

Abert's Squirrel (*Sciurus aberti*)

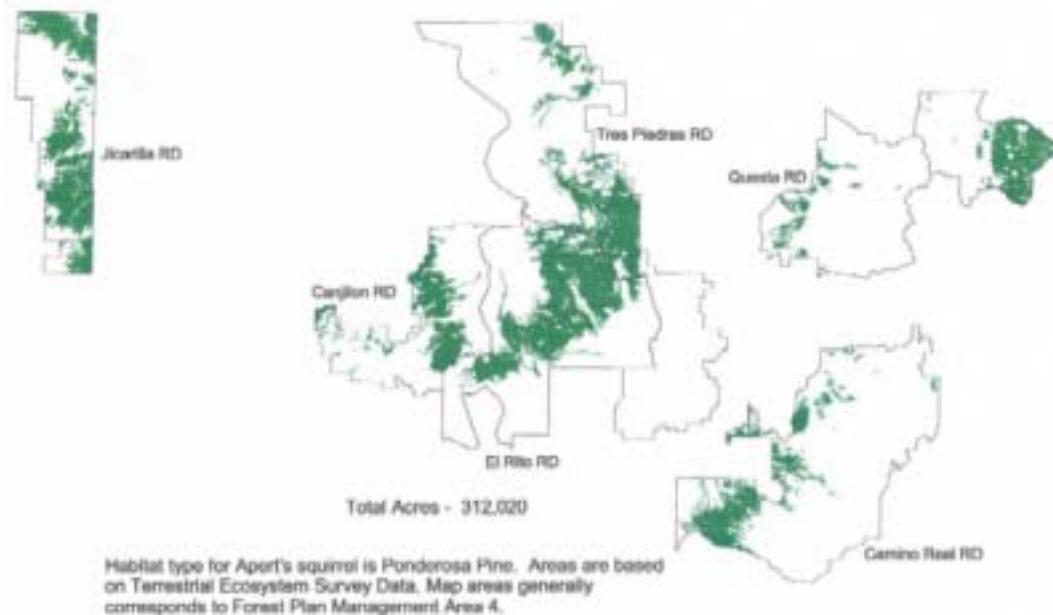
Indicator Species Habitat

Abert's squirrel (also referred to as the tassel-eared squirrel) principally utilizes the ponderosa pine (*Pinus ponderosa*) forest type. The species is an indicator for the presence of interlocking canopies in ponderosa pine (USDA 1986a, p.97). Abert's squirrel depends on ponderosa pine for basically all its life necessities and requires diversity of age classes and tree densities. Pine twigs, pine cones, pine seeds, pine bark, as well as truffles (underground mushrooms known to form mycorrhizal associations with ponderosa pine) are used by the Abert's squirrel (States 1985 and 1988). In addition to pure ponderosa pine stands, Abert's squirrels are also associated with Gambel oak (*Quercus gambelii*), true piñon (*Pinus edulis*), junipers (*Juniperus* spp.), quaking aspen (*Populus tremuloides*), and Douglas-fir (*Pseudotsuga menziesii*) (Keith 1965). Findley and others (1975) mention that Abert's squirrels are common in mixed conifer canyons in New Mexico.

Tree density, diameter and grouped distribution of trees are the most important components of Abert's squirrel nest cover. The right combinations of these factors provide squirrels with optimum conditions necessary for nest protection. The best cover conditions are found in uneven-aged ponderosa pine stands with trees spaced in small, even-aged groups within the stand. These pine stands have densities between 200 and 250 trees per acre. Average tree diameter for the stand is between 11 and 13 inches in diameter at breast height (DBH), but the presence of small groups of larger trees produces a mosaic of height groups (Patton 1975). The majority of the use occurs in mid- to late seral stages vegetation structural stage (VSS) classes III through VI. Dwarf mistletoe (*Arceuthobium vaginatum*) infestations that cause the formation of "witches brooms" are often incorporated into or support Abert's squirrel nests (Farentinos 1972).

Abert's squirrels are well distributed throughout the Southwest, but restricted to areas where ponderosa pine is the dominant tree (Patton 1975). A good sign of squirrel activity is the presence of clipped twigs on the forest floor under ponderosa pine trees. The number of clipped twigs found has been suggested as a good index of Abert's squirrel population density (Brown 1982).

