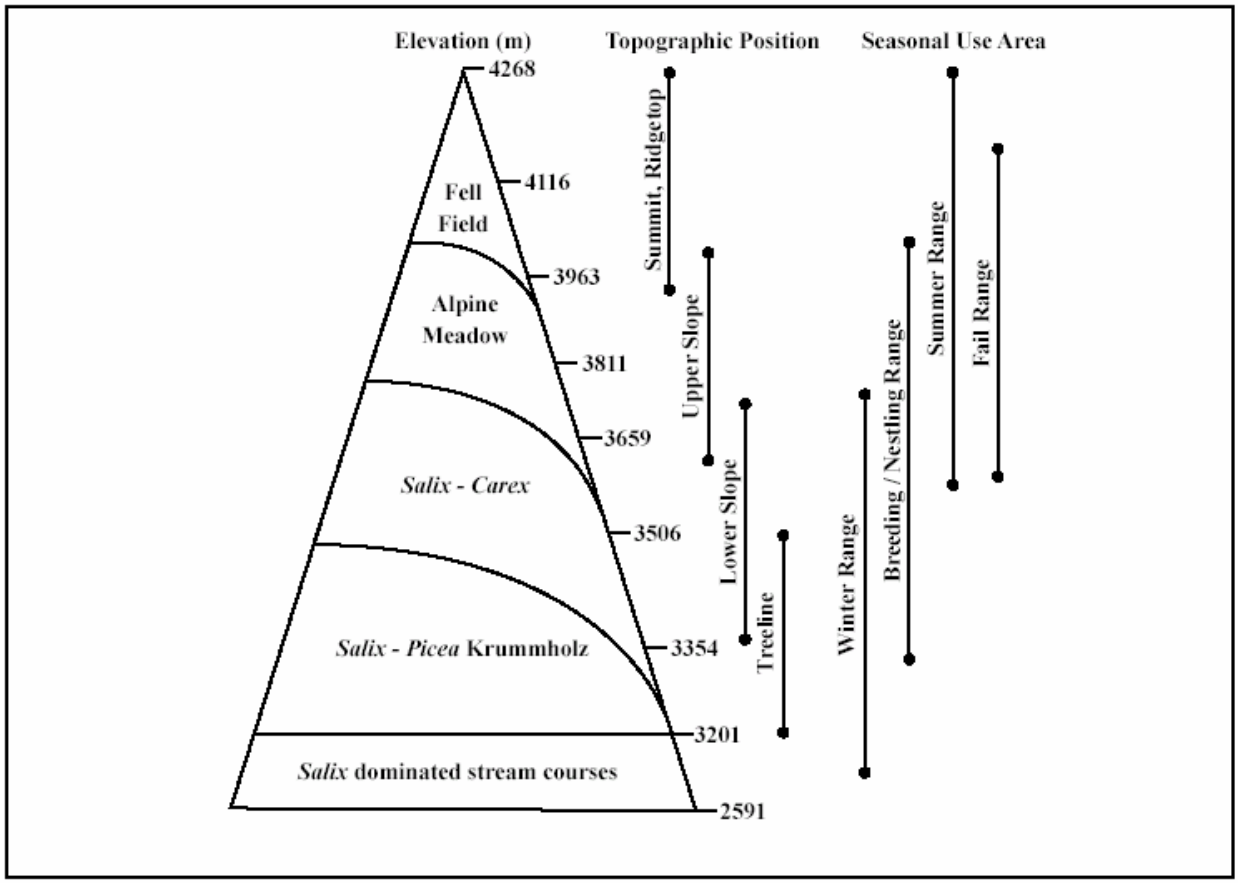


Figure 1. Distribution of Seasonal Ranges (Hoffman 2006)

In New Mexico, white-tailed ptarmigan populations exist year-round on the peaks of the Sangre de Cristo Mountains from the vicinity of Santa Fe northward to the Colorado border. This region includes the eastside of the Carson National Forest. They have been found in the Chama area, but only during the winter. The decline in ptarmigan numbers in New Mexico is due to many reasons. The historic use of tundra habitats by livestock, particularly sheep, and the increase use of wilderness areas by humans have had negative impacts on the species and its habitat.