On the Carson National Forest, this species occurs sporadically throughout the ponderosa pine habitat type. The species may be casual in the piñon/juniper woodlands, mixed conifer and even spruce-fir (not shown on map), but forest types other than ponderosa pine are not preferred habitat (Rasmussen 1941, Keith 1965, Patton and Green 1970, Patten 1975, Pederson et al. 1976, J. Hall 1981, Brown 1984, Pederson and Welch 1985, Hoffmeister 1986, Davis and Brown 1989). As displayed on a map of the Carson National Forest (next page), the potential habitat (312,000 acres) for the Abert's squirrel is well distributed across the Forest.



Map 1. Abert's Squirrel Potential Habitat Distribution on the Carson National Forest (USDA 1987)

Management Activities or Natural Events That May Affect Habitat

Negative: Primarily related to long term cumulative effects of forest succession after heavy logging, long term fire suppression and some overstory removal prescriptions and wildfire.

Positive: Thinning, prescribed fire and low intensity wildfire.

Plans, Regulations and Guidelines Supporting, Maintaining or Improving Habitat

- *Carson National Forest Land and Resource Management Plan, Forest-wide Prescriptions for Wildlife and Fish* (1986) are described,

By creating a diversity of stand conditions and providing juxtaposition of stands over time and space, suitable habitat components of Abert and Abert's squirrel squirrels will be maintained over time. During the intensive reconnaissance phase of integrated stand management, State and Federal biologists should identify those stands where squirrel activity is especially high and recommend deferment of cutting during the entry (USDA 1986c, p. Wildlife & Fish – 10).

The desired conditions for Management Areas 4, 5 and 7 are described as quality habitat for Abert's squirrel (USDA 1986c, p. 4. Pine <40% - 1, 5. MC/PP >40% - 1, 7. Unsuitable - 1).

- *Record of Decision for Amendment of Forest Plans* (1996) provides guidelines relative to the management of both Mexican spotted owl and northern goshawk habitat.

Standards for ecosystem management in northern goshawk habitat include:

Manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Sustain a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape. Provide foods and cover for goshawk prey (USDA 1996, p. 91).

- *Management Recommendations for the Northern Goshawk in the Southwestern United States* (Reynolds et al. 1992) describe the Abert's squirrel as an important prey species for the goshawk and habitat management recommendations include:
 - Ponderosa pine specialist
 - o VSS 3, VSS 4, VSS 5, and VSS 6
 - Nesting
 - o VSS 4, VSS 5, and VSS 6
 - o Groups of trees with interlocking crowns are very important
 - Foraging (considered a food specialist)
 - o VSS 3, VSS 4, VSS 5, and VSS 6
 - o Large-diameter trees important for cone production
 - o Areas of shaded overstory (>60%) necessary for fungi production
 - Other important habitat attributes
 - o Snags may sometimes be used for nest trees (Vahle pers. comm.)
 - o Downed logs and woody debris are important for food substrate and cover
 - o Large openings are detrimental because they force squirrels, moving from tree to tree, to travel longer distances on the ground. Retention of trees with interlocking crowns may serve as travel ways and escape corridors (Reynolds et. al 1992).

Habitat Condition And Trend On The Carson National Forest

There are two levels that need to be considered when looking at the ponderosa pine habitats across the Forest. First is the overall ponderosa pine habitat. This is important to help place the subset of interlocking canopies identified in the Forest Plan EIS in perspective. Although there are 301,297 total acres of ponderosa (based on current stand data cover types), the Forest Plan EIS identifies a subset of 53,220 acres of occupied Abert's squirrel habitat in the ponderosa pine. In 1986, when the Forest Plan was adopted, the key feature used to identify quality habitat was "interlocking canopies" (USDA 1986a, p. 97). Since that time, stands have grown, some have been harvested or burned, and data to estimate conditions has improved. Although there is important data forest-wide, the subset of interlocking canopies is the primary feature by which habitat trend for Abert's squirrel is tracked.

Several factors are used to determine habitat trend. Management activities (primarily timber sales) and wildfire have reduced certain habitats to unsuitable conditions. High intensity wildfire and certain harvest prescriptions such as overstory removal, seed cuts and shelterwood harvests are examples of areas that are deducted from the total acres of interlocking canopies. Total stand acres are not deducted. Only the actual acres treated that are estimated to result in acres becoming unsuitable are subtracted. Appendix A explains in more detail how habitat trend is determined.

Suitable stands (1,958 ac) that had experienced high intensity fire were removed from squirrel habitat. In addition, suitable habitat lost to timber harvest (2,603 ac) was deducted. Also taken into account is forest succession, where ponderosa pine stands have progressed towards more quality habitat since 1986. An estimate of stands moving to suitability from forest succession is five percent of the overall ponderosa pine on the Forest (MIS Habitat Trend Analysis).

Table 1. Abert's Squirrel Suitable Habitat Acres: Change from Wildfire, Logging, and Tree Growth 1986-2002

Ranger District	Total PP Acres	Estimated Acres of Habitat in 2002	Habitat Acres Reduced by Wildfire	Habitat Acres Reduced by Logging	Total Acres Reduced	Total Acres of Ingrowth (+ 5%)	Remaining Acres of Abert's Squirrel Habitat
D1, D2, D6 ¹	176,966	35,476	371	2,410	2,781	1,774	34,469
D3	33,905	6,729	22	0	22	336	7,043
D4	50,005	17,338	110	194	304	867	17,901
D7	40,421	5,001	1,474	0	1,474	250	3,777
Total	301,297	64,544	1,977	2,604	4,581	3,227	63,190

The habitat trend for Abert's squirrel from 1986 to 2002 is estimated to have increased from 53,220 to 63,190 acres of interlocking canopies or an upward trend of almost 20 percent.

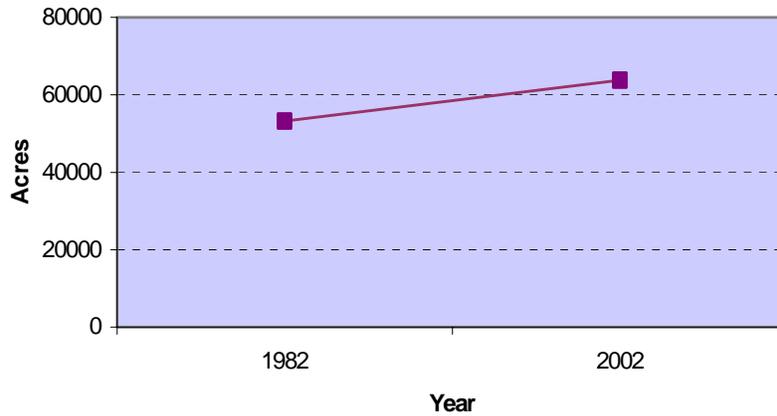


Figure 1. Changes in Abert's Squirrel Suitable Habitat on the Carson National Forest from 1986 to 2002.

Forest Management Activities

Management for quality Abert's squirrel habitat is management for large diameter, cone-producing ponderosa pines (Flyger et al. 1982, Patton 1975). Optimum habitat for Abert's squirrels consists of stands of large ponderosa pine at densities greater than 200 trees per acre (Patton 1984). Patton (1984) finds that timber harvest in ponderosa pine stands is not incompatible with Abert's squirrel habitat management, however management goals should include maintenance of small, uneven-aged groups of large trees.

The recommended harvest type is group selection, with retention of ponderosa pine 15 to 20 inches DBH in groups suitable for nesting (Clary 1987, Ffolliott et al. 1978, Patton 1975,

¹ D1 = Canjilon, D2 = El Rito, D3 = Jicarilla, D4 = Camino Real, D6 = Tres Piedras, D7 = Questa

Pederson et al. 1976). Pederson and others (1976) also recommended the following: established Abert's squirrel nesting and feeding sites should be avoided, harvesting should occur in late summer to early fall (after juveniles have left nests), logging units should be broken into small blocks and worked checkerboard fashion (to minimize direct disturbance of squirrels), and slash should not be piled and burned.

Indiscriminate logging can degrade Abert's squirrel habitat. Lower numbers of Abert's squirrels and lower recruitment rates occur in areas where large pines are harvested than in unharvested areas. In Utah Abert's squirrels fed less in logged ponderosa pine plots than in control plots. Abert's squirrels moved away from logged areas to unharvested stands. Plots had been logged with either a 10-inch or 12-inch minimum diameter cut (Pederson et al. 1976). Abert's squirrels consumed more hypogeous fungi in uncut stands than in logged stands. Fewer fungi were produced in logged stands, probably because crown reduction increased drying out of litter and decreased the amount of litter (Pederson et al. 1987).