Photos from as early as the 1920's indicate the alpine meadows in what is now the Pecos Wilderness were severely overgrazed. This condition is most likely the reason for the rare

occurrence of the species today. Different behavioral patterns have been found to occur in areas of Colorado, which were intensively grazed by domestic livestock. When the upper ridges were heavily grazed there was no movement to these areas in the post-breeding season. Instead, there was lateral or horizontal movement to rocky areas or movement downhill into rocky and wet places within the krummholz. Fall habitats are primarily the last places where snow has melted. Phenology of these areas is delayed because they are the last to become snow free in late summer, and consequently they are the only remaining source of green plants in the late fall (Braun 1979).

Braun (1979) does not believe grazing has had a negative effect on ptarmigan populations in Colorado. He observed the movement pattern went from upslope in summer to lateral or downward to find adequate forage. From his studies, he is unable to determine the extent of livestock utilization or the duration of any severe utilization and how it compares to impacts of livestock grazing in the Pecos, Latir, or Wheeler Peak wilderness areas. It is also possible that rocky, wet areas in his study are protected from grazing and may be more extensive in Colorado than in New Mexico. In addition, certain species of willow may be more valuable and not have persisted during the years of intensive grazing. Future studies could determine if the willow species found in Colorado are still present or to what abundance in historic habitats in New Mexico.

Clait E. Braun (former white-tail ptarmigan researcher for the Colorado Division of Wildlife) surveyed habitat condition on the Carson National Forest in both 1969 and 1979 (Braun 1969; 1979). In Braun's habitat evaluations of New Mexico, he was accompanied by several Forest Service personnel (Braun 1979). The following is a summary of his 1979 report:

> Latir Peak area – Isolated, small (~3 squire miles) alpine area is dominated by *Carex* spp.- *Trifolium dasyphyllum* (alpine clover), *Carex* spp. *T. nanum* (dwarf clover), and *Carex* spp. – *Geum rossi* (Ross's avens) communities at higher elevations (up to 12,000 feet). Lower elevations are dominated by *Potentilla* spp. and *Poa* (grasses) spp., with some *Deschampsia* (grass) and *Kobresia* (sedge) in suitable sites. The limited krummholz in this area is dominated by *Ribes* (currant) and *Potentilla*. Salix (willow) brushes are conspicuously absent, although prostrate or mat willows do occur in suitable sites. The suitable of Latir Peak-Latir Mesa-Venada Peak is that it is marginal and breeding and winter habitat is almost non-existent. This is especially true for the breeding period as exposed willow in the krummholz is lacking. Some taller willow exists in drainages away from the alpine and it is probable that ptarmigan could utilize this resource.
>
> Wheeler Peak area – Vegetation within this area is typically alpine being dominated by *Carex, Trifolium, Geum,* and *Kobresia,* with *Potentilla, Poa,* and *Deschampsia* being abundant in some sites. Prostrate *Salix* is common and bushes of *Salix* occur in some of the more poorly drained sites. Condition of the alpine vegetation is excellent. Wheeler Peak area has a lack of breeding areas and possibly winter use sites. Bush willows are not abundant, although some occur in La Cal Basin, near Horseshoe Lake and the basin below Wheeler Peak and Old Mike. This area does not contain large amounts of superlative breeding habitat.

> Jicarita Peak-Truchas Peaks-Pecos Baldy-Santa Fe Baldy-Lake Peak Area – This area represents the largest area of continuous alpine habitat (~10-12 air miles in length) in New Mexico, which includes both Carson and Santa Fe National Forests. This area contains the best ptarmigan habitat in New Mexico.
>
> The area from Jicarita Peak to Barbara Peak especially the east side from Serpent Lake to the head of Rincon Bonito and possibly east to Santiago Lake, appears excellent for ptarmigan breeding and winter use. Bush *Salix* is abundant along the east side of the Divide trail with obvious windblown areas suitable for breeding territories. The divide area itself is dominated by communities of *Carex-Geum, Geum-Carex,* and *Carex-Geum-Trifolium.* Some *Kobresia* is present, as is *Deschampsia*. Prostrated willows are common. Rock patterned ground, stripes, nets and polygons occur in profusion, frequently in close proximity to late lying snowfields and wet seeps. This area of about five miles in length by up to one mile in width appears markedly similar to some of Colorado's better ptarmigan areas.
>
> New Mexico habitat – Overall alpine habitats in New Mexico are marginal for white-tailed ptarmigan breeding and wintering. Maintenance of viable populations is possible near Chama (winter only), Costilla Peak, Wheeler Peak area and with introduction, the Barbara Peak-Jicarita Peak area. All other areas appear capable of supporting only transients or limited numbers in times of high populations in the best habitats.

During 2006, the Carson National Forest invited Clait Braun to the forest to provide training to district personnel on conducting ptarmigan surveys and assessing habitat conditions. During this training session, actual surveys were conducted in the Pecos Wilderness area (Braun 2006). Braun (2006) noted that in the Jicarita Peak area the area has not changed from that noted during his visit in 1979 as being good habitat for the ptarmigan. He noted the vegetation changes appeared to consist of continued recovery of the alpine turf communities and some excessive browsing of willow bushes, presumably by elk.

Also in 2006, Little Costilla Peak in the Valle Vidal area on the Questa Ranger District was field checked to determine its potential for breeding habitat. Surveys of potential ptarmigan habitat were conducted along the Little Costilla Peak ridge during the August 2006 (USDA 2006b). No quality habitat or evidence of ptarmigan was found. The Little Costilla Peak area, however, could be transient range for ptarmigan between breeding and wintering habitat (July–September).

Domestic sheep were removed from the Pecos Wilderness about 25 years ago. Today, cattle do not access the upper slopes; however they still graze the lower areas where *Salix* occurs. These *Salix* patches are in good condition and do not show signs of extensive use by livestock. The main competition for *Salix* on the upper slopes is from bighorn sheep, and to some extent elk. Although the ptarmigan and these species did naturally occur together, it is believed the *Salix* has never effectively recovered from 75 years of heavy use prior to domestic sheep removal from the wilderness. The habitat condition and trend on the Carson National Forest for the white-tailed ptarmigan is generally poor and varies between a stable and downward trend.

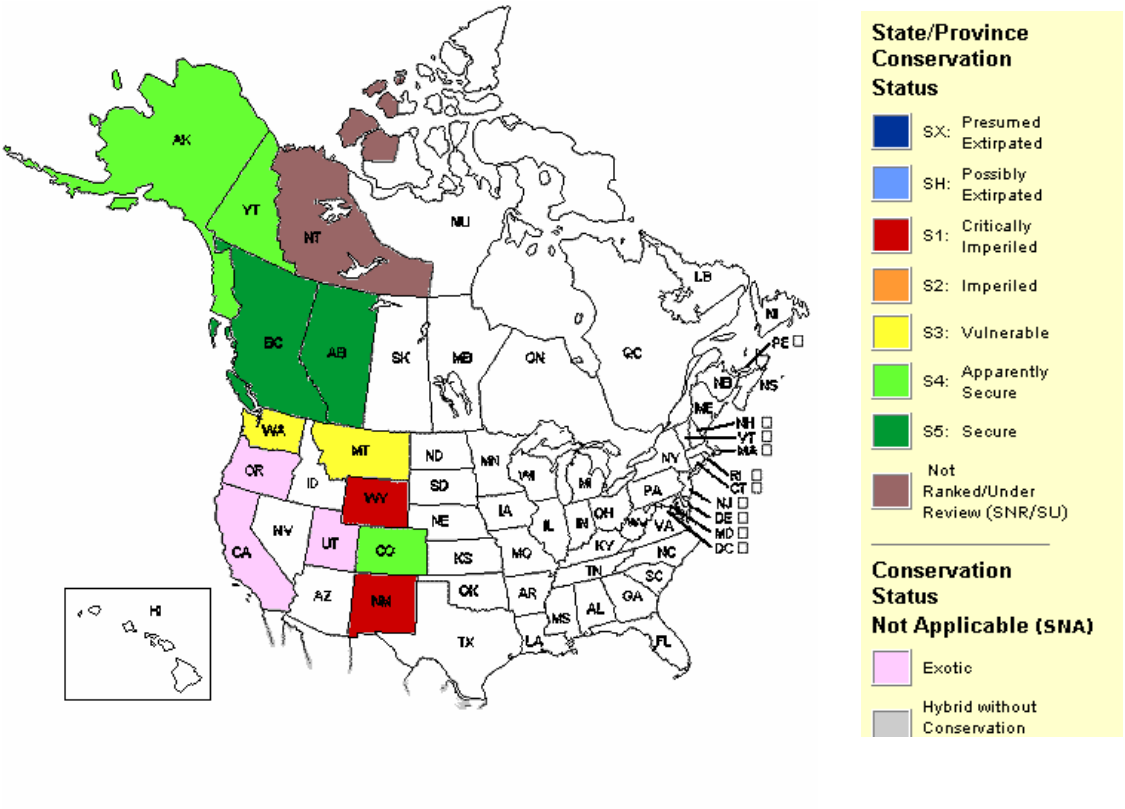
Currently, combined Rocky Mountain bighorn sheep and elk forage utilization along specific areas of the alpine zone may be affecting recovery of tall willow species needed for ptarmigan habitat. Current willow populations for winter survival can only be found in a few spots of TES units 340 and 341 and comprises only a "trace" of percent cover. Because livestock class has changed from domestic sheep to cattle in all allotments affecting alpine habitats on the Carson National Forest, current livestock grazing utilization levels have no effect on existing willow populations in areas where ptarmigan habitat occurs.