Ponderosa pine is dependent on frequent, low-severity fire for maintenance and reproduction. Such fires also benefit Abert's squirrels since they are dependent on ponderosa pine. The immediate effect of low-severity fire in ponderosa pine on Abert's squirrels is probably negligible. Prescribed fire in ponderosa pine can be used to reduce woody understories and encourage ponderosa pine reproduction, growth and productivity (Flyger 1982).

The Carson Forest Plan estimates approximately 222,000 acres of ponderosa pine forest type that provides "potential" habitat for Abert's squirrel. It should be noted that a number of acres of this cover type are contained in "Management Areas" not specifically identified by habitat types. These include recreation areas, wilderness, semi-primitive etc., thus the total ponderosa pine acres are not fully represented. The Terrestrial Ecosystem (TE) survey data (USDA 1987) used to produce the potential habitat distribution map indicates the Carson National Forest has 312,020 acres of ponderosa pine. This data does however include transitional forest types and may best be represented as potential natural vegetation. The most accurate acres based on the vegetation coverage (recently completed) show that there are 301,297 acres of total ponderosa pine across the Forest. These cumulative acres are generally referred to as "potential habitat" for the species.

Large ponderosa pines with interlocking canopies are a structural component not as prevalent as desired across the forest. The present dominance of mid-seral conditions in ponderosa pine relate primarily to cumulative effects of historic heavy harvesting, such as the railroad logging early in the 20th century and fire suppression. Historic overstory removal prescriptions also contributed to the trend towards smaller diameter stands. The long-term trend (pre-forest plan) across the Carson was away from the larger structure stands and towards denser and smaller diameter stands. Some areas of ponderosa pine have also been lost or shifted towards mixed species by the invasion of white fir. **As a result, the current habitat condition for this species is poor to fair, but in a slight upward trend.**

Recent changes in management practices on the Forest places more emphasis on thinning and prescribed burning, which will increase desired habitat. Thinning to create clumpy conditions and reduce competition can replace larger trees faster. Prescribed fire controls dense reproduction. Maintenance of clustered stands is essential in providing the canopy cover needed for truffle production, as well as cover and nesting sites. Reduction of stand heterogeneity and removal of big trees in large disjunctive blocks would likely have a negative effect on this squirrel's habitat. In some areas there has been little or no activity in this habitat type during the life of the Forest Plan. For example, the Jicarilla Ranger District has not harvested commercial sawtimber since the 1970's, and incidental personal use in the ponderosa type is very limited.

The figure below shows that between 1986 (when the Carson Forest Plan was implemented) and 2000, approximately seven percent of the potential Abert's squirrel habitat has been actively managed for timber production.

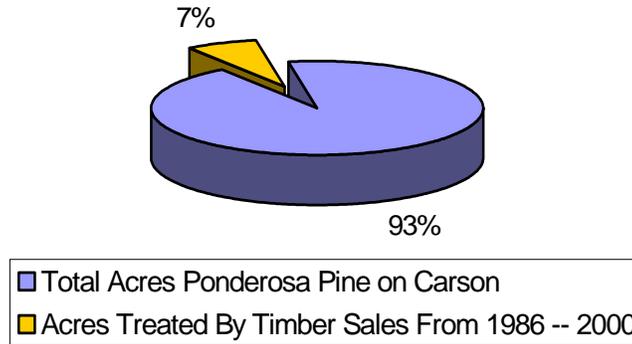


Figure 2. Proportion of Ponderosa Pine Treated in Timber Sales on the Carson National Forest From 1986 to 2000 (RMRIS DB, Activity Records)

Unless 20 percent of the ecosystem management area has been allocated to old growth, Carson Forest Plan direction restricts harvesting large trees in the ponderosa pine in a manner that would take a stand out of meeting old growth criteria (USDA 1996). More recent management has tended to focus on thinning from below, rather than timber activity primarily used during the early years of the Forest Plan. Management practices of thinning from below and group selections across the Forest enhances Abert's squirrel habitat that in turn should assure its survival (Patton 1984).

The graph below shows that of the seven percent potential Abert's squirrel habitat that has been treated through timber sales since 1986, 65 percent of the habitat has shifted from late² to early seral conditions.

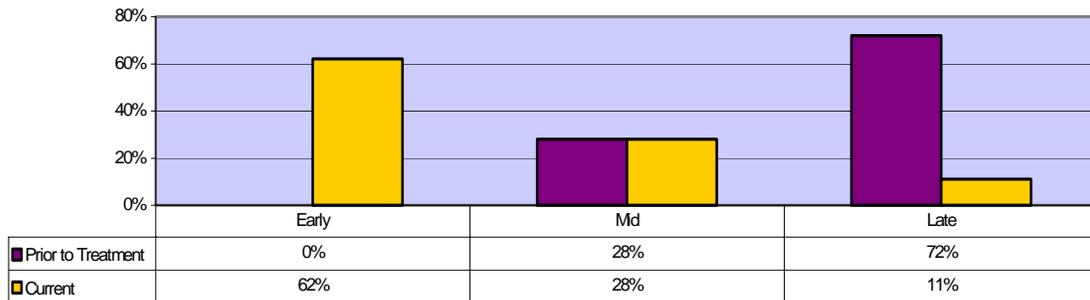


Figure 3. Changes in Forested Seral Conditions in Timber Sale Areas on the Carson National Forest from 1986 to 2000.

Although timber harvest areas have shifted seral stages from late³ to early, it is on a limited percentage of the total habitat area and the rest of the treated areas are still in mid to late seral conditions.

² Late seral stage includes mature stands that are not old growth.

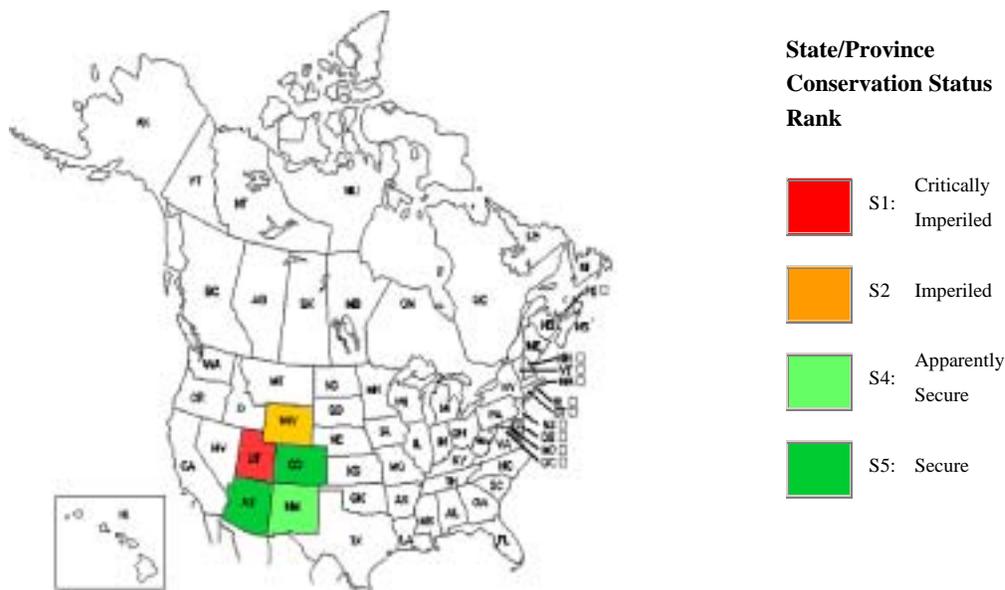
³ Late seral stage includes stands that are not old growth.

In addition, there are over 254,000 acres of wilderness areas (Wilderness Act 1964), wild and scenic river areas (Wild and Scenic Rivers Act 1968), roadless areas (USDA 1986c, 20. Semi-primitive-2), slopes > 40 percent (USDA 1986c, 5. MC/PP >40% - 2 and Timber - 12) and special management areas (USDA 1986c, 19. Special Areas - 2) on the Carson National Forest that have management direction through the Forest Plan or federal laws that exclude harvesting.

Population Trend And Viability

Information from the Bison-M database indicates that this species is fairly common throughout New Mexico and Arizona (NMDGF 2001). Findley (1975) also describes Abert's squirrel to be widely distributed throughout its range.

The NatureServe database (www.natureserve.org/explorer) documents that throughout its range, Abert's squirrel is listed as "G5", (i.e., globally secure and common, widespread and abundant). 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 Abert's squirrel is listed as "N5" (i.e., secure and common, widespread and abundant). In New Mexico, the Abert's squirrel is listed as "S4" (i.e., apparently secure - uncommon but not rare, and usually widespread in the nation or state/province). An "S4" ranking can imply possible cause of long-term concern.