The increase of the elk population on the forest since the implementation of the Forest Plan could affect ptarmigan habitat conditions. Use of willow by elk in early winter and early spring may constrain ptarmigan breeding densities by reducing the amount of willow protruding above the snow (Hoffman 2006). Braun (2006) notes, while putting on a training session in the area south of Jicarita Peak, he observed excessive browsing of willow bushes, presumably by elk, as their sign was found in the area. Considering the positive adjustments in grazing management on the forest and little change in habitat conditions detected by Braun between 1979 and 2006, **the overall habitat trend for the white-tailed ptarmigan on the Carson National Forest is stable.**

POPULATION TREND

The white-tailed ptarmigan is a resident of central Alaska, northern Yukon, southwestern Mackenzie, south to Kenai Peninsula; Vancouver Island, Canada, Cascade Mountains in Washington, and in the Rocky Mountains from British Columbia and Alberta south to northern New Mexico; introduced and established outside its native range in high central Sierra Nevada in California; releases also have been made in the Wallowa Mountains in Oregon, Pike's Peak in Colorado and Uintah Mountains in Utah (Hoffman 2006). The ptarmigan is locally common over many parts of its range, but in New Mexico the species has become rare since the turn of the century. By the early 1900s, the white-tailed ptarmigan had become extremely rare throughout its New Mexico range and by the mid-1900s it was extirpated from the southern peaks and restricted to only a few peaks in the northernmost reaches of its former habitat. In Colorado the white-tailed ptarmigan is considered a fairly common game species and is regulated through hunting seasons. In New Mexico, however, the species is listed as endangered by the State and is protected.

The *NatureServe* database (www.natureserve.org/explorer) documents that throughout its range, the white-tailed ptarmigan is listed as “G5”, (i.e., globally secure and common, widespread and abundant) although it may be rare in parts of its range, particularly on the periphery (such as New Mexico). Reasons given for the G5 ranking are its large range and that it is common in many areas and there is no evidence of large-scale declines. It is not vulnerable in most of its range. Species with this rank typically occur in more than 100 localities, and there are more than 10,000 individuals. Within the United States, the white-tailed ptarmigan is listed as “N5” (i.e., secure and common, widespread, and abundant). In New Mexico, the species is listed as “S1” (i.e., critically imperiled). Ptarmigan are critically imperiled in New Mexico because of extreme rarity or other factor(s) such as very limited habitats, making it especially vulnerable to extirpation from the state. Typically this means only five or fewer occurrences or very few remaining individuals (<1,000) exist.