Map 2. Distribution of Abert's Squirrel in North America (NatureServe Explorer 2002)

Surveys specific to Abert's squirrel on the Carson National Forest have not been conducted. However, based on the frequency and level of Abert's squirrel activity observed by biologists and other field personnel, the species is fairly common across its range. Several years ago on the Jicarilla Ranger District, the Abert's squirrel was determined to be plentiful enough for the NM Department of Game and Fish to expand hunting of the species in the area. With 91 percent of the squirrel's habitat on the Forest being not being impacted by management activities, changes to habitat conditions are not likely to have an effect on population viability.

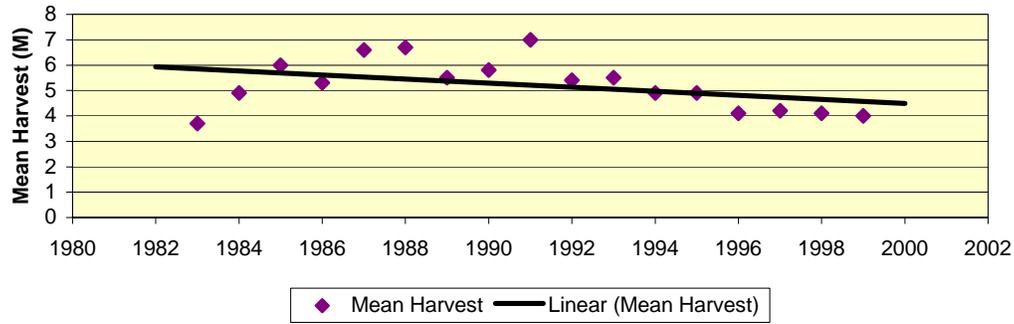


Figure 4. Mean Harvest Abert's Squirrel for New Mexico (NMDGF 2001)

State wide harvest data indicates a slight decrease in mean harvest from 1983 to 1999 (NMGF 2001). Population trends, however, are not necessarily directly correlated with harvest data. It is possible that the popularity of squirrel hunting is declining slightly. However, it is just as likely that some degree of correlation can be made. When populations are increasing, the popularity of the squirrel hunting is likely to be more appealing.

Available evidence suggests that populations of Abert's squirrels fluctuate both in the short- and long-term (Pearson 1950, Keith 1965, Farentinos 1972, Hall 1981), but there is in no danger of extinction (UM 1997). Factors causing these fluctuations are not clear. A good and widespread mast crop brings an abundance of squirrels, whereas a year or so of scanty pine cone production results in a scarcity of these animals (Hoffmeister 1986). Population numbers of *S. aberti* appear to fluctuate widely over time and space. Population cycles may be related to cyclic variation in the biomass of the pine seed crops. Eight subspecies of *S. aberti* are listed in CITES-Appendix III (Hall and Kelson 1959).

Estimates of squirrel home range size vary as well. In Utah, Pederson et al. (1976) radio-tracked squirrels during the summer on home ranges before and after timber harvests. Seven home ranges in this study averaged 6.2 acres before harvest, and three of these home ranges averaged 32.0 acres after harvest, indicating that timber harvesting can have an effect on squirrel density. Optimum densities are 50 to 100 per 100 acres (Patton 1977).⁴ On the Carson, the species ranges from fairly uncommon to common throughout the pine type, but by no means approaches these numbers. This is likely to be linked to large areas of mid-seral habitat conditions as opposed to mature stands of ponderosa coupled with less favorable (more extreme) weather conditions. Surveys specific to Abert's squirrel population densities have not been conducted on the Carson National Forest, and are not known to have occurred elsewhere in New Mexico (Schmidt NMGF per. conv.).

The Abert's squirrel population on the Carson National Forest is considered to be stable, but likely lower than potential. Abert's squirrel habitat on the Forest is in poor to fair condition with an upward trend. Taking into account the condition and trend of the squirrel's habitat on the Forest, existing data and field observations, the Carson National Forest is sustaining viable populations of Abert's squirrel. Continued implementation of prescribed burning and thinning should continue to improve the squirrel's habitat.

⁴ Note: This is for excellent habitat in Arizona.

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