Map 2. Distribution of White-tailed Ptarmigan in North America (NatureServe Explorer 2006)

New Mexico and Carson National Forest

In 1979, Clait E. Braun conducted a literature search and habitat evaluations on white-tailed ptarmigan in New Mexico (1979). The following information is from his report: White-tailed ptarmigan were first collected in New Mexico sometime before 1866. The exact locations of these collections are unknown, but Bailey presumed the birds came from the Truchas Peaks, however Braun notes it is more likely they came from the Taos area. Other specimens were taken in the Wheeler Peak area and on Costilla Peak in 1904. Oldenettel (2007) notes white-tailed ptarmigan were found on Costilla Peak in 1926 (11 birds) by Ligon and in 1952 (7 birds) by Brewser.

Braun (1979) indicates there were only four known specimens of white-tailed ptarmigan in museums in 1970. All were from north of Taos. Braun noted he had supportable observations of the southern-most factual records, as far south as the Santa Fe Baldy area in 1974. He does not agree with Bailey, and can find no data to suggest ptarmigan were once common from Wheeler to the Colorado line. He also notes it is doubtful a viable population of ptarmigan ever existed in the Pecos Wilderness Area, since it is not likely the species would have been eliminated through over-grazing, over-hunting (there would be specimens), or a combination of the two factors.

Braun (1979) also noted the white-tailed ptarmigan occupy essentially the same area in New Mexico at present as they did historically. They are found from Costilla Peak south to Latir Peak and the Wheeler Peak area. Birds occasionally seen south of Wheeler Peak are undoubtedly transients as no established populations are known to exist in the Jicarita Peak-Lake Peak area. There are no data to suggest viable populations (transients in winter only) have ever occurred

south of Wheeler Peak. Birds periodically seen near Chama are winter migrants from the southern San Juan Mountains in Colorado.

The following is Braun (1979) assessment of population potential in the Latir, Wheeler Peak and Pecos wilderness areas.

> Latir: Due to the lack of breeding and winter habitat, ptarmigan could exist in the Latir Peak area from June-October. The lack of breeding and winter habitat will result in the periodic extinction of this population. It will continue to be periodically restocked with emigrants from Costilla Peak (<10 miles north) and Wheeler Peak (10-12 miles south).
>
> Wheeler Peak: This alpine area could support 15-20 pairs of ptarmigan. It is unlikely that the total population was more than 50 breeding pairs. This population level could not be sustained on a long term basis considering the white-tail ptarmigan life cycle appears to be cyclic. Due to the area not containing large amounts of superlative breeding habitat, breeding densities will be low with almost no potential for substantial increases.
>
> Pecos Wilderness (both Carson and Santa Fe National Forests): The area from Jicarita Peak to Barbara Peak; from Serpent Lake to the Rincon Bonito and east to Santiago Lake appears capable of supporting at least 10 and probably 15 breeding pairs per square mile.
>
> It is unlikely that a viable ptarmigan population could be maintained south of Barbara Peak. At best in some years a few birds might exist south of this area if a population was established between Jicarita and Barbara Peaks.

In 1981, a reintroduction[18] of the white-tailed ptarmigan was made in the Pecos Wilderness. The New Mexico Department of Game and Fish (NMDGF), along with the Colorado Division of Wildlife and the Forest Service, transplanted 43 birds into unoccupied habitat in the Truchas Peak area. Further sightings of adults and young show the reintroduction appears to have been successful. In September 1984, Santa Fe National Forest conducted surveys and located 24 ptarmigan. Based on the limited number of banded birds and the age class structure, the surveys indicated vigorous recruitment since 1981 release (USDA 1984).

[18] Some documents call this release an “introduction” and some a “reintroduction.” In Hoffman (2006) it is directly stated this is a “new population.”

Table 1. Sighting of Ptarmigan on the Carson and Santa Fe National Forests Since 1985

Year	Location	Number of birds	Source
1985	Truchas Peak	10	Oldenettel 2007
	Rincon Bonito	5	
	Jicarita Peak	4	
1986	Santa Fe Baldy	1	Oldenettel 2007
	Rincon Bonito	12	Natural Heritage 2006
1987	Pecos Baldy	5 (1 female and 4 young)	Natural Heritage 2006
1990	Santa Fe Baldy	4	Oldenettel 2007
1993	Barbara Peak	nest site (1)	NMDGF 2001
			Oldenettel 2007
1996	Barbara Peak	4 subadults and pair w/3 young	Oldenettel 2007
1999	Pecos Baldy	1	Oldenettel 2007
	Wheeler Peak	6	
2000	Kachina Peak	5	Oldenettel 2007
	Jicarita Peak	6	
	Mt. Walter (near Wheeler	3	
2002	Latir Peak	5	Oldenettel 2007
	Wheeler Peak	11	
	Jicarita Peak	5 (pictures)	Gardiner 2002
	Truchas Peak	1	
	Jicarita Peak	2	
	Santa Fe baldy	feather	
2004	Jicarita Peak	1	Oldenettel 2007
	Jicarita Peak	3	
	Jicarita Peak	2	
2005	Barbara Peak	pair with chick	Oldenettel 2007
2006	Jicarita Peak	3 adults	Wolfe 2006
	Jicarite Peak	3 males and 1 female	Braun 2006
	Rio Santa Barbara	2 males	Braun 2006

While conducting the Rocky Mountain bighorn sheep study to determine population estimates in 1995, fresh ptarmigan sign was reported on top of East Pecos Baldy. During the Braun (2006) field visit, he observed old winter droppings and or white feathers. It was Braun's professional view the area would only support a low breeding density of birds, due to the large amount of unsuitable areas (little snow cover, little rock cover, few if any willows, and little relief) within the Pecos Wilderness. His conclusion was the white-tailed ptarmigan are established in the Pecos Wilderness Area from at least Jicarita Peak on the north to at least the high point above the Middle Fork of the Rio Santa Barbara.

Table 2. Bird Densities in Different Areas of the U.S. (Braun et al. 1993)

Area	Birds Per Km^2	Birds Per Hectare	Birds Per Acre
Colorado: Mt. Evans	2.0 - 10.3	0.02 - 0.103	0.008 - 0.042
Colorado: Rocky Mountain National Park	4.5 - 13.5	0.045 - 0.135	0.018 - 0.055
Montana	6.7	0.67	0.027
California	4.4 - 5.7	0.044 – 0.057	0.018 – 0.023
California	3.1 - 6.6	0.031- 0.066	0.013 - 0.027

Long-term studies (27 years) of hunted and unhunted populations in Colorado indicate populations fluctuate widely among years, with no clear evidence of population cycles (Braun et al. 1993, Hoffman 2006). Table 2 displays the variability of breeding densities across the western United States.

Several studies support the evidence of weather as a key influence in the demography of white-tailed ptarmigan populations. Although factors such as hunting, habitat degradation by large ungulates, and pollution may reduce breeding densities in some areas, it is argued these factors are not general phenomena that regulate populations (Hoffman 2006). In addition, the opportunity for large population increases is limited because, compared to other grouse species, white-tailed ptarmigan produce relatively few young, even in a good production year, and turnover in the breeding population is low (Hoffman 2006). The relatively high survival rate of white-tailed ptarmigan apparently buffers against potential effects of perturbations on reproductions. It should also be noted the distribution of white-tail ptarmigan is not continuous, nor are all seemingly suitable habitats occupied (Hoffman 2006).

While the actual number of ptarmigan on the Carson National Forest is uncertain (albeit low), the species is still present and the population trend appears to be stable across the Forest. This trend is based on Braun's conclusion that the Pecos Wilderness population is established and there have been sightings of ptarmigan in all three areas over the years. Although ptarmigan are on the forest in low numbers, it was never expected the Carson National Forest would achieve large breeding populations, because of the limited amount of suitable habitat in the area. This confirms what the Forest Plan predicts of ptarmigan populations over the course of plan implementation – "…"habitat will be maintained or improved to at least provide habitat for minimum viable populations" (USDA 1986c, p. 238).

As previously described, white-tailed ptarmigan habitat on the Carson National Forest is in poor condition, but with a stable trend. Domestic sheep grazing has been eliminated in ptarmigan habitat, eventually contributing to willow recovery and subsequently improving trend over time, as documented in Braun's observations in 2006 (Braun 2006).

Impacts bighorn sheep and elk have on *Salix* should be considered in the management of these big game species. A management strategy for improving and expanding willow habitat should be developed and include a comparison study of the willow areas in Colorado, where ptarmigan populations are healthy. Willow plantings in areas where recovery has been slow or negligible might also improve habitat conditions.

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